Final

F.E. Warren AFB
Wyoming

Environmental Impact Statement

Peacekeeper Missile System Deactivation and Dismantlement

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COVER SHEET
FINAL ENVIRONMENTAL IMPACT STATEMENT
PEACEKEEPER MISSILE SYSTEM DEACTIVATION AND DISMANTLEMENT
F.E. Warren AFB, Wyoming

a: Lead Agency: U.S. Air Force Space Command (AFSPC)

b: Cooperating Agencies: U.S. Army Corps of Engineers

c. Proposed Action: Deactivation and Dismantlement of the Peacekeeper Missile System at F.E. Warren AFB, Wyoming

d. Affected Jurisdictions: F.E. Warren AFB, Wyoming; Laramie County, Wyoming; Platte County, Wyoming; and Goshen County, Wyoming

e. Inquiries on this document may be directed to: Mr. Jonathan D. Farthing, Chief, Environmental Analysis Division, HQ AFCEE/ECA, 3207 North Road, Brooks AFB, TX 78235-5363, telephone 210-536-3069

f. Designation: Final Environmental Impact Statement (FEIS)

g. Abstract: This EIS was prepared in accordance with the National Environmental Policy Act (NEPA) to analyze the potential environmental consequences of the Proposed Action, two Implementation Alternatives, and the No Action Alternative. The Proposed Action is deactivation and dismantlement of the Peacekeeper missile system to comply with the Strategic Arms Reduction Treaty II, as modified by the Helsinki Agreement of 1997. The Implementation Alternatives involve two other options in the dismantlement process of the Proposed Action: Removal of the Hardened Intersite Cable System; and Mechanical Demolition of the Headworks. The No Action Alternative is to continue operation of the Peacekeeper missile system.

   This EIS addresses the potential environmental impacts that could result from activities that would occur under the Proposed Action, two Implementation Alternatives, and the No Action Alternative. Environmental resources evaluated include the local community (socioeconomics, environmental justice, transportation, and land use), hazardous materials and waste management (health and safety, hazardous materials, hazardous wastes, above ground and underground storage tanks, solid waste, and wastewater), and the natural environment (geological resources, water resources, air resources, noise, biological resources, and cultural resources). The potential cumulative effects of each of these resources were also evaluated.

h. Comments: Those agencies, individuals, and groups who desired to provide written comments were invited to submit them to the U.S. Air Force Space Command (Item e). Verbal and written comments could also be provided at Public Hearings, which were held during the public comment period. Times and dates of the Public Hearings were published in local newspapers. Public hearings were held starting at 6:30 p.m. in Cheyenne (July 31), Wheatland (August 1), and Torrington (August 2) for the Air Force to present the findings of the DEIS and invite public comments.

EXECUTIVE SUMMARY

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The United States Air Force proposes to deactivate and dismantle up to 50 Peacekeeper Intercontinental Ballistic Missile (ICBM) Launch Facilities (LF) and 5 Missile Alert Facilities (MAF) located within the deployment area north and east of Francis E. Warren Air Force Base (AFB), Wyoming. The need for deactivation and dismantlement of the Peacekeeper missile system is to comply with the Strategic Arms Reduction Treaty (START) II, as modified by the Helsinki Agreement of September 1997. The Treaty ratification process is ongoing; the need to implement the Proposed Action would depend upon final ratification of the Treaty. To meet START limitations on warheads and launchers, the Department of Defense (DoD) has been demolishing particular ICBM systems and plans to demolish the facilities within the F.E. Warren AFB Peacekeeper deployment area. This environmental impact statement (EIS), prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA, and Air Force Instruction 32-7061, evaluates the potential environmental impacts of the proposed deactivation and dismantlement of the Peacekeeper missile system.

The deactivation process is scheduled to occur in four phases. Phase 1 is the removal of the missiles. Phase 2 is the removal of salvageable items from the LFs and MAFs and placing the LFs and MAFs in caretaker status. Phases 1 and 2 would be performed primarily by Air Force personnel with contractor support as needed. Phase 3 is a contractor operation involving the closure of MAF sewage disposal facilities, removal and/or closure in place of USTs, and the deactivation/dismantlement of certain portions of the LFs and MAFs. Phase 4 involves the disposal of property.

The Peacekeeper missile system includes 50 LFs (with one missile per LF) and 5 MAFs (with one MAF per missile flight of 10 LFs). The 400th Missile Squadron (400 MS) includes 5 flights, each composed of 10 LFs and 1 MAF. Under the Proposed Action, deactivation would occur at an average rate of one every three weeks and dismantlement is planned to occur over a 27-month period, with activities occurring throughout the year, as weather permits.

A number of facilities on F.E. Warren AFB support the 90th Space Wing (90 SW) mission. While the final disposition of these training and maintenance facilities has not yet been determined by the Air Force, most Peacekeeper missile facilities could be reused by the Minuteman (MM) III missile program. Consequently, potential on-base environmental impacts were assessed in a general manner.

PROPOSED ACTION

The Proposed Action involves activities at LFs and MAFs within the deployment area as well as F.E. Warren AFB.

LF Activities

An LF consists of a launcher and an associated launch facility support building (LFSB). All facilities are enclosed within a security fence. The sites average about 1.6 acres in size.

Phase 1 of deactivation is the removal of the missiles, including the reentry system (RS), missile guidance control system (MGCS), and rocket engines. Approximately one week is required to remove the missile components and transport them to the missile support base (MSB), or transfer and assemble missile components from the MSB to the deployment area. The RS and MGCS are first removed from the LF, then successive missile stages are removed ending with Stage I. Under the Proposed Action, one missile would be removed approximately every three weeks.

Phase 2 of the deactivation process involves the removal of salvageable items from the LFs. Ordnance would be removed and transported to the munitions area on F.E. Warren AFB. Classified and save list items would be recovered from the LFs. Air Force personnel would drain fluids from the fueling, coolant, and hydraulic systems (with exceptions for certain environmental control systems), remove electrical filters and switches, and remove the power supply batteries. Air Force security teams would perform periodic security checks of each location during site deactivation. Following deactivation activities, the gates would be secured and the sites would be placed in caretaker status. During the Proposed Action, an LF would be deactivated at an average rate of one every three weeks.

Phase 3 (dismantlement) includes demolishing the headworks of each LF silo and destroying the LFSB. Prior to demolition, various hazardous materials (such as residual fluids and filters, capacitors, and ballasts with polychlorinated biphenyls (PCB)) would be removed from the facilities. With the exception of one 4,000-gallon underground storage tank (UST) at Q-8, each Peacekeeper LF has a shallow-buried, 14,500-gallon UST for storing diesel fuel to power a back-up generator. The shallow-buried USTs (less than five feet from the ground surface) would all be removed in accordance with state and Federal regulations and disposed of off-site at approved facilities. Each LFSB contains a 315-gallon above ground storage tank, and a 60-gallon above ground lube oil tank.

The dismantlement technique would include explosive demolition of the headworks to the depth of the launcher equipment room (LER) floor (approximately 21 feet). This depth complies with START protocols that require explosive demolition to at least six meters (19.5 feet) or mechanical demolition to at least eight meters (26.0 feet). For explosive demolition, everything above the floor of the LER, including the launcher closure door, would be removed for salvage or become rubble. Concentric holes would be drilled vertically in the concrete of the headworks for emplacement of explosives.

To limit environmental impacts, the Air Force has produced specifications for explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The dismantlement contractor would be required to use the minimum amount of explosives necessary to implode the concrete and steel into the launch tube. The demolition of each LF would be designed to preclude the ejection of large pieces of debris outward from the launch tube. The Air Force estimates that the amount of rubble produced from destroying the upper 26 feet of the headworks would be sufficient to fill the launch tube to the elevation of the former floor of the LER.

The next sub-phase of the process would be an observation/verification period. A 90-day period would follow the demolition of the headworks. A contractor would place a steel-reinforced, 2-foot thick, 14-foot diameter, concrete cap over the launch tube, at a depth of

approximately 28 feet. A plastic liner would be placed above the cap to limit infiltration of precipitation into the tube. Verification would likely be conducted by satellite observation, but onsite visits by representatives of the Commonwealth of Independent States would also be possible. After the observation period, the remaining excavations would be filled with rubble and gravel, backfilled, compacted, and contoured to leave a slightly mounded gravel surface to meld with existing gravel contours.

The cathodic protection system control would be removed during dismantlement. The Hardened Intersite Cable System (HICS), which connects the LF to the MAF, has marker posts that define the path of the cable. The HICS would be abandoned in place, and the marker posts could be removed after the HICS easements have been relinquished. Power companies own the transformer pole and service connections to the LF; removal of the poles is their responsibility. Azimuth markers would be removed only at a landowner's request. The azimuth markers would be buried in place unless the landowner requested removal; the Air Force would then excavate and remove the markers for burial as launch tube fill. The security fence would remain in place throughout dismantlement.

Phase 4 is the disposal of property. The Air Force has no plans to retain any of the dismantled LF sites. After all START requirements have been met, the General Services Administration would dispose of the real property during Phase 4. The disposal process is covered in Public Law 100-180, Section 2325 (10 United States Code (USC) § 9781). First priority of consideration is to adjacent landowners, who would be offered the property at fair market value.

MAF Activities

A MAF is located within a fenced area averaging about 5.5 acres. All MAFs are enclosed by a security fence, except for a buried antenna consisting of two intersecting rings (each about four feet in diameter) buried four feet below surface, a dual-celled sewage lagoon, and a helicopter pad. Because Phase 1 only applies to LFs, the deactivation at the MAFs would start with Phase 2.

Phase 2 of the deactivation process involves the removal of salvageable items from the MAFs. All five Peacekeeper MAFs would remain operational until the last missile in the 400 MS is removed, then deactivation would proceed with a MAF being active until all LFs in its flight have been deactivated. Classified items would be recovered from the launch control center (LCC) at each MAF, and office and living quarter items would be recovered.

Air Force personnel would drain fluids from the fueling, coolant, and hydraulic systems (with exceptions for certain environmental control systems), remove electrical filters and switches, and remove the power supply batteries. The only asbestos believed to remain is in insulation on some pipes behind false ceilings of the launch control support building (LCSB) and in the garage furnace room on two walls. Reusable equipment would be placed in the supply system for use by F.E. Warren AFB and other bases. Air Force security teams would perform periodic security checks of each location during site deactivation. Following deactivation activities, the gates would be secured and the sites would be placed in caretaker status.

Phase 3 of the deactivation process is dismantlement of the MAFs. The Phase 3 activities would include removing any remaining hazardous materials from the facilities, and retrieving salvageable materials, such as scrap metal. Each MAF contains several storage tanks. There are five tanks used to contain diesel fuel: a 14,500 gallon UST (buried approximately 45 feet deep), two 1,000-gallon above ground storage tanks (AST), a 100-gallon AST, and a 2,500-gallon UST. One 2,000-gallon motor gasoline AST is located at each MAF and there is also a 65-gallon AST containing lube oil. The ASTs would be removed and the USTs would be closed (removed or filled with inert material) in accordance with state and federal regulations. The shallow-buried USTs (less than five feet from the ground surface) that contain fuel would all be removed and disposed of off-site at approved facilities. Each MAF has a shallow-buried tank used to store up to 1,000 gallons of water; these tanks would be abandoned in place for potential reuse. The cathodic protection system control would be removed during dismantlement. The sewage lagoons at the MAFs would be sampled and closed in accordance with federal and state regulations. There is one water well at each MAF (with the exception of S-1 which has two water wells); well closures would be in accordance with state requirements or left in place based on requests from landowners.

The MAF waste disposal system removes and disposes of all sewage from the LCSB, launch control equipment building (LCEB), and the LCC. Wastewater is discharged to the sewage lagoon by gravity flow drain lines and pumps. The sewage lagoon is located outside the security fence. Solids in the lagoon are oxidized by bacterial action into an inert sludge, and sewage water is lost through evaporation. The lagoon contents, both liquids and sludge, would be sampled prior to dismantlement. The liquids would be properly handled, which may include discharging sufficiently clean wastewater to surface waters, based on test results. Sludge disposal would also be dependent on test results. The dismantlement contractor would drain the lagoons, level and grade the lagoons and berms for proper drainage, and stabilize and seed the site with grasses; all of these actions would be done in accordance with Wyoming regulations.

The MAF buildings would not be demolished, but would be left as a part of the real property. The LCC interior and walls of the LCSB were painted with lead-based paint. USTs and sub-surface concrete and steel at MAFs likely have a coating that contains PCBs. These coatings would be handled in accordance with federal and state requirements.

Phase 4 is the property disposal of the LF and MAF sites. The government owns the parcels upon which the LFs and MAFs are located, and holds a variety of easements near the LF and MAF sites that support the Peacekeeper missile system. The Air Force has no plans to retain any of the dismantled sites. After all START requirements have been met, and upon determination by the Secretary of the Air Force, the General Services Administration would dispose of the real property during Phase 4, and the easements would be terminated. The disposal process is covered in Public Law 100-180, Section 2325 (10 *United States Code* (USC) § 9781). The first priority of consideration is to adjacent landowner(s), who would be offered the property at fair market value.

ALTERNATIVES

Two Implementation Alternatives (Mechanical Demolition of the Headworks and Removal of the HICS) and the No Action Alternative are considered in this EIS. Although the No Action Alternative is the environmentally preferable alternative regarding short-term environmental impacts, the Proposed Action is the preferred alternative for minimizing long-term impacts.

Under the Mechanical Demolition of the Headworks Implementation Alternative, the amount of excavation would be greater than the Proposed Action because of START II requirements. The deeper excavation could pose a storage problem given the limited space on the missile sites, and the stockpiled excavation materials would also be subject to wind and water erosion. This alternative would also be more costly and time-consuming, with possible delays in meeting the dismantlement schedule.

The second Implementation Alternative is Removal of the HICS. The removal of approximately 570 miles of cable would require digging a trench of several feet in width and up to seven feet in depth, and refilling the trench. The removal operations would disrupt grazing and other agricultural operations during the cable removal activities. Removal of the cable beneath water bodies and beneath roads would cause significant impacts. This alternative would also result in wind and water erosion of soil, with adverse impacts to nearby water bodies (such as wetlands), and could disturb wildlife, especially in sensitive habitat areas or during nesting or migration periods.

IMPACTS OF THE PROPOSED ACTION, IMPLEMENTATION ALTERNATIVE, AND NO ACTION ALTERNATIVE

The following text summarizes impacts that will likely occur from proceeding with deactivation and dismantlement, with mitigation measures provided subsequent to the impact summary. Impacts can be adverse (negative) or beneficial. The intensity of an adverse impact can be *significant* or not *significant*. Beneficial impacts are not characterized as to their level of significance. Impacts are typically *adverse*, but *beneficial* effects can result if the action measurably improves the current condition. *No impact* is specified in cases in which a resource would not be affected because certain resource elements (e.g., oil and gas wells, floodplains, or low-income or minority populations) are not present in the area of the Proposed Action or an Implementation Alternative. No impact could also occur under the No Action Alternative if there were no changes to the existing environment. Where applicable, impacts are also defined as permanent or long-lasting (long-term) or temporary and of short duration (short-term). For this project, short-term impacts are defined as those lasting approximately three years (the estimated timeframe for completing the project), while long-term impacts would last more than three years (beyond the construction and demolition activities). Some impacts may be significant in the short-term but not significant over a longer duration; the difference in impact intensity is noted where applicable.

Mission and Operations

Regardless of whether dismantlement of the Peacekeeper missile system occurs, the 90 SW would remain the host unit at F.E. Warren AFB. The 37th Helicopter Flight would remain the only flying mission on base. Under the Proposed Action, helicopter flights to the Peacekeeper deployment area would no longer occur. Helicopter operations to the MM III missile sites, training, local support for search and rescue operations, and emergency flights to major hospitals in Colorado would not be affected by the Proposed Action. The base would retain the same number of helicopters, although the total number of operations would be slightly reduced. Military flights at the Cheyenne Municipal Airport would also not be affected by the Proposed Action.

Under the No Action Alternative, the mission and operations of the 90 SW would remain the same. Helicopter operations to support the Peacekeeper deployment area would also remain the same. The Implementation Alternatives would result in similar impacts as under the Proposed Action.

Socioeconomics

Under the Proposed Action, there would be no significant impacts to population. Personnel reductions would not cause significant impacts to employment, while workforce requirements and construction expenditures for the deactivation would result in small short-term benefits to local employment and income. There would be a beneficial impact to landowners and county governments from the disposal of the MAF and LF sites. Impacts to housing, education, utilities, and rural electric cooperative members would not be significant. There would be no change to socioeconomic resources under the No Action Alternative.

Under the Implementation Alternatives, impacts to socioeconomic resources would be similar to those under the Proposed Action. Both Implementation Alternatives, mechanical demolition and cable removal, may result in slightly greater short-term beneficial impacts to employment than would the Proposed Action, but the cable removal could have adverse, but not significant, short-term impacts to the affected landowners due to the potential disruption of agricultural activities. There would be no long-term impacts.

Environmental Justice

Under the Proposed Action or Implementation Alternatives, no environmental justice impacts have been identified, as there are no minority or low-income populations located near the dismantlement activities. There would be no impact under the No Action Alternative.

Transportation

Under the Proposed Action, contractor personnel and equipment traveling to LFs and MAFs during the dismantlement process would not generate a significant increase in traffic on the road network in the deployment area over a 2½-year period. No change in the level of service (LOS) on area roads or the frequency of accidents are projected to occur during the short- or long-term. Construction traffic on deployment area roads during wet

conditions could cause short-term significant impacts to the integrity of gravel roads. No significant impacts to road conditions and traffic would result from ceasing Federal funding for extra maintenance and snowplowing.

The No Action Alternative would not result in a noticeable change from the present LOS. If mechanical demolition of the headworks occurred, more construction equipment would be needed (but the LOS is not predicted to change) and stress on area roads would be greater than under the Proposed Action. If the HICS were removed, additional vehicles would travel on area roads and could involve the temporary excavation of roads where the HICS passes under the road. Detours of traffic would be required for a longer period of time than under the Proposed Action resulting in a short-term significant impact on travel time and the LOS of area roads.

Land Use

Long-term land use impacts caused by the Proposed Action are not expected to be significant; a small increase in arable land would occur. There would be no significant adverse short-term impacts to land use in the immediate vicinity of the LFs and MAFs. Construction site activities would occur within the boundary of the sites, with the exception of certain activities performed at a landowner's request (e.g., removal of azimuth markers). After completion of dismantlement activities, the Air Force plans to dispose of the property. Reuse of the land is subject to Federal regulations.

Under the No Action Alternative, no short-term impacts would occur because current land use would not be affected. Long-term impacts would involve continuance of the current land uses, with the missile sites being retained by DoD. If mechanical demolition was implemented for dismantlement, adverse short-term land use impacts could occur from the construction activities. However, the long-term land use impacts would be the same as if explosive demolition occurred. Removal of the HICS would significantly affect land use in the short-term because of the short growing season and the disturbance of miles of ground to excavate the cable system. Long-term impacts of cable removal on land use would not be significant.

Hazardous Materials and Waste Management

Various hazardous materials and wastes are found at the LFs and MAFs. Although many hazardous materials would be removed during deactivation, small amounts of hazardous substances would remain during the dismantlement. Some wastes and hazardous materials (such as PCB coatings) would remain as part of the site, if they do not present a future hazard to human health or the environment, and if the action is approved by the appropriate state or Federal agency. The Air Force believes it is in the best interest of the environment to leave the PCB coatings and some other materials in place due to the disturbance required to remove the materials and transport them to a disposal facility. For disposal of the property, a disclosure statement would be issued noting the potential for coatings (such as PCBs) on buried USTs, piping, and concrete.

No significant short-term or long-term risks to the environment, or to human health and safety, have been identified from the proposed dismantlement of the Peacekeeper systems

and the management of hazardous materials or wastes. The safety of workers and the public would not be jeopardized, as dismantlement operations would be managed in accordance with standard Air Force and industry practices. No unique or unusual hazards would be associated with the dismantlement. Hazardous materials and wastes could be safely removed, and the potential for pre-existing contamination (for example, from past spills) would be minimal. Long-term hazardous material usage and hazardous waste generation would decrease at F.E. Warren AFB after dismantlement of the Peacekeeper missile system. Sampling would be conducted during deactivation and dismantlement to ensure that the sites do not have contamination above levels of concern.

There would be no significant adverse impacts from hazardous materials or hazardous waste under the No Action Alternative. The Implementation Alternatives would have varying impacts. The mechanical demolition option would increase the amount of heavy construction activities and the associated safety risks. Removal of the HICS would increase the potential for spills of hazardous materials and increase the potential for accidents, since additional time and work would be required for the removal.

Geological Resources

The Proposed Action would affect geological resources. Explosive demolition would cause ground acceleration, but damage to nearby structures would be unlikely given the specified limits on peak particle velocity. Based on their distance from the LFs, no oil and gas wells would be affected. Impacts on topography, mineral resources, and soils would not be significant. Soil used for fill material must be of acceptable quality, with engineering characteristics of minimal shrink and swell potential and adequate compaction capability, so that the compaction of the soil would minimize the potential for future subsidence. Excavation to clean deep-buried tanks would be required. To prevent subsidence, the excavated material and fill would need to be properly compacted when the excavations are refilled. These areas were previously disturbed when the tanks were installed, and impacts to soils would not be significant with mitigation. Geological hazards would not be affected by the deactivation activities. Geological resources would not be adversely affected under the No Action Alternative. The Implementation Alternative of mechanical demolition would cause slightly greater impacts to soils than under the Proposed Action, but these impacts would still not be significant. If the HICS were removed, significant soil erosion could occur.

Water Resources

Impacts to water resources could occur due to demolition of the LFs. Physical disturbances or material releases into surface water or groundwater can degrade the quality and quantity of water in the area. Under the Proposed Action, short- or long-term impacts to the recharge system due to the dismantlement would not be significant. Wells would not likely be significantly impacted from the explosive demolition event. Groundwater quality near deactivated LFs is projected to not be significantly affected by dismantlement. In groundwater adjacent to the LFs, localized nitrate levels are projected to increase temporarily, but there would be no significant impacts to aquifers. Impacts to surface water during dismantlement and demolition would not be significant with the use of best

management practices to limit sedimentation impacts, as required in stormwater management plans and erosion control specifications. The appreciable distance between the missile facilities (4 to 7 miles) minimizes the unlikely possibility that water resource impacts at two or more sites would result in a cumulative impact on a well, aquifer, or surface water body. No floodplain impacts would occur because no sites are in floodplains. Water demand in the deployment area would be less than historic levels given the lack of need for MAFs, loss of missile system personnel, and lack of maintenance activity water requirements.

The No Action Alternative would involve the continuance of existing impacts, such as site runoff and need for water associated with caretaker activities; no new water resource impacts would occur. The Implementation Alternative of mechanical demolition is unlikely to noticeably modify the local hydrology because of the common presence of unconsolidated upper Tertiary aquifers throughout the deployment area. Alluvium below the aquifer would not be adversely affected by mechanical demolition. The HICS Removal Implementation Alternative could cause significant impacts in areas where it lies beneath surface water and wetlands, and passes through floodplains.

Air Resources

The air quality at F.E. Warren AFB and the deployment area would not be appreciably impacted by activities associated with the Proposed Action. Some short-term adverse impacts to air quality would result from the dismantlement activities at the LFs and MAFs, and a slight long-term beneficial impact would result from the cessation of operations (e.g., from decreased travel to and from the missile field). Removal of refrigerants (R-12 and R-22)—chlorofluorocarbons—from coolant systems would decrease the possibility of leaks. The air quality would be impacted (but not significantly) along transportation routes and at intermittent periods at distinctly separate sites within the deployment area.

The No Action Alternative would have some long-term emissions associated with the continued operation and maintenance of sites, but levels would be similar to existing emissions. The Implementation Alternatives for mechanical demolition or HICS removal would cause more emissions than under planned dismantlement activities; these increased levels of emissions would not significantly affect air quality.

Noise

Certain activities that would be associated with the Proposed Action or Implementation Alternatives could influence the noise environment. Impacts on the environment would be related to the magnitude of noise caused primarily from the LF headworks demolition (blast noise), and from vehicle and equipment noise associated with dismantlement of the Peacekeeper system. Blast noise could cause a slight annoyance to a few nearby residents, rattle windows and walls slightly, and momentarily startle wildlife. The noise environment would not be significantly affected from the short-term increase in noise associated with the Proposed Action activities. There would be no long-term adverse noise impacts because the sound levels within the deployment area and F.E. Warren AFB would return to current levels. Noise-sensitive receptors, such as churches and hospitals, would not likely be adversely affected by the blasting and traffic noises.

Under the No Action Alternative, no impacts would occur because future noise levels near the missile facilities would be similar to current conditions. If mechanical demolition was implemented, noise impacts would not be significant, but would be more annoying to nearby residents than if explosive demolition was implemented. Removal of the HICS would increase the amount of construction equipment needed, thus increasing ambient noise levels above those projected if the HICS were left in place. The HICS extends for many miles and may pass by sensitive receptor locations; therefore, there is a potential for significant noise impacts depending on the proximity and level of the noise and the type of receptor.

Biological Resources

Impacts to biological resources at the LFs and MAFs would result primarily from the explosive demolition and ground restoration activities associated with the dismantlement action. Final disposition of Peacekeeper facilities on base is not yet known; however, no impacts to important or crucial habitats or species are expected since the Peacekeeper facilities are located on previously disturbed land within the built up portion of the base. Dismantlement activities would include ground-disturbing excavation, the explosive demolition of the LFs, stockpiling soil, and grading. The effects of dismantlement activities would adversely, but not significantly, impact both plants and animals during demolition, excavation, grading and filling. No long-term significant adverse impacts are projected to occur. The activities would not lead to degradation of important or crucial habitats or risk the viability of threatened or endangered plants or animals, or of candidate species. No wetlands would be filled as a result of dismantlement activities. Runoff flowing into wetlands would flow across well-vegetated areas, and thus would not result in significant adverse impacts. No significant impacts from noxious weeds would occur with continued management practices.

The No Action Alternative would result in the continuation of the existing, non-significant biological resource impacts from missile system and operation and maintenance activities. If mechanical demolition of the headworks occurred, slightly more area would be excavated than under the Proposed Action, but the impacts would not be significant. The Implementation Alternative of removing the HICS would potentially disturb terrestrial and aquatic wildlife to a significant degree.

Cultural Resources

Excavation, grading, and soil compaction for demolition necessary to support the proposed dismantlement action would not likely degrade archaeological resources because the dismantlement would occur on areas of previously disturbed ground on the Peacekeeper sites. There are no known Native American religious or cultural sites within the deployment area. It is unlikely any degradation or destruction of non-Peacekeeper system structures listed or eligible for listing on the National Register of Historic Places would occur within the deployment area. The Air Force will coordinate the Historic American Building Survey (HABS)/Historic American Engineering Record (HAER) documents for the Peacekeeper missile system with the Wyoming State Historic Preservation Office (SHPO); any additional mitigation would be determined through the National Historic

Preservation Act Sections 106 and 110 consultation process. A Programmatic Agreement is being prepared to provide stipulations for the Air Force, SHPO, and the Advisory Council to accomplish mitigation of adverse effects from dismantling the Peacekeeper missile system. With mitigation, impacts to Cold War resources would be adverse, but not significant.

The No Action Alternative would not affect cultural resources. The Implementation Alternatives would take place on previously disturbed land and would not likely impact unknown cultural resources; the same consultation process would occur as for the Proposed Action.

Mitigations

The following mitigations should be implemented to avoid or minimize adverse impacts to particular environmental resources:

- Coordinate the timing of the explosive demolition events with the Burlington Northern-Santa Fe and Union Pacific Railroads for the two LFs located within about ¼ mile of the rail lines.
- Limit damage to public roads by having all contractor-operated heavy equipment use the current approved Air Force missile access route system and observe weight limits to the maximum extent practicable.
- Notify the appropriate District One or Two Offices of the Wyoming Department of Transportation (WYDOT) and county road offices three weeks prior to demolition of an LF to allow for time to plan detours and notify the public.
- Perform sampling of soils at the LF and MAF sump outfall points, sewage lagoons (water samples at lagoons will also be taken), and potentially other locations, to identify hazardous constituents at the most probable point of contamination. Develop a sampling plan of action and work with the State of Wyoming to determine the type and extent of sampling for characterizing potential contamination sources prior to dismantlement activities.
- Sample wastewater and sludge at the MAF lagoons to determine constituent levels for performing proper closure of the wastewater treatment facilities by landfarming of biosolids.
- Survey subsurface structures within 2,000 feet of an LF prior to commencing dismantlement activities. The condition of a structure, if known, would be noted. A post-blast survey should be done to determine whether explosive demolition affected the structure.
- Use erosion control measures, such as silt fences and watering soil stockpiles in dry conditions, to prevent potentially significant erosion during excavation to clean-up deep-buried tanks.
- Protect public and environmental interests through preparing and implementing a blasting and safety plan. The plan will include provisions to limit the demolition activity to times when the meteorological conditions favor rapid dissipation of

pollutants, and restrict the demolition activity when winds blow in the direction of sensitive receptors.

- Prepare and implement a blasting and safety plan that would include provisions for modifying blasting techniques (e.g., elect to use millisecond delays) to satisfy stringent limits if houses, structures, or dams are located close to demolition sites; this would reduce the intensity of airblast and ground vibration. The plan would also address the repair of windows or other items inadvertently damaged by a demolition blast.
- Avoid blasting at LF S-9 during peak fall migration due to the high volume of birds and the potential for startling the birds into flight along hunting areas. Blasting should also be scheduled to avoid impacting breeding and nesting waterfowl near this site.
- Avoid blasting prior to 9 a.m. between March and June at all sites to avoid impacts to the sharp-tailed grouse during breeding and nesting seasons.
- Coordinate with the United States Fish and Wildlife Service regarding surveys of raptor nests and roosts, and threatened, endangered, or candidate species within the Peacekeeper missile system deployment area.
- Ensure that noxious weed control is maintained at completed sites awaiting disposition.
- Coordinate the HABS/HAER reports being prepared for the Peacekeeper missile system with the SHPO.
- Continue Sections 106 and 110 consultation with the SHPO and Advisory Council to determine the appropriate level of mitigation for this action.

CUMULATIVE IMPACTS

The cumulative impacts of the Proposed Action or an Implementation Alternative occurring concurrently with landowner activities, and from construction of the 4th Command and Control Squadron facility and the MM III Service Complex, were assessed within the EIS. Although impacts for several resources under the Proposed Action or an Implementation Alternative may not be individually significant, when the impacts are considered together, significant cumulative impacts could result. However, no significant cumulative impacts from the Proposed Action or an Implementation Alternative were identified.

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CHAPTER 1

PURPOSE OF AND NEED FOR ACTION

1. PURPOSE OF AND NEED FOR ACTION

The United States Air Force Space Command proposes to deactivate and dismantle the Peacekeeper missile system at Francis E. Warren Air Force Base (F.E. Warren AFB), Wyoming. The Proposed Action does not directly affect the Minuteman (MM) III missile system, which will be sustained at F.E. Warren AFB. The Air Force is preparing an environmental impact statement (EIS), the most detailed type of environmental analysis, for this action. This EIS evaluates the Proposed Action (Deactivation and Dismantlement), two implementation options of the Proposed Action (Mechanical Demolition of the Headworks; Removal of the Hardened Intersite Cable System (HICS)), and the No Action Alternative.

This chapter of the EIS describes the purpose and need for the Proposed Action. The location of the Proposed Action, and background information about the processes of deactivating and dismantling the Peacekeeper systems, are discussed. This chapter also describes the decisions to be made, the environmental impact analysis process (EIAP), public scoping, and laws and regulations relevant to the Proposed Action.

1.1. PURPOSE OF AND NEED FOR ACTION

The purpose and need for the Proposed Action is to deactivate and dismantle the Peacekeeper missile system at F.E. Warren AFB to comply with the Strategic Arms Reduction Treaty II (START II), as modified by the Helsinki Agreement of September 1997. The Treaty ratification process is ongoing; the need to implement the Proposed Action would depend upon final ratification of the Treaty. To meet START limitations on warheads and launchers, the Department of Defense (DoD) has been demolishing particular Intercontinental Ballistic Missile (ICBM) systems. To meet START requirements for elimination of ground-based ICBM launchers, the dismantlement must involve explosive demolition of the launcher headworks to a depth of six meters (20 feet (ft)), or mechanical demolition to a depth of eight meters (26 ft).

After ratification of START II, the Proposed Action would occur in four phases, which are summarized below. A detailed description of the activities associated with each phase is found in Chapter 2.

Phase 1 would be the removal of the missiles, including the reentry system (RS), missile guidance system (MGS), and rocket engines. The missiles would be removed from the launch facilities (LF) at the approximate rate of one missile every three weeks. Most rocket engines and RSs would be transferred to Hill AFB, Utah. Some RSs are scheduled for retirement, and would be returned to the Department of Energy for disposal. Some MGSs may be transferred to the Boeing Guidance Repair Center, Newark, Ohio for maintenance.

Phase 2 of the deactivation process would involve the removal of salvageable items from the LFs and missile alert facilities (MAF). Ordnance would be removed and transported to the munitions area on F.E. Warren AFB. Classified items would be recovered from the LFs and MAFs; office and living quarter items would be recovered from the MAFs. The

LFs and MAFs are put into caretaker status, which involves Air Force personnel draining fluids from the fueling, coolant, and hydraulic systems, removing electrical filters and switches, and removing the power supply batteries. Reusable equipment would be placed in the supply system for use by F.E. Warren AFB and other bases. Air Force security teams would perform periodic security checks of each location during site deactivation. Following deactivation activities, the site gates would be secured. Most of the DoD personnel affected by the deactivation of the Peacekeeper system at F.E. Warren AFB would be the officers, enlisted personnel, and civilians associated with the Peacekeeper program only; other missile (MM III) personnel would not be directly affected. An estimated 220 positions at F.E. Warren AFB would no longer be authorized after the fourth quarter of FY07, following a three-year deactivation period.

Phase 3 (dismantlement) of the Proposed Action would include the closure of MAF wastewater treatment facilities (i.e., lagoons), removal or closure in place of underground storage tanks (UST), and the dismantlement of certain portions of the LFs and MAFs.

Phase 4 of the Proposed Action would include the disposal of the LFs and MAFs.

1.2. DECISIONS TO BE MADE

The National Environmental Policy Act (NEPA) of 1969 and its implementing regulations require that the environmental effects of proposed actions and alternatives be considered in the decision-making process. Preparation of an environmental document (this EIS) must precede final decisions regarding the Proposed Action, and be available to inform decision makers and the public of potential environmental consequences. The development of this EIS allows for public consideration and input concerning the Peacekeeper missile system deactivation and dismantlement. This EIS is to provide decision makers and the public the information required to understand the future environmental consequences of the Proposed Action. After completion of this EIS, the Air Force will publicly state which action will be implemented in a formal document called a Record of Decision (ROD).

1.3. LOCATION OF WARREN AFB AND MISSILE DEPLOYMENT AREA

F.E. Warren AFB is located on 5,866 acres in southeastern Wyoming, adjacent to the western edge of the city of Cheyenne in Laramie County. The east-west Interstate-80 intersects north-south Interstate-25 near the southeastern corner of the installation. The Wyoming-Colorado border is 11 miles to the south, while the Wyoming-Nebraska border is about 40 miles to the east. Denver, Colorado is approximately 100 miles to the south. Cheyenne is the state capitol of Wyoming and is 6,062 ft above sea level. The general location of the base is shown in Figure 1.3-1.

F.E. Warren AFB is part of the Air Force Space Command (AFSPC) and is home to the 20th Air Force, headquarters for the U.S. ICBM force. The host unit at F.E. Warren AFB is the 90th Space Wing (90 SW), which includes four missile squadrons (MS), each with five MAFs and 50 LFs. The deployment area for these missile facilities comprises 12,600 square miles of eastern Wyoming, western Nebraska, and northern Colorado. The Peacekeeper missiles, part of the 400th Missile Squadron (400 MS), are located in southeastern Wyoming in Laramie, Platte, and Goshen counties, as shown in Figure 1.3-2.

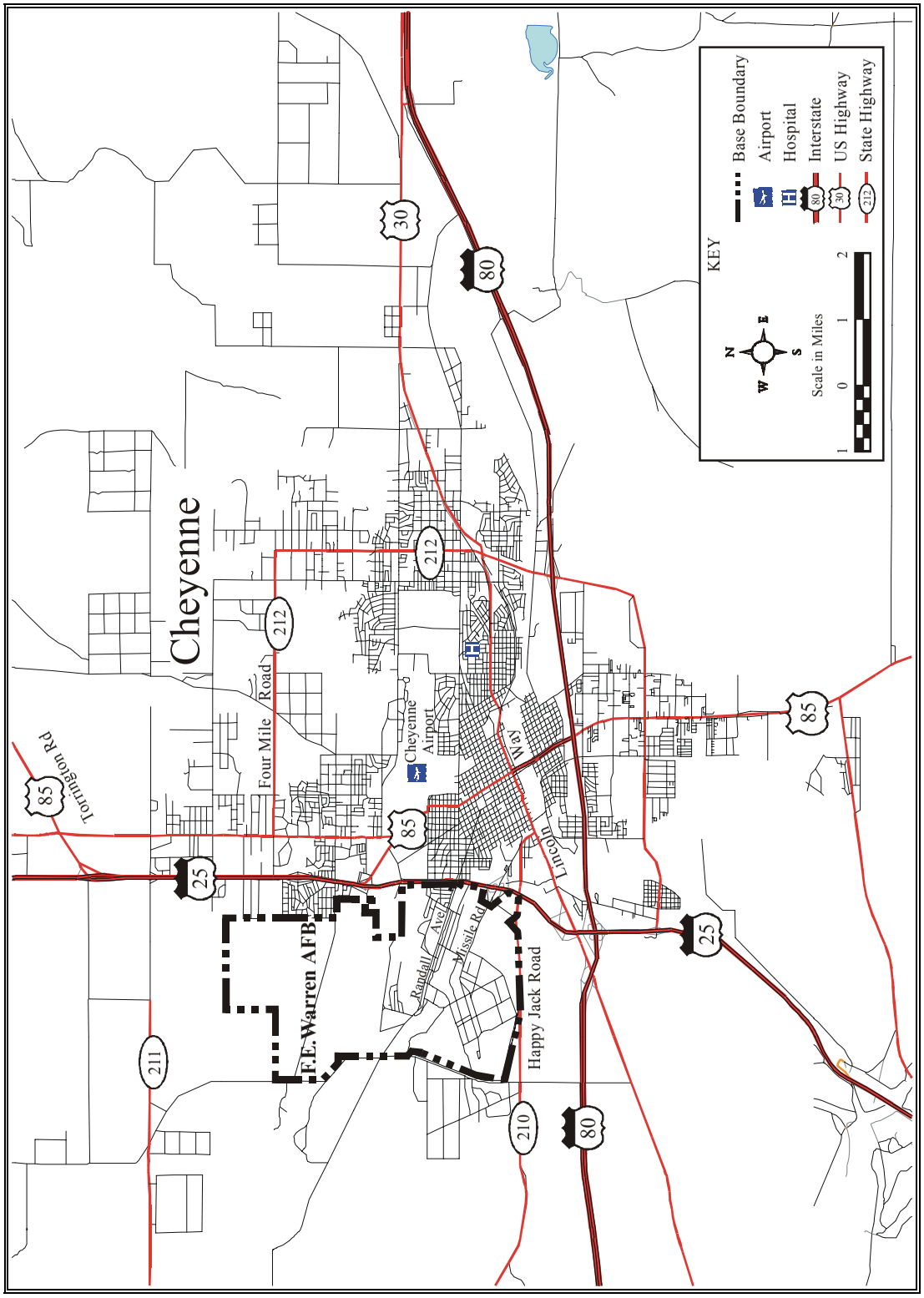

Figure 1.3-1. Location of F.E. Warren AFB, Wyoming

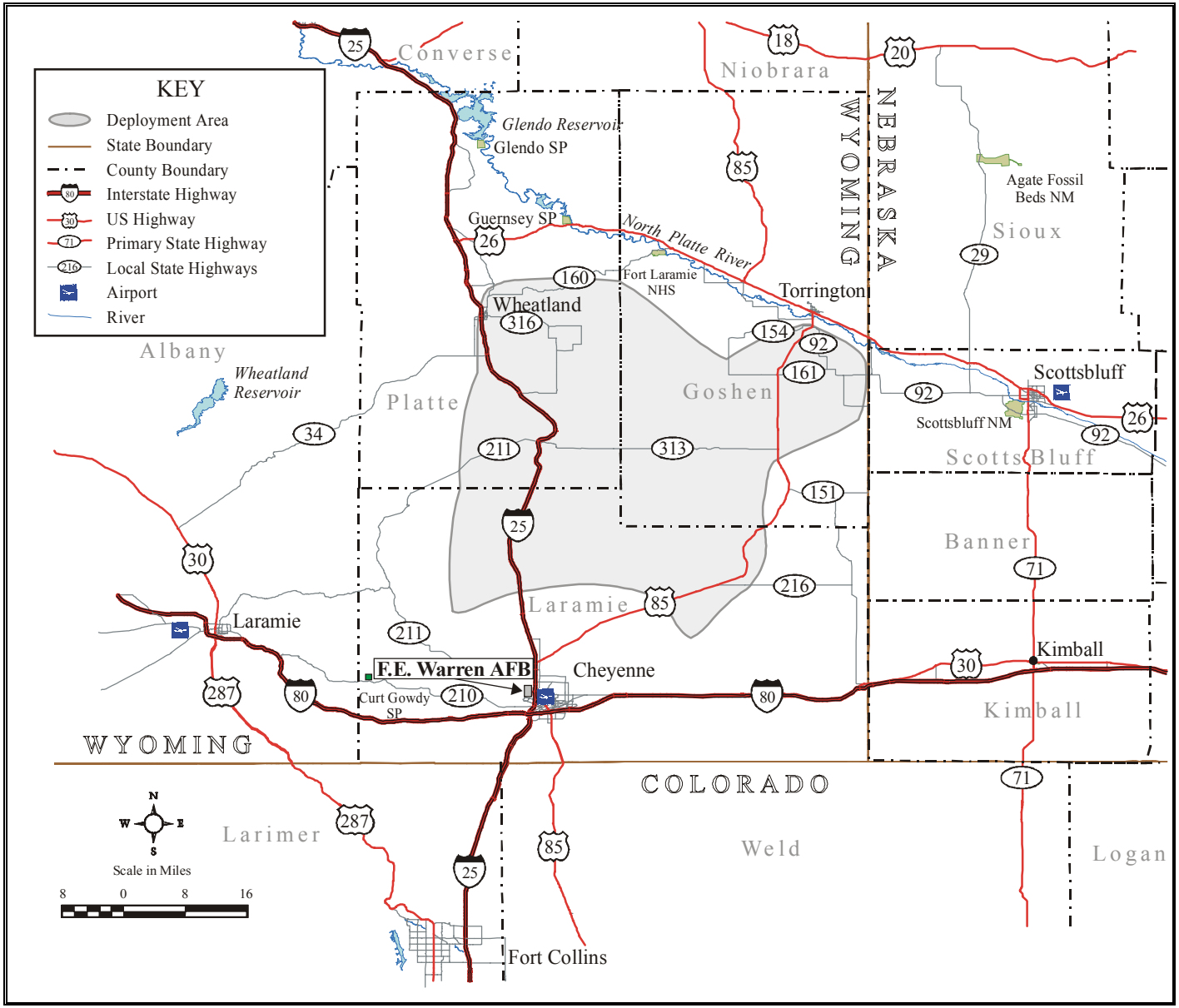

Figure 1.3-2. Map of the Peacekeeper Deployment Area

The Proposed Action would occur principally within the deployment area, although some related activities would occur at F.E. Warren AFB.

Regional land use in the deployment area consists primarily of livestock grazing and pasture lands, with some cultivated crops generally in the northeastern portion of the deployment area. There is some interspersed urban development, recreational areas, and wildlife habitat.

1.4. ENVIRONMENTAL IMPACT ANALYSIS PROCESS

NEPA, as amended, established a national policy to protect the environment and ensure that federal agencies consider the environmental consequences of their decisions before the decisions are made. The President's Council on Environmental Quality (CEQ) issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. Air Force Instruction (AFI) 32-7061, *The Environmental Impact Analysis Process (EIAP)*, governs the process and is the mechanism by which the Air Force ensures its decisions include an understanding of potential environmental consequences. The CEQ regulations are used in conjunction with AFI 32-7061 to determine the appropriate documentation with regard to the level of environmental analysis. When an EIS is required, the proponent must publish a Notice of Intent (NOI) to prepare an EIS in the *Federal Register*. This formal announcement signifies the beginning of the scoping period, during which the major issues to be addressed in the EIS are identified. A Draft EIS (DEIS) is prepared, which includes the following:

- A statement of the purpose and need for the action
- A Description of the Proposed Action and Alternatives (DOPAA), including the No Action Alternative
- A description of the environment that could be affected by the Proposed Action or Alternative Actions
- A description of the potential environmental consequences of implementing the Proposed Action or Alternatives and potential mitigation measures or best management practices to reduce the impacts.

A copy of the DEIS is filed with the U.S. Environmental Protection Agency (EPA), and is circulated to the interested public and government agencies for a period of at least 45 days for review and comments. During this period, a public hearing is held so that the proponent can describe the Proposed Action and Alternatives, summarize the environmental impacts for each alternative, and receive input from the affected public. At the end of the review period, all substantive comments received must be addressed. A Final EIS (FEIS) is then produced that contains responses to comments as well as changes to the document, if necessary.

The FEIS is filed with EPA and distributed in the same manner as the DEIS. Once the FEIS has been available for at least 30 days, the Air Force may publish a ROD for the action.

1.4.1. PUBLIC SCOPING PROCESS

The Air Force published a NOI in the *Federal Register* on June 11, 1999, to prepare an EIS for the deactivation and dismantlement of the Peacekeeper missile system based out of F.E. Warren AFB (see Appendix B). Letters were sent to Federal, State, and local agencies and civic leaders apprising them of the Proposed Action. Appendix C includes an example letter sent to public representatives, agencies, and other interested parties, and letters and comments received in response. Press releases were provided to local and area newspapers. A public notice was published in the *Wyoming Tribune-Eagle and Casper Star-Tribune* on June 13, 1999; in the *Platte County Record Times on June 16, 1999;* and in the *Torrington Telegram* on June 11, 1999. Scoping meetings were held on June 28, 1999 at Cheyenne, Wyoming, on June 29 at Wheatland, Wyoming, and on June 30 at Torrington, Wyoming, to obtain input from the general public and public agencies and to help the Air Force determine the nature, extent, and scope of significant environmental issues related to the Proposed Action. Comments and concerns related to the political or diplomatic issues of the START II Treaty or to other geopolitical issues are beyond the scope of an EIS, and are therefore not addressed within this document.

Approximately 40 people attended the scoping meeting in Cheyenne, while there were four and one attendees at Wheatland and Torrington, respectively. Ten members of the public presented verbal testimony or provided comments at the Cheyenne meeting, while one individual each provided comments at the Wheatland and Torrington meetings. As part of the scoping process, written comments were also solicited. The issues and concerns of the public, along with programmatic requirements of the Air Force, will be analyzed and used to develop alternatives and the factors by which the alternatives could be evaluated. The issues and concerns of the public are also used to assess the impacts of the various alternatives (evaluated in Chapter 4), to develop mitigation measures, and to establish the preferred alternative.

The verbal and written comments that were received during the scoping process, in addition to internal Air Force discussions about the Proposed Action, identified the following concerns, grouped by environmental resource areas**:**

- General: Ensure that the document is understandable by the public; define and explain technical terms and issues.
- Local Community
  - Socioeconomics
    - Adverse impact on housing, infrastructure, educational, and social institutions from the loss of Air Force personnel and the jobs and expenditures associated with the Peacekeeper mission.
    - Adverse impacts on the agricultural industry (especially grazing), individual producers, and local economy.

- Transportation
  - Damage to the transportation network from heavy equipment traveling the network to, from, and within the deployment area, with possible adverse effects on private traffic and schoolbuses.
  - Transportation hazards to communities along the transport routes; emergency response procedures.
- Land Use / Aesthetic Resources
  - Impact on 600 acres of prime farmland.
  - Examination and soil survey of each site for environmental contamination prior to release of the property.
  - Lead and PCB contamination remaining in soil after dismantlement.
  - Reuse of LF and MAF facilities and transfer of ownership of the LF and MAF properties.
  - Preference to surrounding landowners to purchase LF and MAF property.
  - Restoration of land to avoid the adverse aesthetic impacts of gravel mounds over closed LFs and MAFs, as occurred at former Atlas sites when that system was dismantled.
  - Negative impacts to scenic vistas as part of traditional image of Wyoming and the West.

- Hazardous Materials and Waste Management (including safety)
  - Health and Safety
    - Public and worker safety issues (local and remote).
    - Safety issues regarding removal, dismantlement, storage, transportation, and accounting for nuclear warheads.
    - Safety issues regarding handling, transporting, and disposing of hazardous materials and wastes (PCBs, asbestos, fuel, other fluids and contaminants).
  - Hazardous Materials
    - Disposition of explosives used at LFs.
  - Hazardous Waste
    - Lead and PCB contamination remaining in soil after dismantlement.
    - Methods for ensuring that the sites will be cleaned up before disposition.
    - Involvement of local community in sampling and in monitoring sites for closure.

- Above ground and underground storage tanks
    - Closure issues and procedures related to USTs and removal of any UST leak contamination.

- Natural Environment
    - Water Resources
        - Adverse impacts to groundwater, aquifers, wells, and stock watering ponds from contaminant leakage and from demolition of the LF headworks.
        - Reduction in Platte River water levels from pumping or other activities.
    - Air Resources
        - Adverse effects on air quality, including visibility.
    - Biological Resources
        - Harm to threatened, endangered, or protected animal and plant species.
        - Loss of wetlands.
        - Concerns about stream crossings or sensitive habitats if HICS is removed.
        - Noxious weed concerns, especially related to gravel mounds.
    - Cultural Resources
        - Protection of Cold War, historic, and prehistoric resources; appropriate coordination with federal and state agencies charged with protecting these resources.
- Cumulative impacts.

The DEIS addresses all of these issues, as well as others, in evaluating the potential impacts of the Proposed Action. Relevant environmental issues and questions raised during the EIAP have also been addressed.

1.4.2. PUBLIC COMMENT PROCESS

The DEIS was made available for public review and comment via a Notice of Availability published in the Federal Register on June 30, 2000. Notices of the DEIS and public hearings were published in local media (the *Cheyenne Tribune Eagle* (July 23), *Torrington Telegram* (July 21), *Platte County Record Times* (July 25), and the *Casper Star Tribune* (July 23)). Copies of the DEIS were made available for review in local libraries and provided to those individuals, groups, and agencies requesting copies (see Appendix D for the DEIS mailing list). The DEIS was sent to the following local libraries: County of Goshen Public Library, 2001 East A, Torrington, WY 82240; Laramie County Central Library, 2800 Central Ave, Cheyenne, WY 82001; and Platte County Public Library, 904 9th Street, Wheatland, WY 82201. Public hearings were held starting at 6:30 p.m. in Cheyenne (July 31), Wheatland (August 1), and Torrington (August 2), for the Air Force to present the findings of the DEIS and invite public comments. All comments were

reviewed and addressed, when applicable, and included in their entirety in the final document (see Chapter 8). The Air Force will prepare an administrative record of the NEPA process that includes scoping letters and public comments received by the Air Force. Air Force responses to comments offering new data or changes to data, and questions about the presentation and analysis of data, have also been included. Comments simply stating facts or opinions, although appreciated, did not require specific responses. Chapter 8, Public Comments and Responses, more thoroughly describes the comment and response process, and contains a reproduction of each comment letter and a transcript of the comments made at the public hearings. Chapter 8 also contains a response to each comment with a notation, where appropriate, to the relevant section of the document.

The text of this EIS has been revised, when appropriate, to reflect concerns expressed in public comments. Additional environmental modeling was performed and the EIS was updated using the new information. Other changes include clarifications and typographical corrections. The comment issues are summarized in the following list.

- Procedural questions regarding the EIS and the EIAP, areas of responsibility, the role of state and local government agencies, and coordination with and education of the public
- The timing of the Peacekeeper dismantlement
- Socioeconomic concerns related to wage rates, local employment, and local schools
- Compensation to nearby residents in the event of an adverse occurrence
- Transportation concerns regarding school buses and other local traffic during dismantlement, and road maintenance funding
- Condition of the property upon return to private ownership
- Use of gravel to cover the LF sites after dismantlement
- Explosive demolition of the LFs
- Impacts of the HICS Implementation Alternative and other HICS concerns
- Handling and storage of hazardous materials
- Disposal of hazardous materials and solid waste from the sites during the dismantlement process
- Protection of workers and the public from hazardous contamination (both short-term and long-term)
- Protection of future landowners from hazardous contamination
- Cleanup of the missile sites to remove contamination
- Contamination from wastewater and sump discharge during dismantlement activities at the missile sites
- Closure of sewage lagoons and disposal of sewage lagoon sludge
- Underground and above ground storage tank concerns regarding removal or closure; coatings on USTs; soil sampling; and cleanup
- Weapons concerns regarding storage capacity and transportation

- Water concerns regarding the need for regional water quality data in the EIS; and the protection of water, water quality, aquifers, and wells from impacts from explosive demolition and other dismantlement activities
- Wildlife concerns regarding the protection of habitat and of listed and candidate species, the impacts of the HICS Alternative, and coordination with the U.S. Fish and Wildlife Service
- Preservation of an LF as an historic site

1.5. ORGANIZATION OF THIS EIS

This EIS is organized into the following chapters and appendices. Chapter 1 presents the purpose of and need for the action, and the general organization of the EIS. Chapter 2 describes the Proposed Action and identifies alternative actions considered. Chapter 3 describes the existing environmental and socioeconomic conditions for resource areas that could potentially be affected by the Proposed Action or alternatives. Chapter 4 discusses the potential impacts to the biological, physical, and human environs as a result of implementing the Proposed Action or any alternative, along with a discussion of cumulative impacts of the action with other reasonably foreseeable actions. Chapter 5 contains consultation and coordination information. Chapter 6 contains a list of the document preparers and contributors, while Chapter 7 contains references. Chapter 8 contains public comments and the Air Force responses to the comments.

In addition to the main text, the following appendices are included in this document:

- Appendix A Applicable Regulations and Guidelines
- Appendix B Notice of Intent
- Appendix C Agency Letters and Consultation
- Appendix D Draft Environmental Impact Statement Mailing List
- Appendix E Maps of Missile Flights P through T
- Appendix F Socioeconomic and Environmental Justice Tables
- Appendix G Photographs
- Appendix H Weapon System Safety
- Appendix I Soils Tables
- Appendix J Water Data
- Appendix K Lead and PCB Transport Modeling
- Appendix L Pesticide Persistence and Transport Modeling
- Appendix M Species of Special Concern Tables
- Appendix N Maps of Wetlands Near LFs and MAFs
- Appendix O Glossary of Terms and Acronyms/Abbreviations
- Appendix P Index

1.6. RELATED ENVIRONMENTAL DOCUMENTS

The environmental documents listed below were prepared separately and address environmental issues related to F.E. Warren AFB or to missile deactivation and dismantlement actions. These documents provided supporting information for this EIS:

- Environmental Assessment, 721st Mobile Command and Control Squadron Relocation, F.E. Warren AFB, Wyoming
- Environmental Impact Statement, Minuteman III System Dismantlement, Grand Forks AFB, North Dakota
- Environmental Impact Statement, Minuteman III Conversion, Malmstrom AFB, Montana
- Environmental Impact Statement, Minuteman II System Deactivation, Whiteman AFB, Missouri
- Environmental Impact Statement, Minuteman II System Deactivation, Ellsworth AFB, South Dakota

1.7. RELEVANT FEDERAL, STATE, AND LOCAL STATUTES AND GUIDELINES

A listing of the laws, regulations, executive orders, and other guidelines that are relevant to the action is provided in Table 1.7-1. The description of the applicable authorities and the function of each rule of action are included in Appendix A of this document. A brief discussion of the applicable permits, licenses, and consultation requirements, including those listed in Table 1.7-1 and Appendix A, that may be required by the Air Force to implement the Proposed Action are discussed in Section 1.8.

Table 1.7-1
Federal, State, and Local Statutes and Regulations

ENVIRONMENTAL POLICY	
National Environmental Policy Act	42 U.S.C. § 4321 *et seq.*
Council on Environmental Quality Regulations	40 CFR § 1500-1508
Department of Defense Directive 6050.1	32 CFR § 188
Protection and Enhancement of Environmental Quality	EO 11514
Intergovernmental Review of Federal Programs	EO 12372
Federal Actions to Address Environmental Justice in Minority Populations	EO 12898
Environmental Impact Analysis Process	AFI 32-7061
AIR QUALITY	
Clean Air Act	42 U.S.C. § 7401 *et seq.*, as amended
Wyoming Air Quality Standards	W.S. Chap 9.1, Articles 1-11
Wyoming Air Quality Act	WEQA Title 35, Chap 11-201
Air Quality Compliance	AFI 32-7040

Table 1.7-1 Federal, State, and Local Statutes and Regulations	
WATER QUALITY	
Clean Water Act	33 U.S.C. § 1251 *et seq.*, as amended
Safe Drinking Water Act	42 U.S.C. § 300f *et seq.*, as amended
National Primary Drinking Water Regulations	40 CFR 141
Quality Standards for Wyoming Groundwaters	W.S. Sections 35-11-101 through 1104
Quality Standards for Wyoming Surface Waters	W.S. 35-11-101 through 1304
Wyoming Water Pollution Control Act	W.S. Section 35-502 *et seq.*
Floodplain Management	EO 11988
Water Quality Compliance	AFI 32-7041
BIOLOGICAL RESOURCES	
Endangered Species Act	16 U.S.C. § 1531-1544
Wyoming Wetlands Act	W.S. 35-11-308 through 311
Wyoming Noxious Weed Control Act of 1973	W.S. 11-5-101 through 303
Protection of Wetlands	EO 11990
Integrated Natural Resource Management	AFI 32-7064
CULTURAL RESOURCES	
National Historic Preservation Act	16 U.S.C. § 470 *et seq.*, as amended
Archaeological Resources Protection Act	16 U.S.C. § 470a-11, as amended
Archaeological and Historic Preservation Act	16 U.S.C. § 469a *et seq.*
American Indian Religious Freedom Act	42 U.S.C. § 1996 *et seq.*
Native American Graves Protection and Repatriation Act	PL 101-601; 25 U.S.C. § 3001-3013
Protection and Enhancement of the Cultural Environment	EO 11593
Cultural Resource Management	AFI 32-7065
NOISE AND LAND USE	
The McKinney Act of 1987	42 U.S.C. § 11411
Public Law 100-180, Section 2325	10 U.S.C. § 9781
Noise Control Act	PL 92-574
PUBLIC HEALTH AND SAFETY / HAZARDOUS MATERIALS / HAZARDOUS AND SOLID WASTE	
Comprehensive Environmental Response, Compensation, and Liability Act	42 U.S.C. § 9601 *et seq.*
Community Environmental Response Facilitation Act	PL 102-425
Resource Conservation and Recovery Act	42 U.S.C. § 6961
Toxic Substances Control Act	15 U.S.C. § 2601-2654
Defense Environmental Restoration Program	10 U.S.C. § 2701 *et seq.*
Occupational Safety and Health Act Asbestos Standard	29 CFR § 1926.58
Wyoming Solid Waste Management	WYEQA, Article 5, Section 35-502.42-44
Wyoming Hazardous Waste Management	W.S. 35-11-102
Water Pollution from Underground Storage Tanks Corrective Action Act of 1990	W.S. 35-11-1414
Federal Compliance With Pollution Control Standards	EO 12088
Facility Asbestos Management	AFI 32-1052
Solid and Hazardous Waste Compliance	AFI 32-7042
Environmental Restoration Program	AFI 32-7020
SOCIOECONOMICS	
Davis-Bacon Act	40 U.S.C. § 276a *et seq.*
ENVIRONMENTAL JUSTICE	
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	EO 12898
TRANSPORTATION	
Hazardous Materials Transportation Act	49 U.S.C. § 5101

Table 1.7-1 Federal, State, and Local Statutes and Regulations		
KEY:	EO—Executive Order	U.S.C.—*United States Code*
AFI—Air Force Instruction	W.S.—Wyoming Statutes	WYEQA—*Wyoming Environmental Quality Act*
CFR—*Code of Federal Regulations*	PL—Public Law	

1.8. PERMITTING, LICENSING, AND CONSULTATION REQUIREMENTS

The Proposed Action will be evaluated for the need to obtain permits and licenses, and requirements for consultation with Federal, State, and local agencies. The following potential issues (and others, if necessary) will be discussed during meetings or consultation with Federal and Wyoming regulators:

- National Pollutant Discharge Elimination System (NPDES) stormwater permit
- Dewatering of LFs
- Disposal of construction rubble generated by dismantlement of the LFs
- Closing and capping sites
- PCBs found in coatings on the LFs
- PCB bulk product waste
- Hazardous waste generated by project construction activities
- Well closures
- The use of explosives (to be managed by certified and permitted explosive specialists)
- Disposal of wastewater and sludge from lagoons

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CHAPTER 2

DESCRIPTION OF THE ALTERNATIVES INCLUDING THE PROPOSED ACTION

2. DESCRIPTION OF THE ALTERNATIVES INCLUDING THE PROPOSED ACTION

The United States Air Force proposes to deactivate and dismantle the Peacekeeper missile system at F.E. Warren Air Force Base (AFB), Wyoming. The Proposed Action does not directly affect the Minuteman (MM) III missile system, which will be sustained at F.E. Warren AFB. This chapter describes the Proposed Action, No Action Alternative, and two implementation alternatives. Ongoing and future developments at F.E. Warren AFB will be considered and included in the analysis of cumulative impacts. The chapter concludes with a summary of potential impacts that could be caused by implementing the Proposed Action, an implementation alternative, or the No Action Alternative.

The Peacekeeper missile system is a technologically advanced system that must be described using engineering terminology. This EIS attempts to describe the system and proposed activities in the simplest terminology applicable. To aid the reader in understanding engineering concepts, a glossary (Appendix O) defines many of the technical terms.

2.1. DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is the deactivation and dismantlement of the Peacekeeper missile system according to the Strategic Arms Reduction Treaty (START) II requirements. The Proposed Action would not start until START II is ratified. There are ongoing efforts for sustainment of the Peacekeeper system pending treaty ratification. If START II is entered in force, December 31, 2003 is the milestone date for removing the last warhead and December 31, 2007 is the date for completing the dismantlement.

The Peacekeeper missiles are located within a deployment area north and east of F.E. Warren AFB. This system includes 50 launch facilities (LF) (with one missile per LF) and 5 missile alert facilities (MAF) (with one MAF per missile flight of 10 LFs). Descriptions of LF and MAF characteristics are provided in Sections 2.1.3 and 2.1.4, respectively. The 400th Missile Squadron (400 MS) is the military organization primarily responsible for maintenance and operation of the Peacekeeper missile system. Physical assets of the 400 MS within the deployment area include 5 flights of missile facilities, each composed of 10 LFs and 1 MAF. All LFs in a squadron can be controlled by any MAF within the squadron. The 10 LFs within a flight are directly connected to a MAF through a hardened intersite cable system (HICS), which includes a buried copper cable several inches thick and encased in plastic. The HICS provides an electrical connection between the missile facilities for operation and security purposes.

Each Peacekeeper MAF or LF is identified by a letter defining its associated flight (P through T) and a number (the number 1 designates a MAF and a sequence of numbers 2 through 11 is used to designate a particular LF in a flight). For example, “T-1” is the MAF in T-flight and “T-11” is the last LF in the T-flight. Appendix E contains maps of each flight area.

The deactivation process is scheduled to occur in four phases. Phase 1 is the removal of the missiles from the LFs. Phase 2 is the removal of salvageable items from the LFs and MAFs and placement of the LFs and MAFs in caretaker status. Phases 1 and 2 would be performed primarily by Air Force personnel with contractor support as needed (e.g. private companies would haul the Peacekeeper Stage IV rocket motors). Phase 3 is a contractor operation involving the closure of MAF sewage disposal facilities, removal and/or closure in place of USTs, and the deactivation/dismantlement of certain portions of the LFs and MAFs. Phase 4 involves the property disposal of the LF and MAF sites. The phase activities are discussed in more detail in the following sections. Figures 2.1-1 and 2.1-2 show a simplified flow chart of key elements of deactivation and dismantlement activities at each Peacekeeper LF and MAF, respectively.

The following subsections describe the Proposed Action activities that would occur at F.E. Warren AFB, LFs, MAFs, and the deployment area, as well as those involving the Peacekeeper missiles, service contracts, and personnel.

2.1.1. F.E. WARREN AFB FACILITIES AND EQUIPMENT

F.E. Warren AFB, the missile support base (MSB), contains a number of facilities that support the 90th Space Wing (90 SW) mission (some specifically for the 400 MS) and would be affected by the Proposed Action (see Figure 2.1-3). For example, training facilities located on the Base help maintain proficient operations and maintenance crews. Building (Bldg) 486 is a missile maintenance training facility—a model Peacekeeper LF outfitted with a full-scale launcher and underground access. This facility allows the maintenance crews to practice on Base, rather than driving approximately one-half hour to the nearest launcher. The Peacekeeper Maintenance Facility, Bldg 1501, hosts personnel, equipment, and materials used to maintain vehicles for transporting Peacekeeper personnel and missile components. While the Air Force has not yet determined the final disposition of all facilities at F.E. Warren AFB that would be affected by the deactivation and dismantlement process, most Peacekeeper missile facilities could be reused by the MM III missile program.

Other Peacekeeper facilities include, but are not limited to: buildings to store rocket motor stages, missile guidance control systems (MGCS), and reentry systems (RS); facilities to train operations officers; personnel offices; and a missile stage processing facility. Vehicles used to transfer missile stages are maintained at F.E. Warren AFB; these include the Type II transporter with interchangeable cargo containers (depending on the equipment or missile stages being transferred), and vehicles used to place and remove the missiles. If the Proposed Action were implemented, these vehicles could be used for MM III maintenance activities, sent to other missile bases, sold through the Defense Reutilization Marketing Organization (DRMO), or salvaged for parts.

The 37th Helicopter Flight uses seven UH-1N "Huey" helicopters to support the 90 SW through medical evacuation (medevac), search and rescue, airborne surveillance of missile convoys, and rapid transfer of critical personnel and missile system components to the deployment area. The helicopters fly a total of approximately five flights per day.

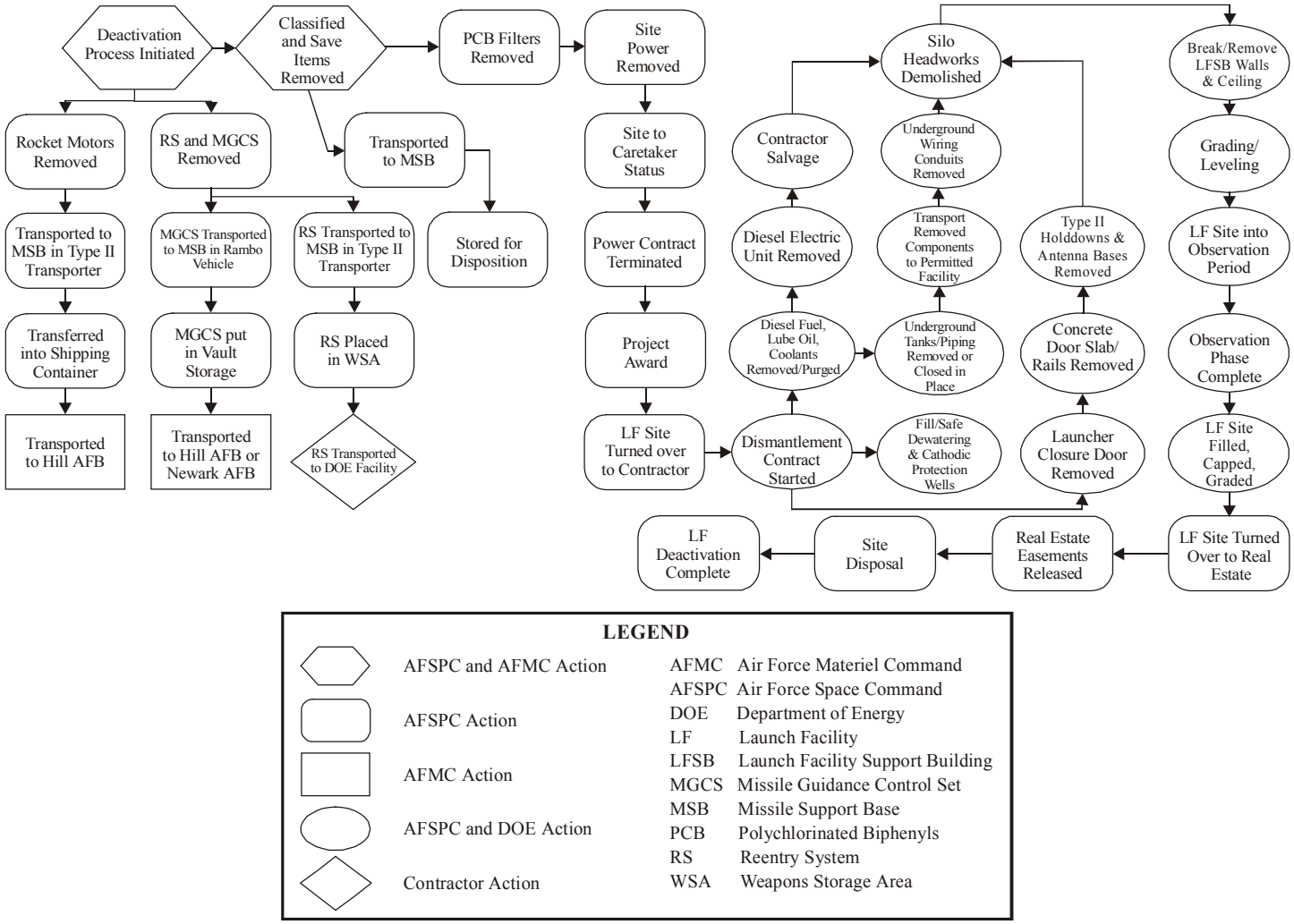

Figure 2.1-1. Flow Diagram for LF Deactivation and Dismantlement

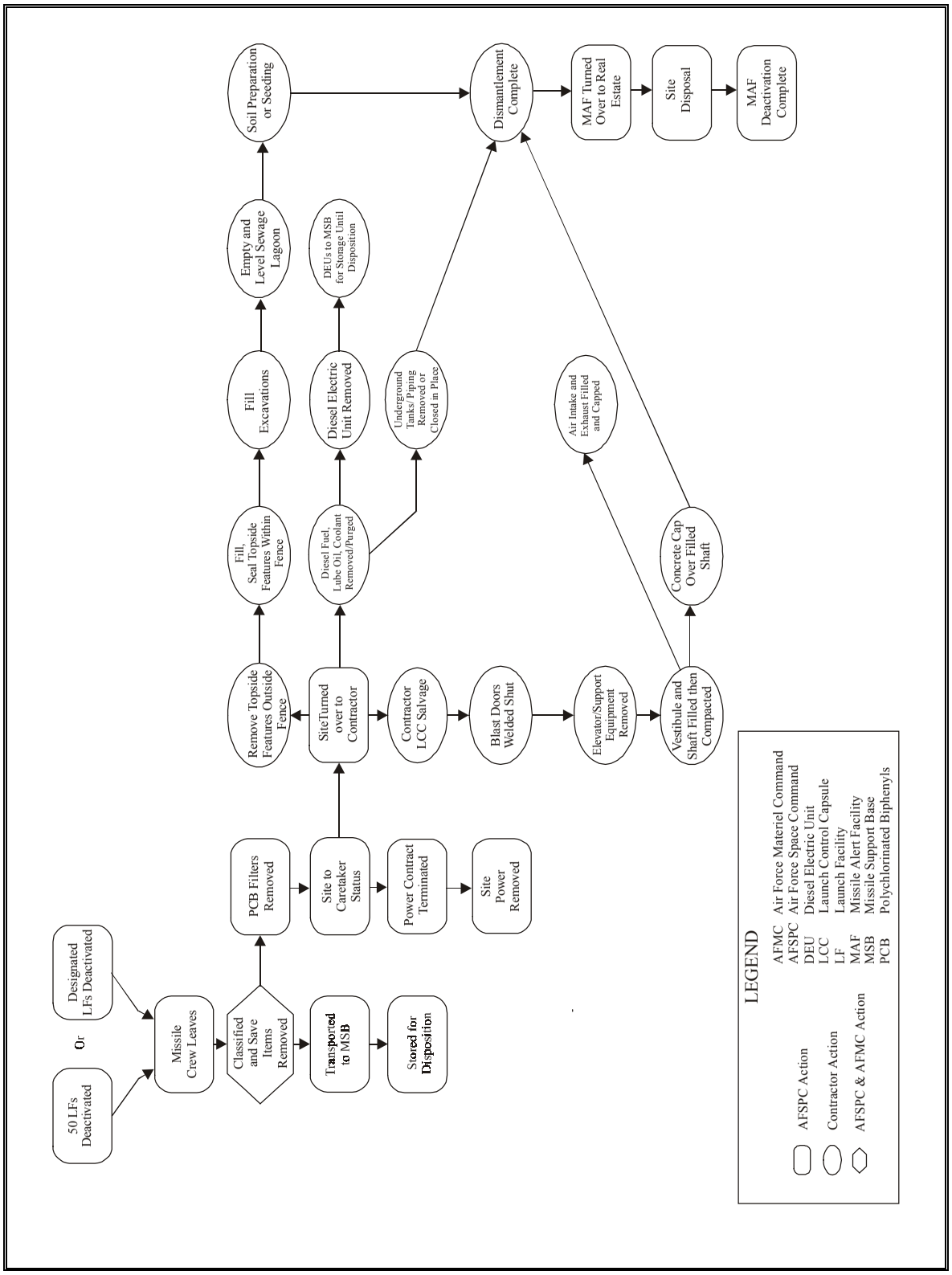

Figure 2.1-2. Flow Diagram for MAF Deactivation and Dismantlement

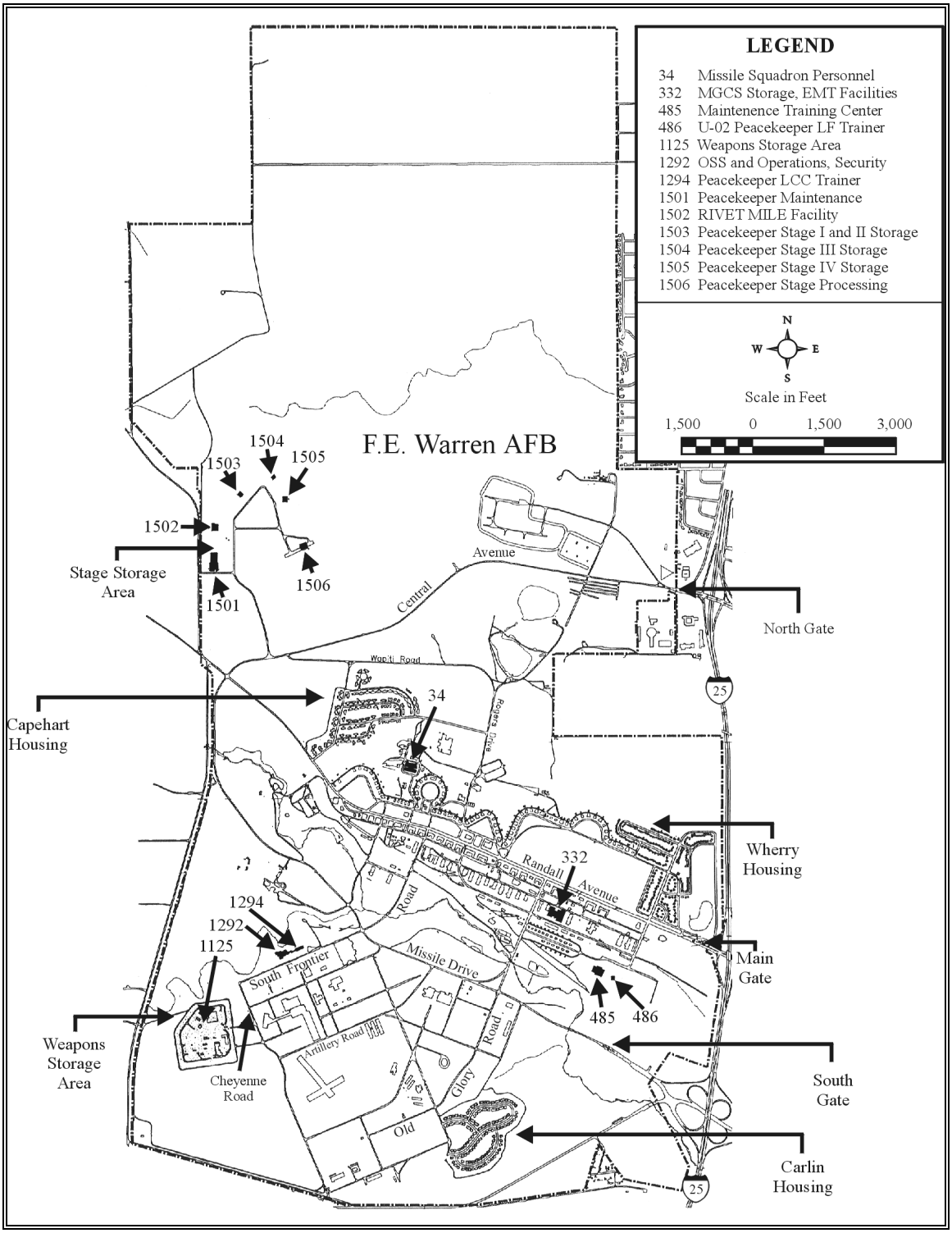

Figure 2.1-3. Facilities on F.E. Warren AFB

2.1.2. MISSILES

The Peacekeeper is a four-stage intercontinental ballistic missile (ICBM) that is configured to deliver Mark 21 reentry vehicles to independent targets. The Peacekeeper missile is approximately 71 feet long, 92 inches in diameter, and weighs 195,000 pounds. When placed inside the LF, the top of the missile is several feet below the launcher door. The missile rests on a missile air elevator surrounded by a canister and would be ejected from the LF by high-pressure steam before the solid rocket motor in Stage I fires.

The first three stages are fueled by solid propellants carried in Kevlar/epoxy cases, and the fourth stage is an aluminum structure housing the guidance and control system and thrust vector control components. The liquid fuel components for the fourth stage are monomethyl hydrazine, nitrogen tetroxide, freon, and helium.

Vehicles used in the process include an emplacer, Type II transporter, Rambo (a support truck used for carrying equipment, personnel, and the MGCS), and an air compressor truck, as well as security vehicles. Multiple vehicles of the same type may be at the LF simultaneously (see photos in Appendix G).

Vehicles transporting missile components from the missile sites to the MSB follow approved routes. Vehicles enter the North Gate and follow Missile Drive to South Frontier Road, and Cheyenne Road to the weapons storage area (WSA). An alternate route is to enter the South Gate and follow Missile Drive to Artillery Road and entering the WSA through Cheyenne Road (see Figure 2.1-3).

2.1.3. LAUNCH FACILITIES

An LF consists of a launcher and an associated launch facility support building (LFSB). All facilities are enclosed within a security fence. The sites average about 1.6 acres in size. Figure 2.1-4 shows a schematic of a typical Peacekeeper LF. The interior of the LF is approximately 90 feet deep, with the top 28 feet comprising the headworks. Including concrete and steel, the headworks is approximately 25 feet wide and 33 feet deep. The launch tube is 12 feet in diameter below the headworks.

Phase 1 of deactivation is the removal of the missiles, including the RS, MGCS, and rocket engines. Movement of the missiles is currently being conducted for failures and age surveillance, as well as test launching at Vandenberg AFB, California. Several missiles are removed each year. Approximately one week is required to remove the missile components and transport them to the MSB, or to transfer and assemble missile components from the MSB to the deployment area. The RS and MGCS are first removed from the LF, then successive missile stages are removed ending with Stage I.

Under the Proposed Action, one missile would be removed approximately every three weeks. The rocket engines would be transferred to Hill AFB, Utah; rail transport is typically used for Stage Is and some Stage IIs, with road transport used for the remaining stages. The disposition of the MGCS and RS components is being planned and will be addressed later in the environmental impact analysis process (EIAP); these components are transported primarily by air or road.

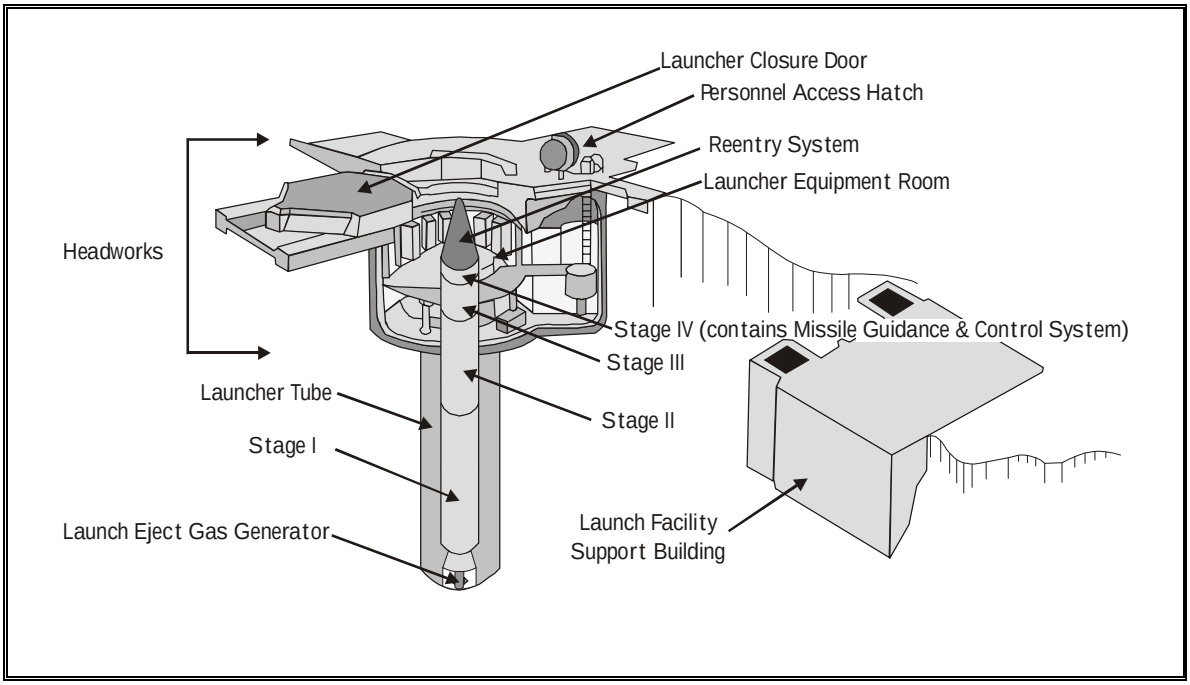

Figure 2.1-4. LF Schematic

Phase 2 of the deactivation process involves the removal of salvageable items from the LFs. Ordnance would be removed and transported to the munitions area on F.E. Warren AFB. Save list items (items to be reused by the Air Force) and classified items would be recovered from the LFs. Air Force personnel would drain fluids from the fueling, coolant, and hydraulic systems (with exceptions for certain environmental control systems), remove electrical filters and switches, and remove the power supply batteries. The LFs are not known to contain any asbestos. Reusable equipment would be placed in the supply system for use by F.E. Warren AFB and other bases. Air Force security teams would perform periodic security checks of each location during site deactivation. Following deactivation activities, the gates would be secured and the sites would be placed in caretaker status, awaiting the completion of the dismantlement process. During caretaker status at the sites, sump pump and cathodic protection operations would be maintained to prevent damage to the facilities until dismantlement or other final disposition occurs, and operation of the remaining environmental control systems would be discontinued. During the Proposed Action, an LF would be deactivated at an average rate of one every three weeks.

Phase 3, dismantlement, includes demolishing the headworks of each LF silo and destroying the LFSB. This phase is planned to occur over a 27-month period (an average dismantlement rate of approximately three LFs per month, with dismantlement occurring throughout the year, as weather permits). Prior to demolition, various hazardous materials (such as residual fluids and filters, capacitors, and ballasts with polychlorinated biphenyls (PCB)) would be removed from the facilities to avoid possible contamination of soil and groundwater.

Each Peacekeeper LF has a shallow-buried underground storage tank (UST) for storing diesel fuel to power a back-up generator. All USTs have a 14,500-gallon capacity, except for Site Q-8, which has a 4,000-gallon capacity. A 315-gallon above ground storage tank (AST) and a 60-gallon lube oil tank are in the LFSB. Each UST would be removed in accordance with state and federal regulations.

Lead-based paint coatings on the inside of the LF and coatings on the exterior of the headworks and USTs that likely contain PCBs would be handled in accordance with federal and state regulations.

The dismantlement technique would include explosive demolition of the headworks to the depth of the launcher equipment room (LER) floor (approximately 21 feet). This depth complies with START protocols that require explosive demolition to at least six meters (19.5 feet) or mechanical demolition to at least eight meters (26.0 feet). For explosive demolition, everything above the floor of the LER, including the launcher closure door, would be removed for salvage or become rubble. Concentric holes would be drilled vertically in the concrete of the headworks for the placement of explosives.

To limit environmental impacts, the Air Force has produced specifications for explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The dismantlement contractor would be required to use the minimum amount of explosives necessary to implode the concrete and steel into the launch tube. The demolition of each LF would be designed to prevent the ejection of large pieces of debris outward from the launch tube. The site would be excavated to a depth of about 20 feet and rubble pushed into the launch tube. The Air Force estimates that the amount of rubble produced from destroying the upper 26 feet of the headworks would be sufficient to fill the launch tube to the elevation of the former floor of the LER.

The next sub-phase of the process would be an observation/verification period, a 90-day period following the demolition of the headworks. A contractor would place a steel-reinforced, 2-foot thick, 14-foot diameter, concrete cap over the launch tube, at a depth of approximately 28 feet. A plastic liner would be placed above the cap to limit infiltration of precipitation into the tube. Verification would be conducted by satellite observation.

After the observation period, the remaining excavations would be filled with rubble and gravel, backfilled, compacted, and contoured to leave a slightly mounded gravel surface to meld with existing gravel contours.

During dismantlement, the cathodic protection system control would be removed. The antenna located outside the fenced LF is buried several feet deep and would be left in place. Under the Proposed Action, the HICS, which connects an LF to a MAF, would be abandoned in place. The HICS has marker posts that define the path of the cable; these markers are approximately 3 to 5 feet in height. The landowners may remove the marker posts after the HICS easement has been relinquished. Power companies own the transformer pole and service connections to each LF; removal of the poles would be their responsibility. Azimuth markers are located near the missile sites to assist in helicopter navigation and are approximately 3 to 5 feet in height. These markers would be removed by the Air Force's dismantlement contractor only at a landowner's request. The markers would be buried in place unless the landowner(s) requested removal; the Air Force would

then excavate and remove the markers for burial as launch tube fill. The security fence would remain in place throughout dismantlement.

Phase 4 is the property disposal of the LF and MAF sites. The government owns the parcels upon which the LFs and MAFs are located, and holds a variety of easements near the LF and MAF sites that support the Peacekeeper missile system. The Air Force has no plans to retain any of the dismantled sites. After all START requirements have been met, and upon determination by the Secretary of the Air Force, the General Services Administration would dispose of the real property during Phase 4, and the easements would be terminated. The disposal process is covered in Public Law 100-180, Section 2325 (10 *United States Code* (U.S.C.) § 9781). The first priority of consideration is to adjacent landowner(s), who would be offered the property at fair market value.

2.1.4. MISSILE ALERT FACILITIES

A MAF is located within a fenced area averaging about 5.5 acres. All facilities are enclosed by a security fence, except for a helicopter pad and a buried antenna consisting of two intersecting rings (each about four feet in diameter) buried four feet below surface. The sewage lagoon is enclosed by a separate fence. Figure 2.1-5 shows the layout of a typical MAF. Top-side structures include a launch control support building (LCSB) and a detached garage. Subsurface structures include a launch control center (LCC) and a launch control equipment building (LCEB). Because Phase 1 only applies to LFs, the deactivation at the MAFs would start with Phase 2.

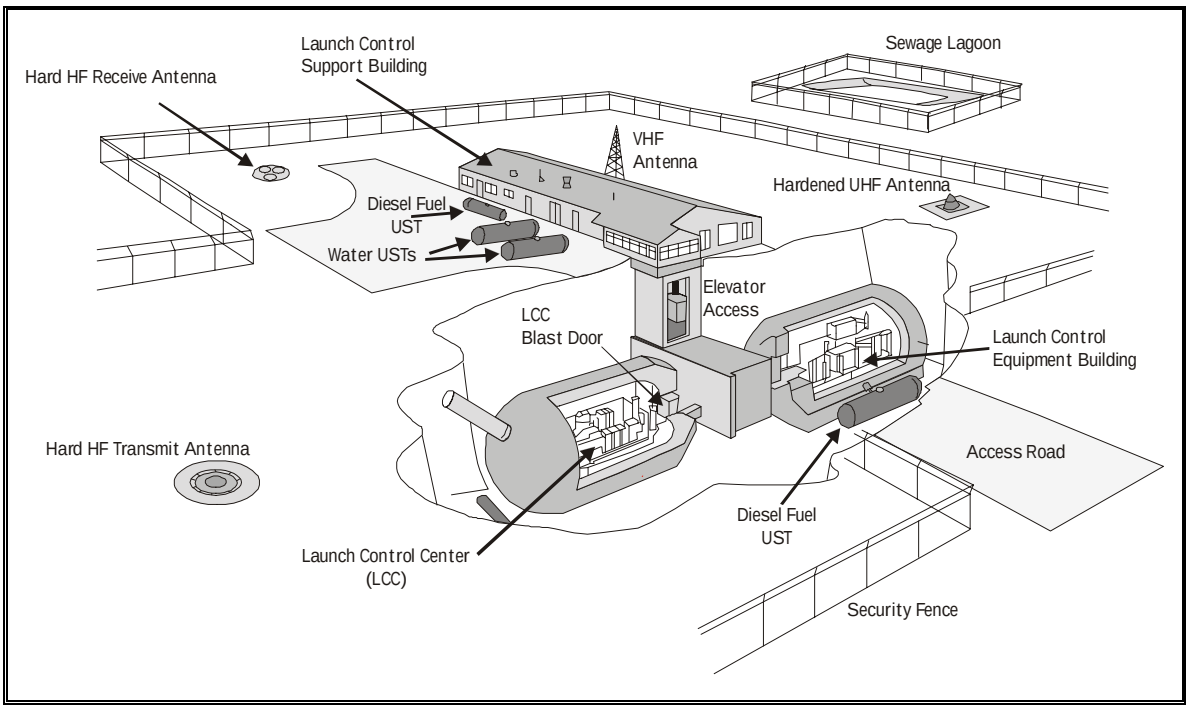

Figure 2.1-5. MAF Schematic

Phase 2 of the deactivation process involves the removal of salvageable items from the MAFs. All five Peacekeeper MAFs would remain operational until the last missile in the

400 MS is removed, then deactivation would proceed, with a MAF remaining active until all LFs in its flight have been deactivated. Classified items would be recovered from the LCC at each MAF, and office and living quarter items would be recovered.

Air Force personnel would drain fluids from the fueling, coolant, and hydraulic systems, remove electrical filters and switches, and remove the power supply batteries. The only asbestos believed to remain is in insulation on some pipes behind false ceilings of the LCSB and in the garage furnace room on two walls; this would be addressed in accordance with federal and state regulations.

Reusable items and equipment would be placed in the supply system for use by F.E. Warren AFB and other bases. Air Force security teams would perform periodic security checks of each location during site deactivation. Following deactivation activities, the gates would be secured and the sites would be placed in caretaker status. During caretaker status at the sites, sump pump and cathodic protection operations would be maintained to prevent damage to the facilities until dismantlement or other final disposition occurs, and operation of the remaining environmental control systems would be discontinued.

Phase 3. Dismantlement of a MAF during Phase 3 activities would include removing any remaining hazardous materials from the facilities, and retrieving salvageable materials, such as scrap metal. Each MAF contains several storage tanks. There are five tanks used to contain diesel fuel: a 14,500-gallon UST (buried approximately 45 feet deep), two 1,000-gallon ASTs, a 100-gallon AST, and a 2,500-gallon UST (buried about 3-4 feet deep). One 2,000-gallon motor gasoline (MOGAS) AST is located at each MAF, and there is also a 65-gallon AST containing lube oil. The ASTs would be removed and the USTs would be closed (removed or filled with inert material) in accordance with state and federal regulations. The deep-buried tank would be cleaned in accordance with State regulations. This would require excavating to gain access to the tank (Frank, 2000). The cathodic protection system control would be removed during dismantlement. The sewage lagoons at the MAFs would be sampled and closed in accordance with federal and state regulations. There is one water well at each MAF, with the exception of S-1 which has two water wells; well closures would be in accordance with state requirements.

The dismantlement contractor would be allowed to salvage items from the LCC and LCEB after the Air Force removal operations are complete. Reusable components of the radio antennas would be salvaged. Subsurface antenna structures would be filled with gravel or other inert fill, and the openings sealed. After salvage operations, the blast door to the LCC and the LCEB door would be welded shut. The elevator, elevator structure, controls, motor, and all structural steel stairs, platforms, and supports would be removed from the elevator shaft. These items would be dismantled for removal through the service door. An option would be to remove the motor and leave the rest as rubble. The vestibule in front of the LCC door and the entire elevator shaft and vestibule before the LCEB blast door would be filled with rubble, sand, gravel, and dirt, and reasonably compacted to within one to two feet of the top of the shaft. A reinforced concrete cap would be placed over the shaft to prevent settling and to deny access to the abandoned LCC structure. Air intakes and exhaust ducts would be filled and sealed with a 2-foot cap of reinforced concrete.

The MAF waste disposal system removes and disposes of all sewage from the LCSB, LCEB, and the LCC. Wastewater is discharged to the sewage lagoon by gravity flow drain

lines and pumps. The sewage lagoon is located outside the security fence. Solids in the lagoon are oxidized by bacterial action into an inert sludge, and sewage water is lost through evaporation.

The lagoon contents, both liquids and sludge, would be sampled prior to dismantlement. The liquids would be properly handled, which may include discharging sufficiently clean wastewater to surface waters, based on test results. Sludge disposal would also be dependent on test results. The dismantlement contractor would drain the lagoons, level and grade the lagoons and berms for proper drainage, and stabilize and seed the site with grasses; all of these actions would be done in accordance with Wyoming regulations.

The MAF buildings would not be demolished, but would be left as a part of the real property. The LCC interior and walls of the LCSB were painted with lead-based paint. USTs and sub-surface concrete and steel at MAFs likely have a coating that contains PCBs. These coatings would be handled in accordance with federal and state requirements.

Phase 4. The Air Force has no plans to retain any of the dismantled MAF sites. After all START requirements have been met, the General Services Administration would dispose of the real property during Phase 4. The disposal process is covered in Public Law 100-180, Section 2325 (10 U.S.C. § 9781). First priority of consideration is to adjacent landowner(s), who must pay fair market value.

2.1.5. SERVICE CONTRACTS

To maintain the capability of the 400 MS, the roads from F.E. Warren AFB to and within the deployment area must be kept in acceptable condition. The Air Force provides funding to the State and county departments of transportation for maintaining and improving these routes. Under the Proposed Action, funding to state and local governments for road maintenance would be based upon existing agreements. The majority of the funding would continue to support roads used by the MSs supporting the MM III missile sites.

As their primary source of power, the LFs and MAFs use electricity provided by Cheyenne Light, Fuel and Power and several rural electric cooperatives, including Wheatland Rural Electric Association, Rural Electric Company, and the Wyoming Rural Electric Company. Under the Proposed Action, the funding for these electrical contracts would be based on existing agreements.

2.1.6. PERSONNEL

Most of the DoD personnel affected by the deactivation of the Peacekeeper missile system at F.E. Warren AFB are the officers, enlisted personnel, and civilians associated with the Peacekeeper program. Approximately 220 positions at F.E. Warren AFB would no longer be authorized after the fourth quarter of fiscal year (FY) 2007, following a 3-year deactivation period.

2.2. IMPLEMENTATION ALTERNATIVES

Within the Proposed Action, two implementation options exist. These options are discussed in the following subsections.

2.2.1. MECHANICAL DEMOLITION OF THE HEADWORKS

Mechanical demolition could be used to destroy the headworks. However, this method has a number of practical difficulties. It may not be possible to store the amount of soil and gravel excavated on site when mechanically demolishing the headworks. A minimum depth of eight meters is required by the START protocols, and construction requirements limit the slope of the excavation, which would result in a greater quantity of material being generated from the excavation. This quantity of material may affect the drainage ditches surrounding the sites and would be subject to wind erosion. The excavation of sites would be larger, deeper, and more expensive than explosive demolition. Also, the amount of time needed to conduct mechanical demolition would be longer, possibly delaying the dismantlement schedule.

2.2.2. REMOVAL OF THE HARDENED INTERSITE CABLE SYSTEM

The HICS could be removed rather than left in place. There are approximately 570 miles of cable throughout the Peacekeeper missile deployment area; the cable is buried three to six feet below ground. The Air Force has a perpetual easement of 16.5 feet in width along the length of the HICS. A trench of several feet in width and slightly greater than the depth of the cable would need to be dug to retrieve the cable. The removal operations would require a great deal of time and expense, and would disturb areas that have not been disturbed for more than 30 years. This alternative would require the use of trenching equipment and other machinery, and would disrupt grazing and other agricultural operations during the cable removal activities. Disturbing the vegetative cover during the trenching process could result in wind and water erosion of soil, and possible sedimentation of nearby water bodies. Cable removal activities could also disturb wildlife, especially in sensitive habitat areas or during nesting or migration periods. If this alternative is implemented, these operations would take place in areas between the LFs and MAFs throughout the Peacekeeper deployment area.

2.3. DESCRIPTION OF THE NO ACTION ALTERNATIVE

The EIS will also evaluate the impact of the No Action Alternative. Under this alternative, the Peacekeeper missile system would be maintained in its current condition. Implementation of this alternative would not allow reductions of launchers and ICBMs according to START requirements. The United States Senate and the Russian Duma have ratified slightly differing versions of the START II Treaty due to subsidiary agreements reached after original United States Senate ratification, but before ratification by the Russian Duma. If the revised Treaty were ratified by the United States Senate and dismantlement did not occur, the United States would be in violation of that Treaty.

Electrical power company contracts for the deployment area would continue to be renewed at current levels, and funds would continue to be provided by the Air Force to the State Department of Transportation for the upkeep and improvement of roads from the Base to, and within, the deployment area. The approximately 220 personnel positions at F.E. Warren AFB that support the Peacekeeper missile system would continue to be authorized.

2.4. REASONABLY FORESEEABLE CUMULATIVE IMPACTS

The impacts of implementing the Proposed Action would be concurrent with other actions at F.E. Warren AFB and in the Cheyenne area. The 721st Mobile Command and Control Squadron relocated from Peterson AFB, Colorado to F.E. Warren AFB in 1999. The squadron was subsequently redesignated the 4th Command and Control Squadron. Until a permanent facility can be constructed, the squadron is occupying Bldg 930 on F.E. Warren AFB. A permanent facility will be constructed north of the existing firing range in FY 01 and will be operational by FY 03. The firing range will be moved to a location on the west side of the base adjacent to the west boundary. Relocating personnel from Colorado to F.E. Warren AFB increased the population of Cheyenne by approximately 350 persons (military personnel and family members). This increase in personnel occurred prior to any reduction in personnel associated with the Proposed Action. Environmental impacts of relocating personnel and assets were evaluated in an environmental assessment entitled *721st Mobile Command and Control Squadron Relocation, December 1998*.

Another action proposed at F.E. Warren AFB is to construct a facility to enhance service and efficiency in support of the maintenance and operation of MM III missiles, missile facilities, and launch facilities. The action is to construct a 97,000 square foot facility for mechanical, electrical, and pneudralic maintenance and repair; vehicle maintenance, repair, and storage; secure electronic test and repair; general storage, operations and dispatch; and administrative operations in support of the MM III missiles. This action would occur on base and would take place prior to disposition of any on-base Peacekeeper facilities. Environmental impacts of constructing and operating a service complex to enhance service and efficiency in support of the MM III missile system are being evaluated in an environmental assessment entitled *Minuteman III Service Complex*.

Further impacts of implementing the Proposed Action concurrently with other actions (including those in the Cheyenne area and within the deployment area) in the FY 00 to FY 07 timeframe are not known at this time, but will be addressed as they become identified. For example, landowners could create minor disturbances such as erosion if they remove marker posts after the restrictive easements for the HICS have been relinquished. Additional actions occurring on base during this timeframe would be assessed separately in other documents prepared to meet the requirements of the National Environmental Policy Act (NEPA).

2.5. SUMMARY OF POTENTIAL IMPACTS

Based on discussions with Air Force personnel, federal and state agencies, public comments received to date, and comparisons with similar activities, areas of potential concern for the Proposed Action and Implementation Alternatives have been identified. The potential impacts were evaluated and are described in Chapter 4.

Impacts can be adverse (negative) or beneficial. The intensity of an adverse impact can be *significant* or *not significant*. Beneficial impacts are not characterized as to their level of significance. The criteria used to define the intensity of impacts are discussed at the beginning of each resource section in Chapter 4, which also identifies any needed mitigations. Impacts are typically *adverse*, but *beneficial* effects can result if the action measurably improves the current condition. *No impact* is specified in cases in which a

resource would not be affected because certain resource elements (e.g., oil and gas wells, floodplains, or low-income or minority populations) are not present in the area of the Proposed Action or an Implementation Alternative. *No impact* could also occur under the No Action Alternative if there were no changes to the existing environment. Where applicable, impacts are also defined as permanent or long-lasting (long-term) or temporary and of short duration (short-term). For this project, short-term impacts are defined as those lasting up to three years (the timeframe for completing the project), whereas long-term impacts would last more than three years (beyond the construction and demolition activities).

Table 2.5-1 identifies the relative significance of impacts for each resource area under the Proposed Action, the two Implementation Alternatives, and the No Action Alternative. Although the No Action Alternative is the environmentally preferable alternative regarding short-term impacts, the Proposed Action is the preferred alternative for minimizing long-term impacts. Table 2.5-2 provides a text summary of the potential impact to the public and the environment from implementing the Proposed Action, the Implementation Alternatives, or the No Action Alternative.

Table 2.5-1
Summary of Impact Significance

		Implementation Alternatives		
	Proposed Action	***Mechanical Demolition***	***Removal of the HICS***	***No Action Alternative***
Legend: B = beneficial; N = no impact; NS = not significant; S = significant; ST = short-term; LT = long-term				
LOCAL COMMUNITY				
• Socioeconomics				
•• Population	NS	NS	NS	N
•• Employment & Income	B (ST), NS (LT)	B (ST), NS (LT)	B&NS (ST), NS (LT)	N
•• Housing	NS	NS	NS	N
•• Schools	NS	NS	NS	N
•• Utilities	NS	NS	NS	N
• Environmental Justice				
•• Environmental Justice	N	N	N	N
• Transportation				
•• Construction Traffic	NS	NS	NS	N
•• County Roads	S (ST), NS (LT)	S (ST), NS (LT)	S (ST), NS (LT)	N
• Land Use				
•• Land Use	NS	NS	S (ST), NS (LT)	N
HAZARDOUS MATERIALS AND HAZARDOUS WASTE MANAGEMENT				
• Health & Safety				
•• Public Safety	NS	NS	NS	NS
•• Worker Safety	NS	NS	NS	NS

Table 2.5-1 Summary of Impact Significance				
	Proposed Action	*Implementation Alternatives*		*No Action Alternative*
		Mechanical Demolition	*Removal of the HICS*	
Legend: B = beneficial; N = no impact; NS = not significant; S = significant; ST = short-term; LT = long-term				
• Hazardous Materials				
•• Asbestos	NS	NS	NS	NS
•• PCBs	NS	NS	NS	NS
•• Refrigerants	NS	NS	NS	NS
•• Fuels, Oils, & Ethylene Glycol	NS (ST), B (LT)	NS (ST), B (LT)	NS (ST), B (LT)	NS
•• LBP & cadmium electroplating	NS	NS	NS	NS
•• Pesticides	NS	NS	NS	NS
•• Lead-acid batteries	NS (ST), B (LT)	NS (ST), B (LT)	NS (ST), B (LT)	NS
• Hazardous Waste				
•• Hazardous Waste	NS (ST), B (LT)	NS (ST), B (LT)	NS (ST), B (LT)	NS
• Above Ground and Underground Storage Tanks				
•• ASTs and USTs	NS (ST), B (LT)	NS (ST), B (LT)	NS (ST), B (LT)	NS
• Solid Waste				
•• Solid Waste	NS	NS	NS	NS
• Wastewater				
•• Wastewater	NS (ST), B (LT)	NS (ST), B (LT)	NS (ST), B (LT)	NS
• Monomethyl Hydrazine and Nitrogen Tetroxide				
••MMH & Nitrogen Tetroxide	NS (ST), B (LT)	NS (ST), B (LT)	NS (ST), B (LT)	NS
NATURAL ENVIRONMENT				
• Geological Resources				
••Physiography & Topography	NS	NS	NS	N
•• Geology	NS	NS	NS	N
•• Mineral Resources	NS	NS	NS	N
•• Geologic Hazards	NS	NS	NS	N
•• Soils	NS	NS	NS	N
• Water Resources				
•• Groundwater	NS	NS	NS	N
•• Surface Water	NS	NS	S	N
•• Floodplains	N	N	S	N
•• Water Quality	NS	NS	S (ST), NS (LT)	N
• Air Resources				
•• Air Quality	NS (ST), B (LT)	NS (ST), B (LT)	NS (ST), B (LT)	NS
• Noise				
•• Noise	NS (ST), N (LT)	NS (ST), N (LT)	NS (ST), N (LT)	N

Table 2.5-1 Summary of Impact Significance				
		Implementation Alternatives		
	Proposed Action	*Mechanical Demolition*	*Removal of the HICS*	*No Action Alternative*
Legend: B = beneficial; N = no impact; NS = not significant; S = significant; ST = short-term; LT = long-term				
• Biological Resources				
•• Vegetation	NS	NS	S	N
•• Noxious Weeds	NS	NS	NS	NS
•• Wildlife	NS	NS	S	N
•• T&E Species	N	N	S	N
•• Wetlands	NS	NS	S	N
• Cultural Resources				
•• Cultural / Arch. Resources	NS	NS	NS	N

Table 2.5-2 Summary of Impacts				
	Proposed Action	*Implementation Alternatives*		*No Action Alternative*
		Mechanical Demolition	*Removal of the HICS*	
Legend: ST = short-term; LT = long-term				
LOCAL COMMUNITY				
• Socioeconomics				
•• Population	No significant impact to population	No significant impact to population	No significant impact to population	No impact to population
•• Employment & Income	ST beneficial impact to employment; no significant LT impact	ST beneficial impact to employment; no significant LT impact	ST beneficial impact to employment, no significant impact to agricultural production from HICS removal; no significant LT impact	No impact to employment or income levels
•• Housing	No significant impact to housing market	No significant impact to housing market	No significant impact to housing market	No impact to housing market
•• Schools	No significant impact to schools	No significant impact to schools	No significant impact to schools	No impact to schools
•• Utilities	No significant impact to utility companies and REC members	No significant impact to utility companies and REC members	No significant impact to utility companies and REC members	No impact to utility companies or REC members
• Environmental Justice				
•• Environmental Justice	No impacts to minority or low income populations	No impacts to minority or low income populations	No impacts to minority or low income populations	No impacts to minority or low income populations
• Transportation				
•• Construction Traffic	No significant impact from construction vehicles on area roads	No significant impact from construction vehicles on area roads	No significant impact from construction vehicles on area roads	No impact from construction traffic
•• County Roads	ST significant impact to gravel roads during wet conditions; No significant LT impacts from reduced traffic and funding	ST significant impact to gravel roads during wet conditions; No significant LT impacts from reduced traffic and funding	ST significant impacts from stress on area roads and detours; No significant LT impacts from reduced traffic and funding	No change in current vehicle traffic levels
• Land Use				
•• Land Use	No significant ST impact to land use; No significant LT increase in arable land	No significant ST impact to land use; No significant LT increase in arable land	Significant ST impact to land use; No significant LT increase in arable land	No impact to land use

Table 2.5-2 Summary of Impacts				
	Proposed Action	*Implementation Alternatives*		*No Action Alternative*
		Mechanical Demolition	*Removal of the HICS*	
Legend: ST = short-term; LT = long-term				
HAZARDOUS MATERIALS AND HAZARDOUS WASTE MANAGEMENT				
• Health & Safety				
•• Public Safety	No significant ST impact during and after dismantlement activities	No significant impact during and after dismantlement activities	No significant impact during and after dismantlement activities	No significant impact to public safety
•• Worker Safety	No significant impact during and after dismantlement activities	No significant impact during and after dismantlement activities	No significant impact during and after dismantlement activities	No significant impact to worker safety
• Hazardous Materials				
•• Asbestos	No significant impact from asbestos	No significant impact from asbestos	No significant impact from asbestos	No significant impact from asbestos in facilities
•• PCBs	No significant impact from PCB coatings	No significant impact from PCB coatings	No significant impact from PCB coatings	No significant impact from PCB coatings
•• Refrigerants	No significant impact from reclamation of refrigerants	No significant impact from reclamation of refrigerants	No significant impact from reclamation of refrigerants	No significant impact from continued use
•• Fuels, Oils, & Ethylene Glycol	No significant ST impact from handling; LT beneficial impact from removal of materials	No significant ST impact from handling; LT beneficial impact from removal of materials	No significant ST impact from handling; LT beneficial impact from removal of materials	No significant impact from continued use
•• LBP & cadmium electroplating	No significant impact due to low potential for affecting human health and groundwater quality	No significant impact due to low potential for affecting human health and groundwater quality	No significant impact due to low potential for affecting human health and groundwater quality	No significant impact from LBP and cadmium in facilities
•• Pesticides	No significant impact from potential residues	No significant impact from potential residues	No significant impact from potential residues	No significant impact from continuing use
•• Lead-acid batteries	No significant ST impact from handling; LT beneficial impact from removal	No significant ST impact from handling; LT beneficial impact from removal	No significant ST impact from handling; LT beneficial impact from removal	No significant impact from continued use
• Hazardous Waste				
•• Hazardous Waste	No significant ST impact during dismantlement activities; LT beneficial impact from proper disposal	No significant ST impact during dismantlement activities; LT beneficial impact from proper disposal	No significant ST impact during dismantlement activities; LT beneficial impact from proper disposal	No significant impact from continued use

Table 2.5-2 Summary of Impacts				
	Proposed Action	*Implementation Alternatives*		*No Action Alternative*
		Mechanical Demolition	*Removal of the HICS*	
Legend: ST = short-term; LT = long-term				
• ASTs/USTs				
•• ASTs and USTs	No significant ST impact during removal or closure; LT beneficial impact from removal	ST No significant ST impact during removal or closure; LT beneficial impact from removal	ST No significant ST impact during removal or closure; LT beneficial impact from removal	No significant impact from continued use
• Solid Waste				
•• Solid Waste	No significant impact from generation of solid waste from dismantlement activities	No significant impact from generation of solid waste from dismantlement activities	No significant impact from generation of solid waste from dismantlement activities	No significant impact from continued generation of solid waste
• Wastewater				
•• Wastewater	No significant ST impact; LT beneficial impact from no wastewater production	No significant ST impact; LT beneficial impact from no wastewater production	No significant ST impact; LT beneficial impact from no wastewater production	No significant impact from continuing use
• Monomethyl Hydrazine and Nitrogen Tetroxide				
•• MMH & Nitrogen Tetroxide	No significant ST impact from handling; LT beneficial impact from removal of fuel	No significant ST impact from handling; LT beneficial impact from removal of fuel	No significant ST impact from handling; LT beneficial impact from removal of fuel	No significant impact from continued use
NATURAL ENVIRONMENT				
• Geological Resources				
•• Physiography & Topography	No significant impact	No significant impact	No significant impact	No impact to physiography or topography
•• Geology	No significant impact	No significant impact	No significant impact	No impact to geology
•• Mineral Resources	No significant impact	No significant impact	No significant impact	No impact to mineral resources
•• Geologic Hazards	No significant impact	No significant impact	No significant impact	No impact from earthquakes
•• Soils	No significant impacts from erosion	No significant impacts from erosion	Significant impact to soils from removal of HICS	No impact to soils
• Water Resources				
•• Groundwater	No significant impact to aquifers	No significant impact to aquifers	No significant impact to aquifers	No impact to groundwater
•• Surface Water	No significant impact to surface waters	No significant impact to surface waters	Significant impact to surface water bodies disturbed during HICS removal	No impact to surface waters

Table 2.5-2 Summary of Impacts				
		Implementation Alternatives		
	Proposed Action	***Mechanical Demolition***	***Removal of the HICS***	***No Action Alternative***
Legend: ST = short-term; LT = long-term				
•• Floodplains	No impacts to floodplains	No impacts to floodplains	Significant impact to floodplains disturbed during HICS removal	No impact to floodplains
•• Water Quality	No significant impact to water quality	No significant impact to water quality	ST significant impact to water quality, no significant LT impact	No impact to water quality
• Air Resources				
•• Air Quality	No significant ST increase in air emissions from dismantlement activities; beneficial LT impact from decreased travel	No significant ST increase in air emissions from dismantlement activities; beneficial LT impact from decreased travel	No significant ST increase in air emissions from dismantlement activities; beneficial LT impact from decreased travel	No significant impacts in air emissions from continued missile system operation
• Noise				
•• Noise	No significant ST noise increase associated with dismantlement activities; no LT impact	No significant ST noise increase associated with dismantlement activities; no LT impact	No significant ST noise increase associated with dismantlement activities; no LT impact	No impact from continued missile system operation
• Biological Resources				
•• Vegetation	No significant impact	No significant impact	Significant impact to vegetation from removal of HICS	No impact to vegetation
•• Noxious Weeds	No significant impact from noxious weeds	No significant impact from noxious weeds	No significant impact from noxious weeds	No significant impact from noxious weeds
•• Wildlife	No significant impact on wildlife	ST No significant impact on wildlife	Significant impact to aquatic species if streams/rivers are disturbed	No impact to wildlife
•• T&E Species	No impacts to T&E species	No impacts to T&E species	Significant impact to nesting or migrating T&E birds in HICS path	No impacts to T&E species
•• Wetlands	No significant impact to wetlands from runoff	No significant impact to wetlands from runoff	Significant impact to wetlands and associated wetland species if HICS removed	No impact to wetlands
• Cultural Resources				
•• Cultural / Arch. Resources	No significant impact (with mitigation) to Cold War resources; no impact to NRHP properties	No significant impact (with mitigation) to Cold War resources; no impact to NRHP properties	No significant impact (with mitigation) to Cold War resources; no impact to NRHP properties	No impact to cultural resources

CHAPTER 3

AFFECTED ENVIRONMENT

3. AFFECTED ENVIRONMENT

This chapter describes the current existing environmental and socioeconomic conditions at F.E. Warren Air Force Base (AFB) and the missile system deployment area. The introduction defines the method for selecting resource areas for description and subsequent analysis, and then discusses the history, mission, and current operations of F.E. Warren AFB. The introduction is followed by sections that describe relevant environmental and socioeconomic resources.

