CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF EACH ALTERNATIVE

3.1 CONTINUATION OF CURRENT OPERATIONS AT THE MOUND SITE (NO ACTION ALTERNATIVE)

3.1.1 Land Resources

Affected Environment

Land Use. Mound covers 122.4 hectares (ha) (306 acres) adjacent to and partly within the south city limits of Miamisburg, in Montgomery County, Ohio, about 16.1 kilometers (km) (10 miles [mi]) southwest of Dayton and 48.3 km (30 mi) northeast of Cincinnati. (Figure 3.1.1-1) Additional details on current land use are provided in the Mound Consolidation EA (DOE 1999a). Mound is owned by DOE and managed by Babcock & Wilcox Technologies of Ohio, Inc. (BWXTO). Mound occupies land on high bedrock bluffs with two hills, separated by a northeast-to-southwest valley and drainage-way emptying into the Great Miami River, and a flatter area to the south. In 1999, DOE consolidated the HS/RPS operations into a small area of existing and new buildings. Operations, personnel, and storage functions are currently housed in five buildings on the eastern side of Mound referenced in this EA as the HS/RPS operations area. The remainder of Mound is a mix of undeveloped land and developed areas for planned use as an industrial park. There is no prime agricultural land within Mound.

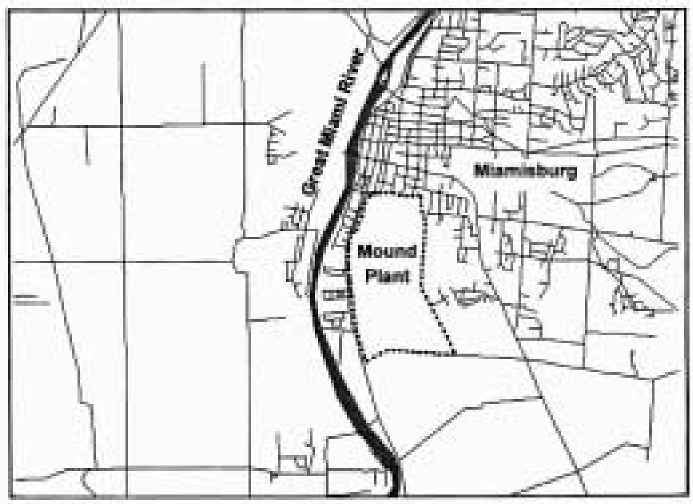

FIGURE 3.1.1-1.—*Location of Mound*

Land uses surrounding Mound include a mix of industrial, commercial, and residential uses to the north associated with the city of Miamisburg, industrial and recreational uses along the Great Miami River valley area to the west, and mainly residential development of Miamisburg and recreation areas to the east. To the south of Mound and outside the urbanized area, land uses are predominantly agricultural. The Miami Valley Regional Planning Commission considers Mound and Miamisburg, with a total population of more than 80,000, to be within the Dayton metropolitan area.

Visual Resources. Mound and Miamisburg are part of the Great Miami River Drainage Basin, with the surrounding land beyond the urban development generally characterized by open agricultural and grassland, valley areas, vegetated drainage channels, and hills. Miamisburg and the Great Miami River valley area have an industrialized visual character. Once the environmental restoration activities are completed and the Mound site is transferred to the city of Miamisburg, the site will have a primarily industrial character. Required security and facility upgrades to the existing HS operations will have a visible security element much higher than common industrial practices and would stand out from the industrialized visual character of the site.

Consequences

Under the No Action Alternative, the land uses at Mound would not change. The HS/RPS operations area would continue to house the HS/RPS operations. However, there would be a noticeable visual change in the appearance and activity around Building 50. This change may have a detrimental impact on the city of Miamisburg's reuse of the site. The rest of Mound would continue to undergo environmental restoration and eventual transfer to the city of Miamisburg.

3.1.2 Air Quality and Noise

Affected Environment

Nonradiological Air Quality

Emissions data from 1996 show that all emissions were within required limits and no enforcement actions were initiated in 1996 (EG&G 1997). Additional details on air quality are provided in the *EA for the Consolidation of Heat Source/Radioisotope Thermoelectric Generator (HS/RTG) Assembly and Testing Operations at Mound* (DOE 1999a).

Regional Air Quality. Mound is located in Montgomery County in the Metropolitan Dayton Intrastate Air Quality Control Region (AQCR) 173. AQCR 173 is designated by EPA as:

- "better than national standards" for SO_2
- "unclassifiable/attainment" for CO, PM_{10} and O_3
- "cannot be classified or better than national standards" for NO_2
- "not designated" for lead

Emissions. The primary source of nonradiological airborne emissions at Mound is Mound Central Plant Utilities Services Powerhouse, a steam power plant. The powerhouse is normally fueled with natural gas, but under certain circumstances fuel oil is used. Fuel oil with 0.1 percent sulfur content is burned during unusually cold weather or if the natural gas supply to Mound is interrupted. Mound fuel oil and natural gas consumption rates are presented in Section 3.1.10.

Noise

The major noise sources at Mound include equipment and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and material-handling equipment, and vehicles). The acoustic environment in areas adjacent to Mound can be classified as residential. In the residential environment, the major source of noise is traffic and yard care equipment. Operation activities in and around Mound do not expose workers or members of the public to noise limits in excess of the Occupational Safety and Health Administration (OSHA) 90 A-weighted decibels (dBA) limit over an 8-hour period (29 CFR 1910.95).

Consequences

There would be no changes to the current operations at Mound under the No Action Alternative. The noise level would remain at levels typical for industrial facilities.

3.1.3 Water Resources

Affected Environment

Surface Water

Although there are no perennial surface waters located onsite, Mound is situated within the Great Miami River drainage basin and the river is located 0.8 km (0.5 mi) from the western border of the site. The river's water level adjacent to Mound is controlled by the Hutchings Station Dam, which is located about 2.4 km (1.5 mi) downstream from the facility.

The existing facilities that house HS/RTG operations require non-process water and water to perform cleaning operations, supplied by municipal water from the city of Miamisburg. Sanitary wastewater is the primary source of wastewater, which is routed to Mound's Wastewater Treatment Plant until connection to the Miamisburg Municipal Treatment Plant becomes feasible. The 100-year recurrence interval flood event elevation to Mound is 213 m (698.67 ft). The HS/RPS operations area is located above the 100-year interval flood event elevation.

Groundwater

Groundwater at Mound exists in two hydrogeologic environments: groundwater flow associated with the Buried Valley Aquifer (BVA) and perched groundwater. The BVA serves as a primary source of drinking water in the Miami Valley Region and is classified by EPA as a Class I sole-source aquifer. The Great Miami River supplies a significant amount of water recharge to the BVA.

The BVA provides Mound with both drinking and process water, as municipal water from the city of Miamisburg. The total amount of recharge from these sources provides sufficient volumes of water to balance Mound's water requirement. At Mound, maximum aquifer depth is about 21 m (70 ft) at the southwest corner of the site. BVA groundwater movement at Mound generally flows south, following the course of the Great Miami River.

As part of its environmental restoration activities, DOE is investigating potential contamination of groundwater, surface water, and soil areas. In response to possible volatile organic compounds (VOC) contamination in the portion of the BVA that underlies the southeast corner of Mound, DOE installed a series of extraction and monitoring wells, and an air stripper was also installed to reduce VOC contamination.

Consequences

The No Action Alternative would involve the continued use of groundwater at Mound for domestic and process use. The level of use would not change. The impacts to surface and groundwater from the HS/RPS operations would remain at the current levels.

3.1.4 Geology and Soils

Affected Environment

Mound is located on the eastern portion of the Indiana-Ohio platform within the Central Stable Physiographic Province. Mound is situated on two knolls with a valley in between. Elevations range from approximately 270 m (885 ft) at the tops of the knolls to 235 m (771 ft) at the base of the valley. The HS/RPS operations area facilities are located on an elevated portion of Mound in areas that are not subject to geologic hazards such as landslides or land subsidence. There are no known economically viable geologic resources at Mound.

Consequences

There would be no disturbance of land under the No Action Alternative. Therefore, no impacts to soils would result from the No Action Alternative.

3.1.5 Ecological Resources

Affected Environment

Mound is an industrial area with terrestrial habitats generally limited to the southwestern portion of Mound, other than the HS/RPS operations area, and to several slopes separating developed areas throughout Mound. The HS/RPS operations area is in a well-developed and previously disturbed industrial setting with limited vegetation. The western half of Mound supports a matrix of mowed grass, deciduous forest, and scrub-shrub communities in various stages of succession. Land surrounding Mound is urbanized or under cultivation (DOE 1999a).

~~No wetland delineation has been performed on areas within the site boundaries.~~ Wetlands at Mound are likely limited to a small area of seeps, narrow intermittent stream channels, some drainage ditches, and man-made ponds. No wetlands are located in the vicinity of Building 50, the location of most of the HS/RTG operations. No perennial streams occur on the site.

Threatened and Endangered Species. The only federally-listed threatened or endangered species potentially occurring in the vicinity of Mound is the Indiana Bat (*Myotis sodalis*), a federally- and state-listed endangered species. Although no bats have been officially recorded on the site, the Indiana Bat is known to occur in the surrounding area. Suitable habitat is thought to include riparian areas and nearby woodlots, especially those with dead trees or trees with peeling bark, such as the shagbark hickory (*Carya illinoisensis*) (DOE 1999a).

Consequences

The HS/RPS operations area does not contain any habitat suitable for the Indiana Bat (i.e., riparian or woodlot areas). Thus, continued operations under the No Action Alternative would not impact threatened or endangered species or their critical habitat.

3.1.6 Cultural Resources

Affected Environment

Cultural resources in the vicinity of Mound include prehistoric and historic sites as well as standing structures related to the historic occupation of the region, including the World War II era and the Cold War era.

The National Register of Historic Places (NRHP) notes two sites in Miamisburg and in ~~the~~ the greater Dayton area surrounding ~~vicinity of~~ Mound: the prehistoric Miamisburg Mound (a conical burial mound) and Jacob's Church (dating from the town's early settlement.) In addition, Mound has identified 17 sites as having the potential for listing as a historic site and eligible for listing on the NRHP. The ~~T-Building, which is removed from the vicinity of the HS/RPS operations area, is being evaluated by the Advisory Council on Historic Preservation~~Advisory Council on Historic Preservation is evaluating the T-Building, which is not located in the vicinity of the HS/RPS operations area, for listing on the NRHP. Since the ~~since~~site is being environmentally restored, a ~~Memorndum~~Memorandum of ~~Agrrement~~Agreement was negotiated to allow for the demolition of most of these sites after written and photographic histories were developed.

Consequences

The continuation of the current HS/RPS operations at Mound would not impact the known cultural resources.

3.1.7 Socioeconomics

Affected Environment

Employment and Income

Consistent with most regions of the country, economic growth over the past several decades has been in non-agricultural sectors. The service, wholesale and retail trade, and manufacturing sectors are the major sources of ROI employment. Government and finance, insurance, and real estate jobs are also important sectors. The ROI experienced stable growth during the 1990s (DOE 1999a).

The ROI unemployment rate was 3.7 percent in 1997, the lowest level in over a decade. The unemployment rate for Ohio during 1997 was 4.6 percent (BLS 1998). Per capita income for the ROI was $25,305 in 1996, a 37-percent increase over the 1990 level of $18,496. The per capita income for Ohio was $23,493 in 1996 (DOE 1999a).

Population and Housing

Population. From 1990 to 1995, Ohio's population growth was 0.5 percent per year, while ROI growth averaged 0.8 percent annually. Population growth rates for both the ROI and Ohio are projected to slow after the year 2000. Based on population trends, the ROI population will total approximately 1,257,000 persons by 2025 (DOE 1999a).

Housing. There were a total of 391,809 housing units in the ROI during 1990; approximately 67 percent of these units were single-family units, 30 percent were multi-family units, and 3 percent were mobile homes. Approximately 6 percent of the housing units were vacant, although some vacant units were used for seasonal, recreational, or other occasional purposes.

In 1990, the median value of the owner-occupied housing units ranged from $65,000 in Montgomery County to $77,600 in Warren County, while the median monthly contract rents ranged from $316 in Montgomery County to $340 in Warren County.

Community Services

Community services in the ROI include: 33 public schools that provide educational services for approximately 161,000 students; 2,772 law enforcement personnel that work in 64 county and municipal police departments; 14 hospitals with a capacity of over 5,000 beds (AHA 1995); and over 2,100 working physicians.

Consequences

It is conceivable that the employment would be increased as the necessary security protection force is staffed, trained, and qualified. Continuing site procurements would benefit the local economy in terms of additional sales revenue and tax revenue for local governments. Since the continuation of the current operations at Mound would not result in any change, the current level of socioeconomic impacts would continue.

3.1.8 Waste Management

Affected Environment

Outside the HS/RPS operations area, waste management operations at Mound consist of five broad waste types: transuranic (TRU) waste, low-level waste (LLW), low-level mixed waste (LLMW), hazardous/toxic waste, and non-hazardous waste. Mound currently manages a backlog of TRU waste that is awaiting shipment. Mound also generates TRU waste from decontamination and decommissioning (D&D) activities.

