

5.4 PANTEX SITE

The following sections discuss the environmental impacts associated with the No Action Alternative and the MPF Alternative at Pantex. The environmental impacts are presented below for each of the following environmental resource areas: land use, visual resources, site infrastructure, air quality and noise, water resources, geology and soils, biological resources, cultural and paleontological resources, socioeconomics, human health and safety, accidents, environmental justice, transportation, and waste management.

5.4.1 Land Use and Visual Resources

5.4.1.1 Land Use

The proposed concept for MPF is a multibuilding aboveground configuration. There would be three separate process buildings: Material Receipt, Unpacking, and Storage; Feed Preparation; and Manufacturing. They would be flanked by a number of smaller support facilities which would include: the Analytical Support Building, Production Support Building, Process Building Entry Control Facilities, Operations Support Facilities, Engineering Support Facility, PIDAS, Safe Havens, Standby Diesel Generator Buildings, Diesel Fuel Storage Tank, Chillers/Chemical Feed and Chilled Water Pump Buildings, Cooling Towers, Alternate Power Electrical Transformers, Truck Loading Docks, Liquid Nitrogen/Argon Storage Tanks, Chemical Storage Tanks, Bottled Gas Storage and Metering Buildings, HVAC Exhaust Stacks, Waste Staging/TRU Packaging Building, Commodities Warehouse, Roads and Parking Areas, and a Runoff Detention Area. In addition to these structures, a Construction Laydown Area and a Concrete Batch Plant would be built for the construction phase only. Upon construction completion, they would be removed and the area would be returned to its original state.

All buildings would be either one or two stories. The site would require two HVAC exhaust stacks; the tallest, standing 30 m (100 ft), would be located inside the PIDAS. Facility exhausts would be HEPA-filtered prior to discharge through the stacks.

Under the multibuilding configuration, production rates would dictate the size of the facilities proposed. The three potential facility capacities are 125, 250, and 450 ppy. Required acreage for each of the facility capacities during construction and operations is presented in Table 5.2.1.1-1. As discussed in Section 3.1.2.4, these areas are for a generic campus type layout and the actual facility footprint covers much less area.

The MPF reference location at Pantex is a 36-ha (90-ac) tract of land just north of Zone 11 and south of Zone 4 West and Zone 4 East (see Figure 4.4.1.1-2). The land was cultivated until 1993 and replanted with native grasses in 1996. This tract of land is surrounded on all sides by a similar land use, open space. It is now considered a non-industrial, low maintenance area within the Protected Area boundaries.

No Action Alternative

Under the No Action Alternative, no new buildings or facilities would be built and there would be no impact on land use at the site.

Modern Pit Facility Alternative

Construction Impacts

Depending on the facility capacity, an estimated 56-69 ha (138-171 ac) of land for buildings, walkways, building access, parking, buffer space, and construction-related workspace would be required to construct the MPF. The land required for the proposed MPF construction would represent approximately 0.9-1.1 percent of Pantex's total land area of 62 km² (24 mi²), a very small proportion. The 36-ha (90-ac) reference location has adequate space to handle the total facilities footprint and NNSA believes that, should Pantex be selected for the MPF site, the proposed facility design could be adapted to the space available.

Although there would be a change in land use, the proposed MPF is compatible and consistent with land use plans for this area. No impacts to Pantex land use plans or policies are expected.

Operations Impacts

Depending on the facility capacity, an estimated 44-56 ha (110-138 ac) of land for buildings, walkways, building access, parking, and buffer space would be required to operate the MPF. The reduction in required acreage from construction to operations represents the removal of the Construction Laydown Area and the Concrete Batch Plant upon construction completion. The land required for the proposed MPF operations would represent approximately 0.7-0.9 percent of Pantex's total land area of 62 km² (24 mi²), a very small proportion. As detailed above, NNSA believes that, should Pantex be selected for the MPF site, the proposed facility design could be adapted to the space available.

Although there would be a change in land use, the proposed MPF is compatible and consistent with land use plans for this area. No impacts to Pantex land use plans or policies are expected.

Sensitivity Analysis

Doubling shifts for any of the three proposed facility capacities would not have any additional effect on land use for this alternative.

5.4.1.2 Visual Resources

No Action Alternative

Under the No Action Alternative, there would be no impact on visual resources at Pantex since no new facilities would be built.

Modern Pit Facility Alternative

Construction Impacts

Activities related to the construction of new buildings required for the MPF Alternative would result in a change to the visual appearance of the reference location due to the presence of construction equipment, new buildings in various stages of construction, and possibly increased

dust. The reference location is obstructed from offsite view by existing buildings and infrastructure. However, dust and construction equipment mobilization may be visible to the general public. Members of the public, as well as onsite employees and visitors, observing MPF construction would find these activities temporary and similar to the past construction activities of other developed areas on the Pantex site. Thus, impacts on visual resources during construction would be minimal.

Operations Impacts

The MPF, which would include one- and two-story buildings, storage tanks, and two HVAC exhaust stacks, would change the appearance of the reference location. Located in the midst of the industrial complex, the facility would be visible to onsite employees and visitors, but not to the general public. The offsite view of MPF buildings would be obstructed by existing buildings and infrastructure. This change would be consistent with the currently developed areas of the Pantex site. Thus, new construction would not change the current Class IV BLM Visual Resource Management rating of developed areas within Pantex boundaries.

Sensitivity Analysis

Doubling shifts for any of the three proposed facility capacities would not change the layout or the physical features of the MPF reference location. Therefore, there would be no additional impacts to Visual Resources.