3.1. INTRODUCTION

Chapter 3 provides information to serve as a baseline from which to identify and evaluate environmental and socioeconomic changes resulting from the deactivation and dismantlement of the Peacekeeper missile system. Topics discussed in this chapter are addressed under the general headings of community issues, hazardous materials and wastes, and the natural environment.

Community issues include socioeconomics and associated topics, such as housing and transportation issues. Hazardous materials and wastes include those hazardous substances that exist or may exist at the missile facilities. For example, asbestos is discussed because it may be found in the coatings of some of the buried tanks. Discussion of topics such as biohazardous wastes are excluded, since that type of waste was not generated nor stored at any missile location. Natural environment descriptions include topics such as air quality and biological resources. Certain topics were considered but not discussed in detail in this environmental impact statement (EIS), since there would be no potential impact to that particular resource. Visual resources, for example, are not discussed. Visual resources would not be impacted because the missile sites are generally flat (most facilities are buried), are located in agricultural areas, and would vary minimally in appearance after dismantlement. The graveled roads and pads would be left as they currently exist. Those five sites containing above ground missile alert facilities (MAFs) (several buildings per site) would be left intact. The principal change to the visual landscape would be the removal of several power line poles (assuming the power companies remove the poles). The visual change would be minimal and congruous with the existing agricultural setting.

The region of influence (ROI) is specified within each resource topic. For some topics, the ROI is determined by the geographical boundary of each site. An impact to archaeological resources, for example, would only occur within the disturbed area (i.e., within the boundary of a site). Potential impacts to other resources can transcend site boundaries, and may extend outside the deployment area. For example, the use of electrical power may be suspended at specific sites, and the loss of that revenue to a public utility may affect the price of electrical power to consumers throughout the region served by the utility.

The baseline conditions used for the purpose of the analyses are the conditions that currently exist (or as near to current conditions as are reasonably ascertainable). The baseline setting is compared to the projected conditions that would exist as a result of implementing a dismantlement alternative, or that would result if no action were taken.

Other references to previous conditions are used when needed, and are also presented in this chapter.

The Proposed Action would indirectly affect base facilities at F.E. Warren AFB. Destruction of on-base facilities as part of the Proposed Action is not planned to occur. On-base facilities could be reused by the Minuteman III missile program. The particular reuse of on-base facilities is unknown at this time. This chapter will discuss the baseline environment at F.E. Warren AFB to provide a basis for assessing potential environmental impacts. For example, the removal of hazardous material from the deployment area to the base are handled and disposed of using current base equipment, personnel, and facilities.

3.1.1. HISTORY OF F.E. WARREN AFB

F.E. Warren AFB has the distinction of being the oldest continually operating Air Force installation in the United States. The base began as the Fort D.A. Russell military post on July 4, 1867. The installation was constructed to protect the Union Pacific railroad crews that were laying tracks to California. The base has numerous historic buildings, including several buildings on the National Register of Historic Places, and a National Historic District. In 1930, President Hoover issued a proclamation changing the name of the post to Fort Francis E. Warren, honoring the Wyoming Territorial Governor, first state governor, and United States Senator for 37 years.

In 1949, 80 years after its founding, Fort D.A. Russell became Francis E. Warren AFB. As an Air Force installation the base was initially a training facility, with schools in aviation, engineering, administration, supply, and teletype. The base joined the Strategic Air Command (SAC) in 1958 and organized the nation's first solely Intercontinental Ballistic Missile (ICBM) wing. Atlas D and E missile sites in eastern Wyoming, western Nebraska, and northern Colorado were under F.E. Warren AFB.

The unit soon became the 90th Strategic Missile Wing. On July 1, 1963, the wing became the free world's largest ICBM unit, having 200 Minuteman I missiles in the tri-state area. Unlike previous weapons, the Minuteman missiles had the capability of being fired from hardened and widely dispersed underground silo launchers. The first Minuteman missiles deployed at F.E. Warren AFB were the "B" models, which contained one warhead. These missiles incorporated significant advances beyond the liquid-fueled, remote-controlled Atlas missiles.

In 1975, the 200 Minuteman II sites were converted to Minuteman IIIs, which can carry a maximum of three warheads, and in 1986 F.E. Warren AFB became the only base in the nation to deploy the Peacekeeper missile. By the end of 1988, deployment was complete, with 50 Peacekeeper missiles replacing 50 Minuteman III missiles. The Peacekeeper missile is capable of delivering 10 independently-targeted warheads. Both the Minuteman III and Peacekeeper missiles are dispersed in hardened silos to protect against attack and are connected to 20 underground MAFs through a system of hardened cables.

After an Air Force restructure in 1991, the unit dropped "Strategic" from its name and became the 90th Missile Wing. On July 1, 1992, F.E. Warren AFB was transferred from SAC to Air Combat Command. Under the current Air Force structure, F.E. Warren AFB

became part of Air Force Space Command (AFSPC) on July 1, 1993. As of October 1, 1997, the host wing was renamed the 90th Space Wing (SW).

3.1.2. MISSION AND OPERATIONS

The host unit at F.E. Warren AFB is the 90 SW, which has 20 MAFs along with 200 LFs for 50 Peacekeeper missiles and 150 Minuteman III missiles. The primary mission of F.E. Warren AFB is national security and storage and maintenance of missiles. The installation is part of the AFSPC and is home to the 20th Air Force, headquarters for the ICBM force. The deployment area for the Peacekeeper and Minuteman III missiles comprises 12,600 square miles of eastern Wyoming, western Nebraska, and northern Colorado; all Peacekeeper missiles are located in Wyoming. The 37th Helicopter Flight, with seven UH-1N helicopters, is the only flying mission on base. They support the missile mission and provide local support for search and rescue operations and emergency flights to major hospitals in Colorado.

3.2. LOCAL COMMUNITY

This section describes socioeconomic resources, environmental justice, transportation, and land use.

3.2.1. SOCIOECONOMICS

Socioeconomic resources are described in this section using demographic, employment, and income measures. These elements are the key factors influencing housing demand, education needs, infrastructure requirements, public finance, and the services sector. The data used are the most recent consistent data available.

Demographic and housing data were obtained from the U.S. Bureau of the Census (USBC) *1990 Census of Population and Housing* and from later population reports issued by the USBC. Employment, economic, and income data are from the U.S. Bureau of Economic Analysis (USBEA) (1999, 2000), the Wyoming Department of Employment (1999, 2000), and the Laramie County Community College Economic and Business Data Center (EBDC), (1999). Information on F. E. Warren AFB personnel, payroll, and housing were obtained from the 90 SW/PA, 90 CPTS/FMA, and 90 CES/CEH at F.E. Warren AFB. School data were provided by the Laramie County Public School District #1. Utility information was furnished by the 90 CES/CEM. Detailed socioeconomic data and graphs are found in Appendix F.

3.2.1.1. Regions of Influence

F.E. Warren AFB is located near the city of Cheyenne, Wyoming, and lies within Laramie County. The Peacekeeper deployment area includes Laramie, Goshen, and Platte Counties.

The socioeconomic ROI for this type of analysis is generally defined by the residence patterns of current installation personnel, the number of personnel changes associated with the action under consideration, and the value of any construction associated with the action. For this analysis, there are two categories of ROI: by residence and by

deployment area. A brief discussion of the ROIs is given below; they are illustrated in Figure 1.3-1.

The Residence ROI is Laramie County, where F.E. Warren AFB is located and where an estimated 98 percent of its military personnel reside and affect the county's employment, population, housing, and schools. Because most F.E. Warren AFB personnel reside in Laramie County, housing and schools will be discussed only for the Residence ROI.

The Deployment ROI comprises the three counties of the missile deployment area; Laramie County is also included in the Deployment ROI since there are missiles located within the county. Laramie County is predominantly urban, while Platte and Goshen Counties are primarily rural, with only a few small towns in each county.

3.2.1.2. Population

Key elements for describing the demographic characteristics of a given region include current and historic population numbers and a description of the factors affecting these changes. Section 3.2.2, Environmental Justice, describes the ethnic and poverty characteristics of the ROIs. Table 3.2.1-1 summarizes population trends for the ROIs and comparison regions.

Table 3.2.1-1
Population in Regions of Influence and Comparison Areas, 1970-1997

Area	Population			Percentage Change		
				1971-1997	1991-1997	
	1970	1980	1997	27-Year Total	7-Year Total	Average Annual
Residence ROI — Laramie County	56,360	68,649	79,060	36.4%	7.2%	1.0%
Two Rural Counties	17,371	24,015	21,401	20.2%	4.2%	0.6%
Deployment ROI — 3-County Area	73,731	92,664	100,461	32.6%	6.5%	0.9%
State of Wyoming	332,416	469,557	479,743	41.1%	4.7%	0.7%
United States	202,302,020	226,542,204	267,743,595	29.5%	6.2%	0.9%

Source: USBC, 1990 and 1999

3.2.1.2.1. Residence ROI Population Characteristics

The long history of F.E. Warren AFB (formerly known as Fort Russell), described in Section 3.1.1, goes back to 1867. During this period of uninterrupted service, the installation has been a contributor to population and economic growth in Cheyenne and Laramie County. Cheyenne is also the state capital and has long been a major center for the Union Pacific Railroad.

Laramie County has experienced steady population growth since 1930 except for the decade between 1960 and 1970, when population decreased by about 6 percent. During the 1970s, population jumped in Laramie County (a 22 percent increase), and the State of Wyoming (41 percent). These increases were, to a large extent, the result of the energy boom (the oil and coal industries) in Wyoming and corresponding increases in rail activity

and state government, both of which are centered in Cheyenne. In the 1980s, Laramie County continued to grow, although at a slower rate, with a total increase of about 6 percent in population, while Wyoming population declined by more than 3 percent and the U.S. population grew by nearly 10 percent.

Since the 1990 Census, Laramie County growth has accelerated, with the 1997 population of 79,060 representing an increase of nearly 17 percent over the 1990 population level. At the same time, Wyoming has increased by nearly 7 percent, while the U.S. population has expanded by less than 8 percent.

In 1999, F.E. Warren AFB had 3,810 military members and 4,110 family members (90 MS/DPMD, 1999). Of this total F. E. Warren AFB population of 7,920, an estimated 7,770 reside on- or off-base in Laramie County and represent nearly 10 percent of the county's total population. Nearly 70 percent of base personnel and their families (approximately 5,600 persons) reside off-base; more than 98 percent live in Laramie County.

3.2.1.2.2. Deployment ROI Population Characteristics

Population trends in the three counties are contradictory and reflect the dual nature of this ROI. Laramie County population trends are discussed in Section 3.2.1.2.1. Population in Goshen County grew slightly during the 1930s and 1940s, but declined during the 1950s and 1960s, while Platte County population declined during all four decades. These trends were typical for rural areas, as farms became more mechanized and job opportunities increased in towns and cities. During the 1970s and early 1980s, population fluctuated dramatically in Platte County, and to a lesser extent in Goshen County, probably as a result of changes in the agricultural economy and the energy sector. Since the mid-1980s, population has been somewhat more stable, with smaller fluctuations. The combined 1997 population of 21,400 for the two rural counties represents more than a 4 percent increase over the 1990 population levels. The three-County deployment area constitutes approximately one-fifth of Wyoming's total population, a proportion that has changed little since 1930.

3.2.1.3. Employment and Income

Key measures of a region's economic strength include the number of individuals employed, employment growth, economic diversification, unemployment, and income. This section discusses characteristics and growth patterns of employment and income in the ROIs. Table 3.2.1-2 summarizes employment trends for the ROIs and comparison regions. Section 3.2.2, Environmental Justice, contains a discussion of the poverty characteristics of the ROIs.

3.2.1.3.1. Residence ROI Employment and Income Characteristics

Between 1970 and 1997, Laramie County employment grew by nearly 75 percent, slightly higher than the U.S. employment growth during that period but lagging behind Wyoming's 91 percent growth.

As of 1997, Laramie County had a fairly diversified economy, with a high proportion of employment in the government sector (almost 30 percent of all employment).

Table 3.2.1-2 Employment in Regions of Influence and Comparison Areas, 1970-1997						
Area	Employment			Percentage Change		
				1970-1997	1990-1997	
	1970	1980	1997	27-Year Total	7-Year Total	Average Annual
Residence ROI — Laramie County	28,560	42,692	51,166	74.3%	12.1%	1.6%
Two Rural Counties	8,131	11,888	12,572	49.6%	13.8%	1.9%
Deployment ROI — 3-County Area	36,691	54,580	63,738	68.8%	12.4%	1.7%
State of Wyoming	159,382	279,637	315,393	91.3%	12.8%	1.7%
United States	91,281,600	114,231,200	156,410,400	70.8%	12.7%	1.7%
Source: USBEA, 1999						

As shown in Figure 3.2.1-1, nearly 60 percent of government employees worked for state or local government, while the remainder were federal civilian (Fed. Civ.) or military (Mil.) personnel.

Services and trade (wholesale and retail) were the other major employment sectors, accounting for 23 percent and 21 percent of jobs, respectively (USBEA, 1999). The finance, insurance, and real estate sector provided 9 percent of the county's jobs, construction and transportation and public utilities sectors each provided 6 percent, and the manufacturing and agricultural sectors provided the remaining employment.

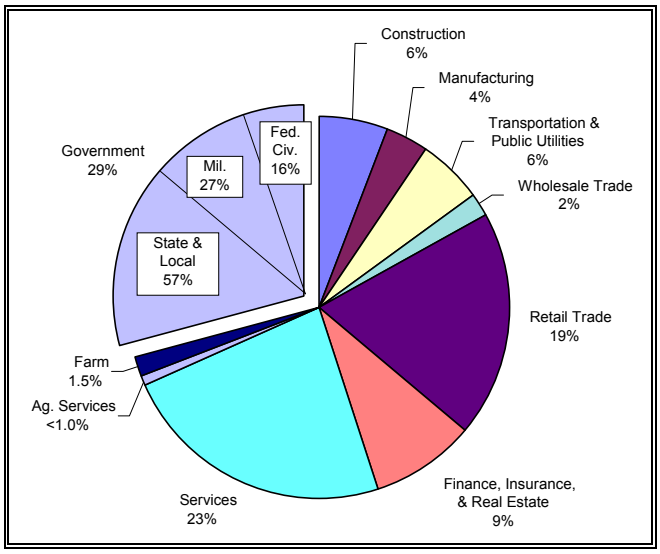

Figure 3.2.1-1. Laramie County Employment by Industry, 1997

In November 1999, unemployment in Laramie County was only 3.0 percent, compared to 3.3 percent in November 1998, while average unemployment for all of 1998 was 3.6 percent (WDE, 2000). The Great Plains area typically has lower unemployment rates than the U.S. as a whole, and frequently suffers labor shortages in some occupations. November 1999 unemployment was 4.1 percent for both Wyoming and the U.S.

Total personal income (TPI) for 1997 in Laramie County was $1.8 billion, accounting for more than 16 percent of the state's total income. Per capita income (PCI), which is calculated by dividing an area's TPI by its total population, is used to compare income across regions. The 1997 PCI in Laramie County was approximately $22,815, which was

90 percent of the U.S. PCI ($25,288) and slightly higher than Wyoming's PCI ($22,596) (USBEA, 1999).

In 1998, the total valuation of building permits issued by the City of Cheyenne was $57.8 million. This followed two years of greater construction activity ($87.5 million in 1997 and $95.7 million in 1996), which is turn followed gradual increases from $25.2 million in 1990 to $51.6 million in 1995. The City of Cheyenne requires all construction within the city limits to obtain a building permit. The permit valuations do not include construction outside the city limits of Cheyenne; Laramie County does not issue building permits (Heatherington, 2000).

In June 1999, F.E. Warren AFB had approximately 3,810 military members and 1,200 civilian employees, contributing about 10 percent of total employment in Laramie County. Annual payroll for all military and civilian employees totaled $137 million, about 8 percent of Laramie County's total personal income. Pay to military retirees within a 50-mile radius of the base totaled $77 million. During FY 1999, the base had expenditures of $40 million, some proportion of which contributed to the Laramie County economy (USAF, 1999j).

3.2.1.3.2. Deployment ROI Employment and Income Characteristics

Total 1997 employment in the three-county Deployment ROI was approximately 63,700, which constitutes 20 percent of the state's employment. Because Laramie County contributes 80 percent of the Deployment ROI's employment, the trends for the two ROIs are very similar. However, the two rural counties, Goshen and Platte, show smaller growth. Goshen County has experienced a fairly steady upward trend, while Platte County employment has fluctuated more.

As of 1997, the economy of the two rural counties was also fairly diversified (USBEA, 1999). Government and trade (retail and wholesale) sectors were the largest employment sectors, with each contributing 19 percent of employment. The combined farming and agricultural services sectors accounted for 15 percent, while identifiable service sector employment provided 14 percent of the total. (However, 1,900 Platte County employees were undisclosed by sector but probably belong to the service and transportation/public utilities sectors. Non-disclosure provides data confidentiality where only one or two employers are found in a sector, which can occur in a small economy.) The remaining sectors contribute 6 percent or less of employment.

In November 1999, unemployment in Goshen County was only 3.0 percent, compared to 3.3 percent in November 1998, while average unemployment for all of 1998 was 4.7 percent. Unemployment in Platte County was 3.9 percent, compared to 4.6 percent in November 1998, while the 1998 average was 4.9 percent (WDE, 2000).

The TPI for 1997 in Goshen County was $221.4 million, accounting for 2.0 percent of the state's total income, while Platte County's income was $172.8 million, representing 1.6 percent of the state total. The 1997 PCI in Goshen County was $17,099, which is 68 percent of the U.S. PCI, while Platte County PCI was $20,213 (80 percent of the U.S. value) (USBEA, 1999).

In 1998, the total valuation of building permits issued by the City of Wheatland (Platte County) was $1.6 million, while Torrington (in Goshen County) shows permits of $3.3 million. Wheatland and Torrington are the county seats and the largest towns in their respective counties. These permit valuations do not include construction outside the city limits of Wheatland and Torrington; neither county issues building permits.

3.2.1.4. Housing

This section discusses residence patterns of F.E. Warren AFB personnel and describes Laramie County housing characteristics. As noted in Section 3.2.1.1, housing will be discussed only for the Residence ROI, Laramie County, where an estimated 98 percent of the off-base residents live (USAF, 1999i).

3.2.1.4.1. F. E. Warren AFB Personnel Residence Patterns

As of 1999, about 30 percent of F.E. Warren AFB military personnel (1,120) resided on base, along with an estimated 1,200 dependents. Of the on-base residents, 7 percent are officer households, while 93 percent are enlisted personnel households. The remaining 70 percent of F.E. Warren AFB personnel (2,690) and their estimated 2,900 dependents lived off base. Of these, 19 percent are officer households, while 81 percent are enlisted personnel households (USAF, 1999i).

Currently, there are approximately 720 family housing (FH) units in service at F.E. Warren AFB, along with dormitories that provide about 500 rooms. F.E. Warren AFB housing units include the 19th Century historic red brick houses surrounding the parade ground, which are part of the National Historic District listed on the National Register of Historic Places (see Section 3.4.6, Cultural Resources). The 156 “bricks” are still used for family housing, along with modern units in Carlin Heights (265 units), Capehart (200 units), and Wherry Housing. The 210 Wherry Housing units built in 1951 no longer met Air Force standards and were recently demolished. Approximately 100 replacement units are now in service; the remaining 110 units are expected to be completed later in 2000, making a total of approximately 830 housing units at F. E. Warren AFB.

On-base housing is essentially full. Waiting times for housing vary by housing size and grade, with generally longer waits for larger units. For junior non-commissioned officers (NCO), waits are from 3-20 months, senior NCOs wait 3-9 months, company-grade officers wait 22-26 months for 1-3 bedroom units and more than 2 years for 4-bedroom units, and field-grade officers wait 6-12 months (Lawrence, 2000).

3.2.1.4.2. Local Housing Characteristics

At the time of the 1990 Census, there were approximately 30,500 year-round housing units in Laramie County, of which 92 percent were occupied. Approximately 65 percent of the occupied units were owner-occupied. The vacancy rate for owner-occupied housing units was only 2.7 percent, while the vacancy rate for rental units was 10.3 percent.

The 1990 Census reported housing costs in Laramie County at a median value of $69,800 for owner-occupied homes and $312 for median contract monthly rent, low to moderate in cost compared to many parts of the U.S. and lower than the U.S. medians at that time of $79,100 and $374, respectively. However, according to the F.E. Warren AFB Housing

Office, current monthly rents for unfurnished apartments in the area range from $400 to $500 for a 600-sq ft apartment with two bedrooms and one bath, while a 3-bedroom apartment could cost $750 per month. Rent for a typical 1,500 sq ft home with three bedrooms and two baths ranges from $900 to $1,000 per month. The average sale price of a 1,500 sq ft home is approximately $100,000. Affordable housing that is suitable for military families is very scarce in Cheyenne, where much of the new home construction is larger homes that are too expensive for the average military family.

The basic allowance for housing (BAH) for F.E. Warren AFB was recently reduced. Examples of the current BAH monthly amounts are $489 for a staff sergeant (E5), $651 for a chief master sergeant (E9), and $717 for a major (O4) (Lawrence, 2000).

3.2.1.5. Education

This section discusses the school district that serves F. E. Warren AFB. As noted in Section 3.2.1.1, schools will be discussed only for the Residence ROI. The Laramie County School District Number 1 (LCSD1) serves most of Laramie County, including nearly all F.E. Warren AFB dependents. The eastern portion of the county, including Pine Bluffs, Albin, Buras, and Carpenter, is served by LCSD2. Since only a few F. E. Warren AFB households live in LCSD2, only LCSD1 will be discussed. The following information was provided by LCSD1 personnel (White, 1999; Wiggam, 1999; Christopherson, 2000).

3.2.1.5.1. Schools and Enrollment

No schools are located on-base; students who are dependents of on-base F. E. Warren AFB personnel attend designated schools in Cheyenne. Students dependents of off-base personnel attend LCSD1 schools for their neighborhood.

Figure 3.2.1-2 shows LCSD1 enrollment trends since 1990, with annual percentage changes in enrollment. Current school enrollment is generally at capacity for existing facilities (White, 1999).

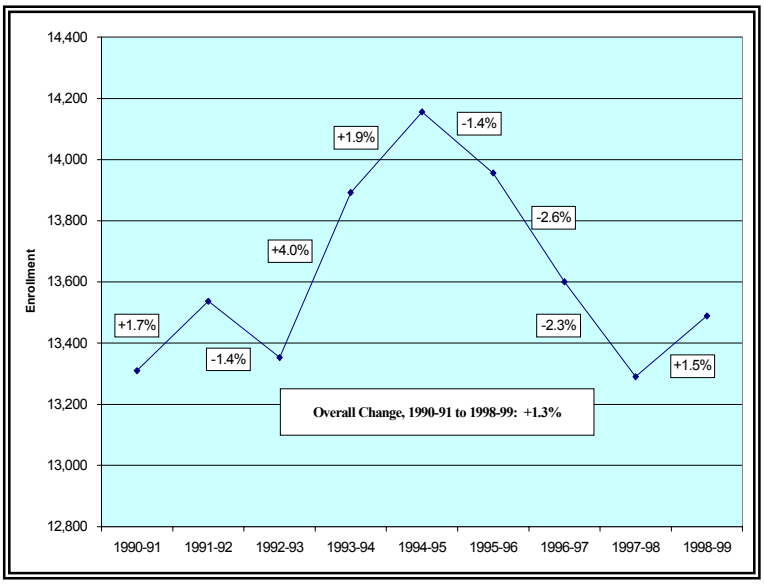

Figure 3.2.1-2. Laramie County School District 1 Enrollment Trends, 1990-91 to 1998-99

The total enrollment for the 1998-99 school year for LCSD1 was approximately 13,500 students, representing an increase of only 1.3 percent over 1990-91 enrollment. Increases in school enrollment have not followed population

increases, because many of the community's in-migrants are younger persons who do not yet have school-age children, or retirees (Christopherson, 2000).

3.2.1.5.2. Federal Impact Aid

Federal impact aid is paid by the federal government to local school districts who have large federal installations within their boundaries. The intent of this aid is to offset the loss of property taxes that would be received by the district if this property were privately owned and if on-base residents paid local property taxes. Impact Aid payments are substantially higher for Category A students, who are dependents of on-base residents, than for Category B students, who are dependents of off-base residents (including civilian employees). Higher payments in both categories are made for students with disabilities.

The LCSD1 receives impact aid of $0.46 million, representing slightly over 0.5 percent of its total budget (Wiggam, 1999). Not all of this aid is based on students who are dependents of F. E. Warren AFB personnel, since the county is host to several other federal agencies for whose dependent children LCSD1 also receives impact aid.

3.2.1.6. Utilities

This section describes rural electrification and provides information about the providers of electric power to F. E. Warren AFB and the missile sites. Domestic water usage and sources are discussed in more detail in Section 3.4.2.

Rural electric cooperatives (REC) began during the Great Depression in the 1930s as a way to bring affordable electric power to sparsely populated rural areas. Rural residents banded together and contributed membership fees to form cooperatives. With the help of the Rural Electrification Administration (now the Rural Utilities Service), the RECs installed power lines and bought power from existing utility companies for distribution to their members. Today, RECs still provide much of the electrical service for rural agricultural areas. RECs are owned by their members, who live within each REC's service area. Urbanized areas may be served by investor-owned utilities, which are owned by their stockholders, who can reside anywhere. Other areas such as municipalities may be served by public power districts, which are quasi-governmental agencies who are authorized by state legislation and whose boards of directors are elected by the public in their service areas.

Cheyenne Light, Fuel, & Power Company supplies F. E. Warren AFB and the city of Cheyenne with electricity and natural gas. The Cheyenne Board of Public Utilities supplies water to the base and the city.

Electricity for all but four of the launch facilities (LF) and missile alert facilities (MAF) is supplied by three RECs: Rural Electric Company, Wheatland Rural Electric Association, and WYRULEC Company. Because they serve the missile sites, these cooperatives receive an Air Force allocation of low-cost Western Area Power Administration (WAPA) federal preference power. The savings from this low-cost power have been shared by all REC members since the missile system was installed. The remaining four LFs receive power from Cheyenne Light, Fuel, & Power Company.

The MAFs have wells to provide domestic water. There are no water sources at the unmanned LFs. Maintenance crews or security police bring their own water, as needed, during activities at the LFs.

3.2.2. ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was signed by the President on February 11, 1994. This EO requires that each federal agency identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. In order to evaluate these potential effects, demographic data on minority and low-income populations are provided in this section.

The terms "low-income" and "minority" are defined according to guidance published by the Air Force Center for Environmental Excellence (AFCEE). Under this guidance, "low-income" is defined as persons below the poverty level. The poverty threshold, which is a function of family size and is adjusted over time to account for inflation, was designated by the federal government as $13,301 for a family of one adult and three children in 1990 and had risen to $16,588 in 1998. "Minority" means persons designated in census data as Black (African-American); American Indian, Eskimo, or Aleut (Native American); Asian or Pacific Islander; Other; or of Hispanic origin (AFCEE, 1997). According to the USBC, the Hispanic origin designation is separate from the ethnic (racial) designation, as Hispanic persons can be of any race (USBC, 1990). Within this document, to avoid confusion and eliminate double-counting, the Hispanic population is differentiated from ethnic (racial) minority populations. The ROI definitions for Environmental Justice are the same as those used in Section 3.2.1, Socioeconomics.

This section describes the minority and low-income characteristics of the two ROIs. The descriptions are based on data from the 1990 Census of Population and Housing, which provides the latest reliable data regarding ethnic characteristics. Table 3.2.2-1 summarizes the proportions of ethnic, Hispanic, and low income populations for the two ROIs and comparison areas.

3.2.2.1. Residence ROI Minority and Low-Income Characteristics

The 1990 Census found that the population of Laramie County was 91 percent White, 3 percent Black, 1 percent each Native American and percent Asian, with Other accounting for 5 percent of the total; 10 percent are considered Hispanic, which can be any race. Laramie County has the highest proportion of Blacks and Asians within the deployment area, undoubtedly due to the presence of F.E. Warren AFB.

Wyoming has a smaller proportion of minority population than Laramie County, with only 6 percent of its population considered Hispanic. In contrast, the U.S. population is approximately 20 percent minority, with Blacks (12 percent) as the largest minority group, and Hispanics representing nearly 9 percent of total population.

As of 1990, less than 11 percent of the Residence ROI's population was below the poverty level, while nearly 12 percent of the state's population and about 13 percent of the U.S. population was in this category (USBC, 1990). The 1997 PCI for Laramie County was $22,815, which represents 90 percent of the U.S. per capita income.

Table 3.2.2-1 Minority and Low-Income Population in Regions of Influence and Comparison Areas, 1990							
Area	Percent of Total Population by Ethnic Origin					Hispanic Origin	Percent Low Income
	White	African-American	Native American	Asian	Other		
Residence ROI — Laramie County	90.6%	3.0%	0.7%	1.1%	4.5%	10.0%	10.6%
Two Rural Counties	96.5%	0.1%	0.6%	0.1%	2.6%	7.2%	16.6%
Deployment ROI — 3-County Area	91.9%	2.4%	0.7%	0.9%	4.1%	9.4%	11.9%
State of Wyoming	94.2%	0.8%	2.1%	0.6%	2.3%	5.7%	11.9%
United States	80.3%	12.1%	0.8%	2.9%	3.9%	9.0%	13.1%
Source: USBC, 1990							

3.2.2.2. Deployment ROI Minority and Low-Income Characteristics

As shown in Table 3.2.2-1, the three-county deployment area is 92 percent White. Native Americans comprise less than 1.0 percent of the three-county population; other minorities combined total about seven percent. The minority populations are concentrated in Laramie County, which is the residence for 99 percent of the deployment area's African-Americans, 81 percent of the Native Americans, 97 percent of the Asians, and 86 percent of the population characterized as Other.

Persons of Hispanic origin make up 9 percent of the Deployment ROI population. Of the deployment area's Hispanic population, 83 percent reside in Laramie County, 12 percent in Goshen County, and only 5 percent in Platte County.

For the Deployment ROI as a whole, 12 percent of the population is below the poverty threshold, only slightly higher than the Residence ROI; these rates are comparable to the rates for the state of Wyoming and the U.S. as a whole. The two rural counties (Goshen and Platte) have somewhat higher poverty rates (17 percent and 16 percent, respectively). The higher poverty rates likely result from two factors. First, the rural counties have a higher employment concentration in the services sector, which tends to offer lower-paid jobs in rural areas. Second, when compared to the U.S., Wyoming, and Laramie County, the two rural counties have a lower level of employed persons as a percent of total population, resulting in lower family or household incomes and higher rates of poverty. Per capita incomes for the two counties are somewhat lower than Laramie County's PCI; Goshen County's PCI is $17,099 (68 percent of the U.S. value), while Platte County's PCI is $20,213 (80 percent of the U.S. value).

No concentrations of low-income or minority populations occur near the missile sites.

3.2.3. TRANSPORTATION

The transportation infrastructure in the region of F. E. Warren AFB and the deployment area includes roadways, railways, and airports. The following subsections describe these traffic pathways.

3.2.3.1. Roadways

F.E. Warren AFB is located just west of Interstate 25 and about two miles north of Interstate 80 at the western edge of Cheyenne (see Figure 1.3.1). Three gates provide access to the base from Interstate 25. The Main Gate is accessed via Randall Drive, which intersects I-25 in the west-central area of Cheyenne. The South Gate provides access to the base from Missile Drive, and the North Gate is located along Central Avenue (see Figure 1.1-3).

The Peacekeeper deployment area covers approximately 2,000 square miles in southeastern Wyoming. Because the topography is rolling hills, the road network is somewhat irregular. The main road network in this area (see Figure 1.3-2) includes two north-south routes (Interstate 25 and U.S. 85) and one east-west route (State Highway 313). Other routes used include State Highways 152, 154, 158, 161, 211, 314, 316, and 320, as well as numerous county roads.

The Air Force has approved primary routes on which all missile transporters and overweight vehicles must travel. These Defense Access Roads (DAR) are maintained by Federal funding (discussed in further detail below) and are used for access to Peacekeeper and Minuteman sites. Secondary routes within the deployment area are maintained by State and County authorities. These routes have restrictions for vehicle width and weight. The mileage of each type of road used as a DAR is listed in Table 3.2.3-1, while Figure 3.2.3-1 illustrates the network of primary and secondary routes within the deployment area.

About 71 percent of the DARs are used for Peacekeeper sites and about 29 percent are used to access Minuteman sites within the three counties that include the Peacekeeper sites. Most of the Minuteman mileage is in Laramie County. Gravel roads maintained by Federal Lands Highway Projects Office (FLHPO) funding total about 65 miles in Laramie County (about four percent of the total county roads), about 47 miles in Goshen County (about 16 percent of the total county roads), and about 18 miles in Platte County (about four percent of the total county roads).

Nine Peacekeeper launch facilities (LF) are located within ¼ mile of U.S. and State highways. Table 3.2.3-2 provides a list of these locations and the adjacent highway. All other LFs are located along county roads, within the same range of distances from the edge of the road.

The LFs and MAFs are accessed along paved major roads and finally by gravel roads. Approximately 200 trips per year were dispatched for normal maintenance of Peacekeeper missiles in 1999 (Schuler, 1999). Additional trips would be generated for food service and security personnel. An average round trip from the missile support base (MSB) to a site is approximately 60 miles. Each of the LFs are serviced four times per year. Any given access route to an LF averaged approximately one trip daily.

Vehicles associated with the 90 SW travel an average of 8 million miles per year (Charron, 1999). Assuming that about one-fourth of these miles are associated with Peacekeeper operations, roughly 2 million miles are driven in the Peacekeeper deployment area.

Table 3.2.3-1 Defense Access Road (DAR) Mileage in the Laramie, Goshen, and Platte Counties				
Type of Road	**Laramie County**	**Goshen County**	**Platte County**	**Three County Total**
Interstate – Peacekeeper	35.9	0.0	34.1	70.0
Interstate – Minuteman	46.4	0.0	0.0	46.4
Total Interstate	82.3	0.0	34.1	116.4
Percent Peacekeeper	43.6%	NA	100.0%	60.1%
U.S. Highway – Peacekeeper	39.7[1]	33.2[2]	0.0	72.9
U.S. Highway – Minuteman	0.0	0.0	0.0	0.0
Total U.S. Highway	39.7	33.2	0.0	72.9
Percent Peacekeeper	100.0%[1]	100.0%[2]	NA	100.0%
State Highway – Peacekeeper	0.0	41.5	34.0	75.5
State Highway – Minuteman	38.3	10.0	0.0	48.3
Total State Highway	38.3	51.5	34.0	123.8
Percent Peacekeeper	0.0%	80.6%	100.0%	61.0%
County Paved – Peacekeeper	17.0	9.0	35.0	61.0
County Paved – Minuteman	41.0	1.0	0.0	42.0
Total County Paved	58.0	10.0	35.0	103.0
Percent Peacekeeper	29.3%	90.0%	100.0%	59.2%
County Gravel – Peacekeeper	65.0	46.5	18.0	129.5
County Gravel – Minuteman	29.7	0.0	0.0	29.7
Total County Gravel	94.7	46.5	18.0	159.2
Percent Peacekeeper	68.6%	100.0%	100.0%	81.3%
Total Peacekeeper	157.6	130.2	121.1	408.9
Total Minuteman	155.4	11.0	0.0	166.4
Total DAR	313.0	141.2	121.2	575.3
Percent Peacekeeper	50.4%	92.2%	100.0%	71.1%

[1] U.S. Highway 85 is used for Peacekeeper and Minuteman for 39.7 miles in Laramie County
[2] U.S. Highway 85 is used for Peacekeeper and Minuteman for 6.0 miles in Goshen County
NA is Not Applicable
Sources: USAF, Undated b; WYDOT, 1994; WYDOT, 1995; WYDOT, 1996

Change-out of missiles is based on need. Some are being removed under an age surveillance program. Moving the missile to or from an LF is a 7-day process, and takes longer if there are equipment or weather problems. Each stage of the Peacekeeper missile is handled separately from the others with a Type II vehicle that has replaceable containers depending on what component is being moved. A security team is used when components are being transported. Helicopters and a convoy of security vehicles, including a U.S. Marshall in a vehicle, protects the shipments. The components are transported to the missile stage processing facility at F.E. Warren and the stages are fitted with support rings for storage and shipping.

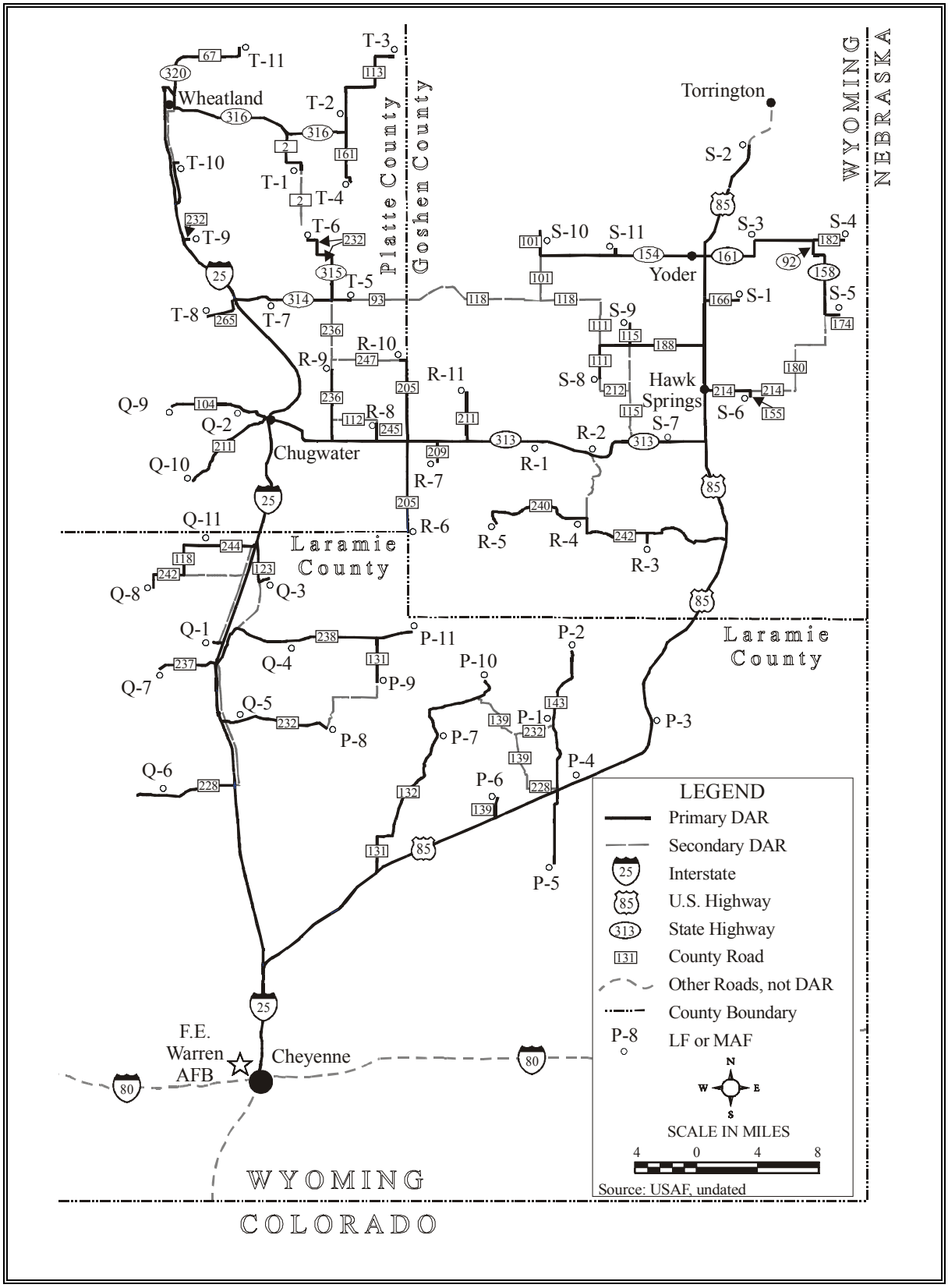

Figure 3.2.3-1. Major Highways in the Deployment Area

Table 3.2.3-2 Peacekeeper Launch Facilities (LF) Within ¼ Mile of State and U.S. Highways			
Launch Facility	**Adjacent Route**	**Distance from LF to Road[1]**	**County**
P-3	U.S. Highway 85	420	Laramie
P-4	U.S. Highway 85	670	Laramie
R-2	State Highway 313	250	Goshen
S-2	U.S. Highway 85	550	Goshen
S-3	State Highway 161	660	Goshen
S-7	State Highway 313	260	Goshen
S-11	State Highway 154	220	Goshen
T-5	State Highway 314	290	Platte
T-7	State Highway 314	140	Platte

[1] Distance from the fenceline of the LF to the nearest edge of the road, in feet (rounded to nearest 10 feet).
[2] S-2 is 380 feet from County Road 151 and is 550 feet from U.S. Highway 85.
[3] T-10 is 1/3 mile east of Interstate 25.
Sources: USAF, 1962; USAF, 1995b; USAF, Undated b; USDA, 1971; USDA, 1999a; USDA, 1999b; USDA, 1999c.

Vehicles involved in missile changeout and maintenance include an Emplacer (an oversized semi tractor-trailer truck with oversize load signs); three or four Rambo vehicles (similar to a semi tractor-trailer) used for transporting equipment, personnel, or a missile guidance control set (MGCS); and a Type II vehicle (a specially designed vehicle, meeting U.S. Department of Energy and Department of Defense regulations for transporting missile components). Pictures of these vehicles can be found in Appendix G.

Four reportable mishaps involving general purpose Air Force vehicles assigned to F. E. Warren AFB occurred during FY 1999 (Vigio, 1999). Considering over 1,000 trips per year totaling about 2 million miles occur throughout the deployment area, the number of mishaps (accident rate) is negligible (about 0.000002 accidents per mile driven). In the State of Wyoming, there were 16,635 accidents in 1997 for 7,649,000,000 miles driven (about 0.0000022 accidents per mile driven) (WYDOT, 1999a). The accident rate for the Air Force and the State of Wyoming is nearly identical.

There has been only one incident involving a special vehicle used for Peacekeeper missile maintenance: an accident with a "Rambo" vehicle in 1994. This accident did not involve the release of any hazardous or radioactive materials (the Rambo does not carry radioactive components).

Traffic in the deployment area is generally light to moderate. As shown in Table 3.2.3-3, roads in the deployment area have a level of service (LOS) of A. LOS A is characterized by free flow operations with nearly unimpeded ability for drivers to maneuver among lanes. This LOS could deteriorate somewhat under certain conditions, such as severe weather or other emergencies.

The Air Force uses a network of highways and county roads to access the LFs and MAFs. This includes 313 miles of paved interstates and highways, 103 miles of paved county roads, and 159 miles of gravel county roads. The State of Wyoming is responsible for maintenance of U.S. interstates and highways, and state highways. Federal funding accounts for about 50 percent of the Wyoming Department of Transportation (WYDOT)

Operating Budget (WYDOT, 1999b); State taxes (including mineral taxes and royalties) account for the other 50 percent. The majority of this budget is allocated for the State Highway System, which includes U.S. Interstate and Highways, and State Highways.

Counties are responsible for maintenance of all paved county roads (whether they are part of the DAR system or not), as well as county gravel roads that are not part of the DAR system for Peacekeeper and Minuteman missile systems. Funding for county road budgets comes from a variety of sources. Counties receive 20 percent of the state diesel fuel tax and 14 percent of the state gasoline tax collected in the county. Counties also use some of their sales and property tax revenue for maintaining and improving county roads (Hibbard, 1999).

Table 3.2.3-3
Annual Average Daily Traffic in the Peacekeeper Deployment Area

County	Route	Location	1997 Car	1997 Truck	1998 Car	1998 Truck	LOS[1]
Laramie	I-25/US 87	Randall Ave Intersection	16,340	1770	16,640	1770	A
Laramie	I-25/US 87	Missile Drive Intersection	15,150	1775	15,450	1775	A
Laramie	US 85	Meriden Post Office	1490	255	1370	240	A
Laramie	US 85	County Road 149 Intersection	1490	265	1370	250	A
Platte	I-25/US 87	Chugwater South City Limits	4540	1105	4700	1105	A
Platte	I-25/US 87	Wheatland South City Limits	4780	1140	4950	1140	A
Platte	WY 313	WY 321 Intersection	390	35	390	35	A
Platte	WY 314	Slater	100	20	100	20	A
Goshen	US 85	Hawk Springs	1790	295	1670	280	A
Goshen	US 85	Torrington South City Limits	4300	530	4230	515	A
Goshen	WY 152	FAS 0803, Near Yoder	190	50	190	50	A
Goshen	WY 313	Platte – Goshen County Line	100	25	100	25	A

[1] Level of Service (LOS) is a measure of operational conditions of traffic flow. Varies from A (best) to F (worst). Estimated using Transportation Research Board (TRB) methodology (TRB, 1985). LOS calculations assume that traffic is equally divided between both directions. If traffic is significantly higher in one direction, LOS values would be somewhat lower.

Source: WYDOT, 1998a Traffic Count Database

Since the installation of the Minuteman missile system and continuing with the Peacekeeper system, the Military Traffic Management Command (MTMC), through the FLHPO and the Federal Highway Administration (FHWA), has paid the State of Wyoming for routine maintenance of gravel roads in the deployment area. About the time of the installation of the Minuteman system in the early 1960s and again with the Peacekeeper system in the late 1980s, the FHWA administered a program to pave access roads to many of the missile sites (Taylor, 1999). Some existing county gravel roads were also established as part of the DAR system.

A 4-inch layer of gravel—required by the Air Force, but in excess of State or local requirements—must be maintained on the roads used by the Type II vehicles and other large equipment for safe and dependable movements in all weather conditions. The standard for existing county gravel roads (in all three counties that house Peacekeeper

missiles) is three inches of gravel. Laramie County recently adopted a standard of six inches for new gravel roads (Beard, 1999); the previous standard of 3 inches of gravel still applies to existing roads. The FLHPO administers contracts to regravel county roads and for repairs to culverts, ditches, or cattle guards. F.E. Warren AFB prioritizes routes for regraveling, with all routes being regraveled typically within three to five years. A request is submitted to the MTMC for funding. If not all routes are approved, they are re-prioritized. Bids are then let to private contractors; some are set aside for disadvantaged and small businesses. An average of 12 to 15 miles are regraveled each year. Thus, all DAR roads are regraveled over a 10- to 12-year period. About 90 to 95 percent of the annual FLHPO budget for routine maintenance is for regraveling, the balance is for repairs to structures, such as ditches, culverts, or cattle guards. The money is generally spread evenly throughout the three counties, especially if averaged over a few years. The total amount is generally $500,000 per year, sometimes as much as $750,000 per year. Federal funds formerly went directly to the county for regraveling DARs; however, the FLHPO now contracts with private contractors to regravel county roads as needed (Taylor, 1999).

Table 3.2.3-4 shows the mileage of county paved and gravel roads in the three county Peacekeeper deployment area compared to the DAR mileage. The percentage of county paved roads used for Peacekeeper access routes varies from 6.8 percent in Laramie County to 14 percent in Platte County. The percentage of county gravel roads used for Peacekeeper access routes varies from 3.6 percent in Platte County to 15.5 percent in Goshen County. The Minuteman system is located in southern and eastern Laramie County and extreme southern Goshen County. The Peacekeeper system is located in northern Laramie County and southern Goshen and Platte Counties (see Figure 1.3-2).

Table 3.2.3-4
County Paved and Gravel Road Mileage in Laramie, Goshen, and Platte Counties

	Laramie	Goshen	Platte
Paved Roads			
County Paved – Peacekeeper	17.0	9.0	35.0
County Paved – Defense Access Road (DAR)[1]	58.0	10.0	35.0
Total County Paved	250.0	100.0	250.0
Percent Peacekeeper of Total County	6.8%	9.0%	14.0%
Percent DAR[1] of Total County	23.2%	10.0%	14.0%
Gravel Roads			
County Gravel – Peacekeeper	65.0	46.5	18.0
County Gravel – DAR[1]	94.7	46.5	18.0
Total County Gravel	1,500.0	300.0	500.0
Percent Peacekeeper of Total County	4.3%	15.5%	3.6%
Percent DAR[1] of Total County	6.3%	15.5%	3.6%

[1] Includes Peacekeeper and Minuteman mileage
Sources: USAF, Undated b; WYDOT, 1994; WYDOT, 1995; WYDOT, 1996

In Laramie County, many of the paved county roads are 35 to 40 years old and do not meet county engineering standards (for design factors, such as width, percent grade, intersections, etc.) (Beard, 1999). Many of these roads are dilapidated and need

reconstruction. The county uses farm to market (FM) funds from the state to rehabilitate these roads. Laramie County receives about $1 million per year for this program. This money is from mineral royalties and gas taxes collected within the county that is put into separate state accounts and spent for the county's benefit. Control of these funds went to the counties on January 1, 2000. It costs about $375,000 to rebuild one mile of paved road at county standards. Laramie County has recently rebuilt County Road 143 north of Hillsdale and County Road 149 north of Burns (both of these are Minuteman routes).

The paved county roads are up to engineering design standards for Platte and Goshen counties (Lackey, 1999; Craig, 1999). These counties received $40,000 and $190,000, respectively, in FM funds last year. However, the paved county roads are getting old and not much maintenance has been done on them in either county due to lack of funds.

The majority of county road and bridge budgets in the three counties is allocated to maintaining gravel roads. In Laramie County, about $1.7 million of the $2.4 million budget is for maintenance of gravel roads (Beard, 1999). A detailed breakdown of road budgets for Goshen and Platte counties was not available (Craig, 1999; Lackey, 1999). These roads are regraveled and graded on an as needed basis.

The FHWA has a contract with the state and counties for extraordinary maintenance. When access along a DAR system county gravel road is obstructed (such as a washout of a culvert or cattle guard), counties will repair items upon request. Money to repair these items is paid to the state, and the state reimburses the county (Swanson, 1999).

The State of Wyoming received authority to render service for $190,000 ($56,000 for mobilization for normal snow removal and $134,000 for extraordinary snow removal and extraordinary maintenance) in 2000 for snowplowing DARs as needed by F.E. Warren AFB; $175,000 has been funded for 2001 (Swanson, 2000). Recently, funds became directly reimbursable from the FHWA to counties (Laramie, Platte, and Goshen Counties for Peacekeeper and Minuteman sites) rather than being allocated through the State of Wyoming; approximately 70 percent of DARs in the three counties are for access to Peacekeeper sites. The FHWA contracts with each county for extraordinary snow removal and extraordinary maintenance. If the snowplowing requirement were to exceed the $190,000 authority to render service, the FHWA would apply for an overrun, although this has never happened. On occasions when a county road has not yet been plowed and the USAF needs access to a PK site, F.E. Warren AFB informs the county. Upon a request for extraordinary snow removal, the county plows up to the gate of the facility (Swanson, 1999).

In the three-county Peacekeeper deployment area, there are eight road projects scheduled between 2000 and 2005 (see Table 3.2.3-5). There are two additional projects on which preliminary engineering studies are being completed that are scheduled for 2005 or later.

3.2.3.2. Other Transportation Modes

The Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) Railroads operate railroad lines within the deployment area. The Union Pacific line from Egbert, Wyoming to Yoder, Wyoming carries mostly coal, with some grain. A spur from Yoder to Torrington, Wyoming carries mostly sugar.

Table 3.2.3-5 Planned Road Construction Projects in the Deployment Area (FY 2000-2005)					
Fiscal Year	**County**	**Highway**	**Location**	**Type of Work**	**Length (Miles)**
2001	Laramie	I-25	Cheyenne (College Drive to Happy Jack Road)	Concrete Reconstruction	3.40
2001	Laramie	I-25	Cheyenne (Happy Jack Road to Western Hills Road)	Crack Sealing	2.30
2001	Platte	WY 316	Wheatland East to County Roads 161 and 113	Widen and Overlay	10.27
2002	Laramie	I-25	Cheyenne (Vandehei Interchange)	Replace Structure	0.00
2002	Laramie	C-211	Cheyenne (Horse Creek Road)	Reconstruction	3.56
2003	Goshen	WY 154	North from Veteran	Reconstruction	6.50
2003	Platte	I-25	I-25 Service Road, Wheatland Streets, Mariposa Parkway and 16th /Oak Street	Corner Reconstruction/ Bridge Widen	0.00
2004	Laramie	N 025	Cheyenne to Torrington, JCT S-1105 Albin Road	Realign Intersection	0.00
xxxx[1]	Laramie	I-25	Cheyenne (Interchange to U.S. 85)	Interchange Modification	1.00
xxxx[1]	Goshen	WY 154	West of U.S. 85 near Veteran	Reconstruction	7.30

[1] Fiscal Year (FY) xxxx indicates projects for which preliminary engineering will occur in FY 2000, but will not be constructed until after FY 2005.

Source: WYDOT, 1998b; WYDOT 1999c

The line from Egbert to Yoder to South Morrill, Nebraska carries an average of one train per day. However, in late May each year, for one of two weeks, the main UP line from South Morrill, Nebraska to O'Fallons, Nebraska is shut down for maintenance. During this period, traffic is rerouted on the Egbert-Yoder segment, increasing traffic on this line from an average of one train per day to an average of 20 trains per day. The BNSF rail line from Cheyenne to Wendover, Wyoming (running through Chugwater and Wheatland) carries general freight (lumber, truck containers, and chemicals (periodically, hazardous chemicals)). Every other day, a train hauling coal to the Rawhide Power Plant near Wellington, Colorado traverses this line. This line averages about seven trains per day.

Two LFs are within 1,800 feet from railroad lines. LF Q-10 is located about 1,000 feet from a BNSF line that runs from Cheyenne to Wendover. LF S-3 is located about 1,800 feet from a UP line that runs from Egbert to Yoder.

The Cheyenne Municipal Airport is located about one mile east of F.E. Warren AFB and about 19 miles south of the deployment area. On average, about 133 flights arrive and depart each day at Cheyenne Municipal Airport (Lions, 1999). The Air National Guard uses C-130Hs, and averages two flights per day (Smith, 1999). Since F.E. Warren AFB does not have a runway, flights transporting missile components operate out of this airport. Peacekeeper components are transported by C-141s as needed, mainly RSs. There is no steady number of flights for these components (Smith, 1999; Arbegast, 1999). Components are transported between F.E. Warren AFB and the airport by truck on approved routes.

3.2.4. LAND USE

F. E. Warren AFB is located on 5,866 acres in southeastern Wyoming, adjacent to the western edge of the city of Cheyenne in Laramie County. F.E. Warren AFB is home to the 90 SW which includes four missile squadrons (MS), each with five MAFs and 50 LFs. The deployment area for these missile facilities comprises 12,600 square miles of eastern Wyoming, western Nebraska, and northern Colorado. The Peacekeeper missiles, part of the 400 MS, are located in southeastern Wyoming in Laramie, Platte, and Goshen counties, deployed in an area of about 2,000 square miles.

F.E. Warren AFB's General Plan (USAF, 1996), the composition of existing land use on F. E. Warren AFB is summarized in Table 3.2.4-1. The land use plan provides guidance for installation development, considering development constraints and potential land use incompatibilities. The land surrounding F.E. Warren AFB is characterized as generally residential and open space.

Table 3.2.4-1
Existing Land Use on F.E. Warren AFB

Category	Acres
Airfield (helicopter)	11
Aircraft (helicopter) Operations and Maintenance	40
Industrial	345
Administrative	47
Community	83
Medical	23
Housing (Accompanied)	260
Housing (Unaccompanied)	21
Outdoor Recreation	512
Open Space	4,497
Water	27
Totals	**5,866**

Source: USAF, 1996

Land within the Peacekeeper deployment area is generally rural and sparsely populated, consisting of small communities surrounded by mostly mixed grass prairie (much of this is pastureland), dry land crops, and irrigated cropland. Except for the metropolitan area of Cheyenne (Laramie County), which is approximately 15 miles south of the deployment area, populations are generally stable within the deployment area. Therefore, there is minimal population pressure to develop non-urban land for industrial or residential uses. Areas adjacent to the LFs and MAFs are used primarily for pasture and crops. Table 3.2.4-2 lists the types and proportions of land use in each county. Grazing of livestock is the predominant land use in each county, ranging from 79 to 87 percent of the agricultural land. The main crops grown in the deployment area are winter wheat, alfalfa, beans, sugar beets, corn, small grains (such as millet, oats, and barley), and oilseeds (such as sunflowers).

Publicly owned land in the counties including the Peacekeeper deployment area comprises approximately 9 percent in Goshen County, 11 percent in Laramie County, and 20 percent in Platte County. The majority of the public land is held by the State of Wyoming. Most of this land is managed by the Wyoming Commission of Public Lands to generate income for local school districts. The majority of these sites are rangeland, a few may be cropland. Three LFs are adjacent to land owned by the Wyoming Commission of Public Lands. Other public land is owned by the U.S. Bureau of Land Management, the U.S. Bureau of Reclamation, the Wyoming Recreation Commission, and other entities such as the Department of Defense.

Table 3.2.4-2 Land Use in Laramie, Goshen, and Platte Counties, Wyoming			
	Laramie	**Goshen**	**Platte**
Land Area (Square Miles)	2,686.2	2,225.5	2,085.0
Urban (Square Miles)	78.3	3.3	8.9
Rural (Square Miles)	2,607.9	2,222.2	2,076.1
Percent Urban[1]	2.9%	0.1%	0.4%
Percent Rural	97.1%	99.9%	99.6%
Percent Public[2]	10.6%	8.6%	19.8%
Percent Private	89.4%	91.4%	80.2%
Land in Farms (% of Private Rural Land)	98.0%	88.0%	96.0%
Agricultural Land Use (by percent)			
Pastureland	78.6%	79.2%	87.4%
Cropland	20.2%	19.1%	11.8%
Other	0.8%	1.6%	0.8%
Woodland	0.4%	0.1%	0.0%
Total Land in Farms	100.0%	100.0%	100.0%

[1] Urban includes cities, towns, and census designated places (a densely settled concentration of population that is not within an incorporated place).

[2] Includes Federal, state and local governments, as a percentage of all land in the county. Public and private lands are not designated as urban or rural.

Sources: USBC, 1999c; USBC, 2000; UWYO, 2000a. Data from these sources were compiled and estimated for this table.

In addition to F.E. Warren AFB (about 5,900 acres), the Department of Defense owns 50 LF sites (about 10 acres each) and five MAFs (about 20 acres each) for the Peacekeeper system. Additionally, in Laramie County there are 12 Minuteman III LFs and one Minuteman III MAF, and in Goshen County there are three Minuteman III LFs. There are no Minuteman LFs or MAFs in Platte County. Department of Defense land totals about 6,700 acres in the three county area.

In the 1960s, land was acquired by the Air Force for the construction of Minuteman LFs and MAFs. These lands are owned by the Air Force in a fee simple arrangement. The Air Force also purchased easements because of conventional munitions in the Minuteman LFs. These easements do not allow occupied dwellings to exist within a 1,200-foot radius of each LF. An additional easement was purchased when the Minuteman LFs were modified for the Peacekeeper missile in the late 1980's. This additional easement extended the 1,200-foot radius to a 1,750-foot radius to preclude encroachment of inhabited buildings (for a total of approximately 220 acres at each LF). Other land uses such as agriculture and the use of agricultural buildings were not affected by this easement. However, a memorandum (USAF, 1962) allowed the possibility of exceptions to the restrictive easement criteria that could allow structures within 1,200 feet from the center of the missile site. There is an unoccupied ranch house located 1,630 feet from LF Q-5 and a cemetery located 1,600 feet southeast of LF P-6, off County Road 139. This cemetery is not considered historical (Sleesman, 1999). There are some barns and granaries within the 1,750 easement at some of the LFs.

Certain areas of land outside the LF and MAF property boundaries have restricted uses other than for building structures. A boundary of 25 feet outside the LF and MAF fences is defined as the clear zone and cannot be used for crops by the current owner of adjacent property because of security restrictions. Another land use restriction involves portions of the Hardened Intersite Cable System (HICS) right-of-way. The HICS varies in depth from 3 to 6 feet, and is typically about 4 feet deep. The Air Force has perpetual easements along the right-of-way, and the immediate area surrounding the marker posts (used to define the path of the HICS) cannot be used for crops because of the potential for excavating the HICS; but livestock grazing could occur.

Other items outside the fenced sites include azimuth markers and at MAFs, an antenna consisting of two intersecting rings (each about four feet in diameter) buried four feet below surface. The antennas are buried approximately 4 feet beneath the surface. Three azimuth markers, originally used to help orient the guidance and control system of the missile, are located approximately 1,000 feet outside the LF boundary. Some azimuth markers have been removed by the landowners.

3.3. HAZARDOUS MATERIALS AND WASTE MANAGEMENT

This section discusses human health and safety, and the management of hazardous materials and wastes, which may be affected by proposed activities at the LFs, MAFs, and F.E. Warren AFB. The health and safety discussion includes those activities that may pose a direct threat or danger to the safety, health, and well-being of workers or the general public. This discussion includes the potential for accidents when handling or transporting hazardous items, but does not consider health and safety in relation to air quality and noise. Air quality is discussed in Section 3.4.3, and noise is discussed in Section 3.4.4.

The hazardous material and waste sections discuss substances such as asbestos, pesticides, or solid waste, which may affect human health or the environment if improperly managed. A material is considered hazardous if it can cause or contribute to illness or death, or otherwise pose a substantial threat to human health or the environment. When a hazardous material is spilled, spent, or contaminated to the extent that it is not able to be used for its original purpose, or cannot be converted to a usable product, it becomes a hazardous waste. Hazardous wastes can be generated on a continual basis or generated if a spill of a hazardous material occurs. Solid (i.e., non-hazardous) wastes are also discussed in this section, as demolition activities can generate large quantities of debris that must be properly handled.

3.3.1. HEALTH AND SAFETY

The discussion of human health and safety includes both workers and the general public. Safety issues include injuries or deaths, which are usually the result of one-time accidents. Injuries include impacts on a human that directly result from an exposure to toxic concentrations, radiant heat, or overpressures from accidental releases or explosions (such as flying debris), or accidents resulting from working in confined spaces, and that require medical treatment or hospitalization. Health issues result from activities where people may be impacted over a long period of time rather than immediately. Health and safety issues

that are related to specific hazardous materials, such as R-12 and R-22 refrigerants, are discussed in Section 3.3.2, Hazardous Materials.

In accordance with the Air Force Occupational Safety and Health (AFOSH) Standards, contractors must submit a safety plan and are responsible for all aspects of the safety and health of their employees. Safety plans must conform to 29 *Code of Federal Regulations* (CFR) Parts 1910 (Occupational Safety and Health Standards) and 1926 (Safety and Health Regulations for Construction). Details on working in confined spaces, such as the launch tube or excavations for removing USTs, must be included in the safety plan. Explosive or mechanical demolition of the LFs and MAFs, and mechanical demolition of facilities on F.E. Warren AFB, can present a danger to the health and safety of workers. Contractors doing such work must provide a background of their past experience, and must be licensed and bonded. Blasting plans, worker protection plans, and contingency plans must be developed and followed.

The F.E. Warren AFB Safety Division reviews safety issues. Other offices, such as the Bioenvironmental Engineering Flight also ensure safe operations by providing services such as sampling of indoor air, water, and unknown materials or wastes.

The Air Force also has formal safety programs addressing missile logistics, which provide detailed safety requirements and a mandatory reporting system for identifying and preventing safety-related problems. Missile facilities are regularly inspected to ensure compliance with safety criteria. Safety provisions have been incorporated into all aspects of missile maintenance and transportation. Missile transport only occurs when weather conditions are good, and then only with a high level of security. The Air Force has a long record of safe handling and maintenance of missiles. Approximately 500,000 road miles have been driven by transporter-erectors carrying MM and Peacekeeper missiles between the deployment bases and LFs. In roughly 30 years, only six rollover accidents have occurred throughout the Air Force, with none involving propellant ignition (USAF, 1989; USAF, 1991g). No accidents or rollovers have occurred with Peacekeeper missiles (Simpson, 1999). Transportation safety, including accident information for F.E. Warren AFB and Wyoming, is discussed in Section 3.2.3.

While the probability of an accidental explosive detonation of any type of material at an LF is very remote, quantity distance arcs for safety from accidental detonation of explosives have been established for the deployment facilities. The safety distance arc for each Peacekeeper LF is 1,750 feet. There are no inhabited structures within this arc. Two uninhabited structures are found within 1,750 feet. A cemetery is located within the zone at LF P-6, and at LF Q-5 there is an unoccupied ranch house at a distance of 1,630 feet. Ballistic gas generators are considered explosive devices and exist at each LF to rapidly open the launcher closure door during a missile launch. No detonations during handling of these devices have occurred in the F.E. Warren deployment area.

Reentry systems (RS) are tightly sealed and designed to prevent leaks of radioactive material. The radioactive material within the warheads continuously emits ionizing radiation in the form of alpha and beta particles, gamma rays and X-rays, and neutrons at a very low rate as measured at a distance of three feet from the RS. There is virtually no radiation emitted past three feet. By comparison, background terrestrial radiation from

rocks and soils is approximately 28 millirems (mrem) per year (0.003 mrem per hour) in Wyoming (NCRP, 1987). Other natural sources from the environment (such as cosmic radiation and radon) would add another 272 mrem per year, for a total of 300 mrem per year (0.03 mrem per hour). The steel liner of the LF has not been irradiated above background levels to any significant degree as a result of the RS being in the launch tube.

Nuclear safety for handling, maintenance, and transportation of components is regulated under Air Force Policy Directive 91-1 and AFIs 91-101, 91-102, and 91-114. The storage of nuclear weapons is also regulated under AFI 31-101, 91-116, and Department of Defense Directive C-5210.41-M. Specific technical orders also cover every aspect of handling, maintenance, and transportation of nuclear weapon components. The safety of removing the RSs from the LFs and transporting them back to F.E. Warren AFB is further discussed in Appendix H.

Stages I, II, and IV of the Peacekeeper missile are Hazard Class 1.3 Explosives. These explosives are characterized by mass fire (the tendency to ignite as a unit, with fires which are difficult to extinguish (USAF, 1999d). Stage III is a Class 1.1 Explosive, characterized by mass detonation (the tendency to detonate as a unit). Stage IV contains monomethylhydrazine (MMH) and nitrogen tetroxide. Safety issues related to these chemicals are discussed in Section 3.3.7. Safety for handling, maintenance, and transportation of other missile components (i.e., rocket motor stages) is regulated under Air Force Instruction 91-114, *Safety Rules for the Inter Continental Ballistic Missile Weapon Systems,* and Air Force Manual 91-201, *Explosive Safety Standards*.

3.3.2. HAZARDOUS MATERIALS

A material is hazardous when, because of its quantity, concentration, or physical, chemical, or infectious characteristics, it may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or temporary incapacitating illness, or pose a substantial present or potential hazard to human health or the environment. Typical hazardous materials include reactive materials such as explosives (materials which would cause overpressures of one pound (lb) per square inch or more), ignitables (materials which burn at 140 degrees Fahrenheit (°F) or more), toxics (such as pesticides), and corrosives (such as battery acid). When improperly stored, transported, or otherwise managed, hazardous materials can significantly affect human health and safety and the environment.

The primary hazardous materials addressed by AFI 32-7080 are the seventeen chemicals listed under the U.S. Environmental Protection Agency (USEPA) Industrial Toxics Program (USEPA 17 chemicals). These chemicals have been drawn from the Toxic Release Inventory (TRI) list and Superfund Amendments and Reauthorization Act (SARA) Title III. Many chemicals which contain high levels of volatile organic compounds are included in this list. Hazardous materials management at Air Force installations is accomplished in accordance with Department of Defense (DoD) Directive 4210.15, *Hazardous Materials Pollution Prevention,* Air Force Instruction (AFI) 32-7086, *Hazardous Materials Management,* AFI 32-7080, *Pollution Prevention Program, and the F.E. Warren AFB Spill Response Plan,* all of which incorporate the requirements of all federal regulations, AFIs, and DoD Directives for the reduction of hazardous material uses

and purchases. EO 12088, *Federal Compliance with Pollution Control Standards*, under the authority of the USEPA, requires that necessary actions are taken for the prevention, management, and abatement of environmental pollution from hazardous materials due to federal facility activities (USAF, 1998b).

The Hazardous Materials Pharmacy (HAZMART) functions as a centralized clearinghouse for receipt, storage, and distribution of hazardous materials for use on base and in the deployment area. Smaller quantities of hazardous materials are stored and used at specific buildings, with HAZMART serving as the distributor of those materials. Hazardous materials are used throughout F.E. Warren AFB and at the remote missile facilities. Most hazardous materials are purchased and stored in small containers, such as quarts, gallons, 5-gallon pails, or 25-pound bags. Most drums and other large quantities are located at the F.E. Warren AFB HAZMART (Bldg 1285). Hazardous materials at LF sites include about 25 lbs of R-12 in the missile guidance control system; and about 8 lbs of R-22 and approximately 38 gallons of brine (50:50 ethylene glycol/water) in the brine chiller system. There is a 315-gallon day tank of diesel fuel and a 60-gallon lube oil tank in the launcher equipment building (LEB); and a 14,500-gallon (4,000-gallon at Q-8) UST for the diesel generator. Hazardous materials at the MAF sites include about 38 lbs of R-22 and approximately 36 gallons of brine (25:75 ethylene glycol/water) in the brine chiller system. There are several fuel storage tanks providing diesel generator fuel and lube oil and fuel for motor vehicles (see Section 3.3.4).

Hazardous materials stored in the Peacekeeper Maintenance Facility (Bldg 1501) used to maintain the support vehicles include motor oil, gear lube, hydraulic fluid, antifreeze, grease, and lube oil. During FY 97, 688.7 pounds of USEPA toxics were purchased for use at F.E. Warren AFB (excluding aviation fuels). Major contributors to these toxics purchased include 370 lbs of toluene (53.7%) and 94 lbs of trichloroethylene (13.6%) (USAF, 1998b).

Although aviation fuels contain high levels of toxics, there are no associated reduction standards, because of the dependency on these fuels to conduct base operations. Fuel consumption from June 30, 1997, to June 30, 1998, was as follows: 198,182 gallons of jet petroleum (JP)-8, 427,058 gallons for diesel, and 404,745 gallons for motor gasoline (MOGAS) (Elifrits, 1998). Helicopters operated by the 325th Rescue Flight (325 RQF) use JP-8 as fuel.

3.3.2.1. Asbestos

Asbestos is a regulated substance because it is a carcinogen and a cause of asbestosis (a lung disease). Asbestos is a designated hazardous air pollutant under the National Emission Standards for Hazardous Air Pollutants (NESHAP) of the Clean Air Act (CAA). USEPA issues regulations to ensure compliance with the CAA, and has delegated compliance with the CAA to the State of Wyoming. Wyoming has issued regulations contained in the *Wyoming Air Quality Standards and Regulations (Section 29)*. The regulations are enforced by the Wyoming Department of Environmental Quality (WDEQ), Air Quality Division. The Occupational Safety and Health Administration (OSHA) also provides for worker protection for employees who work around or remediate asbestos-containing materials (ACM). Friable ACM, which can be pre-existing or generated during

a demolition or renovation activity, refers to any material containing more than one percent asbestos that can be crumbled, pulverized, or reduced to powder when dry, by using hand pressure or similar mechanical pressure.

When asbestos poses a health danger from the release of airborne fibers (because it is in a friable state), Air Force policy (AFI 32-1052, Facility Asbestos Management) is to remove or isolate it. The WDEQ requires annual registration of personnel involved in asbestos abatement, and notification before renovating (which involves encapsulation, enclosure, or removal activities) or demolishing a facility containing friable ACM of more than 3 square feet or 3 linear feet or more (notice must be given to the WDEQ if any demolition is to occur, whether or not ACM is present). The base maintains trained and certified asbestos abatement personnel, and requires that contractors provide certified personnel if needed. All WDEQ asbestos regulations must be followed when more than 3 square feet or 3 linear feet of ACM is disturbed; amounts of ACM smaller than this may be disturbed by uncertified contractors. After demolition or renovation, and before a site can be considered environmentally safe for a real estate transaction (subject to the provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)), all friable asbestos must be encapsulated or removed, the site must be approved, and the asbestos waste disposed of in an approved landfill.

The Civil Engineering (CE) Squadron/Environmental Flight and the Bioenvironmental Engineering Flight manage most aspects of asbestos remediation. The base maintains an Asbestos Management and Operation Plan, asbestos work orders, notification records, bulk and air sampling results, asbestos registry, training and certification records, and disposal documents. Asbestos hazard awareness training is provided for base employees involved with construction projects containing asbestos.

At F.E. Warren AFB, ACM is generated during remediation operations conducted for building renovations or demolition. The removal of ACM from facilities generates nonfriable waste that is landfilled at the Cheyenne Municipal Landfill, and friable waste that is landfilled at the Denver/Arapahoe Landfill. In 1997, F.E. Warren AFB completed a survey to identify and locate asbestos in two-thirds of the buildings on base. This survey was deficient in that it did not consistently evaluate wallboard and joint compound in the buildings (USAF, 1999b). Currently, any facilities not previously surveyed for asbestos that are to be renovated or demolished are surveyed prior to construction activities, and remediated when necessary on a building-to-building basis.

Facilities at the LFs have been surveyed and are asbestos-free. Previous renovation activities at the MAFs have removed asbestos with the exception of asbestos in the ceiling ductwork and in the insulation around some pipes above the false ceiling of the launch control support building (LCSB). There is no asbestos in the air ducts at the MAFs. All remaining asbestos at the MAFs is encapsulated. For example, there is ACM as hard transit on two walls of each MAF garage furnace room.

3.3.2.2. Polychlorinated Biphenyls

Polychlorinated biphenyls (PCB) are suspected human carcinogens. Improper handling of PCB items or releases of PCBs could have adverse effects on human health and the environment.

PCBs must be handled, stored, and disposed of in accordance with regulations (40 CFR § 761) promulgated under the Toxic Substances Control Act (TSCA). Personnel from the Civil Engineering Squadron/Environmental Flight, Bioenvironmental Engineering Flight, and Maintenance Engineering offices manage PCBs. Documents and files are maintained at F.E. Warren AFB, including past PCB documentation.

By Air Force standards, F.E. Warren is PCB-free regarding transformers, hydraulic systems, heat transfer components, and other PCB items. Transformers in the deployment area are not known to contain PCBs. A site with a transformer was hit by lightning. This transformer did not contain any PCBs.

The electrical surge arrestor's (ESA) radio frequency interference filters in the launcher equipment room (LER) of an LF were tested for PCBs. The filters are about 3" in diameter and tested high in PCBs. The doors of the ESA cabinet are marked in the field as containing PCBs. There are three racks of approximately 25, 5-inch by 5-inch filters in the cabinet. If failure of the filters would occur, standard procedure is to dispose of the filters as a PCB waste.

Light ballasts suspected of containing PCBs at the LCSB are being removed on an as-needed basis. Light ballasts, which are usually sealed, may contain PCBs. Unless clearly identified as non-PCB, ballasts are handled as potentially containing PCBs. A quantity of ten or more ballasts is considered to be a reportable quantity. Because the base frequently generates more than ten ballasts, ballasts that are removed from service are collected and disposed of properly.

Other potential substances that could contain PCBs include copper strap grease, putty, pull grease (for electrical conduits), and paint (PCBs were commonly used as plasticizers). Any hazardous materials, such as residual fluids and capacitors containing PCBs, would be removed from the facilities. During the Rivet Minuteman integrated life extension (MILE) program, all known equipment containing PCB material was removed from the LFSBs throughout the deployment area.

Certain coatings used to help protect subsurface structures contain non-liquid PCBs. A black tar-like coating was applied to a thickness of 1/16- to 1/8-inch thick (Alexander, 1999). This same type of coating was applied at all missile facilities. The coatings are on the launch facility support building (LFSB) foundation and sides, the launcher headworks, underground storage tanks (UST) at the LFs and MAFs, and subsurface piping. Past studies of similar dismantlement actions at Minuteman missile facilities at Ellsworth AFB, SD, Whiteman AFB, MO, and Grand Forks AFB, ND also found PCBs in the external coatings on buried external surfaces.

There is a high variability in sample results (non-detect to 30,000 ppm) due to the PCBs being mixed non-homogeneously. With only one exception for Arochlor 1016, all detections of PCBs have been for a particular Arochlor (1254). The coating on the headworks has not yet been sampled. The highest level of PCB detected was 30,000 parts per million (ppm) on an UST coating. The highest concentration in soil (adjacent to a tank being removed) was 12 ppm and the highest concentration from a pipe coating was 13,000 ppm. The LFSB was tested at four sites and PCBs were not detected (Schuler, 1999), but

another testing program determined a concentration of 18.9 ppm (USAF, 2000a). No PCBs were detected in a sample of the HICS cable (Schuler, 2000).

3.3.2.3. Refrigerants

F.E. Warren AFB previously used a large reservoir system to store sodium chromate solution for circulation through a pump unit to cool the MM missile guidance system. The sodium chromate systems used in the MM system were removed from all sites, and substituted with gaseous R-12 refrigerants in the MGCS. During flight, the inertial measurement unit (IMU) is cooled by R-12, which is supplied from a reservoir within the flight coolant assembly (USAF, Undated c).

R-12, or dichlorodifluoromethane, is an organic compound associated under the Chlorofluorocarbon (CFC) family. R-12 is commonly used as a refrigerant because of its nontoxic and nonflammable properties. It is readily converted from a gas to a liquid and vice versa. R-12 poses an environmental threat, however, due to its ozone-depleting characteristics. CFCs have a high chlorine content and present a high risk to the ozone layer, resulting in its depletion. CFCs are being phased out completely. Production of R-12 was halted by the Clean Air Act on January 1, 1996. The remaining supplies are product which have been recovered and reclaimed back to a chemically pure state in accordance to ARI-700 Standard. The DoD prohibits the purchase of R-12, except for existing systems approved by the DoD.

R-22, or chlorodifluoromethane, is an organic compound in the hydrochlorofluorocarbon (HCFC) family. R-22 is nontoxic, but it is heavier than air and could cause suffocation by lowering the oxygen content of the air in confined spaces if accidentally released. R-22 has been approved as a substitute refrigerant under the Significant New Alternatives Program, required by the Clean Air Act Amendments of 1990. However, R-22 is a Class II ozone depleting substance (with an ozone depleting potential of less than 0.2) and is scheduled to be phased out by 2020.

The Field Maintenance Team handles R-12 and R-22 in the event of needed repairs. After removal of the MGCS from an LF, R-12 is extracted and stored in the guidance control pump unit until further use in another system; the R-12 may be extracted either at the site or on base at the maintenance shop. There are approximately 15 pounds of R-12 in the chiller system of the MGCS (Jackson, 2000). R-22 refrigerant is used in the brine chiller systems at the LFs and MAFs. About 8 lbs of R-22 are in the brine chiller system at the LFs. The brine chiller system at the MAFs contains about 38 lbs of R-22 (Fahrenkrug, 2000).

The Maintenance Training Center, Bldg 485, serves as a training center where maintenance personnel conduct their initial training. The building has MGCS training equipment similar to those at LFs with the exception of a guidance and control conditioning unit rack that contains R-12 but is only 1/3 the capacity of the field units at the LFs.

3.3.2.4. Fuels and Oils

Diesel fuel grade #2 (DF-2) is the primary heating fuel for the MAFs and is used for the back-up generators, or diesel electrical units (DEUs), at the LFs and MAFs. The DF-2 is stored in USTs, which are regulated by the Resource Conservation and Recovery Act

(RCRA) (Subtitle I), and the requirements of the Wyoming Underground Storage Tank Program (Wyoming Statute 35-11-1414, Chapter 17). Section 3.3.4 discusses USTs in more detail. There is a 315-gallon day tank of diesel fuel in the launch facility support building, as well as a 60-gallon lube oil tank for the diesel generator.

Uncontaminated diesel fuel is a hazardous material that can be reused for other applications. If the fuel is contaminated with another hazardous substance (for example, a solvent), the fuel is considered a hazardous waste. If the fuel is contaminated with oil, the fuel can be reused for heating or similar purposes. Diesel fuel that is contaminated with a hazardous substance (other than oil) is removed from the tank and placed in properly labeled 55-gallon drums for transport to F.E. Warren AFB for disposal as a hazardous waste. Fuel-soaked soil that results from a spill or leak would be properly handled and disposed of as a regulated waste per the requirements of the WDEQ. The tanks would be emptied and cleaned prior to dismantlement, in accordance with WDEQ Guidelines. Oil and other lubricants are also used in small quantities. The Peacekeeper Maintenance Building on the base contains facilities for maintaining vehicles used to transport Peacekeeper personnel and missile components. This facility stores hazardous materials such as motor oil, lube oil, and gear oil for maintenance on the vehicles. The LFs and MAFs generate used oil. Used oil is any oil that has been refined from crude oil (or any synthetic oil), used, and become contaminated by physical or chemical impurities. The used oil is reused through incineration (including some uncrushed filters) by the Transportation Squadron. Some residual oil will remain within the equipment; for example, the DEU would be completely drained, but would not be completely purged internally. The amounts of new and used engine oil, used fluids and used grease at the LFs and MAFs is the amount that is generated as maintenance activity.

Oil/water separators installed at the Peacekeeper sites allow the sump pit to differentiate whether excess liquid is water, oil/fuel, or both. It provides an alarm to the MAF if oil is present, and pumps only water out. The oil/fuel is eventually collected.

The Peacekeeper LFs contain a device that generates steam to eject the missile from the LF before the rocket motors fire. There is a fuel cartridge with 320 grains of explosive that ignites and boils 55 gallons of water.

3.3.2.5. Ethylene Glycol

Ethylene glycol is used at LFs and MAFs as a coolant medium for the air-conditioning systems (brine chiller) and the diesel generators. The brine chiller unit (BCU), which is the primary heat transfer mechanism, supplies temperature-regulated brine to the launcher air conditioner and the air compressor (USAF, Undated c). The BCU, a component of the LFSB's environmental control system, stores approximately 15 gallons of brine. The brine is a 50:50 mixture composed of water and ethylene glycol. Some diesel generators may be left in place for salvage. The coolant fluid from all generators is removed before placing the sites in caretaker status. The ethylene glycol that is removed from the diesel generators and the brine chiller system is recycled. Recycled ethylene glycol is a non-RCRA waste and is not considered a RCRA hazardous waste unless it has been contaminated with a hazardous substance. Contaminated ethylene glycol is also removed during the environmental safing process and handled as a hazardous waste.

3.3.2.6. Lead-Based Paint

Lead-based paint (LBP) can be hazardous when dust or chips are generated from deteriorating paint or during removal (e.g., sanding off old paint). Lead exposure (which can result from ingesting paint dust or chips, or from inhaling lead vapors from torch cutting operations) can affect the human nervous system at low levels. Lead is especially hazardous to children due to their size and developing nervous system. Air Force policy (USAF, Undated a) states that workers subjected to prolonged or repeated exposure to airborne LBP dust are working in a hazardous environment.

F.E. Warren AFB provides on-site training for workers involved in LBP removal. To ensure adequate worker protection and proper waste materials disposal, proposed and/or scheduled renovation and demolition sites are screened and sampled for LBP. All housing occupants are informed of the potential presence of LBP in their quarters, along with instructions for reducing the potential for lead exposure (USAF, 1999b).

There is no specific LBP survey on base, but tests for LBP are done when a building is demolished or modified. Paint samples were collected from priority buildings (e.g., residences and child-care centers) in 1997, and buildings that are to be demolished are checked for LBP. Any LBP found is removed by trained and certified abatement personnel, and the resultant waste sampled for hazardous constituents. If the waste is hazardous, it is removed, handled, and disposed of properly. The Base has sampled all the brick-style quarters in the National Historic District and found that levels are very high in the oldest paint layers (Zak, 2000). Latex paints on top of LBPs do not actually meet the "encapsulation" requirement, but in reality this reduces risk to LBP exposure unless the humidity causes the paint to get soggy. Building 1501 and other Peacekeeper industrial facilities could contain LBP, because regulations and limits apply only to housing and not to industrial uses (Zak, 1999). No LBP survey has been conducted for Peacekeeper facilities (Zak, 2000).

The subsurface facilities within the deployment area, including the launch control center (LCC) and launch control equipment building (LCEB) at the MAF and the interior of the launcher and walls of the LCSB were originally painted with paint containing red-lead pigment. When these interiors were first painted, lead was used as a drying agent in paint. Unless otherwise specified, all exterior and interior ferrous metal (except reinforcing steel, bolts, rough hardware, and metals with nonferrous coatings) were coated with a lead-based primer that conformed with Federal Specification TT-P-86, Type I or Type II. Two coats of flat alkyd paint conforming to Federal Specifications TT-P-30 were applied over the primer. Although the lead content of the particular paint used is unknown, the paint used at the LFs, and LCEB and LCC at the MAFs, is conservatively assumed to contain 20 percent lead by weight (industrial paints contain 15 to 18 percent lead by weight (DuPont, 1990; Westinghouse Electric Corporation, 1990). Other heavy metals, such as chromium and mercury, are also likely to be in the paint.

3.3.2.7. Pesticides

Pesticides are a group of biological or chemical materials that includes herbicides and insecticides. Pesticides vary greatly in toxicity, and can pose a threat to human health and safety and the environment, if improperly managed. Herbicides have been used to control

weed and plant growth at the MAFs, LFs, and on F.E. Warren AFB. No insecticides have been used at the LFs, MAFs, or on base.

The management of pesticides at F.E. Warren AFB is accomplished by the Entomology Shop. The Entomology Shop applies most pesticides on the installation and at the LF and MAF sites. No contractor or golf course personnel apply pesticides at F.E. Warren AFB. The only other pesticide use is through self-help activities; types of pesticides available through the self-help shop are limited. Pesticides are stored in the Entomology Shop building. Spent pesticide containers are triple rinsed, the rinse water is reused for pest control applications, and the containers are recycled through a state program. Waste generated at the Entomology Shop is minimal (USAF, 1999b).

The Entomology Shop is aggressively pursuing the Air Force goal set in 1993 for a 50% reduction in pounds of active ingredient applied by the year 2000. Personnel are certified pesticide applicators and application rates on the pesticide labels have been followed or applied at reduced rates.

Herbicides vary greatly in their persistence in the environment. Factors that influence the persistence of herbicides include soil type (coarse soil types allow more leaching), adsorption (clay and organic matter favor strong adsorption), solubility of the herbicide, and degradation rates (dependent on the herbicide, sunlight, temperature, soil pH, soil moisture, and microbial activity).

Over the past 6 years, two herbicides, Oust and Clovar, were used to control noxious weeds at the LFs, MAFs, and on base. Oust is composed of 75% sulfometuron-methyl and is applied at a rate of 3 ounces per site annually. Clovar is composed of 80% Diuron and Bromacil and is applied at a rate of 8 pounds per site annually. The herbicides were applied in a dilution of 50 gallons of water per acre at an average of 1.6 acres per LF site and 4 acres per MAF site (Ascher, 1999).

3.3.2.8. Lead-Acid Batteries

Lead-acid batteries are used as start-up power for the emergency back-up generators at each LF and MAF. There are two banks of six lead-acid batteries (1,450 pounds each including 26.3 gallons of a 28-40% sulfuric acid concentration mixed with water) as an emergency power source for a missile launch. If reusable or recyclable, the batteries are transported back to F.E. Warren AFB for disposition through the Defense Reutilization and Marketing Office (DRMO). Unusable batteries are disposed of as a hazardous waste. There are also small batteries in each missile; stage IV contains an electronics battery (powers the MGCS) and ordinance battery. The AC/DC converters in the LFs have been replaced with motor generators.

3.3.2.9. Cadmium Electroplating

Cadmium is a heavy metal, which is toxic when found in dust and fumes. Wastes containing cadmium are subject to testing with the toxicity characteristic leaching procedure (TCLP) to determine if the waste is hazardous. If cadmium levels in a waste stream were to meet or exceed 1 mg/L, the waste stream would be categorized as a hazardous waste. Cadmium electroplating is present on some surfaces of the Peacekeeper LFs (inside and outside of the ESA cabinet), as well as the canister and reentry vehicle.

An improved Minuteman physical security system upgrade program included cadmium electroplating on the connection into the ESA drawer at each LF. Other cadmium electroplating includes the ultra-high frequency (UHF) connection and the surface of the personnel access hatch (PAH). The cadmium electroplating was done in the field. The total electroplated area at each LF is only on the order of a hundred square inches.

3.3.3. HAZARDOUS WASTE

Hazardous wastes are specified by RCRA and amendments. The regulations governing hazardous wastes are contained in 40 CFR § 261-265, and are issued by the USEPA. Wyoming has closely followed the federal regulations, and has implemented the Wyoming Hazardous Waste Management Statutes (W.S. 35-11-103 d vii). According to these definitions, a hazardous waste is any liquid, solid, semi-solid or contained gaseous waste or combination of those wastes which because of quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to detrimental human health effects, or pose a substantial present or potential hazard to human health or the environment. Only those materials listed as hazardous wastes by the USEPA's hazardous waste management regulations or which exhibit a hazardous waste characteristic specified by the USEPA shall be considered hazardous wastes. Hazardous waste does not include those hazardous wastes exempted under the Resource Conservation and Recovery Act, P.L. 94-580, or under the USEPA's hazardous waste management regulations for the period that they remain exempted by congressional or administrative action.

Generally, a hazardous waste is generated when a hazardous material is spilled, spent, or contaminated to the extent that it can not be used for its original purpose, or cannot be converted to a usable product. RCRA imposes design and operating standards to ensure that hazardous wastes are managed properly to prevent future uncontrolled situations. The regulations specify requirements for identifying, classifying, generating, transporting, tracking, storing, treating, disposing, or otherwise managing hazardous wastes. The regulations are designed to manage hazardous waste from the moment that a waste is generated until the time that a safe and appropriate disposal is achieved.

Throughout F.E. Warren AFB, hazardous wastes are generated by a number of shops. Hazardous wastes generated include solvents, waste oils, ethylene glycol, and battery acid. The base generates less than 1,000 kg of hazardous waste in most calendar months; however, the base does generate more than 1,000 kg of hazardous waste two to three months out of the year. For this reason, the base complies with regulatory requirements for large quantity hazardous waste generators (USEPA identification # WI5571924179) (USAF, 1999b).

The wastes are stored on base at specific locations designated to manage wastes appropriately. Hazardous wastes are generally stored at either the hazardous waste 90-day accumulation site (Bldg 944) or at the hazardous waste SAPs. At the SAPs, the volume of hazardous waste collected cannot exceed 55 gallons and the holding time cannot exceed 365 days. At the 90-day accumulation site, hazardous wastes may be stored in volumes up to the maximum design capacity of the site, for no more than 90 days, then the wastes must be transported (a contractor provides this service) from the base (USAF, 1998c).

The base has been working toward objectives specified in the Pollution Prevention Management Action Plan for F.E. Warren AFB (USAF, 1997c), the Air Force established a goal in 1992 to achieve a hazardous waste reduction of 25% by December 31, 1996, and 50% by December 31, 1999. An example of F.E. Warren trying to meet this goal is the Component Repair Shop, which has reduced its hazardous waste stream by substituting denatured alcohol for other cleaning compounds. Squibs used in the cleaning process are dried and then thrown away as solid waste.

A Hazardous Waste Management Plan and Environmental Leadership Council have been established at F.E. Warren AFB to guide hazardous waste management activities on base. Residues from hazardous materials are collected at 20 satellite accumulation points (SAP), each of which can accumulate up to 55 gallons of hazardous waste or one quart of acute hazardous waste (USAF, 1998b). The Peacekeeper missile stage processing facility (MSPF) in Building 1506 has a satellite accumulation point for hazardous waste. There are special cabinets designed for holding flammable materials that contain hazardous waste. Rags, used by missile maintenance crews to clean up residual liquids, are soaked with alodine, naptha, toluene, isopropyl alcohol, Plus 4 solvent, acetone, and PD-680 (White, 1999). Plus 4 is used with a rag to clean up cadmium-plated metal of missile stages before they are connected. Rags can also be contaminated with grease, as well as oil and diesel. Rags that become contaminated are returned to the base, and then are stored separately according to their waste type. Waste material with zinc chromate primer is also disposed of as a hazardous waste. The primer is used for touchups, and to coat bolts that have been cleaned prior to reassembling a unit.

The LFs and MAFs are not hazardous waste generating sites under the RCRA definition. Only small amounts of hazardous wastes are generated at the LFs and MAFs. The wastes generated at the LFs and MAFs are returned to the base for determination of hazardous waste characteristics for proper storage and disposal. The missile maintenance crews recover non-working incandescent and halogen lights and turn them into a hazardous waste accumulation point on base (Bldg 1501). Any rags that become contaminated at the LFs or MAFs are returned to the base where they are stored dependent on their waste type.

3.3.4. ABOVE GROUND AND UNDERGROUND STORAGE TANKS

F.E. Warren AFB has storage tanks on base and the deployment area for maintaining reserves of fuel (primarily JP-8, DF-2, and MOGAS). Fuel storage tanks are closely regulated and must meet stringent guidelines for spill and leak protection as a result of historic problems with leaking tanks and fuel spills throughout the nation. Effective as of 1991, all USTs installed prior to 1975 must be tightness tested annually. Currently, USTs are also regulated for overfill protection, secondary containment, and leak detection standards, and have been upgraded to meet the December 1998 deadline for corrosion and spill and overfill protection. Once a system is upgraded, annual testing is required. An annual cathodic protection survey for the USTs is performed and further inspections are based on monthly power meter readouts. An inspection would also be performed if work proposed for the site would disturb the site topography. If soil is excavated and a UST or piping is being repaired or replaced, an inspection to ensure cathodic protection is applied would be performed. The Air Force has instituted a program (AFI 32-7044, *Underground Storage Tanks*) to remove USTs that do not meet current standards, to test for soil

contamination, and to provide any required remediation. The Air Force has upgraded all USTs at F.E. Warren AFB and in the Peacekeeper deployment area to regulatory requirements (Zak, 2000).

Numerous above ground storage tanks (AST) and USTs have been used at the LFs and MAFs for fuel and water. Existing tanks at the LFs and MAFs include deep-buried USTs (35 to 45 feet deep at the MAFs), shallow-buried USTs (ranging from about 3 to 10 feet deep), and day tanks that are located within the LFSB at the LFs. ASTs are located inside concrete vaults at MAFs and within the LFSB at LFs. Tanks contain diesel heating fuel, diesel vehicle fuel, MOGAS, lube oil, or water. Some of the buried fuel tanks contain diesel fuel to run back-up power generators; because they are used as a fuel source for the emergency generators, these USTs are deferred from federal regulation and the requirements under the Wyoming Underground Storage Tank Program (W.S. 35-11-1414) for release detection requirements. However, the tanks are still regulated for the December 22, 1998 deadline for corrosion and spill or overfill protection, as well as proper closure. A 30-day notification must be given to the State before UST removal or closure. Tanks found at the MAFs and LFs are identified in Table 3.3.4-1.

Table 3.3.4-1
Tanks at LFs and MAFs

Location	Depth in feet to top of tank	Contents	Capacity in gallons
LF - LCEB[1]	(in concrete vault, above ground)	Lube oil	60
LF - LCEB[1]	(in concrete vault, above ground)	Diesel (day tank)	315
LF	Shallow – about 3 to 4	Diesel	14,500
MAF underground[1]	35 to 45	Diesel	14,500
MAF underground[1]	3 to 4	Diesel	2,500
MAF above ground[1]	(in concrete vault, above ground)	MOGAS	2,000
MAF above ground[1]	(in concrete vault, above ground)	Diesel	1,000
MAF above ground[1]	(in concrete vault, above ground)	Diesel	1,000
MAF above ground[1]	(in concrete vault, above ground)	Diesel (day tank)	100
MAF above ground[1]	(in concrete vault, above ground)	Lube oil	65

[1] All tanks, unless otherwise noted, are steel. Most have non-liquid PCB containing coatings. The UST at LF Q-8 was recently replaced with a 4,000-gallon double-wall fiberglass tank.

Source: Zak, 1999

Tightness testing was conducted to meet the December 1998 USEPA deadline. Testing revealed some leaking tanks and they were replaced with double-walled fiberglass USTs. All of the piping was replaced at the same time, and the system was tightness tested. With one exception, all USTs at Peacekeeper sites passed the leak test. One 14,500-gallon tank at Q-8 was replaced with a 6-foot diameter, 4,000-gallon fuel tank meeting all requirements for new USTs, including interstitial monitoring equipment. The soils at this site were excavated around the tank, tested with a photoionization detector, and replaced when the 14,500-gallon UST was removed.

The 14,500-gallon USTs at the MAFs are 35- to 45-feet deep, while those at the LFs are only 2-3 feet from the surface. MOGAS and diesel tanks used for fueling vehicles at

MAFs have always been above ground. Heating oil tanks at each MAF garage were underground initially. All the garage tanks in the Peacekeeper Squadron were removed and replaced with above ground tanks (Zak, 1999).

3.3.5. SOLID WASTE

The solid waste management program at F.E. Warren AFB, including wastes generated in the deployment area, includes all waste materials that are neither hazardous nor toxic, and which are normally disposed of by landfilling or incineration, or are recycled or recovered. Solid wastes include non-hazardous trash, garbage, bulky wastes, soil, rock, liquids or sludges, slurries, other types of construction debris, and recoverable or recyclable trash or materials. Solid wastes currently generated at the LFs and MAFs during maintenance of the missile systems is brought back to F.E. Warren AFB for proper disposal. Solid waste from the Peacekeeper program is also generated at base facilities. Solid wastes are managed in compliance with RCRA, Subtitle D, and the Wyoming Environmental Quality Act (W.S., Section 5, 35-502.42-44).

There are no active landfills on F.E. Warren AFB. Municipal solid waste and industrial waste is collected, weighed, and taken to the Cheyenne Municipal Landfill by a commercial contractor. An average of 102 tons of municipal solid waste per month are removed from the base's industrial areas, and an average of 134 tons per month are removed from the military family housing area (USAF, 1999h). The Cheyenne landfill has 17 years of life left at the current usage rate (USAF,1999g); a task force is currently working on siting for a new landfill (Alexander, 1999).

F.E. Warren AFB has an active recycling program to reduce the amount of solid waste generated on base. The recycling program includes paper, cardboard, aluminum, scrap metal, plastics, and glass. In addition, construction materials are often reclaimed when a facility is remodeled or demolished and scrap metal, batteries, and tires are collected and sent to the Defense Reutilization and Marketing Office in Colorado Springs (USAF, 1999b). Approximately 500 tons of solid waste were recycled at the base recycling center in FY 98.

3.3.6. WASTEWATER

Sanitary wastewater at F.E. Warren AFB is collected and sent to a reconditioned lagoon system. The wastewater is sampled and analyzed quarterly prior to discharge in accordance with the Cheyenne Board of Public Utilities Industrial Pretreatment. Monthly monitoring for metals in the effluent is also performed. The Water and Waste Shop and Bioenvironmental Engineering conduct the sampling. After approval from the state, the wastewater is discharged. Primary responsibility for compliance rests with the Environmental Flight (90 CES/CEV).

F.E. Warren does not require a point source National Pollutant Discharge Elimination System (NPDES) permit, but quarterly sampling and analysis is conducted in compliance with the CWA. Under current NPDES stormwater permitting regulations (verified with the WDEQ), no permit is required in the deployment area since the disturbance per site is relatively small and the sites are at least 4 miles apart (Wobbe, 1999). F.E. Warren AFB maintains a stormwater pollution prevention plan for on-base facilities.

No wastewater is generated at the LFs. Wastewater at the MAFs is discharged by a gravity feed system or lift station, to a lagoon. The lagoon is a two-cell system that has a bottom layer lined with bentonite. The lagoons are located outside of the security fence and are designed as evaporative basins in the arid climate of southeastern Wyoming. Wastewater is sampled regularly and if it were discharged, must meet discharge limits.

3.3.7. MONOMETHYL HYDRAZINE AND NITROGEN TETROXIDE

Stage IV of the Peacekeeper missile, which includes a propulsion system rocket engine (PSRE), contains 72 pounds each of MMH and nitrogen tetroxide. These chemicals can be stored in missiles at Peacekeeper LFs, Pad 4 in Area 4334, and at the Peacekeeper MSPF (Bldg 1506). MMH is a propellant that ignites on contact with nitrogen tetroxide (an oxidizer) without an ignition source. These chemicals are transported to the Base in pre-assembled, fully enclosed PSRE/Stage IV containers and are visually inspected for leaks on a daily basis. The liquids are internal to the systems and are not drained or filled. Handling of these liquids is performed at Air Force Materiel Command (AFMC) facilities. The PSRE units are handled at Hill AFB, Utah, which has a specially trained spill response team to handle spills of these liquids. These chemicals arrive at F.E. Warren AFB in sealed containers (with 75 gallons of MMH and 15 gallons of nitrogen tetroxide) and are never opened while on Base or at the LFs (USAF, 1998c).

MMH is a clear, nitrogen/hydrogen compound with a "fishy" smell and is classified by the USEPA as a carcinogen and an extremely hazardous substance (EHS) (under 40 CFR § 355) based on its acute toxicity and extreme hazard to humans and other organisms. EHSs are regulated under SARA Title III (the Emergency Planning and Community Right-to-Know Act of 1986). Nitrogen tetroxide is a reddish fluid and has a pungent, sweetish smell. Although not listed as an EHS, nitrogen tetroxide is regulated under 40 CFR § 302.4 based on its toxicity as a strong oxidizer.

3.4. NATURAL ENVIRONMENT

This section describes geological resources, water resources, air resources, noise, biological resources, and cultural resources.

3.4.1. GEOLOGICAL RESOURCES

Geological resources include the physiography (features of the physical landscape), topography, geologic layers and potential hazards, and soils.

3.4.1.1. Physiography and Topography

The three counties in southeastern Wyoming that contain the Peacekeeper LFs and MAFs (Goshen, Platte, and Laramie) are found in two physiographic provinces. Goshen County is located entirely within the High Plains section of the Great Plains Province. Laramie and Platte Counties are within both the Great Plains and the Southern Rocky Mountains Provinces. The Southern Rocky Mountains Province extends from southern Wyoming through all of Colorado to northern New Mexico. The Great Plains Province extends eastward from the Front Range of the Rocky Mountains to the Central Lowlands Province along the Mississippi Valley, and from the Rio Grande on the South to the Canadian

boundary on the North. The 50 LFs and 5 MAFs are approximately 4 to 7 miles from each other, and are located within a 2,000 square mile area of southeastern Wyoming.

Elevations in the deployment area are generally between 4,200 and 6,500 feet above mean sea level (MSL). Local relief (the difference of elevation between high points and valleys) at Peacekeeper sites ranges from 6.5 feet to 72 feet (USAF, 1995b). The Goshen Hole, clearly lined by the Goshen Hole Escarpment, lies in the northeastern quarter of the deployment area. Elevation differences of 400 to 600 feet occur along this escarpment. To the west, the Laramie Range (see Figure 3.4.1-1) and proceeding foothills rise to as much as 10,272 feet at the peaks; the relief averages around 5,000 feet from the surrounding lowlands.

3.4.1.2. Geology

The general near-surface geology of southeast Wyoming is dominated by clastic Tertiary sediments of the Ogallala (upper Miocene), Arikaree (lower Miocene), White River (Oligocene) formations, and Lance (Cretaceous) formations (USGS, 1957, 1960, 1967). A geologic description of the formations follows:

- Ogallala Formation: light-colored tuffaceous claystone, sandstone, and conglomerate
- Arikaree Formation: light-colored, soft, porous sandstone underlain by white tuffaceous claystone
- White River Formation: white to pale-pink blocky tuffaceous claystone and lenticular arkosic conglomerate that is subdivided into three members:
- Conglomerate member: light-colored, soft conglomeratic tuffaceous sandstone and conglomerate of Precambrian clasts
- Brule member: pale pink to white, blocky, tuffaceous claystone and lenticular sandstone
- Chadron member: light-gray to dark-red, tuffaceous claystone, sandstone, and lenticular conglomerate
- Lance Formation: shale and sandstone, gray siltstone, beds of coal

Unlike the Arikaree, the Ogallala formation is composed of highly variable, largely fluviatile deposits, including conglomerates, sandstones, and beds of silts and clay. This creates a difference in stream erosion and lateral channel migration among the Peacekeeper LF sites.

Peacekeeper sites are located along the north and northwest flanks of the Denver-Julesburg Basin, a shallow regional structure in northeastern Colorado, southeastern Wyoming, and western Nebraska. Portions of this basin have been uplifted along the Horse Creek and Greyrocks Anticlines. This uplift produced minor fracturing, especially in shale (USGS, 1957, 1960, 1967).

The individual counties provide some exceptions to the overall geologic picture of the area. The Laramie Range in the western part of Laramie County contains pre-Tertiary rocks, the oldest being a 45-foot thick band of limestone of Casper Formation of Late Mississippian age (USGS, 1967). Platte County also includes sections of the Laramie Mountain range, including some Paleozoic rock. This area is very susceptible to faulting (USGS, 1960).