The LLW at Mound consists of paper, wood, building debris, and soil contaminated with Pu-238, Pu-239, and thorium, in addition to paper, wood, plastic, and scrap equipment contaminated with tritium. Currently, approximately 70 percent of the LLW generated at Mound is a result of ongoing D&D activities. The LLW at Mound is treated using a separation and filtration process, stored, and then shipped to a commercial facility for disposal. In 1999, approximately 8,340 cubic meters (m^3) (294,600 cubic feet [ft^3]) of LLW was shipped to disposal sites. Of this amount, approximately 70 percent was associated with D&D operations.

The HS/RPS cleaning operations at the HS/RPS operations area generate, on a non-routine basis, very small volumes of liquid LLW and hazardous waste. The wastes, which are comprised of fuel clad cleaning solutions, decontamination solutions, and metal component cleaning solutions, are packaged and transported to appropriate treatment, storage, and disposal facilities.

There are no active onsite disposal facilities for hazardous wastes at Mound. All hazardous/toxic wastes are packaged in U.S. Department of Transportation (DOT)-approved containers, mostly 55-gallon drums, manifested and shipped under contract with DOT-registered transporters to *Resource Conservation and Recovery Act* (RCRA) or *Toxic Substance Control Act* (TSCA) permitted facilities for treatment or disposal depending on the waste form. Non-hazardous wastes generated at Mound are disposed of in nearby sanitary landfills that are licensed and permitted.

Consequences

The current generation, treatment, and disposal practices would continue under the No Action Alternative. The HS/RPS operations would continue to generate very small volumes of liquid LLW and hazardous waste on a non-routine basis.

3.1.9 Human Health

Affected Environment

Normal Facility Operations

The following provides a description of the radiological human health effects from normal facility operations at the HS/RPS operations area. Additional detail on radiological human health is provided in the Mound Consolidation EA (DOE 1999a).

Operations at the HS/RPS operations area do not release any radioactivity onsite or offsite to either the atmosphere or water resources because Mound only receives fully encapsulated radioactive material from LANL (DOE 1999a). Therefore, HS/RPS operations do not contribute to the offsite doses to either the maximum exposed individual or the general population within 80 km (50 mi) of Mound (0.31 mrem and 3.9 person-rem respectively).

The radiological impacts to both involved and non-involved onsite workers at Mound from all operations have been decreasing since 1996 (DOE 1999a). Irrespective of operation locations, the doses to the maximum exposed worker and the total work force are not expected to exceed the doses shown in Table 3.1.9-1 (between 50 and 1,000 mrem and 20.1 person-rem, respectively). Table 3.1.9-1 includes the average, maximum and total occupational doses to Mound workers from operations in 1996. The doses received by workers at Mound are within radiological limits (10 CFR 835), which are also shown in Table 3.1.9-1 for comparison. Based on a risk-estimator of 400 fatal cancers per 1 million person-rem among workers, the number of excess fatal cancers to Mound workers from operations in 1996 is estimated to be 0.008.

TABLE 3.1.9-1.—*Doses to the Worker Onsite From Normal Operations at Mound in 1996*

Affected Environment	Onsite Releases and Direct Radiation (committed effective dose equivalent)	
	Standard[a]	Actual[b,c]
Average non-involved worker (mrem)	None	50
Maximally involved exposed worker (mrem)	5,000	<1,000
Total workers (person-rem)	None	20.1

a. 10 CFR 835. DOE's goal is to maintain radiological exposure as low as reasonably achievable.
b. DOE 1999b. The number of badged workers in 1996 with measurable dose was approximately 403.
c. DOE 1999c.

Accidents

HS/RPS Operations at the Mound Facility. In 1999, DOE transferred operations once performed in Building 38 into Building 50. As a result, all HS/RPS operations involving nuclear materials occur in Building 50. Potential accidents associated with HS/RPS operations in Building 50 are described in safety documents (BWXTO 1999). Operations and activities represent the best available historical record of safety hazards and potential accidents associated with HS/RPSs. Hazard studies of the operations in Building 50 determined that its final hazard classification is a Category 3 Nuclear Facility (BWXTO 1999).

Accident Scenarios and Consequences. An earlier safety analysis (Carsner 1995, Gilliat 1995) of RPS operations at Mound indicated that a catastrophic failure of one or more of the GPHS fuel elements could conceivably expose many grams of radioactive Pu-238 dioxide fuel to the environment. However, due to the solid ceramic form of the plutonium, only a small fraction of the radioactive fuel could be dispersed. The Design Basis Release for the facility considered a release of 500 g (17.6 oz) of fuel into the assembly room, but the probability of occurrence is much less than $1.0x10^{-6}$ per year. The consequences of this release are negligible because of the multiple protective features of the Category 3 building. Category 3 facilities are equipped with engineering and administrative controls that, if an accident were to occur, negligible consequences would result. Maximum lifetime dose commitment to any member of the public in Ohio was calculated to be $4.0x10^{-10}$ rem to the lung and $2.0x10^{-10}$ rem to the bone.

No radioactively contaminated liquid wastes would be generated during normal operations. Should an incident result in a release or suspected release of contamination, any contaminated wastes along with all other wastes from drains, showers, sinks, and lavatories would be routed to a holding tank. The liquid waste would be sampled, and if determined to be contaminated, the liquid waste would be pumped into a tank truck for transport and disposal. Solid wastes from the radiation control areas within the building would be treated as contaminated and would be disposed of using existing Pantex Plant procedures.

Accidents postulated for HS/RPS operations at Mound were discussed in the Mound Consolidation EA (DOE 1999b). The postulated accidents result in the unmitigated release of plutonium that could potentially result in fatalities of operators working in the facility. Some unmitigated accidents also have the potential for offsite exposures of greater than 5 rem, which would be in excess of public evaluation guidelines at the facility boundary. However, the potential for offsite exposures beyond the site boundary generally diminishes with increasing distance as a result of the effects of dispersion and dilution in the atmosphere.

The existing facilities would be vulnerable to a large aircraft crash. However, given the nature of the encapsulated material, a large release is not likely. A large release would have the same consequences to the public as the release discussed above. The worker impacts would be dominated by the effects of the crash itself.

Mitigation Factors. DOE operations are conducted in accordance with DOE Orders, the law, and regulatory requirements to minimize the chances of an accidental release of chemical and radiological materials. Measures are taken to prevent accidents, and in the event of an accident, to eliminate, lessen, or compensate for the potential impacts. For example, engineered safety features and administrative controls are designed to prevent accidents from occurring or stop the progression of the accident. Other measures following an accident act to minimize the impacts to workers, the public, and the environment. For example, adverse effects of accidents are mitigated by air filtration systems, room and building barriers and air locks that contain releases of hazardous materials; dikes for controlling spills; fire-fighting equipment; evacuating workers and/or the public; restricting the consumption of contaminated food and water; cleaning up contaminated areas; and restricting public access to contaminated areas. Each mitigative measure for preventing and mitigating accident impacts depends on the accident scenarios, facility locations and other factors.

Consequences

The doses to workers or the public and the associated health risks would not change under the No Action Alternative. HS/RPS operations do not and are not expected to impact the offsite doses to either the maximum exposed individual or the general population within 80 km (50 mi) of Mound (0.31 mrem and 3.9 person-rem respectively).

3.1.10 Utilities/Infrastructure

Affected Environment

The HS/RPS operations area consists of operations, personnel, and storage facilities that are supported by an infrastructure system. As part of establishing the HS/RPS operations area, DOE proposed to disconnect from Mound Central Utilities Services and link the HS/RPS operations area to utility services provided by the city of Miamisburg. Currently, only the water and sewer services are not provided by the city.

Mound is accessible from Mound and Benner Roads. Approximately 11 km (6.6 mi) of roads exist on the site. Two sets of north-south railroad tracks are situated to the west of the site.

Electricity. Four 12,470 volt lines supply power to Mound. A total capacity of 21.3 MVA is available from the three feeders while the fourth supplies 300 KVA to the three deep wells located on the southwest corner of the property. A maximum demand of 14.5 MVA occurred in 1989. The present peak demand on the system is approximately 7.7 MVA.

The estimated electrical requirement for the HS/RPS operations area 2,309 megawatts per year (MWh/yr), are well within the current Miamisburg area utility capacity. A 500-kilowatts diesel-driven generator, located adjacent to Building 38, provides emergency power for critical exhaust fans. The total diesel fuel requirement for emergency generator testing during operations is negligible and is met through additional procurements by normal contractual means.

Fuel. Natural gas requirements of the HS/RPS operations area are approximately 700,309 m^3 (24,731,412 ft^3) per year and are supplied by DP&L. Mound's peak steam load conditions generally occur in the winter.

Water. The HS/RPS operations area total water requirement of 28,020,205 liters (L) (7,285,253 gallons [gal]) is well within the capacity of Miamisburg's water availability. The HS/RPS operations area facilities require non-process water and water to perform cleaning operations, all supplied by municipal water from the city of Miamisburg.

Wastewater. Sanitary wastewater is the primary source of wastewater, which is routed to Mound's Wastewater Treatment Plant until connection to the Miamisburg Municipal Treatment Plant becomes feasible. Prior to consolidation, the Mound sanitary sewer and treatment utility was operating since 1947. The original treatment plant was replaced in the early 1970s, and extensively upgraded in 1993 for a flow of 491,400 L per day (130,000 gal per day). The average daily flow into the plant ranges from 245,700 to 264,600 L per day (65,000 to 70,000 gal per day).

Consequences

The utility use would remain at the current level under the No Action Alternative. If the operations remain at Mound, the water and sewage services would be connected to the city of Miamisburg.

3.1.11 Transportation

Affected Environment

Packaging. All encapsulated Pu-238 dioxide transportation to and from Mound is packaged in USA/5320/B(U)F or USA/9516/B(U)F-85 shipping containers and transported by Safe Secure Transport

(SST). Completed RPSs are packaged and transported in USA/9904/B(U)F-85 shipping containers. The USA/9516/B(U)F-85 consists of a cask/cage assembly, and an assortment of primary and secondary containment vessels. The USA/9904/B(U)F-85 is used to transport RPSs. The maximum gross weight of each package, including payload and limiter, is approximately 9,600 pounds (lbs) (4,355 kilograms [kg]); the empty weight of the packaging is 8,850 lbs (4,014 kg).

Transport. DOE maintains and operates a special fleet of trucks and trailers used to safely and securely transport Special Nuclear Materials, classified configurations of nuclear weapon systems, and other forms and quantities of strategic materials between U.S. Department of Defense (DoD) sites and DOE production sites, laboratories and test sites. An SST trailer is a modified standard closed semi-trailer that includes necessary tie-down equipment, temperature monitoring, fire alarms, and an access denial system. All vehicles undergo an extensive maintenance check prior to every trip, as well as periodic preventive maintenance inspections.

Radiological transportation risk was modeled using RADTRAN4, a computer modeling program developed at Sandia National Laboratories/New Mexico (SNL/NM) (SNL 1992). The incident-free crew dose and combined population dose from off-link, on-link, and stop components along with potential accident impact to population per unit shipment are presented in Table 3.1.11-1. The values are based on the largest RPS assembled. Component doses are determined by the unit shipment dose and the number of shipments. The radiological risk per unit shipment due to incident-free and potential accident are presented in Table 3.1.11-2.

Traffic fatalities were estimated using unit-risk factors (risk per kilometer traveled) developed from national statistics for highway accident-related deaths (SNL 1986). These non-radiological unit risk factors are presented in Table 3.1.11-3. The traffic fatalities per unit shipment are presented in Table 3.1.11-2. Non-radiological LCFs due to truck emissions (air pollutants) were evaluated based on unit-risk factors developed by SNL (SNL 1982). These non-radiological unit-risk factors are presented in Table 3.1.11-3. The non-radiological latent cancer fatalities (LCFs) due to truck emissions per shipment are presented in Table 3.1.11-2. The non-radiological risks are calculated based on round-trip basis as these risks are equally likely when the transport vehicle is traveling loaded or empty.

The overall transportation impact based on the total number of shipments of plutonium dioxide for assembling one GPHS/RPS at Mound, and the shipment of the RPS from Mound to Cape Canaveral, Florida (or other designated site), could be calculated using the unit shipment risk numbers presented in Table 3.1.11-2. Three shipments of encapsulated Pu-238 from LANL to Mound are assumed to be required for fabrication of one RPS at Mound and the fabricated RPS is assumed to be delivered in one shipment to Cape Canaveral, Florida. The summary of overall transportation impacts evaluated in terms of fatalities due to fabrication and delivery to the desired destination of one GPHS/RPS is presented in Table 3.1.11-4.

<u>Consequences</u>

The transportation of materials to and from Mound would continue as discussed above. There would be no changes in the impacts to the public under the No Action Alternative.