5.4.2 Site Infrastructure

This section describes the impact on site infrastructure at Pantex for the No Action Alternative and the modifications that would be needed for the construction and operations of the MPF Alternative. These impacts are evaluated by comparing current site infrastructure to key facility resource needs for the No Action Alternative and MPF Alternative.

5.4.2.1 No Action Alternative

Under the No Action Alternative, there would be no change to the site infrastructure at Pantex. The environment and operations (current and planned) described in Chapter 4 (Affected Environment) would continue.

5.4.2.2 Modern Pit Facility Alternative

Construction Impacts

The projected demand on key site infrastructure resources associated with construction activities of the three proposed plant sizes (125, 250, or 450 ppy) for the MPF Alternative on an annual basis are shown in Table 5.4.2.2–1. Existing infrastructure at Pantex would be sufficient to support annual construction requirements for the proposed plant sizes for the projected 6-year construction period. Infrastructure requirements for construction would have a negligible impact on current site infrastructure.

Table 5.4.2.2–1. Annual Site Infrastructure Requirements for Construction of MPF at Pantex

Proposed Alternatives	Electrical		Fuel		Process Gases
	Energy (MWh/yr)	Peak Load (MWe)	Liquid (L/yr)	Natural Gas (m ³ /yr)	Gases (m ³ /yr)
Site capacity	201,480	47.5	Not limited ^a	289,000,000	Not limited ^a
Available site capacity	119,630	33.9	Not limited	276,090,000	Not limited
No Action Alternative					
Total site requirement	81,850	13.6	59,960	12,910,000	Not limited
Percent of site capacity	41%	29%	Not limited	5%	Not limited
MPF Alternative					
125 ppy					
Total site requirement	83,000	16.6	1,580,000	12,910,000	Not limited
Percent of site capacity	41%	35%	Not limited	5%	Not limited
Change from No Action	1,000	3	7,520,000	0	2,200
Percent of available capacity	0.8%	9%	Not limited	0	Not limited
Peak requirement	NA	NA	2,600,000	0	4,000
250 ppy					
Total site requirement	83,000	17.1	1,800,000	12,910,000	Not limited
Percent of site capacity	41%	36%	Not limited	5%	Not limited
Change from No Action	1,125	3.5	1,700,000	0	2,500
Percent of available capacity	0.9%	3%	Not limited	0	Not limited
Peak requirement	NA	NA	2,900,000	0	4,200
450 ppy					
Total site requirement	83,000	17.6	2,200,000	12,910,000	Not limited
Percent of site capacity	41%	37%	Not limited	5%	Not limited
Change from No Action	1,333	4	2,170,000	0	3,200
Percent of available capacity	1.1%	12%	Not limited	0	Not limited
Peak requirement	NA	NA	3,700,000	0	5,700

^a Not limited due to offsite procurement.

NA = Not Applicable

Source: MPF Data 2003.

Operations Impacts

The estimated annual site infrastructure requirements for the pit production capacities of 125, 250, or 450 ppy are presented in Table 5.4.2.2–2. Existing site infrastructure would be adequate to support pit production capacities of 125 and 250 ppy. There would be significant impacts on site electrical energy for the production of 450 ppy. Available site electrical energy at Pantex would be exceeded by approximately 47 percent for the production of 450 ppy. Available peak load capacity would be exceeded by 8 percent. It is expected that additional electrical capacity could be procured from the electrical power provider to support the increased requirements. Impacts to fuel and process gases would be negligible.

Table 5.4.2.2–2. Annual Site Infrastructure Requirements for Facility Operations Under MPF at Pantex

Proposed Alternatives	Electrical		Fuel		Process Gases	
	Energy (MWh/yr)	Peak Load (MWe)	Liquid (L/yr)	Natural Gas (m ³ /yr)	Nitrogen (m ³ /yr)	Argon (m ³ /yr)
Site capacity	201,480	47.5	Not limited ^c	289,000,000	Not limited ^c	Not limited ^c
Available site capacity	119,630	33.9	Not limited	276,090,000	Not limited	Not limited
No Action Alternative^d						
Total site requirement	81,850	13.6	59,960	12,910,000	Not limited	Not limited
Percent of site capacity	41%	29%	Not limited	5%	Not limited	Not limited
MPF Alternative						
125 ppy^{a,b}						
Total site requirement	162,000	34.1	320,000	17,000,00		
Change from No Action	79,800	20.5%	260,000	4,400,000 ^d	224,000	4,200
Percent of site capacity	80%	72%	Not limited	6%	Not limited	Not limited
Percent of available capacity	67%	60%	Not limited	2%	Not limited	Not limited
250 ppy^{a,b}						
Total site requirement	196,000	37.1	420,000	18,000,000		
Change from No Action	114,000	23.5	360,000	4,990,000 ^d	245,000	7,300
Percent of site capacity	97%	78%	Not limited	6%	Not limited	Not limited
Percent of available capacity	95%	69%	Not limited	2%	Not limited	Not limited
450 ppy^{a,b}						
Total site requirement	257,000	50.1	640,000	21,000,000	Not limited	Not limited
Change from No Action	176,000	36.5	580,000	7,730,000 ^d	303,000	11,800
Percent of site capacity	128%	105%	Not limited	7%	Not limited	Not limited
Percent of available capacity	147%	108%	Not limited	2%	Not limited	Not limited

^a Peak load is based on electrical demands of HVAC, lighting, and miscellaneous electrical systems. Peak load and annual electrical consumption estimates for the three pit production capacities are based on ratioing SRS FY99 Pit Manufacturing data (MPF Data 2003) to the multiple facility sizes. Estimates based on 24 hrs/day, 365 days per year.

^b Diesel fuel estimates based on vendor fuel consumption data ratioed for expected diesel generator size. Diesel generator testing of 1 hour per week.