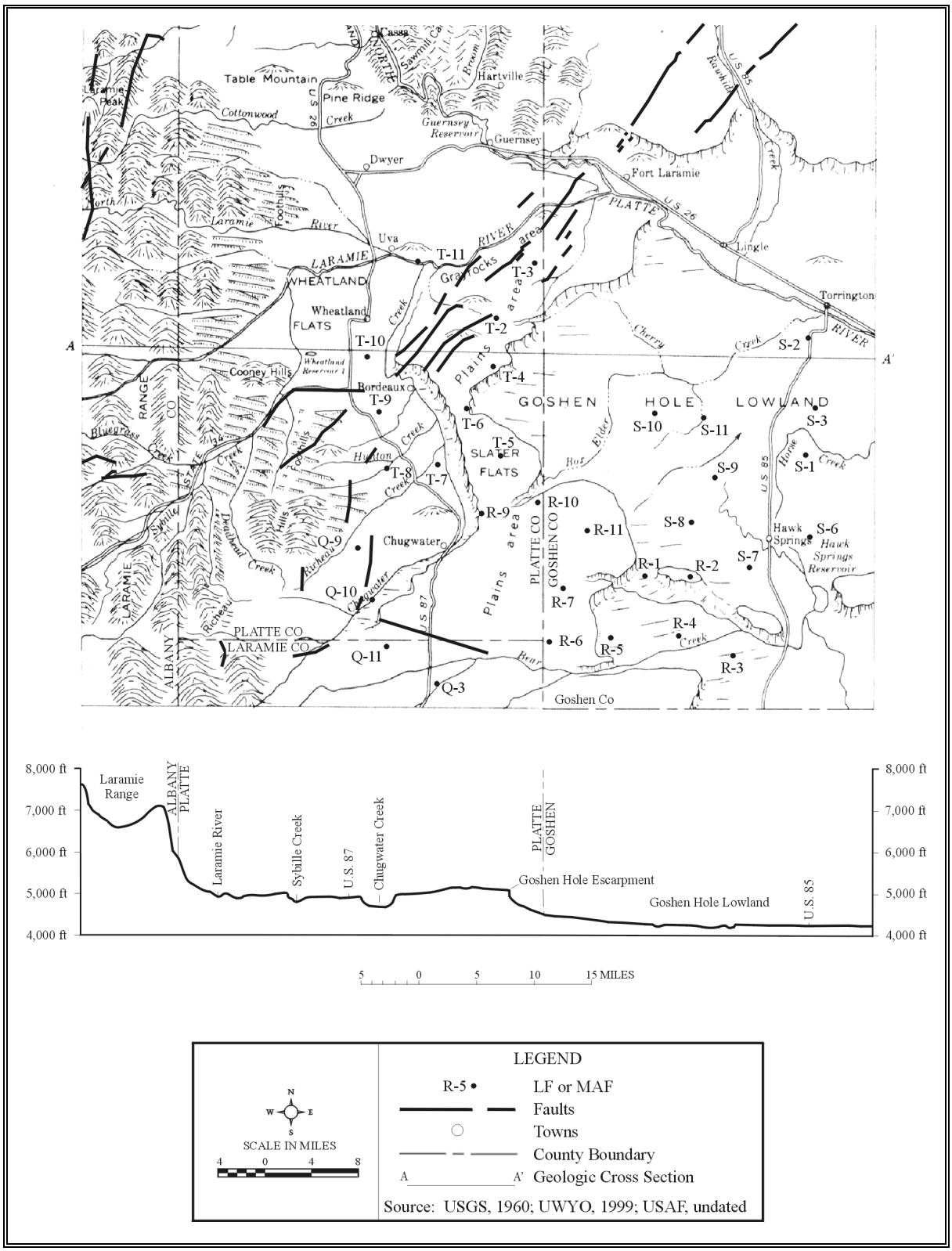

Figure 3.4.1-1. Geological Features of the Goshen Hole Vicinity

A unique feature, centralized in Goshen County but spreading to include sections of Platte and Laramie County, is the Goshen Hole Lowlands, which is the wedge-shaped widening of the North Platte River. Soft layers of sedimentary rock in the Brule-Arikaree Formation were eroded down to the harder Lance Formation, after which the Hole proceeded to widen and spread, causing the surrounding escarpments to retreat. The Goshen Hole proper was formed similarly, but involved several tributary streams of the North Platte that eroded below the Brule-Arikaree Formation (USGS, 1957). The Peacekeeper LFs located within the Goshen Hole Lowlands include LFs S-3, S-4, S-5, S-6, S-7, S-8, S-10, and S-11.

The Wheatland Flats, an area of terraces comprised of sand, gravel, cobbles, and boulders with a few lenses of clay and silt, exists in the central part of Platte County. The terraces are underlain by the Arikaree and White River Formations. The rocks that crop out in this area are of mostly Tertiary age, and belong to the Brule Formation and Arikaree Formation. The Brule Formation (Oligocene) consists of white to orange, moderately brittle argillaceous, bentonitic blocky siltstone or silty claystone. The Arikaree Formation is composed of mostly fine to very fine quartz sand and sandstone containing muscovite and biotite grains. Like in many areas in the county, the Arikaree Formation is divided into two distinct groups, the basal conglomeratic unit and an upper sandy unit. The Arikaree Formation in the Wheatland Flats can reach up to 1,080 feet thick, and is cut by several faults (Wheatland and Whalen fault systems) near the eastern and southern boundaries of the area (USGS, 1960). Peacekeeper LFs T-9, T-10, and T-11 are in the Wheatland Flats area of Platte County.

Geologic cores to a depth of 130 feet were excavated prior to construction in 1962. Most sites contain a mixture of sand, silt, clay and sandstone to a depth of 130 feet, along with siltstone or shale. Eleven LF sites did not contain shale in the core hole. For the core holes that did contain shale or siltstone, the depth of its occurrence ranges from 4 feet at LF S-4 to 126 feet at LF T-4. Stratigraphy to 1,000 feet was obtained through seismic data. Only one site (LF P-4) is underlain by the Ogallala Formation. Most sites are underlain by the Arikaree, White River, and Lance Formations. A few sites (nine LFs in the northern part of the deployment area) overly Pierre Shale; however, the depth of its occurrence ranges from 370 feet to 850 feet below the surface (USAF, 1963).

F.E. Warren AFB lies within the High Plains section of the Great Plains Physiographic Province. Rocks within the region range in age from Pre-Cambrian to recent, and are composed primarily of shale with small amounts of sandstone, siltstone, and limestone (USAF, 1996).

3.4.1.3. Mineral Resources and Production

In the Peacekeeper deployment area, coal, oil, natural gas, and potash are the main minerals present. The only coal deposit within the deployment area occurs near the Goshen Hole Lowlands, in south central Goshen County. The coal bed is almost 38,000 acres, and is considered of moderate value (less than a million dollars). The coal field is not currently mined.

Potash is also found in the southeastern section of Wyoming. The Denver Basin Bedded Evaporites Field potash deposit covers more than 1.7 million acres and includes most of Goshen County along with sections of Platte and Laramie Counties. The discovery of the

potash deposits is recent, and mining has not taken place. The deposit exists at around depths of 8,000 feet. Though considered moderate in value, the nature and extent of the deposit is unknown.

Oil production occurs throughout the deployment area. Oil fields present in the deployment area include Horse Creek, Silo, Torrington, Wildcat Creek, Echo Spring, Chug Spring, and Yoder. Table 3.4.1-1 lists oil wells within a half mile of LFs and MAFs.

Table 3.4.1-1
Peacekeeper Sites In the Vicinity of Oil Wells

LF	Stratigraphy (ft)	Distance to Well (ft)	Direction	Well Status	Well Depth (ft)
Q-6	0-3 clay	1,400	SE	PA[1]	5,590
	3-9 sand				
	9-116 conglomerate				
	116-120 sandstone				
	120-300 conglomerate				
Q-6	0-3 clay	2,000	S	PA	5,446
	3-9 sand				
	9-116 conglomerate				
	116-120 sandstone				
	120-300 conglomerate				
Q-6	0-3 clay	2,300	SE	PA	5,420
	3-9 sand				
	9-116 conglomerate				
	116-120 sandstone				
	120-300 conglomerate				
S-1	0-3.5 silt & sand	2,400	SE	PA	7,040
	3.5-19 limestone, sand and clay				
	19-65 sandstone & clay shale				
	65-850 shale & sandstone				
S-1	0-3.5 silt & sand	2,400	NW	PA	7,305
	3.5-19 limestone, sand & clay				
	19-65 sand, sandstone & clays shale				
	65-850 shale & sandstone				
P-3	0-8.5 sand	2,200	SW	PA	8,152
	8.5-18 sandstone & sand				
	18-92 sandstone				
	92-132.5 sand & sandstone				
	132.5-200 sand & sandstone				
R-3	0-24 clay, silt & sand	2,600	NE	PA	8,878
	24-130 siltstone				
	130-370 siltstone, clay & sandstone				
T-1	0-2 sand	2,300	SW	PA	3,635
	2-65 sandstone				
	65-300 sand & sandstone				

[1] PA: Permanently Abandoned; includes bentonite and concrete plug inside steel casing
Source: UWYO, 1999

Horse Creek Oil Field, in western Laramie County, has been producing oil steadily since 1943, and natural gas since 1989. Last year Horse Creek Oil Field produced an average of around 3,000 barrels of oil per month (WYOGCC, 1999). Several oil fields also produce natural gas. These include the deployment area fields of Horse Creek, Silo, Wildcat Creek, Golden Eagle, and Borie. Horse Creek Oil Field produces natural gas at an average of 400 million cubic feet (Mcf) a month, and the Silo Field has produced between 1314 and 54790 Mcf per month over the last year. The closest active natural gas producing well is approximately one mile Southwest of LF Q-6.

3.4.1.4. Geologic Hazards

Some slumping could occur in areas where shale is close to the surface or in some soils susceptible to slumping. The Peacekeeper deployment area is in a zone rated as low to seismicity, with only slight damage anticipated if an earthquake occurred (USAF, 1992b). However, the Federal Emergency Management Agency and the U.S. Geological Survey have classified all of Wyoming as having a very high seismic hazard. Earthquakes of 6.2 or less on the Richter Scale (IX or less on the Modified Mercalli Scale) could occur in any part of the state (WSGS, 1999). Five earthquakes of 2.5 or greater magnitude with an epicenter in Platte, Goshen, and Laramie Counties (two each in Goshen and Laramie Counties and one in Platte County) have occurred since 1871. None of these have occurred since 1986. About 40 earthquakes with an epicenter within a radius of 100 miles of the deployment area have occurred since 1871 (WSGS, 1999; USGS, 2000a) with magnitudes generally between 3.0 to 5.5.

Several faults are situated in the Peacekeeper deployment area. The Whalen Fault System and the Wheaten Fault System extend from central Platte County to northern Goshen County. All of these faults are characterized as normal faults, where the displacement along the fault is vertical. Three unnamed faults occur in northern Laramie. Twelve Peacekeeper sites (11 LFs and one MAF) are located within five miles of faults. Individual sites and distances to faults are shown in table 3.4.1-2. These faults are of Quaternary age, and have produced recent earthquakes, as described above).

Table 3.4.1-2
Peacekeeper Sites Located within Five Mile Radius of Faults

Site	Fault	Distance to Fault (miles)	Direction from Fault
Q-3	unnamed	3.0	SW
Q-8	unnamed	3.0	SE
Q-9	unnamed	1.0	W
Q-10	unnamed	0.8	E
Q-11	unnamed	1.8	S
T-1	Whalen Fault System	0.5	SE
T-2	Whalen Fault System	0.6	NW
T-3	Whalen Fault System	0.8	E
T-4	Whalen Fault System	3.8	SW
T-9	Wheatland Fault System	2.0	SE
T-10	Wheatland Fault System	2.5	W
T-11	Wheatland Fault System	3.0	W

Sources: USGS, 1957; USGS, 1960; USGS, 1967; UWYO, 1999.

3.4.1.5. Soils

Soils in the deployment area are derived primarily from windblown and alluvial (water-deposited) sandstone. A few of the soils are derived from windblown silt. Fifty-five soil series were identified at LF and MAF sites. Several properties of soil determine the type and extent of potential impacts from disturbance. These include soil texture, permeability, the depth to the water table, the hydrologic group, runoff, the potential for erosion by water and wind, and the shrink-swell index. The potential agricultural use of an area is determined by the land capability class. See Appendix I for a complete listing of soils occurring at Peacekeeper sites, their physical properties, and the locations at which they occur. Soils at Peacekeeper sites were disturbed to a depth of 90 feet or more during construction of the original Minuteman silos nearly 40 years ago. While some soil properties are generally the same as surrounding soil, many have been modified because of compaction and mixing during construction.

Soil texture is determined by the relative proportion of sand, silt, and clay. Most of these soils have a loam or sandy loam texture near the surface. Loam is a soil with roughly equal proportions of sand, silt, and clay. A few soils have a silt loam or gravelly loam surface. The subsoil is primarily sandy or fine sandy loam, although a gravelly or sandy layer underlies some of the soils. Over half of the Peacekeeper sites have shallow soils, with bedrock at a depth of six to 39 inches (see Appendix I). The underlying bedrock is mainly soft sandstone, with a few instances of siltstone or shale. The texture of a soil is related to the hazard of piping, the tendency of subsurface cavities and tunnels to form and erode the soil. A fine-textured soil layer (clay or silt), especially in a soil with moderate to high infiltration of water, has a high hazard of piping. The soils in the Peacekeeper deployment area contain a type of clay known as montmorillinite. The clay content of the soil ranges from 14-24 percent in southeastern Platte, southern Goshen, and northern Laramie counties (USDA, 1999a, 1999b, 1999c). The organic content ranges from 0.5 percent in sandy soils to 1.5 percent in silt loams and loams. The porosity (amount of air space in the soils) ranges from about 40 percent in silt loam to 60 percent in sandy soils.

The hazard of slumping is greater in soils with layers of varying textures, particularly with fine layers overlying coarse materials. About half of the Peacekeeper sites have soils with fine layers overlying coarse layers (see Appendix I).

Permeability is the measure of the quantity of water that can move downward in a soil in a given time period; it is usually expressed in inches of water per hour. Terms describing permeability, in inches per hour, are: very slow (less than 0.06), slow (0.06 to 0.2), moderately slow (0.2 to 0.6), moderate (0.6 to 2.0), moderately rapid (2.0 to 6.0), and rapid (6.0 to 20.0). Soil moisture moves downward in the soil until it reaches the water table, a zone where all of the pore spaces within the soil are saturated with water. The depth to the water table varies according to soil texture, topographic position (upland, slope, bottomlands, etc.), and the drainage characteristics of the soil. The depth to the water table also varies throughout the year, depending on weather conditions. In the Peacekeeper deployment area, the depth to the water table is six feet or greater in all of the soils except one. The depth to the water table is three to six feet from May to October in the Coaliams-Haverdad soil (found at LF Q-10).

Soils are grouped according to their hydrologic characteristics (infiltration, runoff, and transmission of water through the soil profile). Four groups are recognized: A, B, C, and D. Group A soils have a high infiltration rate, low runoff, and a high rate of water transmission. Group B soils have moderate infiltration, medium runoff, and moderate water transmission. Group C soils have slow infiltration, medium runoff, and slow water transmission. Group C soils have a layer that impedes the downward movement of water. Group D soils have very slow infiltration, high runoff, and very slow water transmission. These soils have a clay layer at or near the surface, are shallow to bedrock, or have a permanent high water table. About half of the soils in the Peacekeeper deployment area are classified as hydrologic group A. Nearly half of the soils are classified as group D because of a shallow depth to bedrock.

Hydric soils are saturated, flooded, or ponded long enough during the growing season to develop anaerobic (living without free oxygen) conditions in the upper part of the soil. These soils are sufficiently wet to support the growth and regeneration of hydrophytic vegetation. Hydric soils and hydrophytic vegetation are among the criteria for determining the presence of a wetland. None of the soils at Peacekeeper sites are classified as hydric.

The shrink-swell potential refers to the tendency of soils to shrink in volume when they become dry and to swell when they become wet. The shrink-swell potential ranges from low (a volume change of less than 3 percent), moderate (a volume change of 3 to 6 percent), and high (a volume change of more than 6 percent). Most of the soils at Peacekeeper sites have a low shrink-swell potential. A few have a medium potential for shrink-swell, and one soil (the Kim clay loam located at LF S-3) has a medium to high potential for shrink-swell. A high shrink-swell potential can make construction and excavation difficult.

Surface runoff is the precipitation that flows off the land without infiltrating into the soil. Runoff rates depend upon the slope, soil texture, vegetative cover, and the moisture content of the soil and are expressed in qualitative terms: ponded, slow, medium, and rapid. Runoff rates affect the potential for erosion by water. The hazard of water erosion of each soil series is given as slight, moderate, or high, depending on runoff rates, slope, and the length of slope. The potential for erosion by water ranges from slight to severe within Peacekeeper sites. The potential for erosion by wind also ranges from slight to very severe, with the majority of soils at Peacekeeper sites having a severe potential for wind erosion.

Soil temperatures are generally between 40° to 60° F. Soils are generally frozen from mid-November to early April in the deployment area.

The U.S. Department of Agriculture has developed land capability classes to rate the potential agricultural uses of a given area of land. These classes range from I to VIII, with Class I having few limits restricting their use for crops and Class VIII having limitations that preclude their use for commercial production of plants and restrict their use to wildlife habitat, water supply, or esthetic uses. Classes III and IV, with soil conservation practices, can support the cultivation of crops; Classes V through VII cannot support the cultivation of crops and are limited to pasture, range, woodland, or wildlife habitat. Modifications to the soil, such as irrigation or drainage can improve the land capability class. Subclasses

further define classes. For example, subclass e denotes a soil subject to severe erosion if not protected. Soils at Peacekeeper sites are generally classified from IIIe to VIIe.

Prime farmland is defined by the U.S. Department of Agriculture as land that is best suited for production of food and fiber crops. This land has an adequate supply of moisture and the growing season is favorable. It has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated for long periods of time. The slope is generally between zero and six percent. There are four soil series adjacent to Peacekeeper sites which are listed as prime farmland when irrigated: Keith loam (at LF S-5), Manter and Anselmo fine sandy loams (at LF S-6), Satanta loam (at LFs S-2 and S-7), and Vetal fine sandy loams (at LF S-2).

The predominant soil series on F.E. Warren AFB is classified texturally as loamy, where average topsoil depth ranges from four to six inches. The subsoil is primarily an alluvial clay and extends from a depth of approximately six to 36 inches (USAF, 1996).

3.4.2. WATER RESOURCES

Water resources include surface and groundwater sources, quantity and quality, drainage conditions, and subsurface movements. The hydrologic cycle results in the transport of water into various media such as the air, the ground surface, and subsurface. Natural and human-induced factors determine the quality of water resources.

3.4.2.1. Groundwater

Groundwater occurs mainly in Quaternary and Tertiary sediments in southeastern Wyoming. Quaternary aquifers primarily occur along stream channels and in a broad area along the North Platte River. These aquifers also consist of broad extensive sheets of alluvium that were deposited by a network of branching and rejoining streams. These Quaternary aquifers are composed of sand and gravel with beds of fine sand, silt and clay, and large chunks of siltstone, pebbles, and boulders (USGS, 1957). In an area known as the Wheatland Flats north and west of Wheatland, an aquifer occurs in an area of terrace deposits (sand, gravel, cobbles, and boulders with a few lenses of clay and silt) up to 100 feet thick (USGS, 1960). This is an important local source of groundwater for domestic, livestock, and irrigation wells. Peacekeeper LFs T-10 and T-11 are located near the edge of this aquifer (at the edge to a few hundred feet). The depth to the water table in this area is 20 to 40 feet (UWYO, 2000a).

Upper Tertiary aquifers, part of the High Plains Aquifer System extending from southeastern Wyoming to Texas, are the most important sources of water in southeastern Wyoming. These aquifers consist mostly of unconsolidated to semi-consolidated deposits of sand and gravel, commonly interbedded with silt and clay. The alluvium was derived from the Middle Rocky Mountains and transported into the valleys by streams. Thick sequences of sand and gravel in the alluvium compose productive aquifers, especially in the Miocene Ogallala Formation and the Miocene and Oligocene Arikaree Formation. The unconsolidated sand and gravel beds of the Ogallala Formation yield water much more readily than the sandstone beds of the Arikaree Formation. The High Plains Aquifer System is as much as 1,000 feet thick in southeastern Wyoming (USGS, 1999). The High Plains Aquifer System underlies most of Laramie County, southwestern Goshen County,

and southeastern and central Platte County. Twenty one LFs are located in Upper Tertiary aquifers. The depth to groundwater at these LFs varies from 77 to 128 feet. Appendix J shows the depth to the water table at all of the LFs.

The permeability of the Upper Tertiary aquifers is variable and directly related to the grain size and sorting of the deposits that compose the aquifers. Where the aquifers consist primarily of sand and gravel, they are extremely permeable (permeability decreases as clay content increases). Generally, the upper Tertiary aquifers become more clayey and less permeable as depth increases. Yields of wells completed in these aquifers are reported to range from 5 to 800 gallons per minute, but yields of a few wells exceed 2,000 gallons per minute. Depth to water in the High Plains Aquifer System ranges from less than 50 to almost 300 feet (USGS, 1999a). Because the upper Tertiary aquifers usually are at shallow depths, most wells completed in the aquifers are less than 600 feet deep. However, some well depths exceed 1,000 feet in southeastern Wyoming (USGS, 1999). Much of the water in the High Plains Aquifer System is unconfined, but clay beds and lenses of other fine-grained materials locally create confined conditions.

Lower Tertiary aquifers are comprised of the White River Formation (sometimes divided into the Brule and Chadron Formations). The consolidated siltstone and sandstone of the Brule formation of Oligocene age yield highly variable volumes of water; yields are greatest where the beds have been fractured. The Chadron Formation only yields water in large quantities where there are coarse-grained channel deposits. Lower Tertiary aquifers are used for domestic and stock wells where the yields are sufficient. Lower Tertiary aquifers occur in northeastern Laramie County, southern Goshen County, and southwestern and south central Platte County. Twenty one Peacekeeper LFs occur in Lower Tertiary aquifers. The depth to groundwater at these LFs ranges from 63 to 128 feet.

The Lance Formation, of Cretaceous age, contains sandstone beds within layers of shale and siltstone. These beds of sandstone yield up to 100 gallons per minute in domestic and stock wells in southern Goshen County. Peacekeeper LFs S-3, S-6, S-7, S-8, S-10, and S-11 are located in the Lance Formation. The depth to groundwater at these LFs varies from 51 to 129 feet. There are two dewatering wells at site S-1, and one dewatering well at sites S-3, S-11, and Q-9. The dewatering wells were installed at these sites to address groundwater leaking into the missile facilities (Frank, 2000).

Recharge to aquifers occurs in the majority of all three counties in the Peacekeeper deployment area. Principal areas of recharge include sandy soils, streams, and irrigation canals.

The Ogallala aquifer lies beneath F.E. Warren AFB and can be described as a heterogeneous mixture of sand and gravel beds, silt, clay, and thin limestone units. The beds are sometimes cemented by calcium carbonate. Lenses of sand and gravel are generally sporadic, but consistently occur from the surface to a depth of about 10 feet in the southwestern part of the installation. Below this depth, the predominant sediments are fine-grained, but sand and gravel still occur. The Ogallala is about 300 feet thick in the northern part of the base, thinning to the south until it reaches a thickness of approximately 30 feet in valleys where it has been deeply eroded (USAF, 1999b).

3.4.2.2. Surface Water

The deployment area is located in portions of the North Platte River Basin and the South Platte River Basin. Figure 3.4.2-1 shows the boundaries of watersheds in the deployment area. The North Platte River Basin covers most of southeastern Wyoming, part of western Nebraska, and a small portion of north central Colorado. The basin is approximately 30,900 square miles in area. The North Platte River Basin is subdivided into 14 watersheds. Three of these watersheds are within the deployment area: the Middle North Platte River, the Lower Laramie River, and Horse Creek (see Figure 3.4.2-1). The extreme southern portion of the Peacekeeper deployment area (LFs P-4 and P-5) and F.E. Warren AFB are located in the South Platte River Basin.

This basin, which encompasses an area of 23,900 square miles, includes the southeastern corner of Wyoming, northeast Colorado, and a small area of western Nebraska. The South Platte River Basin is subdivided into 18 watersheds. Two of these watersheds are in the deployment area: Lower Lodgepole Creek and Upper Lodgepole Creek (see Figure 3.4.2-1). F.E. Warren AFB is located within the Crow Creek watershed. Crow Creek, which naturally divides the northern and southern portions of the base, and Dry Creek both serve as drainage for the base (see Figure 2.1-3).

The North Platte River is located just north of the Peacekeeper deployment area (about two miles north of LF S-2) and is the only major river in the area. The Laramie River is located about one mile north of LF T-11. Major creeks in the deployment area are Horse, Chugwater, Lodgepole, Bear, and Richeau (see Figure 3.4.2-1). Table 3.4.2-1 lists these and other creeks and reservoirs located within one mile of an LF or MAF.

3.4.2.3. Floodplains

The MAFs and LFs are not located within floodplains (Sleesman, 1999). There are seven LFs (P-8, Q-5, Q-8, S-3, S-6, S-7, and S-9) that may experience temporary flooding in the event of a three- to four-inch rainfall.

3.4.2.4. Water Quality

Water quality in the deployment area varies for both groundwater and surface water. Generally, groundwater is suitable for most uses but not as a potable water source. A survey of rivers in Wyoming shows that 37 percent fully support aquatic life uses, 4 percent fully support these uses now but are threatened, 55 percent partially support aquatic life uses, and 4 percent do not support aquatic life uses. In lakes, 54 percent of the surveyed acres fully support aquatic life uses and 46 percent partially support these uses (USEPA, 1996). Based on total dissolved solids (TDS) levels, water with less than 500 milligrams per liter (mg/L) is considered safe for most domestic uses.

3.4.2.4.1. Groundwater

The High Plains Aquifer System is generally classified as being suitable for most uses, but is not suitable as a potable water source in some areas. Dissolved solids concentrations in this aquifer range from 175 to 604 mg/L. In some cases, primarily in Platte County, this exceeds the 500 mg/L secondary maximum contaminant level (MCL) recommended for drinking water by the USEPA. Water from the High Plains Aquifer System is primarily of the calcium bicarbonate type.

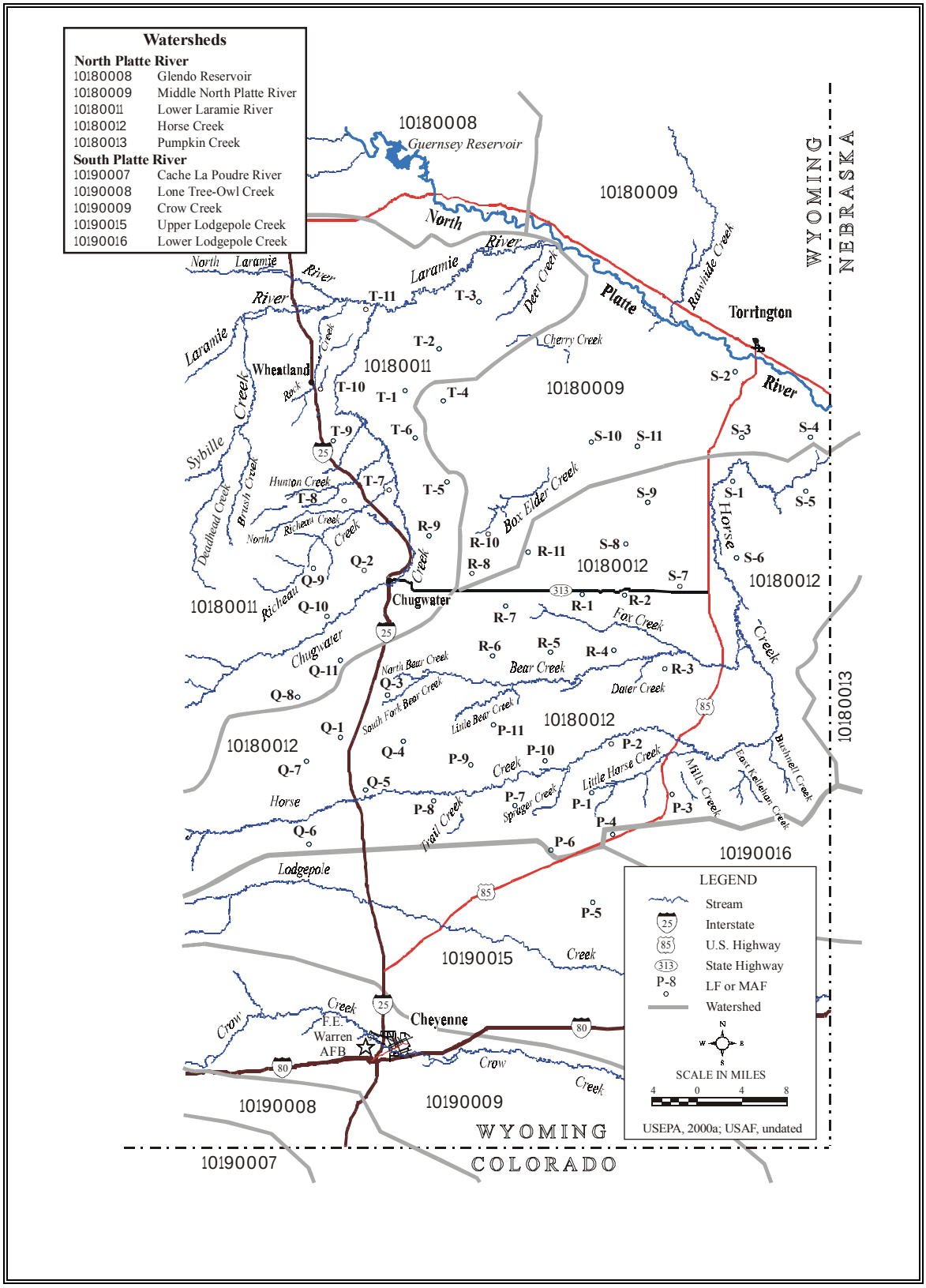

Figure 3.4.2-1. Water Features of the Deployment Area

Table 3.4.2-1 Creeks and Reservoirs Near Peacekeeper LFs and MAFs		
LF or MAF Designation	**Approximate Creek or Reservoir Location**	**County**
P-2	1/8 mile from Branch of Horse Creek	Laramie
P-3	1/8 mile from Herrick Creek	Laramie
P-4	1/4 mile from unnamed creek	Laramie
P-5	1/4 mile from unnamed creek	Laramie
P-6	1/8 mile from branch of Chevington Draw	Laramie
P-7	1/8 mile from unnamed creek	Laramie
P-8	1/8 mile from branch of Horse Creek	Laramie
P-10	1/8 mile from branch of Horse Creek	Laramie
P-11	1/8 mile from unnamed creek	Laramie
Q-2	1/4 mile from two different branches of Chugwater Creek	Platte
Q-3	1/8 mile from North Bear Creek	Laramie
Q-5	1/8 mile from Lewis Draw Number 1	Laramie
Q-6	Within 300 feet of branch of Horse Creek	Laramie
Q-7	1/8 mile from branch of South Fork Bear Creek	Laramie
Q-8	Within 400 feet of branch of North Bear Creek	Laramie
Q-9	1/4 mile from branch of Richeau Creek	Platte
Q-11	1/4 mile from unnamed creek	Laramie
R-3	1/4 mile from branch of Bear Creek	Goshen
R-10	Within 500 feet of unnamed creek	Platte
S-2	1/4 mile from branch of Cherry Creek Lateral	Goshen
S-3	1/4 mile from unnamed reservoir, ¼ mile from East Springer Main Lateral	Goshen
S-7	1/8 mile from branch of Lone Tree Creek	Goshen
S-8	1/4 mile from creek feeding Sinnard Reservoir	Goshen
T-2	1/8 mile from two different branches of creek in Eagles Nest Canyon	Platte
T-4	1/8 mile from unnamed creek in Eagles Nest Canyon	Platte
T-6	1/8 mile from unnamed creek	Platte
T-7	1/8 mile from branch of Chugwater Creek	Platte
T-8	1/8 mile from branch of Chugwater Creek	Platte
T-10	1/4 mile from Canal No. 1	Platte
T-11	1/4 mile from Chugwater Creek, one mile from Laramie River	Platte
Source: WYDOT, 1994, 1995, 1996		

Some aquifers in Wyoming have naturally high levels (near or above the MCL) of fluoride, selenium, and radionuclides. Petroleum hydrocarbons are the most prevalent type of contaminants impacting Wyoming groundwater, followed by halogenated solvents, salinity/brine, nitrates, and pesticides. Leaking underground storage tanks are the most numerous source of contamination. Other sources include mineral mining, agricultural activities, spills, landfills, septic tank leachfields, and other industrial sites (USEPA, 1996).

Groundwater quality in the Peacekeeper deployment area varies by watershed. Generally, less than five percent of water samples exceeded 50 percent of MCL levels, or there was insufficient data (USEPA, 2000a). Vulnerability to pesticide contamination is generally

low to moderate in this area, with the exception of stream valleys, where the vulnerability is high. The risk of groundwater contamination from nitrates is high in the Crow Creek and Lower Lodgepole Basins and low in other basins in the area (UWYO, 2000b). All groundwater in Wyoming is classified as Groundwater of the State and then further classified according to waters that are known to be sources of supply or are unappropriated waters. Unappropriated waters are classified according to their suitability for potential use and are divided into seven classes: domestic use, agricultural use, use for livestock, fish and aquatic life, high TDS (greater than 10,000 mg/L), mineral, and excessively contaminated water. Each class of groundwater has specific cleanup standards according to Chapter VIII, Quality Standards for Wyoming Groundwater, promulgated in Wyoming Statutes, Section 35-11-302.

3.4.2.4.2. Surface Water

The state of Wyoming is monitoring stream sites around the State and sampling chemical and biological parameters such as dissolved oxygen, nutrients, aquatic insect species composition, species abundance, and habitat conditions at the stream sites. The most widespread problems in Wyoming rivers and streams are siltation and sedimentation, excessive nutrient levels, high total dissolved solids and salinity, flow alterations, and habitat alterations (USEPA, 1996). The most prevalent sources of water quality problems in rivers and streams are due to runoff from rangeland, natural resources, irrigated cropland, pasture land, and construction of highways, roads, and bridges.

The leading problem in Wyoming lakes are low dissolved oxygen concentrations, organic enrichment, sedimentation and siltation, and high levels of nutrients, inorganic substances, and metals (USAF, 1996). The most prevalent contaminants in lakes are derived from natural sources, rangeland, irrigated cropland, and municipal sewage treatment plants. Flow regulation also affects lake water quality.

Surface water quality is variable in the deployment area. The impact from agricultural, pesticide, and nitrogen runoff is moderate. The percent of rivers and lakes meeting their USEPA designated uses ranges from less than 20 percent to 100 percent in various watersheds. Less than 25 percent of surface water samples exceed 50 percent of the MCL (see Table J-2).

3.4.2.4.3. Domestic Water

Drinking water at F.E. Warren AFB is provided by the Board of Public Utilities in Cheyenne. Nine wells provide the majority of the water for the base water system. The City of Cheyenne produces its water from the Crow Creek drainage, municipal wellfields, and from Douglas Creek. The Bioenvironmental Engineering Flight conducts monthly bacteriological samples at various locations on base. Analytical test results for organisms, inorganics, and radiological constituents are reviewed and maintained by the Bioenvironmental Engineering Flight. Results from the bacteria analysis on base and at the MAFs have been negative for the past three years (USAF, 1999e).

Domestic water at the MAFs is provided by wells owned by the Air Force. The depth of the wells, the aquifer source, and the yield of the wells is summarized in Table 3.4.2-2.

Table 3.4.2-2 Characteristics of MAF Wells			
MAF	**Depth of Well (feet)**	**Aquifer**	**Yield (gallons per minute)**
P-1	150	Arikaree	50.0
Q-1	152	Arikaree	15.0
R-1	265	Lance	15.2
S-1	282	Lance	10.0
T-1	385	White River	31.4
Source: USAF, 1999f			

The Bioenvironmental Engineering Flight also conducts monthly bacteriological samples at the MAFs. Analytical test results for organisms, inorganics, and radiological constituents at the MAF wells were below MCLs. A chemical and radionucleide analysis was conducted at the MAFs in October 1997. All samples were taken at the wells prior to any treatment to establish raw water quality. Both primary and secondary drinking water standards were evaluated.

Primary drinking water standards (MCLs) are mandated by the Safe Drinking Water Act to protect health and must be followed. No primary standards were exceeded at any of the Peacekeeper MAFs. Secondary drinking water standards are unenforceable federal guidelines regarding taste, odor, color, and certain other non-aesthetic effects of drinking water. The USEPA recommends them to the State as reasonable goals, but federal law does not require water systems to comply with them. Several parameters were sampled at the MAFs that have secondary standards. A secondary standard for dissolved solids was exceeded at the well at S-1. Subsequent to the sampling and to improve overall water quality at the MAFs, this site as well as other Peacekeeper MAFs, has been equipped with a class II water system which includes a reverse osmosis filtration unit (USAF, 1999e). This unit provides adequate treatment to remove dissolved solids to a level below the secondary standard.

The population served by public water supply systems ranges from 54 percent in Goshen County to 69 percent in Laramie County (See Table 3.4.2-3). There are 53 community and 36 non-community public water systems in Laramie County. The primary municipal systems are the Cheyenne Board of Public Utilities, South Cheyenne Water and Sewer District, the U.S. Air Force Hospital at F.E. Warren AFB, Pine Bluffs, Burns, and Albin. In Goshen County, there are 10 community and 16 non-community public water systems. The primary municipal systems are at Torrington, South Torrington, Lingle, Fort Laramie, La Grange, and Yoder.

There are 10 community and 33 non-community public water systems in Platte County. The primary municipal systems are at Wheatland, Guernsey, Chugwater, and Glendo. Most of these systems have consistently met primary MCL standards. However, some of these systems, such as Torrington, Wheatland, and Chugwater have had violations of the MCL for Coliform between 1993 and 1999 (USEPA, 2000b).

Table 3.4.2-3 Public and Self Supplied Domestic Water Supplies			
	Goshen	**Laramie**	**Platte**
Population Served By Public Supply Groundwater	6,860	9,800	5,060
Population Served By Public Supply Surface Water	0	44,630	0
Total Population Served by Public Supply Water	6,860	54,430	5,060
Population Served by Self-Supplied Water	5,770	24,010	3,280
Total Population	12,630	78,440	8,340
Percent of population served by public supply	54.3%	69.4%	60.7%
Percent of population served by self supply	45.7%	30.6%	39.3%
Public System Withdrawals of Fresh Groundwater (MGD)[1]	3.10	3.62	1.93
Public System Withdrawals of Fresh Surface Water (MGD)	0.00	16.21	0.00
Total Public System Water Withdrawals (MGD)	3.10	19.83	1.93
Self Supplied Domestic Withdrawals of Fresh Groundwater (MGD)	0.41	1.71	0.24
Self-Supplied Domestic Withdrawals of Fresh Surface Water (MGD)	0.02	0.09	0.01
Total Self-Supplied Domestic Water Withdrawals (MGD)	0.43	1.80	0.25
Percent Of Public System Water From Groundwater	100.0%	18.3%	100.0%
Percent Of Public System Water From Surface Water	0.0%	81.7%	0.0%
Percent Of Self-Supplied Domestic Water From Groundwater	95.3%	95.0%	96.0%
Percent Of Self-Supplied Domestic Water From Surface Water	4.7%	5.0%	4.0%

[1] MGD = million gallons per day
Source: USGS, 2000b

Water for domestic, stock, irrigation, industrial, and other uses in the Peacekeeper deployment area is derived from both groundwater and surface water. Domestic water is derived from groundwater in Goshen and Platte Counties, and primarily from surface water in Laramie County. Table 3.4.2-4 lists the aquifer, well depths, and total dissolved solids for the major municipal public water systems in the deployment area.

Table 3.4.2-4 Sources of Groundwater for Major Municipal Public Water Systems in the Deployment Area			
City/Town	**Aquifer**	**Typical Well Depth (feet)**	**Total Dissolved Solids (mg/L)**
Cheyenne	Ogallala (Upper Tertiary)[1]	163-638	175-308
Torrington	Floodplain Deposits of the North Platte River (Quaternary)	60 to 90	324-674
Yoder	Lance (Cretaceous)	80 to 101	416-1,250
Wheatland	Arikaree (Upper Tertiary)	355 to 560	264-604
Chugwater	Brule (Lower Tertiary)	62 to 86	232-646

[1] Cheyenne obtains the majority of its water from surface water in the Crow Creek Drainage Basin
Sources: USEPA, 2000b; USGS, 1957; USGS, 1960; USGS, 1967

Most groundwater and surface water use is for irrigation of crops, followed by public supply. Table 3.4.2-5 lists the percentage of water use by major categories. Privately owned wells account for over 90 percent of the water used in the three counties.

Table 3.4.2-5 1995 Water Use in the Three-County Peacekeeper Deployment Area							
Fresh Groundwater Use				**Fresh Surface Water Use**			
	Goshen	**Laramie**	**Platte**		**Goshen**	**Laramie**	**Platte**
Public Supply	7.0%	5.2%	8.8%	Public Supply	0.0%	37.7%	0.0%
Commercial, wells	0.1%	0.3%	0.0%	Commercial, wells	0.0%	0.3%	0.0%
Domestic, wells	0.9%	2.5%	1.1%	Domestic, wells	0.0%	0.2%	0.0%
Industrial, wells	0.0%	0.0%	0.1%	Industrial, wells	0.1%	0.0%	0.0%
Power, wells	0.0%	0.0%	0.0%	Power, wells	0.0%	0.0%	15.1%
Mining, wells	1.5%	0.4%	0.3%	Mining, wells	0.2%	0.2%	0.0%
Livestock, wells	4.5%	0.8%	2.5%	Livestock, wells	0.4%	0.3%	0.3%
Irrigation, wells	86.0%	90.9%	87.2%	Irrigation, wells	99.3%	61.3%	84.6%
Total	100.0%	100.0%	100.0%	Total	100.0%	100.0%	100.0%
Groundwater Use	327.49 MGD	203.96 MGD	257.29 MGD	Surface Water Use	91.24 MGD	159.79 MGD	45.38 MGD
Source: USGS, 2000b							

The highest concentration of wells is near cities, towns, and outlying acreage areas and in irrigated cropland (Manley, 1999). The State of Wyoming Engineers Office conducted a search of water wells adjacent to Peacekeeper LFs and MAFs. Twenty-nine LFs are located within one mile of permitted water wells. Table 3.4.2-6 lists the adjacent LF, distance to the well, and the type of well. Distances are estimated to the nearest ¼ mile. Eleven domestic wells are located within about ¼ mile of LFs. The actual distance to these wells could range from a few hundred feet to nearly ½ mile (the well locations provided by the State of Wyoming are only within a ¼ by ¼ mile area). The depths of these wells range from one foot to 280 feet.

3.4.3. AIR RESOURCES

3.4.3.1. Climate and Meteorology

F.E. Warren AFB and the Peacekeeper LFs and MAFs are located in southeastern Wyoming. The climate is similar to that of other parts of the Northern High Plains. The area is classified as semiarid and is typified by low annual precipitation rates, high evaporation rates, and wide temperature extremes. The Peacekeeper missile deployment area is subject to frequent dry and cold polar and arctic air mass intrusions during the winter, and continental tropical air masses and infrequent maritime tropical air masses in the summer.

The topography of the deployment area is somewhat varied in southeastern Wyoming (see Section 3.4.1.1 for further details). No major bodies of water affect climate in the Peacekeeper deployment area.

Mean temperatures in the area have a daily range during summer of about 27°F, in winter, this range is about 24°F. Mean daily maximum temperatures in the area range from mid 30s°F in January to the low 80s°F in July and August. Mean daily minimum temperatures range from 15°F in January to the mid-50s°F in summer.

Table 3.4.2-6 Estimated Distance[1] to Permitted Water Wells near Launch Facilities					
LF	**Distance (miles)**	**Use**	**LF**	**Distance (miles)**	**Use**
P-3	1/4	stock, industrial, irrigation	S-2	0 – 1/4	stock
P-3	1/4	stock	S-3	0 – 1/4	stock
P-5	3/4	domestic, stock	S-3	1/4	stock, domestic
P-6	1/2	stock, domestic	S-3	0-1/4	dewatering
P-8	1/4	stock	S-4	1/4	stock, domestic
P-9	1/4	stock	S-4	1/4	stock, domestic
Q-2	1/4	stock	S-4	1/4	stock
Q-3	1/4	stock	S-6	1/2	stock
Q-4	1/4	stock	S-6	1/2	stock
Q-8	3/4	stock, domestic	S-9	1/2	stock
Q-8	1/4	stock	S-9	1/4	stock, domestic
Q-9	0-1/4	dewatering	S-11	0 – 1/4	dewatering
Q-11	1/4	stock	T-2	1/2	stock
R-2	1/4	monitoring	T-3	1/2	domestic
R-2	1/4	stock	T-3	0 – 1/4	domestic
R-3	1/4	stock	T-3	1/4	stock
R-4	1/2	domestic	T-4	1/4	stock, domestic
R-4	1/4	stock, domestic	T-4	1/4	stock
R-7	1/4	domestic	T-5	1/4	stock, domestic
R-9	1/4	stock	T-6	1/4	stock, domestic
R-11	1/4	stock	T-7	1/4	stock
S-1	0-1/4	dewatering (two wells)	T-11	1/4	monitoring
S-2	1/4	stock	T-11	1/4	monitoring
S-2	1/4	domestic	T-11	1/4	monitoring

[1] Distances are estimated to the nearest ¼ mile. Actual well locations provided by the State of Wyoming are to the nearest ¼ mile by ¼ mile area.

Source: Wyoming State Engineers Office, 1999.

Extreme temperatures during cold arctic air masses have reached near -30°F in the region. Extreme high temperatures have reached near 100°F. Relative humidity ranges from near 50 to 60 percent at 7:00 a.m. and 35 to 40 percent at 1:00 p.m.

Mean precipitation in the deployment area is about 15 inches per year. This amount is fairly evenly distributed across the 12 months with a maximum in late spring and early summer at about 2.0 to 2.5 inches per month. Precipitation during the winter months is in the form of snow or frozen precipitation. Snowfall amounts typically range between 5 and 10 inches per month, which is equivalent to approximately an inch or less of water per month. Extreme snowfalls of greater than 20 inches have occurred. Forty-five percent of the precipitation falls in the months of April, May, and June while only 16 percent of the precipitation falls in the winter. Summer precipitation usually comes in the form of thundershowers, which can bring high winds and hail. An average of 12 days in July have thunderstorms. Normal winds in the area average between 9 and 13 knots (10 to 15 miles

per hour) with maximum wind speeds reaching 75 knots (86 miles per hour). Prevailing winds are from the west and northwest.

3.4.3.2. Regional Air Quality

The National Ambient Air Quality Standards (NAAQS), established by the USEPA, define the maximum allowable concentrations of pollutants that may be reached but not exceeded within a given time period. These standards were selected to protect human health with a reasonable margin of safety. Standards are not to be exceeded more than once per year, except for ozone (O_3) and particulate matter smaller than 10 microns in diameter (PM_{10}), which are not to be exceeded more than an average of one day per year. Areas not meeting NAAQS are designated as nonattainment areas for the specific pollutant causing the violation. Any area in exceedance of an NAAQS is at risk of experiencing potentially significant impacts for specified pollutants regardless of nonattainment classification. Wyoming has adopted a more stringent set of standards, termed the Wyoming Ambient Air Quality Standards (WYAAQS).

Six "criteria" pollutants are regulated by the USEPA. The criteria pollutants are O_3, carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), PM_{10}, and lead (Pb). The USEPA standards for PM_{10} replaced total solid particulate (TSP) standards that were originally established for particulate matter of all sizes. Wyoming has retained a standard for TSP as well as adopting the PM_{10} standard. An additional standard for particulate matter smaller than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) has been promulgated, but compliance with the new standard will be phased in during future years. Generally, these pollutants directly originate from diverse mobile and stationary sources. Tropospheric ozone is an exception, since it is rarely directly emitted from sources. Most ozone forms as a result of volatile organic compounds (VOC) and NO_x reacting with sunlight. Table 3.4.3-1 presents the NAAQS and the WYAAQS for the six criteria pollutants (although not yet enforceable, the $PM_{2.5}$ standard is included as a reference) and TSP.

The three counties (Laramie, Platte, and Goshen) in the Peacekeeper deployment area are part of the Metropolitan Cheyenne Intrastate Air Quality Control Region (81.89) and are in attainment status for all criteria pollutants.

3.4.3.3. Prevention of Significant Deterioration

Prevention of Significant Deterioration (PSD) Regulations (40 CFR § 52.21) define air quality levels that cannot be exceeded by major stationary emission sources in specified geographical areas. Major stationary sources are usually sources that emit more than 100 tons per year (tpy) of a specific pollutant.

F. E. Warren AFB is not a major source of any criteria pollutant, as emissions are well below this threshold (see Table 3.4.3-2). PSD regulations establish limits on the increments of SO_2 and TSP that may be emitted above a pre-measured amount in each of three class areas. Class I areas are pristine areas, and include National Parks and wilderness areas. All other areas in the United States are classified as Class II, where moderate, well-controlled industrial growth could be permitted. There are no Class I areas located within a sixty-mile radius of the Peacekeeper area.

Table 3.4.3-1 National and Wyoming Ambient Air Quality Standards				
Pollutant	**Unit**	**Averaging Time**	**NAAQS[a]**	**WYAAQS**
O_3	µg/m^3 (ppm)	8 hr	157 (0.08)	same
CO	µg/m^3 (ppm)	1 hr 8 hr	40,000 (35) 10,000 (9)	same same
NO_2	µg/m^3 (ppm)	AAM[b]	100 (0.053)	same
SO_2	µg/m^3 (ppm)	3 hr(NAAQS)/ 24 hr AAM	1,300[c] (0.5) 365 (0.14) 80 (0.03)	same 260 (0.10) 60 (0.023)
PM_{10}	µg/m^3	24 hr AAM	150 50	150 50
$PM_{2.5}$	µg/m^3	24 hr AAM	65 15	--- ---
TSP	µg/m^3	24 hr	---[d]	150
Pb	µg/m^3	¼ year	1.5	same

[a] Primary standard unless otherwise noted. National Primary Standards establish the level of air quality necessary to protect the public health from any known or anticipated adverse effects of a pollutant, allowing a margin of safety to protect sensitive members of the population.

[b] Annual Arithmetic Mean.

[c] Secondary standard. National Secondary Standards establish the level of air quality necessary to protect the public welfare by preventing injury to agricultural crops and livestock, deterioration of materials and property, and adverse impacts on the environment.

[d] The NAAQS total suspended particulate standards were discontinued on July 1, 1987, with the promulgation of the PM_{10} regulations.

Source: WEQA, 1999

Table 3.4.3-2 Total 1996 Pollutant Emissions at F.E. Warren AFB (values in tpy)			
PM_{10}	3.46	CO	17.55
NO_x	35.46	VOCs	10.76
SO_2	30.6	Lead	3 (lb/yr)

Source: USAF, 1998d

3.4.3.4. Air Pollutant Sources

Air pollutants include the six criteria pollutants discussed previously, hazardous air pollutants (HAP) and ozone depleting chemicals (ODC). HAPs include a wide range of materials or chemicals that are toxic or potentially harmful to human health. HAPs are found in numerous products and used in many processes. An example is methyl ethyl ketone, widely used as a solvent for paint products.

ODCs are chemicals that react with and destroy stratospheric ozone. Stratospheric ozone, which should not be confused with the ground-level or tropospheric ozone previously discussed, plays a beneficial role by blocking harmful ultraviolet rays from the sun. Chlorofluorocarbons used in air conditioners and many halons used in fire extinguishers are ODCs.

F.E. Warren AFB conducts baseline emissions inventories (USAF, 1998d) to establish emissions of criteria pollutants. Those criteria pollutant emissions qualifying for inclusion under the CAA applicability thresholds are shown in Table 3.4.3-2.

The principal sources of air pollution from Peacekeeper operations (vehicular traffic emissions and emissions from helicopter operations) occur during transit to and from the main base to the MAFs and LFs.

Table 3.4.3-3 presents estimated emissions from helicopter operations in the vicinity of F.E. Warren AFB. The table also shows vehicle emissions estimated by using typical vehicle miles traveled. Peacekeeper vehicle miles traveled are calculated using an average of 2 million miles per year (Charron, 1999). Factors provided by the USEPA are used to calculate vehicle emissions based on mileage traveled.

Table 3.4.3-3
Typical Annual Emissions from Missile Support Aircraft and Vehicles (values in tpy)

Source	VOC	NO_x	PM_{10}	CO	SO_x
UH-1N[1]	0.47	5.93	negligible	5.77	1.00
Vehicles[2]	1.76	2.65	0.57[3]	22.05	NA

[1]Emissions generated in the vicinity of F.E. Warren AFB, WY (Source: U.S. Army, 1993; Westerlund, 1999)
[2]Based on 2million miles per year (Charron, 1999); using AP-42 factors (USEPA, 1985)
[3]Includes all sizes of particulate matter

Additional air emissions are generated by aircraft used to transport missile components to other locations. Air emissions that are attributed to a flight include emissions generated during landing and takeoff cycles (emissions generated at altitudes below 2,000 feet).

Ongoing operations also generate some air emissions; generally HAPs are of most concern. These emissions are released during the use of cleaning compounds during maintenance activities at the LFs, MAFs, and F.E. Warren AFB. The emissions are minimal, due to the small quantities of volatile materials used in the process.

3.4.3.5. Sensitive Receptors

Sensitive receptors are populations that are more susceptible to the effects of air pollution than the general population. Localized sources (e.g., sources within ¼ mile) of HAPs and CO are of particular concern to sensitive receptors. Examples of sensitive receptors include the following:

- Long-term Health Care Facilities
- Rehabilitation Centers
- Hospitals
- Convalescent Centers
- Retirement Homes
- Residences
- Schools
- Playgrounds
- Child Care Centers
- Athletic Facilities

Peacekeeper maintenance facilities on base are located more than 2,000 feet from sensitive receptors. The Peacekeeper LFs and MAFs are located throughout rural southwestern Wyoming, and there are no known sensitive receptors located near the sites. No towns exist within a two-mile radius of any LF or MAF.

3.4.4. NOISE

This section provides a description of noise, existing ambient noise levels and primary noise generators, and the influence of noise on land use.

3.4.4.1. Noise Description

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are designated as noise. Noise can be stationary or transient, intermittent or continuous. The human response to noise is generally divided into three categories: physiological, which is primarily hearing loss; behavioral, which includes speech and sleep interference; and subjective, which is predominantly annoyance.

Community response to noise is not based on a single event, but on a series of events over the day. Factors that have been found to affect the subjective assessment of the daily noise environment include the noise levels of individual events, the number of events per day, and the time of day at which the events occur. Most environmental descriptors of noise are based on these three factors, although they may differ considerably in the manner in which the factors are taken into account.

A decibel (dB) is the physical unit commonly used to describe sound levels. Sound measurement is further refined by using an "A-weighted" decibel (dBA) scale which emphasizes the audio frequency response curve audible to the human ear. Thus, the dBA measurement more closely describes how a person perceives sound. For example, typical noise levels include: a quiet urban nighttime (40 dBA), an air conditioner operating 100 feet away (55 dBA), and a heavy truck moving 50 feet away (85 dBA). Table 3.4.4-1 shows noise levels for various human activities. Noise generated near the ground generally attenuates 6 dB for each doubling of distance from a noise source; trees and terrain would further increase attenuation (Thuman, 1976).

Construction noise is normally measured over an 8-hour time period, using the equivalent sound level (L_{eq}). The L_{eq} is obtained by averaging dBA sound levels over a selected time period. Another descriptor of a noise environment over extended periods of hours or days is the day-night average sound level (L_{dn}).

Table 3.4.4-1 Typical Decibel Levels Encountered in the Environment and Industry			
Sound Level (dBA)	**Maximum Exposure Limits**	**Source of Noise**	**Subjective Impression**
10			Threshold of hearing
20		Still recording studio; Rustling leaves	
30		Quiet bedroom	
35		Soft whisper at 5 feet; Typical library	
40		Quiet urban setting (nighttime); Normal level in home	Threshold of quiet
45		Large transformer at 200 feet	
50		Private business office; Light traffic at 100 feet; Quiet urban setting (daytime)	
55		Window air conditioner; Men's clothing department in store	Desirable limit for outdoor residential area use (USEPA)
60		Conversational speech; Data processing center	
65		Busy restaurant; Automobile at 100 feet	Acceptable level for residential land use
70		Vacuum cleaner in home; Freight train at 100 feet.	Threshold of moderately loud
75		Freeway at 10 feet	
80		Ringing alarm clock at 2 feet; Kitchen garbage disposal; Loud orchestral music in large room	Most residents annoyed
85		Printing press; Boiler room; Heavy truck at 50 feet	Threshold of hearing damage for prolonged exposure
90	8 hr	Heavy city traffic	
95	4 hr	Freight train at 50 feet; Home lawn mower	
100	2 hr	Pile driver at 50 feet; Heavy diesel equipment at 25 feet	Threshold of very loud
105	1 hr	Banging on steel plate; Air hammer	
110	0.5 hr	Rock music concert; Turbine condenser	
115	0.25 hr	Jet plane overhead at 500 feet	
120	< 0.25 hr	Jet plane taking off at 200 feet	Threshold of pain
135	< 0.25 hr	Civil defense siren at 100 feet	Threshold of extremely loud
Source: U.S. Army, 1978			

To compute an L_{dn}, single noise events are measured using an A-weighted scale with corrections added for the number of events and the time of day. A 10-dB penalty is added for noise that occurs between the hours of 10 p.m. and 7 a.m. because nighttime noise events are considered more annoying than noise occurring during daytime. The L_{dn} descriptor is accepted by federal agencies, including the Air Force, as a standard for estimating noise impact from aircraft and establishing guidelines for compatible land uses. The relationship between noise and land use is discussed in Section 3.4.4.3.

3.4.4.2. Existing Noise Conditions

Major sources for ambient sound levels on F.E. Warren AFB include traffic on Randall Avenue, and helicopter activities at the base helipads. Operations at the Cheyenne Municipal Airport also contribute to area noise and include military flights. The helipads are located in the southern portion of the base. Operations at the helipads take place between the hours of 7:00 a.m. and 10:00 p.m. The flying mission at F.E. Warren AFB is limited to seven UH-1N helicopters that serve the Peacekeeper and Minuteman deployment area. In addition to providing support to the deployment area, the base conducts training missions and provides support for distinguished visitors. The on-base airfield facilities for the helicopters consists of 13 visual flight rule (VFR) helipads and two Helicopter Slide Landing Training Areas.

The base has no runway, and therefore no transient fixed wing aircraft visit the base. Fixed wing aircraft serving the base use the runway at the Cheyenne Municipal Airport; these aircraft are used to transport Peacekeeper components, primarily boosters, to maintenance facilities or other installations. The Cheyenne Municipal Airport is located approximately two miles east of the base.

The Cheyenne Municipal Airport has sufficient infrastructure to support all of the existing and future flying requirements of F.E. Warren AFB. The main Instrument Landing System (ILS) runway is 9,200 feet long and 150 feet wide. The secondary runway is 6,700 feet long and 150 feet wide. The Wyoming Air National Guard bases 8 C-130H aircraft, and the Army National Guard bases 11 UH-1N helicopters at the Cheyenne Municipal Airport. Other military aircraft such as C-5s, C-141s, and additional C-130s are transients to the airport. Approximately 4,000 flights (includes all aircraft) per month are conducted at the Cheyenne Municipal Airport. Flights involving F. E. Warren components and personnel comprise a low proportion of the total flights at the airport.

The number of daily aircraft operations directly affects the level of noise in the vicinity of an Air Force base. The Air Force examined the effects of aircraft noise and accidents on communities near Air Force installations and developed the Air Installation Compatible Use Zone (AICUZ) Program. Air Force Instruction 32-7063 outlines the objectives of the AICUZ program: to protect Air Force installations from incompatible land use and to assist local, State, and Federal officials in protecting and promoting public health, safety, and welfare by providing information on aircraft accident potential and noise. F.E. Warren AFB is exempted from AICUZ study requirements because the airfield and approach/departure zones for its helicopters are fully contained within the base boundaries (USAF, 1996).

Although F.E. Warren AFB does not have an AICUZ, the base applies AICUZ criteria when planning new development. The base also maintains working relationships with local planning offices to ensure that the base has an opportunity to evaluate and keep informed of Cheyenne's development proposals, including those for the Municipal Airport that could affect the base.

Noise produced by helicopters during takeoff and landing operations results in greater noise impacts than ground traffic. These noises fall into a broad range of "transient" noises, which come and go in a finite period of time. Dependent primarily on the type of

aircraft, type of operations, and distance from the observer to the aircraft, the maximum flyover noise levels will vary widely in magnitude ranging from levels undetectable in the presence of other background noise, to levels sufficiently high to create feelings of annoyance, or to levels that interfere with speech or sleep. The duration of the noise will also vary depending on the proximity of the aircraft, speed, and orientation with respect to the observer. Noise effects from helicopters are obvious along the flight path because of the lower altitude of operations and the minimal time involved in takeoff and landing. Noise levels associated with overflights of UH-1N helicopters at 1,000 feet above ground level are approximately 90 dBA within 1,000 feet to either side of the flight path (U.S. Army, 1992). These noise levels from overflights occur for about 20 seconds.

Ground traffic includes the use of maintenance vehicles for routine maintenance at LFs and MAFs and the movements of rocket boosters and missile components occurring in separate, large vehicles (mainly Type II vehicles). Missiles at the LFs are changed out based on need. Moving the missile to or from an LF is a 7-day process, and takes longer if there are equipment or weather problems. Typically, one to three missiles are shipped each year. Helicopters and a convoy of security vehicles accompany the missile as it is transported to the base. The vehicles used to maintain and move the missiles contribute to the level of noise both in the deployment area and on base. Traffic in the deployment area is sporadic—nearly all the roads have a LOS class A (light traffic, see Section 3.2.3.1 for more transportation information). Background noise levels in the deployment area are similar to those in other rural areas. Agricultural lands typically have background noise levels of approximately 40 to 48 L_{dn} (DoD, 1978). Average noise levels temporarily increase and approach 50 L_{dn} as traffic proceeds through the deployment area. The Public Affairs office has not received any noise complaints during the past year (Linehan, 1999).

3.4.4.3. Noise Influence on Land Use

The *Noise Control Act* of 1972 (42 *United States Code* (U.S.C.) § 4901-4918) provides a basis for state and local governments to establish exterior noise standards for various land uses. The Act also directs Federal agencies to carry out their programs in such a manner as to minimize noise impacts on public health and welfare. The Department of Housing and Urban Development sets an L_{dn} of 65 dBA as an acceptable exposure for all sources of noise except loud, impulsive sounds like sonic booms, or quarry blasting. The USEPA has identified 55 dBA as a desirable noise level for outdoor and residential use. The Air Force sets an L_{dn} 65 to 70 dBA as an acceptable level for most on-base administrative and residential land-use areas.

The Federal Interagency Committee on Urban Noise has defined guidelines for considering noise in land use planning. The guidelines consider areas with noise levels of 75 L_{dn} or greater as unacceptable living environments. Areas between 65-75 L_{dn} are recommended as "generally acceptable" for noise-sensitive land uses such as residences, schools, hospitals, and public services. Houses located in areas between 65-75 L_{dn} may not qualify for federal mortgage insurance without additional costs associated with installing noise attenuation. In the outdoor noise environment, levels greater than 65 L_{dn} may be annoying to some people during communications. Generally, development is not recommended in areas experiencing noise levels of 65 L_{dn} or greater. Although discouraged, residential development is compatible with the 65-70 L_{dn} and 70-75 L_{dn} contours, provided noise

reduction levels of 25 dB and 30 dB, respectively, are achieved. Commercial/retail businesses are a compatible land use without restrictions up to 70 L_{dn}, and up to 80 L_{dn} provided that noise reduction levels of 25-30 dB are achieved for public areas.

F.E. Warren AFB has developed an installation-specific General Plan to coordinate long-range growth of the base. The plan identifies essential characteristics and capabilities of the base and assesses potential for development in accordance with land use compatibility. Existing and proposed off-installation land uses are compatible with adjacent uses on F.E. Warren property (USAF, 1999b).

3.4.4.4. Noise-Sensitive Receptors

A noise-sensitive receptor is commonly defined as the occupants of any facility where a state of quiet is a basis for use, such as a residence, hospital, daycare, church, or wildlife areas. The Cheyenne Municipal Airport completed a Noise Study for the airport in 1989. There are no noise-sensitive receptors within the 65 L_{dn} contours. Since that noise study was completed, annual operations at the airport have decreased. Currently, all 65 L_{dn} contours fall within airport-owned property with the exception of one dwelling located off of the secondary runway.

The key receptors to noise impacts will likely be residents living near LFs, where most of the dismantlement activities would occur. The closest towns to Peacekeeper LFs are Wheatland (two and one-half miles from T-10), Chugwater (two miles from Q-2), Yoder (four miles from S-3 and S-11), Torrington (two and one-half miles from S-2), Cottier (two miles from S-2), Lyman (two miles from S-4), and Hawk Springs (two miles from S-6).

No inhabited structures are within the 1,750-foot distance originally based on the quantity of conventional munitions on site (see Section 3.2.4 for a further discussion of the survey and 1,750-foot criteria). An unoccupied ranch house is located 1,630 feet from Q-5. A cemetery is located approximately 1,600 feet from P-6.

3.4.5. BIOLOGICAL RESOURCES

Biological resources include the native and introduced plants and animals that make up natural communities. Natural communities are closely linked to the climate and topography of the area, and change according to the season. The discussion of biological resources is broken down into five topics: vegetation, noxious weeds, wildlife, threatened or endangered species, and wetlands.

3.4.5.1. Vegetation

Southeastern Wyoming is naturally vegetated with grassland, meadow, shrubland, woodland, and rock outcrop. Mixed and short-grass prairies and introduced grassland represent the grassland types that occur within the deployment area. Mixed-grass prairie is the least common and occurs primarily where grazing pressure is low or excluded (USAF, 1987). Swales and low areas within the mixed-grass prairie are dominated by western wheatgrass (*Agropyron smithii*). Hilly areas with steeper slopes and rocky soils support fendler three-awn (*Aristida fendleriana*), Hood's phlox (*Phlox hoodii*), milkvetch (*Astragalus* spp.), and wild buckwheat (*Eriogonum* sp.). Shrubs, including silver sagebrush (*Artemisia cana*) and Spanish bayonet (*Yucca glauca*), are located within the

grasslands. The short-grass prairie native vegetation is dominated by buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*). Other grass and grass-like species present in areas of low grazing, sandy soils, swales, bottomlands, and drainages include western wheatgrass (*Agropyron smithii)*, June grass (*Koeleria macrantha*), Indian ricegrass (*Oryzopsis hymenoides*), and needle-and-thread grass (*Stipa comata*).

Meadow vegetation in the deployment area is limited to areas near creeks and around ponds. Common species include bluegrass (*Poa* spp.), thistle (*Cirsium* spp.), goldenrod (*Solidago* sp.), and death camus (*Zygadenus elegans*). Shrub species occur on rocky slopes at higher elevations within the deployment area. Dominant shrub species include mountain mahogany (*Cercocarpus montanus*), skunkbush (*Rhus trilobata*), wood rose (*Rosa woodsii*), copper mallow (*Sphaeralcea coccinea*), and James wild buckwheat (*Eriogonum jamesii*). Shrub species within the woodlands include yucca (*Yucca glauca*), winterfat (*Ceratoides lanata*), and silver sagebrush (*Artemisia cana*). Rock outcrops support plants with low moisture requirements and wind tolerance such as cryptantha (*Cryptantha* spp.).

The access roads, MAFs, and LFs were heavily modified during site construction for the Peacekeeper missile system. Low areas were filled, and roads and sites built up and graveled. All native grasses and trees within MAFs and LFs have been removed, and areas are treated with herbicides to prevent weed growth (Ascher, 1999). In recent years, the base has decreased herbicide use on base and at the LFs and MAFs as part of the F.E. Warren AFB pesticide reduction effort.

The deployment area is primarily rangeland and agricultural lands. The principal crops grown in southeastern Wyoming are sugar beets, corn, beans, potatoes, alfalfa, winter wheat, sunflowers, and flax.

The vegetation at F.E. Warren AFB consists of mixed-grassland, crested wheatgrass, wet meadow, cottonwood stands, riparian areas, and wetlands (USAF, 1998). The mixed grassland communities are typically dominated by Kentucky bluegrass (*Poa pratensis* L.), Baltic rush (*Juncus arcticus* ssp. *Ater*), Leafy spurge (*Euphorbia esula*), Dalmation toadflax (*Linaria dalmatica*), Western wheatgrass (*Agropyron smithii*), Needle-and-thread grass (*Stipa comata*), and Blue grama (*Bouteloua gracilis*). Short-grass prairie dominates the base with rolling hills and occasional small rock outcrops on slopes. This habitat consists of mixed short grasses and low-growing forbs. Low-lying areas interspersed in the short-grass prairie form ephemeral wetlands in the months of May and June. A planted, competitive, exotic grass dominates the Crested wheatgrass community. Meadow areas are found near Crow and Diamond Creeks, Lake Pearson, and along seeps and springs. The Colorado butterfly plant, a proposed threatened species by the USFWS, (discussed in Section 3.4.5.4) is present in the meadow areas on base. Riparian type vegetation on base primarily consists of areas of palustrine vegetation and includes both wetland and emergent species.

3.4.5.2. Noxious Weeds

The Wyoming Department of Agriculture, Weed and Pest Control District develops and coordinates integrated weed management programs in the state. Weeds declared noxious are those that are difficult to control, easily spread, and are injurious to public health,

crops, livestock, land, and other property (Wyoming Noxious Weed Control Act, Wyoming Statutes 11-5-101 through 303). The weeds listed in Table 3.4.5-1 are the primary noxious weeds that have been identified on base and at the LFs and MAFs.

Table 3.4.5-1
Noxious Weeds

Scientific Name	Common Name
Linaria dalmatica	Dalmation toadflax
Cirsium arvense	Canada thistle
Kochia scoparia	Kochia
Euphorbia esula	Leafy spurge
Salsola tragus	Russian thistle

Source: Ascher, 1999

The County Weed and Pest Control District has the responsibility to control or eradicate noxious weeds and pests along county and township highways (Wyoming Statutes 11-5-101 through 303). The Air Force actively manages noxious weeds on base and at the missile sites. Weed management is conducted annually with primary emphasis during the spring and summer months. The Air Force uses Oust and Carvor to spray for noxious weeds on base and at the LFs and MAFs (Ascher, 1999). Section 3.3.2.7 discusses the use of herbicides at the LFs and MAFs.

3.4.5.3. Wildlife

The deployment area is located in southeastern Wyoming within the High Plains section of the Great Plains province. The deployment area, as well as F.E. Warren AFB, supports a variety of mammals. Some of the common mammals found include pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), spotted skunk (*Spilogale putorius*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), swift fox (*Vulpes velox*), long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitus mephitus*), badger (*Taxidea taxus*), and mink (*Mustela vison*). Jackrabbits and cottontails are found in the area as well as burrowing rodents such as ground squirrels, prairie dogs, pocket gophers, and other smaller species.

The deployment area is located in the Central Flyway, and is in one of the prime waterfowl production areas of the U.S. Common waterfowl include Canada goose (*Branta canadensis*), snow goose (*Chen caerulescens*), mallards (*Anas platyrhynchos*), northern pintail (*Anas acuta*), wood duck (*Aix sponsa*), teal (*Querquedula discors*), gadwall (*Anas strepera*), American wigeon *(Anas americana*), canvasback (*Aythya vallsineria*), redhead (*Aythya americana*), and scaup (*Aythya* sp.).

Upland game birds include the sage grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Tympanuchus phasianellus*), gray partridge (*Perdix perdix*), and ring-necked pheasant (*Phasianus colchicus*). Breeding for the sharp-tailed grouse occurs in the spring, when the grouse congregate at traditional dancing grounds at dawn. The males perform a peculiar courtship dance, trying to attract as many females as possible. During the dance, males take a distinctive posture characterized by a lowered head and raised tail, stamp their feet, ruffle their plumage, and produce a low booming sound from air in inflated sacs on

the sides of their neck. After breeding, the hen goes off to nest; the peak of the hatch occurs during the first week of June (Zornes, 2000).

Approximately 200 non-game bird species are expected to be found within the deployment area and on F.E. Warren AFB (USAF, 1983). Approximately 100 of these species are considered breeding migrants and occur only during the summer (USAF, 1983). The majority of the remaining species are considered yearlong residents or only pass through during the spring and fall migrations. Species such as the western meadowlark (*Sturnella neglecta*), lark bunting (*Calamospiza melanocorys*), and horned lark (*Eremophila alpestris*) are the common species in grassland and agricultural habitats. Riparian habitats have greater species diversity than grasslands. Common species in riparian habitats include redwinged blackbird (*Agelaius phoeniceus*), American goldfinch (*Carduelis tristis*), common grackle (*Quiscalus quiscala*), and song sparrow (*Melospiza melodia*).

Fish species commonly found in southeastern Wyoming include perch (*Perca fluviatilis*), walleye (*Stizostedion vitreum*), and trout (*Salmo platycephalus*). Amphibian, reptile, lizard, and snake species commonly found include toads and frogs *(Scaphiopus bombifrons)*, common snapping turtle *(Chelydra serpentina serpentina)*, Bullsnake *(Pituophis melanoleucas sayi)*, Eastern short-horned lizard *(Phrynosoma douglassi brevirostre)*, and Prairie rattlesnake *(Crotalus viridis viridis)*. All fishes in Wyoming are the property and management responsibility of the State through the Wyoming Game and Fish Department.

The U.S. Fish and Wildlife Service (USFWS) is responsible for carrying out Federal laws and programs that conserve fish and wildlife and their habitats. They are also responsible for migratory birds, endangered species, and management of the National Wildlife Refuge (NWR) System. There are no NWRs within the deployment area. The Springer Wildlife Habitat Management Area, managed by the Wyoming Game and Fish Department, is located approximately two miles east of LF S-9 (see Appendix N).

The MAFs and LFs are located in rural agricultural and rangeland areas, however; they are fenced, restricted access areas where only birds and small mammals such as mice, gophers, or rabbits are found.

3.4.5.4. Threatened, Endangered Species, or Candidate Species

In accordance with Section 7(c) of the Endangered Species Act (ESA), Region 6 of the USFWS was consulted concerning the presence of threatened or endangered species within the deployment area and within or near F.E. Warren AFB. The Wyoming Game and Fish Department was consulted concerning wildlife species and waterfowl within or near the launch facilities. Appendix C provides the correspondence to and from these agencies concerning the possible presence of and impacts to these species. The USFWS identified five Federally listed threatened or endangered plant and animal species that are known to occur, or are likely to occur in Goshen, Laramie, and Platte Counties (see Table 3.4.5-2). Candidate species (those proposed for listing) are also included in Table 3.4.5-2.

A listed species, provided protection under the ESA, is so designated because of danger of its extinction as a consequence of economic growth or development without adequate concern and conservation. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or a significant part of its range, other

than a species of Insecta determined by the Department, or the Secretary, of the United States Department of the Interior to constitute a pest whose protection under this part would present an overwhelming and overriding risk to humans. A threatened species is any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Nearly all listed as threatened or endangered at the State level are also listed at least as candidates at the Federal level.

Table 3.4.5-2
Federal Threatened or Endangered Species

Scientific Name	Common Name	Status
Mammal		
Mustela nigripes	Black-footed ferret	Endangered
Cynomys ludovicianus	Black-tailed prairie dog	Candidate, Ready for Proposal
Vulpes velox	Swift fox	Candidate, Ready for Proposal
Birds		
Falco peregrinus	Peregrine falcon	Endangered
Haliaeetus leucocephalus	Bald eagle	Threatened
Charadrius montanus	Mountain plover	Proposed Threatened
Plant		
Spiranthes diluvialis	Ute ladies'-tresses	Threatened
Gaura neomexicana coloradensis	Colorado butterfly plant	Proposed Threatened
Rodent		
Zapus hudsonius preblei	Preble's meadow jumping mouse	Threatened

Source: USFWS, 1999a; USFWS, 1999g

Black-footed ferrets usually live in prairie dog towns. Typically, these habitats include short-grass prairie, mixed sagebrush-grassland, or other shrub-grass ranges. Prairie dogs comprise about 90 percent of the ferret's diet. The decline of the ferret has been linked to vast acreage of the Great Plains grassland being converted to farmland, destroying many acres of prairie dog colonies (Wyoming Game and Fish, 1998).

Black-tailed prairie dogs are highly social animals that live in colonies or towns which cover from one acre to tens-of-thousands of acres of grassland habitat. The historical range of the black-tailed prairie dog in Wyoming includes the eastern third of the state contiguous with the range of species on the Great Plains. Elevation (approximately 5,500 feet) and vegetation define the western edge of the range. The habitat changes from Great Plains to the Intermountain West. Black-tailed prairie dogs feed on a variety of vegetation including grasses and forbs and to a lesser extent seeds and insects. Decline in the species is due to loss of habitat from urbanization and agriculture and from shooting and poisoning.

The Swift fox is the smallest of the North American wild dogs, weighing approximately two to three kilograms. Swift foxes hunt continually from dusk to dawn and cover great distances each night. They eat what they can catch which includes small mammals, birds, reptiles, amphibians, fish, insects, grasses, and berries. The fox has a short life span in the

wild, living only three to six years. In captivity they can live up to 14 years. The decline of the fox is due to agricultural, industrial, and urban development that ploughed over their dens and native grasses. In addition, people continue to mistake them for young coyotes and kill them.

The peregrine falcon migrates in Wyoming in the spring and fall, primarily along the major river courses, springs, lakes, and perennial streams (Wyoming Game and Fish, 1998). Wyoming supported at least 40 pairs of falcons in 1997 and the population is increasing. For nesting purposes, peregrines prefer habitat with cliffs, and will nest in cities with tall buildings (Wyoming Game and Fish, 1998).

The bald eagle has been a protected species in the United States since the establishment of the Bald Eagle Protection Act in 1940. In the early 1960s and 1970s many states had placed the bald eagle on their list of endangered species. In July 1976, the USFWS officially listed the bald eagle as a national endangered species. In 1994, the recovery program was deemed a success and the bald eagle's Federal status was upgraded to threatened; Wyoming also lists bald eagles as threatened. Wyoming supports approximately 80 pairs of bald eagles year-round in Wyoming where open water and adequate food are available (Wyoming Game and Fish, 1998). Approximately 600 to 800 bald eagles are winter visitors to Wyoming and may move from as far as northern Canada from late autumn through early spring. Bald eagles use trees located near large bodies of water for perching and nesting (Wyoming Game and Fish, 1998).

Mountain plovers are approximately seven inches tall and predominantly light brown in color with an even lighter colored breast. Unlike other plovers, mountain plovers are not found near water or wetlands, instead they prefer short grasslands and barren ground where they can easily find insects which provide 95 percent of their diet. They feed primarily on spiders, beetles, grasshoppers, crickets, and ants. Human activities have had the greatest effect on the distribution and number of mountain plovers, including hunting and conversion of prairie to agricultural land.

Ute ladies'-tresses is a perennial, terrestrial orchid with stems 8 to 20 inches tall, narrow leaves, and flowers consisting of few to many small white or ivory flowers clustered into a spike arrangement at the top of the stem. It blooms from late July through August; however, depending on location and climatic conditions, orchids may bloom in early July or still be in flower as late as early October. The Ute ladies'-tresses is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams. It occurs generally in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows at elevations from 4,200 to 7,000 feet. The orchid colonizes early successional riparian habitats such as point bars, sandbars, and low-lying gravelly, sandy, or cobble edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season (Wyoming Game and Fish, 1998).

The Preble's meadow jumping mouse is about 3.5 inches from nose to rump with a 5-inch tail. Its hind feet are much larger than its front feet, leaving the impression of a tiny kangaroo. The diet of the Preble's meadow jumping mouse consists of seeds, fruits, fungi, and insects. Hibernation occurs from October to May in small underground burrows it excavates. Nests are made of grass, leaves, or woody material excavated two to three inches below ground level. The mouse occurs in low undergrowth consisting of grasses,

forbs, or a mix of both, in wet meadows and riparian corridors, or where tall shrubs and low trees provide adequate cover. In Wyoming, the Preble's meadow jumping mouse has been documented in Laramie and Platte Counties but has not recently been trapped in its former range in Goshen County (USFWS, 1999a). The Preble's meadow jumping mouse has been found near Crow and Diamond Creeks on-base (USAF, 1998). Loss of grassy streamside cover on Wyoming's Laramie Range may have reduced or eliminated populations. The Preble's meadow jumping mouse is so small and unobtrusive that its current distribution and population size are unknown (Wyoming Game and Fish, 1998).

The Platte River is located north of the deployment area. Any Federal actions resulting in water depletions to the Platte River system are likely to jeopardize the continued existence of the endangered Whooping crane (*Grus americana*), Interior least tern (*Sterna antillarum*), Pallid sturgeon (*Scaphirhynchus albus*), and the threatened Piping plover (*Charadrius melodus)* (USFWS, 1999a). Depletions include evaporative losses and/or consumptive use, often characterized as diversions from the Platte River or its tributaries less return flows (USFWS, 1999a). Project elements that could be associated with depletions to the Platte River system include, but are not limited to, wells, water treatment facilities, and pumping of water for dust control associated with construction activities.

The ferruginous hawk (*Buteo regalis*) is the largest hawk in North America with broad powerful wings. This species builds big, bulky nests in isolated trees, on rocky ledges or occasionally on the ground. A breeding pair may have up to five nests in their territory but use only one each year. Gophers make up nearly 90 percent of their diet. In the wild, their life span is up to 15 to 20 years. Habitat loss is the major problem affecting ferruginous hawks. Cultivation, settlement, and resource exploration have reduced prairie grasslands and gopher populations. Without sufficient food, the hawks won't establish a nest.

The Colorado butterfly plant (*Gaura neomexicana coloradensis*) is proposed for listing as a threatened species by the USFWS. Three populations of this plant occur on base, along Crow Creek, Diamond Creek, and an unnamed drainage area (USAF, 1998). The Swainson's Hawk (*Buteo swainsoni*), a protected migratory bird, is known to nest on base. Other protected species more commonly seen on base include the American kestrel (*Falco sparverius*), Canada goose, and mallard duck. Appendix M lists these and other plant, mammal, and bird species of special concern in Laramie, Goshen, and Platte counties (University of Wyoming, 1999b)

3.4.5.5. Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Interagency Committee for Wetland Delineation, 1989). Wetlands are diverse ecosystems that provide natural flood control by storing spring runoff and heavy summer rains, replenish groundwater supplies, remove water pollutants, filter and use nutrients, provide a source of water for livestock and, in dry years, are valuable for crop and forage production. They also provide habitat for many plant and animal species, including economically valuable waterfowl and 45 percent of the nation's endangered species.

Wetlands are regulated under Section 404 of the Clean Water Act (CWA) and EO 11990 (Protection of Wetlands). The USFWS Region 6 oversees Wetland Management Districts in Wyoming to provide wetland areas needed by waterfowl in the spring and summer for nesting and feeding. If avoidance to wetlands is not feasible, in order for the project to proceed, the Deputy Assistant Secretary for Environment, Safety, and Occupational Health must approve a finding of no practicable alternative in accordance with EO 11990.

Wyoming contains approximately 2 million acres of wetlands which comprises two percent of the total acreage of the state. A large portion of these wetlands are in the western half of the state, but there are wetlands located in the eastern half of the state, predominately in the Laramie Plains and the North Platte River drainage (USFWS, 1999b). Wyoming wetlands are associated primarily within four major river drainage systems: the Snake, Colorado, Missouri, and Platte. Other wetlands are commonly associated with irrigation projects located in the Platte, Bighorn, and Wind River drainages. Riparian or streamside areas are a valuable natural resource and are the single most productive wildlife habitat type in North America. They support a greater variety of wildlife than any other habitat. Riparian vegetation plays an important role in protecting streams, reducing erosion and sedimentation as well as improving water quality, maintaining the water table, controlling flooding, and providing shade and cover (USFWS Letter, 1999).

No MAFs or LFs are located within wetlands. A review of National Wetland Inventory maps for the deployment area identified 12 wetland areas in the vicinity of LFs. Table 3.4.5-3 lists the types of wetlands and their proximity to the LFs. The wetlands identified were classified as palustrine (non-tidal wetlands dominated by trees, shrubs, persistent emergent vegetation, emergent mosses or lichens) or riverine (occurring in a channel which is not dominated by trees, shrubs, persistent emergent vegetation, emergent mosses or lichens). Appendix N illustrates nearby wetlands occurring in the vicinity of the LFs.

3.4.6. CULTURAL RESOURCES

Cultural resources are archaeological, historical, and Native American items, places, or events considered important to a culture, community, tradition, religion, or science. Archaeological and historic resources are locations where human activity measurably altered the earth or left deposits of physical or biological remains. Prehistoric examples include arrowheads, rock scatterings, village remains, whereas historic resources generally include campsites, roads, fences, homesteads, trails, and battlegrounds. Architectural examples of historic resources include bridges, buildings, canals, and other structures of historic or aesthetic value. Native American resources can include tribal burial grounds, habitations, religious ceremonial areas or instruments, or anything considered essential for the persistence of their traditional culture.

Construction activities and landscape modification has been ongoing at F.E. Warren AFB since initial construction of the base (originally named Fort D.A. Russell) began in the 1860s. The deployment of the Peacekeeper missile system required construction of a number of new buildings on base and additions to or modifications of several existing buildings. The major change in the deployment area was the use of a larger missile stage transporter vehicle that required modifications to existing defense access roads, bridges, and culverts. Grading was also undertaken at each LF.

Table 3.4.5-3 Wetlands in the Vicinity of Peacekeeper LFs				
LF	**County**	**Location (Township, Range, Section)**	**Wetland Type**	**Closest Wetlands to LF**
P-2	Laramie	T18N, R63W, SEC 9	Riverine	1,050 feet N; 1,600 feet NW
P-10	Laramie	T18N, R64W, SEC 21	Palustrine, Riverine	1/2 mile S; 1/2 mile SE
R-3	Goshen	T19N, R62W, SEC 5	Palustrine	1/2 mile NE
R-10	Platte	T21N, R65W, SEC 4	Palustrine	1/2 mile NE
S-2	Goshen	T24N, R61W, SEC 29	Riverine	1/2 mile N
S-3	Goshen	T23N, R61W, SEC 28	Palustrine, Riverine	1,200 feet SE; 750 feet W
S-4	Goshen	T23N, R60W, SEC 28	Palustrine	1/8 mile NE
S-8	Goshen	T21N, R63W, SEC 15	Palustrine	1,400 feet NW; 2,100 feet S-SE
S-9	Goshen	T22N, R63W, SEC 25	Riverine	1,450 feet NW
S-10	Goshen	T23N, R64W, SEC 25	Palustrine	1/2 mile SE
T-3	Platte	T25N, R65W, SEC 28	Palustrine, Riverine	1/2 mile SE
T-5	Platte	T22N, R66W, SEC 13	Palustrine	1/2 mile SE

Sources: USFWS, 1999c, 1999d, 1999e, 1999f (National Wetlands Inventory Maps)

Palustrine wetlands include non-tidal wetlands dominated by trees, shrubs, persistent emergent vegetation, emergent mosses or lichens.

Riverine wetlands occur in a channel and are not dominated by trees, shrubs, persistent emergent vegetation, emergent mosses or lichens.

A Cultural Resources Technical Report for the Peacekeeper Program was prepared in 1987 (USAF, 1987b). This report states that historically documented construction activities likely destroyed a number of prehistoric sites on F.E. Warren AFB, especially along the Crow Creek floodplain. The floodplain was used as a borrow area for gravel and soil during the initial construction of the base. The migration of Crow Creek within its floodplain also contributed to the destruction of prehistoric sites, and historic channelization and damming of the creek were also contributing factors.

Archaeological studies on F.E. Warren AFB have recorded two classifications of cultural resources: sites and isolated finds. Archaeological sites are defined as the location of an event, a prehistoric or historic occupation, or a ruined or vanished building or structure, where the location itself possesses historic, cultural, or archaeological value. Isolated finds are defined as a single artifact or multiple fragments of a single artifact. To date, no isolated finds recorded on base are considered to be eligible for listing on the National Register of Historic Places (NRHP) (USAF, 1999a).

A number of archaeological surveys were completed for F.E. Warren AFB between 1984 and 1993 (USAF, 1999a). Base records indicate that approximately 99 percent of the base has been surveyed for archaeological and historical resources. Approximately 178 cultural resource sites and two cultural resource districts have been defined and recorded on base (USAF, 1999a). Cultural resource types that have been recorded include: a National Historic District and a National Historic Landmark containing 215 individual buildings and structures, 6 historic buildings outside the districts; 95 historic archaeological sites, 82

prehistoric archaeological sites, 3 unclassified archaeological sites, and 138 isolated finds (both historic and prehistoric). Twenty-three World War II era historic archaeological sites have been identified from maps and air photos, but have not yet been recorded. On July 9, 1969, the Wyoming Recreation Commission nominated the central core of the base, along Randall Avenue, to the National Register of Historic Places because of its outstanding importance in American History. This same core area was nominated as a National Historic Landmark in 1974; this National Historic District and the Fort D.A. Russell National Landmark are treated as the same entity for purposes of management and protection.

Off-base land use activities were generally less intense and more localized than land use activities on base which were intense because of the long history of military actions. Prehistoric sites exist in the missile system deployment area near streams and other water sources (USAF, 1987b). Road and silo construction for the Atlas missile in the late 1950's and the Minuteman ICBM in the early 1960's most likely destroyed some prehistoric resources in the deployment area. Road construction caused greater impacts at stream crossings because of the extensive cutting and filling required to cross the deep stream channels in the region. Extensive land modifications occurred around the silos during their construction. Potential prehistoric lithic artifacts found on cleared areas around the silos were likely to have been brought into the area as part of construction fill or moved during construction of the site (USAF, 1987b).

To meet cultural resource statutory and policy requirements for protection and preservation of properties eligible to the NRHP, as part of the Peacekeeper program, surveys were conducted at the LFs and LF roads, and along the HICs path in 1983 and 1984 (USAF, 1987b). Field work conducted at the Peacekeeper LFs and LF roads included pedestrian surface reconnaissance of 25-foot-wide corridors around the perimeter of each LF, vehicle reconnaissance along access roads, and pedestrian surface inspection of rights-of-way that were relatively undisturbed by previous road construction. Ten prehistoric sites and nine isolated artifacts were identified and recorded as a consequence of reconnaissance associated with the LFs and LF access roads. Crews also conducted archaeological reconnaissance within a 50 meter-wide corridor along portions of the Peacekeeper HICS path in response to some design changes. Sixteen prehistoric archaeological sites were found during the survey. The sites found included low-density lithic scatters and two temporary campsites.

A copy of the Description of Proposed Action and Alternatives (DOPAA) was provided to the Wyoming Department of State Parks and Cultural Resources, State Historic Preservation Office (SHPO). Correspondence from the SHPO, letter dated July 15, 1999, is included in Appendix C. The SHPO letter states they have no objections to the Proposed Action provided the Air Force follows the procedures established in Section 106 regulations 36 CFR Part 800.

The Air Force evaluated the Peacekeeper missile system for its eligibility for listing on the NRHP. Eligibility criteria are properties that are 50 years old or under 50 years old and exceptionally important at a local, state, and/or national level. The Peacekeeper missile system is considered eligible for inclusion in the NRHP because of its significance in the Cold War (USAF, 1999k). The Air Force is in the process of preparing a Historic

American Building Survey (HABS)/Historic American Engineering Record (HAER) report for the Peacekeeper missile system. This report will be forwarded to the SHPO for their review and acceptance when completed.

The presence of Native American religious and traditional sites was investigated as part of the Peacekeeper in Minuteman Silos EIS. Interviews were conducted with representatives from tribes that historically occupied sites within the Peacekeeper deployment area. These tribes included the Cheyenne, Shoshone, Comanche, Crow, Plains Apache, Kiowa, Arapaho, and Sioux. None of those interviewed was aware of any current or traditional cultural use sites, burial grounds, or holy places within the deployment area (USAF, 1984).

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4. ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential for significant impacts to the human environment as a result of implementing the Proposed Action or the No Action Alternative. Implementation of the Proposed Action could vary, and is evaluated by considering two Implementation Alternatives. As defined in 40 Code of Federal Regulations (CFR) §1508.14, the human environment is interpreted to include natural and physical resources, and the relationship of people with those resources. Accordingly, this analysis has focused on identifying types of impacts and estimating their potential significance. This chapter discusses the effects that the Proposed Action, No Action Alternative, and Implementation Alternatives could generate in the environmental resource areas described in Chapter 3.

4.1. INTRODUCTION

The concept of "significance" used in this assessment includes consideration of both the context and the intensity or severity of the impact, as defined by 40 CFR §1508.27. Severity of an impact could be based on the magnitude of change, the likelihood of change, the potential for violation of laws or regulations, the context of the impact (both spatial and temporal), degrees of adverse effect to specific concerns such as public health or endangered species, and the resilience of the resource.

Impacts can be permanent or long-lasting (long-term) or temporary and of short duration (short-term). Short-term impacts occur during and immediately after the conclusion of construction activities. Although short in duration, such impacts may be obvious and disruptive. For this project, short-term impacts are defined as those lasting approximately three years (the timeframe for completing the Proposed Action) or less, while long-term impacts last more than three years (beyond the construction and demolition activities).

The criteria used to characterize impacts are introduced at the beginning of each resource section. According to these criteria, adverse impacts of a proposed activity are identified as significant or not significant. *Significant* impacts are effects that are most substantial and should receive the greatest attention in decision making. Impacts that would not cause long-term harm or affect the viability of a resource are characterized as *not significant*. *No impact* is specified in cases in which a resource would not be affected because certain resource elements (e.g., oil and gas wells, floodplains, or low-income or minority populations) are not present in the area of the Proposed Action or an Implementation Alternative. *No impact* could also occur under the No Action Alternative if there were no changes to the existing environment. If a resource would be measurably improved by a proposed activity, a *beneficial* impact was noted.

Significant adverse impacts can be mitigated through avoidance, minimization, remediation, reduction, or compensation. Certain mitigations are required by law. This document presents any mitigations identified during the analysis. The document also presents best management practices that are necessary or useful to minimize environmental impacts; these discussions are located within each resource area. Mitigations and best management practices assist the project proponents in maintaining compliance with environmental regulations.

This chapter is organized by resource element in the same order as in Chapter 3. For each resource section, the potential impacts of implementing the Proposed Action, No Action Alternative, or Implementation Alternatives are summarized. Chapter 2 also includes a summary of environmental impacts by resource area (see Tables 2.5-1 and 2.5-2).

Then the analysis methods are discussed, including a description of the significance criteria. The criteria are followed by a discussion of the potential impacts of the Proposed Action and the No Action Alternative. Potential impacts associated with two Implementation Alternatives are then discussed; although these are not planned to be implemented for the Proposed Action, they are evaluated in this Environmental Impact Statement (EIS) as implementation options. The analysis focuses on potential deployment area activities because reuse and disposition of on-base Peacekeeper facilities are currently unknown. Some Peacekeeper facilities also host Minuteman (MM) functions and could be converted to MM facilities. Where applicable, some resource elements assess future on-base facility activities.

Best management practices used to limit impacts will be discussed within the Proposed Action impact section. Lastly, mitigation measures needed to mitigate adverse environmental impacts are presented. The chapter concludes with a discussion of the compatibility of the Proposed Action with objectives of federal, state, and local land use plans, policies, and controls, an evaluation of the relationships between short-term uses of the environment and long-term productivity, cumulative impacts, and irreversible and irretrievable commitments of resources.

4.1.1. MISSION AND OPERATIONS

Regardless of whether dismantlement of the Peacekeeper missile system occurs, the 90th Space Wing (90 SW) would remain the host unit at F.E. Warren Air Force Base (AFB). The 37th Helicopter Flight would remain the only flying mission on base. Under the Proposed Action, helicopter flights to the Peacekeeper deployment area would no longer occur. Helicopter operations to the Minuteman (MM) III missile sites, training, local support for search and rescue operations, and emergency flights to major hospitals in Colorado would not be affected by the Proposed Action. The base would retain the same number of helicopters, although the total number of operations would be slightly reduced. Military flights at the Cheyenne Municipal Airport would also not be affected by the Proposed Action.

Under the No Action Alternative, the mission and operations of the 90 SW would remain the same. Helicopter operations to support the Peacekeeper deployment area would also remain the same. The Implementation Alternatives would result in similar impacts as under the Proposed Action.

4.2. LOCAL COMMUNITY

This section assesses potential impacts related to socioeconomic resources, environmental justice, transportation, and land use.

4.2.1. SOCIOECONOMICS

Activities related to the Proposed Action or Implementation Alternatives could affect socioeconomic resources. Impacts to socioeconomic resources could result from the departure of personnel associated with the 90 SW, from expenditures of construction dollars associated with deactivation activities, or from the reduction of electric services to the missile facilities by local rural electric cooperatives (REC).

Under the Proposed Action, impacts to population in the Residence Region of Influence (ROI), Laramie County, would not be significant. Personnel reductions would not cause significant impacts to employment in Laramie County, while workforce requirements and construction expenditures for the deactivation would result in small short-term benefits to local employment and income. There would be a beneficial impact to landowners and county governments from the disposal of the missile alert facility (MAF) and launch facility (LF) sites. Impacts to housing, education, utilities, and REC members would not be significant in either the Residence or Deployment ROI. Under the Implementation Alternatives, impacts to socioeconomic resources would be similar to those under the Proposed Action. Both the mechanical demolition and cable removal Implementation Alternatives may result in slightly greater short-term beneficial impacts to employment than would the Proposed Action, but the cable removal could have adverse short-term, but not significant, impacts to the affected landowners due to the potential disruption of agricultural activities. There would be no significant long-term impacts. There would be no change to socioeconomic resources under the No Action Alternative.

4.2.1.1. Analysis Methods

Measures used for impact analysis include population, employment, housing, and school enrollment. Population and housing data were obtained from the U.S. Bureau of the Census (USBC). Employment and income data were obtained from the U.S. Bureau of Economic Analysis (USBEA), the Wyoming Department of Employment, and the Laramie County Community College Economic and Business Data Center (EBDC). Information on base personnel, payroll, and housing was obtained from the 90 SW/PA, 90 CPTS/FMA, and 90 CES/CEH at F.E. Warren AFB. School data were provided by the Laramie County Public School District #1. Utility information was furnished by the 90 CES/CEM. Employment multipliers were obtained from the U.S. Army Corps of Engineers Economic Impact Forecast System (EIFS). Rational threshold values were calculated using employment and population data from the USBC.

Significance Criteria. Significance criteria for socioeconomic resources are determined for each region of influence (ROI) by analyzing long-term fluctuation in elements such as population and employment within that ROI. This analysis allows an ROI-specific determination of the appropriate levels, or thresholds, beyond which changes in population or employment will noticeably affect individuals and communities. The analysis compares each element's actual yearly change to the predicted amount of change. This predicted amount, in turn, is based on the average annual change that has occurred over the long-term period used as a basis for the analysis. The annual deviations between actual change and predicted (average) change during this period are the basis for determining a threshold of

significance, called the rational threshold value (RTV), for each element. Because growth is the norm, regions are assumed to have a greater capacity for positive change—growth—than for negative change. For this reason, negative deviation is decreased (by one-half for population and one-third for employment) to avoid understating impacts from actions that may result in a decline in population or employment (Webster, 1978).

To determine the population and employment RTVs for the Residence ROI for this study, annual changes in population and employment between 1970 and 1997 were calculated and compared to the average change during that 27-year period. The deviations, with negative values adjusted as described above, yield threshold values of 2.7 percent and –1.1 percent for population and 6.1 percent and –3.1 percent for employment. In other words, these values are the upper and lower limits of a "tolerable" range of change, within which communities and individuals have the capacity to absorb increases or decreases. Increases or decreases outside this range could burden communities or individuals beyond their absorption capacity, and would be a significant impact.

Thus, a significant impact for the Residence ROI would be an increase of more than 2.7 percent or a decline of more than –1.1 percent in the projected level for population and an increase of 6.1 percent or a decline of –3.1 percent for employment. Significance levels for these variables are calculated only for the Residence ROI, since it is unlikely that noticeable changes to population or employment would occur outside of Laramie County.

A significant change in population or employment, in the short term, could noticeably affect local labor and housing markets as well as local services. In the long term, it could change a community's existing structure and organization. An impact would not be significant if no long-term, noticeable, or disruptive changes occurred in housing demand, school enrollment, public service demands, or local government revenues or expenditures. Impacts may be adverse or beneficial.

4.2.1.2. Potential Impacts of the Proposed Action

The Proposed Action includes the Peacekeeper deactivation process, including the dismantlement and disposal of the missile sites. The socioeconomic impacts of these activities are described below.

4.2.1.2.1. Population

The Proposed Action is not expected to result in significant impacts to population in the Residence ROI or Deployment ROI. As a result of the Proposed Action, less than 6 percent of F.E. Warren AFB's personnel authorizations would be lost over a three-year period. As shown in Table 4.2.1-1, impacts to Laramie County population would be negligible, with the population reductions representing less than 1 percent of total county population. Based on the significance criteria noted above, this would not be a significant impact.

It is unlikely that more than a few individuals associated with the dismantlement activities would settle in the deployment area, and impacts in both the Residence and Deployment ROIs would not be significant. As noted in Section 4.7, Cumulative Impacts, proposed

mission realignments to F.E. Warren AFB would offset the adverse impacts that would result from the Peacekeeper deactivation.

4.2.1.2.2. Employment and Income

Impacts to employment and income as a result of the Proposed Action would not be significantly adverse and could be slightly beneficial. The decreases in employment at F.E. Warren AFB would have a multiplier effect on other employment in the region, because military and Department of Defense (DoD) civilian employment is considered a basic employment industry. A basic industry is defined as an industry that produces goods or services (for example, national defense) that are consumed or exported outside the region. This industry brings outside money into the economy that supports local service and non-basic businesses. A non-basic industry is generally a service-oriented business that serves other local businesses or the consumer needs of the population in the immediate area, and usually does not earn income or do business outside of its regional location.

Table 4.2.1-1
Estimated Population Impacts to Residence ROI

	1999	2000	2001	2002	2003[1]	Total[2]
Population						
Laramie County estimated population[3]	81,159	82,492	83,847	85,224	86,624	
Personnel authorizations lost[4]			55	55	110	220
Lost personnel allocated to Laramie County (based on 98% residence)			54	54	108	216
Estimated number of family members			58	58	116	233
TOTAL population loss in Laramie Co.			112	112	224	448
as % of Laramie Co. Population			0.13%	0.13%	0.26%	0.52%

[1] The actual final year in which personnel reductions would occur will be determined by the DoD decision regarding implementation of the Proposed Action or an alternative action.

[2] Total losses are shown as a percentage of the projected population for the year 2003.

[3] Population estimates are based on 1997 population and the average Laramie County population growth rate between 1990 and 1997.

[4] The number of lost personnel authorizations is approximate. Based on prior missile system deactivations, it is assumed that one-fourth will be lost during each of the first and second years of the deactivation process, and the remaining one-half of personnel slots will be lost during the final year.

The ratio of basic to non-basic employment in a given region is the employment multiplier, which indicates the potential change in total jobs in the community as a result of changes in basic industry employment. Because the secondary jobs tend to follow the residence patterns of the installation personnel, it is assumed that 98 percent of the secondary employment would be lost in the Residence ROI, Laramie County, in accordance with the distribution of F.E. Warren AFB personnel residence.

Although employment at F.E. Warren AFB is considered to be a basic industry, the military employment does not have the full impact on the local non-basic employment sector that would occur with a private basic industry business of a similar employment size, because a

substantial proportion of the goods, services, and housing used by military households is consumed on the military installation (ORNL, 1987). Therefore, for this analysis, the multipliers for the ROI (as calculated by EIFS) were reduced by 50 percent, resulting in a "modified multiplier" of 1.16 for the Residence ROI, meaning that for each lost job in the basic sector, an additional 0.16 jobs would be lost in the non-basic sectors, for a total of 1.16 jobs.

Civilian employees on base are generally ineligible to purchase most of the goods, services, and housing on a military installation. For this reason, the unadjusted multiplier is used to calculate the impact of civilian employment on the local economy. The Laramie County multiplier is 2.31, meaning that for each civilian job, approximately another one and one-third jobs would be lost in the non-basic sectors, for a total of 2.31 jobs.

The Air Force has not yet determined the precise allocation of personnel reductions that would occur under the Proposed Action. For the purposes of this analysis, it is assumed that the allocation of military and civilian personnel slots would be the same as the proportion for the base as a whole in 1999 (89 percent military and 11 percent appropriated fund civilian). Non-appropriated fund (NAF) civilians were not included in these calculations since NAF positions would not be directly affected by the personnel reductions. A very small number of NAF positions might be eliminated due to the potential 6 percent reduction in the population of F.E. Warren AFB; these would be considered as secondary employment.

Virtually all of the employment impacts that would result from the Proposed Action would occur in Laramie County. As shown in Table 4.2.1-2, these impacts would result in reductions to county employment of less than 1 percent, not a significant impact based on the significance criteria.

The construction activities related to deactivation of the Peacekeeper missile system are expected to have a beneficial, short-term impact on area employment and income. Some of the construction workers would likely be drawn from the local labor market. Discussions with contractors who have performed previous dismantlement efforts suggest that most of the dismantlement labor force would be hired locally, but it is anticipated that only about 20 workers would be needed from the local area (Anderson, 2000). So while there would be a small beneficial impact to the local construction labor market and to local personal income, it is unlikely that any permanent change to the structure of the local labor force would occur.

Contractors on Federal projects are required by the Davis-Bacon Act (40 *United States Code* (U.S.C.) § 276a *et seq.*) to pay no less than the "prevailing wage rate" for similar types of work. The U.S. Department of Labor collects local wage data to determine that locale's prevailing wage rate for various types of jobs. Beyond the requirements of the Davis-Bacon Act, the normal forces of labor supply and demand would affect the wage rate, along with any union-negotiated wage rates that may apply to the area.

Table 4.2.1-2 Estimated Employment Impacts to Residence ROI						
	1999	**2000**	**2001**	**2002**	**2003**[1]	**Total**[2]
Employment						
Laramie Co. estimated employment[3]	52,860	53,729	54,611	55,508	56,419	
Total personnel authorizations to be lost at F.E. Warren AFB[4]			55	55	110	220
Mil. personnel authorizations lost (89%)[5]			49	49	98	197
Secondary employment (Military Multiplier: 1.16)			9	9	17	34
Civ. personnel authorizations lost (11%)[5]			6	6	12	23
Secondary employment (Multiplier: 2.31)			11	11	22	45
Total Employment Loss			75	75	149	299
Total Employment Loss in Laramie Co. (based on 98% residence)			73	73	146	293
as % of Laramie Co. Employment.			0.13%	0.13%	0.26%	0.52%

[1] The actual final year in which personnel reductions occurred would be determined by the DoD decision regarding implementation of the Proposed Action or an alternative action.
[2] Total losses are shown as a percentage of the projected population for the year 2003.
[3] Employment estimates are based on 1997 employment and the average Laramie County employment growth rate between 1990 and 1997.
[4] The number of lost personnel authorizations is approximate. Based on prior missile system deactivations, it is assumed that one-fourth would be lost during each of the first and second years of the deactivation process, and the remaining one-half of personnel slots would be lost during the final year.
[5] It is assumed that lost personnel slots would be allocated between military and civilians in the same proportions as for base personnel as a whole (based on 1999 personnel levels).

A few new secondary short-term jobs could be created to service the construction activity. Local small businesses (grocery stores, gas stations, cafes, etc.) on transportation routes to the LF and MAF sites may experience short-term beneficial impacts from the presence of the construction crews.

It is likely that some proportion of the dismantlement activities would be performed by firms within the Deployment ROI, with the income from those activities remaining in the local area, providing a short-term beneficial impact. No significant long-term employment or income impacts would occur.

The construction expenditures associated with the Peacekeeper missile system dismantlement are estimated to be $13.3 million (Fahrenkrug, 1999). It is assumed for this analysis that the expenditures would occur evenly over the three-year deactivation period. As noted in Section 3.2.1, the valuation of 1998 building permits for the cities of Cheyenne, Wheatland, and Torrington totaled $62.7 million. The annual Peacekeeper expenditures of approximately $4.43 million would represent a 7 percent increase over the value of the 1998 construction, a beneficial impact. This impact is overstated for two reasons: first, because construction outside the cities is not included, and second, because not all of the expenditures would go to businesses within the deployment area. However, the expenditures would still provide a beneficial impact to income in the Deployment ROI.

The economic impacts of the property disposal (Phase 4 of the deactivation process) cannot be measured with any certainty, since the potential uses of the land are unknown at this time. However, it is assumed that the property owners who would obtain the MAF and LF sites would use the properties for some profitable activity, such as returning the sites to agricultural use. This would result in a beneficial impact, both to the landowners and to county governments, who would realize a slight increase in tax revenues as the properties were returned to private ownership.

4.2.1.2.3. Housing

The personnel reductions at F.E. Warren AFB would not have a significant impact on the housing market in the Residence ROI, and may result in small improvements to local housing availability. Under normal circumstances, population declines could have an adverse impact on a local housing market, leading to reduced demand and lowered values for homes. Employment declines and the resulting reductions in income contribute to this effect by reducing the amount that a family can spend for housing and limiting the family's demand for a newer, more expensive home. However, the Cheyenne area is experiencing a shortage of housing that is affordable to military families, so it is likely that the small reduction in military households in the area would alleviate this shortage to a small extent by improving the availability of affordable housing.

As noted above, there is unlikely to be much relocation of construction workers into the rural counties of the deployment area, and no significant impacts to the Deployment ROI housing market would result.

4.2.1.2.4. Education

Impacts to Laramie County School District #1 (LCSD1) would not be significant. The local school system would be affected by the personnel reductions associated with the Peacekeeper deactivation. The LCSD1 currently serves virtually all of the students who are dependents of F.E. Warren AFB personnel, although the proportion of F.E. Warren AFB dependents as a component of LCSD1 enrollment is unknown. It is assumed for this analysis that the base dependents constitute approximately 15 percent of LCSD1 enrollment, or approximately 2,025 students. This assumption is based on the fact that F.E. Warren AFB personnel constitute about 10 percent of the population of Laramie County, and that a disproportionate number of the arrivals to Laramie County during the 1990s do not have school-age children (see Section 3.2.1.5.1). Therefore, the dependents of base personnel would make up a larger proportion of school enrollment.