TABLE 3.1.11-1. — *Radiological Doses to Crew and Public per Unit Shipment of a GPHS/RPS*

Material Type	Route		Crew Dose	Incident-free Public				Accident	Total Dose	
	From	To	Person-rem	Handlers Person-rem	off-link Person-rem	on-link Person-rem	Stops Person-rem	Public dose Person-rem	Person-rem Crew	Public
Encapsulated $Pu^{238}O_2$	LANL	Mound	$2.88x10^{-02}$	$3.75x10^{-03}$	$1.70x10^{-03}$	$1.74x10^{-02}$	$2.48x10^{-01}$	$9.85x10^{-01}$	$2.88x10^{-02}$	1.29
GPHS/RPS	Mound	Florida	$2.39x10^{-02}$	$3.75x10^{-02}$	$2.10x10^{-03}$	$1.82x10^{-02}$	$2.48x10^{-01}$	3.10	$2.39x10^{-02}$	3.41

TABLE 3.1.11-2. — *Transportation Risk per Unit Shipment*

Material Type	ROUTE		Incident-free Risk		Accident Risk	Traffic Fatalities	Truck Emission
	From	To	Crew (LCFs)	Public (LCFs)	Public (LCFs)	Crew and Public	(LCFs)
Encapsulated $Pu^{238}O_2$	LANL	Mound	$1.44x10^{-5}$	$1.53x10^{-4}$	$4.93x10^{-4}$	$2.72x10^{-4}$	$1.02x10^{-5}$
GPHS/RPS	Mound	Florida	$1.20x10^{-5}$	$1.53x10^{-4}$	$1.55x10^{-3}$	$1.68x10^{-4}$	$5.60x10^{-6}$

TABLE 3.1.11-3. — *Non-Radiological Unit-Risk Factors for Truck Transportation*

Type	Rural	Suburban	Urban
Nonoccupational Latent cancers/km (Urban)	-	-	$1.0x10^{-7}$
Nonoccupational Fatalities/km	$5.3x10^{-8}$	$1.3x10^{-8}$	$7.5x10^{-9}$
Occupational Fatalities/km	$1.5x10^{-8}$	$3.7Ex10^{-9}$	$2.1x10^{-9}$

TABLE 3.1.11-4. — *Summary of Overall Transportation Impact for Fabrication and Delivery of One GPHS/RPS*

Type of Impact	Fabrication Pu from LANL to Mound	Delivery GPHS/RPS from Mound to Florida
Radiological Incident-Free	$5.01x10^{-4}$	$1.65x10^{-4}$
Radiological Accident	$1.48x10^{-3}$	$1.55x10^{-3}$
Traffic Fatalities	$8.16x10^{-4}$	$1.68x10^{-4}$
LCFs Due to Truck Emissions	$3.06x10^{-5}$	$5.60x10^{-6}$

3.1.12 Environmental Justice

The minority population percent totals in Butler County, Montgomery County, and Warren County equal 5.7 percent, 0.4 percent, and 3.0 percent, respectively. The percentage of the total population living below the poverty line in Butler County, Montgomery County, and Warren County totals 10.6 percent, 12.6 percent, and 6.4 percent, respectively (DOE 1999b). The population residing adjacent to Mound is not comprised of a disproportionately high number of minorities or persons living below the poverty line. For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority populations or low-income populations. As discussed throughout this chapter, there would be no adverse human health or environmental human impacts. Therefore, minority and low-income populations would not be disproportionately affected and there would be no environmental justice impacts.

3.2 ALTERNATIVE 1: TRANSFER OF OPERATIONS TO THE T-BUILDING AT MOUND

Under this Alternative 1, the HS/RPS operations would be moved from their current locations to the T-Building at Mound. The discussion of the affected environment and consequences for the No Action Alternative in Section 3.1 describes the impacts of the HS/RPS operations at the site as they are currently configured. The impacts of relocating the operations to the T-Building are essentially the same as presented in Section 3.1. The utilities, workforce, emissions, would all be essentially the same. The impacts associated with visual resources, air quality, noise, water resources, geology and soils, environmental justice, waste management, and transportation would remain the same.

The consequences for the following resource areas would be slightly different from those discussed above.

Land Use. The land use at Mound would remain the same. The HS/RPS operations would continue and the environmental restoration and eventual transfer of the site to the city of Miamisburg would also continue. The only difference would be that the current buildings used for HS/RPS operations in the HS/RPS operations area would eventually be transferred to the city instead of the T-Building.

Cultural Resources. The T-Building is eligible for listing on the National Register of Historic Places.~~an historic building.~~ Use of the T-Building for HS/RPS operations could have an adverse impact on the building as a cultural resource. Any modification to T-Building would be reviewed in accordance with the Mound Cultural Resources Management Program. After this review, c~~C~~oordination with the Ohio State Historic Preservation Officer (SHPO) may~~would~~ be required before any movement could occur.

Socioeconomics. It is not anticipated that relocating the facility to the Mound T-Building would have any significant socioeconomic impacts on the area surrounding the Mound Site. This alternative would not require the present site staff to transfer into new positions. However, there may be some increase in employment due to the security personnel required for this alternative. Any site procurements would benefit the local economy in terms of additional sales revenue and tax revenue for local governments.

Human Health. Due to the T-Building being underground, the impacts from accidents in the T-Building would likely be less than those described for current facilities at Mound. Therefore, the discussion of the potential impacts from accidents in Section 3.1.9 above would bound the impacts that would occur should the operations be relocated to the T-Building.

The underground T-Building would provide robust protection against the effects of a large aircraft crash. It is not likely that such a crash would result in any release of radioactive material.

3.3 ALTERNATIVE 2: RELOCATION OF OPERATIONS TO PANTEX PLANT ALTERNATIVE

The Pantex Plant is where DOE fulfills its responsibilities regarding the assembly and disassembly of nuclear weapons, maintenance and quality assurance testing of weapons components, and research and production of high explosives. The *Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE/EIS-0225) (Pantex EIS) (DOE 1996) and the 2002 Environmental Information Document were used as the primary references for the information in this section (BWXTP 2002).

Under Alternative 2, the HS/RPS assembly and testing operations at Mound would be relocated to the Pantex Plant outside of Amarillo, Texas (Figure 3.3-1). Existing facilities at the plant would be modified to house the operations.

3.3.1 Land Resources

Affected Environment

The Pantex Plant consists of approximately 3,680 ha (9,100 acres) of DOE-owned property, and 2,350 ha (5,800 acres) of land leased by DOE from Texas Tech University.

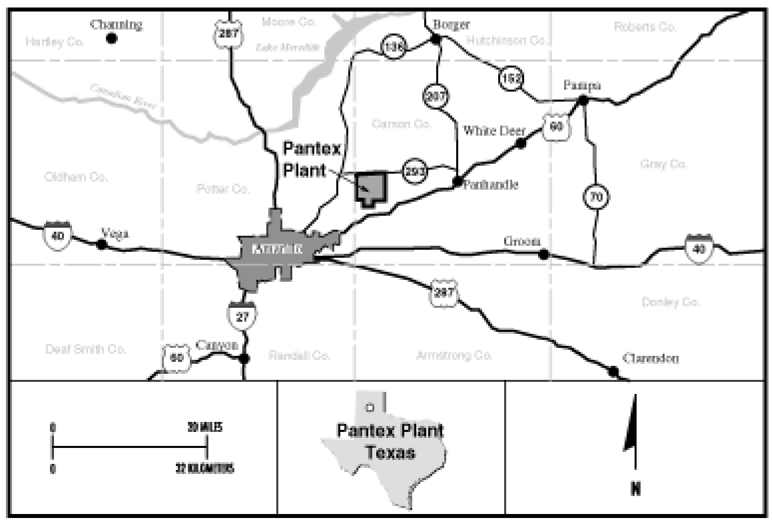

FIGURE 3.3-1 —*Location of Pantex Plant.*

Land Use. Just less than 1,010 ha (2,500 acres) of the DOE-owned land is used for the industrial operations at Pantex including the Burning Ground, firing sites and other outlying areas. The remaining DOE-owned land and land leased from Texas Tech are used by DOE as safety and security buffer zones. Texas Tech uses some of this land for agricultural purposes. The land use surrounding the Pantex Plant is primarily agricultural. The greatest portion of this is devoted to rangeland. Cropland for both irrigated and dryland crops are the second largest category.

Visual Resources. Visual resources at the Pantex Plant are typical of farm and rangeland in the area. The visual resources of the Pantex facilities are typical of industrial facilities.

Consequences

Land Use. The land use at the Pantex Plant would remain industrial. Existing facilities would be modified and used for the HS/RPS operations.

Visual Resources. The outward appearance of the facilities would not be changed. There would be no impacts to visual resources.

3.3.2 Air Quality and Noise

<u>Affected Environment</u>

Nonradiological Air Quality

Criteria Pollutants. The nonradiological air quality at the Pantex Plant is monitored by the Texas Natural Resource Conservation Commission (TNRCC). TNRCC measured total suspended particulates (PM_{10}), hydrogen fluoride, and 20 VOCs. No significant levels of pollutants and very few exceedances of any Federal standards for these pollutants were recorded. The exceedances were associated with PM_{10} on very windy days.

Chemical Pollutants. The Pantex Plant is a minor source under Title V of the Federal Operating Permit. Federally enforceable emission limits have been established. The actual emissions are tracked to ensure compliance with the limits.

Noise

Long-term ambient sound from Pantex Plant operations occurs in terms of daily cycles. Pantex Plant employee noise exposure ranged from 55 to 95 decibels (dB) in the industrial area. Greater short-term increases in the sound levels occur due to alarms, testing of high explosives, and target practice for security personnel.

<u>Consequences</u>

Nonradiological Air Quality

Relocation of the HS/RPS operations to the Pantex Plant would result in nonradiological air emissions for operations in existing facilities.

Criteria Pollutants. Under this alternative, activities associated with the construction of modification to the facility would take place inside the facility. No outside construction is necessary. There would be no particulate matter emissions from the modification activities.

The primary source of particulate emissions due to HS/RPS operations would be from the natural gas and diesel fuel burned in the Pantex Plant boilers to provide facility heating. The facility is currently being used to a degree that heat is already provided. The addition of the HS/RPS operations would result in a minimal increment to the existing boiler operations. Therefore, the <u>increase in</u> impacts from the HS/RPS operations would ~~also be minimal~~<u>not be significant</u>.

Chemical Pollutants. The HS/RPS operations at the Pantex Plant would involve the infrequent use of very small amounts of hazardous chemicals; including solvents used for cleaning operations, adhesives, leak test fluid, lubricants, rust inhibitors, and acid within wet cell batteries. The use of these materials could involve releases into the air through evaporation. The quantities of these materials are small and would not cause the Pantex Plant to exceed <u>current permit</u> ~~the Federal~~ limits.

Noise

Construction activities and the new HS/RPS operations would result in minor noise impacts; however, the magnitude of noise impacts would not exceed OSHA's 90 dBA limit over an 8-hour period (29 CFR 1910.95).

3.3.3 Water Resources

Affected Environment

Surface Water

All of the surface water runoff at the Pantex Plant drains into nearby internal drainage surface features called playas. In between precipitation events the playas are frequently dry. There are three onsite playas with a fourth on the land leased from Texas Tech. Treated wastewater from the Pantex Plant is discharged to a playa in the northeast part of the site.

Groundwater

The Pantex Plant overlies the Ogallala Aquifer that is the primary source of water in and around the Plant; water is supplied by five wells pumped into a common line and into ground storage tanks. Texas Tech also uses this water system. Total water use has ranged from 645 to 1,190 million liters (172 to 315 million gallons) annually. The Pantex Plant used 613 to 848 million liters (162 to 224 million gallons) during the same period. Water use by both the Pantex Plant and Texas Tech has decreased in recent years.

Historical groundwater withdrawals and long-term pumping from the Ogallala Aquifer in Carson County, Texas have exceeded the natural recharge rate. These overdrafts have caused substantial water level declines. Pantex Plant production wells withdraw only a small amount relative to the amount withdrawn for use in Amarillo, Texas and irrigation.

Operations at the Pantex Plant and its predecessors have resulted in contaminants being detected in the perched aquifer under the Pantex Plant. Downward migration of perched aquifer water could pose a threat to the underlying main Ogallala Aquifer.

Consequences

Surface Water

The modification and use of existing facilities for the HS/RPS operations would result in no surface water impacts at the Pantex Plant.

Groundwater

The HS/RPS operations at Pantex Plant would require 26.5 million liters (7 millions gallons) per year. This would be a 3 to 5 percent increment of the Pantex water use. While this amount is within the recent decreases in overall water consumption at the Plant, it would contribute to the ongoing over depletion of the Ogallala Aquifer in the area.

3.3.4 Geology and Soils

Affected Environment

The Pantex Plant is located in the Southern High Plains, a region of relatively flat topography with many playas. The soil in the Pantex Plant area is primarily silty clay loam, which is finely textured and easily eroded. The level landscape and the soil are considered prime farmland and allow for productive agriculture in the region.