^c Not limited due to offsite procurement.

^d Used to make steam.

Source: MPF Data 2003.

Sensitivity Analysis

Sufficient electrical energy capacity is not available at Pantex for surge use of two-shift operations. It is expected that additional electrical capacity could be procured from Southwestern Public Service to support the increased requirements. There would be negligible impacts to liquid fuel or process gases from surge production capacity.

5.4.3 Air Quality and Noise

5.4.3.1 Nonradiological Releases

No Action Alternative

Construction Impacts

There would be no nonradiological releases to the environment because this alternative would not involve construction.

Operations Impacts

Under the No Action Alternative, small quantities of criteria and toxic pollutants would continue to be generated. These emissions are part of the baseline described in Chapter 4. No increases in emissions or air pollutant concentrations are expected under the No Action Alternative. Therefore, a PSD increment analysis is not required.

As part of its evaluation of the impact of air emissions, DOE consulted the Guidance on *Clean Air Act* Conformity requirements (DOE 2000d). DOE determined that the General Conformity rule does not apply because Pantex is located in an attainment area for all criteria pollutants; therefore, no conformity analysis is required.

Modern Pit Facility Alternative

Construction Impacts

Construction of new structures would result in temporary increases in air quality impacts from construction equipment, trucks, and employee vehicles. Exhaust emissions from these sources would result in releases of sulfur dioxide, nitrogen oxide, PM₁₀, total suspended particulates, and carbon monoxide. The calculation of emissions from construction equipment was based on emission factors provided in the EPA document AP-42, “Compilation of Air Pollutant Emission Factors” (EPA 1995). For highway vehicles (worker commuting vehicles and delivery vehicles) emission factors were obtained from the EPA Mobile Source Emission Factor Model, MOBILE6.2 (EPA 2002).

Fugitive dust generated during the clearing, grading, and other earth-moving operations is dependent on a number of factors including silt and moisture content of the soil, wind speed, and area disturbed. A common procedure to estimate fugitive emissions from an entire construction site is to use the EPA emission factor of 2.69 metric tons/ha (1.20 tons/ac) per month of activity (EPA 1995). This emission factor represents total suspended particulates (i.e., particles less than 30 microns in diameter). A multiplication factor of 0.75 was used to correct the emission rate to one for PM₁₀ (EPA 1995). Also, it was assumed that water would be applied to disturbed areas. This would reduce emission rates by about 50 percent. Facility construction would necessitate a Concrete Batch Plant at the building site. Particulate matter, consisting primarily of cement dust, would be the only regulated pollutant emitted in the concrete mixing process. Emission factors for the Concrete Batch Plant were obtained from AP-42 (EPA 1995).

The estimated maximum annual pollutant emissions resulting from construction activities are presented in Table 5.2.3.1–1. Actual construction emissions are expected to be less, since conservative emission factors and other assumptions were used in the modeling of construction activities and tend to overestimate impacts. The temporary increases in pollutant emissions due to construction activities are too small to result in violations of the NAAQS beyond the Pantex site boundary. Therefore, air quality impacts resulting from construction would be small.

The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from nonradiological air emissions are presented in Section 5.4.9, Human Health and Safety.

Operations Impacts

Pit manufacturing activities would result in the release of criteria and toxic pollutants into the surrounding air. The primary volume contributors are nitrogen and argon, used to maintain inert atmospheres for glovebox operations. Carbon dioxide would be used as a cleaning agent and helium would be used for leak testing operations. Hydrogen and nitrogen dioxide are reaction products from aqueous purification operations (pyrochemical purification would produce lower amounts of hydrogen and nitrogen dioxide). The chemicals used for dye-penetrant testing of welds are assumed to be volatilized and released to the atmosphere. Organic solvents used for cleaning and chemicals used in the Analytical Laboratory for various analyses would not be expected to contribute any appreciable quantities of any other chemicals to the annual nonradioactive air emissions. Air emissions from periodic functional testing support systems (primarily standby diesel generators) would include carbon monoxide, nitrogen dioxide, PM₁₀, sulfur dioxide, VOCs, and total suspended particulates (WSRC 2002e). The estimated emission rates (kg/yr) for nonradiological pollutants emitted under each of the three new facility scenarios are presented in Table 5.2.3.1–2. These emissions would be incremental to the Pantex baseline. If Pantex is selected as the preferred site, a PSD increment analysis would be performed under a project-specific tiered EIS to determine whether the pit manufacturing activities would cause a significant pollutant emission increase.

As part of its evaluation of the impact of air emissions, DOE consulted the Guidance on *Clean Air Act* Conformity requirements (DOE 2000d). DOE determined that the General Conformity rule does not apply because Pantex is located in an attainment area for all criteria pollutants. Therefore, although each alternative would emit criteria pollutants, a conformity review is not necessary.

The maximum concentrations ($\mu\text{g}/\text{m}^3$) at the Pantex site boundary that would be associated with the release of criteria pollutants under each of the three plant capacity scenarios (i.e., 125, 250, and 450 ppy) were modeled and are presented in Table 5.4.3.1–1. These concentrations were compared to the most stringent (Federal or state) ambient air quality standards. For each of the three capacity scenarios, incremental concentration increases would be small. For most pollutants, there would be an incremental increase of less than 1 percent of the baseline. The greatest increase would occur for nitrogen dioxide under the 450 ppy scenario, but ambient concentrations would remain below the ambient air quality standard. Since estimated emissions are maximum potential emissions and all emergency generators would not operate at the same time, the estimated emissions and resulting concentrations are conservative.