The Proposed Action would eventually lead to approximately a 6 percent reduction in F.E. Warren AFB personnel. A 6 percent reduction in the LCSD1 students who are associated with the base would result in the loss of approximately 120 students. These students would likely be distributed around the school district in accordance with the residence patterns of off-base personnel. Because of the Air Force policy that on-base family housing (FH) will remain as fully occupied as possible, enrollment changes at the individual school facilities serving on-base residents would be minimal. According to LCSD1 personnel, most existing school facilities are at or near capacity, and a slight drop in enrollment would

improve crowded classrooms conditions and postpone the need to add new facilities (White, 1999).

Federal Impact Aid to LCSD1 would decrease very slightly with reduced enrollment. Families would move into on-base FH to fill units vacated by departing personnel, minimizing the reduction in Federal Impact Aid, since dependents of on-base residents generate much higher Federal Impact Aid payments per student. Since existing Federal Impact Aid for F.E. Warren AFB students represents less than 0.5 percent of the total LCSD1 budget, the adverse impact of a small reduction in aid would not be significant.

As noted above, most of the dismantlement labor force would be hired locally, and would likely already be resident in one of the three counties of the deployment area. The number of workers anticipated to move to the Cheyenne area is very small (probably less than 15), and would not result in significant increases in student enrollments in Laramie County School District 1 (LCSD1). The declines in school enrollment due to the loss of personnel associated with the Peacekeeper Missile System would more than offset any slight enrollment gains that might occur as a result of a small number of construction workers relocating to the Cheyenne area.

Because negligible population changes are expected in the Deployment ROI, no significant impacts to schools there are predicted.

4.2.1.2.5. Utilities

Impacts to utility companies in the deployment area would not be significant. Three RECs and one investor-owned electric company (Cheyenne Light, Fuel, and Power, Inc.) supply power to the missile sites, as described in Section 3.2.1.6. Information was solicited during the scoping process from these power companies, but no response has been received to date. Thus, the percentage of Air Force sales as a component of the power companies' total revenues is unknown. The loss of these revenues could have an adverse short-term impact on the RECs and their members, who share in the costs of supplying power to the REC's service areas. Impacts to the RECs would likely not be significant, because only the Peacekeeper missiles would be deactivated, leaving the MM III missiles in place. If rates for REC members were to increase slightly, a short-term impact, but not a significant one, would occur on most households. Long-term impacts would also not be significant, since costs would be adjusted over time, and new customers may enter the service area to offset the loss of the Air Force revenue.

Based on Air Force requirements, a Western Area Power Administration (WAPA) federal preference power allocation goes to the three RECs that serve the missile sites. When the Peacekeeper sites are fully dismantled, this WAPA allocation of low-cost power may be reduced, resulting in slightly higher electricity costs for the RECs and their members who have benefitted from the WAPA allocation for more than 30 years. However, this is not expected to be a long-term significant impact for individual cooperative members, and no mitigation is necessary. Service arrangements upon missile site closures would be handled in accordance with the existing contracts between the Air Force and the RECs.

4.2.1.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. Impacts of this alternative would be similar to those of the Proposed Action. However, due to the labor required to perform the mechanical demolition, the construction labor force would likely be slightly larger than under the Proposed Action; this could result in a slightly greater short-term beneficial impact to local employment and income.

Removal of the Hardened Intersite Cable System. Impacts of this alternative would be similar to those of the Proposed Action. However, due to the labor required to remove the hardened intersite cable system (HICS), the construction labor force would likely be slightly larger than under the Proposed Action; this could result in a slightly greater short-term beneficial impact to local employment and income. However, the landowners on whose property the cable system is buried could suffer adverse, but probably not significant, short-term economic impacts due to the potential disruption of farming or grazing activities.

4.2.1.4. Potential Impacts of the No Action Alternative

Under this alternative, maintenance of the Peacekeeper missile system would continue. There would be no socioeconomic impacts.

4.2.1.5. Mitigation Measures

Proposed Action: There are no significant adverse impacts to socioeconomic resources resulting from the Proposed Action, and no mitigation is necessary or recommended.

Mechanical Demolition Alternative: No significant impacts are predicted to occur under this Alternative. No mitigation is required.

HICS Removal Alternative: Although adverse impacts would occur from removing the HICS, impacts are not expected to be significant. No mitigation is required.

4.2.2. ENVIRONMENTAL JUSTICE

Activities related to the Proposed Action or Implementation Alternatives were evaluated to determine whether they could have environmental justice impacts resulting from deactivation and dismantlement activities near a minority or low-income population.

No minority or low-income populations have been identified in the vicinity of the Proposed Action or an Implementation Alternative; therefore, no adverse environmental justice impacts could occur. There would be no change to environmental justice under the No Action Alternative.

4.2.2.1. Analysis Methods

Measures used for impact analysis include demographic and income data obtained from the U.S. Bureau of Census (1990); these data were used to locate minority populations and low-income populations within the deployment area.

To understand whether or not environmental impacts would disproportionately affect minority or low-income populations, an appropriate basis for comparison must be

established. The Deployment ROI (comprising three counties) and the Residence ROI (Laramie County only), as defined in Section 3.2.1.1, were determined to be the communities of comparison (COC) for the determination of potential impacts.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* requires that federal agencies identify and address disproportionately high and adverse environmental effects (including human health, economic, and social effects) of its programs, policies, and activities on minority populations and on low-income populations. The economic and social effects to be addressed regarding environmental justice concerns pertain only to environmental impacts (e.g., contamination of streams that could decrease fishing revenue for Native Americans). An economic impact that is not tied to an environmental effect would not constitute an environmental justice impact.

Significance Criteria. A significant environmental justice impact would be a serious or long-term health, environmental, cultural, or economic effect that disproportionately affected a nearby minority or low-income population, rather than all nearby residents. A minor or short-term health, environmental, cultural, or economic effect that disproportionately affected a nearby minority or low-income population would not be a significant impact. No environmental justice impacts would occur if the environment was not affected, or if there were no minority or low-income populations in the vicinity of an action.

4.2.2.2. Potential Impacts of the Proposed Action

As discussed in Section 3.2.2, minorities represent less than 10 percent of the total population in the Residence ROI and less than 4 percent in the two rural counties, while the proportion of Hispanic population in the two ROIs is approximately 9 percent, similar to that of the U.S.

The percentage of low-income persons in the Residence ROI is less than 11 percent, lower than the proportions for Wyoming or the U.S. However, a higher proportion of the population (over 16 percent) falls below the poverty level in the two rural counties, probably reflecting the prevalence of low-wage jobs in these rural economies. The low-income population of the Deployment ROI as a whole constitutes less than 12 percent of the total population, comparable to the State of Wyoming, and less than the 13 percent for the U.S. as a whole. No identifiable clusters of minority or low-income persons or populations have been identified as living near the missile sites, which are generally located in remote, rural farmland areas. No known Native American sites would be affected by the Proposed Action.

Potential environmental impacts are addressed in other subsections within this chapter of the EIS. Although adverse impacts (mostly not significant) to various environmental resources are projected to occur from implementing the Proposed Action, none would disproportionally affect minority or low-income persons or populations. For example, road traffic, demolition events, and fill operations would occur with the same extent and frequency near the home of any minority or low-income person as would within any other portion of the deployment area. No environmental justice impacts would occur.

4.2.2.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. The type and extent of the impacts of this alternative would be similar to those of the Proposed Action; the primary difference in impacts would be deployment area traffic increasing slightly, and noise occurring over an extended timeframe. As these impacts would be relatively evenly dispersed throughout the deployment area, no environmental justice impacts are projected to occur.

Removal of the Hardened Intersite Cable System. Removal of the HICS would disturb wetlands, crops, and other surface features. However, these effects would occur relatively evenly throughout the deployment area, and would have no disproportionate impact on low-income or minority persons. Therefore, no environmental justice impacts would occur.

4.2.2.4. Potential Impacts of the No Action Alternative

Under this alternative, maintenance of the Peacekeeper missile system would continue. There would be no environmental justice impacts.

4.2.2.5. Mitigation Measures.

Proposed Action: There are no impacts to environmental justice resulting from the Proposed Action or the Implementation Alternatives, and no mitigations are necessary or recommended.

Mechanical Demolition Alternative: No impacts are identified from mechanically demolishing the headworks, and mitigations are not required.

HICS Removal Alternative: No impacts would occur from this Alternative. Mitigations are not required.

4.2.3. TRANSPORTATION

Phase 1 of the proposed deactivation process would involve Air Force vehicles traveling to one LF every three weeks to remove a missile. Phase 2 would involve Air Force crews traveling to one LF every three weeks to place the LF in caretaker status. Neither of these phases would generate a significant increase in traffic. Air Force crews would travel to MAFs to place them in caretaker status after all missiles have been removed in Phase 2. Contractor personnel and equipment traveling to LFs and MAFs during the dismantlement process would not generate a significant increase in traffic on the road network in the deployment area over a 2½-year period. No change in the level of service (LOS) on area roads or the frequency of accidents are projected to occur during the short term or long term. Construction traffic on deployment area roads during wet conditions could cause short-term significant impacts to the integrity of gravel roads. After dismantlement of the Peacekeeper system is completed, traffic levels would decrease to about ¾ of historic levels. Air Force traffic in support of the MM III missile system would be unchanged. Impacts to road conditions and traffic would result from ceasing Federal funding for extra maintenance and snowplowing, but would not be significant.

The No Action Alternative would not result in a noticeable change from the present LOS. If mechanical demolition of the headworks occurred, more construction equipment would be needed (but the LOS is not predicted to change) and stress on area roads would be greater than under the Proposed Action. If the HICS were removed, additional vehicles would travel on area roads, and the removal could involve the temporary excavation of roads where the HICS passes under the road. Detours of traffic would be required for a longer period of time than under the Proposed Action, resulting in a significant short-term impact on travel time and the LOS of area roads.

4.2.3.1. Analysis Methods

The analysis is primarily concerned with assessing changes from existing road conditions, traffic safety, and traffic volume as a result of implementing the Proposed Action. Information provided by F.E. Warren AFB and by the Wyoming Department of Transportation (WYDOT) on the traffic routes, type of vehicles, frequency of trips, and road improvement programs were examined and compared to baseline conditions to predict the types and extent of impacts that would likely occur under the Proposed Action and Implementation Alternatives. Missile access route maps and General Highway Maps for Laramie, Goshen, and Platte Counties were analyzed to determine the mileage of Defense Access Routes (DAR) for both Peacekeeper and Minuteman systems in each county.

Significance Criteria. Impacts to the transportation system would be significant if the LOS were reduced two or more levels of service, if major repairs to roads would be necessary because of activities associated with the Proposed Action, or if the accident rate increased by more than 2 percent. If the LOS remained at current levels or dropped one LOS, the accident rate increased by less than 2 percent, or the roads only needed minor repairs, the impact would not be significant. No change from the current LOS or accident rate would result in no impact. Beneficial impacts would include an improvement in the LOS or a decrease in the accident rate.

4.2.3.2. Potential Impacts of the Proposed Action

The schedule for performing missile transport during the first phase of deactivation is approximately one LF every three weeks. The vehicle traffic would be an increase over current transportation of missile components in the deployment area. Currently, missile components are only transported back to the base for failures, and then the missiles are replaced. Although there is a somewhat increased risk of accidents due to higher numbers of trips, the Air Force has maintained and transported Peacekeeper missile components throughout the deployment area for over 12 years with no accidents involving missile components. There was an accident involving a “Rambo” vehicle in 1994. However, the accident did not involve missile components. Current operations have caused no significant transportation impacts. The missile components are transported in Type II vehicles specifically designed for transporting missile components. Considering the applicable regulations followed, the specially designed vehicles, and the safety record of the Air Force, the impact from transporting missile components back to F.E. Warren AFB during Phase 1 activities would be only short-term and not significant. Once back at the base, a determination would be made for eventual reuse or disposal of specific

components. Safety issues related to transportation of missile components are more fully discussed in Section 4.3.2.1 and Appendix I.

Phase 2 of deactivation would involve placing the LFs and MAFs in caretaker status. This would involve mostly smaller vehicles than Phase 1, such as several types of vans and heavy-duty sport utility vehicles. An average of one LF every three weeks would be placed into caretaker status. While there would be a short-term increase in traffic during these activities, the increase would be short-term and would not be significant. Once all sites are in caretaker status, only occasional trips to the deployment area would be necessary to maintain the systems. Traffic levels would decrease about 25 percent from current levels.

The reduction in missile system traffic by the Air Force would be offset by contractor vehicle traffic (cranes, dump trucks, heavy equipment, and workers' personal vehicles) during Phase 3 (dismantlement). The initial phase of demolition would require a crane, a large backhoe, and two or three trucks for hauling steel. Approximately 20 to 30 contractor personnel, most of who are likely to live in or near the deployment area, would be commuting to an LF for approximately 1 month. It is possible that up to five LFs may be deactivated simultaneously or in an overlapping sequence (the rate depends upon the weather and the contractual agreement between the contractor and the Air Force).

Under the Proposed Action, approximately three LFs would be dismantled per month over a 27-month period. Some of the construction equipment (backhoes, and a crane) would be moved to a site and remain there for the duration of the demolition phase (typically around two or three weeks). Other contractor vehicles (trucks hauling steel to be recycled, and worker vehicles) would travel to and from a site each day. Contractor vehicle trips would average about 30 round trips (or 60 one-way trips) per day to each dismantlement site for the following: approximately 3 years on primary roads (Interstate 25 or U.S. Highway 85) providing access to the 400th Missile Squadron (400 MS); 4 to 6 months on secondary routes (State highways) providing access to one or two missile flights; and 3 to 4 weeks on tertiary routes (mainly county roads) providing access to one or two LFs or a MAF. Conservatively assuming that all the construction crew workers would travel from the same location at the same time, this would result in a traffic increase of about 0.4 to 4.0 percent on primary routes, and a 16 to 54 percent increase on secondary routes. Even though the increase could be up to 54 percent, an LOS of A would still apply for all routes. It is more likely that workers would travel from multiple dispersed sites and travel at different times. Additionally, contractor vehicles would possibly arrive and depart from each site in several construction stages (i.e., scrap metal recovery, explosive demolition preparation, grading, etc). Dismantlement of the MM II system at Ellsworth AFB involved several different phases of sporadic, high intensity activity at sites, followed by days, weeks, or months of inactivity (Pavek, 1997); dismantlement of the Peacekeeper system at F.E. Warren AFB is likely to follow a similar pattern.

Personnel numbers for the 400th Missile Squadron at F.E. Warren AFB would decrease by about 220 positions after the fourth quarter of fiscal year (FY) 2007, following a 3-year deactivation period. Traffic generated by Air Force personnel at and near F.E. Warren AFB will decrease by about six percent. This would result in a long-term beneficial impact to traffic levels on the roads in the vicinity of F.E. Warren AFB.

As noted in Section 3.2.3, nine Peacekeeper LFs are located within ¼ mile of U.S. and State Highways (see Table 3.2.3-2). The fencelines of these LFs range from about 140 to 670 feet from the highway. WYDOT requires contractors performing blasting operations to adopt precautions to safeguard life and property, as described in 27 CFR Parts 55 and 1926. Small debris and dust have the potential to be ejected several hundred feet from the LF sites during explosive demolition. As a safety precaution, the highways would be temporarily closed prior to and during (approximately 1 hour) the explosive demolition (Eisenhart, 1999). The contractor is required to notify the District One or District Two Office of WYDOT three weeks prior to demolition of an LF to allow for time to plan detours and notify the public. District One covers most of Laramie County, while District Two covers Goshen and Platte Counties and the remainder of Laramie County (including LF sites P-8, P-9, P-11, Q-3, Q-4, Q-5, Q-7, and Q-8, located in Laramie County). Some of the county roads would also need to be temporarily closed. County road offices should be notified prior to closure of county roads and the public should be informed of temporary detours. Temporary detours around LF sites during explosive demolition would not significantly impact traffic, as there are alternate routes in the area and because the highway closures would be of a short duration.

After a 90-day verification period, workers would arrive at the site to fill in the demolished LF. Equipment required for this phase would typically include concrete trucks for pouring the concrete cap over the former launch tube, a truck for hauling rebar for the concrete, bulldozers to move the earth, and dump trucks to haul in fill, as necessary. For the Proposed Action, up to 1,750 cubic yards (approximately 175 truckloads) of fill from area commercial borrow pits could be required at each LF, depending on the soil and geologic characteristics of each site (see Section 4.4.1). Additionally, earthmoving equipment would be required at the borrow sites for fill excavation. Even if the full amount of fill would be required at an LF, it is not likely that more than 10 or 15 dump trucks would be on the same route from a borrow area to an LF at the same time. Approximately six truckloads of concrete would be required for the concrete cap at each LF, or a concrete cap could be fabricated off-site and trucked to the site. An additional three truckloads of gravel may be required to cover the cap at each LF. The increase in traffic from vehicles transporting fill, concrete, and gravel would be similar to the level of contractor vehicles in the earlier phases of the Proposed Action described above, and would not generate significant impacts to traffic.

When the sewage lagoons are filled at MAFs, the amount of fill needed could range from about 70 dump truck loads at P-1 to about 200 dump truck loads at R-1 (see Section 4.4.1). It is likely that less than 10 or 15 dump trucks would be on the same route at the same time. The increase in traffic would be similar to the level of contractor vehicles in the earlier phases of the Proposed Action described above.

Regarding LOS impacts, construction traffic during various construction stages would cause increases in traffic, but no significant changes in the LOS within the deployment area (or roads to the deployment area). Consequently, no short-term LOS impacts would occur. Peak-hour traffic flows could also be reduced using flexible work schedules. Heavy equipment should be moved to and from sites during non-peak hour times as much as

possible. After construction is completed, a decrease in traffic would occur within the deployment area. Because the LOS is already rated "A", the best rating, an improvement in traffic flow would occur, but not to the level of beneficial, as defined in the significance criteria.

The contractor vehicles would be lighter and smaller than missile transporting equipment. However, trips by these vehicles would be more numerous, resulting in increased stress on area roads. Stress levels on gravel roads could cause significant damage in some local areas, especially during wet weather conditions. Damage to gravel roads occurred within the deployment area of Ellsworth AFB from traffic during wet conditions (Pavek, 1997); one significant incident caused by heavy truck traffic on an unauthorized (non-transporter-erector (TE—a vehicle used to transport the missile stages)) route required repair of an approximate 2- to 3-mile section of gravel road. Any significant impacts resulting from dismantlement activities would be short-term. After dismantlement is complete in an area, all gravel missile access routes would be surveyed for damage and restored to county standards for existing gravel roads, using Federal funding (Taylor, 1999). Any damage to roads caused by contractor negligence would be the responsibility of the contractor in accordance with the terms of the contract. Therefore, long-term impacts to road conditions would not be significant. Impacts on U.S. and State Highways and paved county roads would not be significant if contractor vehicles would observe the established weight limits.

Bridges could be impacted from increased traffic from construction. Air Force vehicles are required to travel only on approved missile access routes and observe all weight limits. The contractor should follow approved routes and weight limits to avoid any potential damage to bridges. The short-term impacts to bridges would not be significant if contractors use only approved routes and observe weight limits, as these vehicles are generally lighter than Air Force vehicles. Any damage caused by contractor negligence would be the responsibility of the contractor in accordance with the terms of the contract. A decrease in the number of vehicles crossing bridges after dismantlement is complete would result in a beneficial impact to bridges because less maintenance would be needed.

After the dismantlement is completed, there would no longer be any requirements to maintain gravel routes at standards above state and county requirements. However, the difference between the Air Force standard and county standards is slight (four inches versus three inches) and these roads would be maintained at current standards (Beard, 1999; Craig, 1999). Table 4.2.3-1 shows the estimated impact from the reduction of Federal funding for maintenance. The amount of Federal funding (through the Federal Lands Highway Program Office (FLHPO)) was compared to the county road budgets and the total county budgets. Federal funding was equal to about 11 percent of the Laramie County road budget, about 19 percent of the Goshen County road budget, and 12 percent of the Platte County road budget. When compared to the total county budgets, Federal funding was equal to about 0.7 percent in Laramie County, 4.0 percent in Goshen County, and 1.3 percent in Platte County. About 30 percent of FLHPO funding in Laramie County is for Minuteman access roads, while all FLHPO funding in Goshen and Platte Counties is for roads used by vehicles that support the Peacekeeper missile system. About 4 percent of

gravel roads in Laramie and Platte Counties are maintained by FLHPO funding, while about 16 percent of gravel roads in Goshen County are maintained by FLHPO funding.

Table 4.2.3-1
Estimated Impacts to Counties from
Reduction of Military Traffic Management Command Contracts

	Laramie	Goshen	Platte	TOTAL
FY 1999 Road Budget	$2,400,000	$605,082	$724,652	$3,729,734
Peacekeeper Gravel Road Mileage	65.0	46.5	18.0	129.5
Minuteman III Gravel Road Mileage	29.7	0.0	0.0	29.7
Total Gravel Road Mileage	94.7	46.5	18.0	159.2
Percent of DAR Mileage in County	59.5%	29.2%	11.3%	100.0%
Peacekeeper as Percent of Total County Gravel Road DAR System	68.6%	100.0%	100.0%	81.3%
Percent of FLHPO Funding	59.5%	29.2%	11.3%	100.0%
FLHPO Funding to each County	$297,425	$146,043	$56,533	$500,000
FLHPO Plus County Road Budget	$2,697,425	$751,125	$781,185	$4,229,734
FLHPO as Percent of Total Road Budget[1]	11.0%	19.4%	7.2%	11.8%
Peacekeeper FLHPO Dollars to each County[2]	$204,146	$146,043	$56,533	$406,721
Percent of Total Road Budget[1]	7.6%	19.4%	7.2%	9.6%
Total 1999 County Budget	$28,084,177	$3,446,473	$4,339,874	$35,870,524
Total County Budget Plus FLHPO Funds	$28,381,602	$3,592,516	$4,396,407	$36,370,524
Percent Peacekeeper Funds of Total County Budget[3]	0.7%	4.1%	1.3%	1.1%
Total County Gravel Roads (Miles)	1,500	300	500	2,300
Percent Peacekeeper Gravel Roads of Total County Gravel Roads	4.3%	15.5%	3.6%	5.6%
County Road Budget with Peacekeeper Gravel Roads[4]	$2,504,000	$698,870	$750,739	$3,939,734
Net Increase	$104,000	$93,788	$26,087	$210,000
Total County Budget Plus Net Increase in Road Budget	$28,188,177	$3,540,261	$4,365,961	$36,080,524
Percent Increase	0.4%	2.7%	0.6%	0.6%

[1] Total road budget equals FLHPO plus county road budget
[2] Percentage of Peacekeeper miles of total DAR mileage multiplied by FLHPO dollars for the county
[3] County budget plus FLHPO Funding
[4] Equals road budget

When all Peacekeeper sites are dismantled, and roads have been restored to Federal standards, FLHPO funding for roads used for Peacekeeper sites would be discontinued. Funding for maintaining Minuteman access roads would continue. FLHPO funding to Laramie County would be cut by about 70 percent, while FLHPO funding to Goshen and Platte Counties would be eliminated.

The county road budget has increased an average of 4.3 percent annually from 1996 to 1999 in Platte County, but only 0.1 percent annually in Laramie County. From 1995 to 1999, the road budget for Goshen County has increased an average of 9.3 percent annually; most of this increase is attributed to a 27.4 percent increase from 1998 to 1999. The road budget typically totals between 8.5 and 11 percent of the total county budget for Laramie

County, between 14 and 18 percent for Goshen County, and between 14 and 17 percent for Platte County. The total county budget for Laramie County has increased an average of 7.5 percent annually from 1996 to 1999; for Goshen and Platte Counties, the average annual increase has been 7.6 percent and 1.1 percent, respectively.

After dismantlement, the counties would assume maintenance of Peacekeeper access gravel roads. Assuming that the gravel roads currently maintained with FLHPO funding would be maintained at the same level and everything else in the budget remained constant, the total county budget for Laramie County would increase by 0.37 percent. This is about 5 percent of the annual average increase from 1996 to 1999.

The potential increase in Goshen County would amount to 2.72 percent, or about one-third of the average annual increase from 1996-1999. The potential increase in Platte County would amount to 0.6 percent, or about half of the average annual increase from 1996-1999. These gravel roads are located in sparsely populated areas with light traffic. With lower traffic and the absence of heavy Air Force vehicles, these roads would not likely require maintenance for several years after the Proposed Action would be completed. Thus, the impact from FLHPO funding reductions would likely be spread out over several years. The impacts to Laramie County would be adverse, but not significant. The impacts to Goshen and Platte Counties would be somewhat greater, but not significant.

No FLHPO funding has been provided for county paved roads, as discussed in Section 3.2.3. Counties have maintained these roads with local revenue and money from a State fund for farm to market roads. As discussed in Section 3.2.3, many of these roads are old and in need of repair. The impact from Air Force traffic would decrease as heavy vehicle traffic is reduced. Impacts from the Proposed Action would not be significant.

Federal funding used to reimburse Laramie, Goshen, and Platte Counties for snow plowing for access to Peacekeeper LFs and MAFs (approximately $133,000 per year (70 percent of $190,000 for Peacekeeper and Minuteman sites)) would cease after sites are placed in caretaker status. Snow plowing would be performed according to State or county priorities. Snow plowing for missile access routes as a top priority would no longer be required; current missile access routes would be plowed according to the same schedules as other area roads. Some routes in sparsely populated areas may be plowed later than when the Peacekeeper system was operational. Missile access route segments plowed by the State and counties with Federal funding were a small percentage of the total mileage plowed by the State and counties after a snowstorm. The impact of discontinuing Federal funding for TE routes would not be significant.

Because multiple routes could be used to access the sites and because the LOSs on the primary, secondary, and tertiary roads are good (LOS A), no significant increase in accidents as a result of the Proposed Action is projected to occur. Over the long term, a decrease in the already negligible accident rate for missile-related vehicles in the deployment area is expected.

Within the Peacekeeper deployment area, one LF (Q-10) is within ¼ mile of railroad tracks (operated by Burlington Northern Santa Fe Railroad). Launch facility S-3 is about ⅓ mile

from a railroad track operated by Union Pacific. There is a slight potential for small debris or dust to reach these tracks. It is unlikely that the debris and dust generated by the blast would be of sufficient quantity or duration to impact the safe operation of adjacent railroads. The dismantlement contractor should coordinate the timing of blasts at these two LFs with the Railroads to mitigate potential adverse impacts (See Section 4.2.3.5).

Cheyenne Municipal Airport is about 17 miles south of the deployment area. Dust generated from explosive demolition is quickly diluted into the atmosphere. Visibility is affected only for a short time in the immediate vicinity of the blast. Cheyenne Municipal Airport is located outside of areas where visibility is impaired. Flights over the deployment area would not be affected by dust clouds generated by blasts because the altitude of flights (10,000 to 20,000 ft) is well above the altitude of dust (several hundred feet) observed during similar activities at Ellsworth and Whiteman AFBs.

4.2.3.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. More construction equipment and a greater number of contractor personnel would be needed to mechanically demolish the headworks of the LF as compared to explosive demolition. Consequently, the traffic levels and the potential for accidents would be slightly greater. No significant impacts on the LOS are expected to occur because the increased traffic is not sufficient to affect the LOS. The use of equipment would extend over a longer period of time. About the same amount of fill material would be needed for mechanical demolition as compared to the Proposed Action. Stress on gravel TE routes would be greater than under the Proposed Action and could be significant during wet conditions. Closures of roads due to impacts from explosive demolition (i.e., small debris and dust) would not occur under this implementation alternative. There would be no impacts on adjacent railroads or the Cheyenne Municipal Airport.

Removal of the Hardened Intersite Cable System. Removal of the HICS would require additional vehicles on area roads. This would not significantly impact traffic levels and the potential for accidents. Stress on area roads would be significantly greater than under the Proposed Action, and could cause significant impacts to road conditions. Removal of the HICS could involve the temporary excavation of roads where the HICS passes under the road. Detours of traffic would be required for a longer period of time than under the Proposed Action; this would result in significant impacts on travel time and the LOS of area roads. If the HICS were removed under railroads, temporary closures of portions of railroads would result in significant impacts to the movement of products on rail lines. Impacts would be especially significant if railroads were closed during critical time periods when agricultural products and supplies were in transit. However, in the event this implementation alternative is chosen, it is far more likely that the HICS would be left in place where the HICS intersects railroads and roads.

4.2.3.4. Potential Impacts of the No Action Alternative

No change from the present LOS, accident rates, and road deterioration would occur under this alternative. Current maintenance and operations trips within the deployment area would continue at present levels. Funds for the upkeep and improvement of gravel TE

routes would continue. There are no significant impacts now nor would there be in the future.

4.2.3.5. Mitigation Measures

Proposed Action: Potential adverse impacts to transportation systems could be avoided or minimized by the Air Force contractor using the following mitigation measures:

- Coordinate the timing of the explosive demolition events with the Burlington Northern-Santa Fe and Union Pacific Railroads for the two LFs located within about ¼ mile of the rail lines.
- Notify the appropriate District One or District Two Office of the WYDOT and county road offices three weeks prior to demolition of an LF to allow for time to plan detours and notify the public.
- Limit damage to public roads by having all contractor-operated heavy equipment use the current approved Air Force missile access route system and observe weight limits to the maximum extent practicable.

Mechanical Demolition Alternative: Potential adverse impacts could be avoided or minimized by the following mitigation measure:

- Limit damage to public roads by having all contractor-operated heavy equipment use the current approved transporter-erector route system and observe weight limits to the maximum extent practicable.

HICS Removal Alternative: Potential adverse impacts from removing the HICS would be similar to those under the Mechanical Demolition Alternative, so the same mitigation measure applies.

4.2.4. LAND USE

Long-term land use impacts caused by the Proposed Action are not expected to be significant, and there would be a small increase in arable land. Adverse, but not significant, short-term impacts to land use would occur in the immediate vicinity of the LFs and MAFs. Construction site activities would occur within the boundary of the sites, with the exception of certain activities performed at a landowner's request (e.g., removal of azimuth markers). After completion of dismantlement activities, the Air Force plans to dispose of the property. Reuse of the land is subject to Federal regulations.

Under the No Action Alternative, no short-term impacts would occur because current land use would not be affected. Long-term impacts would involve continuance of the current land uses, with the missile sites being retained by DoD. If mechanical demolition would be implemented for dismantlement, adverse short-term land use impacts could occur from the construction activities. However, the long-term land use impacts would be the same as if explosive demolition occurred. Removal of the HICS would significantly affect land use in the short-term because of the short growing season and the disturbance of miles of ground to excavate the cable system. Long-term impacts of cable removal on land use would not be significant.

4.2.4.1. Analysis Methods

Land use in the deployment area and around F.E. Warren AFB was evaluated through visual observations and review of United States Department of Agriculture (USDA) soil surveys and land use data, and the Wyoming Natural Resources Data Atlas. The review focused on the regional and local land use, and current land use restrictions regarding the existing Peacekeeper system. The proposed deactivation and dismantlement activities were then evaluated for potential impacts to land use.

Significance Criteria. Degradation of land such that it could no longer be used for its current or proposed land use would be considered a significant impact. If some noticeable degradation occurred, but the effect would be temporary and long-term land use would not be affected, the impact would not be significant. No impact would result if land use was not affected by an action. A beneficial impact would be a noticeable improvement in land use; for example, if crop yields, property values, or other economic indicators of land use value would increase.

4.2.4.2. Potential Impacts of the Proposed Action

Land use on F.E. Warren AFB is not expected to change as a result of the Proposed Action. Most Peacekeeper facilities could be reused by the MM III missile program. There would be no impacts to publicly owned lands from the Proposed Action.

Most of the LF and MAF sites were purchased from one landowner and could be sold back to the former landowner under certain conditions after the Air Force has completed the deactivation and dismantlement process (see Sections 2.1.2 and 2.1.3). Some of the sites were purchased from multiple landowners. In either case, disposition of these lands may take several years. Restrictive easements would generally revert back to the former landowners after a period of one year.

During the scoping process, a comment was received indicating that some landowners would prefer that the MAF building be demolished, the fences at the LFs and MAFs be taken down, and the site restored to its original condition. At this time, the Air Force is planning to leave the buildings and fence intact as part of the Proposed Action. This process is consistent with past and ongoing Minuteman missile system dismantlement at Ellsworth AFB, South Dakota, Whiteman AFB, Missouri, and Grand Forks AFB, North Dakota.

During Phases 1 and 2 of deactivation, heavy vehicles would travel throughout the deployment area to recover the missiles and various site components. Explosive demolition of the headworks is unlikely to damage structures, including those within the 1,750-foot explosive blast safety zone. There are no occupied dwellings within the safety zone. Approximately 900 pounds of explosives detonated in millisecond delays were used for imploding the MM II headworks at Whiteman AFB and Ellsworth AFB. The 1,750-foot safety zone was developed based on the presence of 20,000 pounds of conventional munitions within the LFs. Consequently, the smaller amount of explosives anticipated to be used in the demolition events should not generate overpressures sufficient to break windows or cause other structural damage.

A mat was placed over the headworks at Whiteman AFB prior to demolition of some MM II sites, which helped limit the dispersal of demolition debris; however, at most sites in rural areas, it was determined that the mat was not necessary (USAF, 1999c). The contractor did not use a mat at Ellsworth or Grand Forks AFBs. Although the contract specifications require that debris not be ejected off site, there were occasional instances of small pieces of debris (less than several inches in diameter) being transported outside the fence boundary (USAF, 1999c). At Grand Forks AFB, chunks of concrete were sent about 100 feet into the air (ENR, 2000). A best management practice would be to use a protective mat for demolition of the Peacekeeper LFs. Another best management practice is to use sediment barriers and other erosion control devices to help prevent offsite transport of sediments and construction debris; these barriers will help minimize short-term impacts to crops.

Activities at LFs and MAFs would occur primarily within the fenced site boundaries, except for work on small structures such as cathodic protection wells at all sites. The fences would remain at both LFs and MAFs, and the area inside the fence at LFs would remain graveled. The buried antenna located at each MAF outside the site fence would be left in place. Pavement at the MAFs would remain. At a landowner's request, the azimuth markers would be removed from the ground surface by trenching and burial in place, or by excavating, lifting, and placing the markers in the launch tube as construction debris. The marker posts associated with the HICS could be removed by the landowner after the HICS easement was relinquished. The HICS is buried from three to six feet below ground, but is closer to the surface near the markers.

If the landowner removes the marker after the easement has been relinquished, there would be a short-term ground surface disturbance in the immediate vicinity of the marker post. All of these activities would result only in short-term adverse land use impacts, which would not be significant. The long-term land use would be negligibly improved, with a slight increase in arable land caused by removing markers and posts, and allowing cultivation within the current 25-foot clear zone.

Prior to disposal or transfer of the sites, a finding of suitability for transfer must be prepared and signed by the Air Force Installation Commander. Several certifications would be included in the package for real estate disposition. The certifications are included to identify if any hazardous material activity occurred on the excess property as required by Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) (Public Law 99-499), and the Community Environmental Response Facilitation Act (CERFA) (Public Law 102-426). These acts are implemented by United States Environmental Protection Agency (USEPA) regulations (40 CFR part 373 and 41 CFR 101-47.202-2(b)(9) and (10)). The certificates also identify the presence or absence of asbestos on Federal property (Section 120(h) of SARA), the presence or absence of polychlorinated biphenyls (PCB) and the hazardous condition, if any, of the site (41 CFR 101-47.202-2(c)(3)). Environmental baseline surveys would be performed according to Air Force Instruction (AFI) 32-7066 (Environmental Baseline Survey in Real Estate Transactions). Although the General Services Administration (GSA) does not have

specific requirements regarding lead-based paint, if notified that the paint is present, the disposal agency would notify the recipient of the property and include appropriate covenants in the deed as required by law.

If asbestos is still present after the dismantlement activities are completed, a description of the type, location, and condition of asbestos at the property would be provided as part of the certification process. Information pertaining to PCBs in coatings on tanks or exterior concrete surfaces would also be included in the disposition documentation.

Site certification documentation would also include a positive declaration that hazardous substances were stored for more than a year at each LF and MAF. The specific information would include the type and quantity of hazardous substances, and the time at which such storage, release, or disposal took place. Additionally, the certification documentation would note the presence of a subsurface antenna at the MAFs (and its dimensions).

4.2.4.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. Demolition of the headworks by mechanical means could involve affecting a larger plan area than by explosive demolition. The material excavated to reach the necessary depths may not be able to be stored on site and approval would be required to store the material off-site. Also, the 1:1 maximum slope required for construction could cause the excavation to affect the drainage ditch around the site and extend to the perimeter of the site. Consequently, it would be more difficult to prevent temporary off-site impacts to land use. Impacts to adjacent land use, although somewhat greater than under the Proposed Action, would not be significant during the short-term. Long-term impacts (also not significant) would be the same as under the Proposed Action.

Removal of the Hardened Intersite Cable System. Leaving the HICS below ground (except for excavations as necessary to remove the markers) would be far less injurious to the environment than if the cable were excavated. The presence of the buried cables, with the exception of areas around line-of-sight posts where the cables are closer to the surface, does not usually interfere with present surface land uses.

The potential exists for safety hazards to farmers or ranchers if the cable were to rise in a plowed field (because of frost heave or some other factor) and be caught by a tractor and/or other equipment. Severe damage could be done to the equipment and could cause injury to the operator. Long-term farm use could be disrupted if the cables rise. However, over 70 percent of the land is pastureland. Based on the infrequency of past situations where the HICS has been exposed (there has been only one incident during the past 3 to 4 years), it is anticipated that no significant impacts would result from leaving the cable in the ground. If the HICS is left in place, the landowner could eventually salvage the copper.

Short-term consequences of excavating the cable would be significantly adverse, unless mitigated. The excavation could disrupt other activities, such as plowing and grazing. Trenches would likely be four to seven feet deep and about two feet wide. If trenches were left open overnight, cattle or other animals could get stuck or injure themselves by falling in the trenches. The HICS excavation could not occur during the growing season in areas

under cultivation without causing short-term economic loss to individual landowners. Long-term land use impacts from removal of the HICS would likely not be significant.

4.2.4.4. Potential Impacts of the No Action Alternative

Continued maintenance of the Peacekeeper system would not change the present land use environment. No impacts would occur.

4.2.4.5. Mitigation Measures

Proposed Action: No significant land use impacts would occur using best management practices as part of the Proposed Action. No mitigations would be required.

Mechanical Demolition Alternative: Impacts to land use would be somewhat more adverse than under the Proposed Action, but still not significant. Mitigations would not be required.

HICS Removal Alternative: The implementation alternative of removing the HICS cable would lead to a significant disruption of the current land use. To reduce the significance of potential impacts from removing the HICS, the following mitigations should be implemented:

- Refill trenches as soon as the cable is removed.
- Compact and reseed disturbed areas as soon as possible after compaction.
- Notify landowners in advance to allow any planning for short-term land use changes (such as grazing in a specific area) as necessary.

4.3. HAZARDOUS MATERIALS AND WASTE MANAGEMENT

This section addresses general human health and safety issues, and the handling, storage, and disposal of materials and wastes that may pose a threat or danger to the safety, health, and well being of the general public or the environment. Various hazardous materials and wastes are found at the LFs and MAFs. Although many hazardous materials would be removed during deactivation, small amounts of hazardous substances would remain during the dismantlement. Some wastes and hazardous materials (such as PCB coatings) would remain as part of the site, if they do not present a future hazard to human health or the environment, and if the action is approved by the appropriate state or Federal agency. The Air Force believes it is in the best interest of the environment to leave the PCB coatings and some other materials in place due to the disturbance required to remove the materials and transport them to a disposal facility. The following sections also consider the potential for soil and water contamination from past Air Force activities, and the need for sampling or remediation activities.

No significant short-term or long-term risks to the environment, or to human health and safety, are identified from the proposed dismantlement of the Peacekeeper systems and the management of hazardous materials or wastes. The safety of workers and the public would not be jeopardized, as dismantlement operations would be managed in accordance with standard Air Force and industry practices. No unique or unusual hazards would be associated with the dismantlement. Hazardous materials and wastes could be safely removed, and the potential for pre-existing contamination (for example, from past spills)

would be minimal. Long-term hazardous material usage and hazardous waste generation would decrease at F.E. Warren AFB after dismantlement of the Peacekeeper missile system. Sampling would be conducted during deactivation and dismantlement to ensure that the sites do not have contamination above levels of concern. Experience gained during dismantlement of MM II systems at Whiteman AFB and Ellsworth AFB and MM III systems at Grand Forks AFB would be used to plan the F.E. Warren AFB Peacekeeper dismantlement activities.

The Implementation Alternatives would have varying impacts. The mechanical demolition option would increase the amount of heavy construction activities and the associated safety risks. Removal of the HICS would increase the potential for spills of hazardous materials and increase the potential for accidents, since additional time and work would be required for the removal.

Impacts to health and safety may also occur if air pollutants would be released or if certain types or levels of noise would be generated during the action. The potential effects to health and safety related to air quality are discussed in Section 4.4.3, and the potential effects of noise are discussed in Section 4.4.4.

4.3.1. Analysis Methods

This analysis identified potential health and safety issues that could result from performing the Proposed Action, Implementation Alternatives, or the No Action Alternative. The analysis then identified the types and quantities of hazardous materials and wastes associated with the action. The analysis was based on available information on the types of activities proposed for deactivation and dismantlement activities and specified guidelines for performing the actions, the presence and use of hazardous materials in the LFs and MAFs, and the amount and types of wastes generated. The methods of handling explosives and hazardous substances, and the training of personnel, were also evaluated. The analysis focused on the hazard/accident mechanism, the likelihood of an accident, and the severity of consequences if an accident were to occur. Documents pertaining to handling precautions, storage, and toxicity of substances were used to review the methods and training. Sampling and analysis of soils, groundwater, and various materials and wastes during the deactivation of MM II deployment area facilities at Whiteman AFB, Ellsworth AFB, and Grand Forks AFB, MM III deployment area facilities were reviewed prior to sampling and analysis activities at F.E. Warren AFB.

Significance Criteria. An impact would be considered significant for this section if workers or the general public were exposed to hazardous substances above health criteria levels, or suffered a permanent disability or loss of life. Significant impacts would occur if the generation of wastes exceeded handling or disposal capacity, or if a spill or leak of a hazardous substance occurred that could not be remediated as part of the action (e.g., a fuel spill that could not be cleaned up as part of a tank closure). If impacts would occur but would not be significant, they are identified as such. No impact is identified if no effect occurs or if a resource element is not present in the area of an action. A beneficial impact would occur if the generation of wastes were reduced or eliminated, or the potential for spills or leaks of a hazardous substance were decreased.

4.3.2. Potential Impacts of the Proposed Action

The following subsections address the potential impacts under the Proposed Action.

4.3.2.1. Health and Safety

Human health and safety may be affected by activities associated with the Proposed Action. Three general concerns related to health and safety (working in confined spaces, explosive demolition, and hazardous material and waste handling) are covered in this section.

Safety provisions are incorporated into all aspects of missile maintenance and transportation, but there is a chance that an accident could occur when missiles are moved. Section 3.3.1 provides information on the low rates of accidents involving vehicles carrying missile components. The likelihood of an accident during transportation is low, and the potential of an accident endangering the public or the physical environment is even lower.

The launch tube is a confined space that has limited access and room for construction work. Workers would be required to follow all applicable regulations (as found in 29 CFR Parts 1910 and 1926) when working in confined spaces. Proper procedures would be followed for welding and cutting operations in the launch tube and for excavations for removal of USTs.

Explosive demolition of the headworks has an associated risk of mishandling of the explosives or improper detonation. If the explosives were detonated before personnel were beyond a prescribed safety distance (which would be required in the demolition contract), personnel may be injured. However, contractor personnel performing the actions would be expected to follow protective guidelines and regulations when handling explosives and hazardous materials, and when transporting missile components.

The LF interior, launch control center (LCC) interior, and launch control support building (LCSB) walls are painted with lead-based paint. Other paint additives could include other heavy metals, such as chromium and mercury. Cutting of the painted metal with torches during salvage operations, site preparation, and after the headworks demolition to allow the broken concrete to fall into the launch tube, would be done after the paint would be removed from the proposed cutting surface; this would be a contract requirement. Explosive demolition of the launcher would also cause a small amount of paint dust and chips to become entrained in the resulting plume. Human health and safety could be adversely affected by releases of lead and other heavy metals into the environment. Section 4.4.3 discusses air quality impacts of the explosive demolition.

Workers within the launch tubes who are cutting steel coated with lead-based paint would be required to wear suitable protective clothing and respirators when removing the paint prior to cutting. The workers should not be exposed to lead fumes if they wear suitable protective gear in the work area. Exhaust fans and a fume filtering system outfitted with high-efficiency particulate air (HEPA) filters would be required as a precaution to keep lead dust from escaping into the environment when the paint is being removed. There are

some devices, such as paint scrapers with vacuum collectors, that could be used to capture the paint chips and dust for disposal.

Exposure to hazardous substances, such as lead-based paint (LBP) or explosives, could significantly affect human health and safety. Both the workers and the general public could be at risk if hazardous substances were released and not safely and adequately removed, and disposed of properly. The removal or maintenance of hazardous substances would also present environmental hazards if improperly handled or spilled.

Handling of materials or wastes would not have significant health and safety consequences. Air Force personnel would essentially be performing the same types of activities as currently conducted. Only residual materials remaining from the safing process and hazardous materials used during demolition would present a health or safety risk. The primary concern, as discussed above, would be the safe use of explosives. Specialty subcontractors trained in the use of explosives have been retained for previous missile system dismantlement efforts and follow procedures documented in safety plans. Consequently, no significant health and safety impacts from the use of explosives are projected to occur.

All reentry systems (RSs) would be removed from LFs. As discussed in Section 3.3.1, any trace of latent radioactivity in the steel liner of the LFs has dissipated to background levels naturally occurring in the soils. No leaks have ever been reported in the LFs or through transportation of the RSs. No radioactivity impacts would be expected during dismantlement activities.

The RS, which contains the nuclear warhead, would be handled by trained personnel. As discussed in Section 3.3.1, the RS continuously emits ionizing radiation in the form of alpha and beta particles, gamma rays, X-rays, and neutrons at a very low rate as measured at a distance of three feet from the RS. There is virtually no radiation emitted past three feet. The dose of radiation received by a person within three feet of an RS is far less than the average radiation dose of 300 millirems (mrem) per year (0.03 mrem per hour) received from naturally occurring radiation. The amount of radiation received by personnel handling the RSs would be well below the allowable occupational dose of five rems per year specified in 10 CFR 20.1201. Thus, worker exposure to ionizing radiation from handling the RS would not be significant.

The RS handling procedures are designed to prevent a mishap with the nuclear device, and no incidents of detonation have occurred at any intercontinental ballistic missile site. Because of the extremely improbable nature of a detonation during handling (see Appendix H), this scenario is eliminated from further evaluation.

Reentry systems and other explosives at the LFs would be transported to the WSA on base. The WSA operates under strict standards governing the number of various types of explosives that can be stored (see Section 3.3.1). This capacity cannot be exceeded. The base is currently completing a conversion of all Minuteman III missiles from three warheads to one. The capacity of the WSA has been adequate to handle the incoming RSs. These are shipped on a regular basis to the Department of Energy, which also has sufficient capacity to transport and store these components. The small explosives from the LFs

would be stored at the WSA and reused as needed or shipped to another location for storage or disposal (Kralik, 2000).

The Air Force has stringent requirements for handling and transporting rocket motors (see Section 3.3.1). Potential impacts of an accident include accidental ignition or dispersion of toxic materials. However, rocket motors are handled and transported in specialized vehicles designed to prevent these types of impacts and strict regulations are followed at all times. Given the regulations followed and the safety record of the Air Force (no accidents have involved Peacekeeper missile components in its history at F.E. Warren AFB), any accident involving accidental ignition or dispersion of toxic materials is very unlikely (see Appendix H for more details). Impacts to health and safety from the handling and transportation of rocket motors would not be significant.

4.3.2.2. Hazardous Materials

4.3.2.2.1 Asbestos

Asbestos is regulated under the Clean Air Act (CAA) because it is a designated hazardous air pollutant. The CAA requires that USEPA must be notified before demolishing or renovating a facility containing friable asbestos. The state must be notified of any renovation or demolition work, regardless of whether or not there is asbestos-containing material (ACM) present. Air Force policy is to remove or encapsulate friable asbestos before a site can be considered environmentally safe. Some encapsulated ACM would remain at the sites. The Air Force adheres to the National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements specified in 40 CFR 61 and State requirements for handling asbestos. In accordance with the *Wyoming Air Quality Standards and Regulations* (Chapter 3, Section 8) and to 40 CFR part 61, subpart M, the amount and location of regulated ACM must be recorded on the deed to the property. The regulations are enforced by the Wyoming Department of Environmental Quality (WYDEQ), Air Quality Division.

The pipes above the false ceiling in the LCSB and two walls of the MAF garage furnace room, both above ground facilities, would not be removed. These items would be identified in facility disposition documentation (i.e., deeds). This ACM would be left in place during dismantlement activities. Prior to Phase 4 (property disposal), asbestos inventories would need to be accomplished. Results of the inventories would be recorded on disposition documentation. No significant impacts would occur from leaving the asbestos in place.

During deactivations at Ellsworth AFB and Whiteman AFB, asbestos was found in the external coating on the outside of the underground storage tanks (USTs). Sampling of USTs in the missile system deployment area at F.E. Warren AFB has revealed no asbestos on the tanks (Zak, 1999). The shallow-buried USTs at the LFs would be removed to facilitate the demolition process. The deep-buried USTs at the MAFs would be closed in place. The shallow-buried fuel tanks at the MAFs would be removed and disposed of off-site at approved facilities.

4.3.2.2.2 Polychlorinated Biphenyls

All items suspected of containing PCBs at the LFs and MAFs would be sampled or removed. Items that are considered to be PCB-contaminated would be removed (e.g., shallow-buried fuel tanks with PCB-contaminated coatings). Other items that may be PCB-contaminated (e.g., filters, pads, and capacitors) would also be removed. During the environmental safing process, items would be transported to a storage site on F.E. Warren AFB prior to ultimate disposal.

Some filters at the LFs and MAFs (e.g., radio frequency interference capacitor filters) may contain PCBs. These filters would be removed during the environmental safing process. Safe handling of filters is conducted to prevent exposing workers or the public to PCBs. During the environmental safing process, all items suspected of containing PCBs would be extracted by base personnel, packaged, and transported to a storage site on F.E. Warren AFB that meets the criteria specified in 40 CFR 761. The items would subsequently be disposed of via contract at a designated landfill.

By Air Force standards, F.E. Warren is PCB-free regarding transformers, hydraulic systems, heat transfer components, and other PCB items. Transformers in the deployment area were not known to contain PCBs. A site with a transformer hit by lightning was cleaned up, and the transformer and didn't contain PCBs (Alexander, 1999).

Sampling of several UST coatings for PCBs produced results ranging from non-detect to 30,000 ppm. No PCBs were detected in a sample of the HICS cable (Schuler, 2000). Section 3.3.2.3 also discussed various locations where coatings with known or potential PCBs were present. Further testing of coatings on USTs would be required for off-site disposal. Potential substances that could contain PCBs are copper strap grease, putty, pull grease (for electrical conduits), paint, pipe dope, air vent shafts and coatings on the soft support buildings and LF structure. Based on positive detections for PCBs in coatings (see Section 3.3.2.2.2), a groundwater model was used to evaluate the potential dispersion of PCBs (see Appendix K). The model results of simulated groundwater transport over a 20-year period (see Section 4.4.2.2.5) showed PCB concentrations leached from LF coatings are not expected to exceed 0.02 ppb in any of the modeled cells adjacent to the LFs. The model results indicate that PCBs are nearly immobile under the representative site conditions. Leaching of PCBs would not add significantly to background levels at any wells that occur downgradient. The estimated levels of contamination are well below the maximum contaminant level (MCL) for PCBs (0.5 µg/l, essentially 0.5 ppb) as set forth in the National Primary Drinking Water Standards of the Safe Drinking Water Act. The maximum concentration predicted (0.1 µg/l at 100 feet during year 20) is approximately 20 percent of the MCL.

Explosive charges can generate heat and pressure that can break down or change compounds into other compounds or elements. For example, explosions may vaporize PCBs, releasing dioxins. However, all surfaces with a PCB or potential PCB coating are below ground, and would not experience the extreme pressures or heat of the blast. The explosive charges would be placed within the concrete portion of the headworks, and the charges directed inward. Consequently, no airborne release of PCBs or a byproduct of PCB combustion would occur. Conversely, environmental impacts resulting from

removing the PCB coatings could be significant because the necessary excavations would increase PCB exposure to the workers, the general public, and the environment.

As a best management practice, the dismantlement contractor would be informed of the potential for PCBs on various coatings, and provided with available PCB sampling results. On any exposed surface with a coating, no cutting tools (including torches) would be used to dismantle the materials if they contain PCBs above action levels. If any PCB-contaminated items are identified during the dismantlement process, proper safety precautions would be required for workers.

For disposal of the property, a disclosure statement would be issued noting the potential for PCBs in coatings on buried USTs, piping, and concrete. The disclosure statement would be included as part of the property deed, and would also be retained by the Federal Government to ensure proper future management.

4.3.2.2.3. Refrigerants

F.E. Warren AFB uses gaseous R-12 as a refrigerant in the missile guidance control system (MGCS). During Phase 1, the MGCS would be removed and extracted R-12 would be stored for later use. After shipment of the MGCS back to the base, the R-12 would be extracted and consolidated in 25-pound bottles. These would be shipped back to the Defense Logistics Agency storage area to be reclaimed and reused for another system. Air Force personnel would recover the maximum amount possible of R-12. There are approximately 15 pounds of R-12 in the chiller system of the MGCS (Jackson, 2000). Brine chiller units for the LFs and MAFs contain R-22 refrigerant that cools the brine (ethylene glycol and water mixture). The MAFs have air conditioning units that also contain R-22 refrigerants. All refrigerants would be reclaimed during Phase 2 activities, transported to the base, and stored until reuse. Reclamation of the refrigerants with negligible releases to the environment would not be a significant impact.

4.3.2.2.4 Fuels, Oils, and Ethylene Glycol

Residual quantities of fuels, oils, and brine may remain at caretaker sites following the environmental safing process (Phase 2 activities). Lube oil containment units and other reservoirs would be drained to collect the fluid, but not all liquid can be recovered from the reservoirs. The residual liquids would include small amounts (on the order of ounces in lines to a few gallons in USTs) remaining inside any equipment, lines, and tanks that are not salvaged (e.g., a generator engine, if not removed). Contaminated soil, if any, associated with the tanks would be addressed prior to any demolition.

Diesel fuel #2 (DF-2) is used in the back-up generators at the LFs and MAFs. Section 3.3.4 discusses the types of tanks used to store fuels, including DF-2. Uncontaminated fuels are hazardous materials that can be reused elsewhere, and are generally returned to F.E. Warren AFB for reuse in the heating plant during site conversion to caretaker status. Fuels that cannot be reused are handled as an ignitable hazardous waste. Diesel fuel that has been contaminated with a hazardous substance must also be handled as a hazardous waste. Typically, waste fuel is placed in properly labeled 55-gallon drums and transported to F.E. Warren AFB for proper disposal.

The WYDEQ has set action levels for petroleum hydrocarbons in soils. As part of the deactivation process, the Air Force plans to perform a selective sampling program to address potential hydrocarbon as well as other contamination. Any USTs removed would involve separate soil, and potentially water, testing. After completion of testing for these residual fuels near the surface of the sites, those sites above the soil action level would be evaluated. F.E. Warren AFB and the WYDEQ would help determine the proper course of action for the sites above the soil action level. The potential for soil and water contamination is addressed during tank closure, which is discussed in Section 4.3.2.4. Short-term impacts from handling these materials would not be significant. A beneficial impact would result from the removal of these materials.

Brine is used in the LF and MAF coolant systems. Brine, which is an ethylene glycol-water mixture, would be drained from an approximately 100-gallon reservoir at each LF during the environmental safing process at caretaker sites. At each MAF, the launch control capsule coolant systems would be drained during contractor dismantlement. This ethylene glycol mixture would be properly containerized for reuse, recycling, or disposal. Generally, the ethylene glycol within the coolant systems is not contaminated and can be reused. Contaminated ethylene glycol is considered a hazardous waste and would be placed in 55-gallon drums and taken to F.E. Warren AFB for disposal. Ethylene glycol is known to be hazardous to aquatic life. Depending on the volume of water, large amounts of ethylene glycol can asphyxiate fish by depleting the oxygen supply. The Air Force plans on having the ethylene glycol mixture returned to the base for potential reuse. Short-term impacts from handling the brine would not be significant; a beneficial impact would result from the removal of the brine.

4.3.2.2.5. Lead-based Paint and Cadmium Electroplating

As described in Section 3.3.2.6, lead-based paint (LBP) was applied to interior surfaces at the LFs and MAFs. For instance, the interior walls of the LCC and LCSB were painted with LBP. LBP may also have been applied to on-base facilities. Although there hasn't been a LBP survey on base, "as needed" tests are done prior to construction activities. Other heavy metals such as mercury and chromium may also be in the paint. Another heavy metal, cadmium, was electroplated at several areas of the LFs. Lead and cadmium could leach into groundwater if they remain in the LF construction rubble after demolition. However, the remaining quantities of cadmium would be a fraction of the quantities of lead. In addition, the cadmium-plated items are not readily broken down, as compared to LBP. Some cadmium-plated items may be removed during salvage operations.

The Air Force has determined that the health and safety risks of lead exposure are many times greater if the LBP is removed (by workers sandblasting or otherwise stripping the silo) than by imploding the silo and leaving the paint as a part of the rubble (USAF, 1991e; USAF, 1992a). The minor amounts of cadmium electroplating remaining in the facilities also do not warrant the exposure risk from removal. Removing the paints also generates a hazardous waste. Therefore, the Air Force does not intend to strip the LBP or cadmium from the interior of painted surfaces. Previous sampling of LFs at Ellsworth AFB, Whiteman AFB, and Grand Forks AFB has shown that the heavy metals in a representative sample of the waste stream would not meet or exceed the criteria for hazardous waste as

measured by the USEPA-mandated toxicity characteristic leaching procedure (TCLP) test. Because the waste stream was not a hazardous waste as determined by the TCLP, the sites were not considered to be Resource Conservation and Recovery Act (RCRA) hazardous waste sites. The sites were defined to be solid waste sites (USAF, 1991e; USAF, 1992a; USAF, 1999c).

Potential leaching of LBP and migration of lead into the groundwater is evaluated in Appendix K and summarized in Section 4.4.2.2.5. The model results in 20 years indicated that estimated lead levels at 100 feet would be on the order of 0.08 parts per billion (ppb), several orders of magnitude below a level of concern in drinking water (Federal MCL of 15 ppb; Wyoming State Groundwater Quality Standard of 50 ppb for domestic use). As there are no surface sources of lead, residual lead levels in surface soils are expected to be negligible. Cadmium levels would be lower than those predicted for lead, and also not a risk to groundwater.

As discussed in Section 4.3.2.2.2, the Air Force is determining the type and extent of sampling to evaluate possible contamination (including lead) of soils from past activities at a number of LFs and MAFs. Sampling would be conducted at the LFs and MAFs to determine if there is a need for long-term monitoring. The type of action taken during dismantlement under the Proposed Action or Alternative Actions would be influenced by the level of contamination, if any were detected. Impacts from LBP and cadmium electroplating would not be significant due to the low potential for affecting human health and groundwater quality.

4.3.2.2.6. Pesticides

Herbicides remaining in the soil from long-term use at the LFs and MAFs were evaluated to determine whether they may present a health hazard to deactivation workers or future site users. If residues remain in soil or groundwater, workers could be exposed during construction activities that disturb graveled areas and the upper soil layer, and future site users could be exposed through drinking water or residential exposure to soil.

Two herbicides have been used to suppress weed growth around the LFs and MAFs. Oust® and Krovar® have been applied once a year for the past six years. Oust®, is composed of 75% sulfometuron-methyl and is applied at a rate of 3 ounces per site per year. Krovar®, is composed of 40% Diuron and 40% Bromacil. Bromacil is considered a Group C (possible human) carcinogen by the USEPA. Krovar® is applied at a rate of 8 pounds per year.

A computer model, Groundwater Loading Effects on Agricultural Management Systems (GLEAMS), was used to evaluate the potential impact of pesticide residues at the Peacekeeper sites (see Appendix L). Herbicides were evaluated because residues may remain in the soils from long-term use. Results from the model runs show that the residues are minimal within 1 year of application and are not likely to have reached even the shallow aquifers around some of the LFs and MAFs. Thus, potential impacts to groundwater in the deployment area during and after the deactivation period from past use of pesticides would be negligible. Beneficial results to the future landowner from discontinuation of non-selective pesticide application could be realized if vegetative

growth was considered desirable to the new landowner. In addition, the environment would benefit long-term through the discontinuation of pesticide applications, except for the necessary control of noxious weeds. The potential for runoff of pesticides that have been applied at the LFs and MAFs exists only if heavy rains occur soon after application. During the 10-year analysis period, recent runoff would only be on the order of several grams of a herbicide per year. Runoff of residual pesticides would not significantly degrade the quality of surface water and is not considered to be a significant hazard. The following table presents a summary of the predicted soil and groundwater levels of the herbicides, compared to human health risk criteria.

Table 4.3.2-1
Predicted Levels of Herbicides Compared to Human Health Risk Criteria

Parameter	Sulfometuron methyl	Diuron	Bromacil
Concentration in leachate reaching groundwater (mg/L)	0	0	0
Soil residues (ppm)	0	0.5	0.1
RfD (mg/kg/day)[a]	0.025	0.002	0.1
Resident exposure: estimated daily herbicide intake (mg/kg/day)[b]	0	0.0000043	0.00000087
Resident risk: soil ingestion hazard index (concern if >1)	0	0.0022	0.0000087
Estimated dermal absorption rate[d]	ND[5]	ND	20%
Worker exposure: ingestion + dermal[f] (mg/kg/day)	0	0.00032	0.000052
Worker risk: soil exposure hazard index (concern if >1)	0	0.16	0.00052

[a] RfD = Reference dose, a level expected to have no adverse effects in humans when consumed on a daily basis over a lifetime, in mg of chemical per kilogram body weight per day. Sources: DuPont undated (sulfometuron methyl—derived from result of toxicity study), USEPA 1988 (diuron—adopted RfD), USEPA 1996a (bromacil—recommended RfD).

[b] Based on a conservative mean daily soil ingestion rate of 200 mg soil/day from outdoor activity for a child without pica. (Pica is a rare mental disorder in children characterized by compulsive eating of non-nutritive substances, such as dirt.) The adult mean soil ingestion rate is lower, at 50 mg/day. Body weight was assumed to be 23 kg for a six-year-old child. Source: USEPA 1999.

[c] TLV = Threshold limit value, an eight-hour time-weighted average occupational inhalation exposure limit. Source: ACGIH 1996

[d] Source: Bromacil—USEPA 1996b. Diuron—No quantitative dermal absorption factor available; 25 percent conservatively assumed.

[e] ND = No Data.

[f] Assumes soil ingestion rate of 57 mg/day for outdoor work; exposed surface area of 5,800 cm2, soil adherence value of 0.32 mg/cm2 (value for hands), and body weight of 71.8 kg (USEPA 1999).

Worker inhalation exposure to any herbicide residues adsorbed to soil dust particles would be a small fraction of total dust exposure, which is limited by OSHA regulations to 15 mg/m^3, resulting in herbicide exposure levels far below the occupational inhalation criteria. Therefore, no significant risks to workers or the public from herbicide inhalation are expected as a result of site decommissioning activities.

Sampling for pesticides may be done to assess contamination levels at selected sites and locations. If sampling indicates that significant levels are present, remediation activities would be evaluated for treatment or removal of contaminated soils in support of best management practices. Background soil samples may also be taken outside the area where pesticides were applied, to ensure that any detections are not part of farming activities in the vicinity. Pesticides degrade over time, and the currently used types of pesticides degrade rapidly. Based on the modeling results and past experience, it is unlikely that significant pesticide residues remain.

4.3.2.2.7. Lead-Acid Batteries

Lead-acid batteries present at the LFs and MAFs would be removed during Phase 1 and Phase 2 activities. No batteries would remain at the sites. The Air Force would transport the batteries to F.E. Warren AFB for temporary storage, and reuse or recycling. Batteries that are unable to be reused or recycled would be properly disposed of via contract. The weapon system batteries may have had a sulfuric acid and water solution added in the field. Any spills in the field would have been addressed under spill plan requirements. No significant impacts regarding handling the lead-acid batteries are projected to occur. Removing these hazardous materials from the deployment area would be a beneficial long-term impact.

4.3.2.3. Hazardous Waste

Hazardous wastes are generated at the LFs and MAFs during daily routine operations and maintenance of the missile system. Phase 1, 2, and 3 deactivation activities include the handling and movement of hazardous materials and wastes. The Air Force has formal and thorough programs addressing missile logistics that provide detailed safety requirements, training, and a mandatory reporting system for identifying and preventing safety-related problems. Missile facilities are regularly inspected to ensure compliance with rigid safety criteria. During the first two phases of the deactivation process, most hazardous materials and wastes would be removed by Air Force personnel. Hazardous materials and wastes include those described in Section 3.3.2. Some materials, such as the coatings on buried tanks and LBP, cannot be feasibly removed. Other substances (e.g., R-12 solution or batteries) would be removed when placing sites in caretaker status. Phase 3 activities would involve removal of some save list items for the Air Force by the contractor (e.g., generators). If the Air Force doesn't desire the items, the contractor must drain lube oil, fuel, and other hazardous materials to prevent the material from becoming a waste and limit the potential from contaminant migration.

F.E. Warren AFB generates less than 1,000 kg of hazardous waste in most calendar months, but more than 1,000 kg of hazardous waste during two to three months. The deactivation activities could temporarily increase the total quantity of hazardous waste generated per site as hazardous materials are removed; if the materials could not be reused, they would need to be handled as hazardous wastes. Air Force personnel are experienced in handling the same materials and wastes under current practices as they would under deactivation. Following dismantlement, the sites would become inactive, and would be considered closed.

Some additional amounts of hazardous waste (e.g., outdated products that are no longer serviceable and must be discarded) would be generated during the dismantlement process. For example, if a strip of LBP is removed by the contractor prior to torching painted metal, the sludge or dust would be a hazardous waste. The Air Force would require contractors to properly manage and remove any hazardous waste. Because the amounts of hazardous waste would not increase appreciably, and no additional types of wastes or handling procedures would be required; the impact would not be significant. A long-term beneficial impact to the environment would result from proper disposal of this waste.

As discussed in Section 4.3.2.2.4, the Air Force would perform sampling of soils and lagoons to evaluate the potential for contamination above criteria levels. The sampling program would be coordinated with the WYDEQ. Sampling results would be used to determine whether remediation of water contamination is required at any missile facility. If necessary, remediation would occur at a site prior to its dismantlement; certain activities that would not disturb the contaminated area can be performed if approved by the contracting officer.

Once sites have been placed in caretaker status, very little hazardous waste would be generated. One example would be stripping of LBP from metal to prepare it for cutting with a torch. The collected paint and contaminated soil would be managed as a hazardous waste by the contractor and taken to F.E. Warren AFB for appropriate storage and disposal.

4.3.2.4. Above Ground and Underground Storage Tanks

Storage tanks at the LFs and MAFs, as discussed in Section 3.3.4, are used to store motor gasoline (MOGAS), diesel fuel, lube oil, and water. Table 3.3.4-1 lists the status of storage tanks.

As part of the dismantlement, USTs containing diesel fuel or MOGAS at the MAFs and LFs would be removed or closed in place. If the tanks were abandoned not in accordance with State requirements, they could eventually deteriorate and contaminate soils and groundwater. The Air Force would close tanks in accordance with underground storage tank regulations, and take steps to minimize the potential for spills or leaks (e.g., by purging lines of diesel fuel before disposal) during the closure process. While removing the tanks would minimize potential long-term damage and liability, not all tanks could be removed without an extensive excavation.

Deep-buried tanks, including the 14,500-gallon diesel fuel UST at the MAFs, would be very difficult to remove. In the past, these deep-buried USTs within the deployment area have been successfully closed in place in compliance with State requirements. Therefore, any remaining deep-buried tanks regulated for fuel storage would also be closed in place following State guidelines. For the deep-buried tanks, this would involve excavating to gain access to the tank and cleaning it according to WYDEQ standards. All closures would include filling the tanks with an inert material, and determining if the soil or groundwater is contaminated. If contamination exists, the site would be remediated in accordance with State requirements before the closure would be considered complete; no significant adverse impacts to the environment are anticipated as a result.

All shallow-buried diesel tanks at the MAFs and LFs would be removed and disposed of in accordance with Federal and state regulations. Tanks would be tested for the presence of a PCB coating. If present above action levels, the tanks would be removed and disposed of in appropriate landfills to accept PCB waste (Fahrenkrug, 1999). The tanks would be sampled for asbestos and if no PCBs were detected but asbestos was present, the tanks would be disposed of in accordance with asbestos requirements. The day tanks at the LFs and MAFs would be drained and removed for potential reuse. The above ground tanks would be removed from the site, and either reused or be properly disposed. Removal of fuel tanks from the deployment area would have a long-term beneficial impact to the environment.

Each MAF has a shallow-buried tank used to store up to 1,000 gallons of water. These tanks would be abandoned in place for potential reuse. Because the tanks have been used only for water, no environmental impact from this policy would occur.

4.3.2.5 Solid Waste

Solid wastes generated at the LFs and MAFs includes garbage, recyclable materials, and construction debris (C&D). Garbage could be generated during Phases 1, 2, and 3 of deactivation; all garbage, including waste brought on site such as food containers, would be removed from each site. The removal and reuse of recyclable materials would be regulated under the contract used for the demolition of the sites. Some material (e.g., steel, wiring, etc.) may be removed as salvage items prior to the demolition. The removal and reuse of recyclable materials would have a beneficial impact on the environment.

The C&D generated from the demolition of buildings and other miscellaneous materials would not be removed from the construction site. The demolition of the LFs would result in a large waste stream that would not be removed. This waste, consisting of the imploded silo concrete, steel, and other materials, would be left in place. The waste stream would be a solid waste—the debris would not be hazardous. Sampling of prospective rubble from similar facilities (at Ellsworth AFB and Whiteman AFB) have shown that the rubble from the LFs is significantly below the TCLP maximum contaminant concentrations. Based on the sampling results, no sampling of LFs was deemed necessary by the North Dakota Department of Health for the proposed dismantlement at Grand Forks AFB.

Past samples include three core samples from LFs at Ellsworth AFB, and one core sample taken from an LF at Whiteman AFB. Leachate was extracted from the three samples using the TCLP method and analyzed for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). All analytes were below USEPA Method 6-10 detection limits, except for barium, chromium, and silver. Barium was detected at 0.5 mg/l in all three Ellsworth AFB LF samples. Chromium was detected at 0.01mg/l and 0.02 mg/l in two of the samples at Ellsworth AFB. Barium was detected at 0.23 mg/l in one sample, and silver at 0.01 mg/l in one sample at the Whiteman AFB LF (USAF, 1993a; USAF, 1993b). These values are below the maximum concentration of contaminants for the toxicity characteristic (100.0 mg/l for barium, 5.0 mg/l for chromium, and 5.0 mg/l for silver).

The rubble was therefore a nonhazardous waste, and the sites did not need to be managed as hazardous waste sites. Since all launchers have a similar design and construction materials, the rubble from the F.E. Warren AFB LFs is not likely to require management as a hazardous waste under RCRA. The sites at the Ellsworth AFB and Whiteman AFB deployment areas were considered to be a beneficial use for solid waste disposal; no permitting of each site as a landfill was required. Removal of the debris and burial at a landfill would be costly and decrease the available space.

The Proposed Action would involve placing a steel-reinforced concrete cap covered with a plastic liner over the demolished launch tube to ensure that precipitation would not permeate through the demolished LF and subsidence would not occur; this is the same technique used in previous missile system dismantlement efforts. The LF would then be covered with gravel, and recontoured to leave a slight mound where the LF was originally located. This would allow for proper site drainage. The site would be closed and no further use for any disposal would be allowed. Since the waste stream would not meet the criteria for hazardous waste, and the sites would be closed, no significant impacts to human health or safety or the environment would occur. However, the future use of the site would be limited (e.g., no excavation or wells could be sited at the location).

Each of the five Peacekeeper MAFs has a sewage lagoon (with primary and secondary cells). The lagoons would be sampled as part of the test for site contamination prior to dismantlement. While the lagoons are managed for wastewater disposal, little actual use of these systems occurs, and no use of these systems would occur during caretaker status. The lagoons are planned to be closed during the dismantlement process. Water, sludge and soil samples would be taken and evaluated. If no constituents are above criteria levels, the sludge would be incorporated into the soil, clean fill added, and the sites would be leveled and seeded. If the lagoons were to remain as open waters, they would be cleaned. The lagoon sludge would be tested for fecal coliform, metals (Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc), and nitrogen (series 1: ammonia, TKN, nitrate, and nitrite). Sludge sampling, analysis, and management must be in compliance with 40 CFR 503, USEPA and the Wyoming Environmental Quality Act requirements. Typically, a discrete sample would be collected as close as feasible to the sewage effluent discharge point at a depth several inches below the top of the sludge. Because sludge has been transferred between the lagoons, both the primary and secondary lagoons would sampled. The sludge samples would be analyzed for priority pollutant metals (PPM).

Previous investigations of similar lagoons at Ellsworth AFB MM II sites provide a comparative look at the potential extent of contamination. The results of the PPM analyses at all sites showed that only one lagoon had an elevated concentration of metals in sludge samples. Copper in one primary lagoon sludge sample was 209.2 mg/kg, which is below the RCRA corrective action level. All other metals values were within expected concentrations.

If PPM concentrations at F.E. Warren AFB are found to be above action levels, the sludge would be removed or other acceptable means of remediation would be used prior to site

closure; other requirements for the closure would be specified by the State. No significant solid waste impacts regarding the lagoon sludge are projected to occur.

4.3.2.6 Wastewater

Wastewater is generated at the MAF facilities and discharged to a sewage lagoon. Water at the lagoons would be sampled and managed according to the Clean Water Act (CWA). If the water samples exceeded limitations, the water may need to be removed by a tanker truck to an approved disposal site. The lagoons at MAFs P, Q, R, and T have been drained and replaced (new pipes and lining) within the past 5 years; contaminants above criteria levels at these MAFs would be unlikely. The wastewater would be appropriately sampled and managed; no significant impacts would occur. Previous sampling of wastewater in missile system sewage lagoons (i.e., Grand Forks) determined the water chemistry was suitable for landfarming the lagoons (pushing the berms into the lagoon depression, mixing the soils and biosolids, and grading the area). Sampling would be conducted at Peacekeeper sewage lagoons, and if acceptable, the lagoons would be landfarmed in accordance with all applicable regulations. Although the pH was above 9 at some sites at Grand Forks AFB, it was expected to naturally lower (rainfall has a naturally acidic pH) by the time that the water would be drained or removed (USAF, 1999c). If sampling results would be favorable, wastewater could be discharged to the nearest drainage (in compliance with the existing permit). In the deployment area, evaporation and transpiration exceeds precipitation so it is likely the lagoons would dry when discharge ceases. If the lagoons need to be drained, they would be drained in accordance with Wyoming requirements. Long-term impacts to the environment from no wastewater production would be beneficial.

4.3.2.7. Monomethyl Hydrazine and Nitrogen Tetroxide

Stage IV of the Peacekeeper missile includes a rocket fuel (monomethyl hydrazine (MMH)) and nitrogen tetroxide and a strong oxidizer (nitrogen tetroxide). These chemicals are very incompatible with each other, and upon contact will create a hypergolic reaction. This reaction can occur without an ignition source. Therefore, these substances must be handled under very stringent conditions. Both substances are stored separate from each other (with some sort of physical barrier between them) and in compatible containers. These materials are transported using transport trailers, which are sealed to prevent leaks. The propulsion system rocket engine (PSRE)/Stage IV containers are packed within shock-proof containers that are secured within the trailer. These chemicals arrive on base in PSRE/Stage IV containers, which are never opened while on base or at the LFs, and are predominantly stored within missile components. Because there is no direct contact with the extremely hazardous substances within the containers and these containers are visually inspected each day for leaks, the threat of a release during missile handling operations on base or at the LFs is minimal. The containers are usually only stored on base long enough for missile maintenance to be completed, and then transported directly to the LFs for installation.

Shipments in stages from Hill AFB are in end rings placed within carriage and adapters. When received at the missile stage processing facility (MSPF), the end and shipping rings are removed. The process is reversed when shipping the stages back to Hill AFB. If there

would be special work done with drainage or leakage of propulsion from a stage IV rocket motor, a specially trained spill response team from Hill AFB, Utah would come to F.E. Warren AFB. Consequently, the handling of the systems for 50 Peacekeeper missiles during Phase 1 of the deactivation would not result in a significant impact. A long-term beneficial impact would occur from removing these hazardous materials from the deployment area.

4.3.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the LF Headworks. The mechanical demolition of the LFs would greatly expand the effort of the dismantlement and would require considerable additional construction activities and equipment. The use of mechanical means for demolishing the headworks would likely release less lead into the air than explosive demolition, but would have a higher risk for accidents (of all types) than explosive demolition. The accessibility of a crane to the headworks would be difficult because of the need to maintain an excavated slope to allow the rubble to be pushed into the launch tube. The labor hours and consequently the number of accidents (assuming a constant accident rate) involved in mechanical demolition would also be substantially more than for explosive demolition. There would be an increased potential for spills of hazardous materials (especially fuels) as equipment would require additional fueling. While these changes would be adverse, they would not be significant, since accidents during construction are always a risk that must be managed, and because any fuel spills would not likely be of large quantities.

Removal of the Hardened Intersite Cable System. The removal of the HICS would require considerable construction activities and equipment (such as trenching equipment and compactors), that would greatly expand the effort of the dismantlement. The additional labor hours needed would therefore increase the potential for accidents. There would also be an increased potential for spills of hazardous materials (especially fuels) as equipment would be used, and require fueling, throughout the deployment area. The equipment would be operated in the field, refueled in the field, and would operate in areas more sensitive to fuel spills than service stations or paved areas. While the increased potential for accidents would be adverse, it would not be significant, since accidents during construction are always a risk that must be managed. Fuel spills would not likely be of large quantities, but spills could have significant impacts that would be difficult to mitigate. Spill equipment is not as likely to be readily available or useful in the field (as compared to paved or graveled sites, or level areas). Areas in which a spill could occur could include streams, making the cleanup of the spill more problematic.

4.3.4. Potential Impacts of the No Action Alternative

If maintenance of the Peacekeeper missile system were continued, hazardous substances would continue to be used and handled at the LFs and MAFs. Batteries and diesel fuels used for backup diesel electric units would continue to be handled, tanks would be filled and fuels used, and small quantities of hazardous and solid wastes would be generated during maintenance activities. The same levels of materials usage and waste generation

would likely continue. Paint would be likely to deteriorate over time, and maintenance would not likely include painting of the LFs; this condition would require a more extensive cleanup effort in the future that would pose additional worker health risks. These impacts would be adverse, but not significant.

4.3.5. Mitigation Measures

Proposed Action: Because of the low likelihood of accidents affecting human health and safety, no additional mitigation measures are proposed beyond the already stringent safety precautions used by Air Force.

The regulatory framework in this arena provides the guidelines and practices to minimize adverse impacts from hazardous waste generation, disposal, and management. If proper procedures are followed during the removal process, adverse impacts to the environment would be negligible and the overall effect would be positive. All procedures would be in compliance with the appropriate regulations to ensure that potential impacts are minimized.

Mitigation measures for the Air Force for response to contamination caused or discovered during the deactivation and dismantlement process include the following and will be performed:

- Perform sampling of soils at the LF and MAF sump outfall points, sewage lagoons (water samples at lagoons will also be taken), and potentially other locations, to identify hazardous constituents at the most probable point of contamination. Develop a sampling plan of action and work with the State of Wyoming to determine the type and extent of sampling for characterizing potential contamination sources prior to dismantlement activities.
- Sample wastewater and sludge at the MAF lagoons to determine constituent levels for performing proper closure of the wastewater treatment facilities by landfarming of biosolids.

Mechanical Demolition Alternative: Potential adverse impacts under this alternative would be similar to those under the Proposed Action, so the same mitigation measures would apply.

HICS Removal Alternative: Although the risks of a spill would increase somewhat under this Alternative, no significant impacts were identified. The mitigations identified under the Proposed Action would also apply to this alternative.

4.4. NATURAL ENVIRONMENT

This section assesses the potential impacts to geological resources; water resources; air resources; noise; biological resources; and cultural (archaeological and paleontological) resources.

4.4.1. GEOLOGICAL RESOURCES

The Proposed Action would affect geological resources. Explosive demolition would cause ground acceleration, but damage to nearby structures would be unlikely given the specified limits on peak particle velocity (PPV). Based on their distance from the LFs, no

impacts would occur to oil and gas wells. Impacts to topography, mineral resources, geologic hazards, and soils would not be significant. Geological resources would not be adversely affected under the No Action Alternative. The Implementation Alternative of mechanical demolition would cause slightly greater impacts to soils than under the Proposed Action, but these impacts would still not be significant. If the HICS were removed, significant soil erosion could occur.

4.4.1.1. Analysis Methods

The geological resources within the deployment area were studied to determine the potential impacts from the Proposed action and alternatives. Documents and maps containing information from previous studies on the geology, soil surveys, and geologic hazards were examined. The documents that were reviewed included Federal and State reports, geotechnical papers from the United States Geological Survey (USGS) and the State of Wyoming, and USDA Soil Conservation Surveys. The review focused on the regional geology, local and regional soils, and geologic hazards. The activities and procedures of the system deactivation were then considered against this background of existing characteristics of the resource.

Significance Criteria. A geological resource is defined as a limited nonrenewable resource susceptible to degradation by physical disruptions. The impact of an action on geological resources is significant if it depletes the regional or local resource, activates a fault, causes many slumping events or an event with irreparable damage or injuries, accelerates the rate of erosion, or degrades the soil characteristics and causes a loss of productivity. No significant impacts would occur if the resource is only slightly affected or not specifically important to the region. No impact would occur if the resource elements were not affected by an action. Reduction of a hazard potential would be a beneficial impact.

4.4.1.2. Potential Impacts of the Proposed Action

4.4.1.2.1. Physiography and Topography

During Phases 1 and 2 of the deactivation, Air Force vehicles would travel throughout the deployment area to remove missiles and various components from missile system facilities. Sites would be placed in caretaker status, resulting in traffic on graveled roads, addressed as part of transportation impacts in Section 4.2.3, and on the graveled area at the LFs. No impacts to physiography and topography would occur during these phases of the Proposed Action.

The dismantlement activities would not cause significant long-term effects on the deployment area's physiography and topography. Short-term impacts would not be significant during excavation activities and stockpiling soils. Minor on-site soil erosion could occur during dismantlement, but would be addressed in part by the use of best management practices to minimize erosion (e.g., sediment traps and other devices) and eventual grading and compacting of fill at an LF after the observation and verification period is complete. Some erosion and minor slumping could occur at borrow sites where fill material for LFs and MAFs would be obtained, but any required fill would be obtained from established borrow sites where best management practices are used.

4.4.1.2.2. Geology

Air Force vehicle traffic would negligibly disturb gravel roads and the graveled area at the LFs. Dismantlement activities, especially explosive demolition of the LF headworks, could affect geological resources within the deployment area. About 700 to 900 pounds of explosives were used for similar demolitions at Ellsworth, Whiteman, and Grand Forks AFBs (a maximum charge of 139 pounds per delay was used). Several blasts at 25 millisecond delays were generated to produce an implosion (most of the debris is directed inward toward the center of the LF) and is the likely method that would be used at F.E. Warren AFB. Ground vibrations induced by the blasts averaged around 0.15 inches per second or less at frequencies less than 40 hertz (Hz) and around 0.2 inches per second at frequencies of 40 Hz, as measured from a distance of 500 feet (Mortenson, 1997). These vibrations were well within the contract-specified limitations of 0.75 inch per second at frequencies less than 40 Hz or 2.0 inches per second at frequencies of 40 Hz or greater, designed to prevent damage to nearby structures. This peak particle acceleration is roughly equivalent to an earthquake of II on the Modified Mercalli Scale or less than 2 on the Richter Scale (Judson, 1987).

The shock waves could produce additional fractures in weathered or fresh rock in the immediate vicinity (typically several hundred feet) of the launchers. Additional demolition-produced fractures in the fresh rock could alter the water table and normal groundwater and surface-water flow by allowing more channels for flow transportation (see Section 4.4.2). As noted in Section 3.4.1.2, the near-surface geology of the deployment area is largely unconsolidated sand and silt overlying siltstone, sandstone, and shale. Most of the shale is moderately soft to moderately hard. In the original geologic core samples of the eventual Peacekeeper sites (USAF, 1963), fracturing of shale was noted only at LF S-9. Excavations for constructing the original MM silos in the 1960s disturbed an area of up to 100 feet from the LFs to a depth of about 90 feet. Fill material for these excavations consists of unconsolidated soil, sand, and rock fragments. Although fracturing could occur as the result of explosive demolition, it would be limited to areas of undisturbed hard and brittle rock, and would not be widespread or significant. During the dismantlement process, the area near the launch tube would be excavated to a depth of about 20 feet. Due to the angle of excavation required, the majority of the material affected by the implosion would be excavated and then refilled. Impacts to sediments and rock layers would not be significant. Impacts to reservoirs in the vicinity of LFs is discussed in Section 4.4.2.

Based on the amount of explosives used for previous explosive demolitions and the limits of ground acceleration observed, no significant impacts to the subsurface geology would occur from the Proposed Action. A mitigation measure to limit impacts to subsurface structures is discussed in Section 4.4.1.5. No significant long-term impacts would result from the Proposed Action.

Excavation to clean deep-buried tanks would be required (see Section 4.3.2.4). The subsurface geology at MAFs would be temporarily disturbed to a depth of 35 to 45 feet. Shoring would be required to prevent caving in of the excavation. The material would need to be properly compacted when the excavations are refilled to prevent subsidence.

These areas were previously disturbed when the tanks were installed, and impacts to geology would not be significant. Impacts to soils are discussed in Section 4.4.1.2.5.

4.4.1.2.3. Mineral Resources

Oil and natural gas wells and sand and gravel quarries are the only mineral production sites located within the deployment area. The closest active oil and natural gas wells are located one mile or more from LFs and ground vibration caused by explosive demolition would be well below damaging levels at this distance. Permanently abandoned wells (see Section 3.4.1.3) are 1,400 feet or more from LFs and ground vibration caused by explosive demolition would be well below damaging levels at this distance. With a maximum charge of 139 pounds per delay (as per previous Minuteman Missile System dismantlements), the maximum distance that a ground vibration of 2 inches per second would extend would be about 600 feet based on the scaled distance formula for explosive safety. This does not account for differences in soil and geology, and has been measured at much lower levels in past Minuteman missile system dismantlements at Ellsworth AFB, Whiteman AFB, and Grand Forks AFB. Ground vibration from explosive demolition would not impact existing quarries because the quarries are generally located at least one or two miles away from LFs, and the vibrations would occur through unconsolidated materials. Any ground acceleration observed at quarries from explosive demolition would be well below values that would cause damage such as slumping.

Fill for the excavations would likely be taken from borrow areas within the deployment area. Limestone and cement rock are available within the deployment area and ready-mixed concrete could be purchased by the contractor for use on sites. Only small amounts of concrete would be used, which would not create a significant requirement for these materials from any one location. Therefore, geologic resource requirements and impacts to mineral resources would not be significant.

4.4.1.2.4. Geologic Hazards

As discussed in Section 3.4.1.4, eastern Wyoming is in an area of low to moderate seismicity, with generally slight damage anticipated if an earthquake occurred. Eleven LFs are within three miles of active faults, with LF T-2 about 0.6 miles from the Whalen Fault System. Activation of faults within the deployment area would be unlikely because of the low seismicity of the area and the relatively low peak particle acceleration anticipated to occur as a result of explosive demolition.

The equivalence of earthquakes and peak ground acceleration have been well documented. Ground vibrations induced by the blasts for explosive demolition at Ellsworth and Whiteman AFB averaged 0.15 inches per second or less at frequencies less than 40 Hz and around 0.2 inches per second at frequencies of 40 Hz (Mortenson, 1997). This peak particle acceleration is roughly equivalent to an earthquake of II on the Modified Mercalli Scale or less than 4 on the Richter Scale (see Section 3.4.1.4). The resulting shock wave could be felt by some people in the vicinity of the LF, but would not be perceptible to most people in the area (USACE, 1989).

Earthquakes caused by human activities are not unusual and have also occurred from stress loading of the earth's crust by the construction of large reservoirs, disposal of liquid wastes into deep wells, (which raises the fluid pressure in a rock and facilitates movement along fractures), and underground detonation of nuclear devices. The detonation of explosives during demolition of the LFs would be similar to mild, barely noticeable earthquakes in some respects, although technically the physics of the events are quite different. The most damaging components of an earthquake are shear waves of ground motion, which are absent in an explosion. The waves of compression and dilation (primary waves) produced by an explosion can, however, cause structural damage, especially when the primary waves propagate through rock or soil at low frequency. The shale and sandstone common in the deployment area do propagate P waves at low frequency. The depth to bedrock ranges from 2 feet at LF S-8 to 130 feet at T-10; the bedrock at most sites is between 15 and 20 feet. However, many other factors also determine the potential for structural damage, including the soil temperature and moisture content and, of course, the type and proximity of the structure. One major factor affecting damage potential is one over which the Air Force has some control: the precise timing of detonation of the several explosive charges used in demolishing each LF headworks. Detonation of the explosive charges in microsecond intervals reduces the amplitude of ground vibrations (Kopp and Siskind, 1986; USACE, 1989). The method of using delays was implemented during the demolition of LFs at Ellsworth, Whiteman, and Grand Forks AFBs. Impacts to existing seismic conditions would not be significant.

Elevations within the deployment area vary by over 2,300 feet. Local relief at the LF sites ranges from 6.5 to 72 feet. About half of the soils are classified as having fair to poor stability (see Appendix I). About ten sites have a layer of shale at a depth ranging from 8 to 15 feet below the surface. Slumping could occur after explosive demolition at sites with poor to fair soil stability or shale at a shallow depth. The risk of slumping is reduced with the use of millisecond delays for the implosions. Any slumping which could occur would be local and minor in nature.

Another effect of blasting is the air blast produced by the explosive detonation. The potential impacts of the sound waves from explosive demolition of the LF are discussed in Section 4.4.4.

4.4.1.2.5. Soils

LF and MAF dismantlement has the potential for disturbing soils during activities such as demolition of the headworks, excavation of shallow USTs and other support equipment, and grading and filling operations. Disturbances of soil can lead to increased rates of erosion, compaction of hydric soils, and changes in permeability, runoff, and other soil characteristics.

Soil conditions may limit the times that dismantlement activities can proceed. Soils are generally frozen from November until April in the deployment area. A seasonally high water table (of three to six feet during May) only occurs at LF Q-10; this could produce saturated conditions and may limit dismantlement activities at this site during the Spring. The potential for minor slumping of certain water-logged soils exists in portions of the

deployment area (see Section 4.4.1.2.4). The contractor may need to take precautions to avoid potential slumps, especially after heavy rains or if the soil is saturated. Allowing the soil to dry sufficiently before allowing work to be conducted in it, and utilizing standard construction procedures such as shoring, would minimize slumping problems. Using best management practices, and considering the minimal relief in the deployment area, soil slumping impacts would be adverse, but not significant.

Wind erosion is a problem in most areas. LF and MAF dismantlement could lead to increased soil erosion, which in turn could lower soil productivity and adversely affect crops, grazing lands, and streams. Soils at the LFs and MAFs are slightly to moderately prone to water erosion at about two-thirds of the sites, and severe at the remaining sites. Any erosion that occurred during dismantling activities would be limited to onsite locations and would not be significant. In the event of heavy rains, or high winds, best management practices should be used to minimize erosion. The use of sediment control structures (e.g., silt fences) can be used to minimize water-borne erosion.

After the support equipment has been excavated, and the headworks demolished, up to 1,770 cubic yards (yd^3) of fill material could be needed for each LF (88,500 yd^3 total for all 150 LFs). About 30 yd^3 of gravel from the pad would be available as fill at each site (4,500 yd^3 total for all LFs), somewhat reducing the requirement for borrowed fill material.

Excavation to clean deep-buried tanks would be required (see Section 4.3.2.4). The soils and subsurface geology at MAFs would be temporarily disturbed to a depth of 35 to 45 feet. Shoring would be required to prevent caving in of the excavation. Soil and underlying sediments and rock removed from the excavation could be stored onsite (Frank, 2000). Erosion control measures, such as silt fences and watering soil stockpiles in dry conditions, would be required to prevent potentially significant erosion (see Section 4.4.1.5). The material would need to be properly compacted when the excavations are refilled to prevent subsidence. These areas were previously disturbed when the tanks were installed, and impacts to soils would not be significant with mitigation.

Each MAF would need about 180 yd^3 for filling in the elevator shaft and vestibule of the LCC (900 yd^3 total for all five MAFs). If sewage lagoons are filled, about 1,500 yd^3 of additional fill material would be required for each MAF (7,500 yd^3 for all MAFs).

If the full amount of fill would be required at every LF and MAF, about 92,400 yd^3 would be needed for all the sites in the deployment area (assuming that berms at the lagoons would be leveled out and this material is pushed into the lagoons, and then additional fill is used to level the remaining hole with the surrounding topography). The tendency for piping (underground tunnels develop in some soils, resulting in soil erosion), low load-bearing strength of some soils (particularly the subsoil), and the poor to fair stability of many soils in the area (see Appendix I) could limit their usefulness as fill dirt without modification (such as compaction or mixing with sand). Use of soils with excessive clay content for fill could cause subsidence and uneven compaction of completed sites; engineering tests of onsite soils should be performed before filling and final grading takes place.

Many sites would require little or no borrowed fill, but some sites could require substantial amounts of fill. Materials from established borrow areas would be available in the deployment area. The volume of required fill could exceed the above estimates if soil at the LFs or MAFs was contaminated by spills or leaks and had to be removed for proper treatment and/or disposal. Unless suitable fill is used, subsidence could occur, and result in significant adverse impacts affecting site drainage and integrity. Soil used for fill material must be of acceptable quality, with engineering characteristics of minimal shrink and swell potential and adequate compaction capability, so that the compaction of the soil would minimize the potential for future subsidence.

Hydric soils and wetlands are not located in close proximity to LFs or MAFs. The closest wetland, about 750 feet from LF S-9, is located a sufficient distance from the LF to preclude any significant impacts from occurring.

The MAF sites would be covered with topsoil and revegetated. Topsoils at sites in the deployment area, which are generally of fair quality, range from 3 to 14 inches in depth. Most of these soils have a slight to moderate potential for water erosion and a moderate to very severe wind erosion potential, and precautions need to be taken to prevent erosion from disturbance of sites. At LFs the sites would be mounded with gravel consistent with surrounding site gravels. Onsite soils may be used to cover the site, depending upon the amount and quality of the soils found at the specific LF. Soils may need to be brought to some LFs from other locations.

The contractor would be required to reestablish drainage at the site. If the drainage was not reestablished, water could collect above the former launchers, exacerbating the potential for herbicides or hazardous materials to leach from the soil. Section 4.4.2 describes potential impacts on water resources from soils treated with pesticides. Because all soil within the LF boundary is already treated, disturbing it is unlikely to cause any new impacts.

Excavations of offsite soil to provide fill and cover would also expose soil to wind and water erosion at the borrow areas, potentially increasing sedimentation of streams in the region. However, the Air Force plans to have the contractor use established borrow pits; no additional areas would be exposed to potential erosion. Best management practices should be used at these borrow sites to minimize soil erosion.

It is unlikely that LF and MAF sites would be returned to productive agricultural land because of soil compaction, the gravel at the sites (ranging from nearly 30 feet deep near the LF to about 1 foot deep at the rest of the site), and restrictions placed on the future use of the sites. The Proposed Action would not impact prime farmlands.

4.4.1.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. Mechanical demolition could be used to destroy the headworks. However, this method has a number of practical difficulties. It may not be possible to store the amount of soil and gravel excavated on site when mechanically demolishing the headworks. A minimum depth of eight meters is required by the START protocols, and construction requirements limit the slope of the excavation to 45 degrees or less, which would result in a great quantity of material being generated from the

excavation. Landowner approval to temporarily store the material off site may be needed. Erosion from this material may affect the drainage ditches surrounding the sites. Although adverse impacts would result, the impacts would not be significant if best management practices such as sediment barriers are used.

Removal of the Hardened Intersite Cable System. The HICS could be removed rather than left in place. The cable is buried three to six feet below ground. The Air Force has a perpetual easement of 16.5 feet in width along the length of the HICS. A trench of about two feet in width and slightly greater than the depth of the cable would need to be dug to retrieve the cable. The removal operations would take a great deal of time and would disturb areas that have not been disturbed for more than 30 years. These operations would take place in areas in between the LFs and MAFs throughout the deployment area. Many of these areas contain highly erodible soils, which would be significantly impacted by the trenching and removal of the HICS. Soils prone to piping (underground cavities resulting from erosion) could cause erosion to spread beyond the excavated trenches into areas used for agriculture and wildlife habitat. Increased siltation of streams would result in areas where the cable is removed within or in close proximity to streams, or where erosion has spread from removal of the cable. Areas where vegetation has been removed during trenching would be prone to severe wind erosion. Fill material would be needed for many areas where the HICS is routed to fill in the void from removing the cable or to replace or modify soil which is not suitable for fill (due to high vulnerability to piping or subsidence). Impacts from erosion and borrowing fill would be significant.

4.4.1.4. Potential Impacts of the No Action Alternative

Continued maintenance of the Peacekeeper missile system would not produce any new impacts to the topography, or geologic, soil, or mineral resources within the deployment area, nor create new or affect existing geologic hazards.

4.4.1.5. Mitigation Measures

Proposed Action: Impacts to geological resources would not be significant if the following mitigation measures are implemented:

- Survey subsurface structures within 2,000 feet of an LF prior to commencing dismantlement activities. The condition of a structure, if known, would be noted. A post-blast survey should be done to determine whether explosive demolition affected the structure.
- Use erosion control measures, such as silt fences and watering soil stockpiles in dry conditions, to prevent potentially significant erosion during excavation to clean-up deep-buried tanks.

Mechanical Demolition Alternative: The second mitigation under the Proposed Action would be applicable for this alternative.

HICS Removal Alternative: The following mitigation would lessen the significant impact to soils from removing the HICS:

- Trenches excavated for removal of the HICS must be refilled and compacted as soon as possible to avoid potentially significant erosion from occurring. Vegetation must

be reestablished as soon as possible to avoid severe wind erosion. Soils that are unsuitable for compaction would need to be modified or replaced with borrowed fill material.

4.4.2. WATER RESOURCES

Water resources are surface and subsurface resources that are finite but renewable. Impacts to water resources could occur due to demolition of the LFs. Physical disturbances or material releases into surface water or groundwater can degrade the quality and quantity of water in the area. Under the Proposed Action, short- or long-term impacts to the recharge system due to the dismantlement would not be significant. Wells would not likely be significantly impacted from the explosive demolition event. Groundwater quality near deactivated LFs is not projected to be significantly affected by dismantlement. In groundwater adjacent to the LFs, localized nitrate levels are projected to increase temporarily, but there would be no significant impacts to aquifers. Impacts to surface water during dismantlement and demolition would not be significant with the use of best management practices to limit sedimentation impacts, as required in stormwater management plans and erosion control specifications. The appreciable distance between the missile facilities (4 to 7 miles) minimizes the unlikely possibility that water resource impacts at two or more sites would result in a cumulative impact on a well, aquifer, or surface water body. No floodplain impacts would occur because no sites are in floodplains. Water demand in the deployment area would be less than historic levels given the lack of need for MAFs, loss of missile system personnel, and lack of maintenance activity water requirements.

The type and magnitude of water resource impacts caused by the Alternative Actions would be essentially identical as those caused by the Proposed Action. The No Action Alternative would involve the continuance of existing impacts, such as site runoff and need for water associated with caretaker activities; no new water resource impacts would occur. The Implementation Alternative of mechanical demolition is unlikely to noticeably modify the local hydrology because of the common presence of unconsolidated upper Tertiary aquifers throughout the deployment area. Alluvium below the aquifer would not be adversely affected by mechanical demolition. The HICS excavation Implementation Alternative could cause significant impacts in areas where it lies beneath surface water and wetlands, and passes through floodplains.

4.4.2.1 Analysis Methods

The analysis involved evaluating the activities necessary to dismantle the missiles in the deployment area. Activities that could involve potential movement of contaminants to surface water or groundwater were assessed. The extent of land area on and around the base and in the missile deployment area that could be potentially affected was defined and the water resources in the area were examined.

Documents from previous studies of groundwater, surface water, and water quality were reviewed to gather relevant information. These documents included federal and state reports, geotechnical material, and NEPA documents. Civil Engineering, Environmental

Management, and other base personnel were interviewed as well as personnel from HQ AFSPC. Other persons with state, federal, and local government were contacted concerning water resources. The review centered on the proximity of the missile sites to surface waters, in addition to the hydrogeology, water availability and supply system, and water quality of the local and regional area.

Pesticides and heavy metals are two potential water contaminants of concern that were recognized as requiring a detailed analysis. Pesticides have been used to control vegetation of the sites since their construction, and may have leached into the groundwater. Data were gathered on the type of pesticide, proportion and type of active ingredient, and amount applied. The interiors of each launcher, LCC, and LCEB have been painted with industrial paint that may contain 15 to 20 percent lead by weight. Other heavy metals such as chromium and mercury may also be in the paint. In addition, small areas of the LFs were electroplated with cadmium. Groundwater has seeped into some LFs on occasion and has been removed through sump pumps, water drains, and mop-up operations. Dewatering wells were installed at MAF S-1 and at LFs S-3, S-11, and Q-9 to address excessive water influx. Because groundwater has seeped into the LFs in the past, and any alternative that would involve disabling the cathodic protection well could enhance the possibility of seepage through corrosion of the concrete and steel, there is a possibility that the groundwater could come in contact with the lead-based paint, leach the heavy metals, and migrate to private or public water supplies.

Two computer models were used to evaluate potential water resource impacts. The Groundwater Loading Effects on Agricultural Management Systems (GLEAMS) was used to assess the likelihood of pesticide residue accumulating, leaching, and running off from a conceptual LF site; and the Method of Characteristics (MOC) model was used to assess the potential for lead and PCB to leach from the LF and degrade groundwater. The models are described in Appendix K (GLEAMS) and Appendix L (MOC). The appendices provide the modeling assumptions and results; conclusions of the modeling are summarized in Section 4.4.2.2.5.

Significance Criteria. An impact to water resources in the deployment area would be considered potentially significant if an aquifer, groundwater well, or surface water body is damaged, resulting in a measurable change in a user's water supply, or if the quality of water is affected so that it exceeds Federal or state maximum contaminant levels (MCL). A significant impact would involve future water demand exceeding supply or distribution capability. An impact would not be significant if the change in the water quality did not exceed an MCL or the change in water quantity attributable to the action was unmeasurable. No impact would occur if a resource element was not affected by an action. Increased recharge, improved water quality, or decreased demand would be considered beneficial impacts.

4.4.2.2 Potential Impacts of the Proposed Action

4.4.2.2.1 Groundwater

The local groundwater quantity and quality could be affected if aquifers were damaged by deactivation and demolition activities. The deactivation process would involve the

removal of missiles and other components from the MAFs and LFs. Water use would decline from previous levels because after a MAF is deactivated—no personnel occupy the site. The deactivation process would involve vehicle movements to and from the deployment area, maintenance activities on site, and fewer personnel authorizations over time. The site activities are similar to those that have occurred in the past. Sites that are placed into caretaker status have their sump pumps operating to prevent water buildup caused by groundwater seepage. Cathodic protection wells are also being maintained to limit the potential for corrosion of buried metal (UST, LCC, etc.), with subsequent leakage of a hazardous material into groundwater, or into a structure. The usage of water needed for missile system maintenance activities, as well as the need for water to support personnel located on F.E. Warren AFB, would decrease as deactivation commences. The decrease in water demand constitutes a beneficial impact.

Excavating fill and removing pieces of the LF should minimally affect aquifer recharge because the aquifer system is recharged as direct infiltration of precipitation and as seepage through the beds of streams or from irrigated land. Deep aquifers would not likely be disrupted by explosive demolition of the headworks.

The potential adverse effects to shallow aquifers include changes in water quantity and quality resulting from one or more possible mechanisms. The shock from the explosions could disrupt the top aquifer, disrupt the low permeability material below the aquifer, or disrupt the perched water table. Disruption of the lower unit or the perched water table could allow water in the aquifer to drain or percolate at higher velocities through underlying units and thereby lower the level of the water table. This same mechanism could also connect aquifers of different yields and water qualities, leading to changes in supply and water quality for nearby users of either aquifer. Shock waves from an explosion could also cause a local change in the aquifer's gradient, changing the direction of flow and possibly affecting water quantities and quality for local users.

Studies done on the blasting effects on shallow, low-yield wells drawing from fractured rock in Appalachia indicate that a level of 2.0 inches per second peak velocity, the maximum allowable under the proposed blasting specifications for that program as well as for the Proposed Action, was not high enough to damage the wells. Results of the blasting did include lateral stress relief, which increased the fracture width and the storage space in the aquifer, which, in turn, lowered the static water levels in local wells (U.S. Bureau of Mines, 1980). Static water levels recovered where recharge to groundwater was sufficient.

Demolition of rock for mining operations is designed to generate force *outwards*, whereas the demolition (actually an implosion) of an LF is designed to generate the maximum amount of force *inwards*; the implosion process is facilitated typically by using millisecond delays in the explosive charges, starting in an outer layer and proceeding inward. Although some shallow fracturing of a formation could occur from explosive demolition of the launcher headworks, it is unlikely that waters from the different aquifers would mix to any extent greater than normal. Because unconsolidated materials dominate the surficial layers within the deployment area, they would not be subject to fracturing. However, some minor settling could occur, causing a likely decrease in hydraulic conductivity of the layers.

These impacts, considering the requirement to have peak particle velocities below 2.0 inches per second, would likely not be significant.

Groundwater in the deep aquifers (High Plains Aquifer System and Lower Tertiary aquifers) would be negligibly affected by the explosive demolition event. The depth of the aquifers and the confining units between the aquifers would isolate them from the effects of demolition. The shallow, unconfined surficial aquifers would not be significantly affected by the dismantlement activities.

Groundwater wells located in Laramie County range in depth from 26 to 713 feet for domestic use, 48 to 637 feet for irrigation use, 85 to 765 feet for industrial use, 10 to 430 feet for stock use, and 12 to 493 feet for public use (USGS, 1967). Groundwater wells located in Goshen County range in depth from 11.3 to 1,080 feet for domestic use, 10 to 210 feet for irrigation use, 38 to 87 feet for industrial use, 14.5 to 1,080 feet for stock use, 60 to 470 feet for public use and 11.3 to 188 feet for observation (USGS, 1957). Groundwater wells located in Platte County range in depth from 6.8 to 1,296 feet for domestic use, 8 to 1,296 for irrigation use, 61 to 453 feet for industrial use, 8.6 to 3,800 feet for stock use, 12 to 793 feet for public use and 8.5 to 150 feet for observation (USGS, 1960). Also, pipelines carrying water from public water systems occur within the deployment area. The deployment area is rural and sparsely populated. Unless waivered, no structures are allowed within 1,200 feet of the LF. Given a sufficient PPV, ground movement could affect subsurface structures. However, the blasting criteria are designed to minimize the potential for disruptive impacts. The common use of millisecond delays in implosions to focus energy inward would minimize the potential for exceeding the blasting criteria. For the dismantlement efforts at Ellsworth AFB and Whiteman AFB, the actual PPVs measured (all demolition events were monitored) were less than the 500-foot criteria of 0.75 inch per second at frequencies less than 40 Hz and 2.0 inches per second at frequencies of 40 Hz or more. Typical values were 0.15 in/sec at frequencies less than 40 Hz (measured at 500 feet), approximately 5 times less than the low frequency criteria, and 0.2 in/sec at frequencies equal to or greater than 40 Hz (measured at 125 feet), which is closer than the required distance (Mortenson, 1997). All groundwater wells (including those at MAFs) are located at a sufficient distance from LFs to preclude any potential damage to the wells. Consequently, it is unlikely that subsurface structures, such as abandoned or active groundwater wells, would be affected by the demolition event. Mitigations for decreasing the potential of adverse impacts are provided in Section 4.4.2.7. A mitigation to conduct a pre- and post-blast survey of subsurface structures is discussed in Section 4.4.1.5.

The dismantlement effort for the Ellsworth AFB deployment area did not result in any documented impacts to wells. A rural water district expressed concern over reported breaks in an 8-inch polyvinyl chloride water line near an LF. Fourteen breaks, within one-third mile either side of the LF, occurred over an 8-month period beginning 8 months after demolition of N-7 (USAF, 1999c). Water district cement-asbestos water lines within 100 feet of LFs were not affected by the demolitions. Monitoring data from the site show the PPV well below (approximately an order of magnitude) blasting criteria. Based on the blasting results, it is unlikely that the demolition caused the impacts.

Groundwater wells at the MAFs would no longer be used. All wells would be closed in accordance with Wyoming requirements, or left in place based on landowner requests. Obstructing materials (e.g., any floating debris) would be removed from the wells, disinfection of the wells would occur, and the wells would be filled with plugging materials and capped. Cathodic protection wells at the MAFs and LFs would also be filled and capped to eliminate a conduit for future subsurface contamination. Dewatering wells would be closed in accordance with all applicable regulations.

Excavation of fill for use at LFs and MAFs could affect aquifer recharge or discharge. However, the amount of fill required, if taken from several areas, would negligibly affect discharge or recharge rates. Excavation of fill would probably occur at commercial borrow pits designed not to intercept the water table—if the pits fill with water, then the economic viability of the borrow area would be threatened.