<u>Consequences</u>

The relocation of HS/RPS operations to the Pantex Plant would not involve any soil disturbance. There would be no impacts to soils or farmlands.

3.3.5 Ecological Resources

<u>Affected Environment</u>

The vegetation in the Southern High Plains is characterized as short grass prairie with two grass species: blue grama (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*). Much of this native prairie has been converted to agricultural purposes. The uplands of the Pantex Plant support a variety of invertebrates, reptiles, amphibians, birds, and mammals, as wells as insects. There are 16 endangered, threatened, or candidate species or species of concern known to occur on or near the Pantex Plant. No critical habitat for these species is located on the Pantex Plant or in Carson County, Texas. An assessment of Pantex Plant operations determined that the operations were "not likely to adversely affect any federally listed threatened or endangered species" (BWXTP 2002).

There are five playas on the land owned or leased by DOE at the Pantex Plant. Although the playas are ephemeral waterbodies, many playas meet the criteria for jurisdictional wetlands. Wetland delineations have been made for four of the five playas. An official determination for the fifth playa has not yet been made.

<u>Consequences</u>

Relocating the HS/RPS operations to the Pantex Plant would not adversely affect ecological resources at the Plant. The use of an existing facility precludes the disturbance of any vegetation. Noise associated with the operations would be within the levels already produced by Plant operations. No wetlands would be impacted.

3.3.6 Cultural Resources

<u>Affected Environment</u>

Cultural surveys at the Pantex Plant have identified 69 archaeological sites, and have evaluated the historic occupation and use of the land, the features associated with the World War II predecessor to the Pantex Plant, and the Cold War era features. Two of the archaeological sites have been recommended as potentially eligible for inclusion on the NRHP. No historic or World War II features were potentially eligible. Continuing consultation is ongoing with the Texas SHPO concerning the management and eligibility of the Cold War era features.

<u>Consequences</u>

The internal modifications of the existing structures and operations associated with the HS/RPS operations at the Pantex Plant would be coordinated with the SHPO, but would not likely result in adverse impacts to cultural resources.

3.3.7 Socioeconomics

Affected Environment

This section tiers directly from the Pantex EIS (DOE 1996) and associated supplemental analyses. The actions addressed in this alternative would occur within the boundaries of the Pantex Plant. All demographic information from this EIS is applicable to this EA.

This section presents an overview of current socioeconomic conditions within an ROI where approximately 95 percent of the Pantex Plant workforce resides. The Pantex ROI is a four-county area comprised of Armstrong, Carson, Potter, and Randall Counties.

Employment and Income

The Pantex ROI contains the Amarillo Metropolitan Area of Potter and Randall Counties, which contains more than 95 percent of the population. Aside from the metropolitan area, the ROI is rural in character. Consistent with most regions of the country, economic growth over the past several decades has been in non-agricultural sectors. Although farming and agricultural services remain important to the ROI economy, these sectors provide less than 2 percent of the total number of jobs in the ROI. The wholesale and retail trade, service, and government sectors are now the major sources of ROI employment. Together, these sectors generate approximately 71 percent of the jobs in the ROI. The last decade has seen a dramatic increase in the level of government employment in the area. Finance, construction, and transportation jobs are also important sectors and accounted for about 15 percent of the ROI's employment in 2000 (TWC 2001). Table 3.3.7-1 presents employment levels for the major sectors for the ROI.

TABLE 3.3.7-1.—*Employment by Sector in 2000*

Sector	Percentage
Wholesale and retail	27.9
Services	25.6
Government	18.1
Manufacturing	11.6
Finance, insurance, and real estate	5.2
Construction	5.1
Transportation and public utilities	4.5
Farm	1.3
Agricultural service, forestry, and other	0.7

Source: TWC 2001.

Total ROI employment grew from 91,412 in 1990 to 100,820 in 2000, an annual growth rate of approximately 1.0 percent (DOE 1996, TWC 2001). The ROI unemployment rate was 3.4 percent in 2000. Unemployment rates within the ROI ranged from a low of 1.4 percent in Randall County to a high of 6.0 percent in Potter County. The unemployment rate for Texas in 2000 was 4.2 percent (BLS 2002).

Per capita income for the ROI was $12,639 in 1989. Per capita income levels within the ROI ranged from a low of $10,230 for Potter County to a high of $15,369 in Randall County. The per capita income for Texas was $12,904 in 1989 (DOE 1996).

Population and Housing

Population. From 1990 to 2000, the ROI population grew by 15 percent. Population growth rates for the ROI are projected to slow after the year 2000. Table 3.3.7-2 presents population estimates for the ROI through 2000 and projections for 2010 through 2030. Based on population trends, the ROI population will reach more than 237,000 persons by 2030.

Potter and Randall are the two largest counties in the ROI; together, they accounted for over 96 percent of the total ROI population in 2000. Armstrong and Carson are the most sparsely populated counties; together, they contain only 3.8 percent of the total ROI population. The largest city in the ROI is Amarillo, Texas, with a population of 173,627 in 2000 (Census 2000).

TABLE 3.3.7-2. —*Population Estimates for the Pantex ROI.*

County	1990	2000	2010	2020	2030
Armstrong	2,021	2,148	2,034	2,022	1,993
Carson	6,576	6,516	7,115	7,255	7,332
Potter	97,874	113,546	114,860	121,899	126,820
Randall	89,673	104,312	99,278	101,482	101,165
ROI	**196,144**	**226,522**	**223,287**	**232,658**	**237,310**

Sources: Census 2000, TSDC 2000.

Housing. There was a total of 84,506 housing units in the ROI during 1990. Approximately 11 percent of the housing units were vacant, although some vacant units were used for seasonal, recreational, or other occasional purposes. About 35 percent of the occupied housing units in the ROI were rental units and 65 percent were homeowner units. The majority of housing units in the ROI were located in Potter and Randall Counties, which includes the city of Amarillo. Table 3.3.7-3 shows housing characteristics for the ROI.

TABLE 3.3.7-3. —*ROI Housing Characteristics (1990)*

County	Total number of housing units	Number of owner-occupied units[a]	Number of occupied rental units[a]	Vacancy rates
Armstrong	916	620	148	16.2%
Carson	2,856	1,950	452	15.9%
Potter	42,927	22,490	14,854	13.0%
Randall	37,807	23,642	10,911	8.6%
ROI	**84,506**	**48,702**	**26,365**	**11.2%**

Source: DOE 1996.

a. Does not include housing used for seasonal, recreational, or other uses.

Community Services

This ROI has community services, including public schools, law enforcement, fire protection, and medical services, typical of a mid-size city. Available services are sufficient to meet the demands of the local population.

<u>Consequences</u>

It is not anticipated that this alternative would have any significant socioeconomic impacts on the area surrounding the Pantex Plant. All workers employed during construction would come from within the ROI, thus presenting no impacts to population, housing, and community services. Operation and maintenance of the facility may require relocation of specially trained staff from outside the ROI;

however, the maximum number of relocated staff is expected to be less than 20, which would present negligible impacts to population, housing, and community services. Current available resources would absorb the additional demand for housing and community services. Any of the 20 required operations and maintenance staff hired from within the ROI population would not have an impact on socioeconomic resources and would incrementally decrease the negligible impacts from individuals relocating to the ROI.

The employment generated by this alternative would benefit the ROI in terms of the creation of new jobs, additional income, and new tax revenues for local governments. The jobs directly created during the transfer and operation of the project would create additional economic benefits in terms of jobs and income in other sectors throughout the local economy. Any site procurements would also benefit the local economy in terms of additional sales revenue and tax revenue for local governments.

3.3.8 Waste Management

Affected Environment

The Pantex Plant generates and manages LLW, mixed waste (MW), and hazardous waste. The MW is currently stored onsite until they can be sent for offsite treatment and disposal. The LLW is made up of lab wipes, personal protective equipment (PPE), filters, HEPA filters, and various packing materials. The LLW is packed and transported to the Nevada Test Site. The recent LLW inventory volume is 83.4 m^3 (2,945 ft^3) of which 32.1 m^3 (1,133 ft^3) is liquid LLW (BWXTP 2002). Hazardous waste at the Pantex Plant includes debris, PPE, lab wipes, absorbent pads, sanitized weapon components, and liquids contaminated with solvents, high explosive, or heavy metals. The hazardous waste inventory at Pantex is 82.6 m^3 (2,916 ft^3). Other than the thermal treatment of high explosive materials, hazardous waste is sent offsite for treatment and disposal.

Consequences

The LLW and hazardous waste generation (other than high explosive) at Pantex is much less than either Mound or ANL-W. While the HS/RPS operations would generate only small volumes of liquid (LLW) and hazardous waste, this amount would be greater relative to the sites' waste volumes. Pantex has currently reduced or eliminated the production of liquid LLW. The generation of liquid LLW from the HS/RPS operations could result in changes to the current Pantex Plant waste management practices. The liquid LLW wastes, which are comprised of fuel clad cleaning solutions, decontamination solutions, and metal component cleaning solutions, would have to be packaged and transported to appropriate treatment, storage, and disposal facilities. The amounts of hazardous wastes generated by the HS/RPS operations are within the range of the existing Pantex waste streams.

The modifications to the existing Pantex Plant facility would result in short-term generation of nonhazardous construction waste that would be shipped offsite for disposal.

3.3.9 Human Health

Affected Environment

Releases from Pantex Plant Operations constitute a very small fraction of the total exposure to the public in the vicinity of the Plant. Cancer statistics for the State of Texas indicate that annually, a person in the Pantex Plant vicinity has a 1.7×10^{-3} probability of contracting a fatal cancer. From examining nominal fatal cancer risk factors for the public, it can be seen that fatal cancers attributable to environmental radioactivity released from Pantex Plant constitute an extremely small fraction (less than 0.01 percent) of the average yearly fatal cancer probability in the vicinity of Pantex Plant. The maximally exposed offsite individual had an estimated dose of 1.61 x 10^{-4} mrem in 2000. The estimated collective population dose was 1.~~-~~59 x 10^{-3} person~~s~~ rem for 2000 (BWXTP 2002).

The majority of Pantex Plant workers receive no detectable radiation exposures (i.e., zero dose) during normal operations as a result of their work and are considered non-involved workers. Of those workers that received non-zero doses (involved workers total 329) over the last 5 years, the average annual dose was 111 millirem with a maximum individual dose of 0.905 rem (DOE 1996). DOE orders and regulations specify a limit of 5 rem per year for occupational workers. In addition, as of 1996, the Pantex Plant administrative control level is 500 millirem per year for most workers and 900 millirem per year for production (weapons operations) workers.

The Plant plans to continue to reduce the control level for production workers to the 500 millirem per year level. Using fatal cancer risk factors for workers, the average annual probability of a Pantex Plant worker contracting a fatal cancer due to occupational radiation exposure is 4.4 x 10^{-5}. For those Pantex Plant workers that receive radiation doses, this 4.4 x 10^{-5} value is essentially in addition to the average annual fatal cancer risk of 1.7 x 10^{-3} for the regional population.

The largest contributors to worker radiological doses at the Pantex Plant are external exposures (i.e., those received from radiation-emitting sources). The largest potential for external doses occurs from weapon operations and pit repackaging. Involved worker population dose, from an external exposure viewpoint, has been significantly reduced at the Pantex Plant due to improvements in work practices and changes in work scope. In 1980, Pantex Plant operations resulted in a cumulative involved and non-involved worker dose of 148 person-rem over 719 personnel. In 1994, Pantex Plant operations resulted in a cumulative involved and non-involved worker dose of 29 person-rem over 329 personnel.

Consequences

Normal Operational Radiological Impacts

HS/RPS operations at Pantex are not expected to release any radioactivity onsite or offsite to either the atmosphere or water resources because Pantex would only receive fully encapsulated radioactive material from LANL (BWXTO 1998). During normal ~~Normal~~ operations, the fully encapsulated radioactive material would not be breached. ~~do not involve breaching this encapulation.~~ Therefore, HS/RPS operations, irrespective of the operation locations, would not impact the offsite doses to either the maximum exposed individual or the general population within 80 km (50 mi) of Pantex (1.61 x 10^{-4} mrem and 1.59 x 10^{-34} person-rem, respectively).

The radiological impact to the Mound onsite workers including those associated with the HS/RPS operations has been decreasing since 1996 (DOE 1999a). Irrespective of operation locations, the doses to the maximum exposed worker and the total work force are not expected to exceed between 50 and 1,000 mrem and 20.1 person-rem, respectively.

Accidents

This section depends on the accident analyses and history of the HS/RPS operations at Mound discussed in Section 3.1.9. This information is combined with Pantex Plant site-wide and facility specific information to project potential impacts from accidents.

Accident Scenarios and Consequences. A catastrophic failure of one or more of the GPHS fuel elements could conceivably expose many grams of radioactive Pu-238 dioxide fuel to the environment.