Table 5.4.3.1–1. Criteria Pollutant Concentrations at the Pantex Site Boundary for the MPF—Operations

Pollutant	Averaging Period	Most Stringent Standard or Guideline ^a (µg/m ³)	Maximum Incremental Concentration (µg/m ³) ^b			
			Baseline ^b	MPF		
				125 ppy	250 ppy	450 ppy
Carbon monoxide	8-hour	10,000	161	4.1	5.7	9.3
	1-hour	40,000	924	5.9	8.2	13
Nitrogen dioxide	Annual	100	0.90	2.1	2.189	4.75
Sulfur dioxide	Annual	80	<0.01	0.15	0.2	0.33
	24-hour	365	<0.01	0.73	1.0	1.6
	3-hour	1,300	<0.01	1.6	2.2	3.7
PM ₁₀	Annual	50	8.73	0.058	0.079	0.13
	24-hour	150	88.5	0.29	0.40	0.65
Total Suspended Particulates	3-hour	200	NA	0.16	0.21	0.35
	1-hour	400	NA	0.78	1.1	1.8

NA = not available.

^a The more stringent of the Federal and state standards will be presented if both exist for the averaging period.

^b The No Action Alternative is represented by the baseline.

Source: MPF Data 2003, TAC 30.1.101.21.

The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from nonradiological air emissions are presented in Section 5.4.9, Human Health and Safety.

Sensitivity Analysis

As discussed in Chapter 3, each plant could operate two shifts, increasing the number of pits produced per year. This increased capacity would result in increased releases of criteria pollutants. The increase in releases of criteria pollutants from the 125 ppy plant operating at surge capacity would be bounded by the 250 ppy facility releases. Similarly, the increase of criteria pollutants from the 250 ppy plant operating at surge capacity would be bounded by the 450 ppy plant releases (see Table 5.4.3.1–1). A review of the maximum incremental concentrations in Table 5.3.4.1–1 indicates that if the maximum incremental concentration of each criteria pollutant for the 450 ppy facility were conservatively doubled for surge capacity, concentrations would still not approach the most stringent standards or guideline concentrations.

5.4.3.2 Radiological Releases

No Action Alternative

Construction Impacts

There would be no radiological releases to the environment because this alternative would not involve construction.

Operations Impacts

Under the No Action Alternative, small quantities of radionuclides would continue to be emitted. These emissions are part of the baseline described in Chapter 4. The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from radiological air emissions are presented in Section 5.4.9, Human Health and Safety.

Modern Pit Facility Alternative

Construction Impacts

No radiological releases to the environment are expected in association with construction activities. However, the potential exists for contaminated soils and possibly other media to be disturbed during excavation and other site preparation activities. Prior to commencing ground disturbance, DOE would survey potentially affected areas to determine the nature and extent of any contamination and would be required to remediate any contamination in accordance with established site procedures.

Operations Impacts

Radioactive air emissions from pit manufacturing activities would involve plutonium, americium and enriched uranium. The pit manufacturing activities would be performed within gloveboxes or vaults for radiological containment, and include plutonium recovery using aqueous or pyrochemical processes, foundry, machining, assembly, post assembly operations, inspection and certification, waste handling, and preparing the final product (pits) for shipment. Analytical operations would normally be conducted in laboratories consisting of rooms with gloveboxes and hoods for radiological containment. Each laboratory module would be separated from occupied areas of the laboratory facility by airlocks. Sample transfers would occur using a vacuum tube transfer system from the Feed Preparation and Manufacturing Facilities to the Analytical Support Facility. The ventilation exhaust from process and laboratory facilities would be filtered through double banks of HEPA filters before being released to the air via a 30-m (100-ft) tall stack. HEPA filters are the best available control technology for particulate emissions and are capable of removing more than 99.99 percent of entrained particles from the exhaust air.

DOE estimated routine radionuclide air emissions for three different plant capacities: 125, 250, 450 ppy (see Table 5.4.3.2-1). Releases under each of the three capacity scenarios would be small. Total radionuclide emissions would increase by less than 0.016 percent. To ensure that total emissions are not underestimated, DOE's method for estimating emissions was conservative. Therefore, actual emissions from pit manufacturing operations would be smaller.

DOE estimated the radiation doses to the offsite MEI and the offsite population surrounding Pantex. As shown in Table 5.4.3.2-2, the expected annual radiation dose to the offsite MEI would be much smaller than the limit of 10 mrem/yr set by both the EPA (40 CFR 61) and DOE (DOE Order 5400.5) for airborne releases of radioactivity. The maximum estimated dose to the offsite population residing within an 80-km (50-mi) radius would also be very low. The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from radiological air emissions are presented in Section 5.4.9, Human Health and Safety.

Table 5.4.3.2–1. Annual Radiological Air Emissions for the MPF at Pantex—Operations

Isotope	Annual Emissions (Ci/yr)			
	Baseline ^{a,b}	125 ppy	250 ppy	450 ppy
Americium-241	NA	2.08×10^{-7}	3.81×10^{-7}	7.61×10^{-7}
Plutonium-239	NA	7.72×10^{-6}	1.19×10^{-5}	2.05×10^{-5}
Plutonium-240	NA	2.01×10^{-6}	3.10×10^{-6}	5.35×10^{-6}
Plutonium-241	NA	1.48×10^{-4}	2.28×10^{-4}	3.94×10^{-4}
Uranium-234	6.47×10^{-11}	4.19×10^{-9}	5.58×10^{-9}	8.38×10^{-9}
Uranium-235	NA	1.32×10^{-10}	1.76×10^{-10}	2.64×10^{-10}
Uranium-236	NA	2.13×10^{-11}	2.84×10^{-11}	4.26×10^{-11}
Uranium-238	6.73×10^{-7}	1.18×10^{-12}	1.58×10^{-12}	2.36×10^{-12}
Tritium	2.714	---	---	---
All other	3.28×10^{-6}	---	---	---
Total	2.714	1.58×10^{-4}	2.43×10^{-4}	4.21×10^{-4}

NA = not available.