Explosive demolition of the headworks would increase the potential for groundwater incursion into the launch tube. If lead-based paint is not removed, heavy metals could gradually leach from the LCC or launch tube into the groundwater. This water quality issue is addressed in Section 4.4.2.2.5.

During the dismantlement process, the headworks of the LF would be destroyed and the launch tube filled with the demolition rubble, capped, and then preliminarily graded for a 90-day observation period. If sufficient water enters the observation cone during the observation period, the contractor would have to dewater the cone to perform the final backfill and grading of the site. For past dewatering projects involving individual missile system facilities, a separate discharge permit was required for each dewatering site. Based on the same construction plan for all LFs and the 4 to 7 miles distance between the closest sites, only one dewatering permit may be necessary for the consolidated dismantlement activities. The water would need to be tested to determine whether it would need to be treated prior to release, hauled away for disposal, or pumped onto the surface for drainage into waters of the state. This would be done in accordance with the Source Water and Assessment Program.

4.4.2.2.2 Surface Water

The surface water hydrology within the deployment area is unlikely to be altered by the destruction and removal activities. Explosive demolition of the launchers would cause dust to settle in nearby surface water bodies and would increase the erosion potential of the soils at the LFs. Airborne dust and runoff would temporarily increase turbidity of nearby surface water bodies. The short-term impacts would not be significant with the use of standard best management practices to minimize runoff. During the last stage of dismantlement at a site, vegetation would be reestablished along drainage pathways at the perimeter of the fence. The former LF site would have fill added after demolition, be capped, and have gravel graded on top of the site to minimize the potential for subsidence and ponding of surface water on site. No long-term surface water impacts are projected to occur. Performing intermittent light watering of roads and sites is a best management practice to decrease the amount of airborne dust that increases siltation of water bodies.

The deployment area has some small surface water bodies (ponds, lakes, reservoirs). There is one dam present located within a quarter mile from an LF (Site S-3). Based on past dismantlement experience with the Minuteman missile system at Ellsworth AFB, it is unlikely that explosive demolition would cause dams, or any earthen impoundments, to leak. Within the Ellsworth AFB MM II deployment area, there are approximately 200 impoundments for irrigation and stock watering located near the LFs, as well as some water supply reservoirs. There have been no damage claims for numerous stock watering ponds located several hundred feet from LFs that have been explosively demolished (USAF, 1999c). The specifications for blasting are designed to keep ground acceleration below damaging levels. In the extremely unlikely event of a dam rupture, the water supply would be adversely impacted in the short term, and catastrophic effects could occur downgrade of the dam.

Stormwater discharge permits can be required for projects that would disturb more than five acres of land. The LFs and MAFs are less than five acres in size, are not contiguous, nor are they connected by property boundary lines. Guidance issued by USEPA (Federal Register, Vol. 55, No. 222, November 16, 1990, p. 48033-48035) limited the definition of stormwater discharge associated with industrial activity by exempting from the definition "those construction operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan or development or sale." The term "common plan" was not defined further. A proposed new rule by the USEPA (Federal Register, Vol 63, No. 6, January 9, 1998) would expand the existing NPDES program to smaller municipalities and construction sites that disturb greater than one but less than five acres. Waivers are proposed for activities that occur during a negligible rainfall period; when there is a determination of low soil loss; or a watershed plan addresses the pollutants of concern. The proposed new rule would take affect in 2003. However, the small area of Peacekeeper sites and their isolation (4 to 7 miles between each site) has led to an accepted interpretation by USEPA on Peacekeeper dismantlement actions that a discharge permit for the construction activities would not be necessary. The regulations are designed to minimize runoff impacts in one or a few drainage basins; most of the sites are in separate drainage basins and impacts would occur separately, at different times. Discussions with the WYDEQ determined that no stormwater discharge permits would be required for the dismantlement project as long as best management practices are used to minimize runoff from the construction sites. Consequently, the construction sites would be considered exempt from stormwater discharge permit regulations.

4.4.2.2.3 Floodplains

Although groundwater can seep into LFs and MAFs, the sites are not subject to flooding from surface water, and no sites are located within a floodplain. Performing dismantlement activities at the site would not modify floodplains, nor affect the flooding potential of the sites. The LFs discussed in Section 3.4.2.3 that are subject to temporary flooding from downpours would not be further impacted as a result of the Proposed Action.

4.4.2.2.4 Water Quality

Dismantlement activities can affect groundwater quality by leaching of contaminants from surface or subsurface features, and runoff and dust can affect surface water quality. In accordance with Chapter VIII Quality Standards for Wyoming Groundwaters (discussed in Section 3.4.2.4.1), based on sampling results, the Air Force would coordinate with WYDEQ on the requirement for further action.

Spills. If diesel fuel or hazardous materials are spilled, then soils could become contaminated. Contamination would leach into the groundwater or runoff to adjacent water bodies and significantly affect surface water quality. However, the contractor would be required to have a spill plan and spill control materials to address spills and leaks of hazardous materials, and would implement the plan in the event of an incident. It is highly unlikely that significant concentrations of spilled liquid could reach and contaminate groundwater or surface waters. Water quality is not projected to experience any significant long-term impacts from the Proposed Action.

Nitrogen from Explosives. The use of the explosive ammonium nitrate and fuel oil (ANFO) would result in some residual nitrogen that could enter groundwater. The nitrates in the explosive are typical of fertilizer and are in lower concentrations than those typically used in agriculture. During the explosion, the ammonium nitrate powder in the explosive would be converted to nitrogen oxides (NO_x), the majority of which is vented into the air and eventually becomes nitrogen gas (N_2). A full, complete detonation vaporizes the explosive almost entirely to gas with ammonia, NO_x, CO, and dust as pollutants. The expansion of this volume of gas provides the energy to perform the work of the explosion. Full detonation combusts all but a minuscule amount of trace residues of the original explosive. Some of the residual free nitrogen can penetrate the pore space of adjacent rocks or soil, and eventually be converted to nitrates.

Pre- and post-blasting nitrogen sampling was conducted at two LFs at Ellsworth AFB, South Dakota. Nitrogen concentrations in soil samples after explosive demolition were evaluated at LFs G-2 and H-10 near Ellsworth AFB. The nitrogen-anomalous material was virtually restricted to the rubble concrete at each site. For demolition of the LF headworks, total nitrogen increased by about 11 micrograms per gram (µg/g) (1.22 µg/g of nitrate and 10.1 µg/g of ammonium) at LF G-2 and about 17 µg/g (3.70 µg/g nitrate and 13.93 µg/g ammonium) at LF H-10. In a typical aquifer, about 40 percent of this soil concentration would dissolve into subjacent groundwater (USGS, 1994). This could result in a one-time addition of as much as 5 to 8 milligrams per liter (mg/L) increase of nitrates in local groundwater. The amount of increased nitrogen concentrations at each site was about equal to that typically applied as a fertilizer to one acre of land used for growing wheat in western South Dakota (USAF, 1999c). The amount of nitrogen applied in western South Dakota varies according to soil conditions, but typically about 50 pounds per acre is applied (Keck, 1998).

Peacekeeper LFs are located in rural areas of Laramie, Platte, and Goshen Counties. Of the 50 LFs, 27 are located in range land and 23 are located in cropland (UWYO, 2000). With respect to aquifer sensitivity: 9 LFs are located in areas of moderately low aquifer sensitivity to nitrate and pesticide pollution; 24 are in moderately sensitive areas; 13 are in

moderately high sensitive areas; and 4 are in high sensitivity areas (UWYO, 2000). Three of the high sensitivity locations are in cropland settings, while one is in a range setting. Existing groundwater concentrations of nitrates were examined for locations within the deployment area (WRDS, 2000). Data were available for locations adjacent to LFs Q-03, S-02, T-02, T-04, T-10, and T-11. Concentrations were highly variable, ranging from 0.02 mg/L to 45 mg/L. Most concentrations decreased from the 1970s to 1990s. However, near S-02, located in irrigated cropland southwest of Torrington in the North Platte River Valley, the concentrations have generally increased over time.

The potential concentration of nitrogen predicted would be somewhat less at Peacekeeper sites than for former missile sites in South Dakota because lower amounts of explosives would be used compared to amounts used at Ellsworth AFB. The concentration of nitrate in groundwater on an LF site would likely be less than the MCL of 10 mg/L. The amount of nitrogen generated from dismantling Peacekeeper launch facilities in Wyoming would range from roughly half to equal the amount typically applied as fertilizer in crop production areas, such as winter wheat, alfalfa, beans, sugar beets, corn, small grains (e.g., millet, oats, and barley), and oilseeds (e.g., sunflowers). The estimated one-time loading to groundwater would be subject to dilution, diffusion, advection, and chemical and biological degradation as groundwater would migrate from the site. Consequently, this short-term impact would not be significant, nor would it result in any long-term impacts.

Pesticide Runoff and Leaching. The potential for runoff or leaching of pesticides that have been applied at the LFs is evaluated in this EIS. The potential for runoff at LFs and MAFs exists if heavy rains occur soon after application. Pesticide applications at missile facilities have been dramatically reduced in recent years (Ascher, 1999). Runoff of the pesticides would be greater from any sites that have more erodible soils or greater slopes than assumed for the example scenario, but the overall conclusion would not change over the expected range of conditions. Runoff of residual pesticides would not significantly degrade the quality of surface water and is not considered to be a significant hazard.

A computer model was used to estimate the possibility of residues of pesticides, specifically herbicides, remaining in the soil from long-term use. The proportion of these pesticides that migrate by runoff and leaching was also determined from GLEAMS modeling runs. Results from the model runs (see Appendix L for further information) show that the pesticide residues are minimal within 1 year of application. These residues are at only a fraction of a ppm at depths shallower than 30 cm, with no significant residues below 30 cm.

The herbicide residues are not likely to have reached even the shallow aquifers around some of the LFs and MAFs. Thus, potential impacts to groundwater in the deployment area during and after the deactivation period from past use of pesticides would be negligible. Beneficial results to the future landowner from discontinuation of non-selective pesticide application could be realized if vegetative growth was considered desirable to the new landowner. In addition, the environment would benefit long-term through the discontinuation of pesticide applications, except for the necessary control of noxious weeds.

The potential for runoff of pesticides that have been applied at the LFs and MAFs was also evaluated in Appendix L. The potential for runoff exists only if heavy rains occur soon after application. Runoff of the pesticides would be greater from any sites that have more erodible soils or greater slopes than assumed for the example scenario, but the overall conclusion would not change over the expected range of conditions. During the 10-year analysis period, recent runoff would only be on the order of several grams of a herbicide per year. Runoff of residual pesticides would not significantly degrade the quality of surface water and is not considered to be a significant hazard.

Leaching of LBP and PCBs. After salvage operations and demolition of the launcher headworks, the residual lead-based paint inside the launcher, LCEB, and LCC could leach into the groundwater. Also, some coatings applied to help waterproof USTs, piping, and the LFSB contain PCBs that could leach into groundwater. Because the cathodic protection system would be dismantled, and there are unconfined shallow aquifers throughout the deployment area with shallow water tables, there would be instances of eventual seepage of groundwater into the launch tube.

The rate at which lead leaches from paint and PCBs leaches from coatings, and migrates to nearby shallow wells used for potable water, is calculated in Appendix K. The assumptions used in the quantification of contamination were based on the study of aquifer characteristics, water quantity and quality parameters, proximity of wells to LFs, concentration and volume of lead-based paint in the launch tube, concentration and volume of PCBs in coatings, and the rate of leaching of lead and PCBs by groundwater.

The model results of simulated groundwater transport over a 20-year period showed that lead and PCB concentrations leached from LF coatings are not expected to exceed 0.02 ppb in any of the modeled cells adjacent to the LFs. The model results indicate that both lead and PCBs are nearly immobile under the representative site conditions. Leaching of lead and PCBs would not add significantly to background levels at any wells that occur downgradient. The estimated levels of contamination are well below the MCLs for lead (15 micrograms per liter (µg/l), essentially 15 ppb) and PCBs (0.5 µg/l, essentially 0.5 ppb). Levels of lead in groundwater would increase incrementally and would not significantly impact groundwater quality.

Groundwater quality of the deep aquifers (High Plains Aquifer System and Lower Tertiary aquifers) would be negligibly affected by the explosive demolition event and potential leaching of metals from the LFs and MAFs. The depth of the aquifers and the confining units between the aquifers would isolate them from the effects of demolition. It is unlikely that adverse effects to groundwater quality would occur in the deep aquifers for the reasons listed below:

- Both the vertical and horizontal hydraulic conductivity of the confining layers (primarily clays in the unconsolidated layers and unfractured shale in rock formations) is low. These aquitards inhibit vertical movement.
- The groundwater in the deep aquifers beneath the deployment area are under confined pressure and leakage from underlying aquifers to overlying aquifers commonly occurs. Consequently, contamination would not have a downward flow path because of the hydrostatic pressure upwards.

Groundwater from unused wells (some are closed) at the MAFs would not be affected by leaching because the shallowest well is more than 150 feet deep, and the leachate would have to migrate through clays and shales, which are low permeability materials with a high adsorption coefficient. Contamination of deep wells in other locations from lead or PCBs would be highly unlikely given the aforementioned circumstances. Even if the contamination would reach the wells, the levels would be below MCLs.

As previously stated, other heavy metal additives in the paint (chromium and mercury), as well as cadmium electroplating, might also undergo leaching. Based on the amounts of heavy metals with respect to lead, it is anticipated that the concentrations of leachate would be appreciably lower than that calculated for lead. With MCLs of 2 μg/L for mercury, 10 μg/L for cadmium, and 50 μg/L for chromium, the leachate is anticipated to be at least an order of magnitude lower than the MCLs for these heavy metals.

It is likely that the LFs and MAFs, once deactivated, would not be RCRA sites regulated under Subtitle C (see Section 4.3.2.5). Because the predicted concentrations of heavy metals are significantly below health-based levels, no long-term groundwater monitoring of the sites is necessary. However, if they were regulated as hazardous waste sites, monitoring wells would need to be installed at each site.

Groundwater Mixing. After cathodic protection systems are deactivated, the missile silo launch tube walls would corrode over time. Groundwater would eventually flow into silos from aquifers to a depth of about 80 feet. Where there is more than one aquifer separated by aquitards, there is a potential for mixing to occur between aquifers as groundwater seeps into a silo from two or more aquifers. Water quality, especially total dissolved solids (TDS), varies between aquifers. For example, TDS within various surficial aquifers can vary from several hundred mg/L to thousands of mg/L. Modeling was performed to assess the degree of mixing which could occur at various distances from the LF. For modeling purposes, an upper aquifer with TDS of 500 mg/L was assumed to mix with water from a lower aquifer with TDS of 10,000 mg/L (an extreme level) in a 50-50 ratio in a silo (producing a concentration of 5,250 mg/L). The launch tube prior to demolition extends to a depth of about 80 feet. After demolition, a concrete cap would be placed over the tube at a depth of about 32 feet and the cap would be covered by fill material. Consequently, the main zone of mixing would occur in a cylinder-shaped volume of approximately 50 feet in height and 12 feet in diameter. Over time, through the process of diffusion, this mixture would spread into the upper aquifer. Concentrations of TDS in the upper aquifer would increase on the order of 10s of parts per million within about a mile of LFs where two or more aquifers are separated by an aquitard. Only a few Peacekeeper LFs are situated in profiles where mixing could occur over time. Shallow aquifers (with a depth up to about 30 feet) would not be impacted by potential mixing because of a concrete cap that would be placed over the launch tube. Impacts to water quality within the deployment area are not anticipated to be significant.

In summary, some degradation of near surface aquifers could occur from mixing of groundwater within a launch tube. Any impacts to well water (primarily an increase in TDS) would likely to take several years to occur, and would barely be noticeable. It is

unlikely that the water quality in any well would become significantly affected (exceedance of a drinking water standard) from Proposed Action activities.

Lagoons. As discussed in Section 4.3.2.5 and 4.3.2.6, the liquid and solid contents of the lagoons at each MAF would be tested prior to dismantlement. Based upon the test results, the contractor may be permitted to discharge the effluent directly into the surface waters or utilize other proper disposal methods. The dismantlement plans and specifications would require the contractor to drain the lagoons, level and grade the berms for proper area drainage, and to stabilize (mulch) and seed the area with native grasses. The soil preparation and seeding activities will be based on the Soil Conservation Service technical specifications for Wyoming. Closure of the lagoon by landfarming would have a slightly beneficial effect on the surrounding environment, including the groundwater quality. No impacts to wetlands would occur through filling of the lagoons (the nearest wetland is 750 feet away).

Some soils in the deployment area are erosion prone. Some minimal increase in turbidity of nearby surface waters through erosion and wind or water transport is unavoidable, but not significant.

F.E. Warren AFB receives its water supply from the Board of Public Utilities in Cheyenne. The City water is derived from the Crow Creek drainage, municipal wellfields, and from Douglas Creek. Consequently, dismantlement activities in the deployment area would not affect water quality at F.E. Warren AFB. The deployment area receives its water supply primarily from groundwater replenished by the following watersheds: the Lower Laramie watershed supplies the majority of Platte County; the Middle North Platte-Scottsbluff watershed supplies the majority of Goshen County; and the Crow watershed supplies the majority of Laramie County. Closure of the lagoons would not affect water quality in the deployment area watersheds.

4.4.2.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. Deep aquifers are unlikely to be disrupted by mechanical demolition of the headworks. Some shallow fracturing of near-surface rock layers could occur near the site fence boundary, but it would be unlikely that the groundwater within the overlying sediments would mix with the underlying groundwater in rock formations to any extent greater than they normally do. Surface reservoirs would be less likely to leak if mechanical demolition was implemented, but would likely incur more siltation from airborne dust settling in the surface water; neither type of impact would be significant. Floodplains would not be impacted by this implementation alternative. The quality and quantity of water resources in the deployment area would be negligibly affected by mechanical demolition.

Removal of the Hardened Intersite Cable System. If the HICS was excavated, it would likely adversely affect some aquifer discharge/recharge areas. Permeability of the soil would be increased or decreased along the routes of excavation, depending on the texture of fill used to refill the trenches and the degree of compaction. Because of the shallow depth of the excavation and its linear extent, groundwater impacts would likely not be significant. Soil erosion and siltation of surface water would occur to a greater extent

under this Implementation Alternative than under the Proposed Action. In certain areas where the HICS passes adjacent to or beneath water bodies, the impact of removal would be significantly adverse. Increased erosion would occur if cables were removed where they pass under streams. This could cause minor changes in local drainage. Additionally, disruption of floodplains and wetlands could cause significant impacts. Impacts to water quality could be significant due to increased siltation, resulting in increased sediment content and turbidity of water. If this Alternative were implemented, the cables could be left in place where they pass under streams and other surface water features, to avoid potential increases in siltation and turbidity.

4.4.2.4. Potential Impacts of the No Action Alternative

Continued maintenance of the Peacekeeper facilities in the deployment area would not change the current water resource environment. The potential for runoff of herbicide-laden water to adjacent water bodies would continue, but the residues based on past reduction of applications would be minimal. Modeling results also indicated levels of pesticides from the LFs and MAFs would be negligible. Maintenance and other activities would continue. Existing traffic would continue to generate airborne dust, to degrade roads, and to cause siltation of nearby water bodies. The sump pumps would continue draining water that infiltrates the LFs and MAFs. No new water resource impacts would occur.

4.4.2.5. Mitigation Measures

Proposed Action: Under the Proposed Action and Alternative Actions, no potentially significant impacts to water resources in the deployment area have been identified. Mitigations involving soil sampling and closure of lagoons address potential water resource impacts and were discussed under the Hazardous Materials and Wastes subsection. Based on the predicted ground motion levels generated by an explosive demolition event, and the close proximity of few wells to LFs, detailed site surveys of aquifers and water wells are not believed to be necessary. However, the contractor could decide to survey a particular site area based on unusual hydrologic circumstances.

Mechanical Demolition Alternative: No water resource mitigations are required or recommended for this Alternative.

HICS Removal Alternative: Significant impacts would occur if the HICS were removed under major water bodies, such as streams. Measures would need to be implemented to reduce or avoid siltation, or the HICS could be abandoned in place under water. Measures to control siltation from disturbed soil would also be required near streams and wetlands.

4.4.3. AIR QUALITY

The air quality at F.E. Warren AFB and the deployment area would not be appreciably impacted by activities associated with the Proposed Action. Some short-term adverse impacts to air quality would result from the dismantlement activities at the LFs and MAFs, and a slight long-term beneficial impact would result from the cessation of operations (e.g., from decreased travel to and from the missile field). Removal of refrigerants (R-12, a chlorofluorocarbon (CFC), and R-22, a hydrochlorofluorocarbon (HCFC)) from coolant

systems would decrease the possibility of leaks. The air quality would be impacted (but not significantly) along transportation routes and at intermittent periods at distinctly separate sites within the deployment area.

The Implementation Alternatives for mechanical demolition or HICS removal would cause more emissions than under planned dismantlement activities; these increased levels of emissions would not significantly affect air quality. The No Action Alternative would have some long-term emissions associated with the continued operation and maintenance of sites, but levels would be similar to existing emissions.

4.4.3.1. Analysis Methods

The analysis was based on a review of existing data and publications about the area, and an evaluation of air pollutants that would be directly or indirectly generated by any action. The review covered existing NEPA documents, F.E. Warren AFB general plans, USEPA regulations, emissions from explosives and various products or wastes generated during dismantlement actions at other bases, emissions from equipment and vehicles used in dismantling LFs and MAFs, and current and projected levels of vehicular traffic at the sites. The analysis identified the National Ambient Air Quality Standards (NAAQS) and Wyoming Ambient Air Quality Standards (WYAAQS) attainment status of F.E. Warren AFB and the deployment area, prevention of significant deterioration (PSD) areas, the current force structure, the proximity of major sources of pollutants (such as metropolitan areas), and the local climatological and meteorological conditions. The analysis then established potential air emissions, noted the influence of climatic or other factors, and compared the potential emissions to standards.

Emissions for the transport of the Peacekeeper rocket engines were not directly evaluated as part of this EIS. Similar environmental impacts for the transport of the MM III boosters to other locations were evaluated by the Air Force Logistics Command (AFLC) in separate documents (USAF, 1991f; USAF, 1995a). The Peacekeeper Stage I and some Stage II rocket engines would be transported by rail, with some road transport for the remaining stages. Transport by rail would not necessitate any additional rail operations and the minimal increase in road activity would cause a negligible short-term increase in air emissions.

The PSD requirements specify that owners or operators must obtain permits prior to constructing or modifying major sources. A major stationary source is one that belongs to a list of 28 specific categories and that produces 100 tons per year (tpy) or more of any pollutant regulated by the CAA. Sources not on the list are regulated as a major source if potential emissions would exceed 250 tpy. Site dismantlement does not fall into one of the 28 categories nor would produce 250 tpy of a pollutant. Therefore, PSD is not evaluated further in this EIS.

Significance Criteria. The significance of impacts to air quality is based on Federal, state, or local pollution regulations or standards. A significant impact would be a violation of the NAAQS or WYAAQS, an exposure to any air pollutant above the permissible exposure limit (PEL), or exposure of sensitive receptors to increased pollutant concentrations. Impacts that are adverse, but don't meet the criteria for significance, would not be

significant. No impact would occur if no measurable change in emissions resulted. A beneficial impact to air quality would be a reduction in baseline emissions.

4.4.3.2. Potential Impacts of the Proposed Action

Phase 1 and 2 activities would generate air emissions by Type II and other ground vehicles, as well as helicopters. Emissions would be generated from vehicle operation on site, as well as from vehicle travel between the LFs, MAFs, and F.E. Warren AFB. These emissions would be localized at a MAF or LF and occur along existing transit routes. A minimal number of helicopter flights (5 per day) are currently flown in support of the MM and Peacekeeper deployment area (this number may decrease slightly after the Peacekeeper sites are placed in caretaker status); the impact on air emissions would be negligible. After a site is placed in caretaker status, maintenance of the site would be minimal. An occasional ground trip to the facilities is conducted to ensure that the remaining equipment (e.g., dewatering pumps) is operational and that the sites are secure. The ongoing maintenance of an active site generates similar emissions to those occurring during the deactivation (e.g., vehicle travel). All emissions are short-term. Based on the air quality of the area, the emissions are not considered to significantly affect ambient air.

Other air quality issues include the removal of the large refrigerant systems, large fire extinguishers, and small room air conditioners at the MAFs. The refrigerant system at the MAFs and LFs contain R-12 and R-22 that is part of the coolant system. Room air conditioners at the MAFs also use refrigerants. The large refrigerant systems would be drained, and CFCs and HCFCs removed by trained and certified Air Force personnel. The room air conditioners would be removed as a unit, to prevent releasing the freon. Large fire extinguishers, which may be present at the LFs and MAFs, use a halon (a CFC). These extinguishers would also be removed intact during the environmental safing process.

Air emissions would increase at a site during Phase 3 preparation for and initiation of explosive demolition. Heavy equipment use and worker traffic would increase during different activity phases, such as salvage and site preparation. If a fuel leak occurred, a small amount of air pollutant emissions (such as volatile organic compounds (VOC)) would result. This amount of emissions would not be significant. Due to the highly dispersive meteorologic conditions in the area (see Section 3.4.3), vehicle emissions generated during the commute to the site would not be cumulative with heavy equipment operated during the day. Contractor equipment used in the dismantlement process would likely include dump trucks, flatbed trucks, cranes, bulldozers, large backhoes, and smaller vehicles. Government vehicles involved in dismantlement activities (primarily for oversight of the contractor) would likely include trucks and vans. The main constituents of the exhaust from vehicles and heavy equipment include gases (especially carbon monoxide (CO), NO_x, and hydrocarbons), and solids (suspended particulate matter less than 10 microns in diameter (PM_{10})). For example, about 35 pounds of CO is generated when a grader, dump truck, and loader are operated for one hour. This quantity would be readily dispersed (given the mean wind speed of 9 to 13 knots (kt) during most months) in the rural environment of the ROI.

Construction activity would cease at a given site during the verification period, but would continue at other sites in the deployment area. After the verification period, emissions would again increase while workers restored the site to a suitable condition for eventual disposal. An increase in dump truck traffic, which would be used to haul fill, would be especially noteworthy. As many as 200 trips for each MAF (assuming that the lagoons are to be filled and that only the berm was available as fill material) and 184 trips for each LF could occur. The total vehicle emissions for this effort would be substantial if emissions were to occur simultaneously (for example, about two tons of NO_x would be generated for each LF, including equipment used at the LF, dump truck trips to borrow areas, and worker vehicle trips). However, the vehicle trips and emissions for a specific site would occur over a period of days, emissions would be dispersed, and would not affect the quality of air in the region. Therefore, no significant air impacts are projected to occur.

Table 4.4.3-1
Construction Emissions (Tons per LF)

Pollutant:	CO	VOC	NOx	SOx	PM-10
Total Construction	1.1	0.1	2.1	0.2	4.2

Note: Includes equipment used at LF site, dump trucks traveling to borrow sites, and worker vehicle trips to and from sites.

Source: USEPA, 1985; USEPA, 1999

Other gaseous air pollutants would be generated in similar quantities and would also be dispersed over the same extended time period. Dust would be generated by any activity disturbing soils. Typical rates of dust emissions from land-leveling and contouring activities, such as grading and bulldozing, varies greatly, but is generally estimated at approximately 110 pounds per day per acre (USEPA, 1985). These levels are similar to farming activities such as plowing or discing of a field. Because construction equipment and vehicles would only be used over a short time at a particular site, the impact in this ROI would be inconsequential. Air quality in the ROI is good, and would not be affected by the rates at which the air pollutants would be generated. Best management practices such as periodic watering of the construction sites and restricting vehicle travel speed on gravel roads would further reduce particulate matter emissions.

Explosives used at a site would cause a short-term increase in the amount of air pollutants in the immediate area. The explosion of the LF is directed inward (essentially an implosion), to most efficiently use the energy of the blast. Consequently, the outward ejection of material and dust generated is not commensurate with an above ground blast. The demolition of MM II LFs in the Whiteman AFB deployment area included covering the LF with several truckloads of dirt and a four-ton mat made of tire rubber and steel cable to contain debris. For explosive demolition of LFs within the deployment area at Ellsworth AFB, no mat was used (Pavek, 1997). Use of this or a similar technique would further inhibit the release of harmful constituents (such as lead from LF interior paints) during the implosion. Other pollutants that may be generated in the explosion (assuming the explosives are ANFO [ammonium nitrate with fuel oil], TOVEX [ammonium nitrate slurry with monomethylamine thickener], and TNT [trinitrotoluene]), could include ammonia,

CO, and NO_x. These common air pollutants would be readily dispersed and would not be a concern.

The primary air emission during the explosion would be particulate matter. While particulate matter (including PM_{10}) would be generated in a very short burst, the quantities would not be of concern in the rural area setting of the missile fields. Visual observers at previous MM II silo demolitions describe the dust as a puff of smoke that settled in a half-minute's time (*Kansas City Star*, 1993).

A detailed analysis of the emissions caused by explosive demolition was performed for the dismantlement of MM II LFs at Ellsworth AFB and Whiteman AFB (USAF, 1991e; USAF, 1992a). Two USEPA-approved guideline models were used to evaluate potential impacts. The Industrial Source Complex-Short-Term (ISCST) model was used to estimate ambient concentrations of dust, lead, and herbicide emissions resulting from explosive demolition and other soil-disturbing activities. In addition, the concentrations of herbicides that may be carried aloft on dust particles were calculated by the GLEAMS model for the upper 10 centimeters of soil.

The plume analyses that were generated by this model predicted ambient ground-level concentrations of emissions. These were compared with air quality health standards to determine the potential impacts. Results from these models are relevant to this EIS due to the similarity of system configurations, dismantlement activities, and environmental conditions, and are therefore incorporated by reference per 40 CFR 1502.21.

Table 4.4.3-2 presents the predicted air concentrations of the constituents of concern—particulates, herbicides, and lead—for the explosive demolition at Ellsworth AFB (results are similar for Whiteman AFB). Within 1 hour, most of the dust from the explosive demolition event would have settled or moved downwind so that the 24-hour average concentrations would be approximately one-twenty fourth of those specified in the table. The estimated 24-hour average concentration for dust at 350 meters was 15.5 micrograms per cubic meter ($\mu g/m^3$) and at 1,000 meters was 2.5 $\mu g/m^3$ (USAF, 1991e).

Table 4.4.3-2
Average Hourly Maximum Concentrations of Pollutants in Air ($\mu g/m^3$)

Pollutant	Distance from Source		
	350 meters	600 meters	1,000 meters
Particulates (Dust)	373	150	60
Lead	1.9	0.91	0.41
Prometon	1.1×10^{-3}	4.5×10^{-4}	1.8×10^{-4}
2,4-D	1×10^{-5}	6×10^{-6}	2×10^{-6}

Source: USAF, 1991e

The hourly average concentration predicted for lead was 1.9 $\mu g/m^3$. Because the NAAQS for lead is 1.5 $\mu g/m^3$ averaged over one-quarter year, the predicted lead concentration for one demolition incident (less than 1 hour in duration) would be more than two orders of magnitude below the NAAQS. Although there are no NAAQS or WYAAQS values for

the herbicides, the predicted air concentrations of the herbicides were compared to health exposure standards and were several orders of magnitude below any health level concerns. Pesticides and metals not modeled were predicted to be at lower air concentrations than those that were modeled; amounts of heavy metals remaining in an LF before demolition would be less than lead, and the residues of the pesticides are less than those projected for prometon (USAF, 1991e). The results for the modeling at Ellsworth AFB indicate that air quality would not be significantly impacted by several orders of magnitude below health criteria and ambient air standards. Consequently, although minor variations in the environmental and project conditions at LFs in the F.E. Warren AFB deployment area may exist in comparison to the situation at Ellsworth AFB, the results are applicable to the levels of impact predicted for this dismantlement effort. The LF locations are in attainment status for NAAQS and WYAAQS criteria pollutants, and the normally moderate breezes for this region are favorable meteorological conditions to rapidly dissipate pollutants. Consequently, the short-term impacts of explosive demolition of the headworks would be negligible.

The short-term emissions from dismantlement activities would not be significant, and would likely not affect any sensitive receptors, given the rural location of the LFs and MAFs.

Air pollutant emissions as a result of dismantlement would be unavoidable but not significant. The impacts would be short-term and could be mitigated to some extent, as discussed in Section 4.4.3.5. Air Force vehicles would no longer be traveling to the missile sites for conducting operations and maintenance activities. There would be a long-term beneficial impact from the reduction of emissions within the deployment area.

Impacts within the deployment area would not affect the air quality near F.E. Warren AFB. No PSD areas are found in the ROI and no impact to a PSD would occur. All counties within the ROI are in attainment, and the temporary emissions generated by the proposed activities would not cause a violation of air quality standards. Therefore, a CAA General Conformity Determination is not required for the Proposed Action.

4.4.3.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. The use of equipment for mechanical demolition of the headworks (jackhammers, crane, and backhoe with chisel) would occur over a longer period of time and would create more dust and heavy equipment emissions than those created by the explosive demolition method under the Proposed Action. However, the pollutants would be readily dispersed over the same extended period of time, would not be cumulative, and would not significantly impact the air quality of the area.

Removal of the Hardened Intersite Cable System. If the HICS were excavated and removed, criteria pollutant emissions from the equipment and particulate matter from the disturbed soil (which would be more susceptible to wind erosion) would create much higher levels of air emissions than if the HICS remained in place. However, given the small amount of emissions released at one time, the dispersive conditions of the area, and the good air quality of the ROI, no significant impact would occur.

4.4.3.4. Potential Impacts of the No Action Alternative

Continued operation and maintenance of the Peacekeeper system would not change the present air quality environment; maintenance and other activities would continue. Annual emissions from missile support helicopters and vehicles would remain the same as those presented in Table 3.4.3-3. No new air quality impacts would occur.

4.4.3.5. Mitigation Measures

Proposed Action: Air quality in the ROI is good and the potential emissions predicted for the Proposed Action are not significant (generating less than typical farm activities in the area); no mitigation is necessary. However, demolition of the first several LFs for the Ellsworth AFB and Whiteman AFB MM II dismantlement contract generated a large group of spectators. To minimize potential impacts during explosive demolition, the following mitigation measure is recommended:

- Protect public and environmental interests through preparing and implementing a blasting and safety plan. The plan will include provisions to limit the demolition activity to times when the meteorological conditions favor rapid dissipation of pollutants, and restrict the demolition activity when winds blow in the direction of sensitive receptors (such as spectators).

Mechanical Demolition Alternative: Potential adverse impacts would be similar to those under the Proposed Action. Because demolition would not be used, no blasting plan would be necessary, but a safety plan would address minimizing dust generation when winds blow in the direction of sensitive receptors.

HICS Removal Alternative: Potential adverse impacts would be similar to those under the Proposed Action; the same mitigation measure would apply.

4.4.4. NOISE

Certain activities that would be associated with the Proposed Action or Implementation Alternatives could influence the noise environment. Impacts on the environment would be related to the magnitude of noise caused primarily from the LF headworks demolition (blast noise), and from vehicle and equipment noise associated with dismantlement of the Peacekeeper system. Blast noise could cause a slight annoyance to a few nearby residents, rattle windows and walls slightly, and momentarily startle wildlife. The analysis in this section is concerned with human receptors; noise effects on wildlife are discussed in Section 4.4.5.2.

The noise environment would not be significantly affected from the short-term increase in noise associated with the Proposed Action activities. There would be no long-term noise impacts because the sound levels within the deployment area and F.E. Warren AFB would return to current levels. Noise-sensitive receptors, such as churches and hospitals, would not likely be adversely affected by the blasting and traffic noises. Under the No Action Alternative, no impacts would occur because future noise levels near the missile facilities would be similar to current conditions. If mechanical demolition was implemented, noise impacts would not be significant, but would be more annoying to nearby residents than if explosive demolition was implemented. Removal of the HICS would increase the amount

of construction equipment needed, thus increasing ambient noise levels above those projected if the HICS were left in place. The HICS extends for many miles and may pass by sensitive receptor locations; therefore, there is a potential for significant noise impacts, depending on the proximity and level of the noise and the sensitivity of receptors.

4.4.4.1. Analysis Methods

The information presented in Section 3.4.4 is the basis for evaluating noise impacts from the Proposed Action. The analysis is based on identifying any sensitive receptors (people in a residence, school, hospital, or church) located within an area potentially affected by noise generated from demolition/construction at the LF sites.

The analysis relied on the review of a number of sources: explosive demolition data, specifications, and publications; transportation and noise data; and maps of the deployment area. The review focused on the proximity of dwellings to the LFs; the amount of airblast a window can sustain; the current noise levels, the local meteorological conditions, the presence and location of sensitive receptors, and projected noise levels from explosive demolition, ground traffic, and air traffic. The difference in noise levels was compared to determine whether a significant annoyance impact occurs. Possible impacts to windows from explosive demolition were assessed.

Noise from UH-1N helicopters are not calculated in assessing dismantlement impacts, since the frequency of the flights in the deployment area would decrease over time after the removal and transport of rocket boosters and other equipment.

Noise impacts from the operation of construction equipment are usually limited to a distance of 1,000 feet or less. Noise levels outside this perimeter would generally attenuate below 65 "A-weighted" decibel (dBA), which is the level of potential noise concern. Most construction noise would attenuate to less than 75 dBA at about 200 feet from the construction activity. The 65 dBA noise level approximates the division between a quiet and moderate sound level. If construction equipment with a noise level of 88 dBA is operated in the vicinity of sensitive receptors, the sound would generally attenuate to below 65 dBA approximately 800 feet from the construction activity. It is unlikely that noisy equipment would operate near a sensitive receptor for any length of time.

Significance Criteria. The impact on the noise environment is related to the magnitude of the noise levels generated by demolition/construction activity and the proximity of noise-sensitive receptors to the noise source. A noise-sensitive receptor is commonly defined as the occupants of any facility where a state of quiet is a basis for use, such as a residence, hospital, or church. The 65 L_{dn} noise level is considered to be a threshold criterion for significance. For construction or operational noise, increasing L_{dn} levels from below 65 L_{dn} to between 65 and 75 L_{dn} could be a significant impact. If noise levels increased and affected noise-sensitive receptors to a level below 65 L_{dn}, no significant impact would occur. A decrease in noise levels would be a beneficial impact.

The basis of determining the significance of the impacts to the biological and human environment is primarily the difference between the baseline noise environment and that of the construction traffic and demolition. An appreciable increase in the background noise level (40 - 48 L_{dn} range) would be perceived as an annoyance impact. Increases in noise

that exceed ambient noise levels by more than 5 dBA would be clearly noticeable and represent an adverse impact.

4.4.4.2. Potential Impacts of the Proposed Action

During Phases 1 and 2 of deactivation, heavy vehicles would travel throughout the deployment area to recover the missiles and various site components. The ground transportation noise levels generated by the Type II and other Air Force vehicles involved in the LF deactivation process would be comparable to the existing noise of normal missile movement operations, as described in Section 3.4.4. Average noise levels would temporarily increase and approach 50 day-night average sound level (L_{dn}) as traffic proceeds through the deployment area. Vehicles from F.E. Warren AFB are dispatched to the Peacekeeper deployment area approximately 17 times per month for keeping the rocket motors current, as well as performing failure replacements. The amount of Air Force vehicle traffic would be less than the recent baseline level because a replacement missile would not be going to the LF.

Aircraft noise associated with the first two phases of deactivation would be from airborne transportation of the rocket boosters from F.E. Warren AFB and helicopter operations in the deployment area. Rocket motors would be removed from the deployment area and shipped to Hill AFB at a rate of one every three weeks. Rail transport is typically used for Stage Is and IIs, with road transport used for the remaining stages. Reentry systems would be transported either by air or road. A short-term reduction in helicopter noise and a long-term elimination of helicopter operations within the Peacekeeper deployment area would be a beneficial impact.

In summary, no significant noise impacts would occur during the first two phases of deactivation. Noise generated at a site, or along a transportation route, undergoing deactivation activities would be independent of noise generated during dismantlement activities because they would occur during different timeframes.

Construction equipment used at the LFs and MAFs, and the magnitude of equipment noise would be comparable to that of the Air Force equipment routinely used for missile removal and replacement. Average noise levels would temporarily increase and approach 50 L_{dn} as traffic moves through the deployment area. Construction vehicles such as dump trucks, concrete trucks, graders, bulldozers, and general-purpose vehicles would be operating at each facility. The vehicles would be used to fill in the silos and elevator shafts, place concrete seals on the shafts, and grade the site. The vehicles would be at the sites periodically for two to three weeks total, at an activity level of roughly 50 percent. Normal work hours are from 7:00 a.m. to 5:00 p.m. Typical noise levels at construction sites have been measured from 85-88 dBA at a distance of 50 feet (USEPA, 1971). This would attenuate to about 78 to 82 dBA at 100 feet, and 72 to 76 dBA at 200 feet, and below 65 dBA at 800 feet (see Figure 4.4.4-1).

The Air Force would hire a contractor for demolishing the LFs and MAFs. Dismantlement of the LFs would involve demolition of the headworks. The demolition contractor could use explosives to break up the concrete and separate it from steel, which then could be salvaged.

The following specifications would apply if explosives were used to demolish the LFs:

- Blasting would be supervised and performed by qualified individuals experienced in demolition blasting.
- Blast-induced ground vibrations would not exceed a peak ground particle velocity of 0.75 inch per second at frequencies less than 40 Hz nor 2.0 inches per second at frequencies of 40 Hz or greater.
- The maximum airblast sound level would not exceed 134 decibels (dB) at a distance of 500 feet.
- Flying debris from blasting would not travel beyond the facility site fenced area.
- Ground vibration and airblast noise would be monitored for every explosion. At the first demolition site, the contractor would demonstrate the ability to perform in compliance with the above specifications and would follow the procedures found to be effective and in compliance at future sites, unless the Air Force issued written approval for deviations from those procedures.

Demolition explosions in the deployment area would produce both ground-borne vibration and air-propagated noise (airblast). Seismic waves would propagate more efficiently from those LFs that contact bedrock.

Ground vibration can shake houses or other structures. However, ground wave motions that have a peak particle velocity less than 2 inches per second have a low probability of causing damage (Bollinger, 1971). Air-propagated noise typically arrives slightly later than ground-borne vibration and can produce overpressures that may be perceived as thunder. Ground vibration and airblast can act together to cause windows to rattle and walls and other structural elements to shake. Breakage of windows, however, is rarely observed with overpressures less than 0.1 lb/in^2 (150 dB). The actual demolition noise impacts that would be anticipated would vary with the area's topography. In general, the flat to rolling topography of the landscape in the area where the LFs are located would somewhat attenuate the airblast impacts. Likely impacts include shaking of houses, rattling of windows, and possible annoyance of residents. The extent of such impacts depends on the quantity of explosives required for demolition and the distance from the demolition activity to the affected properties.

Factors affecting the distance and intensity of the airblast include air temperature, humidity, windspeed, and direction. Higher air temperatures and humidity increase the speed of sound, while windspeed and direction determine the direction and distance the airblast travels. As discussed in Section 3.4.4.4, few residences are located near an LF. Given the rural environment surrounding the LFs and MAFs, it is unlikely any sensitive receptors would be adversely affected by a demolition event.

The magnitude of the blast would be sufficiently loud to have a startle effect on nearby residents and would be significantly higher than background noise. The blast shocks are only a momentary adverse local impact. A small number of residents would be near enough to be startled or annoyed by any particular blast. Approximately one LF would be dismantled every three weeks during the dismantlement period, with activities occurring throughout the year, as weather permits. Because of weather conditions and the staging of

construction activities, approximately two demolitions could occur in one week. However, only one blast is anticipated at each LF, and the 4 or more miles between LFs means that few residents would ever be annoyed twice.

Based on experiences using explosive demolition for dismantling Titan II LFs, MM II LFs, and MM III LFs, the maximum airblast levels of the implosions at F.E. Warren AFB LFs should not result in significant noise impacts. Typical results from activities for the MM II demolition events were in the range of 110 to 130 dB at 500 feet from the LF (Mortenson, 1997). The intermittent noise associated with blasting would not significantly increase average ambient noise levels.

Construction activities in the deployment area would not generate noise that would affect current land uses.

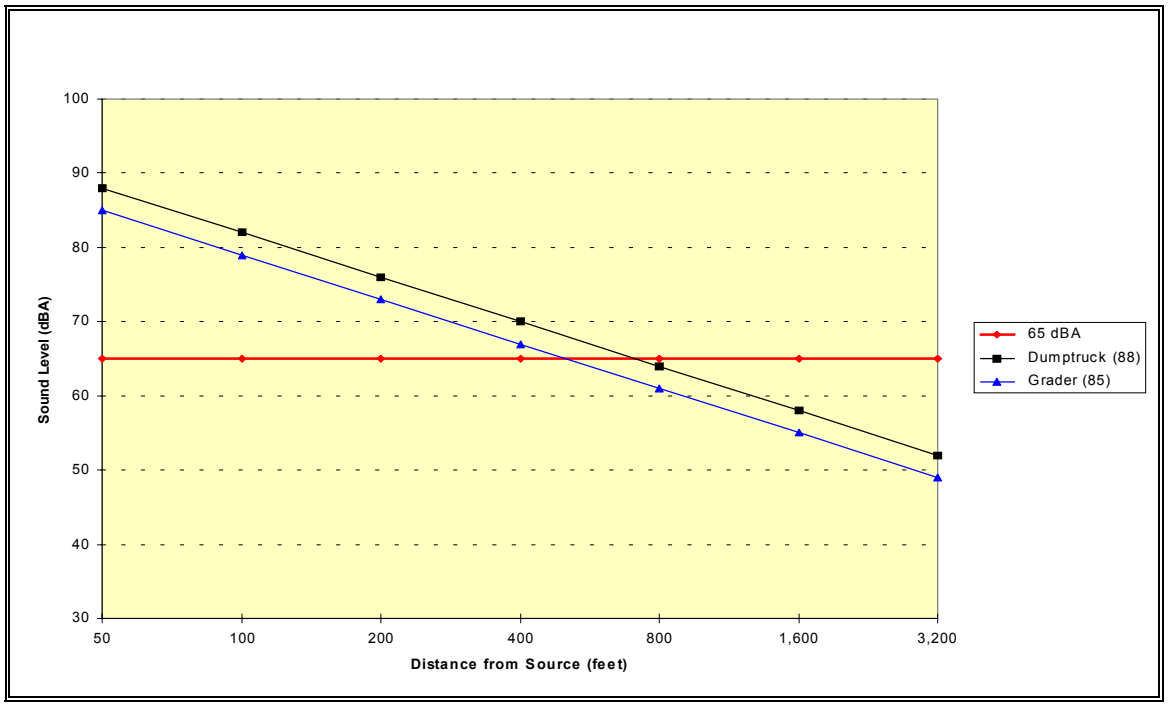

Figure 4.4.4-1. Noise Emissions from Equipment at 85 and 88 dBA

Short-term noise impacts would likely be adverse, but not significant, based on the levels of noise generated from traffic, operation of equipment, and explosive demolition. After construction activities are completed, the ambient noise level in the deployment area would be negligibly less than historical or current levels. Noise generated from construction equipment and vehicles is unavoidable, and explosive demolition would generate unavoidable ground vibration, and airblast effects.

4.4.4.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. If mechanical demolition is performed, the noise would not be as loud as that for explosive demolition but would continue during working hours for possibly a week or more. The repeating noise caused by the use of

mechanical demolition equipment, such as jackhammers, crane, and backhoe with chisel, can be annoying. A jackhammer typically emits a peak sound of 108 dB at its source. At a distance of 1,750 feet (the minimum specified distance where occupied buildings can be located without a waiver), the sound levels would be about 65 dBA; this noise level is approximately equivalent to the sound of a busy restaurant. The noise generated by mechanical demolition activities would cause an adverse impact, but not a significant one. The impacts from traffic noise and construction equipment, with the exception of the mechanical demolition process, would be negligible. There would be no long-term noise impacts after completion of dismantlement.

Removal of the Hardened Intersite Cable System. Removal of the HICS would require the use of a backhoe, crane, dump truck, and flat bed truck. This equipment would cause noise emissions in addition to those generated by the construction equipment at the LF and MAF sites. Noise generated from HICS removal would occur in the deployment area throughout the dismantlement period, but the noise source would be moving along the length of the cable and not originate from any one point for an extended period of time. The operational impact of the equipment would generate noise levels similar to those at the LFs. Short-term noise impacts would be adverse, but not significant, if the HICS were removed. The wide extent of the HICS could result in adverse impacts to sensitive receptors; accounting for the short-term effect of the noise gradually entering and leaving an area, no significant impacts are projected to occur. There would be no long-term noise impacts after completion of dismantlement.

4.4.4.4. Potential Impacts of the No Action Alternative

Continued maintenance of the Peacekeeper system would not change the present noise environment; maintenance and other activities would continue. No new noise impacts would occur.

4.4.4.5. Mitigation Measures

Proposed Action: No significant noise impacts would occur using the best management practices and blast specifications presented in Section 4.4.4.2 and no mitigation is required. However, the following is a recommended initiative that could be taken to avoid or mitigate potential adverse effects of blast noise and vibration:

- Prepare and implement a blasting and safety plan that includes provisions for modifying blasting techniques (e.g., elect to use millisecond delays) to satisfy stringent limits if houses or structures are located close to demolition sites; this would reduce the intensity of airblast and ground vibration. The plan would also address the repair of windows or other items inadvertently damaged by a demolition blast.

Mechanical Demolition Alternative: No significant impacts are identified under this Alternative. No mitigation is required or recommended.

HICS Removal Alternative: No significant noise impacts would occur from removing the HICS, unless a sensitive receptor would be in the proximity of the HICS route (e.g., a school, church, or child care facility). If a sensitive receptor is located near the route of the HICS, coordination of the timing of removal would reduce the severity of the impact.

4.4.5. BIOLOGICAL RESOURCES

Impacts to biological resources at the LFs and MAFs would result primarily from the explosive demolition and ground restoration activities associated with the dismantlement action. Final disposition of Peacekeeper facilities on base is not yet known; however, no impacts to important or crucial habitats or species are expected since the Peacekeeper facilities are located on previously disturbed land within the built-up portion of the base.

During deactivation, heavy vehicles would travel throughout the deployment area to recover the missiles and various site components. Placing sites in caretaker status would result in traffic on roadways and ongoing activities at the LFs and MAFs. These activities would not impact biological resources.

Dismantlement activities would include ground-disturbing excavation, the explosive demolition of the LFs, stockpiling soil, and grading. The effects of dismantlement activities would adversely, but not significantly, impact both plants and animals during demolition, excavation, grading and filling. No significant long-term adverse impacts are projected to occur. The activities would not lead to degradation of important or crucial habitats or risk the viability of threatened or endangered plants or animals, or candidate species. Dismantlement-related activities at the LFs and MAFs would occur on previously disturbed and developed land, and the impacts would not be considered significant. No wetlands would be filled as a result of dismantlement activities. Runoff flowing into wetlands would flow across well-vegetated areas, and thus would not result in adverse impacts. No significant impacts from noxious weeds would occur with continued management practices.

The No Action Alternative would result in the continuation of the existing biological resource impacts from missile system and operation and maintenance activities; current impacts are not significant. If mechanical demolition of the headworks occurred, slightly more area would be excavated than under the Proposed Action, but the impacts would not be significant. The implementation alternative of removing the HICS would potentially disturb terrestrial and aquatic wildlife to a significant degree.

4.4.5.1. Analysis Methods

The analysis methods used to determine potential impacts of activities associated with the Proposed Action and Implementation Alternatives consisted of a review of existing data, and previously written environmental documents for dismantlement actions. Part of this review focused on the particular locations of the Peacekeeper sites in relation to the various biological habitats in the area. The Wyoming State Game and Fish Department and the USFWS were consulted for technical assistance in identifying significant biological resources and the status of threatened or endangered species in the deployment area. Correspondence with these agencies is included in Appendix C and Chapter 8.

Significance Criteria. Biological resources are plants and wildlife, including candidate species ready for proposal to threatened or endangered status, federally- or state-listed endangered or threatened species, and wetland areas. Impacts to biological resources would be significant if the viability of a protected plant or animal species was jeopardized, or if important or crucial habitats would be damaged, with little likelihood of re-

establishment after completion of the action. A lesser impact would result if the disturbed population could be reestablished to its original state and condition, or the population is sufficiently large or resilient to respond to the dismantlement action without a measurable change. Damage could be direct, as would occur during the filling of a wetland, or indirect, as could occur if a noxious weed establishes a population in a disturbed area. The significance of an impact is also dependent upon the importance of the resource, and the proportion of the resource that would be affected relative to its occurrence in the vicinity. An increase in population numbers in response to an enhanced habitat or increased viability of a valued species (such as a songbird) would be viewed as beneficial. In other cases, the impact could be adverse (as would be likely with an enhanced grasshopper population). Significant impacts to wetlands would occur if projects associated with the dismantlement action resulted in altered hydrologic flow, drainage of sediment or contaminants into wetlands, or actual filling or destruction of a wetland area. No impact would represent no change to biological resources, or that a resource element was not present in the affected area.

4.4.5.2. Potential Impacts of the Proposed Action

4.4.5.2.1. Vegetation

Agricultural land and rangeland immediately borders most of the LFs and MAFs. The dismantlement of the LFs would occur in a graveled, unvegetated area within a fenced area. Dust generated from construction equipment during dismantlement activities is expected to be similar to typical farming activities, except that the grading, filling, and other activities would be of short duration (lasting from hours to a few days). The explosive demolition of Peacekeeper LFs would generate a small dust cloud that would dissipate rapidly. Past experience with explosive demolition at the Whiteman AFB and Ellsworth AFB missile fields confirms that the explosion generates a "puff of smoke" that settles quickly—within a half minute according to a local landowner (Kansas City Star, 1993). The LF sites would be contoured for proper runoff, and vegetated areas disturbed during the dismantlement activities would be reseeded with appropriate grasses (as per guidance from the State of Wyoming). Erosion from wind and water runoff would not be a significant concern due to the small area affected, and because erosion control methods would be used where a concern about erosion exists (e.g., near a watercourse). No toxic constituents above levels of concern would be included in the plume (see Section 4.4.3).

Fill dirt may need to be brought to the sites from other locations. If the fill is excavated from existing borrow areas, no significant impact to vegetation or habitat would be expected. Excavating fill from a previously undisturbed area could affect wildlife habitat at that location. However, borrow pits must typically be approved through a county permitting process, and would be approved for the purpose of excavating fill. Topsoil may also be needed at some of the LFs, and may be obtained from borrow pit operators. If topsoil from new borrow pit sites would be needed, the impact would be dependent on the specific location, and the presence of valued habitat. Threatened or endangered plant species are protected by federal law and should not be impacted.

Removal of the azimuth markers and line-of-sight poles (performed by the Air Force at the request of the landowner), and removal of utility poles (performed by utility companies at their option), would disturb very small areas. Markers and poles removed from croplands would be conducted at the request of the landowner. Activities to remove those items would be brief and minimally intrusive. Impacts to vegetation would be only short-term and would not be significant.

4.4.5.2.2. Noxious Weeds

Although the former LF sites would be revegetated with grasses, which would help to control weed growth, additional measures to control weeds may be needed. For example, the Air Force would continue to spray for noxious weeds as needed, for as long as the LF or MAF sites are in caretaker status. Following dismantlement, the property would be turned over to the new landowner. This process may take an extended time, and during that time the Air Force would be responsible for ensuring that the sites would be controlled for noxious weeds. The Air Force may contract for the weed control. After final disposition of the land is determined, control of noxious weeds would become the responsibility of the new landowner. The LFs are currently weed-free and as long as noxious weeds are controlled, they would not have a significant impact on the environment.

4.4.5.2.3. Wildlife

Increased human activity and noise levels in the immediate vicinity of the MAFs or LFs could adversely affect resident or migratory wildlife in the deployment area. Resident wildlife would unlikely be temporarily displaced more than a few times due to the increased activity and noise. The potential of adverse impacts to resident wildlife would be greatest during the explosive demolition of an LF, when the sudden and loud noise of the explosion could startle wildlife. Some species are susceptible to noise and may abandon their young if disturbed. Nesting birds, for example, may leave their nests temporarily, which could expose the nest to greater levels of predation. The startle reflex is related both to the magnitude of the sound and the uniqueness of the sound.

The effects of demolition noise on wildlife, specifically migratory threatened or endangered species such as the peregrine falcon and bald eagle, have not been extensively studied. However, animal reactions to sudden noise, such as blasting, are believed to be similar to reactions to sonic booms. The effects of sonic booms and multiple event noise-producing activities on domestic animals and wildlife have received a considerable amount of attention. These multiple noise event studies are used in the analysis of potential noise effects from MAF and LF demolition.

Species differ immensely with regard to their response to noise. The effects can vary with a species' hearing ability, habitat variation, and noise source. Wildlife rely on their hearing ability to avoid predators, to communicate, and to find food. Their response can be determined by noise type and duration, time of day and year, animal's physical condition, environment, experience with similar noise events, and other stressors such as drought (USFWS, 1988).

A sudden or unfamiliar sound, such as the blasting noise, is believed to act as an alarm, activating the sympathetic nervous system. The sympathetic nervous system invokes physiological stress reactions and can cause a "fight-or-flight" reaction for many vertebrate species. The most common reactions to this alarm include trampling, head raising, jumping, running, and flying. A similar reaction would occur if a predator or competitor entered an individual's habitat area. When sonic booms occur, birds run, fly, or crowd. Reactions vary from boom to boom and are not predictable (USFWS, 1988).

A study was performed for the Idaho Power Company, the Bureau of Land Management, and the Pacific Gas and Electric Company on the response of the prairie falcon to impulsive noise (Russell, 1990). In this study, the falcons were exposed to peak sound levels between 129 and 141 decibels. Each aerie was exposed to an average of 90 events over a period of 62 days. Pre-event behavior was compared to post-event behavior. The falcons usually responded to the impulsive noise by continuing their pre-event behavior or by a short flight followed by their pre-event behavior. During the four-year study, there was no evidence of habituation (i.e., becoming accustomed) to the noise. Yet, the occupancy of the nesting areas exposed to the noise remained the same the year following the impulsive noise events. In general, this study found that construction and recreation activities lacked detectable adverse effects on nesting prairie falcons.

Data on the likely effects of low-level jets and sonic booms on nesting peregrine falcons and other raptors were gathered at areas in Arizona. Responses to extremely frequent and nearby jet aircraft were often minimal and never associated with reproductive failure. Nesting success and site reoccupancy rates were high for all areas. The birds observed were noticeably alarmed by the noise stimuli (82 to 114 dBA), but the negative responses were brief and apparently not productivity limiting (USFWS, 1988).

The Air Force has also conducted numerous studies of the effects of noise, specifically aircraft noise, on domestic and wild animals (USAF, 1991a; USAF, 1991b). Studies have identified the effects of short-term and sudden noise, such as sonic booms, and continuous noise, such as helicopters. The studies on free-ranging cattle (three studies that included 10,378 cattle) did not document any injuries as the result of sonic booms (near 140 dB). Horses (including various breeds) were shown to demonstrate increased aggression and startle responses at simulated aircraft noise of 100 dB and helicopter overflights at 50 meters. Although studies on sheep and goats were not conclusive, one study gave a threshold for high levels of response of 90 dB. Smaller animals, such as swine and mink, showed no statistically significant harmful trauma from the simulated overflights or sonic booms, although continuous noise does appear to have deleterious effects such as increased heart rate (USFWS, 1988).

The results of these studies suggest that little impact would be experienced by resident wildlife in the vicinity of the LFs or MAFs. Any disruption due to the increased activity and noise of the dismantlement would be short-term. The explosive demolition events would occur once at each site, and sites are located approximately four to seven miles apart. Therefore, no significant noise impacts to wildlife or domestic animals would occur.

Impacts to migratory waterfowl could be greater. The noise and human activities may have the highest potential to disturb waterfowl during the hunting season, when migratory

waterfowl are sensitive to gunshots. During much of their migration, waterfowl congregate in safe havens (such as national wildlife refuges (NWR) and State wildlife habitat management areas) to avoid hunting pressure. These areas provide sanctuary during the hunting season, and are areas where the sound of gunshots is distant. The effect of a loud and sudden blast at a NWR or State habitat management area may cause waterfowl to flee, adding stress and increasing mortality among those flocks. The Air Force should provide a blast schedule for the LFs to the Wyoming Game and Fish Department for notifying hunters to avoid the area.

To evaluate the potential to disturb sanctuary areas, the level of noise at the nearest wildlife areas that may be produced by a blast is calculated. The past explosive demolitions of LFs were monitored to determine the blast noise—the noise levels varied between about 110 and 130 dB at 500 feet (Mortenson, 1997). This sound level is about as loud as a civil defense siren at 100 feet (135 dB). Noise attenuates six dB by doubling distance, assuming that there are no obstructions that would absorb sound. There are no NWRs within Platte, Laramie, or Goshen Counties. Springer State Habitat Management Area is located two miles from LF S-9. A blast could generate a sound level of about 107 dB at the State management area. This assumes a worst case, with completely flat terrain, no attenuation (trees and brush can substantially attenuate sound), and an initial noise level of 130 dB. The sound level at the state habitat management area would be similar to that of the sound of a jackhammer or rock music concert. This sound level would not be the same as a shotgun blast at short range, but may be loud and sudden enough to startle waterfowl at the state habitat management area. Waterfowl hunting seasons in Wyoming typically start in September and continue into December. For some species of ducks and geese the season extends through mid-January. Explosively dismantling these sites would have the greatest adverse impact on waterfowl during that time; however, since no NWRs and only one wildlife management unit (Springer) is within two miles of a site, the impact would not be considered significant.

There are no sage grouse near any of the launch facilities (Zornes, 2000). Impacts to the sharp-tailed grouse are most likely to occur during breeding and nesting seasons that take place from March through June. Avoiding blasting at the LFs until after 9 a.m. from March through June would ensure that the sharp-tailed grouse are not impacted during their breeding season (Zornes, 2000). Since explosive demolition would occur once at each site, and the sites are located approximately four to seven miles apart, the action would not likely cause the hens to abandon their nests (Zornes, 2000). Impacts to the sharp-tailed grouse would not be significant.

Lagoons found at the MAFs are not near any wetlands. While the lagoons are managed for wastewater disposal, little actual use of these systems currently occurs, and no use of the lagoons would occur during caretaker status. The plans are to close the lagoons during the dismantlement process. Water, sludge, and soil samples would be taken and evaluated. If no constituents are above criteria levels, the sludge would be incorporated in the soil, clean fill added, and the sites would be leveled and seeded. If the lagoons were to remain as open waters (after being cleaned), they could provide beneficial habitat for area wildlife.

In heavily agricultural areas with no nearby wetlands, the value of the lagoons as wildlife habitat would be minimal.

The line-of-sight poles (marker posts for the HICS) may be used as convenient hunting sites for raptors or as display locations for songbirds. The poles are not located in quality wildlife habitat, and removal of the poles would not have a significant impact on birds or other wildlife. The Air Force will coordinate with the USFWS, Ecological Services, in Cheyenne regarding area surveys for raptor nests and roosts prior to dismantlement.

After construction activities are completed, the ambient noise levels would be similar to historical levels. Because Air Force activities would cease in the Peacekeeper deployment area, fewer wildlife disturbances would occur. Long-term impacts to wildlife would be negligible and not significant.

4.4.5.2.4. Threatened, Endangered, or Candidate Species

No known threatened or endangered species or candidate species inhabit the LFs or MAFs, or are found in the nearby vicinity of the missile facilities. Birds migrating through the area, such as the peregrine falcon or bald eagle, may be temporarily startled by the demolition noise, but no significant impacts are expected as a result of the noise (see Section 4.4.5.2.3). There is no water present at the LFs; therefore, the sites are not habitat for waterfowl. Sewage lagoons at the MAFs do receive minor use by aquatic avian species.

Following the demolition of an LF, a verification period of 180 days would be observed. After the first 90 days, sites would be revisited to perform some fill operations. An extended period of time may transpire before ultimate disposition of the sites. However, although the sites would be undisturbed during this time, the sites would not be conducive to threatened or endangered plant or animal residence (as described in Section 3.4.5.4). Consequently, no adverse effects to threatened or endangered species are projected to occur either during deactivation (short term) or when the sites are going through the disposal process (long term). The Air Force would coordinate with the USFWS, Ecological Services, in Cheyenne regarding species surveys (e.g., mountain plover, black-tailed prairie dog, swift fox, etc.) in the deployment area prior to dismantlement.

No activities are proposed that would result in water depletions to the Platte River system. Therefore, there would be no impacts to the species (whooping crane, Interior least tern, pallid sturgeon, or piping plover) dependent on flows of a certain magnitude.

4.4.5.2.5. Wetlands

Ground disturbance during dismantlement at the LFs and MAFs could increase soil erosion from wind and water runoff, having a short-term adverse impact on aquatic resources at sites where open waters are nearby. The nearest wetland to an LF or MAF is 750 feet (LF S-9, see Appendix N). This wetland and others in proximity to LFs would not incur direct impacts from dismantlement activities. It would not be necessary to fill any wetlands to complete the dismantlement action. Indirect effects from runoff of sediments and pollutants from dismantlement activities could occur. Proper management practices would need to be implemented to minimize runoff. Indirect disturbance of wetlands caused by

runoff would not result in significant adverse impacts, because the runoff flows across well-vegetated areas.

Each MAF has a wastewater lagoon that would be closed (i.e., sampled, drained, and filled). The lagoons have two cells, and were originally built by excavating and removing most soils. Some of the soils were used to create a berm for the lagoons. None of the sewage lagoons are classified as wetlands. The lagoons are located at a great enough horizontal distance or upgradient from wetlands to preclude direct impacts, given normal construction techniques. The Air Force plans to close the lagoons in place by landfarming. If the sample results indicate tested constituents above a level of concern, other options (such as restoration) could be implemented.

If borrow is taken from an area of natural recharge, an impoundment or wetland could be created, resulting in beneficial new or enhanced wildlife habitat in the immediate vicinity. Because existing borrow pits are likely to be used, it is unlikely that the pits would be excavated to the extent that they fill with water.

4.4.5.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. It is unlikely that biological resources would experience significant adverse effects by the mechanical demolition of the headworks. No biological resources of note are found at the LFs. The use of equipment for mechanical demolition of the headworks (e.g., jackhammers, crane, and backhoe with chisel) would occur over a longer period of time, and would generate substantial noise. A jackhammer, for example, produces 105 dB. The sound associated with this equipment would decrease to 82 dB at the Springer Wildlife Habitat Management Area (assuming normal attenuation). In addition, this type of noise would be more constant, and typical (similar to farming equipment) of the area. Wildlife would likely experience less of a startle effect than would occur with an explosion. Over time, the startling effect would decrease because a normal pattern of demolition activity would be established. Impacts to domestic animals and wildlife from mechanical demolition are not anticipated to be significant. The nearest wetland to an LF is 750 feet. Wetlands could be adversely impacted by siltation from soil stored near or outside of the fenced area of the LFs. Impacts would generally not be significant if best management practices, such as siltation barriers, were used.

Removal of the Hardened Intersite Cable System. Significant adverse impacts to biological resources from removing the HICS could occur because of increased soil erosion and human disturbance throughout the deployment area. The HICS traverses much of the deployment area, including fields, natural undeveloped areas, rivers, and wetlands. Removing the HICS would require equipment such as backhoes, cranes, dump trucks, and flatbed trucks. The use of this equipment would disturb areas and adversely affect wildlife. In particular, nesting or migrating birds could be stressed during the spring, early summer, and fall seasons in wetlands or other natural undisturbed areas. Consultation with the USFWS and Wyoming Game and Fish Department would be required if this Implementation Alternative would occur. There are numerous locations where the HICS crosses small streams or rivers. Disturbing soils in the vicinity of streams or open water could cause substantial erosion that would impact aquatic species. It would also be

necessary for the vehicles and equipment to travel across the fields where the HICS is buried; these activities could cause soil erosion and crop damage, and disturb domestic animals and wetlands. Noxious weeds could become established in disturbed areas, unless the trenched areas were regraded and seeded as soon as possible after pulling out the cable. Section 4.4.5.2.2 addresses Air Force management of noxious weeds. The Air Force would have the dismantlement contractor follow noxious weed management requirements of the Wyoming Department of Agriculture, Weed and Pest Control District.

4.4.5.4. Potential Impacts of the No Action Alternative

The current impacts to biological resources within the deployment area and at F.E. Warren AFB are not significant. Missile maintenance does not involve ground disturbance or demolition. The No Action Alternative would have no significant impact on biological resources, and result in the continued minor disturbances caused by ongoing (but decreasing) maintenance activities.

4.4.5.5. Mitigation Measures

Proposed Action: No significant impacts to biological resources are projected to occur from implementing the Proposed Action. This section includes proposed mitigation measures to avoid or minimize adverse impacts to biological resources, including wetlands.

- Avoid blasting at LF S-9 during peak fall migration due to the high volume of birds and the potential for startling the birds into flight along hunting areas. Blasting should also be scheduled to avoid impacting breeding and nesting waterfowl near this site.
- Avoid blasting prior to 9 a.m. from March through June at all sites to avoid impacts to the sharp-tailed grouse during breeding and nesting seasons.
- Coordinate with the USFWS regarding surveys of raptor nests and roosts, and threatened, endangered, or candidate species within the Peacekeeper missile system deployment area.
- Ensure that noxious weed control is maintained at completed sites awaiting disposition.

Mechanical Demolition Alternative: The following mitigations would avoid or minimize adverse impacts to biological resources:

- Use siltation controls to avoid siltation of nearby streams and wetlands from soil stockpiled during excavation.
- Ensure that noxious weed control is maintained at completed sites awaiting disposition.

HICS Removal Alternative: The following mitigations would be required to reduce or avoid adverse impacts:

- Avoid nesting areas of threatened and endangered species.
- Leave the HICS in place under streams, or control siltation while removing the HICS.

- Refill the trenches after removal of the HICS, compact the soil, and reseed with native grasses as soon as possible to avoid the establishment of noxious weeds.
- Implement sediment control measures where the HICS would be removed near wetlands.

4.4.6. CULTURAL RESOURCES

Excavation, grading, and soil compaction for demolition necessary to support the proposed dismantlement action would not likely degrade archaeological resources because the dismantlement would occur on areas of previously disturbed ground on the Peacekeeper sites. It is unlikely any degradation or destruction of non-Peacekeeper system structures listed or eligible for listing on the National Register of Historic Places (NRHP) would occur within the deployment area. The Air Force will coordinate the Historic American Building Survey (HABS)/Historic American Engineering Record (HAER) documents for the Peacekeeper missile system with the Wyoming State Historic Preservation Office (SHPO); any additional mitigation would be determined through the Sections 106 and 110 consultation process. A Programmatic Agreement is being prepared to provide mitigations for the Air Force, SHPO, and Advisory Council to accomplish mitigation of adverse effects from dismantling the Peacekeeper missile system. Under the Proposed Action or Implementation Alternatives, impacts to Cold War resources would be adverse, but not significant with mitigation. No impacts to Native American activities or resources are projected to occur. The No Action Alternative would not affect cultural resources. The Implementation Alternatives would take place on previously disturbed land and would likely not impact unknown cultural resources.

4.4.6.1. Analysis Methods

Existing data, including publications and previously written environmental documents, were reviewed to determine the extent and value of cultural, archaeological, and paleontological resources that may be affected on base and in the deployment area. The base Cultural Resources Management Plan and a Technical Report for cultural resources associated with the Peacekeeper Program prepared for F.E. Warren AFB (including the deployment area) were reviewed. The analysis focused on the locations of the Peacekeeper sites in relation to locations of known cultural resources. The SHPO was consulted for technical assistance in identifying resources of specific concern or value in the missile deployment area. Appendix C and Chapter 8 include correspondence with the SHPO.

Significance Criteria. The criteria used to determine the significance of impacts on cultural resources includes the effects of NRHP eligibility, future research potential, or suitability for religious or traditional uses. An impact would be significant if it resulted in the physical alteration, destruction, or loss of a resource listed or eligible for listing in the NRHP, or considered important to Native American groups. An adverse impact would not be significant if only slight portions of the resource were affected or if the value of the resource is not very important. No impact would occur if the resource remained unchanged or if a resource element was not present. The impact of the action would be beneficial if it protected or reconstructed the resource.

Only significant cultural resources warrant consideration with regard to adverse impacts resulting from a Proposed Action. To be considered significant, archaeological or architectural resources must meet one or more of the criteria (as defined in 36 CFR 60.4) for inclusion on the NRHP.

4.4.6.2. Potential Impacts of the Proposed Action

During deactivation of the LFs and MAFs, vehicles would travel through the deployment area to remove missiles and various components from missile sites. These activities at LFs and MAFs would place sites in caretaker status. These activities would take place on existing roads and highways and at the LFs and MAFs.

Most LFs and MAFs are not within areas viewed as high-density zones for archaeological resources, such as areas adjacent to streambanks, river terraces, or vertical changes in topography. The dismantlement activities proposed at the LFs and MAFs would occur primarily within the security fences in previously disturbed terrain. Because the LFs, MAFs, and right-of-way areas have been extensively disturbed and modified over the years, the likelihood of revealing or affecting intact resources in the immediate area is negligible. No significant impacts are anticipated. Other than the MAFs and LFs themselves, no other NRHP listed site or structure is located on LF or MAF property.

The need for fill dirt at the LFs and MAFs could affect archaeological resources at the borrow areas. In an area with unknown cultural, archaeological, or paleontological resources, some fill could be excavated before the resources are recognized. It is possible that a very localized resource could be destroyed by excavation before its characteristics and significance have been surveyed and recorded. However, previously unrecorded resources could be exposed as fill dirt is excavated. Recording of these sites and documentation of any discovered artifacts would be a beneficial impact. Because the fill is planned to be procured from commercial borrow sites, it is unlikely that cultural resources would be disturbed. In the event of a previously unrecorded find at a commercial borrow site, an archaeologist should be notified to look at the find.

The modifications to the LFs and deployment of the Peacekeeper missile were significant in the history of Wyoming and the United States. The complete dismantlement, demolition, and removal of the Peacekeeper system in the F.E. Warren AFB vicinity would be an irretrievable loss of an historic resource, and an adverse impact. However, the Peacekeeper system is essentially a modified MM III system, and there still would be three MSs active (total of 150 LFs and 15 MAFs). There are also Peacekeeper test facilities (constructed as research and design) still intact at Norton AFB, CA. The impact of dismantlement would be partially mitigated through ongoing preparation of HABS/HAER recordation of the Peacekeeper missile system. The Air Force has also reviewed the Inventory of Cold War Properties prepared for F.E. Warren AFB and other documentation regarding retention of Minuteman sites at Ellsworth AFB, Whiteman AFB, and Grand Forks AFB. The Air Force will coordinate the HABS/HAER recordation with the SHPO. The Air Force has initiated Sections 106 and 110 consultation with the SHPO and the Advisory Council on Historic Preservation to determine the appropriate level of mitigation for this project. A Programmatic Agreement is being prepared to provide stipulations for

the Air Force, SHPO, and Advisory Council to accomplish mitigation of adverse effects from Peacekeeper missile system dismantlement.

Few Native American resources are known or expected to occur in the direct impact area of the LFs or MAFs. As discussed in Section 3.4.6, no traditional or current cultural use sites were identified within the deployment area. The Proposed Action would have no impact on Native American resources or activities.

4.4.6.3. Potential Impacts of the Implementation Alternatives

Mechanical Demolition of the Headworks. It is unlikely that significant impacts to unknown cultural resources would occur under this alternative. The use of equipment for mechanical demolition of the headworks (jackhammers, crane, and backhoe with chisel) would cause less ground shaking to the area surrounding the LF, but of a larger duration, than the use of explosives. This alternative might further reduce the slight potential to disturb historical structures or unknown archaeological resources. Excavation would occur to a wider extent than under the Proposed Action, but occur within previously disturbed areas. Sections 106 and 110 consultation (as described under the Proposed Action) would also be relevant for this alternative.

Removal of the Hardened Intersite Cable System. No significant impacts to unknown cultural resources are anticipated from this alternative. Removal of the HICS would require the use of a backhoe, crane, dump truck, and flatbed truck. This equipment would be used to excavate a trench in soil to help remove the HICS. Locations and general characteristics of cultural resources along the HICS path were documented during surveys in 1983 and 1984. Sixteen prehistoric archaeological sites were found during the surveys. This alternative would not likely damage any cultural resources because the ground was previously disturbed during the original installation of the HICS. In the event of an unexpected discovery, the Air Force would comply with 36 CFR 800.11. This statute, established by the Advisory Council on Historic Preservation regulations for the Protection of Historic Properties, includes provisions for emergency discoveries of historic and archaeological resources. Sections 106 and 110 consultation (as described under the Proposed Action) would also be relevant for this alternative.

4.4.6.4. Potential Impacts of the No Action Alternative

The current impacts to cultural resources are not significant. The continuation of maintenance activities would not involve ground disturbance; therefore, there would be no impacts on cultural resources within the deployment area. The Peacekeeper missile system would not be dismantled and no SHPO consultation would be required.

4.4.6.5. Mitigation Measures

Proposed Action: Cultural resources that are listed, or eligible for listing, in the NRHP are protected under specific Federal laws. The following mitigations are required to implement the required protection:

- The Air Force will coordinate the HABS/HAER documents being prepared for the Peacekeeper missile system with the SHPO.

- In addition, the Air Force will continue Sections 106 and 110 consultations with the Wyoming SHPO and the Advisory Council on Historic Preservation to determine the appropriate level of mitigation for this project. A Programmatic Agreement is being prepared to provide stipulations for accomplishing mitigation for the adverse effects of the Peacekeeper dismantlement.

Mechanical Demolition Alternative: The mitigations specified under the Proposed Action are also applicable for this alternative.

HICS Removal Alternative: The mitigations specified under the Proposed Action are also applicable for this alternative.

4.5. COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, STATE, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS

The Proposed Action would be compatible with the existing Federal, state, and local land use plans, policies, and controls. The Proposed Action or Implementation Alternatives would occur in rural areas on properties that currently are owned and operated by the Air Force. After the dismantlement activities are complete, the sites will go through a disposition process, with the opportunity for owners that own the surrounding land to purchase the sites for their use.

4.6. RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The Proposed Action would involve the use of previously developed areas. No croplands, pastureland, wooded areas, or wetlands would be modified or affected as a result of implementing the Proposed Action and, consequently, productivity of the area would not be degraded. The Implementation Alternative that would remove the HICS would likely disturb croplands, pastureland, wooded areas, and wetlands. Although the HICS removal would result in adverse short-term use of the environment, the impact would be limited in area and duration, and the long-term productivity of the area would not be degraded.

4.7. CUMULATIVE IMPACTS

Cumulative impacts are those changes to the physical, biological, and socioeconomic environments that would result from the Proposed Action or an Implementation Alternative in combination with reasonably foreseeable actions. Significant cumulative impacts could result from impacts that are not significant individually, but when considered together, are collectively significant. However, there would be no significant cumulative impacts from the Proposed Action or an Implementation Alternative.

Impacts from landowners removing marker posts could create minor disturbances such as erosion in the same general area as the LF dismantlement. Landowners would be allowed to remove the marker posts after the restrictive easement for the HICS have ended. Due to the timeframe for dismantlement, landowners could remove marker posts in one area of the deployment area while LFs in another part of the deployment area are being imploded. The distance between sites and the likely different timeframe for the activities minimizes the

potential for cumulative impacts when considered in conjunction with the Proposed Action. Further detailed discussion of landowner activities, and potential impacts by resource area, are not speculated for this analysis because of the uncertainty of the activities.

Socioeconomics. The recent relocation of 350 personnel associated with the 4th Command and Control Squadron (formerly the 721st Mobile Command and Control Squadron) to F.E. Warren AFB would offset any adverse impacts in the Residence ROI (Laramie County) related to the loss of population or employment from the Peacekeeper action. There could be a short-term, but not significant, cumulative impact to incoming personnel due to the limited availability of affordable housing in the Cheyenne area. There could also be a short-term, but not significant, cumulative impact to LCSD1 because many of its school facilities are at capacity, and additional students would strain the already crowded classrooms at some schools. There would be similar cumulative impacts if a sizable number of employees, who were similar to F.E. Warren AFB personnel in income and number of school-age children, were to relocate to any local business or government agency.

Construction of the MM III Service Complex would require additional construction workers. These workers would be derived from the local labor force, or would commute from Denver or other urban areas. Consequently, no significant cumulative impacts to the construction economy are anticipated. It is not expected that any noticeable number of construction employees would relocate to the Cheyenne area. No new personnel would be required for operation of this facility, the same personnel already working on base in other MM facilities would occupy this facility.

Environmental Justice. No environmental justice impacts are projected for the Proposed Action. Construction of the 4th Command and Control Squadron Facility and the MM III Service Complex would occur on base and would not result in adverse environmental justice impacts. Consequently, no significant cumulative environmental justice impacts would occur from implementing the Proposed Action.

Transportation. Construction at F.E. Warren AFB to support the 4th Command and Control Squadron facility, the MM III Service Complex, or for modification of Peacekeeper facilities, would involve the transportation of workers and government personnel. However, it is unlikely that cumulatively significant impacts to the transportation network would occur, given that the Peacekeeper dismantlement would occur within the deployment area. Deactivation activities would involve traffic from the base to the deployment area, but estimated levels of traffic for the Proposed Action or an Implementation Alternative are not projected to result in a significant cumulative impact to on-base traffic.

Land Use. Cumulative land use impacts are not expected, as construction and modification of facilities on base would be in accordance with existing plans and would occur separate from activities in the deployment area.

Hazardous Material and Waste. No significant cumulative impacts to hazardous material and waste management are likely to occur from construction of the 4th Command and

Control Squadron Facility, the MM III Service Complex, and minor modifications to Peacekeeper facilities in conjunction with dismantlement activities. Waste amounts generated on base would not change and would be handled at base facilities; thus, there would be no cumulatively significant effect on waste disposal at public landfills.

Geologic Resources. No cumulative impacts on geologic resources would occur from construction activities at F.E. Warren AFB and in the deployment area, due to the geographic separation of the areas and the abundance of resources (such as fill) in the area. No on-base disturbances of geologic resources are planned for the Proposed Action, so other on-base activities affecting soils and geology would not cause significant cumulative impacts.

Water Resources. On-base construction activities and use of new facilities for the 4th Command and Control Squadron facility and the MM III Service Complex, in conjunction with the recent 3 percent increase in personnel, would not cause cumulatively significant water resource impacts. Water usage in the deployment area would decrease as facilities are placed into caretaker status and personnel are no longer present. No floodplains would be affected by the Proposed Action, so there would be no significant cumulative impacts to floodplains. The distance between sites and the likely different timeframe for the activities minimizes the potential for cumulative impacts to groundwater, surface water, and water quality.

Air Resources. The potential for cumulative impacts to air quality would be slight because of the temporary nature of air emissions. The distance between the deployment area and the base, and the good air quality of the area, would prevent any cumulative impacts, even considering construction of the 4th Command and Control Squadron facility, the MM III Service Complex, and other potential construction projects at F.E. Warren AFB. Given the good air quality, dispersive conditions, and distance between sites, as well as the likely different timeframes of the activities, no significant cumulative impacts would occur to air quality.

Noise. No cumulative noise impacts would occur. Impacts from the Proposed Action in conjunction with construction activities on base for the 4th Command and Control Squadron facility, the MM III Service Complex, and other base renovations that may occur at the same time would not cumulatively affect the ambient noise environment, because the same receptors would not likely be affected by all events. Construction noise on F.E. Warren AFB would be typical of other base activity sounds. Therefore, long-term adverse impacts from cumulative noise would be unlikely.

Biological Resources. No cumulative impacts are likely to occur from the construction of the 4th Command and Control Squadron facility and the MM III Service Complex on base since they are geographically separated from the deployment area. While the disposition of Peacekeeper facilities has not been determined at this time, it is possible they would be reused by other base functions. No on-base disturbances of biological resources are planned under the Proposed Action. No significant cumulative impacts to biological resources would occur.

Cultural Resources. No cumulative impacts are likely to occur from the construction of the 4th Command and Control Squadron facility and the MM III Service Complex on base, since they are geographically separated from the deployment area. While the disposition of Peacekeeper facilities has not been determined at this time, it is possible they would be reused by other base functions. Abandonment of existing MM III facilities after the new Service Complex is constructed would be coordinated with the SHPO as required by Sections 106 and 110 consultation; since Peacekeeper facilities would likely be reused there would be no cumulative impacts. No significant cumulative impacts to cultural resources would occur.

4.8. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Action or Implementation Alternatives would require the use of fill materials at the LFs and MAFs. These materials, as well as other construction materials (such as concrete and rebar), would be irretrievably committed. The Proposed Action or Implementation Alternatives would also irretrievably consume economic resources, electrical energy, and various types of fuel from construction activities.

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CHAPTER 5

CONSULTATION AND COORDINATION

5. CONSULTATION AND COORDINATION

The Federal, State, and local agencies or organizations that were contacted during the course of preparing this Environmental Impact Statement are listed below.

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U.S. Air Force, F.E. Warren AFB, Wyoming
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U.S. Senate, Washington, D.C.
U.S. Army Corps of Engineers, Omaha District, Omaha, Nebraska
U.S. Environmental Protection Agency, Region VIII, Denver, Colorado
U.S. Department of Transportation, Federal Highway Administration, Wyoming Division
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    Federal Lands Highway Projects, Lakewood, Colorado
U.S. Department of Agriculture
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    NRCS, Wheatland, Wyoming
U.S. Department of the Interior
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State Agencies

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Wyoming Department of Agriculture, Cheyenne, Wyoming
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County Commissioners, Laramie, Goshen, and Platte Counties
Platte County Road and Bridge, Wheatland, Wyoming
Goshen County Road and Bridge, Torrington, Wyoming
Platte County Soil Conservation Service, Wheatland, Wyoming
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Laramie County Health Department, Cheyenne, Wyoming
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Rural Electric Company, Pine Bluffs, Wyoming
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CHAPTER 6

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6. LIST OF PREPARERS

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CHAPTER 7

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CHAPTER 8

PUBLIC COMMENTS AND RESPONSES

8. PUBLIC COMMENTS AND RESPONSES

8.1. INTRODUCTION

The Air Force has complied with the National Environmental Policy Act (NEPA) mandate of public participation in the environmental impact analysis process primarily in three ways:

- Scoping meetings were held to solicit input from the public regarding their concerns. The meetings were held in three locations (see Section 1.4.1). Section 1.4.1 includes a summary of issues raised during the public scoping period. Letters were also sent to Federal, State, and local agencies and civic leaders apprising them of the Proposed Action and soliciting their comments. Appendix C includes an example letter sent to public representatives, agencies, and other interested parties, and letters and comments received in response. Concerns received both verbally at the scoping meetings and in writing during the scoping period were reviewed, and addressed within the EIS.
- A Draft Environmental Impact Statement (DEIS) was prepared and made available for public review and comment on June 30, 2000;
- Public hearings were held to present the findings of the DEIS and invite public comments. The hearings were held at three locations (see Section 1.4.2). Section 1.4.2 includes a summary of issues raised during the public review period.

Public comments received both verbally at the public meetings and in writing during the response period have been reviewed and are addressed by the Air Force in this chapter.

8.2. ORGANIZATION

This Public Comments and Responses chapter is organized into several sections, as follows:

- The introduction, which describes the process, organization, and approach taken in addressing public comments;
- An index of commentors;
- A full transcript of the public hearing held in Cheyenne on July 31, 2000, and the public comment portion of the transcripts for the public hearings held in Wheatland on August 1 and Torrington on August 2 (because a script was used for the hearings, unnecessary duplication was eliminated for this document by excluding the identical portions of the transcripts);
- Photocopies of all written comments received;
- A consolidated comment-response document.

Comments that were similar in nature or address similar concerns have been consolidated to focus on the issue of concern, and a response is provided that addresses all of the similar comments. Some comments simply state a fact or opinion. For example, "the DEIS

adequately assesses the impacts on [a resources area]." Such comments, although welcome, do not require a specific response and are not addressed in this document.

Each transcript and comment letter were assigned an identification number that appears in the upper right-hand corner of their first page. The comments are indicated by a code along the left margin of the comment. A three-digit code was used for comments made during the public hearings, and a two-digit code was used for written comments received during the comment period. The first transcript is identified as document "1", the first commentor is designated as commentor "a", and the first comment is coded as "-1". For example, the first comment for the first public hearing would be designated as "1a-1". The comment letters generally were placed in order with letters from Federal Agencies being presented first, followed by those from United States agencies and representatives, State agencies, then private organizations. Following the previously mentioned coding scheme, the first comment number in the first comment letter is designated as "4-1".

Table 8.2-1
Index of Commentors, Public Comment Period

Number	Commentor	Date
1.	Cheyenne Public Hearing	July 31, 2000
2.	Torrington Public Hearing	August 1, 2000
3.	Wheatland Public Hearing	August 2, 2000
4.	US Environmental Protection Agency, Region 8	August 17, 2000
5.	State of Wyoming Office of Federal Land Policy	August 14, 2000
6.	Wyoming Game and Fish Department	July 19, 2000
7.	The State of Wyoming Department of Environmental Quality	August 11, 2000
8.	State of Wyoming Office of Federal Land Policy	August 16, 2000
9.	Wyoming State Historical Preservation Office	August 14, 2000
10.	Mr. Scott Kamber (Representing Self)	August 12, 2000
11.	Ms Mae Kirkbride (Representing Self)	August 22, 2000
12.	US Department of the Interior, Fish and Wildlife Service, Office of Environmental Policy and Compliance	September 7, 2000
13.	State of Wyoming Department of Transportation	August 16, 2000; Received September 15, 2000

PEACEKEEPER MISSILE SYSTEM DEACTIVATION AND DISMANTLEMENT

F.E. WARREN AIR FORCE BASE, WYOMING

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC HEARING

6:30 p.m., Monday

July 31, 2000

1700 West Lincolnway

Cheyenne, Wyoming

ORIGINAL

P R O C E E D I N G S

(Public hearing proceedings commenced 6:35 p.m., July 31, 2000.)

COLONEL MCSHANE: Good evening, ladies and gentlemen. I would like to go ahead and get started now.

I would like to welcome you to the first of three public hearings for the deactivation and dismantlement of the peacekeeper ICBM missile system based out of F.E. Warren Air Force Base.

I am Colonel Mike McShane, the Chief Trial Judge of the Air Force. I'm stationed with the Trial Judiciary Division of the Air Force Legal Services Agency located at Bolling Air Force Base in Washington, D.C. My main job is to preside over Air Force courts martial.

I will be the hearing officer for this evening's hearing. Tonight we will present an overview of the environmental process and summarize the potential impacts of the dismantlement action.

We have with us this evening Major Jeffrey Rammes of Headquarters Air Force Space Command located in Colorado Springs, Colorado, who will present an overview of the missile system deactivation and dismantlement.

Also attending is Mr. George Gauger of Headquarters Air Force Center for Environmental Excellence located in San Antonio, Texas. Mr. Gauger will discuss

the environmental impact analysis process and summarize the potential environmental impacts as presented in the Draft EIS.

Major Rammes and Mr. Gauger will be involved throughout this entire process to address public concerns about the environmental issues associated with the deactivation and dismantlement action.

In accordance with the National Environmental Policy Act, or NEPA, the Air Force has prepared a Draft Environmental Impact Statement, or EIS. The Draft EIS analyzes the potential impacts to the biological, physical and human environment from deactivation and dismantlement of the Peacekeeper missile system. The purpose of this hearing is to receive inputs on the Draft EIS from public agencies, from private or nonprofit organizations and from any interested citizens.

This hearing is intended to provide a means of communication between you and the Air Force on the potential impacts of the deactivation and dismantlement action, with the overall objective of improving the decision-making process.

This hearing will begin first with presentations by the Air Force dealing with the deactivation and dismantlement action and the environmental impact analysis process, with a summary of the subsequent findings in the

Draft EIS.

The second part of the hearing is for you to provide the Air Force with information or to make a statement for the record. Your input will provide the decision-makers with the benefit of your knowledge of the local area and any environmental effects, whether adverse or beneficial, that you think may result from the deactivation and dismantlement action.

This hearing will not be a debate, nor is it a referendum or a vote on the dismantlement action itself. Those types of discussions will not generate a worthwhile written record and will simply consume your opportunity for input to the decision-making process.

With this in mind, I would like to make a few administrative comments. First of all, if you wish to speak tonight I ask that you fill out one of the cards like this that were located at the registration table as you came into the room. From those cards I will call your name for you to come forward and state your comments.

If you did not pick up a card and would like to make a comment tonight, please raise your hand and one of our representatives will bring you a card.

Please use the microphone located in the center of the room so that everyone will have a chance to hear your comments. Begin your comment by stating your name,

address and who you are representing tonight, such as a public office or agency, an organization, or yourself.

For other members of the audience, please be courteous and do not talk while the recognized speaker is speaking.

Please limit your comments to five minutes to ensure that everyone who wishes to provide input can do so. After everyone has had the opportunity to comment, I will then address the audience to see if anyone would like to speak again.

We have a court reporter and a tape recorder here to ensure that everything said tonight is documented. This process allows the record to show your concerns as they were stated so that your concerns are accurately and completely addressed in the environmental process.

If you have proposed a statement, you may read it out loud, leave a copy of it with us, or both. Regardless of your choice, your statement will become a matter of public record and will be completely evaluated as part of this environmental process.

If you later decide to make a comment after this hearing or have additional considerations, we encourage you to send your written comments to the address shown on the screen and also indicated on the comment sheet. If you want your comments to be included in the record and

considered in the process, they must be received no later than August 14th, 2000.

I will continue with an explanation of the environmental impact analysis process, and the role you, the public, play in assessing the deactivation and dismantlement action on the local environment.

The presentation tonight will focus on three areas of the environmental impact analysis process: First, an explanation as to why the Air Force prepared an EIS for this deactivation and dismantlement action, and how this public hearing and your comments fit into the NEPA process; second, an overview of the deactivation and dismantlement action; and last, a summary of the potential environmental impacts as presented in the Draft EIS.

The National Environmental Policy Act of 1969 -- commonly known as NEPA -- is our basic national charter for the protection of the environment. NEPA requires all federal agencies to analyze the potential environmental consequences of major federal actions that may significantly affect the quality of the human environment.

For example, we have evaluated the environmental consequences of the deactivation and dismantlement action on areas such as air quality, water quality, biological and cultural resources and the socioeconomic environment.

There are different levels of environmental

analysis that a federal agency is required to conduct depending upon the size and the complexity of a federal action. Because the deactivation and dismantlement action based out of F.E. Warren is a major federal action which may involve the use of explosive demolition, the Air Force has determined that the most comprehensive level of analysis will be necessary.

This level of analysis is an environmental impact statement, or EIS. Public participation is an important component of NEPA. Public input is solicited at the beginning of the process and again in response to the Draft EIS.

This environmental process began in June 1999 when the Air Force published a Notice of Intent in the Federal Register to prepare an EIS for the deactivation and dismantlement of the Peacekeeper missile system.

In June 1999, three scoping meetings were held -- one in Cheyenne, one in Wheatland, and one in Torrington -- to obtain input from agencies, organizations and the public on the scope of issues and to identify the key issues related to the deactivation and dismantlement action.

A Draft EIS was then prepared in accordance with NEPA. The Draft EIS was filed with the Environmental Protection Agency and a Notice of Availability was

published in the Federal Register on June 30th, 2000. The public comment period will continue until August 14th, 2000.

Again, if you choose not to make a verbal or written statement tonight and later want to comment, or if you have additional input after making comments at tonight's hearing, your comments may be sent to this address and will be accepted until August 14th, 2000.

All comments received through August 14th, including any noted tonight, will be reviewed and will be given equal consideration in evaluating and determining the implementing procedures and mitigation measures the Air Force will take.

In addition -- excuse me.

If necessary, additional analysis will be performed and the EIS will be changed to reflect the comments received and the results of any new analysis.

In the Final EIS a response will be given to all comments that are received. The Final EIS will be distributed to local libraries and to those who are on the mailing list for the Draft EIS. If you are not on this mailing list and you want to receive a copy of the Final EIS, you can request a copy from this address or indicate on a comment card that you would like a copy. The Final EIS is scheduled for completion in October 2000.

The decision on implementing procedures and mitigation measures for the deactivation and dismantlement of the Peacekeeper missile system will be based on inputs from the Final EIS. The Air Force Record of Decision scheduled for December 2000 will include those measures that will be taken to avoid or minimize environmental harm.

At this time I will call on Major Rammes.

MAJOR RAMMES: Thank you, sir.

Good evening, ladies and gentlemen. I'm Major Rammes from Headquarters Air Force Space Command.

The purpose of this Proposed Action is to deactivate and dismantle the Peacekeeper missile system at F.E. Warren Air Force Base to comply with the Strategic Arms Reduction Treaty II or START II as modified by the Helsinki Agreement of September 1997. To meet START limitation on warheads and launchers, the Department of Defense has been demolishing particular Intercontinental Ballistic Missile systems.

To meet START requirements for elimination of ground-based ICBM launchers, the dismantlement must involve explosive demolition of the launcher headworks to a depth of 20 feet, or mechanical demolition to a depth of 26 feet.

The F.E. Warren Peacekeeper missile system

includes 50 launch facilities, or LFs, and 5 missile alert facilities, or MAFs, which are operated and maintained by the 400th Missile Squadron, part of the 90th Space Wing.

After ratification of START II, the Proposed Action would occur in four phases. Phase 1 consists of removal of the missiles, including the reentry system, missile guidance system and rocket engines.

Phase 2 involves removal of classified components, reusable components and hazardous materials and wastes.

Phase 3 is the actual dismantlement of the LFs and the MAFs.

Phase 4 involves disposal of the LFs' and MAFs' real property.

Phase 1 is the removal of the missiles from the LFs. Movement of the missiles would be consistent with what is being conducted for failures and age surveillance, as well as test launching at Vandenberg Air Force Base, California. One missile would be removed approximately every three weeks. The rocket engines would be transferred to Hill Air Force Base, Utah primarily by rail transport, with road transport used for the remaining stages.

Phase 2 is the removal of the salvageable items from the LFs and MAFs. Ordnance would be removed and

transported to the munitions area on F.E. Warren. Classified items would be recovered from the LFs and MAFs, and office and living quarter items would be recovered from the MAFs.

Air Force personnel would drain fluids from the fueling, coolant and hydraulic systems, remove electrical filters and switches and remove power supply batteries. Air Force security teams would perform periodic security checks of each location during site deactivation.

Following deactivation activities, the gates would be secured and the sites would be placed in caretaker status. Operation of the environmental control systems would be discontinued at the sites during caretaker status, but sump pump and cathodic protection operations would be maintained to prevent damage to the facilities until dismantlement or other final disposition occurs.

Most of the Department of Defense personnel affected by the deactivation of the Peacekeeper missile systems at F.E. Warren are the officers, enlisted personnel and civilians associated with the Peacekeeper program. Approximately 220 positions at F.E. Warren would no longer be authorized after the fourth quarter of fiscal year 2007, following a three-year deactivation period.

To understand the dismantlement process, it is

necessary to understand the components of a launch facility (LF). The launcher and associated launcher equipment building are enclosed within a security fence on a site that is about 1.6 acres in size. This illustration shows the launcher closure door, headworks, launcher equipment room, launcher tube and launch facility support building.

The contractor would commence dismantlement activities by removing salvageable items and various hazardous materials such as diesel fuel and ethylene glycol from the LF and launch facility support building. All underground fuel storage tanks at the LFs would be drained and closed by removing or filling with insert materials. Dismantlement would include explosive demolition of the headworks to the depth of the launcher equipment room floor.

To meet Strategic Arms Reduction Treaty, or START, requirements, the dismantlement must involve explosive demolition of the launcher headworks to a minimum depth of 6 meters, 19.5 feet, or mechanical demolition to a depth of 8 meters, about 26 feet.

Explosive demolition would involve the minimum amount of explosives necessary to cause an implosion of the concrete and steel into the launcher tube. Mechanical demolition would involve the use of jackhammers, crane and

backhoe with chisel. The Proposed Action would involve the explosive demolition of all 50 LFs.

The next phase of the process would be a 90-day observation verification period required by the START II Treaty. The verification process would be conducted through satellite reconnaissance. Before verification, a contractor would place a 2-foot-thick, 14-foot-diameter concrete cap over the launch tube at a depth of approximately 28 feet.

After verification, the remaining excavations would be filled with rubble and gravel, backfilled, compacted and contoured to leave a slightly mounded gravel surface to meld with existing gravel contours.

A missile alert facility is located within a fenced area averaging about 5.5 acres. This slide shows the main features of a MAF, including the launch control support building, elevator, launch control center, launch control equipment building, underground diesel fuel tank and aboveground storage tanks. A sewage lagoon is located outside the fenced area. Dismantlement of a MAF would include removing any remaining hazardous materials from the facilities and retrieving salvageable materials such as scrap metal. The sewage lagoons at the MAFs would be sampled and closed in accordance with federal and state regulations. There is one water well at each MAF, with

the exception of one site, Sierra 1, which has two water wells. Water well closures would be in accordance with state requirements.

The dismantlement contractor would be allowed to salvage items from the launch control center and launch control equipment building after the Air Force removal operations are complete. Reusable components of the radio antennas would be salvaged. Surface antenna structures would be filled with gravel or other inert fill and the openings sealed. After salvage operations, the blast door to the launch control center and the launch control equipment building door would be welded shut.

The elevator, elevator structure, controls, motor and all structural steel stairs, platforms and supports would be removed from the elevator shaft. These items would be dismantled for removal through the service door. An option would be to remove the elevator motor and leave the rest as rubble. The vestibule in front of the launch control center door and the entire elevator shaft and vestibule before the launch control equipment building blast door would be filled with rubble, sand, gravel and dirt and compacted to within one to two feet of the top of the shaft.

A reinforced concrete cap would be placed over the shaft to prevent settlement and to deny access to the

abandoned launch control center structure. Air intakes and exhaust ducts would be filled and sealed with a two-foot cap of reinforced concrete. The MAF building's topside would not be demolished but would be left as part of the real property.

Each MAF contains several storage tanks. There are five tanks which contain diesel fuel, two underground and three aboveground, which range in size from 100 gallons to 14,500 gallons. There is one 2,000-gallon motor gasoline aboveground tank located at each MAF, and there is also a 65-gallon aboveground tank containing lube oil. The aboveground tanks will be removed and the underground tanks will be closed in accordance with state and federal regulations of Wyoming.

The MAF waste disposal system removes and disposes of all sewage from the launch control support building, launch control equipment building and the launch control center. Wastewater is discharged to the sewage lagoon by gravity flow, drain lines and pumps. The sewage lagoon is located outside the security fence. Solids in the lagoon are oxidized by bacterial action into an inert sludge and sewage water is lost through evaporation.

The lagoon contents, both liquids and sludge, would be sampled prior to dismantlement. The liquids would be properly handled which may include discharging

sufficiently clean wastewater to surface waters, based on test results. Sludge disposal would also be dependent on test results. The dismantlement contractor would drain the lagoons, level and grade the lagoons and berms for proper drainage and stabilize and seed the site with grasses. All these actions would be done in accordance with Wyoming regulations.

I would like now to briefly describe the disposition of the LF and MAF properties after dismantlement. First of all, the Air Force has no plans to retain any of the dismantled sites. After all of the START Treaty requirements have been met, the General Services Administration would dispose of the real property. The disposal process is covered by Title 10 of the United States Code, 10 U.S.C., 9781 (Public Law 100-180 dated December 4, 1987.) The first priority of consideration is to adjacent landowners who will be offered the property at fair market value.

A number of facilities on F.E. Warren support the 90th Space Wing mission, some specifically for the 400th Missile Squadron. For example, training facilities located on base help maintain proficient operations and maintenance crews. Building 486 is a missile maintenance training facility, a model Peacekeeper LF, outfitted with a full-scale launcher and underground access that allows

the maintenance crews to practice on base rather than driving approximately one-half hour to the nearest launcher.

While the final disposition of all facilities on base affected by the dismantlement process has not been determined, most Peacekeeper missile facilities could be reused by the Minuteman III missile program. Modification or demolition of the on-base facilities would be addressed in future NEPA documents.

To maintain the capability of the 400th Missile Squadron, the roads from F.E. Warren to and within the deployment area must be kept in acceptable condition. The Air Force provides funding to the state and county Departments of Transportation for maintaining and improving these routes.

Under the Proposed Action, funding to state and local governments for road maintenance would be based upon existing agreements. The majority of the funding would continue to support roads used by the missile squadrons supporting the Minuteman III missile sites.

As their primary source of power, the LFs and MAFs use electricity provided by Cheyenne Light, Fuel & Power and several rural electric cooperatives, including Wheatland Rural Electric Association, High West Energy and the Wyoming Rural Electric Company. Under the Proposed

Action, funding for these electrical contracts would be based on existing agreements.

The Air Force has identified alternative actions. These include a no-action alternative and two implementation alternatives.

Under the no-action alternative, the Peacekeeper missile system would not be dismantled. The system would be maintained in its current condition.

Implementation alternatives are options for performing dismantlement under the Proposed Action. To meet START requirements, the LFs could be demolished to a depth of 8 meters, about 26 feet, using mechanical means. The increased depth of disturbance would affect a larger area on the surface and require longer time frames for destruction activities.

Another implementation alternative would be excavate the hardened intersite cable system, HICS, that connects each LF to a MAF. The cable is buried three to six feet below ground. Removal of the cable would involve the excavation of a trench several feet deep and wide and disturb the ground that had not been excavated since the cable system was installed more than 30 years ago.

The dismantlement process has been thoroughly researched and planned in detail by the Air Force. The process will be very similar to actions taken to dismantle

Minuteman II sites at Ellsworth Air Force Base, South Dakota and Whiteman Air Force Base, Missouri and Minuteman III sites at Grand Forks Air Force Base, North Dakota.

EISs for these actions noted mitigations and predicted environmental impacts. Documentation is available on impacts that occurred during dismantlement and processes taken to mitigate impacts.

This concludes the description of the deactivation and dismantlement action. I thank you for your attention and again introduce Mr. George Gauger from the Air Force Center of Environmental Excellence

MR. GAUGER: Thank you, Major Rammes.

The Draft Environmental Impact Statement focuses on the biological and physical environment and on the human environment in the context of health, safety and cultural resources. The document also discusses anticipated changes to the local social and economic environment. Impacts to the environment were assessed for the deactivation and dismantlement proposal, as well as to the no-action alternative.

Under the Proposed Action there would be insignificant impacts to population and short-term insignificant impacts to housing, education, utilities and rural electric cooperative members. There would be slightly beneficial short-term economic impacts to local

employment and income.

No adverse environmental impacts were identified to minority or low-income populations under the Proposed Action.

Contractor personnel and equipment would generate an insignificant increase in traffic in the deployment area over a two and a half year period. Construction traffic on deployment area roads during wet conditions could cause short-term significant impacts to the integrity of gravel roads.

Long-term impacts from the Proposed Action are expected to be insignificant with some increase in arable land. Adverse but insignificant short-term impacts to land use would occur in the immediate vicinity of the LFs and MAFs.

Construction activities would occur within the boundary of the sites, with the exception of certain activities performed at a landowner's request, for example, removal of azimuth markers.

The HICS Implementation Alternative would create short-term significant impacts, but long-term insignificant impacts. After completion of dismantlement activities, the Air Force plans to dispose of the property in accordance with applicable federal regulations.

The safety of workers and the public would not

be jeopardized as dismantlement operations would not present unique or unusual hazards. Hazardous materials and wastes could be safely removed and the potential for preexisting contamination, for example, from past spills, would be minimal.

Therefore, the action would have short-term adverse impacts to human health, safety and the environment from the storage, use and disposal of hazardous materials and wastes. There would be long-term benefits from the removal of hazardous materials from the deployment area.

Explosive demolition would cause ground acceleration, but damage to nearby structures would be unlikely given the specified limits on ground motion. Based on their proximity to the launch facilities, no impacts would occur to oil and gas wells. Soil used for fill material would be of acceptable quality with engineering characteristics of minimal shrink and swell potential.

Under the Proposed Action, short- or long-term impacts to the aquifer recharge system due to the dismantlement would be insignificant. Wells would not be significantly impacted from the explosive demolition event. Ground water quality near deactivated launch facilities is projected to be insignificantly affected by

dismantlement. With the use of best management practices to limit sedimentation impacts, insignificant impacts would occur to surface water. The HICS Removal Implementation Alternative would significantly impact water resources.

Some short-term adverse impacts to air quality would result from the dismantlement activities at the LFs and MAFs, and a slight long-term beneficial impact would result from the cessation of operations, for example, from decreased travel to and from the missile field. Removal of refrigerants from coolant system would decrease the possibility of leaks.

Short-term noise impacts would be related to the magnitude of noise caused primarily from the launch facility headworks demolition (blast noise) and vehicle and equipment noise associated with the dismantlement activities.

Blast noise could cause a slight annoyance to a few nearby residents, rattle windows and walls slightly and momentarily startle wildlife. There would be no -- long-term impacts, as noise levels would return to their current levels.

Dismantlement activities would not lead to the degradation of critical habitat or risk the viability of threatened or endangered plants or animals. Construction-

related activities at the LFs, MAFs and on F.E. Warren Air Force Base would occur on previously disturbed and developed land, and the impacts would be considered insignificant. No wetlands would be filled as a result of dismantlement activities and runoff to wetlands would be insignificant.

Impacts on noxious weeds would be insignificant with continued management. The HICS Removal Implementation Alternative would significantly affect biological resources.

The dismantlement would occur on areas of previously disturbed ground; therefore, it is unlikely there would be any degradation of unique archaeological resources. Destruction of structures eligible for listing on the National Register of Historic Places would occur, but the effects would be mitigated.

The Air Force is preparing an Historic American Engineering Record document for the Peacekeeper missile system and will coordinate the document with the Wyoming State Historic Preservation Office. Any additional mitigation would be determined through the National Historic Preservation Act, Section 106 consultation process.

I would now like to turn the meeting back to Colonel McShane.

COLONEL MCSHANE: Thank you, George.

To summarize, I would emphasize that the Air Force is conducting this analysis process to understand the environmental consequences of the action. We are here tonight specifically to solicit input from the public on the scope of issues that were addressed in the environmental study and any significant issues related to the deactivation and dismantlement action.