However, due to the solid ceramic form of the plutonium, only a small fraction of the radioactive fuel could be dispersed. The probability of occurrence was calculated to be less than 1.0×10^{-6} per year. The consequences of this release are negligible because of the multiple protective features of the Category 3 building and the form of the Pu-238 itself. The adverse effects of accidents are mitigated by air filtration systems, room and building barriers and air locks that contain releases of hazardous materials; dikes for controlling spills; fire-fighting equipment; and the evacuating workers and/or the public. For example, the steel armor was installed on some of the exterior walls to protect against wind-driven missiles. The building structure itself is designed to help preclude a release of plutonium and is therefore a safety significant structure. The Pantex Plant facility would be modified to hazard Category 3 standards.

The postulated accidents result in the unmitigated release of plutonium that could potentially result in fatalities of operators working in the facility. The accidents considered consisted of welding accidents, a catastrophic failure of one or more of the GPHS fuel elements, and the potential for a wind-driven missile impact through a facility wall into a glove box causing a breach of a GPHS. Some unmitigated accidents also have the potential for offsite exposures of greater than 5 rem, which would be in excess of public evaluation guidelines at the facility boundary. However, the potential for offsite exposures beyond the site boundary generally diminishes with increasing distance as a result of the effects of dispersion and dilution in the atmosphere. However, it is also important to note that Category 3 facilities are equipped with engineering and administrative controls that, if an accident were to occur, negligible consequences would result.

The existing facilities would be vulnerable to a large aircraft crash. However, given the nature of the encapsulated material, a large release is not likely. A large release would have the same consequences to the public as the release discussed above. The worker impacts would be dominated by the effects of the crash itself.

Maximum lifetime dose commitment to any member of the public in Ohio was calculated to be 4.0×10^{-10} rem to the lung and 2.0×10^{-10} rem to the bone. The maximum lifetime dose to any member of the public in Texas would be similar.

Nonradiological Impacts

Under this alternative, temporary employment would be required for the construction of new facilities. Temporary employees would be subjected to occupational risks that could result in death, injury, or illness. These risks, although minimal, would be minimized to the extent practical by following OSHA procedures for construction activities.

3.3.10 Utilities/Infrastructure

<u>Affected Environment</u>

The Pantex Plant operations, personnel, and storage facilities are supported by an infrastructure system. Pantex is accessible from U.S. Highway 60 and Interstates 40 and 27 provide regional access. A major rail center for the Burlington Northern Santa Fe Railroad is located in Amarillo, Texas, and passes along the southern boundary of the Texas Tech property at the Pantex Plant.

Pantex Plant electrical usage varies and has decreased since 1998. Fiscal year 2001 (FY01) usage was 77.6 kilowatt hours (kWh). Usage has been as high as 81.8 kWh. Natural gas usage for 2001 was 13.5 million m^3 (477 million ft^3)with a high of 15.2 million m^3 (537 million ft^3) in 1993. Pantex Plant water usage has ranged from 613 to 848 million liters (162 to 224 million gallons).

Consequences

Utility requirements for the HS/RPS site operations would be within the current Pantex utility capacity. The estimated total operational requirement for electricity for the HS/RPS operations is 2,039 megawatts per year (MWh/yr). Natural gas requirements would be 700,309 m^3 (2,473,000 ft^3). The water requirement of 26.5 million liters (7 million gallons) per year is within the Pantex Plant capacity but would incrementally increase the overdrawing of the Ogallala Aquifer.

3.3.11 Transportation

Affected Environment

Packaging. All encapsulated Pu-238 dioxide transportation to and from Pantex would be packaged in USA/5320/B(U)F or USA/9516/B(U)F-85 shipping containers and transported by SST. Completed RPSs are packaged and transported in USA/9904/B(U)F-85 shipping containers. The USA/9516/B(U)F consists of a cask/cage assembly, and an assortment of primary and secondary containment vessels. The USA/9904/B(U)F-85 is used to transport RPSs. The maximum gross weight of each package, including payload and limiter, is approximately 9,600 lbs (4,355 kg); the empty weight of the packaging is 8,850 lbs (4,014 kg).

Transport. DOE maintains and operates a special fleet of trucks and trailers used to safely and securely transport Special Nuclear Materials, classified configurations of nuclear weapon systems, and other forms and quantities of strategic materials between DoD sites and DOE production sites, laboratories and test sites. A ~~(~~SST~~)~~ trailer is a modified standard closed semi-trailer that includes necessary tie-down equipment, temperature monitoring, fire alarms, and an access denial system. All vehicles undergo an extensive maintenance check prior to every trip, as well as periodic preventive maintenance inspections.

Consequences

Radiological transportation risk was modeled using RADTRAN4, a computer modeling program developed at SNL/NM (SNL 1992). The incident-free crew dose and combined population dose from off-link, on-link, and stop components along with potential accident impact to population per unit shipment are presented in Table 3.3.11-1. The values are based on the largest RPS assembled, the GPHS/RPS. The doses presented in Table 3.3.11-1 are calculated based on generic distance and route and population characteristics from the current transportation from LANL to Mound and Mound to Florida. Component doses are determined by the unit shipment dose and the number of shipments. The radiological risk per unit shipment due to incident-free and potential accident are presented in Table 3.3.11-2.

The traffic fatalities per unit shipment are presented in Table 3.3.11-2. Traffic fatalities were estimated using unit risk factors (risk per kilometer traveled) developed from national statistics for highway accident-related deaths (SNL 1986). These non-radiological unit risk factors are presented in Table 3.3.11-3. Non-radiological LCFs due to truck emissions (air pollutants) were evaluated based on unit risk factors developed by SNL (SNL 1982). These non-radiological unit risk factors are presented in Table 3.3.11-3. The non-radiological LCFs due to truck emissions per shipment are presented in Table 3.3.11-2.

The non-radiological risks are calculated based on round-trip basis as these risks are equally likely when the transport vehicle is traveling loaded or empty.

The overall transportation impact based on the total number of shipments of plutonium dioxide for assembling one GPHS/RPS at Pantex, and the shipment of the RPS from Pantex to the Kennedy Space Center, Florida (or other designated site), could be calculated using the unit shipment risk numbers presented in Table 3.1.11-2. Three shipments of encapsulated Pu-238 from LANL to Pantex are assumed to be required for fabrication of one RPS at Pantex and the fabricated RPS is assumed to be delivered in one shipment to Cape Canaveral, Florida. The summary of overall transportation impacts evaluated in terms of fatalities due to fabrication and delivery to the desired destination of one GPHS/RPS is presented in Table 3.3.11-4.

3.3.12 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority populations or low-income populations. As discussed throughout this chapter, there would be no adverse human health or environmental human impacts. Therefore, minority and low-income populations would not be disproportionately affected and there would be no environmental justice impacts.

TABLE 3.3.11-1. — *Radiological Doses to Crew and Public per Unit Shipment of a GPHS/RPS*

Material Type	Route		Crew Dose	Incident-free Public				Accident	Total Dose	
	From	To	Person-rem	Handlers	Off-link	On-link	Stops	Public dose	Person-rem	
				Person-rem	Person-rem	Person-rem	Person-rem	Person-rem	Crew	Public
Encapsulated $Pu^{238}O_2$	LANL	Pantex Plant	$2.88x10^{-02}$	$3.75x10^{-03}$	$1.70x10^{-03}$	$1.74x10^{-02}$	$2.48x10^{-01}$	$9.85x10^{-01}$	$2.88x10^{-02}$	1.29
GPHS/RPS	Pantex Plant	Florida	$2.39x10^{-02}$	$3.75x10^{-02}$	$2.10x10^{-03}$	$1.82x10^{-02}$	$2.48x10^{-01}$	3.10	$2.39x10^{-02}$	3.41

TABLE 3.3.11-2. — *Transportation Risk per Unit Shipment*

Material Type	Route		Incident-free Risk		Accident Risk	Traffic Fatalities	Truck Emission
	From	To	Crew (LCFs)	Public (LCFs)	Public (LCFs)	Crew and Public (LCFs)	(LCFs)
Encapsulated $Pu^{238}O_2$	LANL	Pantex Plant	$3.81x10^{-6}$	$4.04x10^{-4}$	$1.30x10^{-4}$	$8.46x10^{-5}$	$1.29x10^{-6}$
GPHS/RPS	Pantex Plant	Florida	$1.81x10^{-5}$	$2.30x10^{-4}$	$2.33x10^{-3}$	$3.17x10^{-4}$	$4.84x10^{-6}$

TABLE 3.3.11-3. — *Non-Radiological Unit-Risk Factors for Truck Transportation*

Type	Rural	Suburban	Urban
Nonoccupational Latent cancers/km (Urban)	-	-	$1.0x10^{-7}$
Nonoccupational Fatalities/km	$5.3x10^{-8}$	$1.3x10^{-8}$	$7.5x10^{-9}$
Occupational Fatalities/km	$1.5x10^{-8}$	$3.7Ex10^{-9}$	$2.1x10^{-9}$

TABLE 3.3.11-4. — *Summary of Overall Transportation Impact for Fabrication and Delivery of One GPHS/RPS*

Type of Impact	Fabrication Pu from LANL to Pantex Plant	Delivery GPHS/RPS from Pantex Plant to Florida
Radiological Incident-Free	$1.33x10^{-4}$	$2.48x10^{-4}$
Radiological Accident	$3.90x10^{-4}$	$2.33x10^{-3}$
Traffic Fatalities	$2.54x10^{-4}$	$3.17x10^{-4}$
LCFs Due to Truck Emissions	$3.87x10^{-6}$	$4.84x10^{-6}$

3.4 ALTERNATIVE: 3 RELOCATION OF OPERATIONS TO ARGONNE NATIONAL LABORATORIES–WEST (PREFERRED ALTERNATIVE)

ANL-W is a part of Argonne National Laboratory (ANL), which is operated by the University of Chicago for the DOE. The ANL-W facilities are located in the southeast corner of the INEEL Site west of the city of Idaho Falls in southeast Idaho (Figure 3.4-1). INEEL is one of DOE's primary centers for research and development activities on reactor performance, materials testing, environmental monitoring, natural resources research and planning, and waste processing.

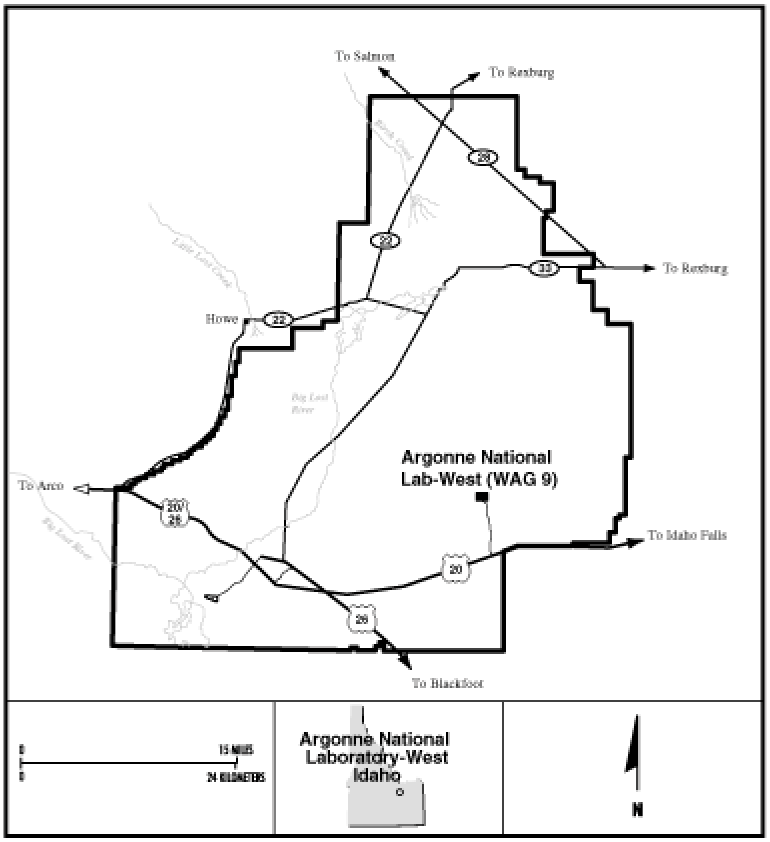

FIGURE 3.4-1. —*Location of ANL-W.*

INEEL consists of several major complexes: the Experimental Breeder Reactor-II (EBR-II), the Transient Reactor Test Facility, the Zero Power Physics Reactor (ZPPR), the Hot Fuel Examination Facility, the Fuel Conditioning Facility, the Fuel Manufacturing Facility; and the Laboratory Support complexes include the Radioactive Liquid Waste Treatment Facility, the Radioactive Scrap and Waste Facility and the Sodium Processing Facility.

INEEL-wide information was obtained and referenced primarily from the *Advanced Mixed Waste Treatment Project Final EIS* (AMWTP EIS) (DOE 1999b) and the *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (INEL EIS) (DOE 1995). Where necessary, updated environmental baseline information is presented and documented accordingly.