^aThe No Action Alternative is represented by the baseline.

^bOnsite emissions only.

Source: WSRC 2002f.

Table 5.4.3.2–2. Annual Doses Due to Radiological Air Emissions from MPF Operations at Pantex

Receptor	125 ppy	250 ppy	450 ppy
Offsite MEI ^a (mrem/yr)	1.7×10^{-8}	2.8×10^{-8}	5.0×10^{-8}
Population within 80 km (person-rem per year)	1.2×10^{-7}	2.0×10^{-7}	3.6×10^{-7}

^aThe offsite MEI is assumed to reside at the site boundary.

Sensitivity Analysis

As discussed in Chapter 3, each plant could operate two shifts, increasing the number of pits produced per year. This increased capacity would result in increased radiological air emissions. The increase in radiological air emissions from the 125 ppy plant operating at surge capacity would be bounded by the 250 ppy facility emissions. Similarly, the increase in radiological air emissions from the 250 ppy plant operating at surge capacity would be bounded by the 450 ppy plant releases (see Table 5.4.3.2–1). Surge capacity of the 450 ppy plant is expected to be approximately 810 pits. A review of the annual radiological emissions in Table 5.4.3.2–2 indicates that if the emissions for the 450 ppy facility were conservatively doubled, concentrations would remain very low. The additional dose represented by these emissions would be well below regulatory limits.

5.4.3.3 Noise

No Action Alternative

Construction Impacts

Under the No Action Alternative, continuing operations at Pantex would not involve any new construction. Thus, there would be no impacts from construction noise on wildlife or the public.

Operations Impacts

The noise-generating activities described in Section 4.2.3.4 would continue. These noise-generating activities are included in the Pantex baseline and are not expected to change under the No Action Alternative.

Modern Pit Facility Alternative

Construction Impacts

Construction of new buildings would involve the movement of workers and construction equipment and would result in some temporary increase in noise levels near the area. Noise sources associated with construction at Area 6 would not include loud impulsive sources such as blasting. Although noise levels in construction areas could be as high as 110 dBA, these high local noise levels would not extend far beyond the boundaries of the construction site. Table 5.2.3.3-1 shows the attenuation of construction noise over relatively short distances. At 122 m (400 ft) from the construction site, construction noises would range from approximately 55-85 dBA. The *Environmental Impact Data Book* (Golden et al. 1980) suggests that noise levels higher than 80-85 dBA are sufficient to startle or frighten birds and small mammals. Thus, there would be little potential for disturbing wildlife outside a 122-m (400-ft) radius of the construction site. Given the distance to the site boundary (2.5 km [1.6 mi]), there would be no change in noise impacts on the public as a result of construction activities, except for a small increase in traffic noise levels from construction employees and material shipments. Impacts would be similar for each of the three plant capacities analyzed (e.g., 125, 250, and 450 ppy) for the MPF.

Construction workers could be exposed to noise levels higher than the acceptable limits specified by OSHA in its noise regulations (29 CFR 1926.52). However, DOE has implemented appropriate hearing protection programs to minimize noise impacts on workers. These include the use of administrative controls, engineering controls, and personal hearing protection equipment.

Operations Impacts

The location of these facilities relative to the site boundary and sensitive receptors was examined to evaluate the potential for onsite and offsite noise impacts. Noise impacts from pit manufacturing operations at the new buildings would be expected to be similar to those from existing operations. There would be an increase in equipment noise (e.g., heating and cooling systems, generators, vents, motors, material-handling equipment) from pit manufacturing

activities. However, given the distance to the site boundary (about 2.5 km [1.6 mi]), noise emissions from equipment would not likely disturb the public. These noise sources would be far enough away from offsite areas that their contribution to offsite noise levels would be small. Some noise sources (e.g., public address systems and testing of radiation and fire alarms) could have onsite impacts, such as the disturbance of wildlife. But these noise sources would be intermittent and would not be expected to disturb wildlife outside of facility boundaries. Traffic noise associated with the operation of these facilities would occur onsite and along offsite local and regional transportation routes used to bring materials and workers to the site. Noise from traffic associated with the operation of these facilities would likely produce less than a 1-dBA increase in traffic noise levels along roads used to access the site, and thus would not result in any increased annoyance to the public. Impacts would be similar for each of the three plant capacities analyzed (e.g., 125, 250, 450 ppy) for the MPF.

Operations workers could be exposed to noise levels higher than the acceptable limits specified by OSHA in its noise regulations (29 CFR 1926.52). However, DOE has implemented appropriate hearing protection programs to minimize noise impacts on workers. These include the use of administrative controls, engineering controls, and personal hearing protection equipment.

Sensitivity Analysis

If any of the three facilities operated at surge capacity, a second shift would be added. However, because of the distance of the facilities to the site boundary, noise from second-shift operations would not be noticeable offsite. Second-shift worker traffic would slightly increase noise levels on local roads. However, most material deliveries would likely occur during normal business hours, so there would be no increase in noise from truck traffic during the second shift. Impacts would be similar for each of the three plant capacities analyzed. Second-shift workers would be exposed to the same level of noise as first-shift workers. DOE would implement the same hearing protection programs for the second shift as used for the first. The second shift would not affect worker hearing.

5.4.4 Water Resources

Environmental impacts associated with the proposed alternatives at Pantex could affect groundwater resources. No impacts to surface water are expected. At Pantex, groundwater resources would be used to meet all construction and operations water requirements. Table 5.4.4–1 summarizes existing surface water and groundwater resources, the total Pantex site-wide water resource requirement for each alternative, and the potential changes to water resources at Pantex resulting from the proposed alternatives.