If you would like to comment on the deactivation and dismantlement action or obtain a copy of the Environmental Impact Statement, please pick up a comment card or a written comment sheet and mail in to the address shown or leave them with us tonight.

We will now move into your part of the evening's session with a few reminders. This is your opportunity to provide your comments. There is still time to fill out a card and give it to one of our representatives. Your comments will be reproduced and addressed in the Final EIS.

Please remember to use the microphone and state your name and address for the record before you begin speaking. If you brought with you a prepared statement, you may leave it at the registration table, read it out loud, or do both. Again, I would ask that you try to limit your comments to five minutes.

And I have been handed it looks like three cards. Let me call on Mae Kirkbride first.

MAE KIRKBRIDE: I was afraid I was going to be first. I'm Mae Kirkbride and my address is 3540 County Road 132, Cheyenne, Wyoming, 82009.

And I live within five miles of three launch facilities and I'm concerned about groundwater and
1a-1 whether -- what the impact would be of this dismantlement on the groundwater and if there are records showing what toxic materials might already be in the groundwater.

Let's see. Well, I've got several things here, but I will probably send in a written comment. And another thing I was wondering is will there be -- after
1a-2 the Environmental Impact Statement is released, there's still going to be five years before this proceeds and I wondered if there will be a chance that you will be revising your impact statement after its issuance. Are
1a-3 you going to consult with state officials?

And I guess that's all the comments I have right now. Thank you.

COLONEL MCSHANE: Thank you.

Next is Barbara J. Guilford.

BARBARA GUILFORD: I'm Barbara Guilford. I live at 2415 Van Lennen, Cheyenne, Wyoming.

My comments are actually questions and the first

question I have is in regard to the impact on the local community. In the socioeconomic sector of the draft statement, I'm seeing that there will be beneficial impact
1b-1 to employment. And my question is what standards will we use to determine wages of people involved in that beneficial impact?

I don't know whether my questions will be answered now or should I wait?

COLONEL MCSHANE: I believe questions will be addressed in the Final Environmental Impact Statement rather than answered tonight.

BARBARA GUILFORD: I would like to have -- I don't know whether you will have a lot of detail in there, but I think if there is a beneficial impact, then
1b-2 the state labor department needs to know about some details of that and how we can procure labor in the best interests of the local community. As much forward notice as would be possible would be beneficial to us.

The second question I have is -- I'm a teacher -- on the impact to schools. You're saying that there are short-term insignificant impact to schools. And
1b-3 are you expecting additional students here? And I believe that there would be some influx into this community if there were jobs here, and I would want to have some of those figures made available to the public school system,

if possible.

Those are the questions that I would be directly affected by and I would like to have some of them answered. Thank you.

COLONEL MCSHANE: Thank you.

Next is Larry Sortor.

LARRY SORTOR: My name is Larry Sortor. I live at 4735 Linden Way in Cheyenne and I'm representing myself.

I have several questions. At the launcher closure or launcher itself after the dismantlement is over
1c-1 with, would the closure door remain open or are you planning on closing it as well and sealing it? I don't think that was addressed.

At the launch control centers, the underground control centers themselves have an emergency escape tunnel. Those emergency escape tunnels come up very close
1c-2 to the surface of the ground. Do you plan on collapsing those as well, digging down to them or doing something so that any later use, that will not afford access down into the launchers?

You had another comment that with removal of the HICS system, if that's approved, that it will cause
1c-3 significant water impact. Most likely the actual depth of the HICS system is classified, therefore you probably

didn't choose to release that depth; however, I would like to have in the statement what exactly the impact to the water would be, whether we're talking of changing streams and wetlands and things above ground or is it even enough in places it will affect filling of the aquifer through cracks in the ground or whatever that you may have to do in order to get the cable out.

And the last question involves removing explosives from the missile silo and various missile components. You do state that all of those various minor explosive items will be moved to a storage area on base.
1c-4 Knowing the weapons storage area has limitations to how many explosives it can have without exceeding its federal license there, I wonder if there is some plan involved as well and would it be appropriate in this Environmental Impact Statement to ensure that the weapons storage area does not become overloaded with explosives, creating a hazard to the people, particularly Rolling Hills and to the base.

And as part of that are there any plans to dispose of any of those explosives on the EOD range on the
1c-5 north part of the base? That range is basically closed but it can be used for limited special explosive operations. And I'm wondering if you're planning on, you know, using that license of the Environmental Impact

Statement or Peacekeeper dismantlement to blow up a whole lot of explosives up there. Thank you.

COLONEL MCSHANE: Thank you.

Well, that was everybody who had signed up to speak.

I see another hand in the back of the room. Could you come up to the mike, sir?

ED WARSAW: Sure. I didn't sign a card yet.

COLONEL MCSHANE: The name, please.

ED WARSAW: My name is Ed Warsaw, 922 West 26th Street here in Cheyenne and I'm a member of the Wyoming Peace Initiatives and a retired federal employee and I'm representing myself.

I have some questions for your consideration and response, eight items.

Id-1 Number one: In the event of adverse occurrence, where and how would a citizen expect to receive just compensation?

Id-2 Number two: What is the rationale for excluding Colorado from public hearings since any adverse consequences could impact them?

Id-3 Three: Who is the supervising agency or authority oversighting the dismantlement activity?

Id-4 Four: What role will the state and local

governments play in the dismantlement process?

Id-5 Five: What health and safety procedures will be in place for hazardous materials and what role will state and local personnel play and what specific training will be required for the handlers?

Id-6 Six: In the event of hazardous materials, that they cannot be moved out of state, what provisions for local storage will be made and what health and safety standards will be in force?

Id-7 Seven: What are the risks for terrorist activity and what security precautions are in place in the event of such activity?

Id-8 And eight: To what extent will the public and the media be advised as the dismantlement process progresses and of any problems that might come about?

I want to thank you for the opportunity to raise these questions for your consideration and response. Thank you.

COLONEL MCSHANE: Thank you.

And I saw another hand.

LINDY KIRKBRIDE: My name is Lindy Kirkbride. My address is 3205 Road 139, Meriden, Wyoming. I am representing myself. We are ranchers out there and we have three missile sites on our land as well as a launch control site.

I'm not a lawyer. This is is not a citizen-
1e-1 friendly book to go through and I'm trying, I really am
trying, but I'm wondering if you guys could please put
this on a website or also if there's a way that we can
1e-2 e-mail in our final comments if -- after tonight, if
there's a -- I know you put the address on the board, but
is there an e-mail address? I would appreciate that. And
1e-3 also, if there's any kinds of things about this that are
online, I kind of like to do that. I bet you do, too.
On this whole thing, it has been going on on our
place and with our children growing up in the missile
fields. And I appreciate the work that is happening on
this right now with the Peacekeeper system, the MX system.
I figure it takes just as long to get out of the woods as
it has to get in the woods, and so I appreciate that it is
taking -- it is going to take the time to do this.
I would also appreciate -- or this is -- we'll
put these in the frame of questions -- a real identifiable
timeline for those of us who live in the area to know what
can we expect. I know that I see some timelines in here
as far as employment, estimated employment table, how
1e-4 that's going to impact things as well as some -- a few
other things, but like I said, I am just -- I am not a
lawyer.
And I have a basic question about what are the

chances of anything but the no-action option happening?
What are the -- I think that the reason that there aren't
a lot more of us landowners here is because there was just
the one article in the paper, the official notice thing,
and most everybody that I talked to didn't even know about
this, that this was happening.
There is a question -- I have a question on
page -- in Section 4-7 in the middle of the page it is
talking about the economic impacts on the property
1e-5 disposal, and it said it might be -- there might be
beneficial impact to both the landowners and county
governments because of it would be returning to private
ownership.
And you mentioned that in your presentation as
well. And I'm wondering at what -- is it reseeded,
totally all junk removed, everything? Because when we as
1e-6 landowners reclaim it, really what are we getting, I
guess, because it would only be beneficial if we can -- if
we can just use it then without having to assume the
removal of some more additional stuff.
I have a comment or questions about school bus
routes and our children out in the area that drive across
the HICS cable lines, the cable lines, routes, and the
launch control facilities. My children drive by, I think,
four missile sites on their way to school every day to

Albin, and Burns would be similar as well as Pine Bluffs. And I know that there would -- as during this process several years from now as this gets underway that children in our neck of the woods start driving when they're 14 to go to sports things, to go to practice. They get these -- they're special permits and they're driving at all times of the day to go to practice.

And I just wonder -- I know you're going to be -- you would be informing schools and the school bus routes, but there may be times when roads are blocked and parents need to know these things and children need to know these things as well. 1e-7

Also, on the road maintenance beyond the time when you're -- if and when this dismantlement happens, the road maintenance is an economic impact to our county. That would be a -- that would be a negative to us because that's been done a lot in cooperation with the Air Force at this point, and I guess with no more MXs out there, there would be no more maintenance of the roads to the level that they've been maintained. 1e-8

I have a short question on where if you have dismantled in North Dakota, I think you mentioned, Major Rammes -- Rammes -- sorry -- where that information on what happened with the population -- you said that was available. If I could -- if you could tell me a more 1e-9

user-friendly place that I could locate some of that information, just what happened to the ordinary citizen-type farmer, rancher person that lived in a small town.

I appreciate the opportunity to speak. The one thing that I really think also that I would like to know is part of your mitigation process is level of education about what this is really meaning to our national defense, that the deactivation of the MX which is our largest, strongest weapons system, land-based weapons system, what that really means so that the level of public education really needs to be increased about what this means, and the fears allayed on this. 1e-10

Some people are concerned that we are taking out the best. Some people are concerned that we're, you know -- whatever the concerns are about this, there just needs to be a lot more public education about this. People do not understand what this means.

And I know this is not maybe -- I don't know if that's part of an Environmental Impact Statement or not, but maybe I need to address my congressman and my senators about that. But I really think that that is part of the people who make those kinds of decisions. We, the public, need a way to know what that really means. So thank you so much.

COLONEL MCSHANE: Thank you.

Anyone else? Anyone change their mind and decide they would like to speak or add comments to earlier comments?

MAE KIRKBRIDE: If I might, may I add a comment?

COLONEL MCSHANE: Yes, ma'am.

MAE KIRKBRIDE: You were talking about the cables. And we have lots of cable going through our ground because we have four missile sites around us, and I'm not clear on what is going to happen with these cables. They do erode and come to the surface in various places and we've had to have some of them covered up again.

1f-1

And so that's going to be a continual process and who is going to be responsible for these things? These cables, I understand, contain things such as PCBs which are hazardous, so I just hope there can be an explanation on that. Thank you.

COLONEL MCSHANE: Thank you.

Anyone else have any further comments tonight?

If not, let me close with a reminder that if you do come up with additional comments, you can send them to the address. It is on the comment form that is available out at the front registration table.

And there are two more of these hearings, one at Torrington tomorrow night and at Wheatland the following night, if you wanted to come to those, as well you're welcome to do that or remind your neighbors that they are being held.

This concludes the public hearing for tonight. If you do want to make additional comments later on, you may send them to this address. We do appreciate your participation in this public hearing. Thank you for coming.

The hearing is adjourned at 7:28.

(Public hearing concluded
7:28 p.m., July 31, 2000.)

C E R T I F I C A T E

I, JANET DEW-HARRIS, a Registered Professional Reporter, and Federal Certified Realtime Reporter, do hereby certify that I reported by machine shorthand the public hearing proceedings contained herein, and that the foregoing 36 pages constitute a full, true and correct transcript.

Dated this 6th day of August, 2000.

JANET DEW-HARRIS
Registered Professional Reporter
Federal Certified Realtime Reporter

PEACEKEEPER MISSILE SYSTEM DEACTIVATION AND DISMANTLEMENT

F.E. WARREN AIR FORCE BASE, WYOMING

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC HEARING

6:30 p.m., Tuesday

August 1, 2000

1700 West Vista Drive

Torrington, Wyoming

ORIGINAL

P R O C E E D I N G S

(Public hearing proceedings commenced 6:30 p.m., August 1, 2000.)

COLONEL MCSHANE: We will go ahead and get the hearing started now. If anyone else shows up, they can join in.

I would like to welcome you to the second of three public hearings for the deactivation and dismantlement of the Peacekeeper ICBM missile system based out of F.E. Warren. I'm Colonel Mike McShane, the Chief Trial Judge of the Air Force. I'm stationed with the Trial Judiciary Division of the Air Force Legal Services Agency located at Bolling Air Force Base in Washington, D.C. My main job is to preside over Air Force courts martial.

I will be the hearing officer for this evening's hearing. Tonight we'll present an overview of the environmental process and summarize the potential impacts of the dismantlement action.

We have with us this evening Major Jeffrey Rammes of Headquarters Air Force Space Command located in Colorado Springs, Colorado, who will present an overview of the missile system deactivation and dismantlement.

Also attending is Mr. George Gauger of Headquarters Air Force Center for Environmental Excellence

Historic Preservation Act Section 106 consultation process.

I would now like to turn the meeting back over to Colonel McShane.

COLONEL MCSHANE: Thank you, George.

To summarize, I would emphasize the Air Force is conducting this analysis process to understand the environmental consequences of the action. We are here tonight specifically to solicit input from the public on the scope of issues that were addressed in the environmental study and any significant issues related to the deactivation and dismantlement action.

If you would like to comment on the deactivation and dismantlement action or obtain a copy of the Environmental Impact Statement, please pick up a comment card or a written comment sheet and mail them to the address shown or leave them with us tonight.

We now move into your part of this evening's session with a few reminders. This is your opportunity to provide your comments. Your comments will be reproduced and addressed in the Final Environmental Impact Statement.

If you have a prepared statement, you can leave it with us, read it out loud, or do both. At this time I would ask if there are any speakers.

Anybody want to make comments tonight? Getting

a negative response.

Okay. Since I don't have any speakers, I'll just remind you that additional comments or comments can be made in writing and sent in so that they're received -- as long as they're received by August 14th, 2000, they will be considered. The comment sheet has the address on it.

There is one more hearing to be held tomorrow night in Wheatland. If you know of anybody who was unable to attend tonight and would like to come on over to Wheatland to the hearing, they're sure welcome to come on over there.

We appreciate your attendance tonight. Thank you for coming.

The hearing is adjourned at 7:06.

(Public hearing proceedings concluded 7:06 p.m., August 1, 2000.)

C E R T I F I C A T E

I, JANET DEW-HARRIS, a Registered Professional Reporter, and Federal Certified Realtime Reporter, do hereby certify that I reported by machine shorthand the public hearing proceedings contained herein, and that the foregoing 24 pages constitute a full, true and correct transcript.

Dated this 6th day of August, 2000.

JANET DEW-HARRIS
Registered Professional Reporter
Federal Certified Realtime Reporter

PEACEKEEPER MISSILE SYSTEM DEACTIVATION AND DISMANTLEMENT

F. E. WARREN AIR FORCE BASE, WYOMING

ENVIRONMENTAL IMPACT STATEMENT PUBLIC HEARING

6:30 p.m., Wednesday

August 2, 2000

65 16th Street

Wheatland, Wyoming

ORIGINAL

P R O C E E D I N G S

(Hearing proceedings commenced 6:30 p.m., August 2, 2000.)

COL. McSHANE: It's 6:30 so we'll go ahead and get started. Good evening. I'd like to welcome you to the third of three public hearings for the deactivation and dismantlement of the Peacekeeper ICBM missile system based out of F. E. Warren Air Force Base. I'm Colonel Mike McShane, the chief trial judge of the Air Force. I am stationed with the Trial Judiciary Division of the Air Force Legal Services Agency located at Bolling Air Force Base, Washington, D.C. My main job is to preside over Air Force courts-martial. I will be the hearing officer for this evening's hearing. Tonight we will present an overview of the environmental process and summarize the potential impacts of the dismantlement action.

We have with us this evening Major Jeffrey Rammes of Headquarters Air Force Space Command located in Colorado Springs, Colorado, who will present an overview of the missile system deactivation and dismantlement. Also attending is Mr. George Gauger of Headquarters Air Force Center for Environmental Excellence located in San Antonio, Texas. Mr. Gauger will discuss the environmental impact analysis process and summarize the potential

written comment sheet and mail them to the address shown or leave them with us tonight.

We now move into your part of this evening's session with a few reminders. This is your opportunity to provide your comments. Your comments will be reproduced and addressed in the Final EIS. If you brought a prepared statement along, you can leave it with us here, read it out loud or do both.

And check and see, do we have anybody who would like to speak tonight? Apparently nobody signed up to speak; is that correct?

Any of the folks here have any comments you want to make about the whole process here?

(No response.)

COL. McSHANE: Apparently not. If you later on decide you do want to send in some comments, I'd invite you to take along one of these comment sheets, fill it out and send it to the address on the bottom. If we have no comments, I'll adjourn the hearing. We're adjourned at 7:01.

(Hearing proceedings concluded 7:01 p.m., August 2, 2000.)

C E R T I F I C A T E

I, LORI ARNOLD, a Registered Merit Reporter, do hereby certify that I reported by machine shorthand the proceedings contained herein and that the foregoing 23 pages constitute a full, true and correct transcript.

Dated this 11th day of August, 2000.

Lori Arnold
LORI ARNOLD, RMR

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
http://www.epa.gov/region08

received
Aug 2000

August 17, 2000

Ref: 8EPR-EP

Mr. Jonathan D. Farthing
Chief, Environmental Analysis Division
HQ AFCHEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

Re: Warren AFB Peacekeeper Missile Dismantle/Deactivation, DEIS Review # 214

Dear Mr. Farthing:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Region 8 Office of the Environmental Protection Agency (EPA) has reviewed the *Draft Environmental Impact Statement (DEIS) for the Peacekeeper Missile System Dismantlement/Deactivation, at F. E. Warren AFB, Wyoming*, dated June 2000. We offer the following concerns and comments for your consideration as you complete the Final Environmental Impact Statement (FEIS). EPA's comments are listed below.

4-1 1. Sections 3.4.2.4.1 and 3.4.2.4.2, General – Much of the information provided here is very general in nature, e.g., statements are made regarding statewide water quality trends. An effort should be made to provide at least regional water quality information. It is recommended that the FEIS address water quality in the area of concern.

4-2 2. Geological Resources, Mitigation Measures Section 4.4.1.5, Page 4-45 – We recommend that several of the mitigation measures discussed in the geological resources section be incorporated into the mitigation measures. Specifically, Section 4.4.1.2.2 Geology, last paragraph, page 4-40, states that "as a best management practice the contractor could perform a survey of subsurface structures within 2000 feet of a LF prior to commencing dismantlement activities." In the same paragraph it is stated that "a post-blast survey could be done to determine whether explosive demolition affected the structure." Both of these mitigation measures seem appropriate for implementation, yet the suggested measures were not carried forward nor were the measures discussed and dismissed elsewhere in the DEIS. Where there are subsurface structures within 2000 feet of explosive demolition, we recommend surveying the subsurface structures before and after the blast, particularly where those subsurface structures could impact ground water.

4-3 3. Section 4.4.2.2.1, Page 4-49 – We have concerns about the successful long term closure of wells in the vicinity of facilities demolished through explosions. For example, will the unused water-supply wells at the missile alert facilities be properly abandoned before or after any explosive demolitions occur at launch facilities in the vicinity? The concern is the potential for damage from explosions to the integrity of recently abandoned water-supply wells. Damage to properly abandoned wells can provide a vertical conduit between aquifers of varying water quality. It is recommended that this issue be addressed in the FEIS.

4-4 4. Section 4.3.2.4 Above Ground and Underground Storage Tanks, Page 4-33 & 34 – It is not clear from the section, whether shallow-buried diesel tanks without asbestos or PCB contamination will be removed or closed in place. We recommend that all tanks be removed where feasible.

4-5 5. We appreciate the Air Force's plans to reuse and recycle hazardous materials that are removed from the facilities prior to implosion.

4-6 6. Are there any plans to dismantle or deactivate any of the Minuteman missile system surrounding Warren Air Force Base? If such plans are under development, the potential impacts should be discussed in a cumulative impact section of the FEIS.

4-7 7. Page E-7, Map of Flight R – It appears that this map is inaccurate. The town depicted as Wheatland is actually Chugwater.

Based on the procedures EPA uses to evaluate the potential effects of proposed actions and the adequacy of the information in the DEIS, the Preferred Alternative identified by the DEIS for the *Peacekeeper Missile System Dismantlement/Deactivation, at F. E. Warren AFB* will be listed in the Federal Register in the category EC-2. This means that the review has identified environmental impacts that should be avoided in order to fully protect the environment, and the DEIS does not contain sufficient information to thoroughly assess environmental impacts that should be avoided to fully protect the environment. Enclosed is a summary of EPA's rating definitions. EPA also notes the improvements in the environmental impact analysis for missile system deactivation and dismantlement. The quality of the information in this EIS is an improvement over previous deactivation activities at Ellsworth and Grand Forks Air Force Bases.

We appreciate your interest in our comments. Please contact Dana Allen at (303) 312-6870 if you have any questions about these comments.

Sincerely,

Cynthia Cody
Chief, NEPA Unit
Office of Ecosystems Protection
and Remediation

Enclosure

cc: Marguerite Duffy, EPA HQ

---

received

State Of Wyoming
Office of Federal Land Policy

JIM GERINGER
GOVERNOR

ART REESE
DIRECTOR

August 14, 2000

Mr. Jonathan D. Farthing
Chief, Environmental Analysis Division
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

RE: Draft Environmental Impact Statement (DEIS), Deactivation/Dismantlement of Peacekeeper Missile System, F.E. Warren AFB, Wyoming

Dear Mr. Farthing:

This Office provided the DEIS to all affected State agencies for their review, in accordance with State Clearinghouse procedures. Attached are letters from the Wyoming Game & Fish Department and the Wyoming Department of Environmental Quality, resulting from their reviews. State agency comments are specific to their respective agency missions. While the State defers to their technical expertise in developing the State's position, the responsibility to articulate the official, unified State policies and positions lies with the Governor or the Office of Federal Land Policy.

5-1 As is indicated in the attached letters, the State of Wyoming has serious concerns regarding the accuracy and robustness of several facets of this impact analysis. We urge the Air Force to give earnest consideration to the attached comments, and to address those concerns in the final EIS. I would add that

5-2 our concern about leaving gravel over the dismantled silos, rather than restoring the land to its original (grassland/shrub) condition after dismantling and salvage (see WyDEQ letter), is an issue we specifically brought up in our scoping comments. Please address that issue in the FEIS. We again recommend close and continued coordination with the affected State agencies throughout the impact analysis and dismantlement.

This Office will need thirteen copies of future information and documents regarding this project for distribution to affected State agencies. Existing Memoranda of Understanding and other working agreements with individual agencies remain in place and unaffected. Policy statements and the State's position will be provided to you by this Office.

Thank you for this opportunity to comment.

Sincerely,

Carol Kruse
Planning Consultant

Enclosures (2)

Herschler Building 1W ◆ 122 W. 25th Street ◆ Cheyenne, Wyoming 82002-0060
Phone (307) 777-7331 ◆ Fax (307) 777-3524

WYOMING
GAME AND FISH DEPARTMENT

Jim Geringer, Governor — John Baughman, Director

"Conserving Wildlife —Serving People"

July 19, 2000

WER 9406
Department of the Air Force
F.E. Warren Air Force Base
Draft Environmental Impact Statement
Deactivate/Dismantle the Peacekeeper Missile System
State Identifier Number: 99-084
Laramie County

Art Reese, Director
Office of Federal Land Policy
Herschler Building, 1W
122 W. 25th Street
Cheyenne, WY 82002

Dear Mr. Reese:

The staff of the Wyoming Game and Fish Department has reviewed the Draft Environmental Impact Statement to deactivate and dismantle the Peacekeeper Missile System based at F.E. Warren Air Force Base, Wyoming. We offer the following comments.

6-1 The Department has no specific issues or concerns with the Proposed Action from the fish and wildlife standpoint. However, if the implementation alternative involving removal of the hardened intersite cable system is selected, the Department would like the opportunity to review the locations of the cables in order to provide input into the seasonal timing of removal. Appropriate timing of cable system removal would help minimize or avoid impacts on wintering wildlife or on breeding/nesting activities. Comments and suggested corrections specific to the technical content of the DEIS follow:

6-2 **Executive Summary-Biological Resources, p.ES-9**: Reference to critical habitats here and elsewhere in the document should perhaps be changed to important or crucial habitats. Critical habitats are federally designated and are in reference to threatened and endangered species. There is no designated critical habitat in Wyoming.

6-3 **Executive Summary-Mitigations, p. ES-11**: Seasonal blasting restrictions to protect waterfowl should be extended to include sage and sharptailed grouse breeding and nesting areas in proximity to blasting sites. Our local biologists should be contacted to determine if such areas are in the vicinity of blasting sites.

Headquarters: 5400 Bishop Boulevard, Cheyenne, WY 82006-0001
Fax: (307) 777-4610 Web Site: http://gf.state.wy.us

6-4 **Section 3.4.5.3-Wildlife, p.3-65**: The statement in paragraph 3 that the USFWS is responsible for "freshwater fish" is incorrect. Except for federal oversight of several threatened and endangered species, all fishes in Wyoming are the property and management responsibility of the State through the Wyoming Game and Fish Department.

6-5 **Section 3.4.5.4-Threatened or Endangered Species and Species of Special Concern, p.3-65**: In the last sentence on this page, the document refers to the Colorado butterfly plant as a "Wyoming species of special concern". In the previous paragraph, the document states that the "State of Wyoming has listed several species as species of special concern". Both of these statements are incorrect. There is no official State of Wyoming species of concern list. The Wyoming Game and Fish Department maintains such a list, but there is no statutory or regulatory significance to the list. In addition, the Department's listing does not include plants.

6-6 **Section 3.4.5.4-Threatened or Endangered Species and Species of Special Concern**: A gross omission in this section and the corresponding section in Chapter 4 is the mountain plover. The mountain plover is a candidate species proposed for listing. A listing decision is expected at any time. These plovers are native to grasslands statewide and may nest where vegetation is sparse or absent. Other candidate species in the project vicinity not mentioned in the DEIS are the swift fox and black-tailed prairie dog.

6-7 **Section 4.4.5.1-Analysis Methods, p4-68**: We are not aware that the Department was consulted for technical assistance relative to biological information for the deployment area. The referenced "consultation" in Appendix C is only the Department's comments on the public scoping notice.

Thank you for the opportunity to comment.

Sincerely,

Bill Wichers

BILL WICHERS
DEPUTY DIRECTOR

BW:TC:as

The State
of Wyoming

Department of Environmental Quality

Jim Geringer, Governor

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
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FAX 777-3610	FAX 777-6462	FAX 777-5616	FAX 777-6937	FAX 777-5864	FAX 777-5973	FAX 777-5973

August 11, 2000

Art Reese, Director
Office of Federal Land Policy
Herschler Building, 1-W
122 West 25th Street
Cheyenne, WY 82002

Re: Response to Draft EIS Peacekeeper Missile System Deactivation and Dismantlement; F.E. Warren AFB

Dear Mr. Reese:

These comments regarding this Draft Environmental Impact Statement (DEIS) are specific to this agency's statutory mission within State government which is protection of public health and the environment. In that regard these comments are meant to, in association with all other agency comments, assist in defining the Official State Position. These comments defer to and are subordinate to the Official State Position.

This letter describes comments and concerns from the Department of Environmental Quality (DEQ). Questions or correspondence regarding this letter should be directed to the current F.E. Warren Air Force Base Project Manager, Mark Thiesse, at 307-332-3144.

7-1 Because the information presented in Chapters 3 and 4 is repetitive and at times it is conflicting, DEQ believes it is appropriate to summarize general concerns on issues or topics rather than provide specific comments on each DEIS section. Specific statements or sections of the DEIS may be referenced in the comments as an example to better explain DEQ's concern on a given issue or topic.

7-2 1. Post-Decommissioning Land Use; Voluntary Remediation Program

It is evident that the Proposed Action was developed in consideration of the Air Force's assumption that the only viable and allowable use of these sites is for agricultural purposes. The DEIS even references that future use will be restricted by federal regulations. This assumption and approach in evaluating and remediating these sites is inadequate. The Air Force must conduct sufficient investigation to identify potential sources, define the nature and extent of contamination, and remediate contamination to levels that are protective of unrestricted land use and ecological receptors. These characterization and remediation requirements are based on the following:

These comments are reflective of a specific agency mission only. These comments defer to and are subordinate to the Official State Position.

Mr. Reese
August 11, 2000
Page 3

7-3 – DEQ is unaware of any federal regulation that can restrict land use for future property owners. If there is such a regulation, the actions taken by FEW (F.E. Warren Air Force Base) must be consistent with the state's statutes and regulations.

7-4 – The Air Force plans to sell the Launch Facilities (LF) and Missile Alert Facilities (MAF) sites. These sites, especially the MAF sites, are very amenable to residential use. Some of the assets of these properties include: good roads to the sites, access to utilities and potable water, and the buildings that will remain at the MAFs are well suited for a residence.

7-5 – The statute for the Voluntary Remediation Program (VRP) requires remediation of soils to unrestricted land use standards and groundwater must meet drinking water standards. Alternate cleanup standards may be applicable for soils if the Air Force demonstrates it is technically impracticable to meet unrestricted land use standards or a Use Control Area (UCA) is designated. Based on the location, number, size ,and distribution of these sites, it is unlikely that the Department would agree to a UCA designation. In addition, if the Air Force does not enter the VRP, a UCA is not an option. For groundwater, alternate standards may be applicable if the Air Force demonstrates it is technically impracticable to meet drinking water standards. The Air Force must consider unrestricted land use (i.e., residential standards for soil and drinking water standards for groundwater) in evaluating the risk these sites may pose to a future owner. This is consistent with the Voluntary Remediation Program statute.

If the Air Force intends to request "no-further-action" letters for the sites, it must do so through the Voluntary Remediation Program. All proposed actions should be addressed in the context of the program before the deactivation process proceeds further. Compliance with the VRP would undoubtedly result in substantial revisions to the actions currently specified in the DEIS as characterization of entire sites would be required, not just selected waste streams. If the Air Force intends to deactivate the Peacekeeper system and dispose of the properties in a timely fashion, it should follow applicable DEQ requirements from the beginning. Proceeding under invalid assumptions will only lead to costly delays. Unless the Air Force follows the Voluntary Remediation Process, it will retain responsibility for environmental conditions at each site.

7-6 – The DEIS indicates that purchasers of these sites will be notified of site conditions. These types of notification are inadequate to prevent unacceptable risks to future users of the property. In addition, these notifications do not address potential risks to ecological receptors.

7-7 The only areas that may not be required to meet unrestricted-use cleanup levels are the demolition debris disposal areas (i.e., waste left in launch tubes at the LFs). Debris may be required to meet "clean fill" and/or "construction/demolition debris" requirements under Solid Waste Rules and Regulations. Releases from these disposal areas that may harm human health or the environment are not allowed.

These comments are reflective of a specific agency mission only. These comments defer to and are subordinate to the Official State Position.

7-8 The DEIS does not include sufficient site characterization plans to fully address possible risks the site may pose to human health and the environment. All potential risks should be identified and evaluated before these sites are sold to the public.

7-9 The DEIS discusses leaving (page 2-8) a "slightly mounded gravel surface to meld with the existing gravel contours." If, in fact, the Air Force intends that the land be used for agriculture or grazing, shouldn't the gravel be removed or covered with topsoil to allow plant growth?

2. Site Characterization

The Air Force must conduct a complete site characterization, including identification of all known or suspected waste management areas, potential sources of contamination (i.e., including sources that may be related to past releases, not just potential sources that are related to the Proposed Action), and defining the nature and extent of contamination for soils, groundwater, and surface water.

7-10 As part of this effort, the Air Force must identify all products, chemicals, etc. used at these sites. For example, although the DEIS discusses a number of chemicals and the Proposed Action regarding these chemicals, there is no mention of evaluating potential releases or impacts from releases of solvents. However, one section of the DEIS mentions potential contamination of petroleum or ethylene glycol from solvents. Obviously, if this contamination was possible, solvents must have been used at the site. The Air Force must develop a complete list of analytes to adequately characterize these sites.

3. Concerns regarding Underground Storage Tanks (UST) and Above Ground Storage Tanks (AST).

The DEIS references management of USTs in several sections of the DEIS. The information presented is conflicting and there does not seem to be a clear commitment or definition of how these tanks will be managed. The DEIS indicates USTs may be removed or closed in place. The USTs contain diesel, gasoline, or water. The criteria discussed in the DEIS to determine the proposed management of USTs include: 1) whether the UST has been upgraded to meet regulatory requirements; 2) depth of the UST; 3) whether the UST coating contains PCBs; and 4) the contents of the UST. The Air Force should, at a minimum, clarify the following:

7-11
- In one section, the DEIS indicates shallow buried USTs will be removed, but deep buried USTs will remain in place. It also indicates that USTs coated with PCB (polychlorinated biphenyl) containing materials will be removed. Does that imply that all deep buried USTs are not coated with PCB containing materials? DEQ does not believe it is appropriate to leave any tanks in place that are coated with PCB and/or lead containing materials.
- In one section, the DEIS indicates that one criterion to determine whether tanks are left in place is if they have been upgraded and meet current tank regulations. If tanks do not meet those requirements they will be removed. How does this

"removal criterion" affect or tie into the "PCB" and "depth of tank" criteria? Why is this criterion applicable given all tanks will no longer contain petroleum products (i.e., no tank will leak regardless of whether it meets the current tank regulations)?

7-12
- Do tank coatings also potentially contain lead and other metals? If so, has the Air Force taken into consideration the potential impacts of these other contaminants on the environment if tanks are left in place (i.e., potential source to soil and groundwater contamination)?

7-13
- Appendix K provides a fate and transport type model for PCB and lead containing wastes. It is apparent that the model is applicable to wastes left in place at launch facilities which are contained in the launch tube and sealed with a concrete and gravel cap. If deep buried tanks are PCB coated and will be left in place, has the Air Force also modeled the fate and transport of PCBs that have been and will continue to be in direct contact with soil and perhaps groundwater? The impacts may be different than those predicted for the leachate model presented in Appendix K.

7-14
- The DEIS indicates that some soil sampling associated with tank removal is planned. The extent of this sampling, and whether soils will be sampled for tanks left in place (e.g., deep buried tanks), is unclear. Will each tank location be sampled? DEQ believes the Air Force should investigate soils at each UST. If it is determined that soils have been impacted by a release of petroleum contaminants, the Air Force must conduct further investigation to determine the nature and extent of contamination and whether groundwater and surface water have been impacted. Risk to future users must also be evaluated to establish appropriate and safe cleanup standards (i.e., unrestricted land use and drinking water standards for groundwater).

7-15
- These sites will likely be sold to individuals. The DEIS indicates purchasers will be notified of environmental conditions and other hazards associated with the property. What prevents subsequent property owners from being exposed to tank related contaminants if they choose to excavate or use one of these tanks? How does the Air Force plan to prevent exposures to humans and ecological receptors from contaminated media?

7-16 Soil samples from AST areas must be collected and analyzed to determine whether there were releases to the environment (i.e., leaks from the tanks, overfilling, spilling, etc.).

4. Concerns regarding wastes/debris left in place at the launch facilities.

7-17 Demolition debris left in place at the launch facilities will be contained in the launch tube and capped. The debris is expected to consist primarily of construction/demolition types of wastes. PCBs, lead, chromium, mercury, petroleum constituents, and possibly contaminants from incomplete combustion of PCBs will be entrained in that debris, and may be a future source of soil and groundwater contamination. The fate and transport type model presented in the DEIS indicates that levels of PCBs and lead in groundwater, 100

feet down gradient of the disposal area, are predicted to be significantly less than the respective constituents' MCL after 20 years. Based on this model, the Air Force concludes that leaving the debris/waste in place would not be a significant threat to groundwater. DEQ has the following concerns:

7-18 – Solid waste regulatory requirements must be met. The Air Force will need to obtain DEQ waste disposal permits before beginning on-site disposal of waste generated at the sites. Before DEQ can determine which type of waste disposal permit is required, all waste proposed for disposal must be characterized and quantified. A work plan should be submitted to DEQ before waste characterization begins. Disposal must meet the requirements of the Solid Waste rules and regulations.

7-19 – Abandoned petroleum storage tanks constitute a solid waste. Prior to disposal, storage tanks would need to be empty and cleaned to satisfy DEQ requirements. A permitted on-site decommissioner or off-site decommissioning facility are required (unless the tanks are transported out of state for cleaning and disposal).

7-20 – The DEIS relies on modeling results to show that the waste left in place will not pose a future threat to human health and the environment. A model is a best guess of future conditions and is dependent on accurate and conservative parameters, assumptions, and data. The model presented in the DEIS must be reviewed and approved. For example, the model parameter for longitudinal dispersivity is given as 100 feet. If the model algorithm uses this parameter to limit contaminant migration, one would not expect the contaminant concentration at 100 feet to be significant. Are the very small concentrations of PCB and lead at 100 feet down gradient of the source (i.e., disposal area) a result of this parameter? If so, is the model conservative and representative of potential future conditions? The model results show significant concentration of lead and PCB near the source area. Why do these contaminants all remain at the source area? Why is the contamination predicted at the source area allowed to remain at levels above drinking water standards? These levels would indicate a potentially continuing source of groundwater contamination, regardless of the results of a predictive model.

7-21 Disposal of waste is discussed for the MAFs but not for the LFs. What was the process for disposing of waste at the LFs? This should include any solid or hazardous waste as well as sewage.

5. Concerns regarding sumps.

7-22 The DEIS provides minimal information regarding sumps. The investigation planned to determine potential releases from sumps, or impacts to the environment, is to sample the sump outlet. The conditions at the sump outlet area may be entirely different than those at the sump or in pipe areas to and from the sump. Contamination that may be present at the outlet may be degraded, diluted, leached, weathered, etc., whereas contamination at the sump and associated piping may be at significantly higher levels. Contamination may also be present down gradient of the sump discharge outlet. The Air Force must evaluate conditions at the sumps and associated piping and in the soil and subsoil below the sump discharge. Again, if investigation results show unacceptable levels of contamination, the nature and extent of that contamination must be defined, including potential impacts to groundwater.

7-23 Section 3.3.6 states that no wastewater is generated at the LFs. Were cleanup activities using liquids (i.e., detergents, solvents, paints, etc.) conducted at the LFs? Are sumps located at the LFs? If so, it seems appropriate to conclude that wastewater, or at least liquid wastes, were generated at the LFs. If that is the case, the Air Force must identify past waste management practices/locations and/or conduct an investigation of suspected waste management areas, including sumps.

6. Concerns with significance criteria.

7-24 The DEIS establishes significance criteria with the Proposed Action, as well as the Implementation Alternatives and No Action. These criteria appear to be entirely related to the action being implemented and do not take into consideration site conditions. For example, the DEIS indicates implementation of the Proposed Action would result in a "beneficial impact" because generation of wastes would be eliminated and there would be a decrease in the potential for spills or leaks of hazardous substances. This action may be beneficial in this context, but if the action stops there it may not be entirely beneficial. Impacts from past releases that may remain on site may act as continuing sources of contamination to groundwater and/or threats to human and ecological receptors. The Air Force should fully evaluate their actions in terms of present and past site activities and current site conditions, not just the benefit from eliminating current potential impacts to the environment and/or receptors.

7-25 Although the following is not specifically a significance criteria concern, it is another example of evaluating a present action without consideration of the long-term impact. In regard to paint wastes, the Air Force relied on sample results from deactivation activities conducted at two other Air Force Bases to make the determination that paint wastes at the FEW missile sites would not exceed hazardous waste criteria. The Air Force must make site specific hazardous waste determinations, unless the Air Force can demonstrate that the same paint formulation was used at all installations.

7-26 One additional concern relates to evaluations centered on present benefits without consideration of long-term impacts. For example, the DEIS indicates that if paint was removed from surfaces prior to the waste being disposed in place, high level exposures would occur to the workers removing the paint. This implies there would be less exposure or threat if the waste was disposed without removing the paint prior to disposal. This evaluation of the Proposed Action is accurate, however, it does not consider the long-term impacts to human health or the environment in terms of disposing painted wastes versus stripped wastes. In addition, it seems likely that safety measures could be implemented to prevent unacceptable exposure to workers removing paint, thereby eliminating Air Force's "exposure to workers" concern.

7. Concerns with pesticides.

7-27 The Air Force used large quantities of pesticides at these sites. They acknowledge potential health hazards to workers during construction activities. They also provide a model to illustrate pesticides did not likely reach shallow groundwater and the residual in soils are minimal after one year. They indicate implementation of the Proposed Action (i.e., discontinuing pesticide applications) results in a "beneficial impact" because future owners may revegetate. DEQ is concerned that if there are health hazards to workers from disturbing the soils, there are likely more significant potential threats to humans who may

purchase the property and reside there. Risks to ecological receptors may also be present and should be addressed. Model results should be reviewed and approved to ensure the model is appropriate for the intended use and that the assumptions, parameters, data, etc. are conservative. Limited testing of soil and/or ground water should be implemented to verify model results. While elimination of further pesticide releases is beneficial, additional evaluation of the impacts of past releases is needed.

8. Abandonment of Groundwater wells.

7-28 On page 4-53, the DEIS indicates groundwater from unused wells at the MAFs would not be affected by leaching because the shallowest well is more than 150 feet deep, and the leachate would have to migrate through clays and shales, which are low permeability materials with a high adsorption coefficient. As discussed earlier, simply considering current conditions is inadequate in determining potential risks to future users. For example, if the 150 foot deep well is abandoned, a future property owner may drill a shallow well for drinking water. The shallow aquifer is more susceptible to contamination and may be impacted by leaching of wastes in place (i.e., demolition debris, tanks with coatings containing PCBs, soil contamination on the surface, waste management areas, pesticide usage, sump discharge, spills, etc.) or subsurface (i.e., historic releases from USTs, sumps and associated piping, etc.). The Air Force must conduct a complete groundwater investigation at these sites, including characterization of shallow aquifers.

7-29 9. Appendix A should be revised/updated to include all applicable Solid Waste and Hazardous Waste Regulations, including the recent VRP statute.

10. Permanent Closure of USTs

The Air Force missile sites have UST systems that are registered with the UST program. The sites also have above ground storage tanks (ASTs). Disposal of ASTs is regulated by DEQ.

Permanent closure of USTs is completed by either 1) removing the tanks and distribution lines from the ground and having the tanks decommissioned (cleaned and cut up) or, 2) by completely emptying the tanks, cleaning out the interior of the tanks, and filling them with an inert material. Both types of closure require a minimum site assessment to determine if the tanks or the distribution piping have allowed releases of tank contents. The minimum site assessments must be performed according to detailed specifications.

7-30 A minimum site assessment report for each tank site must be submitted to the DEQ AUST/LAUST Program (Above Ground and Underground Storage Tanks/Leaking Above Ground and Underground Storage Tanks). If contamination above the allowable limits is not found and if the tanks themselves are handled correctly, the site can be permanently closed via a letter from the DEQ tank program. If contamination was found, and the Air Force wishes to clean up the contamination rather than wait for DEQ to complete the cleanup, the Air Force is required to submit a corrective action plan (CAP) for each site in accordance with Chapter 17 of the Wyoming Water Quality Rules and Regulations. The Air Force CAP must be approved by DEQ prior to initiating remediation. A report describing the remediation activity at each site must be submitted to DEQ following completion of

These comments are reflective of a specific agency mission only. These comments defer to and are subordinate to the Official State Position.

remediation. If the remediation was completed satisfactorily and if the tanks and piping were closed correctly (removed and decommissioned or cleaned and left in place), the DEQ will issue a permanent closure letter for each tank site. The letter closes the AUST/LAUST Program's tank issues; however, it may not close issues regarding PCBs in the tank coating or other potential contaminants.

11. Ground Water Impacts Due to Demolition

7-31 DEQ is concerned that the explosions used to destroy the headworks of the LFs will create fractures (preferential pathways) in the surface and near the surface. This will allow an increased chance of surface contamination from herbicide or fertilizer use to penetrate down into the unconfined aquifer surrounding the sites. Also, even though a cap will be placed at a depth of approximately 30 feet, there is a large potential for cross contamination along this fractured rock into the void of the missile tube. Although this potential is briefly discussed in Section 4.4.2.2.4, no firm data was provided in this report.

7-32 Nitrate contamination from the explosion was also discussed and an example from Ellsworth AFB LFs was provided, but again, no firm numbers were provided to support the Air Force's conclusions. More information about the potential for ground water contamination from blasting, and for surface contamination to reach the abandoned tubes needs to be provided.

12. Potential to Discharge Wastewater

7-33 Any wastewaters generated at the missile sites during the dismantling process must be permitted by the DEQ Point Source Program if they have the potential to enter a surface water of the state. Wastewaters may be generated by many processes including, but not limited to, site dewatering, vehicle or equipment washing, or lagoon drainage. Surface waters of the state are defined as "all permanent and intermittent defined drainages and lakes, reservoirs, and wetlands which are not manmade retention ponds used for the treatment of ... waste..."

13. Sewage Lagoons/Septic Systems

7-34 The site sewage lagoons are a concern only if wastes other than domestic waste have been introduced. At any site where wastes other than domestic may have entered the lagoons, a complete characterization of the biosolids must be performed. If hazardous or solid wastes are found, then appropriate DEQ procedures must be followed.

7-35 The DEIS does not specifically note if septic tanks are present on any of the sites. If present, proper disposal entails pumping out the tank, disposing of the waste, and filling the tank with sand or other inert material.

Additional Comments

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Mr. Reese
August 11, 2000
Page 10

7-36 The four step process for dismantling the sites is described throughout the document, the last step being disposal of the property. However, in several places, the "landowner" is given the option on what to have done at the facility during the dismantling (e.g., bottom of page 2-8). During the dismantling the landowner will still be the Air Force. Does "landowner" in the context of this section refer to potential buyers or adjacent landowners? This section needs to be clarified or changed.

Thank you for the opportunity to comment on the DEIS. We look forward to working with the Air Force in the future. Please direct any questions regarding this correspondence to Mark Thiesse at 307-332-3144. To reference DEQ rules and regulations please visit the following web site at http://soswy.state.wy.us/rules/rules.htm.

Sincerely,

for Dennis Hemmer
Director
Department of Environmental Quality

DH/BLS/02072.ltr

cc: Mark Thiesse, WQD, Lander
Jerry Breed, SHWD, Cheyenne

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These comments are reflective of a specific agency mission only. These comments defer to and are subordinate to the Official State Position.

JIM GERINGER
GOVERNOR

State Of Wyoming
Office of Federal Land Policy

ART REESE
DIRECTOR

August 16, 2000

received
22 aug 00

Mr. Jonathan D. Farthing
Chief, Environmental Analysis Division
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

RE: Draft Environmental Impact Statement (DEIS), Deactivation/Dismantlement of Peacekeeper Missile System, F.E. Warren AFB, Wyoming

Dear Mr. Farthing:

Attached is a letter from the State Historic Preservation Office resulting from their review of the above-referenced document. This letter was received after our previous letter (dated 8/14/00) had been mailed. Please accept our apologies for any inconvenience due to our late submission of this letter.

As I mentioned in our previous letter, State agency comments are specific to their respective agency missions. Please append this letter to our previous comments, and give the Historic Preservation Office's concerns consideration as part of the State of Wyoming's comments.

This Office will now need fourteen copies of future information and documents regarding this project for distribution to affected State agencies. Existing Memoranda of Understanding and other working agreements with individual agencies remain in place and unaffected. Policy statements and the State's position will be provided to you by this Office.

Thank you for this opportunity to comment.

Sincerely,

Carol Kruse
Planning Consultant

Encl

cc: Wy Game & Fish Dept
State Historic Preservation Office
Wyoming Dept. of Environmental Quality

Herschler Building 1W ◆ 122 W. 25th Street ◆ Cheyenne, Wyoming 82002-0060
Phone (307) 777-7331 ◆ Fax (307) 777-3524

WYOMING

DEPARTMENT OF STATE PARKS & CULTURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE

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2301 Central Ave.
Cheyenne, WY 82002

(307) 777-7697
FAX (307) 777-6421

August 14, 2000

Mr. John D. Farthing
Chief, Environmental Analysis Division
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

RE: F.E. Warren AFB, Peacekeeper Missile System Deactivation and Dismantlement Draft Environmental Impact Statement; SHPO #0799TPT026

Dear Mr. Farthing:

Our staff has received information concerning the aforementioned project. Thank you for allowing us the opportunity to comment.

9-1 We concur that the deactivation and dismantlement of the Peacekeeper Missile System will result in an "adverse effect" to historic properties. However, HABS/HAER documentation is not acceptable mitigation for a project of this magnitude and importance. Previous mitigation measures for this project had included the designation of a Minuteman 1 missile site, located at Wall, South Dakota, to serve as an interpretive site. However, that arrangement was not funded by the National Park Service and apparently can no longer serve to mitigate the effects of this project. An appropriate and substantive mitigative package is necessary.

There are missile alert facilities in close proximity to Cheyenne and within 100 yards of Interstate 25. An appropriate mitigative package could include using one of these sites as an alternative interpretive site to the South Dakota location. Another possibility is that the publication of a well documented, and written, book on the Peacekeeper System could serve as appropriate mitigation. The Wyoming SHPO would like to meet with the United States Air Force and the Advisory Council on Historic Preservation to discuss appropriate mitigative alternatives for this important project.

Please refer to SHPO project control number #0799TPT026 on any future correspondence dealing with this project. If you have any questions, contact Sheila Bricher-Wade at 307-777-6179 or me at 307-777-6311.

Sincerely,

Judy K. Wolf
Deputy State Historic Preservation Officer

JKW:SBW:jh

cc: Lee Keatinge, Advisory Council on Historic Preservation

Jim Geringer, Governor — John T. Keck, Director

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rec'd 17 Aug 00

August 12, 2000

1561 N. 22nd Street
Laramie, WY 82070

Mr. Jonathan D. Farthing, Chief
Environmental Analysis Division
HQ AFCEE/ECA
3207 North Road
Brooks, AFB, TX 78235-5363

RE: Comments on the Draft Environmental Impact Statement (DEIS), Peacekeeper Missile System Deactivation and Dismantlement at F.E. Warren Air Force Base, Wyoming

Dear Mr. Farthing:

Pursuant to the above referenced DEIS dated June 20, 2000, please accept the following comments:

1. Re: HICS Alternative:

10-1 I believe that this alternative should be implemented along with the Proposed Action. If the Air Force is going to relinquish legal and physical control on lands containing the HICS, I feel the Air Force should also be responsible for the removal of all components of the HICS. Unless the HICS is removed, it will become a long-term liability for property owners and could interfere or impact future land use and/or development.

2. Re: Air Quality Impacts of the Proposed Action

10-2 There is no indication that the Air Force has or will request a review of the Proposed Action by the Wyoming Department of Environmental Quality/Air Quality Division (WDEQ/AQD). Since the Proposed Action could result in air quality emission, the Wyoming Environmental Quality Act requires that all projects that will or could impact air quality be reviewed by and if required permit by the WDEQ/AQD. A commitment to have to Proposed Action reviewed by the WDEQ/AQD should be included in the mitigation section of the DEIS.

3. Re: Impacts to Threatened, Endangered, and Candidate Species (TE&C)

10-3 The DEIS indicates that the project will not impact TE&C species and therefore, consultation with the Wyoming Game and Fish Department (WGFD) and U.S. Fish and Wildlife Service is not required. The determination of formal consultation with the USFWS under the Endangered Species Act cannot be made by the Air Force. This formal determination can only be made by the USFWS. The Proposed Action should under go informal consultation with the USFWS and the WGFD. The USFWS will make the determination as to whether formal consultation is required and whether or not a biological assessment should be prepared. A commitment to conducting information consultation with the USFWS and the WGFD should be included in the mitigation section of the DEIS.

4. Re: Impacts to Cultural Resources

10-4 The DEIS makes only passing reference to measures to mitigate the loss of Cold War resources. While HABS/HAER documentation will be important, the Air force should select and designate one LF and MAF near Cheyenne as an example of the Peacekeeping missile system for public tours and for future generations. The site should be left intact as much as possible in accordance with standard cultural resource preservation practices. A commitment to preserve one LF and MAF should be included in the mitigation section of the DEIS.

5. Re: Land farming of biosolids from MAF sewage lagoons

10-5 The DEIS indicates that sludge from the MAF wastewater treatment facilities would be landfarmed; however, there is no description where is action would occur and whether or not it would be done in compliance with WDEQ/Water Quality Division regulations. A detailed description of landfarming activities must be added to the Proposed Action. This description should include where landfarming would occur and how it would be conducted.

Thank you for the opportunity to comment on this DEIS.

Sincerely,

Scott W. Kamber

2

Received 31 Aug 2000

Memo

To: Mr. Jonathon D. Farthing, Chief, Environmental Analysis Division,
HQ AFCEE/ECA,
3207 North Road, Brooks AFB, TX 78235-563

From: Mae Kirkbride
3540 County Road 132
Cheyenne WY 82009

Date: 08/22/00

Re: Peacekeeper Missile System Deactivation and Dismantlemen

Thank you for the opportunity to add to the remarks I made at the Cheyenne hearing, July 31st.

I feel I can be more coherent on the written page. My concerns are as follows:

11-1 1) Because there can be no action taken before 2007 and even later if the Start II treaty is not signed soon, I am concerned that the EIS document might need modification. There may be subdivision development near a missile site, for example. I would urge an option in the EIS or some other document that would allow for changes in the future.

11-2 2) Because the gravel roads will receive, heavy use during the dismantlement there should be a provision that the damaged roads will be restored to previous condition. Since the county is chronically short of funds, repair of roads would cause a diversion from some other necessary project.

11-3 3) These missiles contain a variety of toxic and carcinogenic chemicals that might leak into the water table. For that reason, I would urge the Air Force to test ground water near the sites, and before and after tests of domestic wells within 1 mile of the site.

I hope I haven't forgotten anything. Your DEIS was very comprehensive and understandable which leaves little to question.

Best regards,

Mae Kirkbride

• Page 1

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
P.O. Box 25007 (D-108)
Denver, Colorado 80225-0007

September 7, 2000

ER 00/552

Mr. Jonathan D. Farthing
Chief, Environmental Analysis Division
HQ AFCEE/ECA
3207 North Road
Brooks AFB, Texas 78235-5363

Dear Mr. Farthing:

Thank you for the opportunity to review the Draft Environmental Impact Statement for the Deactivation and Dismantlement of the Peacekeeper Missile System at F.E. Warren Air Force Base, in Laramie, Goshen, and Platte Counties, Wyoming. The Department of the Interior reviewed this document and offers the following comments.

General Comments

12-1 The U.S. Fish and Wildlife Service (FWS) has concerns regarding the lack of quantitative data leading to effect determinations for threatened, endangered, proposed, and candidate species. Wildlife monitoring should be performed one year prior to any ground disturbing activities at each site. To determine if areas are being used by wildlife species (e.g., mountain plovers, bald eagles, ferruginous hawks, and swift fox), surveys must be conducted. Without these surveys, protective measures may not be implemented, therefore potentially resulting in non-compliance with the Endangered Species Act of 1973 (ESA), as amended, or the Migratory Bird Treaty Act.

Due to the length of the project, each project site should be surveyed one year prior to disturbance. Should any new species become listed during the 7-year course of the project and an effect is likely, you will need to initiate section 7 consultation under the Endangered Species Act of 1973, as amended, with the U.S. Fish and Wildlife Service, Ecological Services, 4000 Airport Parkway, Cheyenne, Wyoming 82001.

Specific Comments

12-2 **4.2.4.2. Land Use**--We recommend an alternative whereby all above ground structures are razed and the site is restored as closely as possible to predisturbance conditions. This would include

removing LF and MAF support buildings, line-of-sight poles, utility poles, and fencing at each site. These structures provide artificial roost sites for raptors, which may in turn prey upon mountain plovers. If the mountain plover is listed as a threatened or endangered species, any impact to this bird which results in modified habitat or behavior, and affects reproductive success may be a violation under the ESA, unless consultation pursuant to section 7 of the ESA has been completed and take has been addressed in an Incidental Take Statement.

12-3 **4.4.2.2.4. Water Quality**--We have concerns with the determination of acceptable levels of contaminants leaching into ground or surface waters. While water quality issues have been addressed with regard to effects on human use, this evaluation may not accurately apply to effects on wildlife, as their standards differ. Should ground water contaminants reach surface waters, wildlife may be adversely effected.

12-4 **4.4.5.2.1. Vegetation**--It is important that all vegetation planted at the sites (e.g., reseeding of grasses or other vegetation planted along drainage pathways), be native to that area. We also recommend consistent monitoring and management of all sites where fill dirt is brought in from other locations. Although the sites have been determined to be "weed-free," fill dirt brought in from other locations could provide a potential seed source for nonnative species to be introduced. This is especially important in areas along water drainages, as seeds can be easily dispersed and carried downstream to new locations.

4.4.5.2.4. Threatened, Endangered, or Candidate Species--In the *Federal Register* dated February 16, 1999, the U.S. Fish and Wildlife Service gave notice of a proposal to list the mountain plover (*Charadrius montanus*) as a threatened species pursuant to the ESA. Mountain plovers are rarely found near water and show a preference for previously disturbed areas or modified habitat. However, without specific surveys for this species, determining their presence is very difficult and may not be accomplished with casual observations. If the mountain plover is listed, any impact to this bird which results in modified habitat or behavior and affects reproductive success may be a violation under the ESA. We strongly recommend surveys for this species be conducted to avoid this situation.

12-5 Endangered Species Act regulations (50 CFR 402.10) allow for conferencing with the FWS on any action the Federal agency determines may affect a proposed species, and require conferencing with the FWS on any action which is likely to jeopardize the continued existence of any proposed species. On page 7599 of the proposed rule to list the mountain plover, the FWS identified some actions that will likely trigger section 7 conferencing. We believe the proposed action qualifies as one of these actions, and consequently the U.S. Air Force should determine whether the project may affect the mountain plover. If so, we ask that you coordinate with the FWS office in Cheyenne to discuss whether the action is likely to cause jeopardy to the mountain plover and identify measures that would minimize or eliminate any proposed adverse effect. By doing so, the need to consult with the FWS may be eliminated or the consultation process may be significantly streamlined should the mountain plover actually be listed as threatened. Enclosed is a copy of the mountain plover survey guidelines for your use.

12-6 **Candidate Species**--The U.S. Fish and Wildlife Service has determined that the black-tailed prairie dog is warranted for listing as a threatened species, but is precluded from being listed at this time by higher priority species. It would be advisable to evaluate potential impacts to this species now to avoid or minimize possible project delays should the species eventually be listed.

12-7 The swift fox is a candidate species for which the FWS also has determined that listing is warranted, but precluded at this time. Despite its listing being precluded at this time by other higher priority actions, the FWS remains concerned regarding the status of this species. In view of the possible future listing of this species, we recommend that any assessment also analyze potential impacts of the proposed project on the swift fox.

The swift fox is the smallest member of the North American canids (4.6-6.4 pounds), about the size of a house cat. It can be separated easily from the more common red fox (*Vulpes vulpes*) by its small size and black-tipped, rather than white-tipped, tail. The fur is orange-yellow above with frosty or black tips. Side and belly fur is white or light yellow. It prefers short grass prairie habitat but may be found throughout the State in areas generally lacking tall grass, shrubs, or woody vegetation and where topography is flat or gently rolling. Several studies have documented a close association between the swift fox and prairie dog (*Cynomys* spp.) colonies. Declines are thought to be due to conversion of native habitat for cultivation and competition or predation by coyotes (*Canis latrans*) and red fox.

12-8 **Migratory Birds**--Work that could lead to the take of a migratory bird or eagle, their young, eggs, or nests should be coordinated with the U.S. Fish and Wildlife Service, Ecological Services, 4000 Airport Parkway, Cheyenne, Wyoming 82001, before any actions are taken in order to determine how such take could be avoided. Removal or destruction of such nests or causing abandonment of a nest could constitute violation of the Migratory Bird Treaty Act and/or the Bald and Golden Eagle Protection Act. Removal of nests or nest trees is prohibited but may be allowed once young have fledged and/or a permit has been issued. In either case, timing is a significant consideration and you need to allow for this in your project planning. The FWS recommends the project area be surveyed for raptor nests and roost areas. For all active nests found in the project area, a disturbance-free buffer zone of ½ mile should be maintained during the nesting season for all species except listed threatened and endangered species and the ferruginous hawk, which should be protected by a 1-mile disturbance-free buffer zone. If any active nests or roost areas are identified within these buffer zones, we recommend avoiding work in the area between February 15 and August 15 and avoiding impacts to any nests and roost areas. If timing and/or location of the work cannot be modified to avoid possible impacts, you should contact the FWS Wyoming office to determine how to proceed.

Summary Comments

12-9 We recommend the Air Force perform surveys for mountain plovers, raptor nests, and other wildlife species identified in FWS's scoping comments of August 10, 1999. These surveys should be performed one year prior to disturbance at each site. If a species of concern is found, we ask that you coordinate with the U.S. Fish and Wildlife Service, Ecological Services, 4000 Airport Parkway, Cheyenne, Wyoming 82001, to discuss whether the action will require consultation under the ESA and identify measures that would minimize or eliminate any proposed adverse effect.

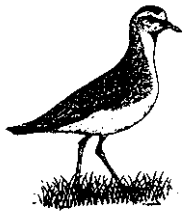
12-10 We also recommend a review of the water quality and land use issues outlined above and their cumulative and long-term effects on wildlife and natural resources in the project area.

Sincerely,

Robert F. Stewart
Regional Environmental Officer

Enclosure

MOUNTAIN PLOVER SURVEY GUIDELINES
U.S. Fish and Wildlife Service
1999



The mountain plover (*Charadrius montanus*) is a small bird (17.5 cm, 7 in.) about the size of a killdeer (*C. vociferus*). It is light brown above with a lighter colored breast, but lacks the contrasting dark breast-belt common to many other plovers. During the breeding season it has a white forehead and a dark line between the beak and eye, which contrasts with the dark crown.

Mountain plover breeding habitat is known to include short-grass prairie and shrub-steppe landscapes; dryland, cultivated farms; and prairie dog towns. Plovers usually nest on sites where vegetation is sparse or absent, due to disturbance by herbivores, including domestic livestock and prairie dogs. Vegetation at shortgrass prairie sites is less than 4 inches tall, while shrubs visually predominate nest sites within the shrub-steppe landscape. Usually, nest sites within the shrub-steppe are on active prairie dog towns. Nests are commonly located near a manure pile or rock. In addition to disturbance by prairie dogs or livestock, they have also been found on oil drill pads. Mountain plovers are rarely found near water. They may be found on heavily grazed pastures throughout their breeding range and may selectively nest in or near prairie dog towns. Positive indicators for mountain plovers therefore include level terrain, prairie dogs, bare ground, *Opuntia* pads, cattle, widely spaced plants, and horned larks. It would be unusual to find mountain plovers on sites characterized by irregular or rolling terrain; dense, matted vegetation; grass taller than 4 inches, wet soils, or the presence of killdeer .

These guidelines were developed by Service biologists Pat Deibert, Lou Hanebury, and Bob Leachman, and Dr. Fritz Knopf, USGS-BRD. Keep in mind these are guidelines - please call Bob Leachman at 970-243-2778 if you have any suggestions.

GENERAL GUIDELINES FOR SURVEYS

On February 16, 1999, the Service proposed the mountain plover for federal listing as threatened. Because listing of this species is proposed, the Service may recommend surveys for mountain plovers to better define nesting areas, and minimize potential negative impacts. The Service recommends surveys for mountain plovers in all suitable habitat, as well as avoidance of nesting areas, to minimize impact to plovers in a site planned for development. While the Service believes that plover surveys, avoidance of nesting and brood rearing areas, and timing restrictions (avoidance of important areas during nesting) will lessen the chance of direct impacts to and mortality of individual mountain plovers in the area, these restrictions do nothing to mitigate indirect effects, including changes in habitat suitability and habitat loss. Surveys are, however, a necessary starting point. The Service has developed the following 2 survey guidelines, depending on whether the intent is to determine the presence or absence of plovers at a site during the nesting season, or to determine the density of nesting plovers.

Survey Protocol

Two types of surveys may be conducted: 1) surveys to determine the presence/absence of breeding plovers (i.e., displaying males and foraging adults), or 2) surveys to determine nest density. The survey type chosen for a project and the extent of the survey area (i.e., beyond the edge of the construction or operational ROW) will depend on the type of project activity being analyzed (e.g., construction, operation) and the users intent. One methodology outlines a breeding survey that was used in northeastern Colorado to establish the density of occupied territories, based on displaying male plovers or foraging adults. The other was developed to only determine whether plovers occupy an area.

Techniques Common to Each Survey Method

- Conduct surveys during early courtship and territorial establishment. Throughout the breeding range, this period extends from approximately mid-April through early July. However, the specific breeding period depends on latitude, elevation, and weather.
- Conduct surveys between local sunrise and 1000 and from 1730 to sunset (periods of horizontal light to facilitate spotting the white breast of the adult plovers).
- Drive transects within the project area to minimize early flushing. Flushing distances for mountain plovers may be within 3 meters for vehicles, but plovers often flush at 50 to 100 meters when approached by humans on foot.
- Use of a 4-wheel drive vehicle is preferable; however, fallow agricultural fields present an access problem. Use of ATVs has proven highly successful in observing and recording displaying males.
- Stay in or close to the vehicle when scanning. Use binoculars to scan and spotting scopes to confirm sightings. Do not use scopes to scan.
- Do not conduct surveys in poor weather (i.e., high wind, precipitation, etc.).
- Surveys conducted during the courtship period should focus on identifying displaying or calling males, which would signify breeding territories.
- For all breeding birds observed, conduct additional surveys immediately prior to construction activities to search for active nest sites.
- If an active nest is located, an appropriate buffer area should be established to prevent direct loss of the nest or indirect impacts from human-related disturbance. The appropriate buffer distance will vary, depending on topography, type of activity proposed, and duration of disturbance. For disturbances including pedestrian foot traffic and continual equipment operations, a 200-meter buffer is recommended.

SURVEY TO DETERMINE PRESENCE/ABSENCE

1. Conduct the survey between May 1 and June 15, throughout the breeding range.

2. Visual observation of the area should be made within 200 m of the proposed action to detect the presence of plovers. All plovers located should be observed long enough to determine if a nest is present. These observations should be made from within a stationary vehicle, as plovers do not appear to be wary of vehicles.

3. If no visual observations are made from vehicles, the area should be surveyed on ATV's. Extreme care should be exercised in locating plovers due to their highly secretive and quiet nature. Surveys by foot are not recommended because plovers tend to flush at greater distances when approached using this method. Finding nests during foot surveys is more difficult because of the greater flushing distance.

4. A site must be surveyed 3 times during the survey window, with each survey separated by at least 14 days.

5. Initiation of the project should occur as near to completion of the survey as possible. For example, seismic exploration should begin with 2 days of survey completion. A 14 day period may be appropriate for other projects.

6. If an active nest is found in the survey area, the planned activity should be delayed 37 days, or one week post-hatching. If a brood of flightless chicks is observed, activities should be delayed at least seven days.

SURVEY TO DETERMINE DENSITY OF NESTING MOUNTAIN PLOVERS

We are assuming people will have received training on point counts in general before using this specialized point count technique adapted to mountain plovers.

Establishing Transects

1. Identify appropriate habitat and habitat of interest within geographic areas of interest.

2. Upon arriving in appropriate habitat, drive to a previously determined random starting point.

3. For subsequent points, drive a previously determined random distance of 0.3, 0.4 or 0.5 miles.

4. Each transect of point counts should contain a minimum of 20 points.

Conducting The Point Counts

1. Conduct counts between last week in June to July 4th at eastern plains elevation in Colorado.

2. Only 1 counter is used. Do not use a counter and recorder or other combinations of field help. Drivers are okay as long as they don't help spot plovers.

3. If an adult mountain plover is observed, plot occupied territories on a minimum of 1:24,000 scale map and on a ROW diagram or site grid (see attached). The ROW diagram will be at a greater level of detail, depicting the location of breeding birds (and possible nest sites) relative to ROW centerline, construction boundary, and applicable access roads.

4. Estimate or measure distances (in meters) to all mountain plovers. Method used should be noted, e.g., estimates w/distance training, estimates w/o distance training, rangefinder or measured with tape measure, etc.

5. Record "fly-overs" as "FO" in the distance column of the data sheet.

6. If you disturb a mountain plover while approaching the point, estimate the distance from point-center to the spot from which the bird was flushed.

7. Conduct counts for 5 minutes with a 3 minute subsample to standardize with BBS.

8. Stay close to your vehicle while scanning.

Recording Data

Record the following information AT EVERY POINT, EVERY DAY.

- start time
- unique point code (don't duplicate within a field crew or across dates)
- number of mountain plovers and distance to each
- land use and/or habitat type (e.g., fallow wheat, plowed, shortgrass)
- temperature, Beaufort wind, and sky conditions (clear, partly cloudy, overcast)
- Information on the data sheet somewhere.
- your name and address
- date
- record for each point at some point during the census.
- detailed location description of each point count including road number, distance to important intersections.
- record transect and point locations on USGS county maps.
- Universal Transverse Mercator from maps or GPS are useful.

GENERAL HABITAT INDICATORS

Positive habitat images

- Stock tank (non-leaking, leaking tanks often attract killdeer)
- Flat (level or "tilted) terrain
- Burned field/prairie/pasture
- Bare ground (minimum of 30 percent)
- "Spaced" grass plants
- Prairie dog colonies
- Horned larks
- Cattle
- Heavily grazed pastures
- *Opuntia* pads visible

Negative habitat images

- Killdeer present (indicating less than optimal habitat)
- Hillsides or steep slope
- Prominent, obvious low ridge
- Leaky stock tanks
- Vegetation greater than 4 inches in height
- Increasing presence of tall shrubs
- Matted grass (i.e., minimal bare ground)
- Lark buntings

- 5 -

THE STATE OF WYOMING

Jim Geringer, Governor

Sleeter Dover, Esq., Director

Department of Transportation

5300 BISHOP BOULEVARD CHEYENNE, WYOMING 82009-3340

August 16, 2000

Mr. Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX. 78235-5363

RE: DEIS for the Deactivation/Dismantlement of the Peacekeeper Missile System at F.E. Warren AFB, Wyoming ID#: 99-084

Dear Mr. Farthing:

13-1 Generally, the sections regarding transportation was very well written. I want to ensure that the third paragraph on page 4-18 is not overlooked during blasting. A significant problem could occur if this prescribed protocol is not adhered to. I believe that the three week notice should be mentioned in the area of Mitigation Measures on page 4-19. Otherwise, everything else appears to be in order.

Respectfully submitted,

Timothy L. Stark

Timothy L. Stark, P.E.
Environmental Services Engineer

cc:
Rick Harvey, P.E., State Materials Engineer, Cheyenne
Pat Collins, P.E., State Bridge Engineer, Cheyenne
Jon Anderson, P.E., State Highway Development Engineer, Cheyenne
Jay Gould, P.E., District Engineer, Laramie
Bill Jones, P.E., Wyoming Division Administrator, FHWA, Cheyenne

Cheyenne Public Hearing

Ms Mae Kirkbride

1a-1 Impacts to groundwater are discussed in Section 4.4.2.2.1. Impacts to groundwater quality are discussed in Section 4.4.2.2.4. Section 3.4.2.4.1 discusses current water quality. The only wells sampled in the area of the missile facilities are at the MAFs; no groundwater contamination has been detected.

1a-2 The exact timeframe of implementing the Proposed Action is undetermined at this time. It depends upon final ratification of the START II Treaty by both Russia and the United States. If there is a substantial delay in or a major modification of the Proposed Action, a Supplemental EIS would be written to address the changes in the Proposed Action and the projected impacts.

1a-3 The Air Force has consulted and will continue to consult with Wyoming officials on regulatory issues while preparing the EIS.

Ms. Barbara Guilford

1b-1 Contractors on Federal projects are required by the Davis-Bacon Act (40 U.S.C. § 276a *et seq.*) to pay no less than the "prevailing" wage rate for similar types of work. The U.S. Department of Labor collects local wage data to determine that locale's prevailing wage rate for various types of jobs. Beyond the requirements of the Davis-Bacon Act, the normal forces of labor supply and demand would affect the wage rate, along with any union-negotiated wage rates that may apply to the area. This discussion has been added to Section 4.2.1.2.2 of the EIS.

1b-2 Discussions with contractors who have performed previous dismantlement efforts suggest that most of the dismantlement labor force would be hired locally. However, it is anticipated that only about 20 workers would be needed from the local area. So while there would be a small beneficial impact to the local construction labor market and to local personal income, it is unlikely that any permanent change to the structure of the local labor force would occur. This discussion has been added to Section 4.2.1.2.2 of the EIS.

1b-3 As noted in response 1b-2, most of the dismantlement labor force would be hired locally, and would likely already be resident in one of the three counties of the deployment area. The number of workers anticipated to move to the deployment area is very small (probably less than 15), and would result in negligible increases in student enrollments in Laramie County School District 1 (LCSD1). According to the DEIS, Section 4.2.1.2, the loss of personnel associated with the Peacekeeper Missile System would result in a total population loss to Laramie County of less than 450 persons over three years, with an estimated loss of approximately 120 students over the same time period in LCSD1. These losses would more than offset any slight enrollment gains that might occur as a result of a small number of construction workers relocating to the Cheyenne area. This discussion has been added to Section 4.2.1.2.4 of the EIS.

Mr. Larry Sortor

1c-1 As discussed in Section 2.1.3, the launch closure door is removed as part of the dismantlement process. The door would be buried on site. A concrete cap is placed over the remaining portion of the launch tube and the area is regraded.

1c-2 As discussed in Section 2.1.4, a reinforced concrete cap would be placed over the emergency escape tunnel.

1c-3 The depth of the HICS is not classified; it ranges from three to six feet. Section 4.4.2.3 has been modified to provide more details of impacts to water from the HICS removal.

1c-4 The Weapon Storage Area (WSA) operates under strict standards governing the number of various types of explosives that can be stored. This capacity cannot be exceeded. The base is currently completing a conversion of all Minuteman III missiles from three warheads to one. The capacity of the WSA has never been an issue. Components are shipped on a regular basis to the Department of Energy, which also has sufficient capacity to transport and store these components. Sections 3.3.1, 4.3.2.1, and Appendix H have been modified to address these issues.

1c-5 Explosives recovered during Peacekeeper deactivation are not planned to be detonated at the Explosive Ordnance Disposal Range at F.E. Warren AFB. The explosives would be reused as needed or shipped to another location for storage or disposal. Sections 3.3.1 and 4.3.2.1 have been modified to address this issue.

Mr. Ed Warsaw

1d-1 The Air Force has policies in place to manage compensation in the event of an adverse impact to the public. The Public Affairs Office could provide more details if necessary.

1d-2 Colorado was not included in the public hearings because the deployment area of the Peacekeeper system is within the borders of Wyoming. The impacts of the Proposed Action are anticipated to be limited to within the deployment area and the vicinity of Cheyenne.

1d-3 The Air Force Space Command along with the U.S. Army Corps of Engineers will oversee the dismantlement of the Peacekeeper Missile System.

1d-4 State and local governments would be consulted to determine how the Air Force would comply with government regulations in a number of resource areas.

1d-5 As discussed in Section 4.3.2.2, the Air Force and its contractor would follow all applicable Federal, State, and local regulations concerning hazardous materials and wastes. Personnel handling these materials would be required to have proper training. State and local governments would be consulted to deal with specific issues concerning hazardous waste disposal.

1d-6 Hazardous materials will continue to be stored in compliance with all applicable regulations. As discussed in Section 4.3.2.2, hazardous wastes would be disposed of at approved facilities in accordance with Federal and State regulations.

1d-7 Section 3.2.3.1 discusses current security and safety measures used to transport missile components. Additional information can be obtained by contacting the F.E. Warren AFB Public Affairs Office.

1d-8 The Air Force will notify the public when dismantlement is scheduled to occur.

Ms Lindy Kirkbride

1e-1 The Peacekeeper missile system is a technologically advanced system that must be described using engineering terminology. The EIS addresses highly technical issues and attempts to describe the system and proposed activities, and discuss the issues in the simplest terminology applicable. To aid the reader in understanding engineering concepts, a glossary (Appendix O) defines many of the technical terms. At this time, the Air Force does not plan to place this EIS on a website; copies will be provided by request.

1e-2 The email address for Mr. George Gauger at Headquarters AFCEE was provided to you at the Cheyenne Public Hearing.

1e-3 Currently, there is not much online information directly related to missile deactivation and dismantlement.

1e-4 The Proposed Action is tied to ratification of the START II Treaty. If the Treaty is ratified, the Proposed Action would take place within the specified timelines. If the Treaty is not ratified, deactivation and dismantlement could occur at the discretion of the Federal government.

1e-5 The potential reuse of land would depend upon deed restrictions imposed on the land according to CERCLA and Wyoming Solid Waste regulations. Future land use would vary according to site, but generally, some of the land outside the security fences would be reusable for grazing or other land uses. The first beneficial impact to land use would occur after the current 25-foot security zone around facilities is discontinued and azimuth markers are removed (at the landowner's request). Other land would be available to the public after dismantlement is completed. Several years would occur before the sites were available to be purchased by the surrounding landowner.

1e-6 At the MAF sites, the housing unit would remain, but some areas would be reseeded. For example, the former sewage lagoons would be closed in accordance with Federal and State regulations, and graded and reseeded with native grasses. At the LF sites, a slight mound of gravel would be left at the site of the former launch tube. This gravel would provide proper drainage and help prevent subsidence at the site.

1e-7 As discussed in Section 4.2.3.2, the contractor would be required to inform the Wyoming Department of Transportation (WYDOT) three weeks prior to the

explosive demolition of an LF to allow time to plan for detours of U.S. and State highways and notify the public. County governments should be informed of temporarily closures of county roads. Sections 4.2.3.2, 4.2.3.5, and the mitigation section of the Executive Summary have been modified to include this supplemental information.

1e-8 As discussed in Section 4.2.3.2, the impact on road maintenance in Laramie County would be adverse, but not significant. In Laramie County, about 4 percent of the gravel roads are maintained with Peacekeeper-related Federal funding. If all items in the County budget remained constant, shifting funding from Federal to County sources would increase the County budget by about 0.4 percent. The average annual increase in the County budget has been about 7.5 percent for the last five years. The potential increase from assuming the cost of gravel road maintenance would amount to 5 percent of the average annual increase in the budget.

1e-9 Impacts to the public near missile facilities at Grand Forks AFB were predicted in the EIS prepared for the Dismantlement of the Minuteman III Missile System at Grand Forks AFB, ND. Dismantlement has been ongoing and all LFs within the 446th Missile Squadron have been explosively demolished. The landowners were notified prior to the demolition and some participated in the process. Personnel from the Missile Engineering Flight at Grand Forks AFB have interacted with landowners, the dismantlement contractor, and the contracting agency (U. S. Army Corps of Engineers (USACE)) during the dismantlement and report no complaints from the public pertaining to environmental impacts. The Public Affairs Office at Grand Forks AFB has received no public complaints from the ongoing dismantlement effort.

1e-10 The EIS process is one method of public education. The Public Affairs Office at F.E. Warren AFB could provide further information.

Ms Mae Kirkbride

1f-1 The Air Force has and would continue to maintain proper burial of HICS cables until the restrictive easement above the HICS is no longer needed and expires. Initial testing has determined that there are no PCBs on or in the HICS cable.

Wheatland Public Hearing

There were no public comments at the Wheatland Public Hearing.

Torrington Public Hearing

There were no public comments at the Torrington Public Hearing.

United States Environmental Protection Agency, Region 8

4-1 Sections 3.4.2.4.1 and 3.4.2.4.2 and Appendix J have been revised to include regional water quality to the extent information is available.

4-2 Section 4.4.1.2.2, 4.4.1.5, and the mitigation section of the Executive Summary were revised to include a pre- and post-blast survey of subsurface structures as a mitigation measure. This mitigation will also be included in the USACE contract with the dismantlement contractor.

4-3 The water supply wells at the MAFs are located a sufficient distance from the LFs (3 miles or more) to preclude impacts from the explosive demolitions of the LFs. Based on ground acceleration from previous explosive demolitions of Minuteman missile systems, the maximum charges per delay used, and standard maximum ground acceleration equations, the maximum distance that ground acceleration would be at levels potentially damaging to structures is about 600 feet. This could vary somewhat depending on geology, but not substantially. During the dismantlement of the Minuteman II missile system at Ellsworth AFB, 33 water wells were tested prior to explosive demolition. The closest water well, about 640 feet from an LF, was tested after demolition of a nearby LF and no damage was found. Section 4.4.2.2.1 was revised to address this concern.

4-4 Subsequent to issuing the DEIS, the Air Force has modified the Proposed Action to include removal of all shallow-buried fuel tanks as part of the Peacekeeper dismantlement. Deep-buried tanks, which would require extensive excavation to remove, would be closed in place in accordance with applicable regulations. The EIS was modified at Sections 4.3.2.2.1 and 4.3.2.4 to clarify this.

4-5 Comment noted.

4-6 The Air Force has no plans currently, or in the foreseeable future, to deactivate the Minuteman III Missile System supported by F.E. Warren AFB.

4-7 The map has been revised to substitute "Chugwater" for "Wheatland."

State of Wyoming Office of Federal Land Policy

5-1 The Air Force will evaluate the specific comments attached to your letter and address them as responses to comments, and revisions to the EIS as deemed appropriate.

5-2 The Air Force considered the scoping comment concerning leaving the sites covered with gravel rather than returning them to their original condition. The comment was included in Section 1.4.1 of the DEIS as the 6th item under "Land Use". To minimize erosion impacts, need for top soil, water use, and growth of noxious weeds, the Air Force still plans to leave gravel over the main portion of the LF sites. Each site would be contoured with gravel to facilitate drainage away from the demolished substructure; this process would be done to minimize environmental impacts such as water incursion into the substructures, subsidence of the ground surface, and ponding of water in the subsidence depression. Because solid waste would be left beneath each site and the remaining structure of the

launch tube would be capped, there are Wyoming requirements to protect the drainage and subsurface integrity (see comments and responses 7-7 and 7-18).

The Air Force plans to continue close and continued coordination with affected State agencies throughout the EIS and dismantlement processes.

Wyoming Game and Fish Department

6-1 The Proposed Action does not include removal of the HICS. The DEIS includes an evaluation of the HICS removal alternative which shows short-term environmental damage greater than that associated with the Proposed Action. If the alternative which includes HICS removal is selected, the Wyoming Game and Fish Department will be consulted.

6-2 The text has been changed as recommended in the Executive Summary-Biological Resources subsection and in Sections 4.4.5 and 4.4.5.1.

6-3 In response to your comment, Mr. Mark Zornes of the Wyoming Game and Fish Department was contacted regarding sage and sharp-tailed grouse breeding and nesting habits. The information was summarized and added in the Executive Summary-Mitigations, and Sections 4.4.5.2.3 and 4.4.5.5.

6-4 The text has been revised in Section 3.4.5.3 to note that all fishes of Wyoming are the property and management responsibility of the Wyoming Game and Fish Department.

6-5 Section 3.4.5.4 has been changed to indicate the Colorado butterfly plant as a proposed threatened plant by the USFWS.

6-6 Sections 3.4.5.4 and 4.4.5.2.4 have been modified to include discussion of the mountain plover, swift fox, and black-tailed prairie dog.

6-7 The consultation performed at the time the DEIS was prepared was submittal of a scoping letter and attached DOPAA that was sent to the Wyoming Game and Fish Department on June 18, 1999. An example of the scoping letter and your response to the letter was included in Appendix C. Additional consultation (involving discussions) has been conducted subsequent to the receipt of your letter.

The State of Wyoming Department of Environmental Quality

7-1 The Air Force repeated some background information from Chapter 3 into Chapter 4 to help the DEIS reviewers compare baseline and future data without switching between chapters.

7-2 The Air Force disagrees that it determined only agricultural use of the sites was viable and allowable. By leaving gravel on the surface at the LFs, they can be used as parking or storage facilities, protected by the existing fence. The Air Force plans to conduct a sampling program and to remediate sites as necessary. Sections 4.3.2.2.5, 4.3.2.3, 4.3.2.4, and 4.3.2.5 discuss in general what sampling would occur. This document has been developed in accordance with NEPA and is not

intended to provide details on the characterization of the sites and a particular sampling and remediation program. The Air Force would prepare a Sampling Plan through coordination with WYDEQ. The Plan would indicate what type samples, their location, number, and analytes, as well as how the results would be addressed. The Air Force plans to conduct the sampling and any necessary remediation similar to what occurred in previous Minuteman Missile System dismantlement programs. The Air Force desires to meet with WYDEQ representatives separate from the NEPA process to commence discussing the proposed sampling program.

7-3 Sections 120(h) and (i) of CERCLA govern transfers of land from Federal agencies where hazardous materials were stored or released, and include provisions for identifying restrictions on the deeds that are necessary to ensure the protection of human health and the environment.

The Air Force will prepare an environmental baseline survey (EBS) for each former missile site in accordance with Public Law 106-65 and applicable DoD and Air Force guidance. The EBSs will be prepared to Environmental Site Assessment requirements of the American Society for Testing and Materials (ASTM) 1527, 1528, and D 6008-96. The Air Force would prepare a finding of suitability to transfer (FOST) or finding of suitability to lease (FOSL) that would document the condition of each site and categorize each site regarding future land use. To ensure that the integrity of the solid waste (remaining rubble of LF) would not be breached, each land conveyance document will include a deed restriction on future excavation of the site, and the Air Force will comply with all State of Wyoming statutes and regulations during this process. The Wyoming Solid Waste Rules are particularly relevant regarding not disturbing the subsurface (see response 7-7).

7-4 Within the excavation restrictions required due to the burial of solid wastes, the Air Force would be pleased to see continued utility of the remaining infrastructure that has supported the Peacekeeper missile system. The Air Force agrees with WYDEQ and the focus on closure is to preserve useful facilities to the maximum extent practicable while minimizing environmental and health and safety effects, as well as limiting future liability for the Air Force.

7-5 The Air Force plans to characterize the soil at each site, not just potential waste streams. Risk information has been added to Section 4.3, Hazardous Materials and Waste Management in which the predicted groundwater and soil concentrations of each hazardous chemical are compared to State and Federal standards for drinking water and to risk-based levels for residential and worker soil exposure; no significant risks are predicted. The only land use restriction anticipated for the sites is a prohibition on future excavation under CERCLA 120(h), as discussed above. The site-specific sampling plans (discussed in DEIS Section 4.3.5, Mitigation Measures), which will be designed in coordination with the appropriate state authority, will be implemented to provide the data required for a determination of the need for additional action, if any.

7-6 As mentioned in response 7-3, site condition notifications are required under CERCLA 120(h). CERCLA 120(h) states that "whenever any department, agency, or instrumentality of the United States enters into any contract for the sale or other transfer of real property which is owned by the United States and on which any hazardous substance was stored for one year or more, known to have been released, or disposed of, the head of such department, agency, or instrumentality shall include in such contract notice of the type and quantity of such hazardous substance and notice of the time at which such storage, release, or disposal took place, to the extent such information is available on the basis of a complete search of agency files." Response 7-2 discusses the Air Force's plan to characterize contamination at each site. Sampling will occur at each site in accordance with a Sampling Plan coordinated with WYDEQ. Human health risks will be assessed; results of human health risk can be used as a general indicator whether any ecological risk exists. Risks to ecological receptors from any soil contaminants will be evaluated if site sampling indicates that a level of concern for any chemical may be present.

7-7 The Air Force recognizes solid waste requirements of Wyoming and has construction specifications to minimize groundwater infiltration of the launch tube area and subsequent leaching of potential contaminants. Evaluation of the solid waste stream through sampling at Minuteman missile facilities scheduled for dismantlement indicated negligible levels of contaminants. Modeling conducted for this analysis, as well as previous Minuteman system dismantlement actions, indicated no release of contaminants at levels that would harm human health or the environment.

Subsequent to completion of the EIS and Record of Decision, the Air Force would submit an application to USEPA Region 8 for risk-based in situ disposal of the PCB bulk waste. Supplemental modeling would be performed with site-specific analysis on several sites selected to assess a range of hydrogeological conditions. Hydrogeologic parameters would be gathered at the selected sites. The number of sites to be evaluated would be determined through consultation with USEPA Region 8. Results of the modeling would be submitted in support of the disposal application.

7-8 As noted previously in response 7-2, the EIS is an early planning document for the deactivation and dismantlement that is required under NEPA. Site characterization through sampling and remediation are subsequent, yet integral, phases of the deactivation and dismantlement process. Potential risks from the sites will be identified and evaluated prior to transfer of property by deed. Risk evaluation, identification, response, and notification will follow all applicable State and Federal requirements.

7-9 See response 7-2. Please refer to the last paragraph of Section 4.4.1.2.5, Soils, which states, "It is unlikely that LF and MAF sites would be returned to productive agricultural land because of soil compaction, the gravel at the sites, and restrictions placed on the future use of the sites." The gravel is approximately 30 feet deep near the LF tube. The volume of gravel available for site grading, amount of topsoil

required for agricultural use, and the process for revegetation and maintenance of the vegetation was considered when the Air Force decided to use the existing gravel as the top surface of each LF site. To maintain integrity of the buried solid waste, the Air Force does not propose to restore the sites for future agricultural use.

7-10 As noted in response 7-8, site characterization is not part of the NEPA scope. Prior to dismantlement, the Air Force will develop a sampling plan, and coordinate it with WYDEQ, to characterize the sites. Section 4.3.5, Mitigation Measures, of the EIS discusses the type of sampling the Air Force proposes to perform. The analytes sampled at Minuteman systems scheduled for dismantlement were based on chemicals known to have been used at the sites; this same process will be performed prior to dismantlement of the Peacekeeper missile system. This sampling will help determine future site-specific activities.

After dismantlement is complete, the Air Force would continue addressing potential environmental concerns by preparing an environmental baseline survey (EBS) (see response 7-3). The environmental review conducted for the EBS would characterize the environmental condition of land, air, and water resources of each land parcel. Because hazardous substances were stored for one year or more, there will be a notice of the type and quantity of hazardous substances and notice of the time during which such storage occurred. The EBS would address environmental issues and document site conditions including a site description, sampling conducted on site, past use of the site, any recorded releases (leaks or spills), and past or required future remediation.

7-11 The text in Sections 4.3.2.2.1 and 4.3.2.4 has been modified in response to your comment on tank removals. The Air Force proposes to remove all shallow-buried fuel tanks at the LFs and MAFs. These tanks would be tested for PCBs, and disposed of in accordance with applicable regulations, which would depend on whether PCBs were detected. Deep-buried tanks would be cleaned and closed in place; there are no deep-buried tanks at the LFs (see Table 3.3.4-1). It is possible that the deep-buried tanks at the MAFs have a PCB coating. The environmental risks associated with closing USTs in place are addressed under the Wyoming Underground Storage Tank Program, which the Air Force will follow when closing the deep-buried tanks.

Section 3.3.4 was revised to note that the Air Force has upgraded all tanks to meet regulatory requirements. WYDEQ has been notified prior to tank remediation actions, as well as upgrade activities, in the missile field. LF Q-8 is the only site within the Peacekeeper deployment area that has required remediation. Closure of the tanks would occur as part of the dismantlement action and WYDEQ would be involved in the activities in accordance with state regulations.

7-12 The USTs are not known to contain lead or any other metal coating.

7-13 The potential presence of a PCB coating on a UST was considered during the modeling of PCBs in groundwater. The volume of PCBs evaluated for potential leaching was conservatively assessed assuming that a PCB coating was on the UST

at an LF, as well as on UST piping, launcher headworks, and the launch facility support building. See Appendix K, page K-2, first bullet under "The amount of PCBs..."

7-14 Sampling would be performed for closure of USTs as required under the Wyoming Underground Storage Tank Program. All work plans and closure plans associated with this effort would be fully coordinated with the State. As noted previously, land use restrictions would be based on Federal requirements as well as Wyoming Solid Waste regulations. Sections 3.4.2.4.1 and 4.4.2.2.4 have been modified to further address groundwater quality issues.

7-15 All shallow-buried fuel tanks would be removed from the LFs and MAFs. Deep-buried tanks, located only at the MAFs, are approximately 40 feet deep. As part of the tank closure process, sampling would occur with accompanying remediation if required. The EBS process would address the UST closures done in compliance with the Wyoming Underground Storage Tank program. Sampling for UST closure at each site would be conducted prior to EBS preparation, and the results would be included in the EBS conducted for each missile facility. Contamination, if any, would be addressed with WYDEQ according to negotiated cleanup levels. See response 7-10 for more information on the EBS process and response 7-3 for a discussion on the FOST/FOSL process. Landowners with property adjacent to the missile facilities would be notified during the EBS process during the gathering of relevant site information. The deed for the MAF property would include a notice of all buried tanks with a restriction on excavating the tanks; as noted in response 7-3 there also would be other site disturbance restrictions.

7-16 The Air Force would sample the AST areas to determine whether there were releases to the environment from overfilling, spills, or leaks. The type and extent of sampling would be identified in a sampling plan coordinated with WYDEQ.

7-17 Coatings containing PCBs are on the outside of the concrete around the circumference of the launcher headworks. The explosives that could be used to demolish the headworks would not cause any combustion of PCBs.

7-18 The Air Force will meet all Wyoming requirements for permitting of solid waste disposal activities. A statement to this effect has been added to the DEIS in Section 4.3.2.5, Solid Waste.

7-19 DEIS Section 4.3.1.4, Above Ground and Underground Storage Tanks, states that all fuel storage tanks would be closed in accordance with state requirements. Closure plans would be coordinated with the appropriate State officials.

7-20 Modeling of potential environmental contamination was performed in the EIS (and summarized in Appendix K) to evaluate impacts of leaving the PCB and LBP coatings on buried surfaces. The higher concentrations near the source area are a result of the modeling assumption that lead and PCBs are continuously leached from the LF coatings over the 20-year modeled time period. As stated in DEIS Section 4.4.2.2.4, Water Quality, the PCB and lead concentrations predicted in the

groundwater nearest the LFs does not exceed the MCLs (drinking water standards) for lead or PCBs. The source area is essentially the layer of water immediately adjacent to the coating where the leaching occurs; the mass and volume of this water is negligible. The dispersivity parameter does not limit movement to 100 feet; it is a rate of dispersion of the contaminant, which is also dependent on the movement of the groundwater. The model continues moving contaminants indefinitely in time and space. Model parameters were conservatively determined based on literature data and past modeling for Minuteman system dismantlement. Pages K-2 and K-3 note the assumptions used, such as no reactions or degradation for lead or PCBs.

Future conditions would remain static after dismantlement is complete assuming no site disturbance by the future landowners in compliance with restrictions under CERCLA and Wyoming Solid Waste Regulations. The highest levels of contamination remain at the source area because of their low solubility in water and high capacity for adsorption in clays and organic matter. The leaching process is relatively slow compared to movement of petroleum substances in groundwater. As noted in the previous paragraph, the volume of the source area is negligible and would not present a risk to drinking water unless a water well was placed adjacent to the coated area (this would be an unreasonable location because the groundwater yield would be dramatically reduced by the adjacent structure).

7-21 There is no sewage generated at the LFs. No solid waste is disposed of at the LFs. Activities that generate waste such as replacement of batteries or of lubricant oil involve the transport of the hazardous material back to F.E. Warren AFB for proper characterization, storage, and disposal.

7-22 As noted in response 7-2, the Air Force would develop a sampling plan through interaction with WYDEQ and determine where characterization of potential contamination is required. There is an ongoing study of sump pump outfall generated at the missile facilities. The Air Force can make these results available to WYDEQ. The sampling results would be used to help determine future sampling requirements as part of dismantlement.

7-23 Every two years Air Force maintenance crews use several gallons of water to test the sump operation. No other standard maintenance process generates wastewater. The Air Force will consider past activities in developing the sampling plan to be coordinated with WYDEQ.

7-24 In accordance with NEPA, the significance criteria are defined to identify adverse impacts of a proposed activity associated with the Proposed Action as significant or not significant. Section 4.1, Introduction, elaborates on significance criteria and further explains that these impacts can have a long- or short-term effect on a resource area. The Air Force plans to further evaluate impacts from past activities at each site during the dismantlement process. As stated in Section 4.3.2.3 the Air Force would perform sampling of soils and lagoons to evaluate potential contamination; Section 4.3.2.4, tanks would be sampled for asbestos and PCBs; and

Section 4.3.2.5, water, sludge, and soil samples would be taken at the sewage lagoons. These results will be presented in future environmental documents.

7-25 As stated in Section 4.3.2.2.5, modeling was done to estimate lead levels; however, the Air Force is determining the type and extent of sampling to evaluate possible contamination of soils from past activities. The type of action taken during dismantlement would be influenced by the level of contamination, if any is detected. Based on the sampling results, the Air Force will coordinate with the state regarding cleanup.

7-26 Section 4.3.2.2.5, 2nd paragraph, discusses removal versus imploding and leaving the paint as part of the rubble. Sampling will be conducted at the sites to determine potential long-term impacts and the need for long-term monitoring. A sentence was added to Section 4.3.2.2.5 to further clarify this issue.

7-27 The first paragraph of Section 4.3.1.1.3, Pesticides, has been revised, as it was intended to convey that herbicides were evaluated in the DEIS to determine whether they presented a potential health hazard, not that it has been concluded that they do present such a hazard. Additional information has been added to the remainder of this section, providing quantitative estimates of risk from herbicide residues, indicating negligible predicted risks to workers and future site users. Information on validation studies of the GLEAMS model has been added to Appendix L. These results will be considered by the Air Force (in coordination with WYDEQ authorities) to determine whether soil and groundwater testing for herbicide residues will provide additional practical data for use in planning activities required for safe and responsible site decommissioning; this is described in DEIS Section 4.3.2.2.6, Pesticides. Risks from soil residues to ecological receptors are assumed to be bounded by risks to a human site resident; a statement to this effect has been added to Section 4.3.1, Biological Resources.

7-28 As stated at the end of the referenced paragraph on page 4-53, "Even if the contamination would reach the wells, the levels would be below MCLs." This conclusion, based on the shallow aquifer modeling detailed in Appendix K, is also applicable to any new shallow aquifer wells drilled by future site users. See response 7-20 for additional information. Details of the site sampling plan, including any possible analysis of groundwater from shallow aquifers, will be developed by the Air Force in coordination with state authorities, as stated in DEIS Section 4.3.1, Mitigation Measures.

7-29 Appendix A has been supplemented with additional regulatory information.

7-30 The Air Force would perform closure of USTs, as well as disposal of ASTs, in accordance with Wyoming requirements, including a site assessment report. In the event of detecting contamination, the Air Force would follow the WYDEQ guidance as stated in your letter. Sections 3.3.2.4, 4.3.2.4, and 4.4.1.2.5 were modified accordingly.

7-31 Fracturing within tens of feet from the headworks has occurred in Minuteman system dismantlement actions. However, the next process (as described in Section 2.1.3) is to excavate the area surrounding the headworks to a depth of approximately 20 feet. Consequently, the required angle of repose for the excavation would result in removal of the majority of area disturbed by the implosion. Sections 2.1.3 and 4.4.1.2.2 were modified to clarify this. After allowing for a 90-day observation/verification period for START, the site would be filled, graded, and compacted to create drainage away from the launch tube area. The herbicide residues calculated from environmental modeling (see Appendix L) are negligible, so no risk from soil or groundwater exposure is predicted to occur. Field sampling for Ellsworth AFB and Whiteman AFB Minuteman missile system dismantlement revealed detections of herbicide residues at only a few sites, and all residues were below levels of concern.

As stated in Section 4.4.2.2.4, Water Quality, "...the contractor could decide to survey a particular site area based on unusual hydrologic circumstances." The subsection of 4.4.2.2.4, Water Quality, titled "Groundwater Mixing" presents the evaluation supporting the conclusions regarding cross contamination of aquifers due to infiltration of the LFs by groundwater. The modeling of potential groundwater contamination was based on the assumption that groundwater incursion into the launch tube area would eventually occur in spite of capping the launch tube.

7-32 As noted in the previous response, the Air Force assumed that groundwater incursion into the launch tubes would occur and has performed modeling and impact assessment based on that assumption. The free nitrogen detected will only partly combine into nitrates at levels below health criteria. The study at the Ellsworth AFB missile deployment area was conducted outside the scope of the Ellsworth AFB EIS on deactivation and dismantlement of missile facilities. Based on your comment, the Air Force has added more information to Section 4.4.2.2.4 from the Ellsworth AFB study and from research of conditions within the Peacekeeper deployment area.

7-33 The Air Force noted in Section 4.4.2.2.1 that one or more dewatering well permits may be needed from Wyoming. The Section has been revised to note the DEQ Point Source Program. Also, Section 4.3.2.6 of the DEIS had identified that because of the timeframe between when the sites are discontinued use and when dismantlement is complete, the lagoons would likely be dry, so no lagoon drainage would likely be necessary. If the lagoons would need to be drained, they would be done according to Wyoming requirements. This Section has been modified accordingly.

7-34 As noted in Section 4.3.2.6, the lagoons would be sampled for potential contaminants. The sampling plan to be coordinated with WYDEQ would address the number and type of samples. Depending on the results of the samples, any contamination would be addressed in accordance with Wyoming requirements.

7-35 There are no septic tanks at the LFs or MAFs. There is a deep-buried (approximately 40 feet deep) holding tank at each MAF that is used only in emergency situations if a pump in the LCC would shut down. Any material in the holding tanks would be pumped to the lagoon and the tanks would be closed in place and filled with inert material.

7-36 The Air Force has clarified the text in the relevant subsections. The "future landowner" would have minimal input as to how the dismantlement occurs. The burying of the azimuth markers is essentially the only decision the "future landowner" will be able to make. The dismantlement contract would be based on performing the same activity at each site.

State of Wyoming Office of Land Policy

No response necessary.

Wyoming State Historical Preservation Office

9-1 The Air Force met with the SHPO and the Advisory Council on September 11, 2000 to initiate discussions regarding an appropriate mitigative package. Section 4.4.6.5 has been modified to reflect compliance with Sections 106 and 110 of the National Historic Preservation Act and consultation with the SHPO to determine the appropriate level of mitigation.

Mr. Scott Kamber

10-1 See response 1f-1.

10-2 F.E. Warren AFB and the LFs and MAFs are not a major stationary source as defined in Section 302 of the Clean Air Act and are not subject to prevention of significant deterioration regulations. Therefore, a review by the Wyoming DEQ Air Quality Division is not required under Section 35-11-203 of the Wyoming Environmental Quality Act.

10-3 The consultation performed at the time the DEIS was prepared was submittal of a scoping letter and attached DOPAA that was sent to the Wyoming Game and Fish Department and the USFWS on June 18, 1999. An example of the scoping letter and their responses to the letter was included in Appendix C. Additional consultation (involving discussions) has been conducted subsequent to submittal of the DEIS. The Proposed Action does not include removal of the HICS. The Air Force has not seriously considered this alternative because of the short-term environmental damage it would cause compared to leaving the HICS in place. If the action changes to include HICS removal, the Wyoming Game and Fish Department and the USFWS will be consulted.

10-4 See response 9-1.

10-5 The sewage lagoons would be landfarmed in accordance with all applicable regulations. If the landfarming is contracted, the Air Force would require the landfarming contractor to conduct landfarming at an approved site using approved methodologies.

Ms Mae Kirkbride

11-1 See response 1a-2.

11-2 As stated in Section 4.2.3.2, county gravel roads which are part of the Defense Access Route System would be surveyed for damage and restored to Air Force standards after the dismantlement is completed. Any damage to roads or bridges caused by contractor negligence would be the responsibility of the contractor in accordance with the terms of the contract.

11-3 As stated in Section 4.3.2.3, the Air Force would perform sampling of soils and lagoons to evaluate potential contamination; Section 4.3.2.4, tanks would be sampled for asbestos and PCBs; and Section 4.3.2.5, water, sludge, and soil samples would be taken at the sewage lagoons. These results will be presented in future environmental documents.

US Department of the Interior, Office of Environmental Policy and Compliance

12-1 Information has been added to Section 3.4.5.4 of the EIS on the mountain plover, ferruginous hawk, and swift fox. Information was added to Section 4.4.5.2.4 regarding surveys for these species. The Air Force will coordinate with the USFWS in Cheyenne regarding area surveys for threatened, endangered, or candidate species one year prior to dismantlement activities.

The Air Force would like to clarify the timeframe of the project versus timeframe of particular activities. Although the project may require approximately seven years to complete, site activities would be episodic with only days or weeks of activities at a time. Phase 1 consists of activities currently performed when missiles are removed for maintenance and would likely take approximately one week per site. Phase 2 activities are also similar to routine tasks the Air Force conducts for scheduled maintenance. Site dismantlement under Phase 3 includes unique activities that would occur at several sites (each site is 4 to 7 miles from each other) simultaneously and sporadically. Phase 4 would be a several year process but would involve negligible site activity. Only the dismantlement activities under Phase 3 would introduce new activities to the deployment area; those activities would occur sporadically, and all site activities (except burial or removal of azimuth markers near the LFs which would be done only at the request of the landowner) would occur on previously disturbed land within the fenceline of the sites. Therefore, and as noted in the EIS, the Air Force does not anticipate adverse effects to occur to threatened, endangered, or candidate species or their habitat.

12-2 Refer to response 7-9 for LF and MAF restoration information. The line-of-site poles could be removed by the landowners after the HICS easement expires. Utility

poles outside of the LF and MAF boundaries are the responsibility of the electric companies. There are also other fences and poles in the deployment area that are not the responsibility of the Air Force. Removal of potential roosting sites by any party would likely result in minimal habitat impact. Since raptors could be using existing fencing and poles as roost sights, there would be no change in the environment if the Air Force leaves the fences and buildings intact. Consequently, the Air Force has no plans to demolish the surface MAF facilities or remove fencing at the LFs or MAFs. As noted in response 12-1, the Air Force would coordinate with the USFWS in Cheyenne regarding surveys for mountain plover one year prior to dismantlement activities.

12-3 Impacts to groundwater and surface water were not predicted to be significant (through environmental modeling and empirical studies) for nitrogen, pesticide runoff and leaching, and leaching of LBP and PCBs and impacts. Data used in the modeling was derived from past field studies, regional information, and published values; no recent field data was gathered from specific sites. Based on the available data, there would be no impacts to wildlife from contaminants leaching into ground or surface waters. As discussed in Section 4.4.2.2.4, it is highly unlikely that significant concentrations of spilled liquid could reach and contaminate groundwater or surface waters. Closure of USTs would involve sampling; leaks and spills associated with the use of the USTs would be addressed in accordance with the Wyoming Underground Storage Tank Program. Response 7-10 provides additional information on the Air Force's proposed site sampling and EBS program. Exposure risk would be evaluated to determine if site remediation would be required. Additional computer modeling of groundwater quality based on field data would be performed to evaluate the groundwater at several specific sites. Predicted concentrations of contaminants would be compared to risk levels for both human health and wildlife. The Air Force would adhere to Wyoming Water Quality Standards for groundwater and surface water.

12-4 As discussed in Section 4.4.5.2.2, the Air Force would continue to control noxious weeds until the sites would be turned over to the new landowner. Disturbed soils would be revegetated with native grasses near the end of the dismantlement phase. The Air Force would require the dismantlement contractor to complete site activities with management of the native vegetation to ensure any nonnative species do not propagate.

12-5 Information on the mountain plover was added to Section 3.4.5.4 of the EIS. Information was added to Section 4.4.5.2.4 regarding surveys near the LF and MAF sites (see response 12-1). The majority of the deployment area may be suitable habitat for the mountain plover. However, the LFs are graveled, small in size, and often located in hilly areas; these factors are not favorable for mountain plovers. The Air Force maintains (through mowing of vegetation) an approximately 25-feet wide security zone outside the fenceline, but beyond that zone vegetation is typically more than 4 inches high. The zone is an area of human disturbance via vegetation mowing and security inspections. No mountain plovers have been

observed when the base Natural Resource Manager has visited the missile sites (Smith, 2000). Considering the aforementioned information and that construction activities would occur within the fence line of the site (with exceptions for potential removal or burial of azimuth markers), the Proposed Action is not expected to adversely affect mountain plovers. However, the Air Force will coordinate with the USFWS in Cheyenne regarding LF and MAF area surveys for mountain plovers.

12-6 Information on the black-tailed prairie dog was added to Section 3.4.5.4 of the EIS. Information was added to Section 4.4.5.2.4 regarding potential surveys near the LF and MAF sites (see response 12-1). Prairie dogs thrive in habitats similar to those that support mountain plover. There are no prairie dog communities on any site or in near proximity to a site (Smith, 2000). Considering the constrained size and location where the construction activities would occur, the Proposed Action is not expected to adversely affect black-tailed prairie dogs. However, the Air Force will coordinate with the USFWS in Cheyenne regarding LF and MAF area surveys for black-tailed prairie dogs.

12-7 Information on the swift fox was added to Section 3.4.5.4 of the EIS. Information was added to Section 4.4.5.2.4 regarding potential surveys near the LF and MAF sites. The swift fox range is within the deployment area but the missile sites are not suitable for dens (Smith, 2000). Considering the constrained size and location where the construction activities would occur, the Proposed Action is not expected to adversely affect the swift fox. However, the Air Force will coordinate with the USFWS in Cheyenne regarding LF and MAF area surveys for the swift fox.

12-8 Information was added to Section 4.4.5.2.3 regarding potential surveys for raptors near the LF and MAF sites. No active nests have been found at the missile facilities (Smith, 2000). The EIS addresses in detail why no adverse impacts to migratory birds or raptors are projected to occur (see Section 4.4.5.2.3). However, the Air Force will coordinate with the USFWS in Cheyenne regarding LF and MAF area surveys for raptor nests and roosts.

12-9 The Air Force will coordinate with the USFWS in Cheyenne regarding surveys for wildlife species identified in your letter.

12-10 The Air Force has reviewed your water quality and land use concerns. The Proposed Action would result in the removal of some hazardous substances from the environment. After the completion of dismantlement, traffic, air emissions, and noise are expected to reduce from pre-deactivation levels. The EIS discusses cumulative and long-term effects on wildlife and natural resources; no adverse affects are predicted to occur.

State of Wyoming Department of Transportation

13-1 The three-week notice prior to demolition has been added to Section 4.2.3.5 as a mitigation measure. The Executive Summary and Record of Decision have also been revised to include this mitigation.

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APPENDIX A

APPLICABLE REGULATIONS

APPENDIX A.
APPLICABLE REGULATIONS

This section lists applicable environmental permits and relevant federal, state, and local statutes, regulations, and guidelines.