3.4.1 Land Resources

<u>**Affected Environment**</u>

Land Use. There are 52 major buildings located within 34 ha (84 acres) at ANL-W, including reactor buildings, laboratories, warehouses, technical and administrative support buildings, and craft shops. These buildings comprise 55,740 m^2 (600,000 ft^2). The land uses are primarily industrial uses associated with nuclear power research. Other land uses include support facilities, tank areas, spent fuel storage, and wastewater treatment and disposal.

INEEL encompasses 230,329 ha (569,135 acres) used to support the DOE facility and program operations and as safety-and-security zones around facilities. Only 2 percent of the land within the INEEL 4,614 ha (11,400 acres) has been developed for the operating areas and facilities. The remaining land 229,507 ha

(567,103 acres) is largely undeveloped and acts as a safety and accident buffer zone. Additionally this undeveloped land is used for environmental research, ecological preservation, socio-cultural preservation, and livestock grazing (DOE 1999b).

Visual Resources. INEEL is part of the Snake River Plain ecosystem and generally consists of sagebrush steppe and native grasses. The ANL-W and the INEEL primary facility areas look like commercial/industrial complexes and are widely dispersed throughout INEEL. Although many INEEL facilities are visible from highways, most facilities are located over half a mile from public roads. The ANL-W is a restricted-access area. The Bureau of Land Management has classified the acreage within INEEL as Visual Resource Management Class III (mixed use) and IV (industrial use).

<u>Consequences</u>

Under Alternative 3, the HS/RPS testing and assembly operations would relocated from the Mound Site in Miamisburg, Ohio, to ANL-W at INEEL, west of Idaho Falls, Idaho. The existing ZPPR complex at ANL-W would be modified to house the operations.

Land Use. The land use at ANL-W would remain industrial. The ZPPR complex that has been used for nuclear reactor research would be modified and used for the HS/RPS operations. No impact to land use is anticipated.

Visual Resources. The existing ZPPR Mockup Building 792 would double in size. However, the ZPPR complex is industrial in character and the ANL-W is restricted from public access. The visual resource impact would be negligible.

3.4.2 Air Quality and Noise

<u>Affected Environment</u>

Climate and Meteorology

The Eastern Snake River Plain climate exhibits low relative humidity, wide daily temperature swings, and large variations in annual precipitation. Average seasonal temperatures measured onsite range from -7.3°C (18.8°F) in winter to 18.2°C (64.8°F) in summer, with an annual average temperature of about 5.5°C (42°F). Temperature extremes range from a summertime maximum of 39.4°C (103°F) to a wintertime minimum of -45° C (-49°F). Annual precipitation is light, averaging 22.1 centimeters (cm) (8.71inches [in]), with monthly extremes of 0-12.7 cm (0 to 5 in). The maximum 24-hour precipitation is 4.6 cm (1.8 in).

Nonradiological Conditions

Criteria Pollutants. The types of nonradiological emissions from ANL-W and INEEL facilities and activities are similar to those of other major industrial complexes. Combustion sources such as boilers and emergency generators emit both criteria and toxic air pollutants. Waste management, construction, and related activities (such as excavation) also generate fugitive particulate matter. The air quality on and around the INEEL is good and within applicable guidelines. The area around the INEEL is in attainment or unclassified for all National Ambient Air Quality Standards. Levels of criteria pollutants are well within applicable standards.

Chemical Pollutants. Sources such as chemical processing operations, waste management activities (other than combustion), and research laboratories emit primarily toxic air pollutants. For toxic emissions, all INEEL boundary and public road levels have been found to be well below reference levels appropriate for comparison. Similarly, all toxic pollutant levels at onsite locations are expected to remain below occupational limits established for protection of workers.

Noise

The noise level at the INEEL ranges from 10 dBA (i.e., referenced to the A scale, approximating human hearing response) for the rustling of grass outdoors to as much as 115 dBA indoors, the upper limit for unprotected hearing exposure established by OSHA. The natural environment of the INEEL has relatively low ambient noise levels of about 35 to 40 dBA due to natural sources (DOE 1999b). The noise generated at the INEEL is not propagated at detectable levels offsite, since all public areas are at least 6.4 km (4 mi) away from site facility areas.

Consequences

Nonradiological Air Quality

Relocation of HS/RPS operations to ANL-W would result in nonradiological emissions from operations in existing modified facilities. These emissions would be within the applicable standards for public and worker health.

Criteria Pollutants. Under Alternative 3, activities associated with the construction of the modifications to Building 792 may result in temporary increase in particulate matter emissions, but such an increase is not expected to exceed the 24-hour PM_{10} standard (150 mg/m^3). Measures such as watering would be used to mitigate any potential impacts. The primary source of criteria pollutant emissions due to operations would be from the burning of fuel oil in the ANL-W boilers that provide heat and power for the facilities. While the current use of the ZPPR complex is low, the increase due to the HS/RPS operations would be within the overall level of boiler operation for ANL-W.

Due to a decreased work force, the overall level of boiler use has dimished to a slight degree in recent years. INEEL has a site-wide NO_x Permit to Construct. Each of the ANL-W boilers has specific limits on the level of emissions. The emissions have not come near the limit even when they operated at a higher level. The HS/RPS operations would not result in the boilers exceeding their permitted levels of NO_x emissions.

Chemical Pollutants. The HS/RPS operations at the ZPRR complex would involve the use of hazardous chemicals; including solvents used for cleaning operations, adhesives for mounting accelerometers, janitorial cleaning supplies, leak test fluid, thread lubricant, alcohol, rust inhibitors within coolant lines, and acid within wet cell batteries. The quantities of these materials would not exceed limits established in 29 CFR 1910.119, Appendix A, Threshold Quantities.

Noise

Construction activities as well as the new HS/RPS operations would result in minor noise impacts; however, the magnitude of noise impacts would not exceed OSHA's 90 dBA limit over an 8-hour period (29 CFR 1910.95). There are no nearby residents or members of the public that would be impacted by the noise from HS/RPS operations.

3.4.3 Water Resources

<u>Affected Environment</u>

Surface Water

Other than three intermittent streams, Big Lost River, Little Lost River, and Birch Creek, the remaining surface waterbodies at INEEL consist of natural wetland-like and man-made percolation and evaporation ponds. No surface water or wetland areas exist within the ANL-W boundary. The ANL-W is not within the 100-year or 500-year floodplain. The are no surface water flows other than stormwater runoff at ANL-W. The only surface water features are the industrial waste pond and the sewage treatment lagoons. In 2000, 12.1 million liters (3.2 million gallons) of effluent wastewater was treated at the lagoons. In 2001, 132 million liters (35 million gallons) of industrial wastewater were treated at the ANL-W's industrial wastewater treatment pond.

Groundwater

The INEEL covers about 2,300 km^2 (890 mi^2) of the north-central portion of the Snake River Plain Aquifer. Depth to groundwater from the land surface at the ANL-W is approximately 200 m (650 ft). Currently, groundwater monitoring is conducted in the vicinity of the ANL-W. The amount of water utilized on the INEEL from the Snake River Plain Aquifer is approximately 7.2 billion liters (1.9 billion gallons) each year. The amount of water pumped from ANL-W's two deep wells was 290 million liters (77 million gallons) per year in 2000 (DOE 1999b).

Tritium was found above the minimum detectable concentration in four offsite drinking water samples. It was not detected in offsite surface water samples. The highest concentration, 160 picocuries per liter from Blackfoot in May 1996, was 0.8 percent of the U.S. Environmental Protection Agency maximum contaminant level for tritium of 20,000 picocuries per liter (DOE 1999b).

<u>Consequences</u>

Surface Water

There would be no impacts to surface water at ANL-W. Sanitary wastewater would be the primary source of wastewater, and would be treated at the ANL-W sewage lagoons. The waste streams from the HS/RPS operations are within the capacity of these facilities. The incremental amount of sanitary wastewater routed to the ANL-W's treatment is not expected to affect permit compliance.

Groundwater

The HS/RPS operations would receive water supplied by ANL-W's two deep groundwater wells. These wells supplied 290 million liters (77 million gallons) in 2000. In the past, when the reactors were operating, the wells pumped much more water. The HS/RPS operations water requirements of 26.5 million liters (7 million gallons) per year represent a 10 percent increase over the 2000 level and would be well within the supply capacity of ANL-W.

3.4.4 Geology and Soils

Affected Environment

The INEEL occupies a relatively flat area on the northwestern edge of the Eastern Snake River Plain. The Plain features thin, discontinuous, interbedded deposits of wind-blown loess and sand; water-borne alluvial fan, lacustrine, and flood-plain alluvial sediments; and rhyolitic domes (DOE 1999b). INEEL soils are derived from volcanic and sedimentary rocks from nearby highlands. In the southern part of the INEEL, the soils are gravelly to rocky and generally shallow.

The Snake River Plain has a remarkably low rate of seismicity, whereas the surrounding Basin and Range has a fairly high rate of seismicity (DOE 1999b). Major seismic hazards consist of the effects from ground shaking and surface deformation (e.g., surface faulting, tilting). Based on the seismic history and the geologic conditions of the area, a moderately low seismic risk exists at ANL-W. However, moderate to strong ground shaking can affect the INEEL from earthquakes in the Basin and Range. Although there is a history of volcanism in the INEEL area, explosive volcanic eruptions are improbable.

Consequences

The construction of modifications to Building 792 would result in geologic resources impacts such as the temporary displacement of soils. Approximately 1,672 m^2 (218,000 ft^2) of the surrounding area the existing Building 792 could be disturbed as a result of construction activities. The soils in the area are already disturbed by past construction and operational activities. All construction would be performed according to best management practices for soil erosion. The impacts would be minimal.

3.4.5 Ecological Resources

Affected Environment

The INEEL lies in a cool desert ecosystem dominated by shrub-steppe communities. Most land within the INEEL is relatively undisturbed and provides important habitat for species native to the region. The vegetation associations on INEEL can be grouped into six types: juniper woodland, native grassland, shrub-steppe, lava, modified large ephemeral playas, and wetland-like vegetation types. The ANL-W lies partially within the sagebrush/rabbitbrush, and sagebrush-steppe on lava vegetation association. Disturbed areas (e.g., industrial areas, parking lots, roads) cover only 2 percent of the INEEL. Disturbed areas, such as the ANL-W, frequently are dominated by introduced annuals, including Russian thistle, halogetan, and cheatgrass. These species are noxious and usually provide less food and cover for wildlife compared to native species and are competitive with perennial native species.

Over 270 vertebrate species have been recorded on the INEEL, including 46 mammal, 204 bird, 10 reptile, 2 amphibian, and 9 fish species (DOE 1999b). The INEEL provides an important winter range for deer, elk, and pronghorn. Additional information on fauna is provided in the AMWTP EIS (DOE 1999b). Federally-listed animal species potentially occurring on the INEEL include the peregrine falcon and bald eagle. Peregrine falcons (endangered) have been observed within the boundary of the INEEL infrequently, only in the winter and for only brief periods. Bald eagles (threatened) are observed each winter near or on the INEEL, but only in areas of the site north of the Test Area North and near Howe.

National Wetland Inventory maps prepared by the U.S. Fish and Wildlife Service have been completed for most of the INEEL. Approximately 20 potential wetlands listed by the U.S. Fish and Wildlife Service are manmade (e.g., industrial waste and sewage treatment ponds, borrow pits, and gravel pits) and are not considered regulated jurisdictional wetlands. There are no natural wetland areas within the ANL-W boundary; however, there are two sewage lagoons and one wastewater pond.

Consequences

Relocating HS/RPS operations to the existing ZPPR complex would not adversely affect ANL-W ecological resources. Construction of the additions to Building 792 may impact ecological resources. However, the new facilities would be constructed in previously disturbed areas to minimize potential impacts. The soil disturbance due to building modifications might cause some displacement of small animals. Noise associated with any building modifications might cause some temporary disturbance to wildlife, but this impact would be minimal since animals living adjacent to Building 792 have already adapted to noise. Impacts to wetlands and aquatic resources are not anticipated since these resources are not found in the vicinity of the construction site.

3.4.6 Cultural Resources

Affected Environment

The INEEL contains a rich and varied inventory of cultural resources, including fossil localities, archaeological and historical remains, and military and Cold War era structures and features. Sites important to contemporary Native American groups are located throughout the INEEL. While cultural resource sites have been identified in the area surrounding ANL-W, the portions of the ANL-W being considered for the Preferred Alternative have undergone extensive ground disturbance in the past that have likely destroyed any archaeological remains within that area.

Of the 516 buildings and structures at INEEL, inventoried for historical significance, 217 are potentially eligible for nomination to the NRHP individually or as contributing elements of an historic district. No potentially eligible NRHP buildings or structures are located with ANL-W. The EBR-II, although not listed on the NRHP, is considered important historically by the American Nuclear Society.

Native American people hold the land sacred. In their terms, the entire INEEL is culturally important and, in fact, is located within the aboriginal territory of the Shoshone and Bannock peoples (DOE 1999b). Areas significant to the Shoshone-Bannock Tribes would include the buttes, wetlands, sinks, grasslands, juniper woodlands, Birch Creek, Big Southern Butte, Middle Butte, and the Big Lost River and the Little Lost River. A comprehensive inventory of Native American resources has not been completed at INEEL, direct consultation with interested tribal governments is critical for successful implementation of INEEL (and ANL-W) projects.