Table 5.4.4–1. Potential Changes to Water Resources from MPF at Pantex

Affected Resource Indicator	No Action ^a	MPF Alternative		
		125 ppy Single-Shift Operation	250 ppy Single-Shift Operation	450 ppy Single-Shift Operation
Construction – Water Availability and Use				
Water source	Ground	Ground	Ground	Ground
Total site-wide water operation requirement (million L/yr)	492	502.7	503.8	508.3
Percent change from No Action water use (492 million L/yr)	NA	2.2%	2.4%	3.3%
Water Quality				
Wastewater discharge into lagoons and ponds (million L/yr)	141	143	143	144
Percent change from No Action Alternative wastewater discharge	NA	26.6%	29.3%	38.4%
Operations – Water Availability and Use				
Water source	Ground	Ground	Ground	Ground
Total site-wide water operation requirement (million L/yr)	492	769.4	821.9	996.3
Percent change from No Action water use (492 million L/yr)	NA	56.4%	67.0%	102.5%
Water Quality				
Wastewater discharge into lagoons and ponds (million L/yr)	141	186.0	202.9	222.8
Percent change from No Action Alternative Wastewater discharge (141 million L/yr)	NA	31.9%	43.9%	58.0%
Floodplain				
Actions in 100-year floodplain	NA	None	None	None
Actions in 500-year floodplain	NA	None	None	None

All discharges to natural drainages require NPDES permits.

NA = not applicable.

million L/yr = million liters per year.

^aSource: DOE 2002k.

Source: MPF Data 2003.

5.4.4.1 Surface Water

No Action Alternative

No additional impacts on surface water resources are anticipated at Pantex under the No Action Alternative beyond the effects of existing and projected activities. The environment and operations (current and planned) described in Chapter 4 (Affected Environment) would continue.

Modern Pit Facility Alternative

Construction Impacts

Surface water would not be used to support the construction of the MPF Alternative at the Pantex as groundwater is the source of water at Pantex. Therefore, there would be no impact to surface water availability from construction. Sanitary wastewater would be generated by construction personnel. As plans include use of portable toilets, onsite discharge of sanitary wastewater would be minimized.

During construction, an estimated total of 37.5 million L (9.9 million gal), 41.26 million L (10.9 million gal), and 54.13 million L (14.3 million gal) of liquid wastes would be generated for the 125 ppy, 250 ppy, and 450 ppy facilities, respectively. It is expected that construction should take approximately 6 years. Assuming an equal generation of liquid waste over that timeframe, it is estimated that approximately 6.25 million L/yr (1.65 million gal/yr), 6.88 million L/yr (1.82 million gal/yr), and 9.02 million L/yr (2.38 million gal/yr) of liquid waste would be generated for the 125, 250, and 450 ppy facilities, respectively. It is estimated that one-third of the liquid wastes generated during construction would be from sanitary wastewater, with the remaining amount attributed to concrete construction activities. Water runoff from construction would be handled according to Pantex's NPDES permit for stormwater involving construction activities.

Stormwater runoff from construction areas could potentially impact downstream surface water quality, although runoff would likely be collected in detention ponds. In addition, appropriate soil erosion and sediment control measures (e.g., sediment fences, stacked haybales, mulching disturbed areas, etc.) would be employed during construction to minimize suspended sediment and material transport, as well as potential water quality impacts. Pantex would comply with Federal and state regulations to prevent, control, and handle potential spills from construction activities. However, the MPF reference location is not located near any surface water; therefore, no impacts to surface water from potential construction-related spills would be expected.

Floodplains at the Pantex site have been delineated. The MPF reference location at Pantex is not within the 100- or 500-year floodplains, or the Standard Project Flood boundaries. Therefore, no impacts to floodplains would be anticipated, nor would project facilities be expected to be impacted by flooding.

Operations Impacts

No impacts on surface water resources would be expected as a result of MPF operations at Pantex. No surface water would be used to support facility activities, and there would be no

discharge of sanitary or industrial effluent to surface waters. Sanitary wastewater would be generated as a result of operations stemming from staff use of lavatory, shower, and breakroom facilities, and from miscellaneous potable and sanitary uses. It is estimated that 45.0 million L (11.9 million gal), 61.9 million L (16.4 million gal), and 81.8 million L (21.6 million gal) of sanitary wastewater would be generated for the 125 ppy, 250 ppy, and 450 ppy facilities, respectively. These quantities would represent 31.9 percent, 43.9 percent, and 58.0 percent increases in sanitary wastewater discharges, respectively. Pantex's current NPDES permit may require modification and approval concerning the increase in wastewater discharges. The sanitary wastewater would be treated in the Wastewater Treatment Facility (WWTF) and disposed of via land application for the irrigation of crops in cooperation with the Texas Tech University Research Farm. No industrial or other NPDES-regulated discharges to surface waters are anticipated.

The MPF would not generate any radioactive water emissions. However, there is a potential for generating radioactive contaminated water from the operation and maintenance of safety showers in contaminated areas, the operation of decontamination stations, the mopping of floors in contaminated areas, and the testing of fire sprinkler systems located in contaminated areas. Wastewater that has the potential for being radioactively contaminated would be collected, sampled, and analyzed prior to discharge. Radioactive wastewater would be converted to a solid and disposed of in accordance with DOE procedures. The water emissions that are sampled, analyzed, and determined to be contaminated can be converted to a solid by processing through the MPF liquid-process waste facilities for the plutonium purification process.

Sensitivity Analysis

For a 450 ppy facility working a double shift, more wastewater would be generated by the increased number of workers. The sanitary wastewater treatment system would require appropriate modifications to handle the increase in flow.