Environmental Policy

The *National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321 et seq.)* establishes national policy, sets goals, and provides the means to prevent or eliminate damage to the environment. NEPA procedures ensure that information about environmental impacts is available to public officials and citizens before decisions are made on major Federal actions that may significantly affect the environment.

The President's *Council on Environmental Quality Regulations (40 CFR 1500-1508)* implements the procedural provisions of NEPA.

Department of Defense Directive 6050.1 (32 CFR Part 214) establishes Department of Defense policies and procedures to supplement the CEQ regulations promulgated from NEPA.

Protection and Enhancement of Environmental Quality, Executive Order (EO) 11514, as amended by Executive Order 11991, sets policy for directing the Federal Government in providing leadership in protecting and enhancing the quality of the Nation's environment.

Intergovernmental Review of Federal Programs, *Executive Order 12372,* provides for opportunities for consultation by state and local governments on proposed Federal developments.

Environmental Impact Analysis Process (EIAP), AFI 32-7061, establishes the procedures to supplement the CEQ regulations promulgated by NEPA.

Air Quality

The *Clean Air Act (CAA) (42 USC 7401 et seq., as amended)* establishes Federal policy to protect and enhance the quality of the Nation's air resources to protect human health and the environment. The CAA was intended to control emissions from stationary (e.g., industries) and mobile (e.g., vehicle) sources, and sets national primary and secondary ambient air quality standards as a framework for air pollution control.

Wyoming Air Quality Standards and Regulations (W.S. Chapter 9.1, Articles 1-11), set air quality standards for the state. "In accordance with the provisions of Section 35-11-106 of the *Wyoming Environmental Quality Act 1973*, Standards and Regulations adopted by the Air Resources Council pursuant to *Section 5, Wyoming Air Quality Act, Chapter 186*, Session Laws of Wyoming 1967 were adopted as Standards and Regulations of the Department effective July 1, 1973. Rules and Regulations adopted subsequent to July 1, 1973, are adopted under the authority of Sections 35-11-110, 112, 114, and 202 through 212 of the Wyoming Environmental Quality Act, 1993 and in accordance with the provisions of Sections l6-3-101 through 16-3-115 of the Wyoming Administrative Procedures Act."

Air Quality Compliance, Air Force Instruction 32-7040, instructs the Air Force on compliance with the CAA, and Federal, state, and local regulations.

Water Quality

The goal of the *Clean Water Act (CWA) (33 USC 1251 et seq., as amended)* is to restore and maintain the biological, chemical, and physical properties of the waters of the United States by assuring good water quality for wildlife and recreation ("fishable and swimmable standards"), and eliminating the discharge of pollutants to navigable waters of the United States. The CWA provides for a National Pollution Discharge Elimination System (NPDES) Permit Program; permits are issued to regulate wastewater and stormwater discharges of pollutants. States are also authorized to set ambient water quality standards for water bodies based on specific uses.

The *Safe Drinking Water Act of 1974, as amended (42 USC 300f et seq.)* authorizes EPA to regulate public drinking water supplies by establishing drinking water regulations, delegating enforcement authority of drinking water standards to the States, and protecting drinking water supplies from the injection of wastes and other materials into wells. Drinking water standards were promulgated from the act by EPA.

The *National Primary Drinking Water Regulations (40 CFR 141)* define maximum concentration limits of specified contaminants allowed in public water systems.

Quality Standards for Wyoming Groundwaters (W.S. Sections 35-11-101 through 1104) govern all bodies of underground water which are wholly or partially within the boundaries of the State, or "Groundwaters of Wyoming". *Quality Standards for Wyoming Surface Waters (W.S. 35-11-101 through 1304)* define all "Surface waters of Wyoming" as all permanent and intermittent defined drainages and lakes, reservoirs, and wetlands which are not manmade retention ponds used for the treatment of municipal, agricultural or industrial waste; and all other bodies of surface water, either public or private which are wholly or partially within the boundaries of the State. Standards are prescribed to protect the natural quality of underground and surface waters from receiving pollution or wastes.

The *Wyoming Water Pollution Control Act (W.S. Section 35-502 et seq.),* establishes provisions for the control and prohibition of water pollution within the state. No installation that is reasonably expected to be a source of water pollution may be operated, maintained, constructed, expanded, or modified without an appropriate permit issued by the department.

Floodplain Management, Executive Order 11988, requires each Federal agency to take action to reduce the risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. All Federal and Federally supported activities and projects are required to comply with EO 11988. Specific compliance actions are required for activities planned within a defined 100-year floodplain.

Water Quality Compliance, *Air Force Instruction 32-7041,* instructs the Air Force on how to assess, attain, and sustain compliance with the CWA and Federal, state, and local environmental regulations.

Biological Resources

The *Endangered Species Act (ESA) (16 USC 1531-1544)* requires Federal agencies that authorize, fund, or carry out actions to avoid jeopardizing the continued existence of endangered or threatened species or destroying or adversely modifying their critical habitat. Federal agencies must evaluate the effects of their actions on endangered or threatened species of fish, wildlife, and plants, and their critical habitats and take steps to conserve and protect these species. All potentially adverse impacts to endangered and threatened species must be avoided or mitigated.

Wyoming Wetlands Act (W.S. 35-11-308 through 311), regulates state activities in wetlands. Permits must be obtained for certain dredging, draining, and filling activities in wetlands.

Wyoming Noxious Weed Control Act of 1973 (W.S. 11-5-101 through 103), authorizes control of noxious weeds in the state.

Protection of Wetlands, Executive Order 11990, requires Federal agencies to take action to avoid, to the extent practicable, the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. All Federal and Federally supported activities and projects must comply with EO 11990. If no practical alternative to the proposed action exists, and wetlands would be impacted, a Finding of No Practicable Alternative (FONPA) must be prepared and approved.

Integrated Natural Resource Management, *Air Force Instruction 32-7064,* provides the Air Force with guidance on compliance with the ESA and Federal, state, and local environmental regulations.

Cultural, Paleontological, and Archaeological Resources

The primary goals of the *National Historic Preservation Act (NHPA) of 1966 (16 USC 470 et seq., as amended);* the *Historic Sites, Buildings, and Antiquities Act, as amended;* and the *Archaeological and Historic Preservation Act* are to ensure adequate consideration of the values of historic properties in carrying out Federal activities and to attempt to identify and mitigate impacts to significant historic properties. The NHPA is the principal authority used to protect historic properties; Federal agencies must determine the effect of their actions on cultural resources and take certain steps to ensure that these resources are located, identified, evaluated, and protected. *36 CFR 800* defines the responsibilities of the State, the Federal Government, and the Advisory Council on Historic Preservation (ACHP) in protecting historic properties identified in a project area. *36 CFR 60* establishes the National Register of Historic Places (NRHP) and defines the criteria for evaluating eligibility of cultural resources to the NRHP.

The *Archaeological Resources Protection Act of 1979 (16 USC 470a-47011, as amended)* protects archaeological resources on Federal lands. If archaeological resources are discovered that may be disturbed during site activities, the act requires permits for excavating and removing any archaeological resources.

The *Archaeological and Historic Preservation Act (16 USC 469a et seq.)* preserves the historic and archaeological data that would be lost due to Federal construction. If a Federal

agency determines that the Proposed Action may cause irreversible damage to archaeological resources, it must notify the U.S. Department of Interior.

The *American Indian Religious Freedom Act (42 USC 1996 et seq.)* is intended to preserve the right of Native Americans to believe, express, and protect their traditional religions. This Act gives Native Americans the right of access to traditional religious sites, the use and possession of sacred objects, and the freedom to worship through traditional rites and ceremonies.

Native American Graves Protection and Repatriation Act (25 USC 3001-3013), prohibits the intentional removal of Native American cultural items from Federal or tribal lands except under an Archeological Resource Protection Act permit and in consultation with the appropriate Native American groups.

Cultural Resource Management, Air Force Instruction 32-7065, provides the Air Force with guidance on compliance with the NHPA, ARPA, and applicable Federal, state, and local regulations. This instruction also provides guidance for consulting with American Indian groups.

Archaeological and Historic Resources Management, DoD Directive 4710.1, provides policy, prescribes procedures, and assigns responsibilities for the management of archaeological and historical resources located in waters and on lands under DoD control.

Environmental Conservation Program, DoD Instruction 4715.3, provides procedures for integrated management of natural and cultural resources on property under DoD control.

Environmental Effects in the US of DoD Actions, DoD Directive 6050.1, provides reference to the implementation of the Council on Environmental Quality (CEQ) regulations and provides policy and procedures of DoD officials for approval of early planning to final implementation of an action.

Noise and Land Use

The *McKinney Act of 1987 (42 USC 11411)* authorizes the Secretary of Housing and Urban Development to enforce consideration of Federal property as possible housing for homeless individuals.

Public Law (PL) 100-180, Section 2325 (10 USC 9781) authorizes the Secretary of the Air Force to dispose of real property at missile sites under specific conditions.

The *Noise Control Act of 1972 (PL 92-574), as amended by the Quiet Communities Act of 1978* establishes a Federal policy "to promote an environment free from noise harmful to health or welfare" and identifies desirable noise levels for residential areas. Federal agencies must also comply with state and local requirements for the control and abatement of environmental noise.

Public Health and Safety / Hazardous Materials / Hazardous and Solid Wastes

The *Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (42 USC 9601 et seq.)* provides EPA with the authority to inventory, investigate, and clean up

uncontrolled or abandoned hazardous waste sites. EPA has established a series of programs to clean up hazardous waste disposal and spill sites nationwide. This act provides for funding, enforcement, response, and liability for the release or threatened release of hazardous substances into the environment.

The *Community Environmental Response Facilitation Act (CERFA)* (*PL 102425*, as it amends Section 120(h) of the *Comprehensive Environmental Response, Compensation, and Liability Act* of 1980 (*42 USC Section 9620(h)*) requires Federal agencies that intend to terminate operations on real property to identify and document those portions of the property that are not contaminated by hazardous waste or petroleum products.

The *Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6961), as amended by the Hazardous and Solid Waste Amendments of 1984 (PL 98-616)*, is a comprehensive program for regulating and managing hazardous wastes *(Subtitle C)*, nonhazardous solid wastes *(Subtitle D)*, Federal procurement of reclaimed products *(Subtitle F)*, and underground storage tanks *(Subtitle I)*. RCRA requires Federal agencies to comply with all Federal, state, interstate, and local regulations respecting control and abatement of solid waste or hazardous waste disposal. EPA's most comprehensive regulations have been developed under the Subtitle C program that governs the generation; transportation; and treatment, storage, or disposal of hazardous wastes.

The *Toxic Substances Control Act of 1976 (TSCA)* requires EPA to regulate the use, storage, and disposal of polychlorinated biphenyls (PCBs), and prohibits production of these compounds after January 1979. The *Occupational Safety and Health Act of 1971* created the Occupational Safety and Health Administration (OSHA) under the Department of Labor. The act grants the Secretary of Labor the authority to promulgate, modify, and revoke safety and health standards; to conduct inspections and investigations and to issue citations, including penalties; to require employers to keep records of safety and health data; to petition the courts to restrain imminent danger situations; and to approve or reject state plans for programs under the act. The act also established the National Institute for Occupational Safety and Health (NIOSH), the principal Federal agency engaged in research to eliminate on-the-job hazards. NIOSH is primarily responsible for identifying occupational safety and health hazards and determining necessary changes to the encompassing regulations.

The *Defense Environmental Restoration Program (10 USC 2701),* is the legal mandate for the IRP. The Installation Restoration Program (IRP) is a DoD program designed to identify, confirm, quantify, and remediate suspected problems associated with past hazardous material disposal sites on DoD installations.

The *Occupational Safety and Health Act (OSHA) Asbestos Standard (29 CFR 1926.1101)* lists the Federal requirements for handling and removing asbestos from equipment and building structures during construction and demolition activities.

The *Wyoming Environmental Quality Act (W.S. 35-11-101 et seq.)* provide regulations for *Wyoming Solid Waste Management (Article 5, Section 35-502.42-44)* and *Wyoming Hazardous Waste Management (W.S. 35-11-102).* Solid waste regulations require each person to properly manage and dispose of solid and hazardous wastes that are generated.

Hazardous waste regulations are established to provide for the proper management and disposal of these wastes. The *Voluntary Remediation Program (W.S. 35-11-1601)* requires the voluntary remediation of soils to meet unrestricted land use standards, and the remediation of groundwater to meet drinking water standards at contaminated sites.

Water Pollution from Underground Storage Tanks Corrective Action Act of 1990 (W.S. 35-11-1414) provides rules and regulations to establish an underground storage tank leak prevention program to prevent releases and to minimize health and environmental damage should a release occur. The Act also establishes priorities for cleaning up releases and procedures to determine environmental restoration standards.

Wyoming Air Quality Standards and Regulations (Chapter 3, Section 8) and 40 CFR part 61, subpart M, requires the amount and location of regulated ACM to be recorded on the deed to the facility property.

The State Emergency Response Commission, Executive Order 1998-5, sets forth the Wyoming state requirements for emergency planning, including notification and response to a release of hazardous substances.

Federal Compliance With Pollution Control Standards, *Executive Order 12088,* directs Federal agencies to comply with State and local laws and regulations concerning air, water, and noise pollution, and hazardous materials and substances to the same extent as any private party.

Facility Asbestos Management, *AFI 32-1052,* addresses guidance for the Air Force in complying with relevant Federal, state, and local regulations.

Solid and Hazardous Waste Compliance, *AFI 32-7042,* provides guidance to the Air Force on compliance with RCRA and applicable Federal, state, and local regulations.

Environmental Restoration Program, AFI 32-7020, provides the Air Force with guidance on compliance with CERCLA, and federal, state, and local regulations.

Socioeconomics

The *Davis-Bacon Act* (40 U.S.C. § 276a *et seq.*) requires federal contractors to pay no less than the "prevailing" wage rate for similar types of work within a given region. The U.S. Department of Labor collects local wage data to determine a locale's prevailing wage rate for various types of jobs.

Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was signed by the President on February 19, 1994. This EO requires that each federal agency identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Transportation

The *Hazardous Materials Transportation Act (HMTA) of 1975 (49 USC 5101)* authorizes the Secretary of Transportation to protect public health from the risks of transporting

hazardous materials. These materials include explosives, flammable liquids and solids, combustible and corrosive materials, and compressed gases. The transportation of all hazardous materials must meet requirements of the HMTA. Regulations promulgated by the U.S. Department of Transportation (DOT) include requirements for packaging, handling, labeling, placarding, and shipping procedures for hazardous materials *(49 CFR Parts 171, 172 Subparts B and C, and 173 Subpart M)*.

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APPENDIX B

NOTICE OF INTENT

APPENDIX B.
NOTICE OF INTENT

This appendix contains a copy of the Notice of Intent to prepare an environmental impact statement for the Peacekeeper missile system deactivation/dismantlement at F.E. Warren AFB, WY.

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NOTICE OF INTENT
TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT
FOR PEACEKEEPER MISSILE SYSTEM DEACTIVATION/DISMANTLEMENT
F.E. WARREN AIR FORCE BASE, WYOMING

The United States Air Force Space Command is issuing this notice to advise the public that the Air Force intends to prepare an Environmental Impact Statement (EIS) to assess the potential environmental impacts of deactivation / dismantlement of the Peacekeeper Missile System of the 90th Space Wing based at F.E. Warren Air Force Base in Cheyenne, Wyoming. The EIS will also evaluate the potential impacts of sustainment of the current system which is the No Action Alternative. The Strategic Arms Reduction Treaty II (START II) requires deactivation of the Peacekeeper Missile System. Deactivation will only occur if the Treaty is ratified by Russia and entered into force. As modified by the Helsinki Agreement, the Treaty requires complete dismantlement by December 31, 2007. In order to meet the Treaty deadline, deactivation could start as early as October 2000.

Public scoping meetings are planned in the towns of Cheyenne, Wheatland, and Torrington, Wyoming. The purpose of these meetings is to determine the scope of issues to be addressed and to help identify significant environmental issues to be analyzed in depth. Notice of the times and locations of the meetings will be made available to the community using the local news media. The schedule for the scoping meetings is as follows:

DATE	LOCATION	TIME
June 28, 1999	East High School 2800 E. Pershing Blvd. Cheyenne, WY	6:30-9:30 p.m.
June 29, 1999	Wheatland High School 1207 13th Street Wheatland, WY	6:30-9:30 p.m.
June 30, 1999	Torrington High School 23rd Ave & West C Torrington, WY	6:30-9:30 p.m.

In addition to seeking public input on environmental issues and concerns at the scoping meetings, the Air Force is soliciting written comments regarding the EIS scope. To ensure the Air Force will have sufficient time to fully consider public inputs on issues, written comments should be mailed for receipt no later than August 2, 1999.

Please direct written comments or requests for further information concerning the Peacekeeper system deactivation/dismantlement EIS to:

Mr. Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363
(210) 536-3787

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APPENDIX C

AGENCY LETTERS AND CONSULTATION

APPENDIX C.
AGENCY LETTERS AND CONSULTATION

This appendix contains a sample copy of the scoping letter that was sent to interested parties soliciting their concerns regarding the Proposed Action, along with copies of the response letters that have been received as of the date of this document.

The following table lists the letters in the order in which they are presented in the appendix and the number assigned to each letter.

Table C-1
Agency Commentors on the DOPAA for the Peacekeeper Deactivation/Dismantlement

Number	Agency	Date of Letter
1.	Sample Scoping Letter	June 18, 1999
2.	Wyoming Game and Fish Department	June 28, 1999
3.	Wyoming Air National Guard	July 12, 1999
4.	Wyoming Department of State Parks & Cultural Resources, State Historic Preservation Office	July 15, 1999
5.	U.S. Department of the Interior, National Park Service	July 15, 1999
6.	Wyoming State Representative Peter S. Illoway	July 16, 1999
7.	Wyoming Department of Transportation	July 19, 1999
8.	Mr. Scott Kamber	July 21, 1999
9.	Wyoming Department of Environmental Quality	July 29, 1999
10.	U.S. Environmental Protection Agency, Region VIII	August 2, 1999
11.	Wyoming Department of Agriculture	August 2, 1999
12.	Wyoming Office of Federal Land Policy (clearinghouse)	August 4, 1999
13.	U.S. Department of the Interior, Fish & Wildlife Service	August 10, 1999

Note: DOPAA mailed on June 18, 1999; Public Scoping Meetings held in Wyoming June 28-30, 1999; Public Comment Period ended August 6, 1999.

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
BROOKS AIR FORCE BASE TEXAS

June 18, 1999

HQ AFCEE/ECA
3207 North Road
Brooks AFB TX 78235-5363

The Honorable Mike Enzi
U.S. Senate
Federal Center
2120 Capitol Avenue, Suite 2007
Cheyenne, WY 82001

Dear Senator Enzi:

The U.S. Air Force plans to prepare an Environmental Impact Statement (EIS) to assess the potential environmental impacts of the proposed deactivation / dismantlement of the Peacekeeper Missile System based at F.E. Warren Air Force Base (AFB), Wyoming. According to the National Environmental Policy Act (NEPA), the Air Force must assess the potential environmental impacts of the proposed action and alternatives.

The purpose of the deactivation / dismantlement is to comply with the Strategic Arms Reduction Treaty II (START II) as modified by the Helsinki Agreement of September 1997. Deactivation will only occur if the Treaty is ratified by Russia and entered into force. The Treaty requires complete dismantlement by December 31, 2007. In order to meet the Treaty deadline, deactivation could start as early as October 2000.

The attached Description of the Proposed Action and Alternatives (DOPAA) more fully explains the purpose and need for the deactivation and discusses the proposed and alternative actions to achieve the deactivation.

The NEPA process requires that the proponent agency conduct scoping meetings to involve the public in determining the nature, extent, and scope of issues and concerns to be evaluated in the EIS. The Air Force will conduct scoping meetings at the East High School cafeteria in Cheyenne on June 28th, at Wheatland High School auditorium on June 29th, and at Torrington High School music room on June 30th. The scoping meetings are scheduled to start at 6:30 PM. The purpose of these meetings is to solicit comments and concerns regarding environmental impacts pertaining to the proposed Peacekeeper missile system deactivation action.

Please provide any comments or responses by August 6th 1999 to Mr. Jonathan D. Farthing at the following address: HQ AFCEE/ECA, 3207 North Road, Brooks AFB, TX 78235-5363

Your assistance and participation in the NEPA process is greatly appreciated. Any questions regarding the NEPA process may be directed to Mr. George Gauger at 210-536-3069.

Sincerely

JONATHAN D. FARTHING
Chief, Environmental Analysis Division
Environmental Conservation & Planning Directorate

Attachment:
DOPAA

WYOMING
GAME AND FISH DEPARTMENT

Jim Geringer, Governor — John Baughman, Director

"Conserving Wildlife —Serving People"

2

June 28, 1999

WER 9406
Department of the Air Force
F.E. Warren Air Force Base
Proposed Deactivation/Dismantlement of the
Peacekeeper Missile System
State Identifier Number: 99-084
Laramie County

Wyoming State Clearinghouse
Office of Federal Land Policy
ATTN: Julie Hamilton
Herschler Building, 3SW
Cheyenne, WY 82002

Dear Ms. Hamilton:

The staff of the Wyoming Game and Fish Department has reviewed the proposal to deactivate and dismantle the Peacekeeper Missile System based at F.E. Warren Air Force Base, Wyoming. Based on the limited information provided, we have no terrestrial or aquatic concerns with this proposal at this time. However, if dismantling involves removal of the Hardened Intersite Cable System, we may have concerns at stream crossings or in sensitive habitats. If warranted, we will provide specific recommendation to minimize impacts to fish and wildlife as more information becomes available.

Thank you for the opportunity to comment.

Sincerely,

Bill Wichers

BILL WICHERS
DEPUTY DIRECTOR

BW:TC:as
cc: USFWS

Headquarters: 5400 Bishop Boulevard, Cheyenne, WY 82006-0001
Fax: (307) 777-4610 Web Site: http://gf.state.wy.us

WYOMING AIR NATIONAL GUARD
HEADQUARTERS 153D AIRLIFT WING
217 DELL RANGE BLVD., CHEYENNE, WYOMING 82009-4799

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12 July 1999

MEMORANDUM FOR Jonathon D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB TX 78235-5363

FROM: 153 SPTG/EM (307) 772-6335
217 Dell Range Blvd.
Cheyenne, WY 82009-4799

SUBJECT: Environmental Impact Statement, Peacekeeper Missile System Deactivation/Dismantlement, F.E. Warren AFB – INFORMATION MEMORANDUM

1. In reference to The Adjutant General (TAG) Maj Gen Ed Boenisch note and Col Richard Ames, Executive Support Staff Officer of the Adjutant General's Office on its Proposed Environmental Impact Statement at F.E. Warren AFB, the Environmental Management Office of the Wyoming Air National Guard reviewed the description of the proposed action and alternatives.

2. The only issues that concern this office is the potential of asbestos, lead-based paint, disposal of hazardous materials, leaks from underground storage tanks, release of known and unknown gases that can cause harm to the environment and personnel, acid leaks and confined space entry.

3. If there are any questions concerning this matter or anything that will impact the Wyoming air National Guard, please contact this office at (307) 772-6335.

AARON G. SMITH, JR., MSgt WY ANG
Environmental Management

WYOMING

DEPARTMENT OF STATE PARKS & CULTURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE

Barrett Building
2301 Central Ave.
Cheyenne, WY 82002

(307) 777-7697
FAX (307) 777-6421

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July 15, 1999

Mr. Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB
TX 78235-5363

RE: F.E. Warren AFB, Deactivation and Dismantlement of the Peacekeeper Missile System; SHPO #0799TPT026

Dear Mr. Farthing:

Our staff has received information concerning the aforementioned project. Thank you for allowing us the opportunity to comment.

Management of cultural resources on United States Air Force (USAF) projects is conducted in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. These regulations call for survey, evaluation and protection of significant historic and archeological sites prior to any disturbance. Provided the USAF follows the procedures established in the regulations, we have no objections to the project. Specific comments on the project's effect on cultural resource sites will be provided to the USAF when we review the cultural resource documentation called for in 36 CFR Part 800.

Please refer to SHPO project control number #0799TPT026 on any future correspondence dealing with this project. If you have any questions contact me at 307-777-6694.

Sincerely,

Todd Thibodeau

Todd Thibodeau, Historian
State Historic Preservation Office

Jim Geringer, Governor John T. Keck, Director

United States Department of the Interior

NATIONAL PARK SERVICE

INTERMOUNTAIN REGION
Intermountain Support Office - Denver
12795 West Alameda Parkway
Post Office Box 25287
Denver, Colorado 80225-0287

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IN REPLY REFER TO:

July 15, 1999

Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

Dear Mr. Brooks:

We reviewed the Notice of Intent to Prepare an Environmental Impact Statement for the Peacekeeper Missile System Deactivation/Dismantlement at F.E. Warren Air Force Base, Wyoming and have no comments. This represents the consolidated comments of the National Park Service. If you should have any questions, please contact me at (303) 969-2377.

Sincerely,

Greg Cody

Greg Cody
NEPA/Section 106 Specialist

Comments Regarding the Draft Environmental Impact Statement for the Deactivation/Dismantlement of the Peacekeeper Missile System at F. E. Warren Air Force Base, Wyoming

6

Wyoming State Representative (House District 42) Peter S. "Pete" Illoway
911 Pike Street; Cheyenne, WY 82009-3201

1. The deactivation and dismantlement of the Peacekeeper missiles at F. E. Warren Air Force Base should not occur. The Start II Treaty has not been ratified by the Russians and the Treaty must now be re-ratified by the US Congress before any deactivation can occur. The scoping process may be warranted because of the very remote possibility of the signing of the Start II Treaty. However, If the Russians haven't ratified the Treaty by this time, the chance to ratify by the Russians should be withdrawn and the United States should get on with upgrading the highly successful Peacekeeper Missile system.

1a. The no action alternative whereby the United States would be in violation of international agreements and federal law is not a totally acceptable alternative, since the United States wants to have other countries respect international laws, it is imperative that the U S respect the Treaty. However, it appears that due to the time that has taken place with no action being taken by the Russians, the Treaty should be withdrawn.

2. If in fact ratification of the Treaty by Russia occurs and the re-ratification of the Treaty by the U S occurs and deactivation and dismantlement begin, then the process of removing all diesel fuel tanks and the removal of all environmental hazards should be accomplished. Also the careful storage and deactivation of the warheads should be accomplished. The land area where the LF's and the MAF's were located should be completely cleared of any objects and the land sold at nominal cost to the landowners upon whose property the facilities were built. Existing landowners must be given a preferential right to these facilities since in many cases these sites are in the middle of someone's property.

3. There are environmental concerns, particularly fuel for the missiles, diesel fuel in underground tanks and any liquids including PCB's and any hazardous materials which must be carefully removed from the sites and destroyed. Although the buried cables will not in all probability cause any environmental problems, they should be removed. When the land is sold or returned to the landowner it should be as free as possible of any traces of the system.

4. The nuclear warheads must be removed with all nuclear explosive devices carefully accounted for and dismantled. With the current problem of nuclear secrets being lost to foreign powers, it is because of national security that a careful accounting of these warheads be undertaken.

July 16,1999

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THE STATE OF WYOMING

Jim Geringer, Governor

Gene Roccabruna, P.E., Director

Department of Transportation

5300 BISHOP BOULEVARD (82009) P.O. BOX 1708 CHEYENNE, WYOMING 82003-1708

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July 19, 1999

Mr. Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX. 78235-5363

RE: Deactivation/Dismantlement of the Peacekeeper Missile System at F.E. Warren AFB, Wyoming

Dear Mr. Farthing:

At this period of time, WYDOT has no really definitive comment to make from the given information. However, WYDOT is curious to the loads that will be applied to the regional highways. Please provide WYDOT with any anticipated loads that may be experienced during this deactivation process. The loading capacities of the highways and bridges need to be reviewed prior to this operation to ensure that there will not be a catastrophic failure for the traveling public. WYDOT needs to have this information coordinated with the following individuals:

For Highways
Rick Harvey, P.E.
State Materials Engineer
WYDOT
P.O. Box 1708
Cheyenne, WY. 82003-1708
TEL: 307-777-4070
FAX: 307-777-4481
Email: RHARVE1@missc.state.wy.us

For Bridges
Pat Collins, P.E.
State Bridge Engineer
WYDOT
P.O. Box 1708
Cheyenne, WY. 82203-1708
TEL: 307-777-4427
FAX: 307-777-4279
Email: PCOLLI@missc.state.wy.us

This information will need to be provided as soon as possible so that any necessary modifications can be completed in a timely manner. If highway and/or bridge work is required for the success of this operation, then all possible funding scenarios will need to be reviewed and approved through the Fred Behrens, the Wyoming Division Administrator of FHWA in Cheyenne. He can be contacted at 307-772-2012.

Respectfully submitted,

Timothy L. Stark

Timothy L. Stark, P.E.
Environmental Services Engineer

cc:
Rick Harvey, P.E., State Materials Engineer, Cheyenne
Pat Collins, P.E., State Bridge Engineer, Cheyenne
Jon Anderson, P.E., State Highway Development Engineer, Cheyenne
Jay Gould, P.E., District Engineer, Laramie
Fred Behrens, P.E., Wyoming Division Administrator, FHWA, Cheyenne

July 21, 1999

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Mr. Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks, AFB, TX 78235-5363

RE: Scoping for the Proposed Peacekeeper Missile System Deactivation/Dismantlement near F.E. Warren Air Force Base, Wyoming

Dear Mr. Farthing:

Regarding the above referenced proposed action, the following issues and concerns should be addressed or considered during the preparation of the Environmental Impact Statement for the deactivation/dismantlement process and continued operation of the Peacekeeper Missile System at F.E. Warren Air Force Base, Wyoming:

1 - The generation and disposal of hazardous and nonhazardous materials/wastes should be addressed.

2 - The reassignment or destruction of the inactivated Peacekeeper missiles should be addressed in the description of the proposed action.

3 - Local and remote (refer to item 2 above) public safety issues should be addressed.

4 - Potential impacts to local aquifers should be addressed.

5 - Potential impacts to cold war, historic, and prehistoric resources should be addressed.

6 - Potential impacts to threatened, endangered, and sensitive plant and animal species should be addressed.

7 - Potential impacts to air quality resources, including visibility, should be addressed.

8 - Cumulative impacts should be addressed.

Thank you for the opportunity to provide input into this important National Environmental Policy Act process.

Scott W. Kamber

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The State
of Wyoming

Department of Environmental Quality

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Jim Geringer, Governor

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
307-777-7758	307-777-6145	307-777-7391	307-777-7369	307-777-7756	307-777-7752	307-777-7781
FAX 777-3610	FAX 777-6462	FAX 777-5616	FAX 777-6937	FAX 777-5864	FAX 777-5973	FAX 777-5973

July 29, 1999

Mr. Jonathon D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

Subject: Final, Description of the Proposed Action and Alternatives, Environmental Impact Statement, Peacekeeper Missile System Deactivation/Dismantlement, F.E. Warren AFB, Wyoming.

Mr. Farthing:

The Wyoming Department of Environmental Quality (DEQ) has reviewed the subject document and provides the attached comments. The DEQ is disappointed that the Air Force Center for Environmental Excellence (AFCEE) chose not to provide a copy of this document to the DEQ. AFCEE also failed to provide DEQ with prior notice of the public meetings scheduled in June of this year. The DEQ has worked closely with the Air Force on a number of environmental issues over the course of many years and believes that our exclusion from the planning process with regards to the deactivation/ dismantlement of the Peacekeeper system can only damage the relationship the DEQ has developed with the Air Force.

If you have any questions or concerns regarding this letter or the attached comments, please contact me at 307-777-7092.

Sincerely,

Daniel Moore
Program Principal, Federal Facilities
Water Quality Division

DM:ll#91862a
cc : Mr . Rob Stites/EPA, 8EPR-F
Mr. Kevin Frederick/WQD

REVIEW OF PROPOSALS/PLANS

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
Herschler Bldg., 4 West
Cheyenne, Wyoming 82002

PROJECT: **Peacekeeper Missile System Deactivation/Dismantlement, F.E. Warren Air Force Base and auxiliary sites, Wyoming**

APPLICANT: **Air Force Center for Environmental Excellence**

WATER QUALITY DIVISION REFERENCE (PERMIT) NUMBER: **Not applicable**

TITLE: **Final, Description of the Proposed Action and Alternatives, Environmental Impact Statement, Peacekeeper Missile System Deactivation/Dismantlement, F.E. Warren AFB, Wyoming.**

✓ PROPOSAL ✓ PLANS __REPORT (Check each that applies)

DATE ON PROPOSAL/PLANS/REPORT: **June 18, 1999**

REVIEWING OFFICIAL: **Daniel Moore**

DATE OF LAST REVIEW: **NA**

DATE OF THIS REVIEW: **July 27, 1999**

ACTION: **Comments provided.**

COMMENTS:

General Comments

1. The Peacekeeper Launch Facilities (LFs) and Missile Alert Facilities (MAFs) include regulated underground storage tanks. In closing these tanks, the Air Force must comply with Wyoming Water Quality Rules and Regulations Chapter 17. Specific requirements are outlined in Part G. The proposed schedule for deactivation and dismantlement of the LFs and MAFs should be evaluated and modified as necessary to account for compliance activities.

2. The DEQ proposes that Air Force, U.S. EPA, and DEQ personnel conduct a walk over inspection of an LF and MAF as part of the scoping process for the Environmental Impact Statement (EIS). Such an inspection would allow regulatory personnel an opportunity to work with the Air Force in identifying potential issues that would need to be addressed in the EIS. If the training facilities located at FEW offer a reasonable representation of the nature of the LF and MAF facilities with regard to environmental concerns, an inspection of these facilities may be an adequate substitute.

3. An adequate environmental assessment of each Launch Facility and Missile Alert Facility should be completed and documented prior to release of the properties. Proper closure and documentation of these properties may work to limit future Department of Defense environmental liabilities. The EIS should outline any land use restrictions that might be employed in the mitigation of adverse impacts resulting from the closure and sale of these properties.

4. A post-dismantlement soil survey will likely be required at each LF and MAF in order to confirm that no unacceptable contamination is present in surface soils. Lead and PCBs would be potential analytes for such a survey.

5. The EIS should include a discussion of past and current practices and conditions at the LF and MAF facilities. This discussion should concentrate on any hazardous materials releases that may have occurred (solvents, cleaning agents, hydraulic fluid, fuel, battery acids, etc.).

6. The EIS should consider potential impacts of proposed blasting activities on protected species including the prairie falcon and the Prebles meadow jumping mouse.

Specific Comments:

1. Section 3.3, Page 8
   Fluids and other materials removed from LFs and MAFs should be reused, recycled, or disposed in accordance with applicable laws and regulations. The EIS should describe the nature of each material and the proposed fate of each material. This section refers to batteries, filters, and switches in generic terms. The EIS should be expansive in discussing any hazardous content contained in these items and the disposition of these items.

2. Section 3.3, Page 9
   The DEQ recommends that the Air Force undertake the underground storage tank drainage and closure as part of Phase 2 activities rather than delaying closure to Phase 3. As long as fluids remain in the tanks, the Air Force will need to continue operating leak

detection systems and fulfilling tank monitoring requirements. In addition, until the tanks are properly closed, the Air Force will continue to make payments into the Wyoming tank fund. Tanks must be closed within twelve months of end of service.

End of Review

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

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AUG 2 1999

Ref: 8EPR-EP

Mr. Jonathan D. Farthing
Chief, Environmental Analysis Division
HQ AFCHEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

Re: Warren AFB Peacekeeper Missile Dismantle/Deactivation, EIS Scoping

Dear Mr. Farthing:

We have listed below EPA's scoping comments for the Environmental Impact Statement being prepared for Peacekeeper Missile System Dismantlement/Deactivation, at F. E. Warren AFB, Wyoming.

1. Please explain the proposed projects in plain English so that those not familiar with missiles systems can understand the actions being proposed. Likely areas of confusion are: dismantlement vs. deactivation, proposed action dependency on treaties, and acronyms. For example, in the proposed action description, section 2. describes 4 missile squadrons (4-MS). The next section - 3 describes 400 MS.

2. Clarify whether missile fuels (solid and liquid) may present a spill hazard during dismantling and transport. If there is a spill/leak potential, describe what actions will be taken to address spills.

3. Any and all removable PCBs should be removed and properly used/disposed.

4. The EIS should disclose how wells and underground storage tanks (UST) will be removed or closed. Closing facilities in accordance with State/Federal requirements is not sufficiently descriptive.

5. The underground storage tanks (including fuel-bearing pipeline systems) closure activities should preferentially remove USTs and soils need to be examined for potential leakage. If contamination is present, address the contamination. USTs should be abandoned in place only when other alternatives are impracticable. There should still be an investigation/evaluation for USTs abandoned in place to assure there are no threats to ground water. Contact Daniel Moore, Wyoming Department of Environmental Quality, (307) 777-7092 for details in state requirements in UST abandonment.

6. The EIS should develop mitigation measures for dismantled LF and MAF which contain hazardous materials abandoned in place such as fuel tanks and/or leakage, PCB residues, and asbestos. The EIS should assess the threat to groundwater from the remaining contamination and describe how USAF plans to include some form of notice or deed restriction to future owners, such as deed restrictions on the use of the land prohibiting disturbances of dismantled facilities.

7. The EIS should identify any near-by wells and water uses (e.g. stock watering).

We appreciate your interest in our comments. If you have any questions or want to discuss these comments, please contact Dana Allen at (303) 312-6870

Sincerely,

Cynthia Cody
Chief, NEPA Unit
Office of Ecosystems Protection
and Remediation

Wyoming
Department of Agriculture

Jim Geringer, Governor
Ron Micheli, Director

2219 Carey Ave., Cheyenne, WY 82002 ▮ Phone: (307) 777-7321 ▮ FAX: (307) 777-6593
E-mail: wda@missc.state.wy.us ▮ Home page address: wyagric.state.wy.us

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August 2, 1999

Julie Hamilton
Wyoming State Clearinghouse
Office of Federal Land Policy
Herschler Building 3W
Cheyenne, Wyoming 82002

Dear Ms. Hamilton:

Following are our comments on the Scoping Statement of the U.S. Air Force regarding their proposed Deactivation/Dismantling of the Peacekeeper Missile System at Warren AFB.

Our mission is to assist the citizens of Wyoming to live safe and healthy lives, promote and preserve our agricultural community, be responsible stewards of our natural resources, and achieve integrity in the marketplace. As the proposed actions of the U.S. Air Force affect the welfare of our citizens, our agriculture industry, and our natural resources, we believe it's important that we be kept informed of proposed actions and decisions and that we continue to be provided the opportunity to express pertinent issues and concerns.

We strongly encourage U.S. Air Force officials to work with landowners regarding this proposal. This project will affect 600 acres of prime agricultural land. Working the land for years, ranchers and farmers are intimately familiar with the distinct environment at each site and the specific impacts that this proposal will have upon each site. We emphatically recommend that USAF officials aggressively address the recommendations and concerns of affected landowners and agriculture producers.

The proposed plans need to consider the impacts that they will have on individual agriculture producers, the agriculture industry, and the overall economy of the affected area. Grazing represents a vital economic value to agriculture producers and to local communities. We believe that livelihoods of agriculture producers and the economy and well-being of the communities affected by the proposed actions must be actively considered in the study.

For both economic and environmental reasons, we recommend USAF officials make every attempt possible to return the restored land to the surrounding landowners. It nearly all cases, the surrounding land is used for agriculture purposes, usually ranching. In addition to economic benefits, grazing and farming represent irreplaceable environmental and social values, contributing to the preservation of open spaces and wildlife habitat, the visual beauty of the area, and the traditional image of Wyoming and the West.

For residents, these are increasingly important values that are fast disappearing in other parts of our nation. For visitors, the scenic vistas, the wildlife, and the inextricable linkage between

western folklore and sheep and cattle grazing adds to their western experience. These irreplaceable environmental and social values need to be considered in the study.

We hope that USAF officials do not repeat the horrid example left by their earlier deactivation/dismantling of the Atlas missile sites. The Atlas missile sites were sold to out-of-state buyers who raped the sites for all salvageable materials, and then left the pillaged sites as everlasting environmental eyesores. While we understand the economic benefits of selling the land to the highest bidder, we also understand (1) the economic benefits to selling the land to a landowner whose land surrounds the missile and launch control sites and thereby maintains the economic integrity of the land for the landowner and rural community, and (2) the environmental benefits of selling the land to the surrounding landowner, thereby maintaining valuable wildlife habitat and scenic vistas while fulfilling the requirements and intent of the National Environmental Policy Act and similar environmental laws.

We believe the dangers of lead and PCB contamination that the USAF acknowledges will be left in the ground need to be addressed in the study.

Regarding the environmental intent to restore land and provide wildlife habitat, we are particularly concerned about the strange proposal to create gravel mounds over every launch facility and launch control facility. During the environmental analysis for the installation of the Peacekeeper Missile, officials from all levels of the Air Force assured and assuaged local landowners and the general public that if any deactivation/dismantling occurred, every attempt would be made to restore the land to its original condition. Hundreds of acres of gravel scattered throughout southeastern Wyoming is not restoring the land to its original condition. Moreover, gravel beds become spawning grounds for noxious weeds that either require annual treatment or spread onto farm and ranch lands. In either case, gravel mounds create unreasonable costs to landowners and local government officials. Unfortunately, the aforementioned Atlas missile sites that scar southeastern Wyoming are reminders of sites left unrestored by USAF officials. Neither unrestored sites or weed-breeding mounds of gravel are acceptable alternatives. Restoration of the land to its original condition needs to be addressed in the environmental study.

In conclusion, we reiterate our recommendation that USAF officials work with the landowners affected by this proposal and that they make every attempt possible to return restored land to landowners. We appreciate the opportunity to comment on the scope of the proposed actions, we encourage continued attention to our concerns, and we look forward to hearing about future actions and decisions.

Sincerely,

for Don Christensen

Ron Micheli
Director

Office of Federal Land Policy 12

122 West 25th Street ● Herschler Bldg., 3 West ● Cheyenne, WY 82002-0600 ● 307-777-7331 ● 307-777-5400 fax

August 4, 1999

Mr. Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB, TX 78235-5363

RE: Scoping Statement, Deactivation/Dismantlement of Peacekeeper Missile System, F.E. Warren AFB, Wyoming

Dear Mr. Farthing:

This Office has reviewed the referenced document on behalf of the State of Wyoming. We also provided the scoping statement to all affected State agencies for their review, in accordance with State Clearinghouse procedures. I have attached letters from the Wyoming Game & Fish Department, the Wyoming Department of Transportation, and the Wyoming Department of Agriculture resulting from their reviews.

The State of Wyoming requests that several issues be addressed in the environmental impact analysis document. We have concerns regarding potential loads on regional highways, restoration of land to its original condition after dismantling and salvage, sale of restored lands to surrounding landowners, potential lead and PCB contamination, and HICS removal at stream crossings and in sensitive habitats. Please see the attached comment letters for additional detail. We recommend early and continued coordination with the affected State agencies throughout the impact analysis and dismantlement.

This Office will need six copies of future information and documents regarding this project for distribution to affected State agencies. Existing Memoranda of Understanding and other working agreements with individual agencies remain in place and unaffected. Policy statements and the State's position will be provided to you by this Office.

Thank you for this opportunity to comment.

Sincerely,

Carol Kruse

Carol Kruse
Planning Consultant

Enclosures (3)

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

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ES-61411
gw /W.10/WY2663

August 10, 1999

Jonathan D. Farthing
Chief, Environmental Analysis Division
HQ AFCEE/ECA
3207 North Road
Brooks AFB, Texas 78235-5363

Dear Mr. Farthing:

Thank you for your letter of June 18, regarding the possible deactivation/dismantlement of the Peacekeeper Missile System based at F.E. Warren Air Force Base, Wyoming. Without the exact location of the five missile alert facilities or the 50 launch facilities, it is difficult to determine exactly which species may be affected by the individual projects. Therefore, my staff has determined that the following threatened, endangered or proposed species may be present in the counties where the proposed actions will take place. Below are the listings of endangered, threatened and proposed species for Goshen, Laramie, and Platte Counties.

Species	Status	Expected Occurrence
Black-footed ferret (*Mustela nigripes*)	Endangered	Potential resident in prairie dog (*Cynomys* sp.) colonies.
Peregrine falcon (*Falco peregrinus*)	Endangered	Nesting. Migrant. springs, lakes, and perennial streams.
Ute ladies'- tresses (*Spiranthes diluvialis*)	Threatened	Moist soils near wetland meadows,
Bald eagle (*Haliaeetus leucocephalus*)	Threatened	Nesting. Winter resident. Migrant.
Preble's meadow jumping mouse (*Zapus hudsonius preblei*)	Threatened	Marshy areas and moist streamside vegetation in open prairie

Black-footed ferrets

Black-footed ferrets may be affected if prairie dog colonies are impacted (poisoned, surface disturbing activities, etc.). If black-tailed prairie dog (*Cynomys ludovicianus*) colonies or complexes greater than 79 acres will be impacted, surveys for ferrets should be conducted even if only a portion of the colony or complex will be disturbed. If a field check indicates that prairie dog towns may be affected, you should contact this office for guidance on ferret surveys.

Mr. Jonathan D. Farthing

Ute ladies'-tresses

Ute ladies'-tresses is a perennial, terrestrial orchid with stems 2 to 5 dm tall, narrow leaves, and flowers consisting of few to many small white or ivory flowers clustered into a spike arrangement at the top of the stem. It blooms from late July through August, however, depending on location and climatic conditions, orchids may bloom in early July or still be in flower as late as early October. The Ute ladies'-tresses is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams. It occurs generally in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows at elevations from 4,200 to 7,000 feet. The orchid colonizes early successional riparian habitats such as point bars, sand bars, and low lying gravelly, sandy, or cobble edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. Recent discoveries of additional orchid colonies in Wyoming and Montana indicate that surveys for and inventories of orchid occurrences continue to be an important part of orchid recovery planning and implementation.

In order to recover the orchid, it is important that surveys be conducted in areas of potential habitat and in response to impending impacts. Ute ladies'-tresses seems generally intolerant of shade and is found primarily in open grass and forb-dominated sites where vegetation is relatively open and not dense or overgrown. The plants usually occur as small scattered groups. Ute ladies'-tresses orchid can only be reliably located and identified when it is flowering, which typically occurs sometime during the period from mid-July through mid-September. Surveys are conducted by walking or otherwise closely scrutinizing areas of potential habitat looking for flowering stalks. Surveys conducted at other times of the year area not reliable and are therefore not acceptable to the Service for purposes of clearance under section 7 of the ESA. Surveys should be conducted by knowledgeable botanists trained in conducting rare plant surveys. The Service does not maintain a list of "qualified" surveyors but can refer those wishing to become familiar with the orchid to experts who can provide training/services.

If any suitable habitat for the orchid is found, (survey guidelines attacheded) the Service strongly encourages the United States Air Force Space Command to support survey efforts on the proposed project sites. If it is determined that the project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so we can work together to determine how the project could be modified to reduce impacts to listed species to the "not likely to adversely affect" threshold.

Federal agencies are also encouraged to consider sensitive species or species at risk in project review. Your consideration of these species may be important in preventing their inclusion on the Endangered Species List. The Wyoming Natural Diversity Database maintains the most current information on sensitive plants in Wyoming. The database must charge for data retrieval to financially support the database and staff. The staff can be contacted at (307) 766-5026.

Migratory Birds

Please recognize that consultation on listed species may not remove your obligation to protect the many species of birds, raptors, and eagles protected under the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). The MBTA, 16 U.S.C. 703, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations and does not require intent to be proven. Section 703 of the Act states, "Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, or possess ... any migratory bird, any part, nest, or eggs of any such bird..." The BGEPA, 16 U.S.C. 668, prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.

Work that could lead to the take of a migratory bird or eagle, their young, eggs, or nests (for example, movement and noise of construction equipment, detonation of explosives, etc.), should be coordinated with our office before any actions are taken. Removal or destruction of such nests, or causing abandonment of a nest could constitute violation of the above statutes. Removal of nests or nest trees is prohibited, but may be allowed once young have fledged and/or a permit has been issued. In either case, timing is a significant consideration and you need to allow for this in your project planning.

Preble's meadow jumping mouse

The Preble's meadow jumping mouse (*Zapus hudsonius preblei)* is a small rodent in the family Zapodidae and is 1 of 12 recognized subspecies of the species *Z. hudsonius*, the meadow jumping mouse. The family Zapus consists of small to medium-sized mice with long tails and long feet adapted for jumping. The coloration of Preble's was described by Krutzsch (1954) as "color dull, back from near Clay Color to near Tawny-Olive with a mixture of black hair forming poorly defined dorsal band; sides lighter than back from near Clay Color to near Cinnamon-Buff; lateral line distinct and clear Ochraceous-Buff; belly white, sometimes faint wash of clear Ochraceous-Buff; tail bicolored, brownish to light brownish-black above, grayish-white to yellowish-white below" (capitalized color terms refer to a scientific standard, while lower case terms reflect common usage).

Preble's meadow jumping mouse is similar in appearance to *Z. princeps,* which also occurs in portions of Colorado and Wyoming. Preble's may be distinguished from *Z. princeps* by a less pronounced mid-dorsal band, smaller average total length, and a skull that is small and light with a narrower braincase and smaller molars. Skull measurements are most useful for positive identification since coloration and total length are not definitive characteristics. The diet of the Preble's meadow jumping mouse consists of seeds, fruits, fungi and insects. Hibernation occurs from October to May in small underground burrows it excavates. Nests are made of grass, leaves or woody material excavated several centimeters below ground level. Preble's are primarily nocturnal or crepuscular, but have been observed during daylight. The Preble's meadow jumping mouse occurs in low undergrowth consisting of grasses, forbs, or a mix of both, in wet meadows

and riparian corridors, or where tall shrubs and low trees provide adequate cover. Additionally, Preble's exhibits a preference for lush vegetation along watercourses or herbaceous understories in wooded areas with close proximity to water. In Wyoming, Preble's meadow jumping mouse has been recently documented in four counties, Albany, Laramie, Platte and Converse but has not recently been trapped in its former range in Goshen County. If the proposed project will result in a disturbance to suitable habitat within the species current or historic range, surveys should be conducted prior to any action. Due to the difficulty in identifying the Preble's meadow jumping mouse, surveys should be conducted by knowledgeable biologists trained in conducting Preble's surveys. We have enclosed a copy of the Preble's meadow jumping mouse survey guidelines for your use.

Platte River Depletions

Since 1978, the Service has consistently taken the position in its section 7 consultations that Federal agency actions resulting in water depletions to the Platte River system are likely to jeopardize the continued existence of the following species:

Species	Status	Expected Occurrence
Whooping crane (*Grus americana*)	Endangered	Downstream resident of Platte River System
Interior least tern (*Sterna antillarum*),	Endangered	"
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered	"
Piping plover (*Charadrius melodus*)	Threatened	"

In addition, the Service believes agency actions resulting in such water depletions may affect but are not likely to adversely affect the continued existence of the endangered eskimo curlew (*Numenius borealis*), and threatened western prairie fringed orchid (*Platanthera praeclara*). Therefore, agency actions which may lead to depletions from the Platte River system will not require formal consultation for possible effects to these species.

In general, depletions include evaporative losses and/or consumptive use, often characterized as diversions from the Platte River or its tributaries less return flows. Project elements that could be associated with depletions to the Platte River system include, but are not limited to, ponds (detention/recreation/irrigation storage/stock watering), lakes (recreation/irrigation storage/municipal storage/power generation), reservoirs (recreation/irrigation storage/municipal storage/power generation), created or enhanced wetlands (mitigation wetlands created at >1:1 ratio), pipelines, wells, diversion structures, water treatment facilities, and pumping of water for dust control associated with construction activities.

Any actions that may result in a water depletion to the Platte River system should be identified. The document should also include an estimate of the amount and timing (by month) of average annual water depletion (both existing and new depletions), and describe methods of arriving at such estimates.

Wetlands/Riparian Areas

The Service recommends measures be taken to avoid any wetland losses in accordance with Section 404 of the Clean Water Act, Executive Order 11990 (wetland protection) and Executive Order 11988 (floodplain management) as well as the goal of "no net loss of wetlands." If wetlands may be destroyed or degraded by the proposed action, those (wetlands) in the project area should be inventoried and fully described in terms of functions and values. Acreage of wetlands, by type, should be disclosed and specific actions outlined to minimize impacts and compensate for all unavoidable wetland impacts.

Riparian or streamside areas are a valuable natural resource and impacts to these areas should be avoided whenever possible. Riparian areas are the single most productive wildlife habitat type in North America. They support a greater variety of wildlife than any other habitat. Riparian vegetation plays an important role in protecting streams, reducing erosion and sedimentation as well as improving water quality, maintaining the water table, controlling flooding, and providing shade and cover. In view of their importance and relative scarcity, impacts to riparian areas should be avoided. Any potential, unavoidable encroachment into these areas should be minimized and quantitatively assessed in terms of functions and values, areas and vegetation type lost, potential effects on wildlife, and streams (bank stability and water quality). Measures to compensate for unavoidable losses of riparian areas should be developed and implemented as part of the project.

Plans for mitigating unavoidable impacts to wetland and riparian areas should include mitigation goals and objectives, methodologies, time frames for implementation, success criteria, and monitoring to determine if the mitigation is successful. The mitigation plan should also include a contingency plan to be implemented should the mitigation not be successful.

We appreciate your efforts to ensure the conservation of endangered and threatened species. If you have any further questions, please contact Jerry Williams (307) 772-2374, ext. 24.

Sincerely,

Michael M. Long

Michael M. Long
Field Supervisor
Wyoming Field Office

Mr. Jonathan D. Farthing

Attachments

cc: Director, WGFD, Cheyenne, WY
Non-game Coordinator, WGFD, Lander, WY

APPENDIX D

DRAFT ENVIRONMENTAL IMPACT STATEMENT MAILING LIST

APPENDIX D.
DRAFT ENVIRONMENTAL IMPACT STATEMENT MAILING LIST

ELECTED OFFICIALS

Federal Officials

U.S. Senate

Senator Mike Enzi
Senator Craig Thomas

U.S. House of Representatives

Congresswoman Barbara Cubin

State of Wyoming Officials

Governor

The Honorable Jim Geringer

State Legislature

State Senate

The Honorable Pete Illoway

State Assembly

Office of the Adjutant General

Major General Ed Boenisch

Wyoming Attorney General

The Honorable Gay Woodhouse

Local Officials

Mayor of Cheyenne

Mr. Leo A. Pando

Mayor of Torrington

Mr. Mike Varney

Mayor of Wheatland

Mr. Joel Dingman

Wyoming County Commissioners Association

Mr. Joseph Evans

Wyoming County Commissioners

Laramie County
Goshen County
Platte County

GOVERNMENT AGENCIES

Federal Agencies

Department of Defense

U.S. Army Corps of Engineers

Public Affairs Office – Mr. Tom O'Hara

U.S. Air Force (USAF)

Headquarters (HQ) USAF/ILEVP
HQ Air Force Center for Environmental Excellence
HQ Air Force Space Command
HQ Air Mobility Command
HQ Air Combat Command
F.E. Warren Air Force Base, WY

Regional Offices of Federal Agencies

Environmental Protection Agency

Office of Ecosystems Protection and Remediation
Chief, NEPA Unit – Ms Cynthia Cody

U.S. Department of Agriculture

NRCS Cheyenne, Abe Stevenson
NRCS Torrington
NRCS Wheatland

U.S. Geological Survey

U.S. Department of the Interior

National Park Service, Great Plains Systems Office - Mr. Craig Kenkel
U.S. Fish and Wildlife Service—Mr. Michael Long

Federal Highway Administration

.

State Agencies

Wyoming Department of Agriculture

Mr. Ron Micheli

Wyoming State Geological Survey

Mr. Lance Cook

Wyoming Department of Health

Dr. Gary L. McKee

Wyoming Department of Transportation

Mr. Timothy L. Stark, P.E.

Wyoming Office of Federal Land Policy

Ms Carol Kruse

Wyoming Department of Environmental Quality

Director – Mr. Dennis Hammer
Solid & Hazardous Waste Division - Mr. David Finley
Air Quality Division - Mr. Dan Olson
Water Quality Division - Mr. Gary Beach, Mr. Daniel More

Wyoming Division of State Parks and Historic Sites

Mr. Gary Thorson

Wyoming Office of State Lands and Investments

Mr. Stephen A. Reynolds

Wyoming Game and Fish Department

Mr. Bill Wichers

Wyoming State Engineer's Office

Mr. Gordon W. "Jeff" Fassett

Wyoming State Historic Preservation Office
Ms. Judy Wolff
Wyoming Air National Guard
MSgt Aaron G. Smith, Jr.
Wyoming Office of Intergovernmental Assistance

Others
Electric Companies
Wheatland Rural Electric Association
Cheyenne Light, Fuel, & Power Company
Rural Electric Company
WYRULEC Co.
Laramie County Public Works - Mr. Don Beard
Burlington Northern & Santa Fe RR
Cheyenne – Mr. Scott Petersen
Fort Worth
Union Pacific Railroad Company
Cheyenne – Mr. Bill Lake
Omaha
Cheyenne Municipal Airport - Mr. Marty Lenss
Laramie County School District #1 - Mr. Brad Oberg
Laramie County Health Department
Platte County Public Health Department
Goshen County Public Health Department
County of Goshen Public Library
Laramie County Central Library
Platte County Public Library
Wyoming Tribune Eagle - Mr. Dillon McKinley
Individuals
W. F. Dennis
Mr. Bill Pomeroy
Mr. Mel Eaton
Mrs. Mae Kirkbride
Mr. Robert J VanRisseghem
Rev. Daniel E. Monson
Mr. Darryl Miller
Rev. Dr. Sally Palmer
Mr. Larry W. Sortor
Mrs. Linda Kirkbride
Mr. Thomas Rauch
Mr. Byron Plumley
Mr. Troy Cochran
Ms Margaret Laybourn
Ms Judy Smith
Mr. Howard Wilshire
Mr. Peter Allan
Mr. Scott Kamber

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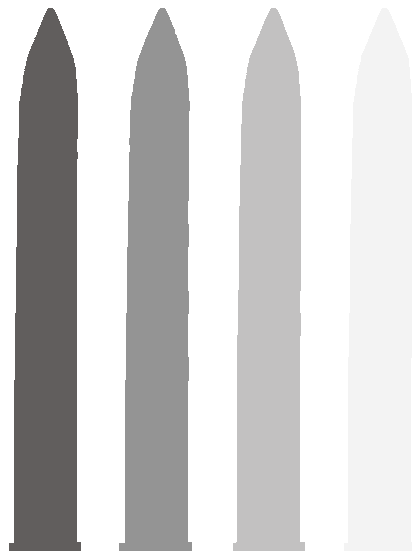

APPENDIX E

MAPS OF MISSILE FLIGHTS P-T

APPENDIX E.
MAPS OF MISSILE FLIGHTS P-T

This appendix contains maps showing each of the five missile flight areas.

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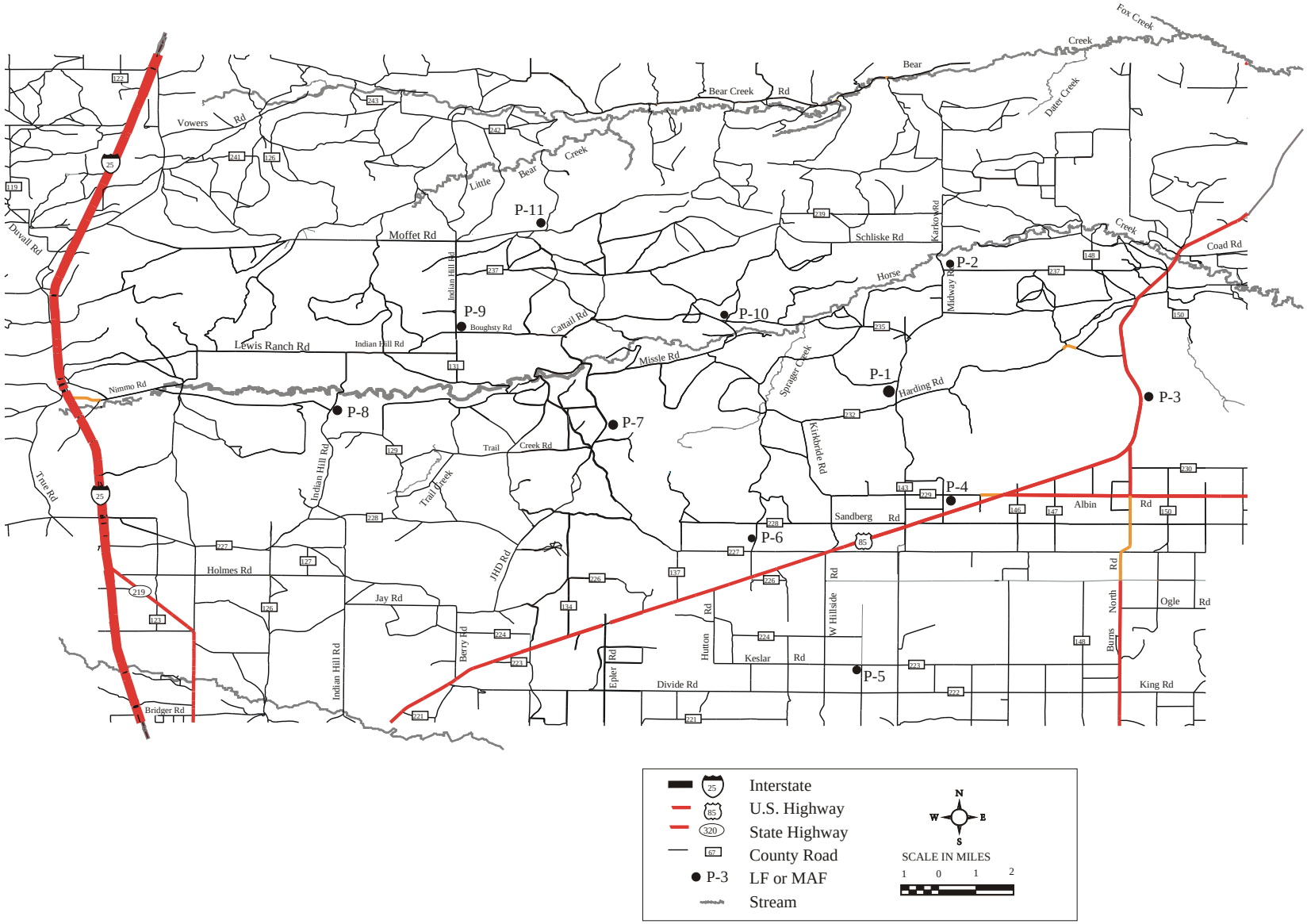
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U.S. Highway
State Highway
County Road
P-3 LF or MAF
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SCALE IN MILES
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P-1
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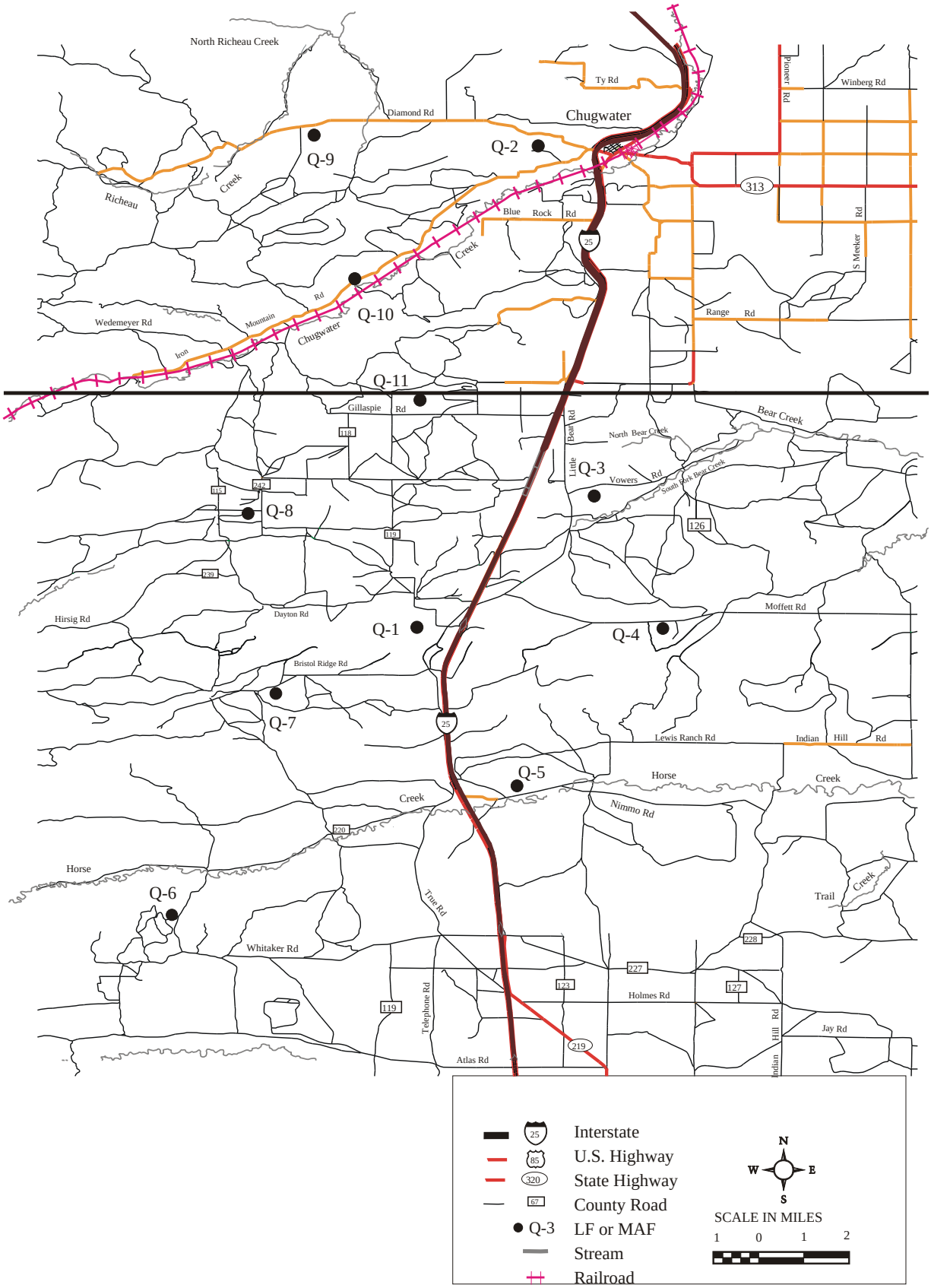
P-7
P-8
P-9
P-10
P-11
Fox Creek
Creek
Bear
Bear Creek Rd
Date Creek
Vowers Rd
Little Bear Creek
Moffet Rd
Schliske Rd
Karkow Rd
Midway Rd
Horse Creek
Coad Rd
Duvall Rd
Indian Hill Rd
Boughsty Rd
Cattail Rd
Missle Rd
Lewis Ranch Rd
Nimmo Rd
Sprager Creek
Harding Rd
Kirkbride Rd
Trail Creek Rd
Trail Creek
True Rd
Holmes Rd
Jay Rd
JHD Rd
Berry Rd
Sandberg Rd
Albin Rd
Hutton Rd
Keslar Rd
W Hillside Rd
Epler Rd
Divide Rd
North Rd
Burns Rd
Ogle Rd
King Rd
Bridger Rd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Ty Rd
Pioneer Rd
Winberg Rd
Diamond Rd
Chugwater
Q-2
Q-9
Richeau
Creek
313
Blue
Rock
Rd
25
Creek
S Meeker
Rd
Q-10
Wedemeyer Rd
Mountain
Rd
Chugwater
Iron
Range
Rd
Q-11
Gillaspie
Rd
118
Bear Rd
Bear Creek
North Bear Creek
Little
Q-3
Vowers
Rd
South Park Bear Creek
242
112
Q-8
119
126
239
Hirsig Rd
Dayton Rd
Moffett Rd
Q-1
Q-4
Bristol Ridge Rd
Q-7
25
Lewis Ranch Rd
Indian
Hill
Rd
Q-5
Horse
Creek
Creek
Nimmo Rd
220
Horse
Q-6
True Rd
Trail
Creek
Whitaker Rd
228
227
123
Holmes Rd
127
119
Telephone Rd
Hill Rd
Jay Rd
219
Atlas Rd
Indian
Interstate
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SCALE IN MILES
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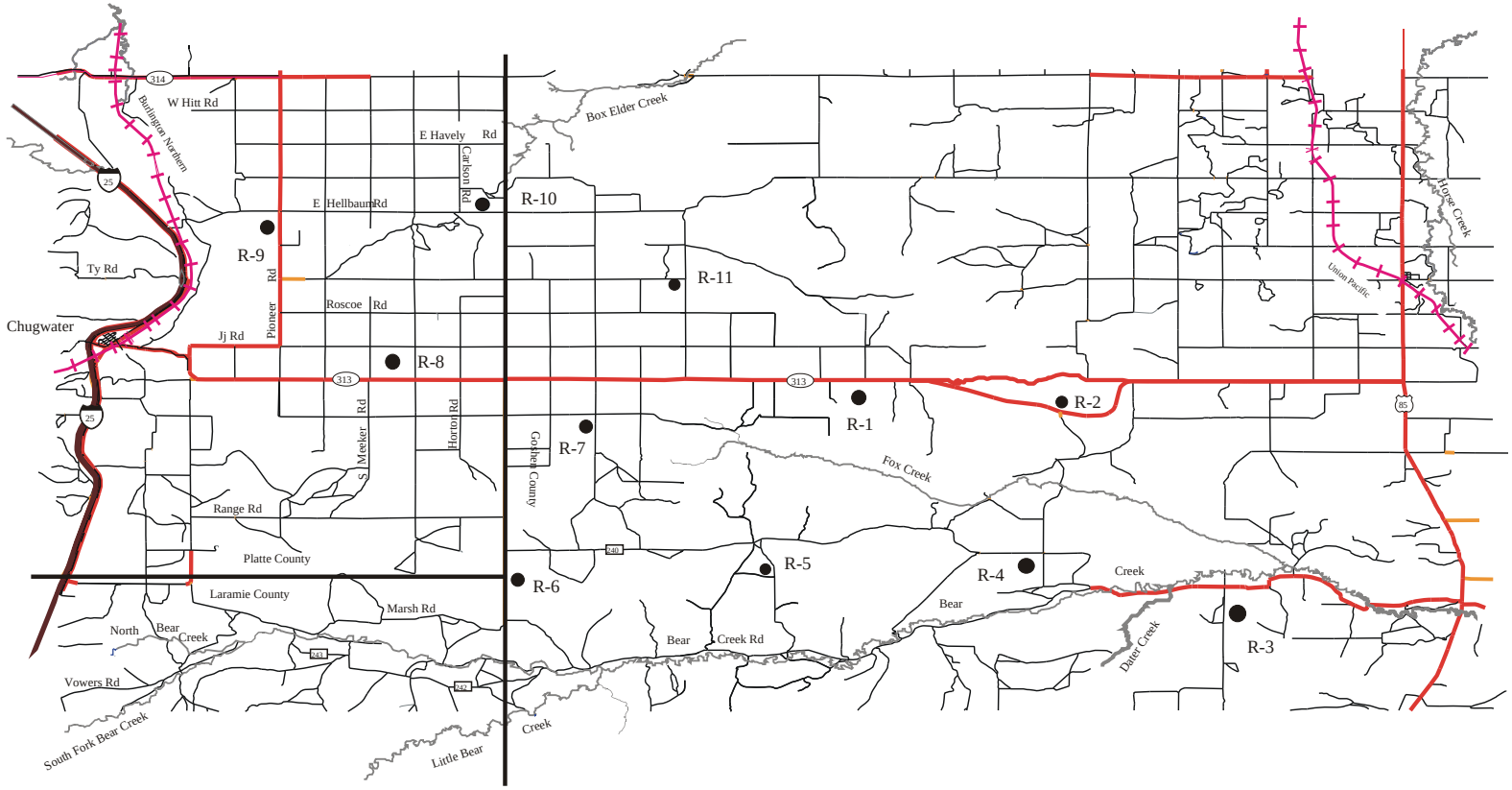
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E Havely Rd
E Hellbaum Rd
Carlson Rd
Box Elder Creek
Burlington Northern
Ty Rd
Chugwater
Jj Rd
Pioneer Rd
Roscoe Rd
S Meeker Rd
Horton Rd
Goshen County
Range Rd
Platte County
Laramie County
Marsh Rd
North Bear Creek
Vowers Rd
South Fork Bear Creek
Little Bear Creek
Bear Creek Rd
Fox Creek
Bear Creek
Dater Creek
Horse Creek
Union Pacific
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R-2
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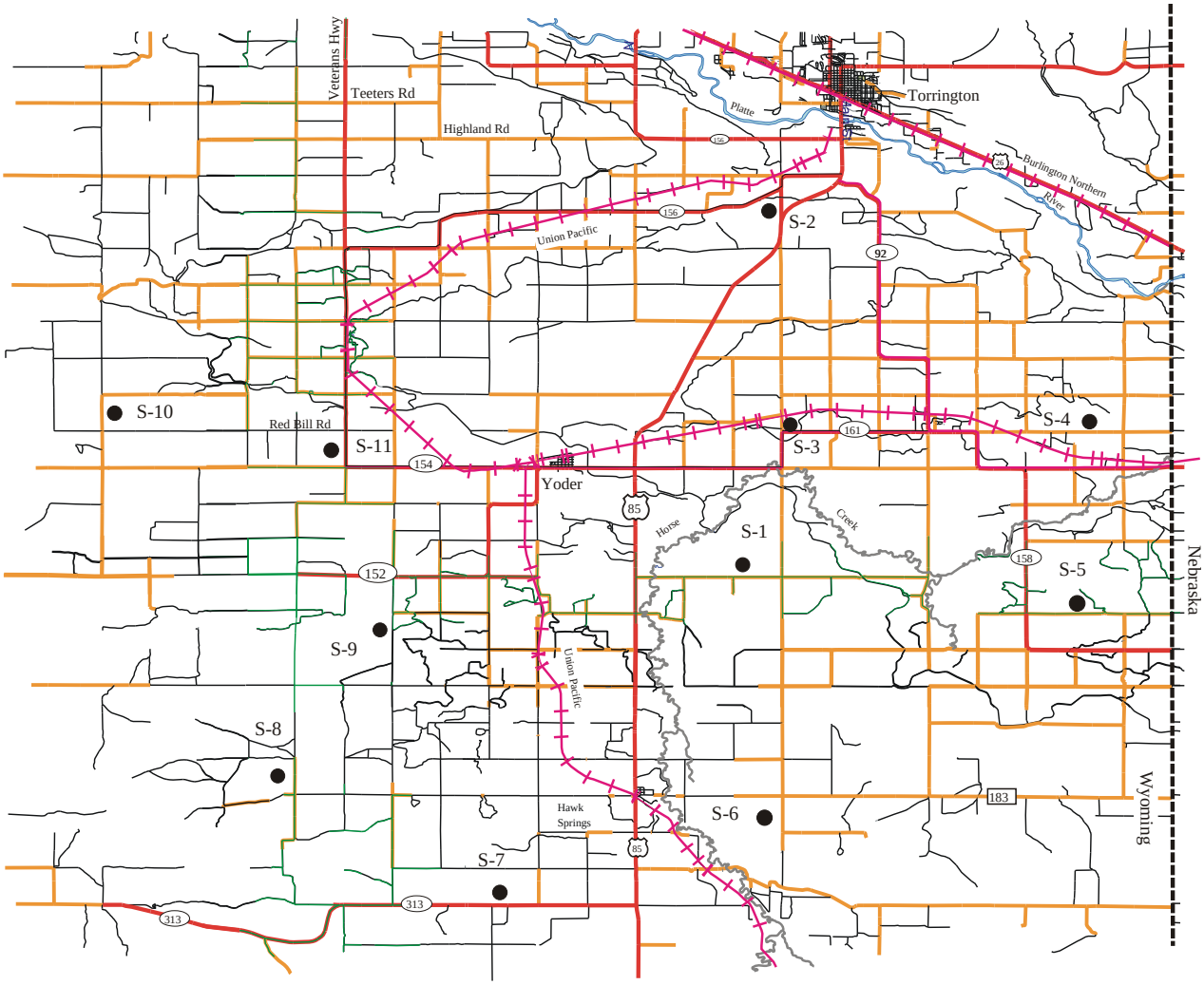
Veterans Hwy
Teeters Rd
Highland Rd
Platte
Torrington
Burlington Northern
River
Union Pacific
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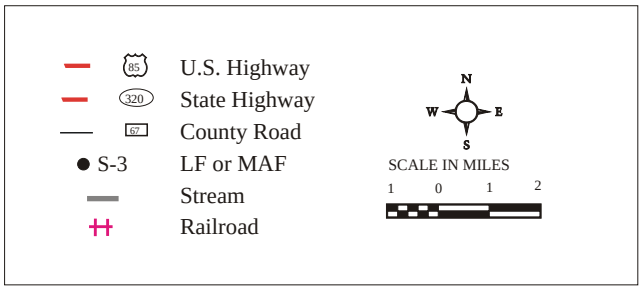
92
S-2
S-10
Red Bill Rd
S-11
154
Yoder
161
S-3
S-4
85
Horse
Creek
S-1
158
S-5
152
S-9
Union Pacific
S-8
Hawk
Springs
S-6
183
S-7
313
Nebraska
Wyoming


85
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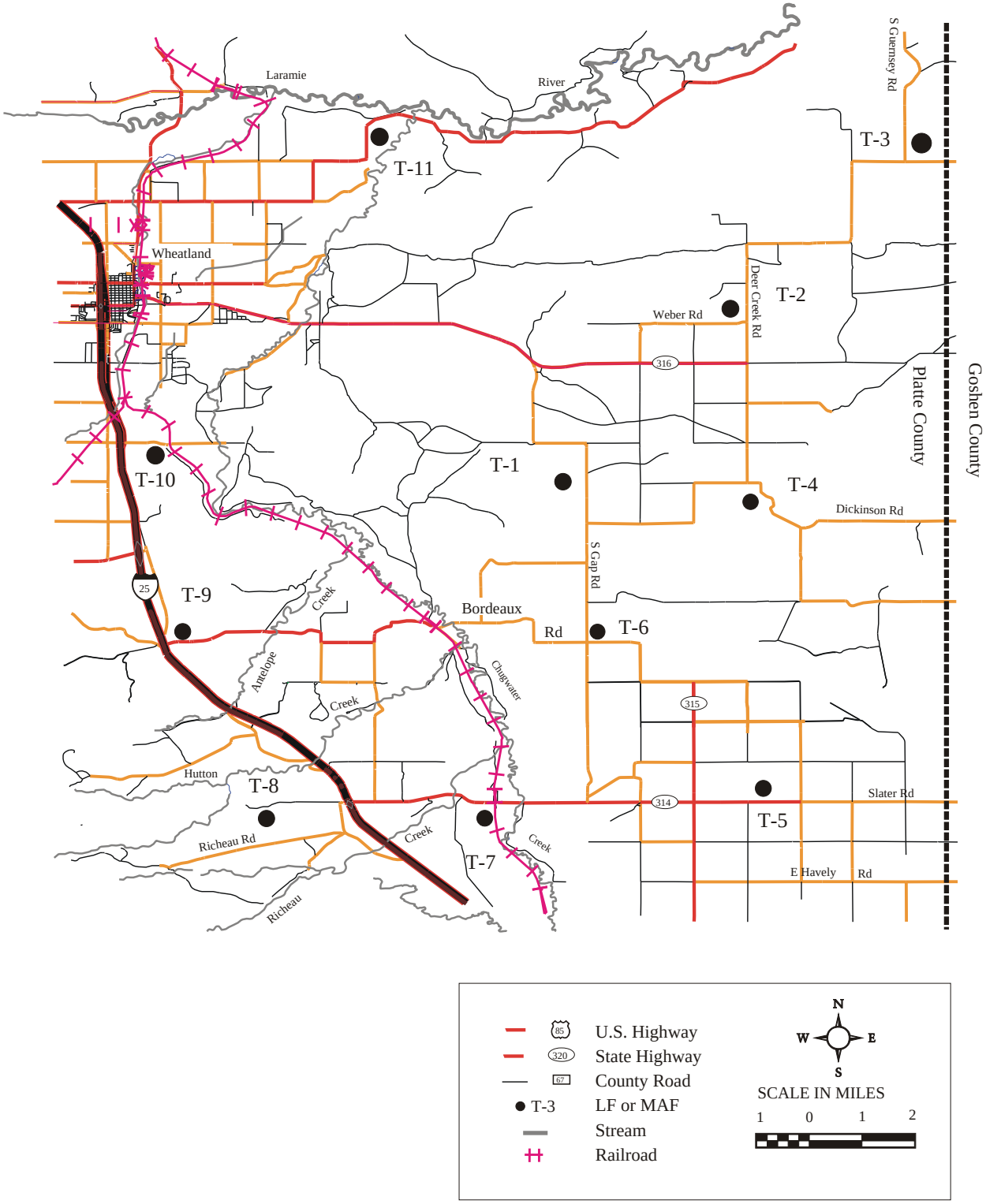
Laramie
River
S Guernsey Rd
T-3
T-11
Wheatland
Deer Creek Rd
T-2
Weber Rd
316
Platte County
Goshen County
T-1
T-10
T-4
Dickinson Rd
S Gap Rd
25
T-9
Creek
Bordeaux
Rd
T-6
Antelope
Chugwater
Creek
315
Hutton
T-8
314
Slater Rd
T-5
Richeau Rd
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Creek
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APPENDIX F

SOCIOECONOMIC AND ENVIRONMENTAL JUSTICE TABLES

APPENDIX F.
SOCIOECONOMIC AND ENVIRONMENTAL JUSTICE TABLES

This appendix contains spreadsheets with detailed socioeconomic and environmental justice data.

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Table F-1.
Ethnic and Income Characteristics, Regions of Influence and Comparison Areas, 1990

Population Numbers							
	Laramie	*Goshen*	*Platte*	*2-Co. Total*	*3-Co. Total*	*WY*	*US*
White	66,280	11,750	8,057	19,807	86,087	427,061	199,686,070
Black	2,218	25	5	30	2,248	3,606	29,986,060
American Indian	528	99	24	123	651	9,479	1,959,234
Asian	821	16	10	26	847	2,806	7,273,662
Other / NEC	3,295	483	49	532	3,827	10,636	9,804,847
TOTAL	73,142	12,373	8,145	20,518	93,660	453,588	248,709,873
Hispanic	7,310	1,078	404	1,482	8,792	25,751	22,354,059
% of total Hispanic	83.1%	12.3%	4.6%	16.9%	100.0%		
Population Percentages							
% of Total	*Laramie*	*Goshen*	*Platte*	*2-Co. Total*	*3-Co. Total*	*WY*	*US*
White	90.6%	95.0%	98.9%	96.5%	91.9%	94.2%	80.3%
Black	3.0%	0.2%	0.1%	0.1%	2.4%	0.8%	12.1%
American Indian	0.7%	0.8%	0.3%	0.6%	0.7%	2.1%	0.8%
Asian	1.1%	0.1%	0.1%	0.1%	0.9%	0.6%	2.9%
Other / NEC	4.5%	3.9%	0.6%	2.6%	4.1%	2.3%	3.9%
TOTAL	100%	100%	100%	100%	100%	100%	100%
Hispanic	10%	9%	5%	7%	9%	6%	9%
Per Capita Income							
	Laramie	*Goshen*	*Platte*	*2-Co. Total**	*3-Co. Total*	*WY*	*US*
1997 Per Capita Inc*	$ 22,815	$ 17,099	$ 20,213	$ 18,337	$ 21,853	$ 22,596	$ 25,288
as % of US PCI	90.2%	67.6%	79.9%	72.5%	86.4%	89.4%	100.0%
as % of WY PCI	101.0%	75.7%	89.5%	81.2%	96.7%	100.0%	
Poverty Status							
In 1989:	71,501	12,109	8,065	20,174	91,675	442,277	241,977,859
Persons below Poverty	7,566	2,077	1,267	3,344	10,910	52,453	31,742,864
% below poverty. 1989	11%	17%	16%	17%	12%	12%	13%
% of total poverty	69.3%	19.0%	11.6%	30.7%	100.0%		

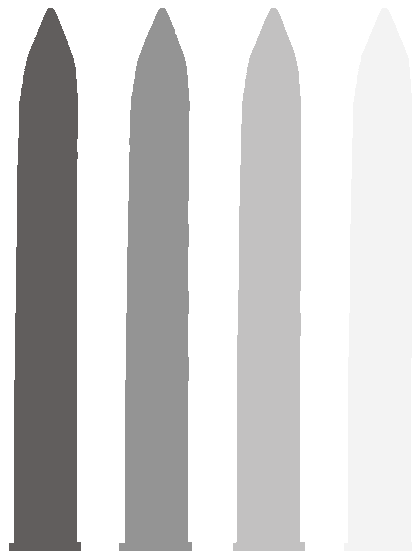
*BEA data 1999 (Regional Economic Information); 2-county and 3-county areas computed

Source: USBC, 1990 U.S. Census of Population and Housing, Table STF-1C

Table F-2.
Detailed Poverty Data, Regions of Influence and Comparison Areas, 1990

Poverty Info w/ Percentages for 1989-90	Laramie	Goshen	Platte	2-Co.	WY	US
Persons Poverty Status Determined 1979	67,357	11,791	11,894	23,685	459,732	220,845,766
Persons Poverty Status Determined 1989	71,501	12,109	8,065	20,174	442,277	241,977,859
Persons Below Poverty Level In 1979	**8%**	**12%**	**10%**	**11%**	**8%**	**12%**
Persons Below Poverty Level In 1989	**11%**	**17%**	**16%**	**17%**	**12%**	**13%**
Persons 65+ Poverty Status Determined 1979	5,740	1,705	1,049	2,754	35,058	24,154,364
Persons 65+ Poverty Status Determined 1989	7,082	1,892	1,227	3,119	44,386	29,562,647
Persons 65 Years Old Over Below Poverty Level In 1979	**14%**	**15%**	**19%**	**17%**	**14%**	**15%**
Persons 65 Years Old Over Below Poverty Level In 1989	**11%**	**13%**	**13%**	**13%**	**14%**	**16%**
White Persons Poverty Status Determined 1989	64,787	11,383	7,958	19,341	417,056	194,811,704
White Persons Below Poverty Level In 1989	**9%**	**15%**	**15%**	**15%**	**11%**	**10%**
Black Persons Poverty Status Determined 1989	2,015	22	1	23	2,954	28,663,173
Black Persons Below Poverty Level In 1979	342	0	0	0	647	7,648,604
Black Persons Below Poverty Level In 1989	**21%**	**27%**	**0%**	**26%**	**25%**	**29%**
Amerind Persons Poverty Status Determined 1989	765	154	25	179	9,627	1,950,915
Amerind Persons Below Poverty Level In 1989	**37%**	**60%**	**0%**	**51%**	**43%**	**31%**
Asian Persons Poverty Status Determined 1989	820	0	29	29	2,601	7,068,454
Asian Or Pacific Islander Below Poverty Level In 1989	**11%**	**0%**	**0%**	**0%**	**16%**	**14%**
Hispanic Persons Poverty Status Determined 1989	6,982	1,061	402	1,463	24,299	21,388,017
Hispanic Persons Below Poverty Level In 1979	790	260	108	368	2,916	3,371,134
Hispanic Persons Below Poverty Level In 1989	**19%**	**44%**	**35%**	**41%**	**23%**	**25%**
Families 1980	18,412	3,322	3,319	6,641	123,420	59,190,133
Families 1990	20,127	3,477	2,318	5,795	121,198	65,049,428
Families Below Poverty Level In 1979	**7%**	**9%**	**8%**	**8%**	**6%**	**10%**
Families Below Poverty Level In 1989	**9%**	**14%**	**13%**	**13%**	**9%**	**10%**
Families With Female Householder, No Spouse 1980	1,718	262	137	399	9,288	8,205,279
Families With Female Householder, No Spouse 1990	2,714	347	179	526	13,622	10,381,654
Families With Female Householder, ***% Of Total Families 1990***	**13%**	**10%**	**8%**	**9%**	**11%**	**16%**
Fem HH Families No Spouse Below Poverty Level In 1979	**29%**	**16%**	**38%**	**23%**	**24%**	**30%**
Fem HH Families No Spouse Below Poverty Level In 1989	**32%**	**48%**	**50%**	**49%**	**37%**	**31%**

Source: USBC, 1990



APPENDIX G

PHOTOGRAPHS

APPENDIX G.
PHOTOGRAPHS

This appendix contains photographs of the vehicles used to transport and maintain the Peacekeeper missiles.

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Figure G-1. Photo of AEST Vehicle

Figure G-2. Photo of Emplacer Vehicle

Figure G-3. Photo of Rambo Vehicle

Figure G-4. Photo of Type II Vehicle

Figure G-5. Photo of Peacekeeper Launch Facility Site

Figure G-6. Photo of U-02 Set Up

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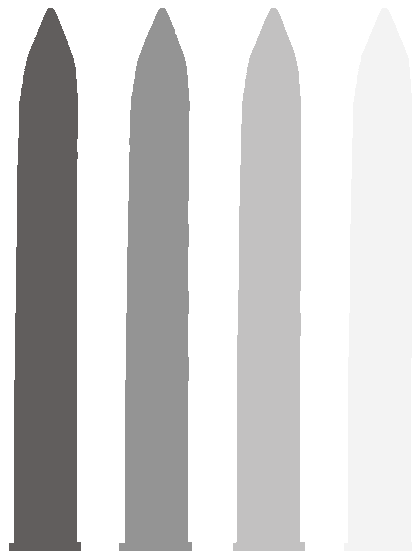

APPENDIX H

WEAPON SYSTEM SAFETY

APPENDIX H.
WEAPON SYSTEM SAFETY

An evaluation of the deactivation of the Peacekeeper missile system at F.E. Warren Air Force Base (AFB), WY identified overall minimal, if not negligible, effects regarding the safety of handling, transporting, and storing missile components; no significant impacts are projected to occur. This appendix describes the safety programs used by the Air Force to reasonably ensure that the probability of the accidents described in the following sections is remote. The *Peacekeeper in Minuteman Silos Environmental Impact Statement (USAF, 1984)* addresses nuclear safety regarding operation of the missile system, including transport of components to and from the deployment area. This analysis is incorporated into this EIS by reference according to 40 CFR 1502.21. A wide range of accident scenarios is possible; some of the more severe accident scenarios are analyzed in terms of potential environmental impacts. It is highly unlikely that any of these accident scenarios would occur.

Removing missiles from their launch tubes and transporting them to storage or elimination facilities poses a low likelihood of accidents during transportation, with an even lower chance that such accidents could damage public health or the physical environment. Movement of missile components is performed according to safety standards and procedures, and weapons are regularly inspected.

The Air Force Space Command (AFSPC) is responsible for all missile components, i.e., reentry systems (RS) (for Peacekeeper missiles) and reentry vehicles (RV) (for Minuteman (MM) missiles), missile guidance system (MGS), and boosters while they are in the deployment area or at the missile support base (MSB). When RSs/RVs are scheduled for retirement, they are shipped to United States Department of Energy (USDOE) facilities. If USDOE transportation is backlogged, some of the RSs/RVs slated for retirement could be shipped by the Air Force to the USDOE holding area. If USDOE ships the RSs/RVs, they are USDOE's responsibility when they leave the MSB. If they are shipped by the Air Force, they are the Air Force's responsibility until they arrive at USDOE facilities (Hendricks, 1991). The USDOE is responsible for manufacturing, transporting, and retiring nuclear weapons when they are no longer in the Air Force's custody. The impacts of RV retirement have been assessed in other documents, including the *Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (USDOE, 1996a) and the *Final Environmental Impact Statement for Stockpile Stewardship, and Management and Storage and Disposition of Weapons-Usable Fissile Materials* (USDOE, 1996b). The findings of these documents are incorporated into this EIS by reference according to 40 CFR 1502.21. These documents evaluated the impacts of nuclear weapon component disassembly and decommissioning of RSs/RVs. The final environmental impact statement (EIS) for the Pantex plant concluded that there have been no direct measurable effects on the health and safety of the general public, and no significant impacts to the environment or to the health and safety of the general public are expected to occur; the plant will continue to operate according to USDOE standards. The Stockpile Stewardship Final EIS did not identify any significant impacts from managing nuclear

weapon components from decommissioned weapon systems. The *1998 Site Environmental Report* (USDOE, 2000) concluded that air and radiological monitoring results were well below Federal standards and that the Plant does not pose a threat to public health.

The Air Force Materiel Command (AFMC) is responsible for shipping MGSs from the MSB to various locations. Some of the MGSs would be retired; these would be shipped to an AFMC facility. Some of the MGSs may be used for another Air Force program, the Reentry System Launch Program. The AFMC is also responsible for shipping the boosters from the MSB to AFLC facilities at Ogden Air Logistic Center, Hill AFB.

Propellant Safety

The Air Force has stringent requirements regarding the transport of rocket motors. The issue of the potential risks of rocket motor transport has been evaluated in several environmental documents prepared to evaluate the potential environmental impacts of various Air Force missile programs (USAF, 1986b; USAF 1987c; USAF, 1989) and from deactivation and dismantlement of Minuteman II missile systems at Ellsworth and Whiteman AFBs (USAF, 1991e; USAF, 1992a). An Environmental Assessment (EA) (USAF, 1991f) was prepared that evaluated, among other MM II rocket motor transport and disposition issues, the potential impacts of an accident involving propellant ignition. Another EA (USAF, 1995a) was done evaluating impacts of transporting MM III rocket motors from Grand Forks AFB, ND to Malmstrom AFB, MT as part of deactivation at the former base and a system upgrade at the latter base. A finding of no significant impact was signed for both EAs. The following text summarizes the results of the aforementioned studies.

Accidental ignition of a booster caused by static discharge, lightning, impact, or a fire or explosion could cause the propellant to burn so rapidly that it has some partial explosive effect. If a transportation accident occurred in which a missile motor ignited, the following may result: fire and heat; an explosive blast; propulsion of the rocket motor; and toxic emissions. The major emissions for solid rocket motors used in MM and Peacekeeper stages I, II, and III include aluminum oxide (Al_2O_3), nitrogen (N_2), carbon monoxide (CO), carbon dioxide (CO_2), hydrochloric acid (HCl), and water (H_2O). Stages I, II, and III of a Peacekeeper missile are similar to those of the MM system. However, Peacekeeper Stage IV contains a propulsion system rocket engine (PSRE). The chemical constituents of the PSRE are monomethyl hydrazine (MMH) and nitrogen tetroxide. The severity of human health consequences could depend on the proximity to and number of people exposed. Similarly, environmental damage, such as damage to crops or other vegetation, would depend on the nature and proximity of such resources.

If an ignition accident occurred with Peacekeeper stages I, II, or III, the dispersion of toxic emissions is likely the main consequence that could be experienced outside of the immediate vicinity (i.e., a few hundred feet if the motor does not exit from the vehicle) of the accident site. If this unlikely event occurred in a populated area, then as many as several thousand individuals could be exposed (for a few minutes to approximately one-half hour) to concentrations of HCl not generally considered to pose a risk to human

health. A few individuals could experience eye, respiratory tract, and skin irritation. In an open environment where accidental ignition would occur, the carbon monoxide readily combines with oxygen to form CO_2, and CO levels would not exceed health standards.

An even more extreme case is conceivable; that is, an accidental ignition during a rainstorm. (Water cannot be used to extinguish a propellant fire). While modeling data for such a scenario are not available, the emissions could likely be less dispersed and could reach ground level at higher concentrations than in clear weather. However, the scrubbing effect of the rain could eventually reduce the gaseous concentrations.

As indicated earlier (Section 3.2.3.1), a transportation accident involving ignition of missile propellant is very unlikely. If such an unlikely event were to occur in rural areas, the location for most of the roads between the MSB and the deployment area, health effects on nearby drivers or residents are far less likely than in an urban setting with higher population densities.

A Peacekeeper stage III motor contains class 1.1C propellant, which is considered an explosive propellant. If a motor containing an explosive propellant were detonated in an accident, the shock wave and heat from the blast could damage vehicles and structures, and injure individuals. By comparison, an explosion of a MM II stage III booster (also a class 1.1C propellant motor) could scatter debris and propellant up to 700 feet from the blast. Fire could engulf this area and the radiant heat could cause injury up to an additional 200 feet. A shock wave may cause window breakage and other minor damage up to 2,100 feet from the blast (USAF, 1991f). Impacts from the explosion of a Peacekeeper Stage III rocket motor would be slightly greater than the impacts from a MM III Stage III motor explosion, because the Peacekeeper motor contains more propellant. Information on the potential combustion products and their dispersion was unavailable for this study. The motor also could ignite and leave the vehicle, breaking away from the protective equipment. While this event is extremely unlikely (based on the Air Force's long history of safe handling of missiles), the potential hazard would be significant.

Moving the missiles to and from the deployment area for maintenance is an ongoing activity. The rate of booster movement would be similar to that incurred in a recent replacement program. Over the long term, the Peacekeeper system deactivation would eliminate the limited transportation hazard.

Nuclear Safety

Nuclear safety requirements are governed by DoD Directive 5030.15 and under Air Force Policy Directive 91-1 and Air Force Instructions (AFI) 91-101, 91-102, and 91-114. Storage of Nuclear Weapons is also regulated under AFI 31-101, 91-116, and Department of Defense Directive C-5210.41-M. Specific technical orders also cover every aspect of handling, maintenance, and transportation of nuclear weapon components. In the event of an accident or incident, DoD 5100.52M *Nuclear Weapon Accident Response Procedures* would define the response. Scenarios evaluating the improbable release of radioactive materials through an accident during transport, or at the launch facility have been evaluated in other EISs that considered potential operations and environmental impacts at and around F.E. Warren AFB, and other AFBs (USAF, 1986b; USAF, 1987c; USAF,

1989; USAF, 1991e). Other documents have evaluated the transportation of radioactive materials in various environments: *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes* (U.S. Nuclear Regulatory Commission (USNRC, 1977); *Shipping Container Response to Severe Highway and Railway Accident Scenarios* (U.S. Nuclear Regulatory Commission, 1987); *Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado* (U.S. Department of Energy, 1977); *Final Environmental Impact Statement, Pantex Plant Site, Amarillo, Texas* (U.S. Department of Energy, 1983); *Rocky Flats Environmental Technology Site Cumulative Impacts Document* (USDOE, 1997); and *Transportation of Radioactive Materials* (USNRC, 2000).

These documents assessed the risk of transporting radioactive materials ranging from spent nuclear fuel and other industrial applications to radioactive source materials for medical diagnosis and treatment. The *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes* concluded that radiation exposure of transport workers and of members of the general public along transportation routes occurs from the normal permissible radiation emitted from packages in transport. The effect of this exposure is believed to be negligible. Examination of the consequences of a major accident and assumed subsequent release of radioactive material indicates that the potential consequences are not severe for most shipments of radioactive material. However, in the unlikely event of a plutonium or polonium release in a densely populated area, the effects could be severe. The *Transportation of Radionuclides in Urban Environs: Final Environmental Assessment* (USNRC, 1977) examines four potential sources of radiation exposure: incident-free transport, vehicular accidents, human errors, and hostile acts or sabotage of shipments. The assessment concluded that the risks associated with such transportation are low, although severe accidents in urban areas have the potential for large radiological and economic consequences. *Shipping Container Response to Severe Highway and Railway Accident Scenarios* (USNRC, 1987) concluded that approximately 99.4 percent of truck accidents and 99.7 percent of rail accidents do not cause significant structural damage to spent fuel casks or significant releases of radioactive material. Other types of containers were not assessed.

A release of radioactive materials during transport would require a series of events, with a very low probability that all of the events necessary for a plutonium release would occur. The reentry system for the Peacekeeper missile was designed with the use of insensitive high explosive and is safer to handle than previous systems (Simpson, 1999).

As stated in Section 3.2.3.1, the probability of an accidental explosive detonation of an RS/RV or release of radioactive materials at an LF is infinitesimal. No accidental release of radioactive materials or detonation has occurred involving handling of an ICBM RS/RV within the deployment area, at the MSB, or enroute between the two areas. For Type B packaging (required for the transportation of the RV), there has only been one incident of package failure. This was an industrial radiography source (USNRC, 2000). Type B containers must pass a series of rigorous tests, including being dropped 30 feet onto a hard surface, being engulfed in flames at 1,475° Fahrenheit for 30 minutes, and being immersed under 50 feet of water for eight hours. During testing, these containers

have been shown to withstand the impact of a 120-ton locomotive travelling at 100 mph, and of trucks and rail cars carrying these containers running head-on into massive concrete barriers at speeds in excess of 80 mph (USNRC, 2000).

Type II vehicles are designed to meet USDOE and DoD standards for transporting RSs. The RS and each missile stage are transported separately, further improving the transportation safety of missile components relative to the MM III vehicles. The Peacekeeper RS, which contains the nuclear warhead, would be handled by trained personnel. The handling procedures and design of the system (as described in Section 3.2.3.1) were established to prevent a mishap with the nuclear device. The safety design and evaluation criteria for nuclear weapon systems (AFR 122-10) specifies a less than 1×10^{-9} probability of an unintentional significant nuclear yield (greater than four pounds TNT equivalent) per weapon per stockpile lifetime in normal environments. When probabilities for accidental releases or detonation were calculated, events such as transportation accidents, lightning strikes, earthquakes, or in-silo accidents were considered abnormal environments (USAF, 1991e). The same regulation specifies a less than 1×10^{-6} probability of an unintentional significant nuclear yield per weapon per stockpile lifetime in abnormal environments. The RVs and RSs would not be handled in an armed state, reducing the likelihood of inadvertent nuclear detonations (IND).

In June 1990, the House Armed Services Committee chartered a group headed by Dr. Sidney Drell of the Stanford Linear Accelerator Center to evaluate the safety of U.S. nuclear weapons if they are involved in accidents (USAF, 1991e). The specific issues to be addressed were IND and plutonium (Pu) release (i.e. dispersal). The risk of IND or Pu dispersal is defined as the probability and consequences of an event occurring. The probability of an accident or abnormal environment causing an inadvertent nuclear detonation or release of plutonium (Pu) is a combination of the probability of an accident or abnormal environment occurring and the likelihood of the response of the RVs. Two possible hazardous conditions may arise in a serious accident: a loss of shielding efficiency of the RV or a loss of containment or detonation of the conventional explosives and subsequent dispersal of the radioactive material. The probability of an IND is extremely remote; the physics of a nuclear explosion requires precise timing mechanisms for even a small nuclear yield. Therefore, a nuclear chain reaction can occur only if all of the high explosives are ignited at precisely timed intervals (USDOE, 1983). Therefore, its potential affects are not further discussed. Although the probability of Pu dispersal is negligible, the consequences could be significant in a localized area. The risks of IND or Pu dispersal are believed to be negligible.

The RV remains in a carefully controlled, benign environment site (in the LF or WSA) for most of its deployment time. There is little likelihood of an accident or event introducing an abnormal environment to the RV, therefore the overall probability of an IND or Pu dispersal is very low. The Drell Commission study (USAF, 1991e) considered accident scenarios for an in-silo event. If the stage three propellant were detonated through an accidental fire, Pu is not likely to be dispersed. The probability of an IND is negligible and the likelihood of propellant detonation is low because of the precautions and safeguards in place. The system is grounded for electrical shock and all power to the

missile is removed before any maintenance or removal activities take place. Two other accident scenarios were considered in which Pu dispersal was judged to be unlikely: a single vehicular accident while carrying the RV or projectile penetration of the RV.

Other accident scenarios may not result in Pu dispersal; these include lightning strikes at the MSB and vehicle accidents. Lightning strikes to a loaded Type II vehicle or at the LF are not likely to result in Pu dispersal (USAF, 1991e). The probabilities of any of these accidents occurring are remote. As previously stated, in approximately 40 years of transporting Minuteman ICBMs and 12 years of transporting Peacekeeper ICBMs, there has never been an incident involving Pu dispersal or IND (USAF, 1989; USAF, 1991e; Grubofski, 1999).

Potential Impacts of Plutonium Dispersal

The predicted environmental impacts resulting from an accident would only be significant within the immediate accident area (USAF, 1987c; USAF, 1989). The area affected would depend upon the type of accident scenario and the resulting events. If the radioactive materials in the RS were released into the atmosphere as a result of a fire, the extent of dispersion would depend upon meteorological conditions at the time of a mishap. Important factors include wind speed and direction, atmospheric stability (the rate at which air rises or descends within the atmosphere), and the presence or absence of precipitation.

The impact from a potential dispersion of radioactive material depends upon the physical and radiological characteristics of the material released. Warheads contain uranium (U) and weapons-grade plutonium (Pu) of two isotopes: Pu-239 and Pu-241. If these materials were released in an accident, Pu would cause the most serious radiation exposure hazard (USAF, 1989). Pu-241 primarily emits beta particles with a small fraction of gamma rays and alpha particles. Pu-239 emits primarily alpha particles at an intensity of 5 million electron volts, and a small amount of gamma rays. U-238 is primarily an alpha-emitter, with a small amount of gamma radiation. Thus, alpha particles would be the primary radiation exposure hazard from the release of radioactive materials (USAF, 1987c; USAF, 1989; Shapiro, 1990).

Alpha particles are composed of two protons and two neutrons; these are emitted by an atomic nucleus during alpha decay. Alpha particles move much more slowly than beta particles and gamma rays, and impart a greater amount of energy to an absorbing medium than beta particles and gamma rays over a much shorter distance (Shapiro, 1990). Alpha particles have a short range, approximately 3.5 cm in air or 44 µm in human skin at 5.0 million electron volts (Piesinger, 1980). Alpha particles emitted by radionuclides cannot penetrate through the dead outer layer of the skin and thus do not constitute an external hazard. They can cause damage only if the alpha-emitting radionuclides are ingested or inhaled and the alpha particles are consequently emitted immediately adjacent to or inside living matter (Shapiro, 1990).

Plutonium oxidizes readily upon warming in moist air (National Council on Radiation Protection (NCRP), 1979). The most common oxide is plutonium dioxide (PuO_2). PuO_2 is generally insoluble in water (USNRC, 1977).

Previous studies (USAF, 1986b; USAF, 1987c; USAF, 1989) predicted that no significant impacts to groundwater quality could be expected because most of the plutonium released would be in a relatively insoluble form (PuO_2) that would bind to soil particles. Surface water quality could be affected in a limited area from surface water runoff and settling of plutonium particles on surface water. This could pose a limited risk to plants and animals, depending upon the amount and concentration of radioactive material deposited in the surface water (USAF, 1987c; USAF, 1989). Plants uptake only a small fraction of Pu when it is present in the soil (USNRC, 1977).

Air quality and biological resources could be adversely affected, especially if the plutonium is dispersed in the atmosphere. Some of the radioactive material could settle on areas where vegetables, fruits, grains, and livestock feed are grown. The affected food would have to be removed and destroyed. The amount of radioactive material reaching humans would likely be small because of the extensive cleanup that would occur following an accident and because of the relative insolubility of the plutonium (USAF, 1989).

Human health impacts could be severe, primarily from inhalation of alpha-emitting radionuclides, within the immediate accident vicinity (USAF, 1986b; USAF, 1987c; USAF, 1989; NCRP, 1979; Shapiro, 1990). Three important factors influencing the severity of health effects to humans are the distance from the source of radioactive particles , the length of exposure, and the amount and type of shielding from the radioactive particles (Shapiro, 1990). The external exposure of humans (or animals) to a cloud of plutonium would not result in significant health effects (USAF, 1986b; USAF, 1987c). The effect of beta particles and gamma rays would be small, and alpha particles have a short penetrating range (approximately 44 micrometers in skin, which is within the layer of dead cells that protect the inner layers of skin). The inhalation or ingestion of alpha-emitting radionuclides would have an adverse effect upon internal body tissues; the most critical, in terms of mortality risk, are bone and bone marrow, lungs, and liver. The amount of plutonium inhaled would depend upon meteorological conditions and the amount and type released. If the wind speed was between five and eight miles per hour, wind direction was constant, release time was approximately one hour, and precipitation was negligible, a person located approximately 500 to 1,000 feet downwind of the release site could inhale 0.65 µg (0.04 µCi) of plutonium (USAF, 1986b; USAF, 1987c). This is equivalent to the maximum permissible body burden (continual working lifetime dose) of plutonium for occupational exposures (NCRP, 1979).

After inhalation, plutonium is solubilized by body fluids, including blood, and redistributed within the body. It is deposited primarily in the skeleton and liver. However, if the inhaled plutonium is an insoluble form, especially PuO_2, it is retained in the lungs for approximately 1,000 days (NCRP, 1979). Although some studies suggest that the rate of cancer or other harmful effects is increased after significant radiation exposure, it is extremely difficult to determine the risk of cancer throughout the lifetime of the individual as a function of dose (NCRP, 1979; Shapiro, 1990). The analysis must consider a minimum latent period, the rate of appearance of cancer with time following the latent period, and the period of time over which the cancers will appear (Shapiro,

1990). While several studies have attempted to model the risk of cancer from various dose levels of radiation exposure (NAS-USNRC, 1980 as cited in Shapiro, 1990), the estimates are believed to be crude. Therefore, the risks of cancer will not be further assessed at this time.

In summary, though the impacts could be severe within the immediate area of an accident involving the release of radioactive materials from an RV, the probability of such a release is extremely low (USAF, 1986b; USAF, 1987c; USAF, 1989). In approximately 40 years of handling the Minuteman systems and 12 years of handling the Peacekeeper systems, there has never been an incident involving accidental nuclear detonation or plutonium release. The probabilities of accidents involving IND or Pu dispersal are remote, although the consequences could be locally significant. In conclusion, the risk (probability combined with consequences) of handling and transporting missile components is negligible.

APPENDIX I

SOILS TABLES

APPENDIX I.
SOILS TABLES

This appendix contains tables showing detailed soil properties at the Peacekeeper sites.