Consequences

The construction of the modifications to the existing ZPPR complex would not adversely affect potential cultural resources. The portions of the ANL-W being considered for Alternative 3 have undergone extensive ground disturbance in the past that have likely destroyed any archaeological remains within that area. There are no sites of cultural interest at the ZPPR complex. The modification of Building 792 and the HS/RPS operations would not affect the EBR-II. Any ~~consulatation~~construction required for implementing this alternative would proceed in accordance with the INEEL cultural resources program.

3.4.7 Socioeconomics

<u>Affected Environment</u>

All demographic information for the INEEL ROI is applicable to this EA. This section presents an overview of current socioeconomic conditions within an ROI where more than 95 percent of the INEEL workforce resides. The INEEL ROI is a seven-county area comprised of Bannock, Bingham, Bonneville, Butte, Clark, Jefferson, and Madison Counties. During 1996, INEEL employees and their families accounted for 20 percent of Bonneville County's population and composed of almost 30 percent of Idaho Falls' population. INEEL employees and their families represent only 2 percent of the population of Bannock and Madison Counties (DOE 1999b).

Employment and Income

The INEEL ROI is rural in character, and the economy has historically been based on natural resources. Consistent with most regions of the country, economic growth over the past several decades has been in non-agricultural sectors. Although farming and agricultural services remain important to the ROI economy, these sectors provide less than 8 percent of the total number of jobs in the ROI. The service, wholesale and retail trade, and public sectors are now the major sources of ROI employment. Together, these sectors generate approximately 70 percent of the jobs in the ROI. Manufacturing and construction jobs are also important sectors and accounted for about 13 percent of the ROI's employment in 1995 (DOE 1999b). Table 3.4.7-1 presents employment levels for the major sectors for the ROI.

TABLE 3.4.7-1. —*Employment by Sector in 1995*

Sector	Percentage
Services	29.6
Wholesale and retail	24.8
Government	16.0
Manufacturing	7.1
Farm	5.9
Construction	5.9
Finance, insurance, and real estate	5.0
Transportation and public utilities	3.9
Agricultural service, forestry, and other	1.7

Source: DOE 1999b.

The ROI experienced stable growth during the 1990s. The labor force grew from 105,837 in 1990 to 122,725 in 1996, an annual growth rate of almost 2.7 percent. Total ROI employment grew from 100,074 in 1990 to 117,009 in 1996, an annual growth rate of approximately 2.8 percent (DOE 1999b). This growth rate was considerably higher than during the 1980s when ROI employment grew at approximately 1.2 percent annually.

The ROI unemployment rate was 4.7 percent in 1996, the lowest level in over a decade. Unemployment rates within the ROI ranged from a low of 3.0 percent in Madison County to a high of 5.4 percent in Bingham County. The unemployment rate for Idaho during 1996 was 5.2 percent (DOE 1999b).

Per capita income for the ROI was $16,550 in 1995, a 17-percent increase over the 1990 level of $14,136. Per capita income levels within the ROI ranged from a low of $11,758 for Madison County to a high of $22,444 in Clark County. The per capita income for Idaho was $18,895 in 1995 (DOE 1999b).

The INEEL exerts a major influence on the ROI economy. During 1996, INEEL provided an average of 8,134 jobs, almost 7 percent of the total jobs in the ROI (DOE 1999b). The INEEL is the largest employer in southeast Idaho and the second largest employer in Idaho (second to State Government). The current workforce, however, is significantly lower than the peak of approximately 11,600 employees that worked at INEEL during 1992. Much of the employment loss was due to consolidation of contracts and reduction in defense-related activities. Employment projections indicate a stabilization of the job force at about 7,250 in FY04.

Population and Housing

Population. From 1960 to 1990, population growth in the ROI paralleled state-wide growth. During this period, the ROI's population increased an average rate of approximately 1.3 percent, while the annual growth rate for the State of Idaho was 1.4 percent. From 1990 to 1995, state population growth accelerated to over 3 percent per year, while ROI growth remained under 2 percent. Population growth rates for both the ROI and the state are projected to slow after the year 2000. Table 3.4.7-2 presents population estimates for the ROI through 1995 and projections for 2000 through 2025. Based on population trends, the ROI population will reach more than 339,000 persons by 2025.

Bannock and Bonneville are the two largest counties in the ROI; together, they accounted for almost 64 percent of the total ROI population in 1995. Butte and Clark are the most sparsely populated counties; together, they contain only 1.6 percent of the total ROI population. The largest cities in the ROI are Pocatello (in Bannock County) and Idaho Falls (in Bonneville County), with 1995 populations of approximately 51,132 and 48,411, respectively (DOE 1999b).

TABLE 3.4.7-2. —*Population Estimates for the INEEL ROI*

County	1990	1995	2000	2005	2010	2015	2020	2025
Bannock	66,026	72,043	78,252	81,303	84,474	90,894	96,802	102,710
Bingham	37,583	40,950	44,479	46,214	48,016	51,666	55,024	58,382
Bonneville	72,207	79,230	86,059	89,415	92,902	99,963	106,460	112,958
Butte	2,918	3,097	3,364	3,495	3,631	3,907	4,161	4,415
Clark	762	841	913	948	985	1,060	1,129	1,198
Jefferson	16,543	18,429	20,017	20,798	21,609	23,251	24,763	26,274
Madison	23,674	23,651	25,690	26,692	27,733	29,841	31,780	33,720
ROI	**219,713**	**238,241**	**258,774**	**268,865**	**279,350**	**300,582**	**320,119**	**339,657**

Sources: DOE 1999b.

Housing. There were a total of 77,660 housing units in the ROI during 1990; approximately 70 percent of these units were single-family units, 17 percent were multi-family units, and 13 percent were mobile homes. Approximately 7.7 percent of the housing units were vacant, although some vacant units were used for seasonal, recreational, or other occasional purposes. Rental vacancy rates ranged from 2.8 percent in Madison County to 16.2 percent in Butte County. About 29 percent of the occupied housing units in the ROI were rental units, and 71 percent were homeowner units. The majority of housing units in the ROI were located in Bonneville and Bannock Counties, which include the cities of Idaho Falls and Pocatello.

In 1990, the median value of the owner-occupied housing units ranged from $37,300 in Clark County to $63,700 in Madison County, while the median monthly contract rents ranged from $158 in Butte County to $293 in Bonneville County. Table 3.4.7-3 shows housing characteristics for the ROI.

TABLE 3.4.7-3. —*ROI housing characteristics (1990)*

County	Total number of housing units	Number of owner-occupied units[a]	Owner-occupied vacancy rates	Median value	Number of rental units[a]	Rental vacancy rates	Median monthly contract rent
Bannock	25,694	16,082	2.4%	$53,300	7,330	10.3%	$237
Bingham	12,664	8,830	2.0%	$50,700	2,683	9.2%	$207
Bonneville	26,049	17,371	1.9%	$63,700	6,918	6.2%	$293
Butte	1,265	744	4.6%	$41,400	253	16.2%	$158
Clark	502	174	1.7%	$37,300	103	9.6%	$189
Jefferson	5,353	3,920	2.0%	$54,300	951	4.1%	$221
Madison	6,133	3,476	1.3%	$68,700	2,325	2.8%	$239
ROI	**77,660**	**50,597**	**2.1%**	**N/A**	**20,563**	**4.6%**	**N/A**

Source: DOE 1999b.

a. Does not include housing used for seasonal, recreational, or other uses.

Community Services

There are 17 public school districts and 3 private schools that provide educational services for the approximately 57,000 school-aged children in the ROI. Higher education in the ROI is provided by the University of Idaho, Idaho State University, Ricks College, and the Eastern Idaho Technical College.

Law enforcement is provided by 15 county and municipal police departments that employed 373 sworn officers and 149 civilians in 1995. Idaho Falls and Pocatello supported the largest departments, each employing 82 police officers. Clark County and the Firth Police Department were each staffed with only two officers (DOE 1999b).

The ROI is served by a total of 18 municipal fire districts staffed with about 500 firefighters, of which approximately 300 are volunteers. In addition, the INEEL fire department provides round-the-clock coverage for the site. The staff includes 50 firefighters with no less than 16 firefighters on each shift. Bingham, Bonneville, Butte, Clark, and Jefferson Counties, which surround the INEEL, and the Fort Hall Fire District, Shoshone-Bannock Tribes, have developed emergency plans to be implemented in the event of a radiological or hazardous materials emergency. Each emergency plan identifies facilities, including the INEEL, with extremely hazardous substances and defines transportation routes for these substances. The emergency plans also include procedures for notification and response, listings of emergency equipment and facilities, evacuation routes, and training programs.

The ROI contains 7 hospitals with a capacity of 1,012 beds (AHA 1995). Over 65 percent of the hospital beds were in Bannock and Bonneville Counties. No hospitals are located in either Clark or Jefferson Counties.

Consequences

It is not anticipated that the Preferred Alternative would have any significant socioeconomic impacts on the area surrounding ANL-W. All workers employed during construction would come from within the ROI, thus presenting no impacts to population, housing, and community services. Operation and maintenance of the facility may require relocation of specially trained staff from outside the ROI;

however, the maximum number of relocated staff is expected to be less than 20, which would present negligible impacts to population, housing, and community services. Current available resources would absorb the additional demand for housing and community services. Any of the 20 required operations and maintenance staff hired from within the ROI population would not have an impact on socioeconomic resources and would incrementally decrease the negligible impacts from individuals relocating to the ROI.

The employment generated by the Preferred Alternative would benefit the ROI in terms of the creation of new jobs, additional income, and new tax revenues for local governments. The jobs directly created during the transfer and operation of the project would create additional economic benefits in terms of jobs and income in other sectors throughout the local economy. Any site procurements would also benefit the local economy in terms of additional sales revenue and tax revenue for local governments.

3.4.8 Waste Management

Affected Environment

ANL-W generates primarily solid radioactive waste, although some gaseous radioactive waste (600 curies/year total) is released from the ten exhaust stacks. Low-level mixed waste, primarily solid waste containing elemental sodium, is also generated in small quantities. Hazardous waste consists primarily of paint removers, analytical chemical waste, and some heavy metals. Small quantities of many waste types have been generated during routine operations at INEEL facilities that have been in operation since the late 1950s. Waste will continue to be shipped to INEEL for treatment, storage, and disposal.

Low-Level Waste. All LLW generated at the INEEL is collected in satellite accumulation areas and is then transferred to a central staging area for packaging and certification for shipment and disposal. ANL-W does not treat, store, or dispose of LLW onsite. All LLW is shipped in DOT-approved carriers to DOE's INEEL for final disposal. The average annual amount of liquid LLW processed at the ANL-W Radioactive Liquid Waste Treatment Facility is 34,800 L (9,200 gal) per year.

Hazardous Waste. All hazardous waste generated at the INEEL is collected in satellite accumulation areas and is then transferred to a central staging area for packaging and certification for shipment and disposal. The ANL-W does not treat, store, or dispose of hazardous waste onsite. All hazardous waste is shipped by DOT-approved carriers to DOE's INEEL for final disposal. An average of 760 L (200 gal) of liquid hazardous waste was generated over the last 3 years with the trend decreasing.

Consequences

No impacts to waste management activities are anticipated under this alternative. The HS/RPS cleaning operations would generate, on a non-routine basis, very small volumes of liquid LLW and hazardous waste. The wastes, which are comprised of fuel clad cleaning solutions, decontamination solutions, and metal component cleaning solutions, are packaged and transported to appropriate treatment, storage, and disposal facilities in accordance with the ANL-W and INEEL practices and requirements. The amounts of these wastes generated by the HS/RPS operations are a small fraction of the existing ANL-W waste streams. Construction of the modifications to Building 792 would result in short-term generation of nonhazardous construction waste that would be shipped offsite for disposal.

3.4.9 Human Health

Affected Environment

Radiological Health Risk

The maximally exposed offsite individual annual dose of 0.031 millirem from INEEL operations in 1996 corresponds to lifetime excess fatal cancer risk of approximately 1 in 60 million. The involved worker dose of 0.32 millirem corresponds to a lifetime excess fatal cancer risk of approximately 1 in 7 million. Current regulations limit the dose resulting from releases of airborne radioactivity from DOE facilities to no more than 10 millirem per year to any member of the public. The surrounding population consists of approximately 120,000 people within a 80-km (50-m) radius of the CFA at INEEL. The total baseline collective population dose of 0.30 person-rem corresponds to a lifetime excess fatal cancer risk of approximately $1.5x10^{-4}$ within the entire population over the next 70 years.

The largest fraction of occupational dose received by INEEL, involved and non-involved workers, is from external radiation from direct exposure or groundshine. The average occupational dose from 1991 to 1995 to individuals with measurable doses was 0.155 rem, which results in an average annual collective dose of about 211 person-rem. This collective dose corresponds to a lifetime increased fatal cancer risk of 0.084 for INEEL personnel (DOE 1995).