5.4.4.2 Groundwater

No Action Alternative

No additional impacts on groundwater availability or quality are anticipated at Pantex under the No Action Alternative beyond the effects of existing and projected activities. The environment and operations (current and planned) described in Chapter 4 (Affected Environment) would continue.

Modern Pit Facility Alternative

Construction Impacts

Water would be required during construction for such uses as dust control and soil compaction, washing and flushing activities, and meeting the potable and sanitary needs of construction employees. The proposed use of portable toilets by construction personnel would greatly reduce water over that normally required by construction activities. In addition, water required for concrete mixing would likely be procured offsite. As a result, it is estimated that construction activities would require a total of approximately 71.92 million L (19 million gal),

79.49 million L (21 million gal), and 109.79 million L (29 million gal) of groundwater for the 125 ppy, 250 ppy, and 450 ppy capacity facilities, respectively, mainly to support MPF construction. It is expected that construction should take approximately 6 years. Assuming an equal usage over that timeframe, it is estimated that approximately 10.7 million L (2.8 million gal), 11.8 million L (3.1 million gal), and 16.3 million L (4.3 million gal) would be needed for the 125, 250, and 450 ppy facilities, respectively. The total site water requirement including these quantities would be no more than a 3.3 percent increase compared to the No Action Alternative and would be within Pantex’s water capacity of approximately 1.6 billion L (437.7 million gal). It is anticipated that this water would be derived from Pantex’s groundwater distribution system via a temporary service connection or trucked to the point-of-use, especially during the early stages of construction.

There would be no onsite discharge of wastewater to the surface or subsurface, and appropriate spill prevention controls and countermeasure plans would be employed to minimize the chance of petroleum, oils, lubricants, and other materials used during construction being released to the surface or subsurface and to ensure that waste materials are properly disposed. In general, no impact on groundwater availability or quality is anticipated.

Operations Impacts

Activities at Pantex for the MPF Alternative would use groundwater primarily to meet the potable and sanitary needs of facility personnel and for cooling tower water makeup. A summary of water need by category and total is listed in Table 5.4.4.2–1. The percent change in water consumption from the No Action Alternative ranges from 56.4 to 102.5. The Pantex wellfield has a water capacity of approximately 1.6 billion L/yr (422.6 million gal/yr), and the range of the additional amount of water needed for the operation of the MPF is from 17.3-31.5 percent of the current water capacity. For comparison, in 2001, the City of Amarillo withdrew 26.23 billion L (6.93 billion gal) of water from the Amarillo City Wellfield. Pantex, governed by the Panhandle Groundwater Conservation District No. 3, does not limit the quantity of water pumped from the aquifer.

Table 5.4.4.2–1. Summary of Water Consumption During Operations at Pantex (million L)

	125 ppy	250 ppy	450 ppy
Domestic Water	44.9	61.7	81.6
Cooling Tower Makeup	232.5	267.8	422.7
Total	277.4	329.5	504.3
Total needed for site operation	769.4	821.9	996.3
Percent Change from No Action Alternative	56.4%	67.0%	102.5%

Source: MPF Data 2003.

No sanitary or industrial effluent would be discharged to the subsurface. Therefore, no operational impacts on groundwater quality would be expected.

Routine chemical additives would be added to the domestic water to control bacteria and pH, as well as to cooling tower water makeup for bacteria and corrosion control. Table 5.4.4.2–2

summarizes the chemicals added. Use of these chemicals is standard and no adverse impacts would be expected.

Table 5.4.4.2–2. Chemical Additives to Domestic Water and Cooling Tower Water Makeup (kg)

Chemical	125 ppy	250 ppy	450 ppy
Water Chemicals			
Sodium hypochlorite	90	124	164
Sodium hydroxide	58	80	106
Polyphosphate	180	247	327
Cooling Tower Makeup			
Betz Slimicide	120	130	210
Betz 25K series (corrosion inhibitor)	7,000	8,000	12,700

Source: MPF Data 2003.

Sensitivity Analysis

The double shift for 450 ppy would cause a significant increase in water use over the 450 ppy single shift, which is already a 102.5 percent increase in water use at the site. This total amount for the single-shift alternative, however, is approximately 62 percent of the Pantex wellfield capacity of 1.6 billion L (422.6 million gal). It is likely that the 450 ppy double-shift water requirement would approach Pantex’s capacity.

5.4.5 Geology and Soils

5.4.5.1 No Action Alternative

Under the No Action Alternative, no additional impacts on geology and soils are anticipated at Pantex. The environmental impacts and operations (current and planned) described in Chapter 4 would continue. Hazards from large-scale geologic conditions, such as earthquakes, and from other site geologic conditions with the potential to affect existing Pantex facilities are summarized in Section 4.4.5 and further detailed in the *Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapons* (DOE 1996d).

5.4.5.2 Modern Pit Facility Alternative

Construction Impacts

The construction of the MPF is expected to disturb land adjacent to existing facilities at Pantex. Table 5.2.5.2–1 shows the amount of disturbance for the three different plant sizes. The major differences in the three facility layouts are in the sizes of the detention basin, Construction Laydown Area, and the roads and parking. The area of disturbance was calculated by extending the MPF area 9 m (30 ft) from the surrounding roads and the borders of the construction area and Concrete Batch Plant.

While the soils that would be disturbed are classified as prime farmland, the disturbed area would not be converted from farming to other purposes as it is not presently farmed. The *Farmland Protection Policy Act* (FPPA) (7 USC 4201 *et seq.*) and associated regulations require agencies to make evaluations of the conversion of farmland to non-agricultural uses by Federal projects and programs. Pantex is exempt from FPPA under section 1540(c)(4) since the acquisition of Pantex property occurred prior to FPPA's effective date of June 22, 1982 (7 USC 4201 *et seq.*).