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Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
East Laramie County										
Albinas loam, 1-3%	P-4	0-4" loam 4-32" SCL, CL 32-60" L, SiL, FSL	0.6-2.0 0.6-2.0 0.6-2.0	L M L	B	Severe piping	Good	Moderate	Slight	Medium
Ascalon loam, 1-3%	P-5	0-5" loam 5-21" SCL, SL 21-38" SCL, loam 38-60" FSL, SCL, L	0.6-2.0 0.6-2.0 0.6-2.0 2.0-6.0	L M M L	B	Severe piping	Good	Moderate	Slight	Medium
Ascalon loam, 3-6%	P-4	0-5" loam 5-21" SCL, SL 21-38" SCL, loam 38-60" FSL, SCL, L	0.6-2.0 0.6-2.0 0.6-2.0 2.0-6.0	L M M L	B	Severe piping	Good	Moderate	Slight	Medium
Manter sandy loam, 0-3%	P-10	0-7" SL 7-25" FSL, SL 25-60" SL, LS, LFS	2.0-6.0 2.0-6.0 2.0-6.0	L L L	B	Severe piping	Good	Slight	Severe	Slow
Manter sandy loam, 3-6%	P-2, P-3	0-7" SL 7-25" FSL, SL 25-60" SL, LS, LFS	2.0-6.0 2.0-6.0 2.0-6.0	L L L	B	Severe piping	Good	Slight	Severe	Medium
Valent loamy fine sand, 0-6%	P-1	0-8" LFS 8-60" FS, LFS, LS	6.0-20.0 6.0-20.0	L L	A	Severe piping	Good	Slight	Very Severe	Slow
Valent-Treon complex, 6-10%	P-1	0-14" FSL 14-24" (sandstone)	2.0-6.0 0.0-2.0	L --	D	Severe piping	Good	Slight to moderate	Severe	Medium
Wages loam, 0-3% (50)	P-5, P-6	0-4" loam 4-13" CL, SCL, loam 13-20" L, FSL, SCL 20-60" SL,GSL, GL	0.6-2.0 0.6-2.0 0.6-2.0 2.0-6.0	L M L L	B	Severe piping	Good	Slight to moderate	Slight	Slow
West Laramie County										
Ascalon loam, 0-6%	Q-5	0-9" loam 9-26" SCL, CL 26-60" loam	0.6-2.0 0.6-2.0 0.6-2.0	M M M	B	Moderate piping	Fair: shrink-swell, low strength	Moderate	Slight	Medium

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Blazon-Trimad complex, 15-45%	Q-7	0-4" silt loam (**Blazon**)	0.6-2.0	L	D	Severe piping	Poor: depth to rock, slope	Slight	Moderate	Medium
		4-12" silt loam, loam	0.6-2.0	L						
		12-22" (shale)	---	--						
		0-10" loam (**Trimad**)	0.6-2.0	L	B	Moderate: large stones	Poor: slope	Slight	Moderate	Medium
		10-60" VGL	2.0-6.0	L						
Evanston loam, 0-6%	Q-8	0-3" loam	0.6-2.0	L	B	Moderate piping	Fair: shrink-swell	Moderate	Slight	Medium
		3-15" loam, CL, SCL	0.6-2.0	M						
		15-60" loam, SCL	0.6-2.0	M						
Manter sandy loams, 0-6%	P-9	0-7" sandy loam	2.0-6.0	L	B	Severe piping	Good	Moderate	Severe	Medium
		7-19" FSL, SL, loam	2.0-6.0	L						
		19-23" FSL	2.0-6.0	L						
		23-60" SL, FSL	2.0-6.0	L						
Manter fine sandy loam, 6-30%	P-11	0-7" FSL	2.0-6.0	L	B	Severe piping	Fair: slope	Moderate	Severe	Rapid
		7-15" FSL, SL, loam	2.0-6.0	L						
		15-60" SL, FSL	2.0-6.0	L						
Otero-Valent-Tassel complex, 0-15%	P-9	0-7" FSL (**Otero**)	2.0-6.0	L	B	Slight	Good	Moderate	Severe	Medium
		7-60" FSL	2.0-6.0	L						
		0-10" LFS (**Valent**)	6.0-20.0	L	A	Severe piping	Good	Slight	Very Severe	Slow
		10-60" LFS	6.0-20.0	L						
		0-7" FSL (**Tassel**)	2.0-6.0	L	D	Severe piping	Poor: depth to rock	Moderate	Severe	Medium
		7-12" FSL	2.0-6.0	L						
		12-22" UB	---	--						
Poposhia-Trimad complex, 3-15%	Q-1, Q-5	0-7" silt loam (**Poposhia**)	0.6-2.0	L	B	Moderate piping	Poor: low strength	Slight	Moderate	Medium
		7-25" silt loam	0.6-2.0	L						
		25-60" silt loam	0.6-2.0	L						
		0-3" loam (**Trimad**)	0.6-2.0	L	B	Moderate: large stones	Fair: large stones	Slight	Moderate	Medium
		3-10" gravelly loam	0.6-2.0	L						
		10-34" very gravelly loam	2.0-6.0	L						
		34-60" very GSL	2.0-6.0	L						

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Treon-Aberone fine sandy loams, 6-30%	P-8, Q-4	0-8" FSL (**Treon**) 8-16" FSL, SL 16-26" UB	2.0-6.0 2.0-6.0 ---	L L --	D	Severe piping	Poor: depth to rock	Slight to moderate	Severe	Medium
		0-7" FSL (**Aberone**) 7-16" SL, FSL 16-60" VGSL, EGSL, VGL	2.0-6.0 2.0-6.0 2.0-6.0	L L L	B	Severe seepage	Fair: large stones	Slight to moderate	Severe	Medium
Treon-Aberone-Treon thin solum FSL, 3-30%	P-7	**Treon** is same as above Treon **Aberone** is same as above 0-4" FSL (**Treon, thin**) 4-7" FSL, SL 7-17" UB	2.0-6.0 2.0-6.0 ---	L L --	D	Severe thin layer	Poor: depth to rock	Slight	Severe	Medium
Trimad-Blazon complex, 15-45%	Q-6	0-8" gravelly loam (**Trimad**) 8-13" gravelly loam 13-37" VGL 37-60" VGSL	0.6-2.0 0.6-2.0 2.0-6.0 2.0-6.0	L L L L	B	Moderate: large stones	Poor: slope	Slight	Slight	Medium
		0-4" silt loam (**Blazon**) 4-14" silt loam, loam 14- 24" (shale)	0.6-2.0 0.6-2.0 ---	L L ---	D	Severe piping	Poor: depth to rock, slope	Severe	Moderate	Rapid
Trimad-Weed-Blazon complex, 0-15%	Q-11	0-8" loam (**Trimad**) 8-14" GL 14-60" VGL	0.6-2.0 0.6-2.0 2.0-6.0	L L L	B	Moderate: large stones	Good	Severe	Moderate	Rapid
		0-3" loam **Weed**) 3-9" SCL 9-27" SCL, CL 27-60" loam, SL	0.6-2.0 0.6-2.0 0.2-0.6 0.6-2.0	L M M L	B	Severe piping	Good	Moderate	Moderate	Medium
		0-2" GSiL (**Blazon**) 2-15" SiL, loam 15-25" (shale)	0.6-2.0 0.6-2.0 ---	L L --	D	Severe piping	Poor: depth to rock	Severe	Slight	Rapid

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Valent loamy fine sand, moist, 0-6%	Q-1	0-10" LFS 10-60" LFS	6.0-20.0 6.0-20.0	L L	A	Severe piping	Good	Slight	Very Severe	Slow
Vetal loamy fine sand, 0-6%	P-7	0-6" LFS 6-32" FSL 32-60" FSL	6.0-20.0 2.0-6.0 2.0-6.0	L L L	B	Severe piping	Good	Slight to moderate	Very Severe	Medium
Wages loam, 0-6%	Q-3	0-7" loam 7-13" CL 13-60" SL, loam	0.6-2.0 0.2-0.6 2.0-6.0	L M L	B	Slight	Good	Moderate	Moderate	Medium
Platte County										
Aberone gravelly sandy loam, 0-15%	Q-9, T-8	0-7" GSL 7-10" GSL 10-60" VGSL, VGL	2.0-6.0	L	A	Low piping	Good	Severe	Moderate	Rapid
Aberone-Cragola complex, 10-30%	Q-10	0-8" GSL (**Aberone**) 8-60" VGSL, VGL	2.0-6.0	L	A	Low piping	Good	Severe	Moderate	Rapid
		0-3" VGSL (**Cragola**) 3-18" VGSL 18-28" UB (sandstone)	2.0-6.0	L	B	Low piping	Poor depth	Severe	Severe	Rapid
Alice-Bayard fine sandy loam, 0-6%	T-6	0-7" FSL (**Alice**) 7-18" FSL 18-60" SL, FSL	2.0-6.0	L	A	Severe piping	Good	Slight	Severe	Slow
		0-8" FSL (**Bayard**) 8-60" FSL, VFSL	2.0-6.0	L	B	Fair stability, high piping hazard	Fair	Moderate	Severe	Slow

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Bayard-Phiferson-Treon thin solum, 0-6%	T-2	0-13" FSL (**Bayard**) 13-60" FSL, VFSL	2.0-6.0	L	A	Fair stability, high piping hazard	Fair	Slight	Severe	Slow
		0-12" FSL (**Phiferson**) 12-20" FSL, VFSL, SL 20-26" FSL, VFSL, SL 26-36" UB (sandstone)	2.0-6.0	L	D	Low piping	Poor depth	Slight	Severe	Slow
		0-5" GFSL (**Treon TS**) 5-8" VFSL, FSL 8-18" UB (sandstone)	2.0-6.0	L	D	Severe thin layer	Poor depth to rock	Slight	Slight	Medium
Bayard-Phiferson-Treon thin solum, 3-45%	T-1	(**Bayard** same as above)								
		0-3" SL (**Phiferson**) 3-12" FSL, VFSL, SL 12-23" FSL, VFSL, SL 23-33" UB (sandstone)	2.0-6.0	L	D	Low piping	Poor depth	Severe	Severe	Rapid
		0-6" FSL (**Treon TS**) 6-16" UB (sandstone)	2.0-6.0	L	D	Severe thin layer	Poor depth to rock	Severe	Severe	Rapid
Cedak-Recluse very fine sandy loam, 0-6%	Q-2	0-9" VFSL (**Cedak**) 9-19" SCL, loam 19-30" VFSL, L, FSL 30-37" FSL 37-47" UB (sandstone)	0.6-2.0	L	C	Severe piping	Good	Moderate	Severe	Slow
		0-9" VFSL (**Recluse**) 9-20" loam 20-35" loam 35-60" VFSL	0.6-2.0	L M M L	B	Severe piping	Good	Slight	Severe	Slow

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Cedak-Recluse-Treon very FSL, 0-6%	T-3, T-9	0-8" VFSL (**Cedak**) 8-13" SCL, loam 13-24" VFSL, L, FSL 24-34" UB (sandstone)	0.6-2.0	L	D	Severe piping	Good	Slight	Severe	Slow
		0-8" VFSL (**Recluse**) 8-12" loam 12-20" loam 20-60" VFSL	0.6-2.0	L M M L	B	Severe piping	Good	Slight	Severe	Slow
		0-7" VFSL (**Treon**) 7-16" VFSL 16-26 UB (sandstone)	2.0-6.0	 L	D	Severe thin layer	Poor depth to rock	Moderate	Severe	Medium
Coaliams-Haverdad complex, 0-3%	Q-10	0-8" FSL (**Coaliams**) 8-60" Stratified CL to S	0.6-2.0	M	B	Moderate piping	Fair wet	Slight	Severe	Slow
		0-5" loam (**Haverdad**) 5-60" Stratified FSL – SiL	0.6-2.0	M	B	Severe piping	Good	Moderate	Moderate	Slow
Featherlegs-Greenhope-Curabith FSLs, 3-15%	T-8	0-5" FSL (**Featherlegs**) 5-13" SCL, loam 13-60" VGSL	0.6-2.0	L M L	B	Severe piping	Good	Severe	Severe	Medium
		0-7" FSL (**Greenhope**) 7-12" loam, VFSL 12-36" FSL, SL 36-60" VGFSL, VCoFSL, VGSL	2.0-6.0	L	B	Severe piping	Good	Moderate	Severe	Medium
		0-7" FSL (**Curabith**) 7-60" VCoSL, VGSL	2.0-6.0	L	B	Low piping	Good	Severe	Severe	Medium

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Graystone-Greenhope-Bayard FSLs, 0-10%	T-11	0-8" FSL (**Graystone**) 8-16" FSL 16-36" L, VFSL, FSL 36-60" VFSL, FSL	2.0-6.0	L	B	Severe piping	Good	Moderate	Severe	Medium
		0-9" FSL (**Greenhope**) 9-20" FSL, SL 20-23" GFSL, GSL 23-35" VGFSL, VCoFSL, VGSL 35-60" GFSL, CoFSL	2.0-6.0	L	B	Severe piping	Good	Moderate	Severe	Medium
		0-8" FSL (**Bayard**) 8-60" FSL, VFSL	2.0-6.0	L	A	Fair stability, high piping hazard	Fair	Slight	Severe	Slow
Greenhope-Featherlegs complex, 0-6%	T-7	0-9" FSL (**Greenhope**) 9-16" FSL, SL 16-25" GFSL, GSL 25-60" VCoSL, VGSL	2.0-6.0	L	A	Severe piping	Good	Moderate	Severe	Slow
		0-7" GFSL (**Featherlegs**) 7-13" GSCL 13-17" GSL 17-60" VGSL	0.6-2.0	L	B	Low piping	Good	Slight	Slight	Slow
Hiland-Cambria sandy loams, 0-6%	T-7	0-10" SL (**Hiland**) 10-15" SCL 15-30" L, FSL 30-60" FSL, VFSL	0.6-2.0	L	B	Severe piping	Good	Slight	Severe	Slow
		0-7" SL (**Cambria**) 7-10" CL, SCL, loam 10-60" L, SCL, FSL	0.6-2.0	L	B	Severe piping	Good	Slight	Severe	Slow

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Keeline-Nidix-Taluce complex, 10-60%	T-9	0-7" GSL (**Keeline**) 7-60" SL, FSL	2.0-6.0	L	A	Low piping	Good	Severe	Moderate	Rapid
		0-8" VCoSL (**Nidix**) 8-20" VCoSL 20-30" CoSL, GSL 30-40" UB (sandstone)	2.0-6.0	L	C	Severe piping	Good	Severe	Slight	Rapid
		0-4" CoFSL (**Taluce**) 4-19" FSL 19-29" UB (sandstone)	2.0-6.0	L	D	Severe piping	Good	Moderate	Slight	Rapid
Phiferson-Treon complex, 0-6%	R-9	0-8" SL (**Phiferson**) 8-19" FSL, VFSL, SL 19-30" FSL, VFSL, SL 30-40" UB (sandstone)	2.0-6.0	L	A	Low to moderate piping	Poor depth	Slight	Severe	Slow
		0-7" FSL (**Treon**) 7-11" VFSL, FSL 11-21" UB (sandstone)	2.0-6.0	L	D	Severe thin layer	Poor depth to rock	Slight	Severe	Medium
Recluse fine sandy loam, 3-6%	T-6	0-10" FSL 10-16" loam 16-30" CL 30-42" loam 42-60" loam	0.2-0.6	L M M M M	B	Severe piping	Fair	Slight	Severe	Slow
Recluse-Cedak loams, 0-6%	R-8	0-8" loam (**Recluse**) 8-23" loam 23-28" loam 28-60" VFSL	0.6-2.0	M	B	Severe piping	Fair	Slight	Moderate	Slow
		0-9" loam (**Cedak**) 9-20" SCL, loam 20-29" VFSL, L, FSL 29-39" UB (sandstone)	0.6-2.0	L	C	Severe piping	Fair	Slight	Moderate	Slow

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Selpats-Forkwood, 0-3%	T-10	0-3" loam (**Selpats**) 3-13" CL, loam 13-24" loam 24-30" loam 30-51" VGSL 51-60" VGLS	0.6-2.0	L M L L L L	B	Severe piping	Fair	Slight	Severe	Slow
		0-8" loam (**Forkwood**) 8-19" loam 19-36" FSL, VFSL 36-60" FSL, VFSL	0.6-2.0	L	B	Severe piping	Fair	Slight	Severe	Slow
Treon thin solum-Phiferson-Keeline FSLs, 0-6%	T-5	0-7" FSL (**Treon**) 7-10" VFSL, FSL 10-20" UB (sandstone)	2.0-6.0	L	D	Severe thin layer	Poor depth to rock	Moderate	Severe	Medium
		Phiferson same as T-2								
		0-7" FSL (**Keeline**) 7-41" SL, FSL 41-60" VFSL	2.0-6.0	L	A	Severe piping	Good	Slight	Severe	Slow
Tulace-Treon complex, thin solums, 6-10%	R-10	0-5" SL (**Tulace**) 5-9" SL, GSL 9-19" UB (sandstone)	2.0-6.0	L	D	Low piping	Poor depth to rock	Moderate	Severe	Medium
		0-5" FSL (**Treon TS**) 5-10" VFSL, FSL 10-20" UB (sandstone)	2.0-6.0	L	D	Severe thin layer	Poor depth to rock	Severe	Severe	Medium

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Vetal-Treon-Phiferson complex, 3-20%	T-4	0-24" FSL (**Vetal**) 24-36" FSL 36-60" FSL	2.0-6.0	L	A	Fair stability, high piping hazard	Fair	Moderate	Severe	Slow
		0-5" SL (**Treon TS**) 5-14" VFSL, FSL 14-24" UB(sandstone)	2.0-6.0	L M	D	Severe thin layer	Poor depth to rock	Slight	Severe	Medium
		0-10" FSL (**Phiferson**) 10-24" FSL, VFSL, SL 24-33" FSL, VFSL, SL 33-43" UB (sandstone)	2.0-6.0	L M	D	Low to moderate piping	Poor depth to rock	Severe	Severe	Rapid
Goshen County										
Anselmo & Dwyer soils, 3-6%	S-1	0-60" FSL (**Anselmo**)	2.0-6.3	L	A	Fair stability, high piping hazard	Fair	Slight-moderate	Severe	Slow-medium
		0-60" LFS (**Dwyer**)	> 6.3	L	A	Fair stability, high piping hazard	Good			
Anselmo & Shingle soils, 3-10%	S-10	0-60" FSL (**Anselmo**)	2.0-6.3	L	A	Fair stability, high piping hazard	Fair	Slight	Severe	Slow
		0-12" loam, CL (**Shingle**) 12" UB (shale)	0.63-2.0	M	D	Fair to good stability, low piping hazard	Poor			
Ascalon fine sandy loam, 0-6%	R-4	0-15" FSL 15-27" SCL 27-40" VFSL 40-60" GFSL	2.0-6.3 0.63-2.0 0.63-2.0 2.0-6.3	L L L L	A	Fair stability, high piping hazard	Fair	Slight	Severe	Slow
Colby loam, 3-10%	R-3	0-60" loam	0.63-2.0	L	B	Poor stability, high piping hazard	Fair	Moderate-Severe	Severe	Medium-rapid
Creighton very fine sandy loam, 6-10%	R-2	0-60" VFSL	0.63-2.0	L	B	Poor to fair stability, high piping hazard	Fair	Severe	Severe	Medium-rapid

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Dix complex, 10-40%	R-3	0-7" GFSL 7-13" GS 13-48" VGS	2.0-6.3 > 6.3 > 6.3	L L L	A	Fair to poor stability, moderate to high piping hazard	Good	Severe	Severe	Rapid-very rapid
Dunday & Dwyer loamy fine sands, 3-10%	R-2	0-60" LFS (**Dunday**) 0-60" LFS (**Dwyer**)	> 6.3 > 6.3	L L	A	Fair stability, high piping hazard Fair stability, high piping hazard	Good Good	Slight	Severe	Slow
Dunday-Trelona complex, 3-35%	R-5	0-60" LFS (**Dunday**) 0-12" FSL (**Trelona**) 12" UB (sandstone)	> 6.3 2.0-6.3	L L	A D	Fair stability, high piping hazard Fair stability, high piping hazard	Good Fair	Slight-very severe	Severe	Slow-Rapid
Epping silt loam, 6-10%	S-4	0-9" silt loam 9" UB (siltstone)	0.63-2.0	L	D	Poor stability, high piping hazard	Fair	Severe	Severe	Medium
Keith loam, 0-1%	S-5	0-10" loam 10-22" CL, loam 22-60" loam	0.63-2.0 0.63-2.0 0.63-2.0	L M L	A	High piping hazard	Fair to poor	Slight	Moderate	Slow
Keota-Epping silt loams, 6-15%	S-8	0-32" loam (**Keota**) 32" UB (soft siltstone) 0-9" silt loam (**Epping**) 9" UB (siltstone)	0.63-2.0 0.63-2.0	L L	D D	Poor stability, high piping hazard Poor stability, high piping hazard	Fair Fair	Severe	Severe	Rapid
Kim clay loam, alkali, 1-3%	S-3	0-60" clay loam	0.2-0.63	M-H	A	Fair to poor stability, low piping hazard	Very poor	Slight-moderate	Moderate	Slow-medium

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Manter & Anselmo fine sandy loams, 0-3%	S-6	0-60" FSL, VFSL **(Manter)** 0-60" FSL **(Anselmo)**	2.0-6.3 2.0-6.3	L L	A	Fair stability, high piping hazard Fair stability, high piping hazard	Fair Fair	Slight	Severe	Slow
Manter & Anselmo fine sandy loams, 3-6%	S-2, S-7, S-9	0-60" FSL, VFSL **(Manter)** 0-60" FSL **(Anselmo)**	2.0-6.3 2.0-6.3	L L	A	Fair stability, high piping hazard Fair stability, high piping hazard	Fair Fair	Slight-moderate	Severe	Slow-medium
Manter & Anselmo fine sandy loams, 6-10%	S-7	0-60" FSL, VFSL **(Manter)** 0-60" FSL **(Anselmo)**	2.0-6.3 2.0-6.3	L L	A	Fair stability, high piping hazard Fair stability, high piping hazard	Fair Fair	Moderate	Severe	Medium
Mitchell silt loam, 0-3%	S-3, S-8	0-60" loam	0.63-2.0	L	A	Poor stability, high piping hazard	Fair	Slight	Severe	Slow
Mitchell silt loam, 3-6%	S-3	0-60" loam	0.63-2.0	L	A	Poor stability, high piping hazard	Fair	Moderate	Severe	Medium
Norka & Colby loams, 0-6%	R-7	0-3" loam **(Norka)** 3-12" clay loam 12-60" loam, VFSL 0-60" loam **(Colby)**	0.63-2.0 0.63-2.0	L M L L	A	High piping hazard Poor stability, high piping hazard	Fair to poor Fair	Slight-moderate	Moderate-severe	Medium

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Rosebud-Dunday-Trelona LFSs, 3-10%	R-6	0-6" LFS (**Rosebud LFS**) 6-11" SCL 11-39" VFSL 39" Sandstone	> 6.3 0.63-2.0 0.63-2.0	L M L	C	Fair stability, low piping hazard	Fair	Slight-moderate	Very Severe	Slight-medium
		0-60" LFS (**Dunday**)	> 6.3	L	A		Good			
		0-12" FSL (**Trelona FSL**) 12" UB (sandstone)	2.0-6.3	L	D	Fair stability, high piping hazard Fair stability, high piping hazard	Fair			
Rosebud & Hargreave FSLs, 0-6%	R-5, R-11	0-3" FSL (**Rosebud FSL**) 3-11" SCL 11-39" VFSL 39" Sandstone	2.0-6.3 0.63-2.0 0.63-2.0	L M L	C	Fair stability, low piping hazard	Fair	Slight-moderate	Severe	Slow-medium
		0-8" VFSL (**Hargreave**) 8-12" SCL 12-33" VFSL 33" Soft sandstone	0.63-2.0 0.63-2.0 0.63-2.0	L M L	C	Fair stability, low piping hazard	Fair to poor			
Rosebud & Norka loams, 6-10%	R-1	0-6' loam (**Rosebud loam**) 6-11" SCL 11-39" VFSL 39" sandstone	0.63-2.0 0.63-2.0 0.63-2.0	L M L	C	Fair stability, low piping hazard	Fair	Severe	Moderate	Medium-rapid
		0-3" loam (**Norka**) 3-12" clay loam 12-60" loam, VFSL	0.63-2.0	L M L	B	High piping hazard	Fair to poor			

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Rosebud-Trelona complex, 0-6%	R-1	0-6' loam (**Rosebud loam**) 6-11" SCL 11-39" VFSL 39" sandstone 0-12" FSL (**Trelona FSL**) 12" UB (sandstone)	0.63-2.0 0.63-2.0 0.63-2.0 2.0-6.3	L M L L	C D	Fair stability, low piping hazard Fair stability, high piping hazard	Fair Fair	Slight-moderate	Moderate	Medium
Rosebud-Trelona FSL, 0-6%	R-11	0-3" FSL (**Rosebud FSL**) 3-11" SCL 11-39" VFSL 39" Sandstone 0-12" FSL (**Trelona FSL**) 12" UB (sandstone)	2.0-6.3 0.63-2.0 0.63-2.0 2.0-6.3	L M L L	C D	Fair stability, low piping hazard Fair stability, high piping hazard	Fair Fair	Slight-moderate	Severe	Slow-medium
Satanta loam,0-1%	S-7	0-60" loam, CL	0.63-2.0	L-M	A	High piping hazard	Fair	Slight	Moderate	Slow
Satanta loam, 1-3%	S-2	0-60" loam, CL	0.63-2.0	L-M	A	High piping hazard	Fair	Slight	Moderate	Slow
Satanta loam, 3-6%	S-11	0-60" loam, CL	0.63-2.0	L-M	A	High piping hazard	Fair	Moderate	Moderate	Medium
Ulysses loam, 3-6%	S-4	0-60" loam	0.63-2.0	L	A	Poor stability, high piping hazard	Fair	Moderate	Moderate	Medium
Valentine & Dwyer fine sands, hilly	S-6	0-60" FS (**Valentine**) 0-60" FS (**Dwyer FS**)	> 6.3 > 6.3	L L	A	Poor stability Fair to poor stability, high piping hazard	Good Good	Moderate	Very Severe	Medium

Table I-1
Soil Properties at Peacekeeper Sites

Soil Series, slope	Site	Texture	Perme-ability	Shrink-swell index	Hydro-logic group	Slope Limitations	Fill	Water erosion	Wind erosion	Runoff
Valentine & Dwyer fine sands, rolling	S-1	0-60" FS **(Valentine)** 0-60" FS **(Dwyer FS)**	> 6.3 > 6.3	L L	A	Poor stability Fair to poor stability, high piping hazard	Good Good	Slight-moderate	Very Severe	Slow-medium
Vetal fine sandy loams, 0-4%	S-2	0-60" FSL	2.0-6.3	L	A	Fair stability, high piping hazard	Fair	Slight	Severe	Slow

Notes
There are no hydric soils on-site.
No flooding, except rare flooding at Q-10 in the Coliams-Haverdad soils
Depth to bedrock is greater than 60", except where indicated
Sources: USDA, 1971; USDA, 1999a; USDA, 1999b; USDA, 1999c

APPENDIX J

WATER DATA

APPENDIX J.
WATER DATA

Table J-1 shows the depth to groundwater at each of the Peacekeeper launch facilities (LF), while Table J-2 provides regional water quality characteristics by watershed. For the reader's convenience, Figure 3.4.2-1 is reproduced as Figure J-1 to show the watershed areas.

Table J-1
Depth to Groundwater at LFs

LF	Depth (feet)	LF	Depth (feet)
P-1	75-90	**S-1**	55-75
P-2	55-75	**S-2**	20-40
P-3	20-40	**S-3**	75-90
P-4	90-110	**S-4**	75-90
P-5	75-90	**S-5**	75-90
P-6	75-90	**S-6**	40-55
P-7	55-75	**S-7**	20-40
P-8	90-100	**S-8**	55-75
P-9	75-90	**S-9**	55-75
P-10	90-110	**S-10**	75-90
P-11	20-40	**S-11**	40-55
Q-1	55-75	**T-1**	40-55
Q-2	75-90	**T-2**	20-40
Q-3	75-90	**T-3**	20-40
Q-4	75-90	**T-4**	20-40
Q-5	55-75	**T-5**	20-40
Q-6	20-40	**T-6**	40-55
Q-7	75-90	**T-7**	55-75
Q-8	55-75	**T-8**	20-40
Q-9	20-40	**T-9**	20-40
Q-10	20-40	**T-10**	20-40
Q-11	20-40	**T-11**	20-40
R-1	20-40		
R-2	55-75		
R-3	20-40		
R-4	55-75		
R-5	20-40		
R-6	55-75		
R-7	20-40		
R-8	20-40		
R-9	90-110		
R-10	20-40		
R-11	55-75		

Note: Depth estimated from ranges provided on map.

Source: UWYO, 2000

Table J-2
Regional Water Characteristics by Watershed

Characteristic	Watershed[1]					
	10180009	**10180011**	**10180012**	**10190009**	**10190015**	**10190016**
Designated Use Attainment[2]	50 – 79 %	Not Available	Less than 20 %	Less than 20 %	80 – 100%	Less than 20 %
Drinking Water Condition	Partial Source Impairment	Partial Source Impairment	No Significant Impairment	No Significant Impairment	Not Available	Not Available
Chemicals in Surface Water	Less than 5 % of samples exceed ½ MCL	5 – 25 % of samples exceed ½ MCL	Insufficient Data	Less than 5 % of samples exceed ½ MCL	Insufficient Data	Insufficient Data
Chemicals in Groundwater	Less than 5 % of samples exceed ½ MCL	Insufficient Data	Insufficient Data	Less than 5 % of samples exceed ½ MCL	Insufficient Data	Insufficient Data
Agricultural Runoff	Moderate Impact	Moderate Impact	Moderate Impact	Moderate Impact	Moderate Impact	Moderate Impact
Pesticide Runoff	Moderate Runoff	Low Runoff	Moderate Runoff	Moderate Runoff	Moderate Runoff	Moderate Runoff
Nitrogen Runoff	Moderate Runoff	Moderate Runoff	Moderate Runoff	Moderate Runoff	Moderate Runoff	Moderate Runoff
Nitrate Contamination in Groundwater	Low Risk	Low Risk	Low Risk	High Risk	Low Risk	High Risk

[1] As defined by Hydrologic Unit Classification, see Figure J-1 (same as Figure 3.4.2-1).

[2] Percent of Assessed Rivers, Lakes, and Estuaries Meeting All Designated Uses (1996) Using the Latest State Information Available

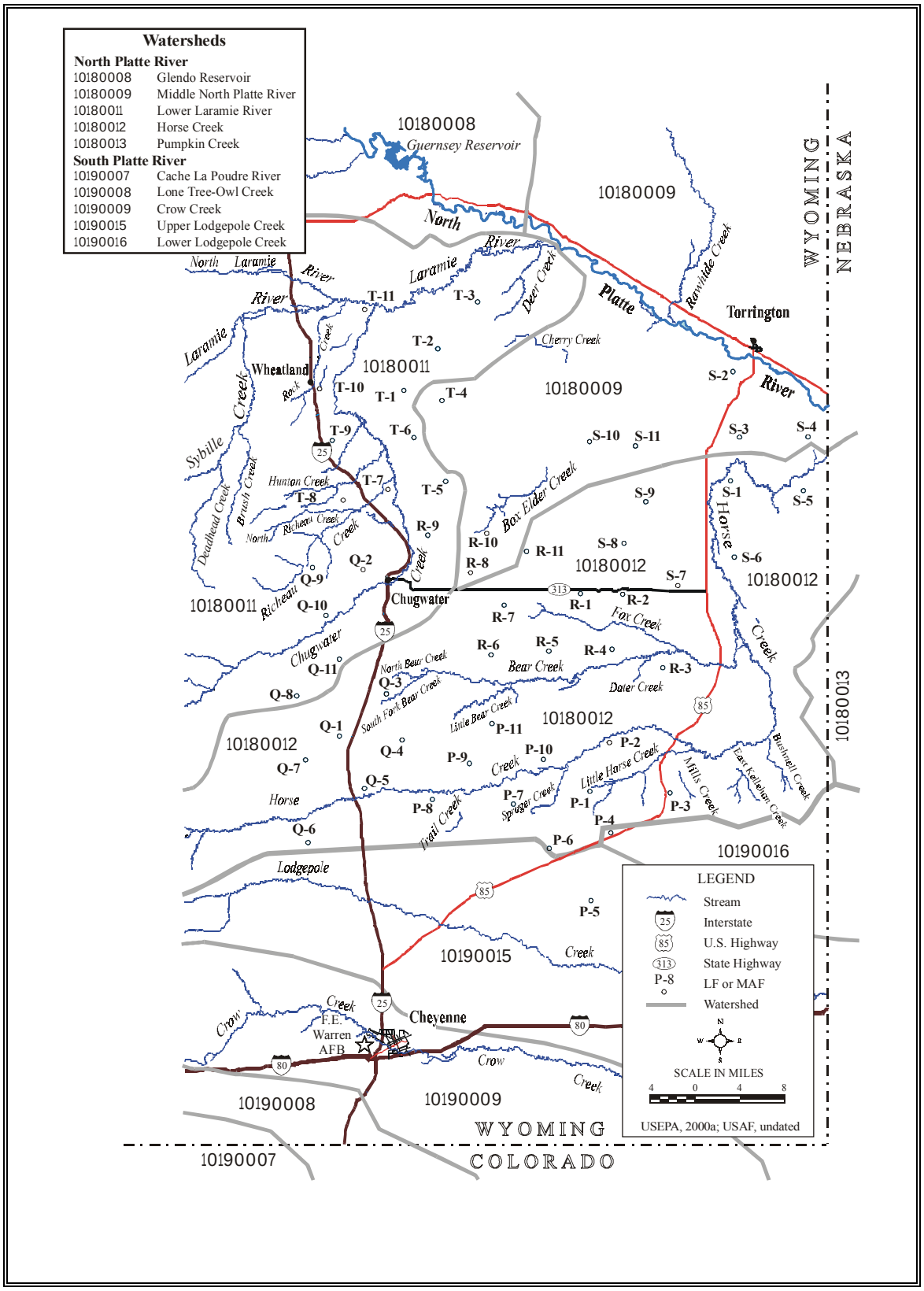

Figure J-1. Water Features of the Deployment Area (same as Figure 3.4.2-1)

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APPENDIX K

LEAD AND PCB TRANSPORT MODELING

APPENDIX K.
LEAD AND PCB TRANSPORT MODELING

The transport of lead and polychlorinated biphenyls (PCBs) into ground water was simulated using the Method of Characteristics (MOC) computer model developed by the U.S. Geological Survey (USGS) (Konikow and Bredehoeft, 1978; Goode and Konikow, 1989; Konikow and Bredehoeft, 1989). MOC is a two-dimensional solute transport model which computes solute concentration over time caused by the processes of convective transport, hydrodynamic dispersion, mixing or dilution from fluid recharge, chemical reactions and sorption. The reactions include first order irreversible rate reaction, reversible equilibrium controlled sorption with linear Freundlich or Langmuir isotherms, and reversible equilibrium controlled ion exchange for monovalent or divalent ions. The model is capable of determining the concentration of a dissolved chemical species in an aquifer at any specified place and time. Although the aquifer may be heterogeneous and/or anisotropic, the model assumes that gradients of fluid density, viscosity, and temperature do not affect the velocity distribution.

MOC couples the groundwater flow equation with the non-conservative solute-transport equation. The computer program uses the alternating-direction implicit (ADI) or strongly implicit procedure (SIP) processes to solve the finite difference approximation of the ground water flow equation. The model uses the method of characteristics to solve the solute transport equation. It uses a particle tracking procedure to represent convective transport and a two-step explicit procedure to solve the finite fluid sources and sinks, and divergence of velocity. The explicit procedure is subject to stability criteria, but the program automatically determines and implements the time-step limitations necessary to satisfy the stability criteria.

MOC uses a rectangular, block-centered, finite difference grid for flux and transport calculations. The grid size for flow calculations is limited to 40 rows and 40 columns. The grid size for transport calculations is limited to 20 rows and 20 columns which can be assigned to any area of the flow grid. The program allows spatially varying diffuse recharge or discharge, saturated thickness, transmissivity, boundary conditions, initial heads and initial concentrations, and an unlimited number of injection or withdrawal wells. Up to five nodes can be designated as observation points for which a summary table of head and concentration versus time is printed at the end of the calculation.

Leaching of Lead from Lead-based Paint and PCBs From Coatings

Areas with shallow aquifers tend to be susceptible to the leaching of chemicals into the ground water from natural infiltration and/or seepage. Through the use of a ground-water transport model, it is possible to make a general estimate of the rate of transport of lead and PCBs via ground water in shallow unconfined aquifers. The model can be applied to the immediate area of the launch facility (LF) launch tube and headworks that may experience the migration of lead leached from paint or PCBs leached from protective coatings through fractures in the sides of the launch tube caused by explosive demolition. It is likely that seepage of ground water would occur at some sites based on past seepage incidents.

The leaching and transport of lead and PCBs were estimated based on an atypical or extreme situation but one that has a basis in reality. The following text describes the assumptions used in calculating the concentration of lead and PCBs in ground water and estimating the time of transport to a nearby, shallow well used for drinking water.

The amount of lead (Pb) which can leach from the paint in the launch-tube walls can be estimated and used to predict the concentration of lead in the ground water by using the following assumptions:

- Two mg per sq. cm (4×10^6 sq. cm) of lead-based paint in the launch tube (based on the assumption that the interior was totally repainted five times rather than spot painted, although spot painting is the standard practice.
- Blasting immediately removes 20 percent of the paint or exposes it, making that 20 percent more accessible to leaching and other subsurface breakdown processes,
- Five percent of the lead leaches out of the paint and into the ground water each year,
- Five percent of Pb is equivalent to approximately 400 grams of Pb.

The amount of PCBs which may leach from surface coatings can be estimated based on solubility considerations:

- Coatings used on the headworks, underground storage tanks (UST), piping, and launch facility support building (LFSB) were assumed to contain PCBs at concentrations as high as 3 percent, based on a maximum measurement of 30,000 parts per million (ppm).
- PCB leaches out of the coating and into the ground water at the maximum rate allowed by its solubility of 0.1 mg/L.
- The volume of PCB-containing coatings was estimated at 1.64×10^6 cm^2.
- The annual leachate of PCB is equivalent to approximately 28 grams.

Ground water Transport from a Launch Tube to a Public/Private Well

This calculation of ground-water transport is based upon certain assumptions, listed below, from the evaluations of information presented previously in Sections 3.4.1 and 3.4.2.

- Potable shallow wells for domestic use are one-fourth to one-half of a mile downgradient from the launcher. Shallow wells are present within the deployment area and may be located within one mile of LFs.
- The ground-water depth is 20 feet, and the total aquifer thickness is 60 feet.
- The geology of the unconfined shallow aquifer penetrated by the launch tube and downgradient public/private well consists of sandstone serving as the aquifer with a confining unit below.
- The aquifer was assumed to be isotropic; that is, the hydraulic conductivity was assumed to be independent of direction.
- It is known that the launch tube is approximately 90 feet deep, with 60 feet comprising the tube proper and 30 feet constituting the headworks.

- The ground water has immediate access to the paint and coatings, and leaching begins instantaneously. In reality, the rate of seepage should be considered, as well as the kinetics of the leaching reaction. The less damage that results from explosive demolition, the slower the seepage would be in and out of the launch tube.
- Adsorption of lead was calculated using a Langmuir equation, based on coefficients ($K = 3.8 \times 10^5$ L/mol and b = 68 mmol/Kg) reported by Schnoor *et al*. (1987) for illite. The Langmuir equation applies to non-linear equilibrium adsorption, which is appropriate for the type of ion-exchange adsorption expected for lead ions. PCB adsorption was calculated using the coefficient measured for Aroclor 1254, expressed as a Koc of 275,000. The fraction of organic carbon was taken to be 0.5 percent in the aquifer.
- The hydraulic conductivity is 1.77×10^{-4} ft/s (5.4×10^{-3} cm/s) and transmissivity is 0.0106 ft^2/s. These values correspond to the highest hydraulic conductivities seen in sandstone. In reality, the hydraulic conductivity and transmissivity would likely be lower.
- The porosity is 40 percent. This value is intended to be conservative, representing the high end of possible porosities. In reality, the porosity is likely to be lower in most locations.
- The bulk density is 1.5 g/mL.
- Ground-water flow within the modeled area was assumed to be at steady-state. Recharge was assumed to be negligible relative to the horizontal water movement.
- The longitudinal dispersivity was 100 feet (moderate), and the lateral dispersivity was 0.15 times the longitudinal dispersivity (15 feet).
- One pumping well was assumed to occur at a distance of one quarter to one half mile from the silo. The flow to the well was assumed to be 0.01 ft^3/s.
- The water table gradient is 5 percent. Five percent was selected as a reasonable but conservative estimate based on the typical topography of the area. Average slope of the land surface over 1,000 feet is approximately 3 percent.
- The modeled area was divided into a grid with square cells 100 x 100 feet.
- The initial concentration for the 100 x 100-foot cell centered on the facility was calculated assuming that the first annual load was immediately dissolved, thus giving initial conditions of 59 ppb of lead and 4,200 ppt of PCB.
- Dissolution of lead and PCBs during the remainder of the 20-year period was input to the program continuously as a nominal injection well. The volume of water was calculated assuming that an equivalent volume to one foot of water over the source cell percolated into the facility and subsequently leaked to the groundwater over the course of each year.
- No reactions or degradation were assumed to occur for either lead or PCBs. PCBs are actually likely to undergo some degradation, although very slowly.

Results

Results of simulated ground-water transport over a 20-year period showed that lead and PCB concentrations were not expected to exceed a fraction of one part per billion in any of the modeled cells adjacent to the facility. Leaching of lead and PCBs from paint and coatings would not significantly increase the levels at any downgradient wells.

Table K-1 shows the simulated concentrations of lead and PCBs at the source, 100 feet, and 200 feet. It can be seen that both lead and PCBs are nearly immobile under these circumstances. The lead concentrations never reach 0.1 ppb; PCB concentrations reach a maximum of only 108 ppt at 100 feet, and 1.3 ppt at 200 feet.

A model run was also performed for 100 years to evaluate far future impacts. The longer the timeframe evaluated by the model, the less reliable are the results because of an increased chance for computational errors. The run determined a source concentration of 2,487 ppt, a concentration of 1,136 ppt at 100 feet, and a concentration of 126 ppt at 200 feet. However, a conservative assumption used in determining criteria for the model runs was that biodegradation of PCBs did not occur. This assumption becomes more unrealistically conservative the longer the timeframe simulated by the model. Studies have been performed to indicate that biodegradation occurs at variable rates depending on conditions (Van Atgeren *et al.*, 1998**)**. The half life (amount of time for a substance to degrade to 1/2 of its original concentration) for PCBs is relatively quick (on the order of days) in sewage treatment plant simulations. In soils and sediments, half lives of PCBs are longer–in the range of years to decades. The model was run over a longer time period to simulate degradation with half lives of PCBs at 5, 15, and 45 years. As expected, the highest PCB concentration was with a half-life of 45 years. A source concentration of 540 ppt, a 100-foot concentration of 249 ppt, and a 200-foot concentration of 29 ppt was predicted.

The model simulations represent a single set of conditions that are within the realistic range for the deployment area and with several key parameters purposely chosen to show a relatively high potential for movement. A series of simulations was also performed to examine the effect of varying several parameters that are not precisely known and can be expected to vary from site to site. Among these parameters, the porosity and carbon content of aquifer materials, the hydraulic gradient, groundwater recharge rate, and the Langmuir adsorption coefficients for lead had small effects on the predictions of the model that would not change the conclusions about the potential to contaminate groundwater at downgradient receiving wells. The hydraulic conductivity (and consequently the transmissivity of the aquifer) had the greatest effect on the predictions of the model. Hydraulic conductivities of sandstones have been reported to vary over a very wide range. Typical values shown by Freeze and Cherry (1979) range from 1×10^{-8} cm/sec to 2×10^{-4} cm/sec. The highest value reported by Rasmussen (1964, in Mercer, Thomas, and Ross, 1982) for 106 wells in fractured sandstone was 5.4×10^{-3} cm/sec. This highest value was used in the simulations described in this Appendix, so it represents a significantly higher value than is typical for sandstones. In spite of this conservatism, little movement of lead or PCBs is predicted.

Although these simulations involve some simplifying assumptions, they clearly indicate that the potential for movement of lead and PCBs from the facilities to downgradient wells is not significant. This result is consistent with experience indicating that lead from paint debris has not tended to migrate from landfills or contaminate groundwater.

Table K-1
Lead and PCB Concentrations

Year	Lead at Source (ppb)	Lead at 100 ft (ppb)	Lead at 200 ft (ppb)	PCBs at Source (ppt)	PCBs at 100 ft (ppt)	PCBs at 200 ft (ppt)
0	58.9	0.01	0.00	4,200	0.0	0.00
2	58.8	0.02	0.00	4,176	11.4	0.00
4	58.8	0.02	0.00	4,151	22.6	0.00
6	58.8	0.03	0.00	4,127	33.7	0.1
8	58.7	0.03	0.00	4,103	44.6	0.2
10	58.6	0.04	0.00	4,080	55.5	0.3
12	58.5	0.05	0.00	4,056	66.1	0.4
14	58.5	0.06	0.00	4,033	76.7	0.6
16	58.4	0.07	0.00	4,010	87.1	0.8
18	58.3	0.08	0.00	3,987	97.4	1.1
20	58.2	0.08	0.00	3,964	108	1.3

Legend:
ppb = parts per billion
ppt = parts per trillion

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APPENDIX L

PESTICIDE PERSISTENCE AND TRANSPORT MODELING

APPENDIX L.
PESTICIDE PERSISTENCE AND TRANSPORT MODELING

The fate and transport of pesticides for a representative application scenario was simulated using the Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) computer model developed by the U.S. Department of Agriculture, Agricultural Research Service (USDA ARS) (Leonard *et al*., 1987; Leonard *et al*., 1988; program version 2.03, 1994). GLEAMS evaluates the movement and degradation of chemicals within the plant root zone of field-size areas under various crop management systems. The model was tested and validated with pesticide and bromide movement data (Leonard *et al*., 1987). The hydrology and erosion components of GLEAMS are essentially the same as those of the Chemicals, Runoff, and Erosion from Agricultural Management Systems (CREAMS) model (Knisel, 1980). CREAMS is a physically-based model that had been validated using data from diverse climatic and physiographic regions (Knisel, 1980; Foster and Ferriera, 1981; Lorber and Mulkey, 1982; Knisel *et al*., 1983). Improvements made during the development of GLEAMS include a new emphasis on predicting chemical losses through leaching to ground water and a more sophisticated handling of irrigation. Figure L-1 illustrates the processes represented by GLEAMS. The structure and function of the model will be discussed briefly here. A summary discussion of the model validation is provided at the end of this appendix. The GLEAMS and CREAMS documentation should be consulted for more detailed information.

The hydrology component of GLEAMS subdivides the soil within the rooting zone into as many as 12 computational layers. The surface layer is taken to be one centimeter thick, and the other layers are adjusted to account for the remainder of the rooting zone. Soils data describing porosity, water retention characteristics, and organic matter content for the site-specific soil layers (horizons) are collected for model initialization. During a simulation, GLEAMS computes a continuous accounting of the water balance for each layer, including percolation, evaporation, and transpiration. Evaporation of chemicals from the soil surface is not represented, but evaporation can cause chemicals to move upward through the soil.

The erosion component of GLEAMS accounts not only for the basic soil particle size categories (sand, silt, and clay), but also for small and large aggregates of soil particles. Further, the program accounts for the unequal distribution of organic matter between soil fractions, using this information and surface-area relationships to calculate an enrichment ratio that describes the greater concentration of chemicals in eroding soil compared with the concentration in surface soil.

The pesticide component of GLEAMS can represent chemical deposition directly on the soil, the interception of chemicals by foliage, and subsequent washoff. Degradation rates are allowed to differ between plant surfaces and soil, and between soil horizons.

Degradation calculations are performed on a daily time interval. Redistribution of chemicals because of hydrologic processes is also calculated on a daily time step. The

distribution of a chemical between dissolved and sorbed states is described as a simple linear relationship, being directly proportional to the organic carbon partition coefficient, K_{oc} (a property of the chemical), and the organic matter content of the soil.

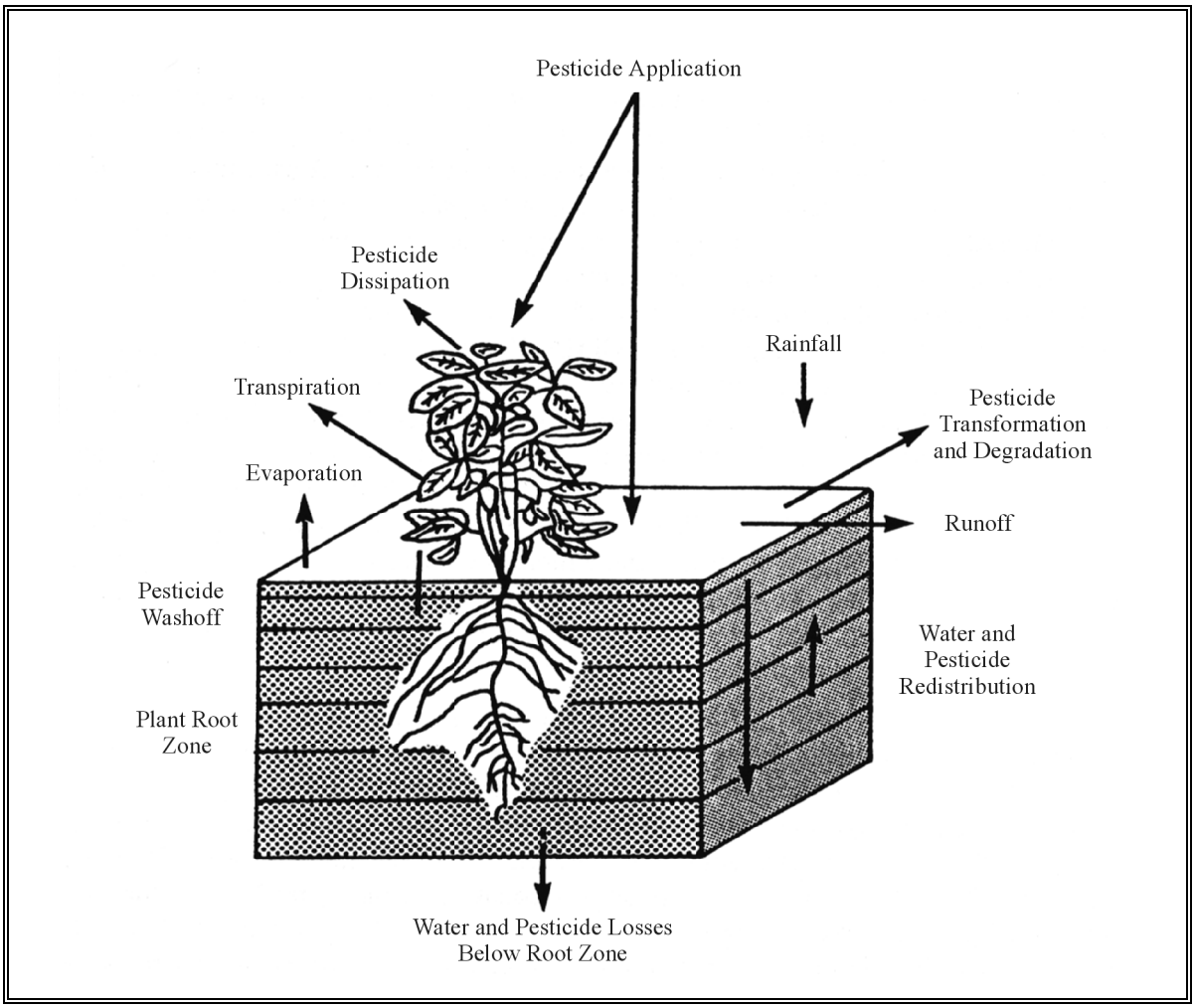

Figure L-1. The Physical System and Processes Represented in GLEAMS (adapted from Leonard *et al.*, 1987).

The extraction of chemicals from the soil surface into runoff is calculated accounting for sorption (assumed to be relatively rapid) and using a related parameter describing the depth of the interaction of surface runoff and surficial soil. Percolation of chemicals is calculated through each of the soil layers, and the amount that passes through the last soil layer is accumulated as the potential loading to the vadose zone or groundwater.

The overall sequence of operation of model components is taken from the Washington Computer Center CREAMS manual (USDA, 1984). The interrelationship of components is essentially the same in GLEAMS, except that the components are integrated into a single program, allowing intermediate files to be passed in memory. Input data required by the GLEAMS model consist of four separate files: rainfall data,

hydrology parameters, erosion parameters, and chemical parameters. The rainfall data were simulated for Cheyenne, Wyoming, using a "climatic generator" program obtained from Dr. Frank Davis, USDA Agricultural Research Service, Tifton, Georgia. The program contains a database with statistical characteristics of rainfall patterns for selected locations around the country, including Bismarck, and it produces daily precipitation files in the format required by GLEAMS. Monthly maximum and minimum temperature files were obtained from the same source. Most other parameters were determined using tables and guidance contained in the GLEAMS program and documentation (Knisel *et al*., 1987), and the documentation for CREAMS (Knisel, 1980; USDA, 1984) based on typical soil for the region. Precipitation, hydrology, erosion, and chemical parameter files were prepared for a representative scenario.

The hydrology parameter file contains information on the geometry and topography of the field, hydraulic conductivity, soil water storage, leaf area indices, and irrigation practices. This file also contains the Soil Conservation Service "curve number," which describes the tendency for water to run off the surface of the soil.

The erosion parameter file contains information needed to calculate erosion, sediment yield, and particle composition of the sediment on a storm-by-storm basis. The input data can represent a number of optional configurations of fields, channels, and impoundments, but the representative scenario for analysis in this study represented a single channel draining a site. Runoff flowing into the channel could be considered as discharge to receiving waters outside the analysis region, typically streams and rivers. The erosion parameter file input to GLEAMS contained parameters describing soil erodibility, soil particle size distributions, area of the pond, and other surface characteristics only relevant of erosion.

Output from the GLEAMS model includes for each chemical a storm-by-storm accounting of concentrations by soil layer, and the movement of chemical residues in percolating soil waters, surface runoff waters, and those residues sorbed to eroded soil particles. An auxiliary program can be used to generate graphs of the total mass per unit area of each chemical over time. Separate output files are produced describing hydrology and erosion in more detail.

Simulation of Pesticides in Soil

Simulation of herbicides used to eliminate vegetation at launch facilities (LF) was performed to investigate the potential for residual pesticide movement through leaching to ground water and to ascertain whether residual concentrations are high enough to pose a hazard to humans or wildlife.

The pesticides modeled included Oust® (75 percent sulfometuron methyl), and Krovar® (40 percent bromacil and 40 percent diuron). These pesticides were applied once annually for the past six years. They were diluted in 50 gallons of water per acre at application.

The GLEAMS simulations were conducted using a spring pesticide application date (a typical application schedule) and meteorological data intended to be typical of the

deployment area in eastern Wyoming. Assumptions and inputs to the model included the following:

- Computer runs were conducted using a fine sandy loam soil texture. A fine sandy loam is common in the deployment area, where soil types typically range from loams to fine sandy loams. The latter soil type was chosen to represent the greatest chance of chemical movement.
- Soil characteristics for the fine sandy loam were assumed to correspond to the borderline between SCS hydrologic soil groups A and B, indicating moderately good infiltration potential.
- Weather records were simulated for a ten- year period using daily precipitation probability and temperature statistics for Cheyenne. A climatic simulator program developed by USDA ARS was used, based on data from the National Weather Service.
- Vegetation was assumed to be either nonexistent or sparse grass and weeds.
- Pesticides were applied annually over a ten-year simulation period. Each pesticide application was assumed to occur on April 30.
- The pesticide application rates used in the simulation are shown in Table L-1.
- The SCS runoff curve number was assumed to be 59, the expected number for rangeland in only fair condition.
- The simulations were performed to a 91 cm (36 inch) depth, the depth of the soil profile where significant residues are expected to occur. The soil's surface layer was one cm thick, the next layer extended from one cm to ten cm, layers three through six were each ten cm thick, layers seven and nine were each 15 cm thick, and layer eight was 16 cm thick.
- The number of soil horizons in the root zone may be two or three. Fine sandy loam soil makes up the first horizon (extending from one to 15.2 cm) and soils ranging from fine sandy loam to sandy clay loam make up the second horizon (extending from 15.2 to 50.8 cm). A third horizon typically ranges from sandy loam to gravelly loam. The simulations presented here assumed the characteristics of fine sandy loam throughout the modeled depth in order to represent conditions from the typical range that are relatively conducive to chemical movement. Organic matter content of the soil was assumed to be two-percent to a depth of 30 cm, and 1.5 percent below that to the simulated depth of 91 cm.
- The slope was set at five percent, a realistic measure for the launch facility sites. A low organic matter content and low slope were intentionally used to maximize the potential for infiltration and leaching.
- The porosity was assumed to be 0.36 cm^3/cm^3. The bulk density was assumed to be 1.5.
- The field capacity was assumed to be 0.27 mm/mm.
- The erodibility was assumed to 0.30, typical for a fine sandy loam (based on the Pesticide Root Zone Model manual, Carsel *et al*., 1984).

- The soil's saturated conductivity was assumed to be 0.30 inches per hour, based on the texture and vegetative cover.
- The field area was assumed to be one acre. Because lateral uniformity was assumed, this parameter was not important for the leaching analysis.
- Table L-1 illustrates the environmental fate data that was used to model the persistence and migration of the pesticides. Half-lives for all of the herbicides, their solubilities, and organic carbon partition coefficients were based on the GLEAMS database, and additional sources noted in the table.

Results

The simulation predicted that no residual herbicide will leach below 36 inches. Table L-2 shows the annual expected rate of runoff of each pesticide. The total predicted runoff of the herbicides over the ten-year simulation period expressed as a percent of the amount applied was 0.00, 0.06 and 0.07 percent for Sulfometuron methyl, Diuron, and Bromacil, respectively.

Table L-1
Environmental Fate Data for Pesticides Used at LFs

Pesticide	Solubility (mg/L)	Soil Half-Life (Days)	K_{oc}	Application Rate (Kg/ha)
Sulfometuron methyl	70.0	20	78	0.13
Diuron	42	180[3] (midpoint)	383[2] (mean of 84 values)	2.24
Bromacil	815[1]	150[1] (124 – 155)	32	2.24

[1] EPA, 1996. Reregistration Eligibility Decision Document for Bromacil.
[2] Hazardous Substances Database, 1999.
[3] Extoxnet Database, 1996.

After ten consecutive years of applying sulfometuron methyl, diuron, and bromacil, the annual herbicide runoff is not expected to be more than a few grams per site, and no significant runoff of sulfometuron methyl is expected. Figure L-2 shows the distribution in the soil profile of remaining herbicide residues near the end of the simulation period. Only two of the herbicides remain, and they are at only a fraction of a ppm at depths shallower than 30 cm, with no significant residues below 30 cm.

Table L-2 Loss of Pesticides Through Runoff During 10-yr GLEAMS Model Simulation											
Pesticide	**YR 1 g/ha**	**YR 2 g/ha**	**YR 3 g/ha**	**YR 4 g/ha**	**YR 5 g/ha**	**YR 6 g/ha**	**YR 7 g/ha**	**YR 8 g/ha**	**YR 9 g/ha**	**YR 10 g/ha**	**Total g/ha**
Sulfometuron methyl	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Diuron	0.00	1.56	6.17	0.36	0.043	0.68	0.86	2.11	0.69	0.78	13.63
Bromacil	0.00	2.14	3.91	0.50	1.11	1.63	0.84	2.19	1.37	1.22	14.91

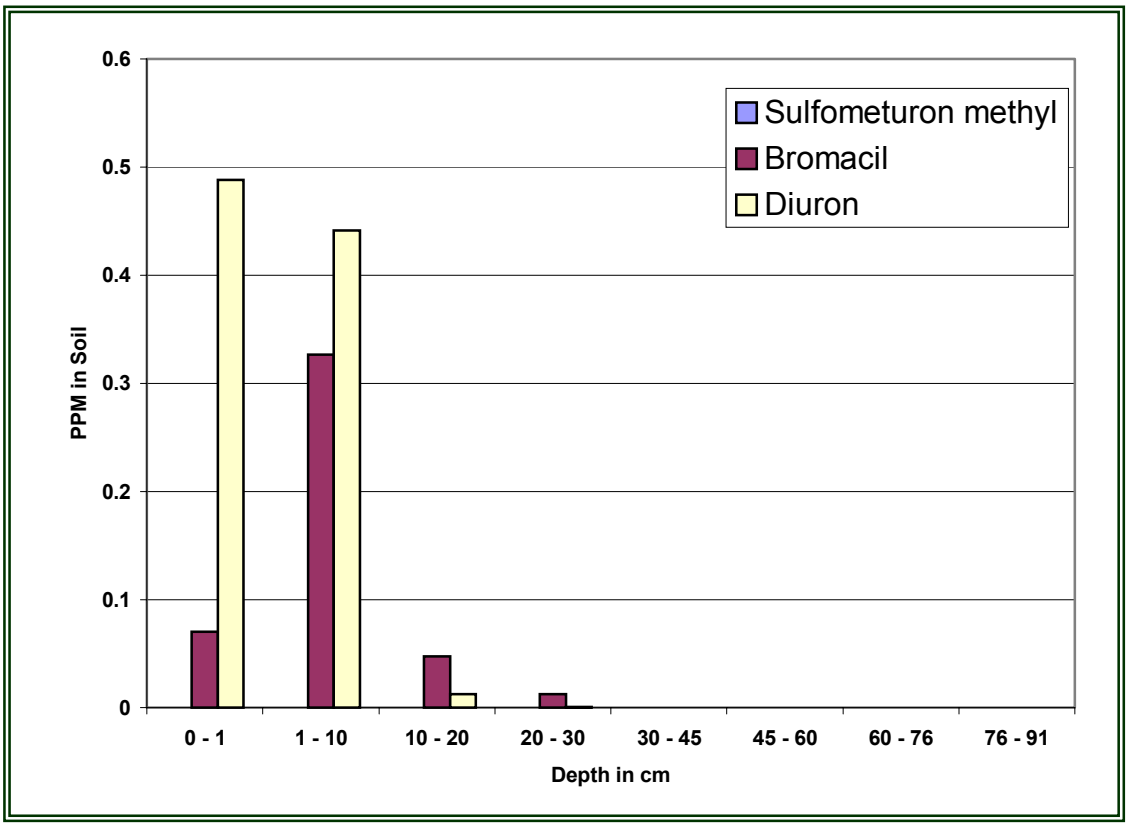

Figure L-2. Estimated Herbicide Residues In Soil After 9 Years of Application

Model Validation

For a detailed discussion of the validation of GLEAMS, its sensitivity to errors in input parameters, and its expected accuracy, the reader should refer to the model documentation referenced at the beginning of this appendix. In addition to these studies, Mueller et al. (1992) evaluated the ability of the GLEAMS model to simulate movement of three herbicides using site-specific soil, environmental, and pesticide data. Field studies were used to examine alachlor and metribuzin movement in sandy loam soil in which cotton was grown, and norflurazon movement in a loamy sand soil. During the course of the study, actual herbicide concentrations were always greatest near the soil surface. The total herbicide present in each profile less than 20 days after application was accurately predicted by the GLEAMS model simulations. Herbicide movement into the soil profile in later simulations was overestimated by the model. Predictions from the model generally agreed with the relative location of alachlor and metribuzin in simulations less than seven days after herbicide application; beyond seven days after herbicide application, simulations deviated from actual concentrations. GLEAMS inaccurately predicted that norflurazon would be located throughout the soil profile, although the predicted depth to the limit of detection by the model was accurate (Mueller et al. 1992).

Crawford et al. (1990) compared GLEAMS simulation results to those of a field monitoring study examining the movement of carbofuran applied in an Appalachian mountain pine seed orchard. The predicted movement of carbofuran by GLEAMS agreed with results measured in the field, including time of initial pesticide movement, peak residue time, and residue dissipation time. Nutter et al. (1984) compared CREAMS (precursor of the GLEAMS model) model predictions of hexazinone concentrations in stormflow for four forested watersheds with the results of concentrations measured in the field over a 13-month period. Hexazinone concentrations in the initial stormflow events were accurately predicted by CREAMS. However, concentrations in stormflow two months or longer after hexazinone applications were underestimated by the model.

The GLEAMS computer model can provide a large amount of information without having to conduct expensive field studies and the subsequent chemical analysis. However, the model is sensitive to input parameters. Any site-specific parameters that were not directly measured and had to be based on available literature introduce potential sources of error into the model. These parameters include pesticide decay rates, foliar washoff, K_{oc}, and soil curve numbers. The decay rates and foliar washoff factors govern the quantity of the contaminant available for movement, whereas the sorption coefficients and the runoff curve numbers govern the actual movement of the contaminants. The areal coverage influences the mass of pesticide that reaches the ground from application. Uncertainty in these parameters causes the majority of model uncertainty. The selection of conservative input parameters in this analysis was designed to allow for the model's uncertainty, and to err on the side of overestimating the predicted soil and water concentrations.

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APPENDIX M

SPECIES OF SPECIAL CONCERN TABLES

APPENDIX M.
SPECIES OF SPECIAL CONCERN TABLES

This Appendix lists the plant (Table M-1), mammal (Table M-2), and bird species (Table M-3) of special concern in Laramie, Goshen, and Platte counties.

Table M-1
Plant Species of Concern

Scientific Name	Common Name	County
Agalinis tenuifolia var. parviflora	Slender false-foxglove	Goshen, Platte
Argyrochosma fendleri [Notholaena fendleri]	Fendler cloakfern	Laramie
Asclepias arenaria	Sand milkweed	Goshen
Asplenium septentrionale	Forked spleenwort	Laramie, Platte
Aster porteri	Porter's aster	Laramie
Bacopa rotundifolia	Roundleaf water-hyssop	Laramie
Bahia dissecta	Dissected bahia	Laramie
Bouteloua hirsuta var. hirsuta	Hairy grama	Goshen, Laramie, Platte
Bouteloua simplex	Mat grama	Laramie
Carex crawei	Crawe sedge	Goshen, Laramie
Carex emoryi	Emory's sedge	Platte
Carex oreocharis	Mountain-loving sedge	Laramie
Carex parryana var. unica [Carex hallii]	Hall's sedge	Laramie
Celtis occidentalis	Common hackberry	Goshen, Platte
Chenopodium pallescens	Narrow-leaved goosefoot	Laramie
Chenopodium subglabrum	Smooth goosefoot	Goshen, Laramie, Platte
Chenopodium watsonii	Watson goosefoot	Goshen, Laramie
Cuscuta indecora	Pretty dodder	Goshen, Platte
Cuscuta megalocarpa [Cuscuta occidentalis]	Big-fruited dodder	Platte
Cuscuta plattensis	Wyoming dodder	Goshen, Platte
Cyperus acuminatus	Short-point flatsedge	Goshen
Cyperus bipartitus [Cyperus rivularis]	Shining flatsedge	Goshen, Platte
Dalea aurea	Golden prairie-clover	Platte
Dalea cylindriceps	Andean prairie-clover	Goshen, Platte
Dalea villosa	Silky prairie-clover	Goshen
Eleocharis parvula	Small spikerush	Goshen
Eleocharis tenuis var. borealis [E. elliptica]	Boreal spikerush	Platte
Eragrostis hypnoides	Teal love grass	Goshen
Eriogonum pauciflorum var. nebraskense	Nebraska buckwheat	Platte
Euphorbia exstipulata	Square-seeded spurge	Platte
Euphorbia geyeri	Geyer's spurge	Goshen
Euphorbia hexagona	Six-angle spurge	Platte
Eustoma grandiflorum [Eustoma russellianum]	Showy prairie-gentian	Goshen, Platte
Euthamia graminifolia var. major [Solidago graminifolia var. major]	Flat-top fragrant goldenrod	Platte
Evax prolifera	Bighead pygmy-cudweed	Platte
Gaura neomexicana ssp. coloradensis	Colorado butterfly plant	Laramie
Gentiana affinis var. bigelovii	Bigelow's prairie gentian	Laramie

Table M-1 (continued) Plant Species of Concern		
Scientific Name	**Common Name**	**County**
Haplopappus annuus [Machaeranthera annua Rayjacksonia annua]	Viscid tansyaster	Goshen
Hemicarpha drummondii [Lipocarpha drummondii]	Dwarf bulrush	Platte
Liatris lancifolia	Lance-leaf gay-feather	Goshen
Lithospermum multiflorum	Many-flowered gromwell	Laramie
Lobelia siphilitica	Great blue lobelia	Goshen
Lomatogonium rotatum	Marsh felwort	Laramie
Lythrum alatum	Winged loosestrife	Platte
Mentzelia oligosperma	Few-seed stickleaf	Platte
Monarda pectinata	Plains lemon bee-balm	Goshen
Muhlenbergia glomerata [incl. in Muhlenbergia racemosa by some authors	Marsh muhly	Laramie
Muhlenbergia montana	Mountain muhly	Laramie
Muhlenbergia torreyi	Ring muhly	Laramie
Oenothera canescens	Spotted evening-primrose	Goshen
Oenothera howardii [Oenothera brachycarpa]	Howard's evening-primrose	Laramie
Palafoxia rosea var. macrolepis	Rosy palafoxia	Goshen
Pectis angustifolia	Crown-seed fetid-marigold	Goshen
Pediomelum digitatum [Psoralea digitata]	Palm-leaved scurfpea	Goshen
Pediomelum linearifolium [Psoralea linearifolia]	Narrowleaf scurfpea	Laramie
Penstemon angustifolius var. caudatus	Narrowleaf beardtongue	Goshen
Phacelia denticulata	Rocky Mountain phacelia	Laramie
Phacelia neomexicana var. alba [Phacelia alba]	White scorpionweed	Laramie
Physalis hederifolia var. comata	Hillside ground-cherry	Goshen
Rorippa truncata [Rorippa curvipes var. truncata]	Wild yellowcress	Goshen
Talinum parviflorum	Small-flowered fame-flower	Platte
Triodanis holzingeri	Holzinger Venus' looking-glass	Goshen, Platte
Source: Wyoming Natural Diversity Database, April, 1999		

Table M-2 Mammal Species of Concern		
Scientific Name	**Common Name**	**County**
Scalopus aquaticus	Eastern mole	Goshen, Laramie, Platte
Myotis evotis	Long-eared myotis	Goshen, Laramie, Platte
Myotis thysanodes	Fringed myotis	Goshen, Laramie, Platte
Lasiurus cinereus	Hoary bat	Laramie, Platte
Corynorhinus townsendii [Plecotus townsendii]	Townsend's big-eared bat	Goshen, Laramie, Platte
Sylvilagus floridanus	Eastern cottontail	Goshen, Laramie, Platte
Spermophilus spilosma	Spotted ground squirrel	Goshen, Laramie, Platte
Cynomys ludovicianus	Black-tailed prairie dog (Large towns only)	Goshen, Laramie, Platte
Sciurus aberti	Abert's squirrel	Laramie
Perognathus flavescens	Plains pocket mouse	Goshen, Laramie, Platte
Perognathus flavus	Silky pocket mouse	Goshen, Laramie, Platte
Chaetodipus hispidus [Perognathus hispidus]	Hispid pocket mouse	Goshen, Laramie, Platte
Reithrodontomys montanus	Plains harvest mouse	Goshen, Laramie, Platte
Zapus hudsonius preblei	Preble's meadow jumping mouse	Goshen, Laramie, Platte
Vulpes velox	Swift fox	Goshen, Laramie, Platte
Urocyon cinereoargenteus	Common gray fox	Goshen, Platte
Spilogale putorius interruptua	Plains (eastern) spotted skunk	Goshen, Platte
Source: Wyoming Natural Diversity Database, April, 1999		

Table M-3 Bird Species of Concern		
Scientific Name	**Common Name**	**County**
Botaurus lentiginosus	American bittern	Goshen, Platte
Aythya collaris	Ring-necked duck	Laramie
Haliaeetus leucocephalus	Bald eagle	Goshen, Platte
Tympanuchus cupido	Greater prairie chicken	Goshen, Laramie
Colinus virginianus	Northern bobwhite (Native populations only)	Goshen
Charadrius melodus	Piping plover	Goshen
Charadrius montanus	Mountain plover	Goshen, Laramie
Bartramia longicauda	Upland sandpiper	Goshen, Laramie, Platte
Numenius americanus	Long-billed curlew	Goshen
Phalaropus tricolor	Wilson's phalarope	Goshen, Laramie, Platte
Coccyzus erythropthalmus	Black-billed cuckoo	Goshen, Platte
Coccyzus americanus	Yellow-billed cuckoo	Goshen, Platte
Asio flammeus	Short-eared owl	Goshen, Laramie, Platte
Tyto alba	Barn owl	Goshen, Laramie, Platte
Athene cunicularia [Speotyto cunicularia]	Burrowing owl	Goshen, Laramie, Platte
Aegolius funereus	Boreal owl	Platte
Stellula calliope	Calliope hummingbird	Platte
Melanerpes lewis	Lewis' woodpecker	Goshen, Platte
Picoides tridactylus	Three-toed woodpecker	Platte
Empidonax hammondii	Hammond's flycatcher	Goshen
Tyrannus vociferans	Cassin's kingbird	Laramie, Platte
Sitta pygmaea	Pygmy nuthatch	Laramie
Sialia sialis	Eastern bluebird	Goshen, Laramie
Spiza americana	Dickcissel	Goshen, Platte
Aimophila cassinii	Cassin's sparrow	Goshen
Amphispiza belli	Sage sparrow	Goshen, Platte
Ammodramus bairdii	Baird's sparrow	Laramie
Ammodramus savannarum	Grasshopper sparrow	Goshen, Laramie, Platte
Spizella breweri	Brewer's sparrow	Goshen, Laramie, Platte
Calcarius ornatus	Chestnut-collared longspur	Laramie
Source: Wyoming Natural Diversity Database, April, 1999		

APPENDIX N

MAPS OF WETLANDS NEAR LFs AND MAFs

APPENDIX N.
MAPS OF WETLANDS NEAR LFs AND MAFs

This appendix contains maps showing the wetlands in the vicinity of launch facility (LF) sites P-2, S-3, S-8, and S-9.

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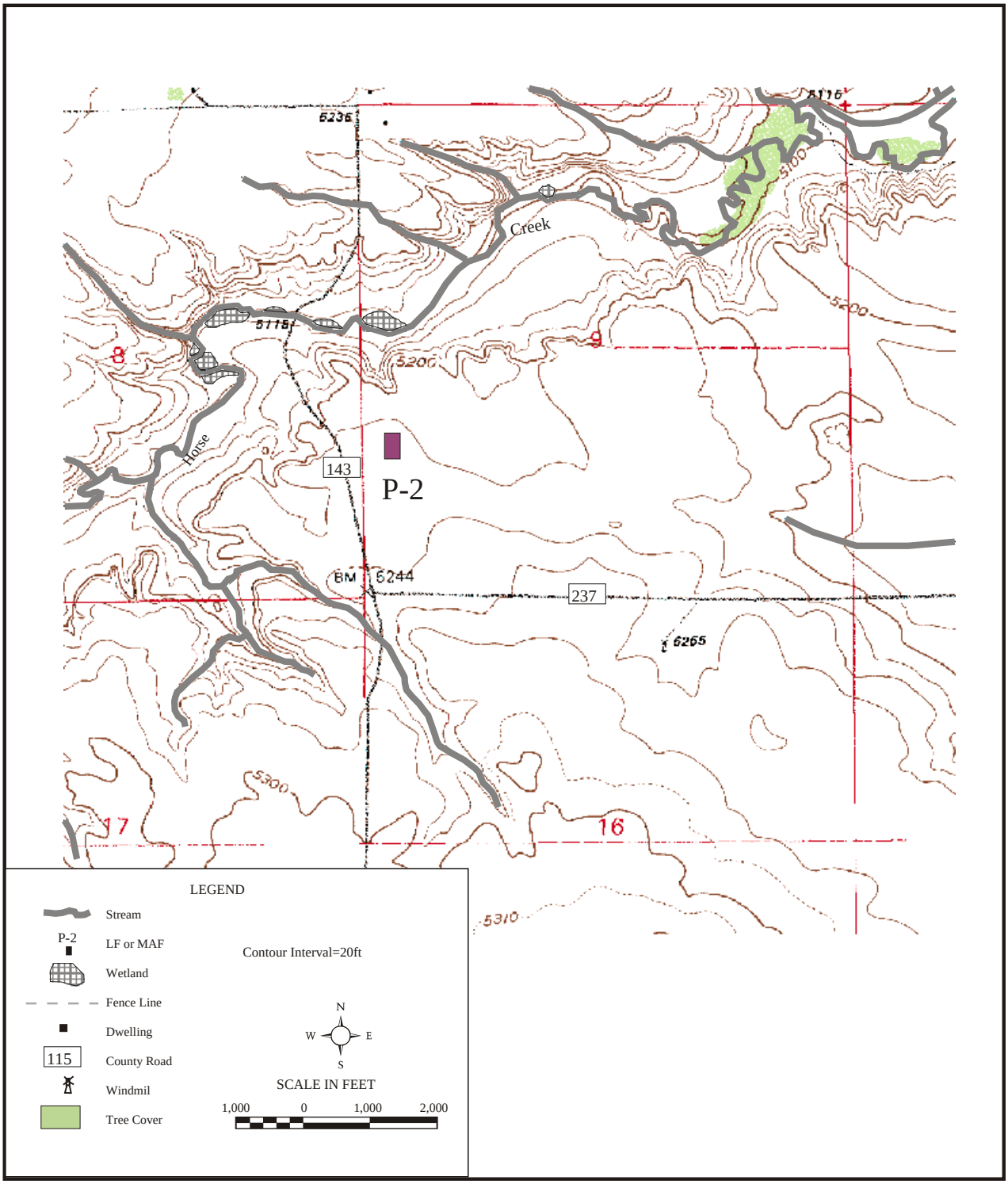
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5200
5118
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9
5200
Horse
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P-2
BM
5244
237
6265
5300
17
16
5310
LEGEND
Stream
P-2
LF or MAF
Wetland
Fence Line
Dwelling
115
County Road
Windmil
Tree Cover
Contour Interval=20ft
N
W
E
S
SCALE IN FEET
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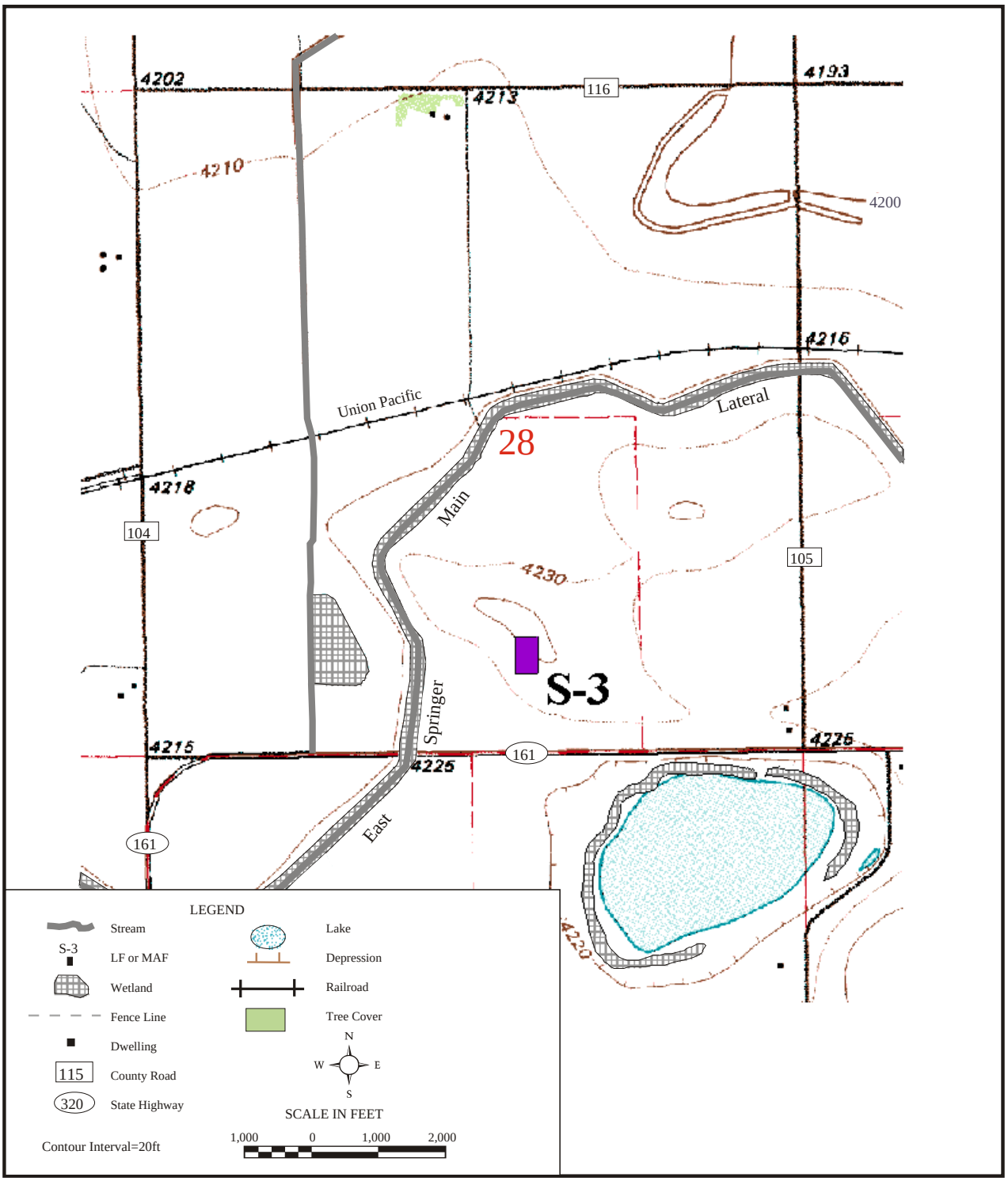
0
1,000
2,000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Main
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105
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Springer
4215
161
4225
4225
East
161
4220
LEGEND
Stream
S-3
LF or MAF
Wetland
Fence Line
Dwelling
115
County Road
320
State Highway
Lake
Depression
Railroad
Tree Cover
N
W
E
S
SCALE IN FEET
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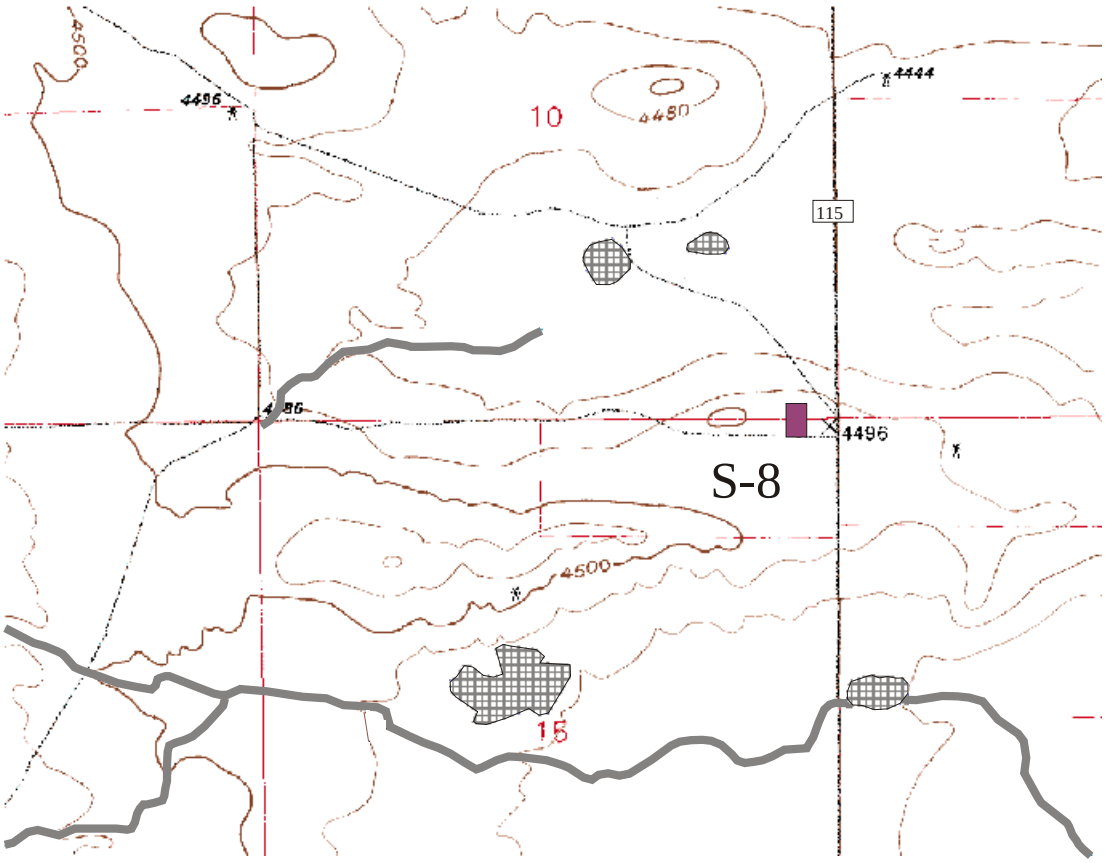
0
1,000
2,000
Contour Interval=20ft



LEGEND

Stream

S-8 LF or MAF

Wetland

Fence Line

Dwelling

115 County Road

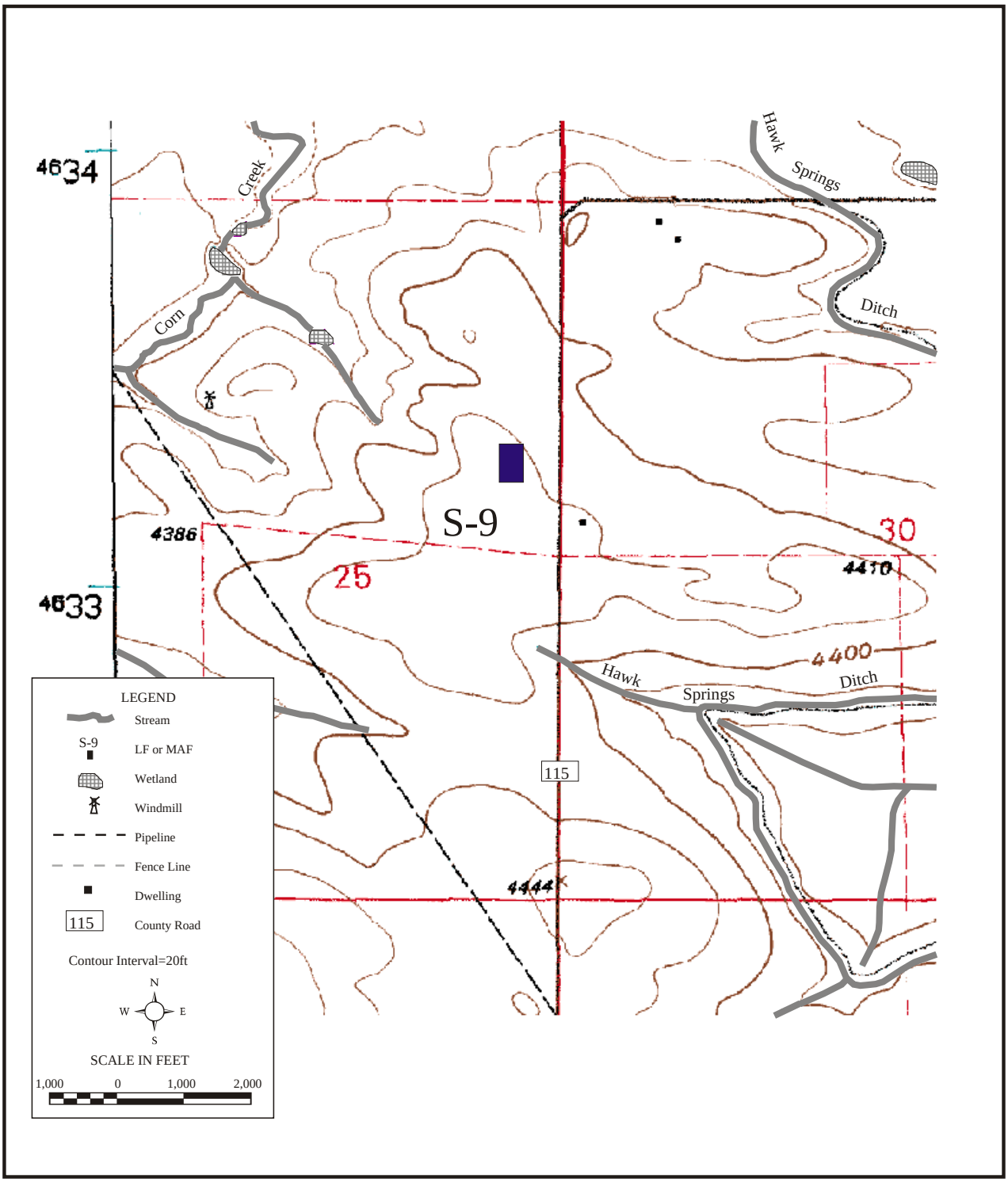
Windmill

Contour Interval=20ft

N
W E
S

SCALE IN FEET

1,000 0 1,000 2,000


4634
4633
Creek
Corn
Hawk
Springs
Ditch
S-9
4386
25
30
4410
4400
Hawk
Springs
Ditch
115
4444
LEGEND
Stream
S-9
LF or MAF
Wetland
Windmill
Pipeline
Fence Line
Dwelling
115
County Road
Contour Interval=20ft
N
W
E
S
SCALE IN FEET
1,000
0
1,000
2,000

APPENDIX O

GLOSSARY OF TERMS AND ACRONYMS/ABBREVIATIONS

APPENDIX O.
GLOSSARY OF TERMS AND ACRONYMS/ABBREVIATIONS

GLOSSARY OF TERMS

Ambient Air Quality Standards. Standards established on a state or federal level that define the limits for airborne concentrations of designated "criteria" pollutants (nitrogen dioxide, sulfur dioxide, carbon monoxide, total suspended particulates, ozone and lead), to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

Aquifer. The water-bearing portion of subsurface earth material that yields or is capable of yielding useful quantities of water to wells.

***Archaeological Resources Protection Act* (ARPA)**. This act protects archeological resources on federal lands. If archaeological resources are discovered that may be disturbed during site activities, the Act requires permits for excavating and removing the resource.

Asbestos. A carcinogenic substance formerly used widely as an insulation material by the construction industry; often found in older buildings.

Attainment area. A region that meets the National Ambient Air Quality Standards for a criteria pollutant under the *Clean Air Act*.

Carbon monoxide (CO). A colorless, odorless, poisonous gas produced by incomplete fossil-fuel combustion. One of the six pollutants for which there is a national ambient standard. See Criteria Pollutants.

Caretaker Status. Placement of a launch facility or missile alert facility in a temporary deactivated status before dismantlement starts. The missile and key operational components have been removed from a launch facility and key operational components have been removed from the missile alert facility. Security is maintained at all sites in caretaker status. See deactivation.

Cathodic protection. Maintenance of corrosion protection of underground components (underground storage tanks, launch control centers, and launch tubes) by delivering an electric charge.

***Clean Air Act* (CAA)**. This act establishes as federal policy the protection and enhancement of the quality of the Nation's air resources to protect human health and the environment. The CAA sets national primary and secondary ambient air quality standards as a framework for air pollution control.

***Clean Water Act* (CWA).** This act establishes federal limits, through the National Pollution Discharge Elimination System (NPDES), on the amounts of specific pollutants that are discharged to surface waters in order to restore and maintain the chemical, physical, and biological integrity of the water. A NPDES permit, or modification to an existing permit, would be required for any change from the present parameters in the quality or quantity of wastewater discharge and/or stormwater runoff. Section 404 of the CWA, administered by the U.S. Army Corps of Engineers (USACE), prohibits the discharge of dredged or fill materials into waters of the United States, including wetlands, without a permit issued by the USACE.

Closure. The process of completing use of an area or object that is conducted in compliance with applicable environmental regulations. For example, closure of an underground storage tank could

involve removing liquid, cleaning the tank, sampling the adjacent soil, and submitting a document for regulatory agency concurrence.

***Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA)**. A law passed in 1980, and amended by the *Superfund Amendments and Reauthorization Act* (SARA) to authorize investigation and cleanup of contamination resulting from previous releases of hazardous substances, pollutants, or contaminants.

Council on Environmental Quality (CEQ). Established by the *National Environmental Policy Act* (NEPA), the CEQ consists of three members appointed by the President. CEQ regulations (40 CFR 1500-1508, as of July 1, 1986) described the process for implementing NEPA, including preparation of environmental assessments and environmental impact statements, and the timing and extent of public participation.

Criteria pollutants. The CAA required the US Environmental Protection Agency (USEPA) to set air quality standards for common and widespread pollutants after preparing "criteria documents" summarizing scientific knowledge on their health effects. Today there are standards I effect for six "criteria pollutants": sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter equal to or less than 10 microns in diameter (PM_{10}), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb).

Deactivation. The process of removing missiles, classified, and salvageable items from the launch facility, draining fluids from certain systems, and placing the launch facility in caretaker status. Deactivation of a missile alert facility includes removing classified and salvageable items, and draining fluids from some systems.

Deployment Area. The area in which missiles are placed in launch facilities.

Dismantlement. The irreversible process of demolishing the headworks and destroying the LFSB. Prior to demolition, various hazardous materials would be removed from the facilities.

***Emergency Planning and Community Right-to-Know Act* (EPCRA)**. This act, passed in 1986, sets forth the requirements for emergency planning, including timely notification and response to a release of hazardous substances.

Endangered Species. A species that is threatened with extinction throughout all or a significant portion of its range.

***Endangered Species Act* (ESA)**. This act requires federal agencies that authorize, fund, or carry out actions, to avoid jeopardizing the continued existence of threatened or endangered species and to avoid destroying or adversely modifying their critical habitat. Federal agencies must evaluate the effects of their actions on threatened or endangered species of fish, wildlife, and plants, and their critical habitats, and take steps to conserve and protect these species. All potentially adverse impacts to threatened and endangered species must be avoided or mitigated.

Environmental Impact Analysis Process (EIAP). The process of conducting environmental studies as outlined in Air Force Instruction 32-7061.

Erosion. Wearing away of soil and rock by weathering and the action of streams, wind, and underground water.

Groundwater. Water within the earth that supplies wells and springs.

Hardened Intersite Cable System (HICS). A network of hardened cables between LFs and MAFs enabling the launch control center to control the launch of missiles.

***Hazardous Materials Transportation Act* (HMTA)**. This 1975 law provides for the protection of public health from the risks of transporting hazardous materials (explosives, flammable liquids and solids, combustible materials, corrosives, and compressed gases). The transportation of all hazardous materials must meet HMTA requirements.

Headworks. The top portion of the launch tube which includes support equipment and the launcher closure door.

Historic American Buildings Survey (HABS). Documentation of significant American buildings, including both graphic and written records, maintained by the National Park Service.

Historic American Engineering Record (HAER). Documentation of significant American engineering structures, including both graphic and written records, maintained by the National Park Service.

Impacts/Effects. An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured using a qualitative and nominally subjective technique. In this EIS, as well as in the CEQ regulations, the word impact is used synonymously with the word effect.

Installation Restoration Program (IRP). The Department of Defense (DoD) program designed to identify, confirm, quantify, and remediate suspected problems associated with past hazardous material disposal sites on DoD installations.

Intercontinental Ballistic Missile (ICBM). A self-propelled missile guided in the ascent of a high-arch trajectory, capable of travelling between continents.

Landfarming. A process involving the sewage lagoons at the missile alert facilities, in which the berms are pushed into the lagoon depression, the soils and biosolids are mixed, and the area is graded.

Launch Facility (LF). A fenced and secured facility comprised of a missile launcher and launch support building.

Lead (Pb). A heavy metal, used in many industries, which can accumulate in the body and cause a variety of negative effects. One of the six pollutants for which there is a national ambient air quality standard. See Criteria Pollutants.

Long-term Impact/Effect. For this EIS, an impact that lasts longer than approximately three years (the length of the construction and demolition activities).

Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water delivered to any user of a public system. MCLs are enforceable standards.

Missile Alert Facility (MAF). A fenced and secured site comprised of a launch control center, launch control support building, and communications equipment.

Missile Stages. The Peacekeeper missile contains four stages to propel the missile to a target. Stages I, II, and III use solid propellants. Stage IV, which contains the missile guidance and control, uses liquid propellants.

Mitigation. A method or action to reduce or eliminate program impacts.

National Ambient Air Quality Standards (NAAQS). Section 109 of the CAA requires USEPA to set nationwide standards, the NAAQS, for widespread air pollutants. Currently, six pollutants are regulated by primary and secondary NAAQS: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter (PM_{10}), and sulfur dioxide (SO_2). See Criteria Pollutants.

***National Environmental Policy Act* (NEPA).** Public Law 91-190, passed by Congress in 1969, established a national policy designed to encourage consideration of the influences of human activities (e.g., population growth, high-density urbanization, industrial development) on the natural environment. NEPA also established the CEQ. NEPA procedures require that environmental information be made available to the public before decisions are made. Information contained in NEPA documents must focus on the relevant issues in order to facilitate the decision-making process. See CEQ.

National Historic District. An area possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development, and whose characteristics make it eligible for inclusion in the National Register of Historic Places under one or more established criteria.

National Historic Landmark. Any district, site, building, structure, or object that the Secretary of Interior has determined possesses exceptional value in commemorating or illustrating the history of the United States and which as been so designated under the authority of the *Historic Sites Act* of 1935, U.S.C. 461 *et seq*.

***National Historic Preservation Act* (NHPA).** Section 106 of this Act requires that a Federal agency take into account the effect of an undertaking on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment with respect to such an undertaking.

National Register of Historic Places (NRHP). A register of districts, sites, buildings, structures, and objects important in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior under authority of Section 2(b) of the *Historic Sites Act* of 1935 and Section 101(a)(1) of the *National Historic Preservation Act* of 1966, as amended.

***Native American Graves Protection and Repatriation Act*.** This act, passed in 1990, prohibits the intentional removal of Native American cultural items from Federal or tribal lands except under an ARPA permit and in consultation with the appropriate Native American groups.

Native Americans. Used in a collective sense to refer to individuals, bands, or tribes who trace their ancestry to indigenous populations of North America prior to Euro-American contact.

Native vegetation. Plant life that occurs naturally in an area without agricultural or cultivational efforts. The term does not include species that have been introduced from other geographical areas and become naturalized.

Nitrogen dioxide (NO_2). Gas formed primarily from atmospheric nitrogen and oxygen when combustion takes place at high temperature. NO_2 emissions contribute to acid deposition and formation of atmospheric ozone. One of the six pollutants for which there is a national ambient air quality standard. See Criteria Pollutants.

Nitrogen oxides (NO_x). Gases formed primarily by fuel combustion, which contribute to the formation of acid rain. Hydrocarbons and nitrogen oxides combine in the presence of sunlight to form ozone, a major constituent of smog.

Noise. Any sound that is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying (unwanted sound).

Noise attenuation. The reduction of a noise level from a source by such means as distance, ground effects, or shielding.

Noise Control Act. This act, passed in 1972, establishes a policy to promote an environment free from noise harmful to the health or welfare of people. Federal agencies must also comply with state and local requirements for the control and abatement of environmental noise.

Nonattainment area. An area that has been designated by the USEPA or the appropriate state air quality agency, as exceeding one or more National or State Ambient Air Quality Standards.

Noxious weed. A weed that is difficult to control, easily spread, and is injurious to public health, crops, livestock land, and other property.

***Occupational Safety and Health Act* (OSHA)**. This act, passed in 1970, provides regulations designed to protect the health and safety of employees in the workplace.

100-year flood zone. Land area having a 1-percent chance of being flooded during a given year.

PCB-contaminated equipment. Equipment that contains a concentration of polychlorinated biphenyls (PCBs) (see definition) from 50 to 499 parts per million and regulated by the USEPA.

PCB equipment. Equipment that contains a concentration of PCBs of 500 parts per million or greater and regulated by the USEPA.

PCB items. Equipment which contains a concentration of PCBs up to 49 parts per million and regulated by the USEPA.

Primary roads. A consolidated system of connected main roads important to regional, statewide, and interstate travel; they consist of rural arterial routes and their extensions into and through urban areas of 5,000 or more population.

Reentry System. A deployment module and ascent shroud housing reentry vehicles. The reentry vehicle contains the warhead.

Reference Dose (RfD). The level of a chemical that is expected to have no adverse effects in humans when consumed on a daily basis over a lifetime. The dose is expressed in milligrams (mg) of chemical per kilogram (kg) of body weight per day.

***Resource Conservation and Recovery Act* (RCRA)**. A law passed in 1976 that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used for treating, transporting, storing, and disposing of hazardous substances. The law also requires federal agencies to comply with all federal, state, interstate, and local regulations respecting control and abatement of solid waste or hazardous waste disposal.

Short-term Impact/Effect. For this EIS, an impact that is related to construction or demolition activities, and that does not exceed approximately three years. See Long-term Impact/Effect.

Significance [of an Impact]. The concept of "significance" used in this assessment includes consideration of both the context and the intensity or severity of the impact, as defined by 40 CFR §1508.27. The severity of an impact could be based on the magnitude of change and the likelihood of change; the potential for violation of laws, regulations, or standards; the context of the impact (both spatial and temporal); degrees of adverse effect to specific concerns such as public health or endangered species; and the resilience and abundance of the resource. Impacts can be characterized as significant or not significant. See Section 4.1 for a more detailed discussion.

Soil series. A group of soils having similar parent materials, genetic horizons, and arrangement in the soil profile.

Species of special concern. A species that has been declining in population in the state. If this species continued to decline, they would be recommended for threatened or endangered status.

State Historic Preservation Officer (SHPO). The official within each state, authorized by the state at the request of the Secretary of the Interior, to act as liaison for purposes of implementing the *National Historic Preservation Act*.

Sulfur dioxide (SO_2). A toxic gas that is produced when fossil fuels, such as coal and oil, are burned. SO_2 is the main pollutant involved in the formation of acid rain. SO_2 also can irritate the upper respiratory tract and cause lung damage. During 1980, some 27 million tons of sulfur dioxide were emitted in the United States, according to the Office of Technology Assessment. The major source of SO_2 in the United States is coal-burning electric utilities.

Threatened species. A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Threshold Limit Value (TLV). An eight-hour time-weighted average occupational inhalation exposure limit to a chemical.

***Toxic Substances Control Act* (TSCA)**. This law was enacted in 1976 to give the USEPA the ability to track industrial chemicals currently produced or imported into the United States. The USEPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard, or can ban the manufacture and import of those chemicals that pose an unreasonable risk.

U.S. Environmental Protection Agency (USEPA). The independent federal agency, established in 1970, that regulates federal environmental matters and oversees the implementation of federal environmental laws.

Voluntary Remediation Program (VRP). The Wyoming Department of Environmental Quality requires the voluntary remediation of soils to unrestricted land use standards, and for groundwater to meet drinking water standards at contaminated sites.

Volatile organic compound (VOC). Compounds containing carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, metallic carbonates, and ammonium carbonate.

Warhead. The component within the reentry vehicle containing the nuclear explosive.

Waters of the United States. Waters that are subject to Section 404 of the *Clean Water Act*, including deep water aquatic habitats and special aquatic sites, including wetlands. Jurisdictional wetlands include those that are isolated, part of intermittent streams, or adjacent to waters that are, or eventually flow into, interstate or navigable waters.

Wetlands. Areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil. This classification includes swamps, marshes, bogs, and similar areas. Jurisdictional wetlands are those wetlands that meet the hydrophytic vegetation, hydric soils, and wetland hydrology criteria under normal circumstances (or meet the special circumstances as described in the U.S. Army Corps of Engineers, *1987 Wetland Delineation Manual,* where one or more of these criteria may be absent and are a subset of "waters of the United States").

ACRONYMS/ABBREVIATIONS

^{o}F	degrees Fahrenheit
µg/l	micrograms per liter
ug/m^3	micrograms per cubic meter
AADT	annual average daily traffic
ABM	anti-ballistic missile
ACM	asbestos-containing material
ADI	alternating-direction implicit
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFI	Air Force Instruction
AFLC	Air Force Logistics Command
AFOSH	Air Force Occupational Safety and Health
AFR	Air Force Regulation
AFSPC	Air Force Space Command
AICUZ	Air Installation Compatible Use Zone
ANFO	ammonium nitrate and fuel oil
AST	above ground storage tank
BAH	basic allowance for housing
BCU	brine chiller unit
BNSF	Burlington Northern Santa Fe Railroad
C&D	construction debris
CAA	*Clean Air Act* (federal)
CE	Civil Engineering
CEQ	Council on Environmental Quality
CES	Civil Engineering Squadron
CERCLA	*Comprehensive Environmental Response, Compensation and Liability Act*
CERFA	*Community Environmental Response Facilitation Act*
CESQG	conditionally exempt small quantity generator
cf	cubic feet
CFC	Chlorofluorocarbon
CFR	*Code of Federal Regulations*
Cm	centimeter
CO	carbon monoxide
COC	communities of comparison
CREAMS	Chemicals, Runoff, and Erosion from Agricultural Management Systems
CWA	*Clean Water Act*
DAR	Defense Access Route
dB	decibel
dBA	"A-weighted" decibel
DEIS	Draft Environmental Impact Statement
DEU	diesel electric unit
DF	diesel fuel
DoD	Department of Defense

DOPAA	Description of the Proposed Action and Alternatives
DRMO	Defense Reutilization and Marketing Office
EBDC	Economic Business Data Center
EBS	Environmental Baseline Survey
EHS	Extremely Hazardous Substances
EIAP	Environmental Impact Analysis Process
EIFS	Economic Impact Forecasting System
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	*Emergency Planning and Community Right-to-Know Act*
ESA	*Endangered Species Act*
ESA	electrical surge arrestors
FEIS	Final Environmental Impact Statement
FH	family housing
FHWA	Federal Highway Administration
FLHPO	Federal Lands Highway Program Office
ft	foot
FM	farm-to-market
FOSL	Finding of Suitability to Lease
FOST	Finding of Suitability to Transfer
FY	Fiscal Year
g/ha	grams per hectare
GLEAMS	Groundwater Loading Effects on Agricultural Management Systems
GSA	General Services Administration
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HAP	hazardous air pollutant
HAZCOM	Hazard Communication
HAZMART	Hazardous Materials Pharmacy
HAZMAT	Hazardous Materials
HCFC	hydrochlorofluorocarbon
HEPA	high efficiency particulate air
HICS	Hardened Intersite Cable System
HUD	Housing and Urban Development
Hz	hertz
ICBM	Intercontinental Ballistic Missile
ILS	Instrument Landing System
IMU	inertial measurement unit
IRP	Installation Restoration Program
ISCST	Industrial Source Complex Short-Term
Jct	junction
JP	jet petroleum

kg/ha	kilograms per hectare
kts	knots
KWH	kilowatt hours
L/mol	Liters per mole
lbs	pounds
LBP	lead-based paint
LCC	launch control center
LCEB	launch control equipment building
LCF	launch control facility
LCSB	launch control support building
LCSD	Laramie County School District
L_{dn}	day-night average sound level
LEB	launcher equipment building
L_{eq}	equivalent sound level
LER	launcher equipment room
LF	launch facility
LFSB	Launch Facility Support Building
LG	Logistics Group
LOS	level of service
MAF	missile alert facility
Mcf	million cubic feet
MCL	maximum contaminant level
mg/L	milligrams per liter
MG	Missile Group
MGCS	missile guidance control system
MGD	million gallons per day
MGS	missile guidance system
MM	Minuteman
MMBTU	million British Thermal Units
MMH	monomethyl hydrazine
mmol/kg	millimoles per kilogram
MOC	Method of Characteristics
MOGAS	motor gasoline
mrem	millirems
MS	Missile Squadron
MSA	Metropolitan Statistical Area
MSB	Missile Support base
MSDS	Material Safety Data Sheet
MSL	mean sea level
MSPF	Missile Stage Processing Facility
MTMC	Military Traffic Management Command
MW	Missile Wing
N_2	nitrogen gas
NAAQS	National Ambient Air Quality Standards
NAF	non-appropriated fund
NEPA	*National Environmental Policy Act*

NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	*National Historic Preservation Act*
NMD	National Missile Defense
NO	nitrogen oxide
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
MSB	missile support base
NWR	National Wildlife Refuge
O_3	ozone
ODC	ozone depleting chemicals
OSHA	Occupational Safety and Health Administration
PAH	personnel access hatch
Pb	Lead
PCB	polychlorinated biphenyl
PCI	per capita income
PEL	permissible exposure limit
pH	alkalinity/acidity factor
PM_{10}	particulate matter equal to or less than 10 microns in diameter
ppb	part per billion
ppm	parts per million
PPM	priority pollutant metals
ppt	parts per trillion
PPV	peak particle velocity
PSD	Prevention of Significant Deterioration
PSRE	propulsion system rocket engine
PT	payload transporter
RCRA	*Resource Conservation and Recovery Act*
REC	rural electric cooperatives
RfD	reference dose
ROD	Record of Decision
ROI	region of influence
RRRP	Resource, Recovery, and Recycling Program
RS	reentry system
RTV	rational threshold value
RV	reentry vehicle
SAC	Strategic Air Command
SAP	satellite accumulation point
SARA	*Superfund Amendments and Reauthorization Act*
SCS	Soil Conservation Service
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
START	Strategic Arms Reduction Treaty

STRATAD	Strategic Aerospace Division
SW	Space Wing
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TE	transporter-erector
TLV	threshold limit value
TNT	trinitrotoluene
TO	Technical Order
TOVEX	ammonium nitrate slurry with monomethylamine thickener
TPI	total personal income
tpy	tons per year
TRB	Transportation Research Board
TRI	Toxic Release Inventory
TSCA	*Toxic Substance Control Act*
TSP	total solid particulate
UHF	ultra-high frequency
UP	Union Pacific Railroad
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USBC	U.S. Bureau of the Census
USBEA	U.S. Bureau of Economic Analysis
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UWYO	University of Wyoming
VFR	visual flight rules
VOC	volatile organic compound
VRP	Voluntary Remediation Program
WAPA	Western Area Power Administration
WSA	weapons storage area
WYAAQS	Wyoming Ambient Air Quality Standards
WYDEQ	Wyoming Department of Environmental Quality
WYDOT	Wyoming Department of Transportation
WYOGCC	Wyoming Oil and Gas Conservation Commission
xtrm	extreme
yd^3	cubic yards

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APPENDIX P

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APPENDIX P.
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