Nonradiological Health Risk

For the individual noncarcinogenic toxic air pollutants, all hazard quotients were less than one. The hazard quotient is a ratio of the calculated concentration in the air to the reference concentration. This indicates that no adverse health effects would be projected as a result of noncarcinogenic emissions. The offsite excess cancer risk from carcinogenic emissions ranged from 1 in 1.4 million for formaldehyde to 1 in 625 million for trichloroethylene (DOE 1995). The hazard quotients for criteria air pollutants associated with maximum baseline emissions were all less than one. This indicates that no adverse health effects were projected from criteria pollutant emissions.

For occupation exposures to workers at the INEEL, modeled chemical concentrations were compared with the applicable occupational standard. The hazard quotients for noncarcinogenic and carcinogenic air pollutants at the INEEL were less than one with the exception of benzene at CFA, for which the hazard quotient was slightly greater than one.

Consequences

Normal Operational Radiological Impacts

HS/RPS operations at ANL-W are not expected to release any radioactivity onsite or offsite to either the atmosphere or water resources because ANL-W would only receive fully encapsulated radioactive material from LANL. Therefore, HS/RPS operations, irrespective of the operation locations, would not impact the offsite doses to either the maximum exposed individual or the general population within 80 Km (50 mi) of ANL-W (1.61×10^{-4} mrem and 1.59×10^{-4} person-rem respectively).

The radiological impact to the involved and non-involved workers including those associated with the HS/RPS operations has been decreasing since 1996 (DOE 1999a). At ANL-W, the annual doses to the maximum exposed worker and the total work force are not expected to exceed between 50 and 1,000 mrem and 20.1 person-rem, respectively.

Accidents

This section depends on the accident analyses and history of the HS/RPS operations at Mound discussed in Section 3.1.9. This information is combined with INEEL and ANL-W information to project potential impacts from accidents.

Accident Scenarios and Consequences. A catastrophic failure of one or more of the GPHS fuel elements could conceivably expose many grams of radioactive Pu-238 dioxide fuel to the environment. However, due to the solid ceramic form of the plutonium, only a small fraction of the radioactive fuel could be dispersed. The probability of occurrence is calculated to be less than 1.0×10^{-6} per year. The consequences of this release are negligible because of the multiple protective features of the Category 3 building and the form of the Pu-238 itself. The adverse effects of accidents are mitigated by air filtration systems, room and building barriers and air locks that contain releases of hazardous materials; dikes for controlling spills; fire-fighting equipment; and the evacuating workers and/or the public. For example, the steel armor was installed on some of the exterior walls to protect against wind-driven missiles. The building structure itself is designed to help preclude a release of plutonium and is therefore a safety significant structure. Building 792 would be modified to hazard Category 3 standards.

The postulated accidents result in the unmitigated release of plutonium that could potentially result in fatalities of operators working in the facility. The accidents considered consisted of welding accidents, a catastrophic failure of one or more of the GPHS fuel elements, and the potential for a wind driven missile impact through a facility wall into a glove box causing a breach of a GPHS. Some unmitigated accidents also have the potential for offsite exposures of greater than 5 rem, which would be in excess of public evaluation guidelines at the facility boundary. However, the potential for offsite exposures beyond the site boundary generally diminishes with increasing distance as a result of the effects of dispersion and dilution in the atmosphere. It is also important to note, however, Category 3 facilities are equipped with engineering and administrative controls that, if an accident were to occur, negligible consequences would result.

Maximum lifetime dose commitment to any member of the public in Ohio was calculated to be 4.0×10^{-10} rem to the lung and 2.0×10^{-10} rem to the bone. The maximum lifetime dose to any member of the public in Idaho would be less as there is less population surrounding the site.

Nonradiological Impacts

Under Alternative 3, temporary employment would be required for the modification of the existing facilities. Temporary employees would be subjected to occupational risks that could result in death, injury, or illness. These risks, although minimal, would be minimized to the extent practical by following OSHA procedures for construction activities.

3.4.10 Utilities/Infrastructure

Affected Environment

The two interstate highways that serve the regional area are Interstate 15 and 86. U.S. Highways 91, 20, and 26 and Idaho State Routes 22, 28, and 33 provide regional access. Approximately 140 km (87 mi) of paved surface has been developed on INEEL, including about 29 km (18 mi) of service roads that are closed to the public. Union Pacific Railroad lines in southeastern Idaho provide railroad freight service. The Union Pacific Railroad's Arco Branch crosses the southern portion of INEEL and provides rail service to INEEL.

Water. The water supply system for ANL-W is independent and is provided by two deep wells. No natural surface water is used. DOE's water rights permit allows INEEL to pump 136,000 L (36,000 gal) per minute of groundwater, but not to exceed 43.1 billion liters (11.4 billion gallons) per year (DOE 1999b). Recent water consumption at INEEL has not exceeded 7.6 billion liters (2 billion gallons) per year.

Wastewater treatment facilities at ANL-W consist of two sewage lagoons and one industrial wastewater treatment pond. The annual sewage discharge volume for ANL-W for 2000 was 12.1 million liters (3.2 million gallons). The annual industrial wastewater discharge volume was 134 million liters (35.5 million gallons) (PC 2002).

Electricity. Electric power is supplied to the INEEL by the Idaho Power Company. The contract with Idaho Power is for up to 45,000 kilowatts (kW) monthly at 138 kilovolts (KV), the site power transmission line loop is rated 138 KV, and peak demand on the system from 1990 through 1993 was about 40,000 KW (DOE 1999b). Average usage prior to 1993 was slightly less than 217,000 MWh/hrs per year (DOE 1995). Usage in 1997 for INEEL was 173,862 MWh/hrs (DOE 1999b). Electrical power is supplied to ANL-W from the INEEL loop through the Scoville Substation and the EBR-II substation.

Fuel. Fuel oil is used in four boilers at ANL-W for heat and hot water. Their use was increased a great deal after the shutdown of the reactors which provided electricity and steam. In 2001, ANL-W used 2 million liters (549,000 gallons) of fuel oil down from a peak of 2.5 million liters (657,000 gallons) used in 1995. The usage af fuel oil varies with the severity of the winters.

__Consequences__

Utility requirements and infrastructure for the HS/RPS site operations would be well within the current ANL-W utility capacity. The estimated total operational requirement for electricity for the HS/RPS operations is 2,039 MWh/yr. Natural gas was used at the Mound Site. The consumption there was 700,309 m^3 (2,473,000 ft^3). At ANL-W fuel oil is used to fire the boilers. The estimated equivalent amount of fuel oil use is 700,000 L (185,000 gal). The heating of Building 792 and the use by personnel is mostly already accounted for in the ANL-W use of fuel oil. The new space that will be added to Building 792 will require an additional amount of fuel to heat. A very conservative estimate of the increase would be less than 189,000 L (50,000 gal). This is within the range of the 2 to 2.5 million liters (550,000 to 650,000 gallons) of fuel oil burned each year at ANL-W. The total diesel fuel requirement for emergency generator testing during operations would be negligible and would continue to be met through additional procurements by normal contractual means. The water requirement of 27.5 million liters (7.3 million gallons) would be well within the capacity of ANL-W's water availability.

3.4.11 Transportation

__Affected Environment__

Packaging. All encapsulated Pu-238 dioxide transportation to and from ANL-W would be packaged in USA/5320/B(U)F or USA/9516/B(U)F-85 shipping containers and transported by SST. Completed RPSs are packaged and transported in USA/9904/B(U)F-85 shipping containers. The USA/9516/B(U)F-85 consists of a cask/cage assembly, and an assortment of primary and secondary containment vessels. The USA/9904/B(U)F-85 is used to transport RPSs. The maximum gross weight of each package, including payload and limiter, is approximately 9,600 lbs (4,355 kg); the empty weight of the packaging is 8,850 lbs (4,014 kg).

Transport. DOE maintains and operates a special fleet of trucks and trailers used to safely and securely transport Special Nuclear Materials, classified configurations of nuclear weapon systems, and other forms and quantities of strategic materials between DoD sites and DOE production sites, laboratories and test sites. An SST trailer is a modified standard closed semi-trailer that includes necessary tie-down equipment, temperature monitoring, fire alarms, and an access denial system. All vehicles undergo an extensive maintenance check prior to every trip, as well as periodic preventive maintenance inspections.

Consequences

Radiological transportation risk was modeled using RADTRAN4 (SNL 1992). The incident-free crew dose and combined population dose from off-link, on-link, and stop components along with potential accident impact to population per unit shipment are presented in Table 3.4.11-1. The values are based on the largest RPS assembled, the GPHS/RPS. The doses presented in Table 3.4.11-1 are calculated based on generic distance and route and population characteristics from the current transportation from LANL to Mound and Mound to Florida. Component doses are determined by the unit shipment dose and the number of shipments. The radiological risk per unit shipment due to incident-free and potential accident are presented in Table 3.4.11-2.

The traffic fatalities per unit shipment are presented in Table 3.4.11-2. Traffic fatalities were estimated using unit risk factors (risk per kilometer traveled) developed from national statistics for highway accident-related deaths (SNL 1986). These non-radiological unit risk factors are presented in Table 3.4.11-3. Non-radiological LCFs due to truck emissions (air pollutants) were evaluated based on unit risk factors developed by SNL (SNL 1982). These non-radiological unit risk factors are presented in Table 3.4.11-3. The non-radiological LCFs due to truck emissions per shipment are presented in Table 3.4.11-2. The non-radiological risks are calculated based on round-trip basis as these risks are equally likely when the transport vehicle is traveling loaded or empty.

The overall transportation impact based on the total number of shipments of plutonium dioxide for assembling one GPHS/RPS at ANL-W, and the shipment of the RPS from ANL-W to Cape Canaveral, Florida (or other designated site), could be calculated using the unit shipment risk numbers presented in Table 3.4.11-2. Three shipments of encapsulated Pu-238 from LANL to ANL-W are assumed to be required for fabrication of one RPS at ANL-W and the fabricated RPS is assumed to be delivered in one shipment to Cape Canaveral, Florida. The summary of overall transportation impacts evaluated in terms of fatalities due to fabrication and delivery to the desired destination of one GPHS/RPS is presented in Table 3.4.11-4.

3.4.12 Environmental Justice

As discussed throughout this chapter, there would be no adverse human health or environmental human impacts. Therefore, minority and low-income populations would not be disproportionately affected and there would be no environmental justice impacts.

TABLE 3.4.11-1. — *Radiological Doses to Crew and Public per Unit Shipment of a GPHS/RPS*

Material Type	Route		Crew Dose	Incident-free Public				Accident	Total Dose	
	From	To	Person-rem	Handlers	Off-link	On-link	Stops	Public dose	Person-rem	
				Person-rem	Person-rem	Person-rem	Person-rem	Person-rem	Crew	Public
Encapsulated $Pu^{238}O_2$	LANL	ANL-W	2.88×10^{-02}	3.75×10^{-03}	1.70×10^{-03}	1.74×10^{-02}	2.48×10^{-01}	9.85×10^{-01}	2.88×10^{-02}	1.29
GPHS/RPS	ANL-W	Florida	2.39×10^{-02}	3.75×10^{-02}	2.10×10^{-03}	1.82×10^{-02}	2.48×10^{-01}	3.10	2.39×10^{-02}	3.41

TABLE 3.4.11-2. — *Transportation Risk per Unit Shipment*

Material Type	Route		Incident-free Risk		Accident Risk	Traffic Fatalities	Truck Emission
	From	To	Crew (LCFs)	Public (LCFs)	Public (LCFs)	Crew and Public	(LCFs)
Encapsulated $Pu^{238}O_2$	LANL	ANL-W	1.08×10^{-5}	1.15×10^{-4}	3.71×10^{-4}	2.41×10^{-4}	3.68×10^{-6}
GPHS/RPS	ANL-W	Florida	3.04×10^{-5}	3.88×10^{-4}	3.93×10^{-3}	5.33×10^{-4}	8.16×10^{-6}

TABLE 3.4.11-3. — *Non-Radiological Unit-Risk Factors for Truck Transportation*

Type	Rural	Suburban	Urban
Nonoccupational Latent cancers/km (Urban)	-	-	1.0×10^{-7}
Nonoccupational Fatalities/km	5.3×10^{-8}	1.3×10^{-8}	7.5×10^{-9}
Occupational Fatalities/km	1.5×10^{-8}	$3.7E \times 10^{-9}$	2.1×10^{-9}

TABLE 3.4.11-4. — *Summary of Overall Transportation Impact for Fabrication and Delivery of One GPHS/RPS*

Type of Impact	Fabrication Pu from LANL to ANL-W	Delivery GPHS/RPS from ANL-W to Florida
Radiological Incident-Free	3.77×10^{-4}	4.18×10^{-4}
Radiological Accident	1.11×10^{-3}	3.93×10^{-3}
Traffic Fatalities	7.23×10^{-4}	5.33×10^{-4}
LCFs Due to Truck Emissions	1.10×10^{-5}	8.16×10^{-6}