Aggregate and other geologic resources (e.g., sand) would be required to support construction activities at Pantex, but these resources are abundant in the Amarillo area. In addition to new facility construction and upgrades, excavation to remove and replace some existing utility systems would also be conducted. The land area to be disturbed is relatively small, the impact on geologic and soil resources would be relatively minor. The potential exists for contaminated soils and possibly other media to be encountered during excavation and other site activities. Prior to commencing ground disturbance, DOE would survey potentially affected areas to determine the extent and nature of any contaminated media and required remediation in accordance with the procedures established under the site's Environmental Restoration Program and in accordance with appropriate requirements and agreements. Construction of the MPF would require a stormwater permit that would address erosion control measures to minimize the impacts of erosion.

As discussed in Section 4.4.5, the faults located in the vicinity of Pantex have little potential for earthquakes. Ground shaking affecting primarily the integrity of inadequately designed or nonreinforced structures might occur, but shaking capable of damaging or slightly damaging properly or specially designed or upgraded facilities is not expected.

Operations Impacts

The operation of the MPF at any of the three capacities would not be expected to result in impacts on geologic and soil resources. New, upgraded, and modified facilities would be evaluated, designed, and constructed in accordance with DOE Order 420.1, which requires that nuclear and nonnuclear facilities be designed, constructed, and operated so that workers, the public, and the environment are protected from the adverse impacts of natural phenomena hazards, including earthquakes.

Sensitivity Analysis

Utilizing the 450 ppy facility for two-shift operations would not impact geologic or soil resources. A second shift of workers would use the same parking lot as the first shift. No increase in the size of the parking lot is foreseen.

5.4.6 Biological Resources

5.4.6.1 Terrestrial Resources

No Action Alternative

Under the No Action Alternative, impacts on terrestrial resources would not occur since no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing Pantex environment and operations would continue to be an accurate portrayal of the site conditions and current and planned activities not connected with MPF.

Modern Pit Facility Alternative

Construction Impacts

The area identified for construction of MPF is classified as a previously cultivated area that has been replanted with native grasses. This tract of land is surrounded by similar land use on all sides, which is wide-open space. The land was last cultivated in 1993 and was planted to native short grasses in 1996 (Robbins 2002). The current state of the altered shortgrass prairie is reflective of conditions of the Southern High Plains of Texas that contain relatively little native undisturbed grassland. Land in the Texas Panhandle, which surrounds Pantex, is used for agricultural purposes and does not support extensive populations of endemic shortgrass prairie wildlife. The remaining undisturbed playas are “islands” of wildlife habitat, allowing the continued existence of many species. The 2002 revision of the *Integrated Plan for Playa Management at Pantex Plant* (BWXT 2002b) calls for adaptive management for species diversity that is consistent with the shortgrass prairie ecosystem of the Southern High Plains. Cultivation, intensive grazing, and invasion of honey mesquite (*Prosopis glandulosa*) have changed species diversity and supporting habitat. Consequently, the importance of managed shortgrass prairie has increased for wildlife and plant species. Thus, preservation and management of remaining grassland is an important goal for biotic community protection. This management issue takes on special significance because few federally managed public lands occur on the Southern High Plains, an important part of the Central Flyway for migratory birds.

Depending upon the MPF capacity, approximately 62-74 ha (152-182 ac) of primarily shortgrass prairie and habitat would be cleared or modified during MPF construction. During site-clearing activities, highly mobile wildlife species, such as some mammals and birds, would be able to relocate to adjacent, less developed areas. However, successful relocation may not occur due to competition for resources to support the increased population and the carrying capacity limitations of areas outside the proposed development. For less mobile species (reptiles and small mammals), direct mortality could occur on a very small scale during the actual construction event or ultimately result from habitat alteration. Acreage used for the development also would be lost as potential hunting habitat for raptors and other predators.

Operations Impacts

Impacts to terrestrial resources would be very similar regardless of the level of pit production operations (potential pit production capacities of 125, 250, and 450 ppy including surge capacities). The major difference is the size of the modification or loss of shortgrass prairie plant

communities and wildlife habitat. The acreage modified or lost would range from 44-56 ha (110-138 ac) depending upon pit production capacity. In addition to the areas to be disturbed, there could be impacts to wildlife in habitat immediately adjacent to the proposed development due to increased noise level, traffic, lights, and other human activity, both pre- and post-construction. Further loss of shortgrass prairie habitat on the site is of regional and local concern due to fragmentation of habitat. However, adverse impacts to wildlife due to the loss of grassland in the highly industrialized Zone 11 would be negligible.

There would be no direct untreated effluent discharges to the environment and air emissions would be controlled to levels that would not be expected to adversely affect terrestrial resources. With implementation and adherence to administrative procedures, along with facility design and engineering controls for pit production, MPF operations would minimize the potential for any adverse affects to plant and animal communities (terrestrial resources) in the surrounding environment.

Sensitivity Analysis

There would be minimal impacts to terrestrial resources during the two-shift operations. Wildlife road strikes (vehicle and wildlife collisions) may increase during morning and evening shift changes due to more vehicle traffic coupled with decreased visibility and higher wildlife activity.

5.4.6.2 Wetlands

No Action Alternative

Under the No Action Alternative, there would be no impacts to wetlands because no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing environment and operations would continue to be an accurate portrayal of the site conditions and current and planned activities not connected with the MPF.

Modern Pit Facility Alternative

Construction Impacts

The two nearest wetlands to the proposed MPF reference location are Playa 1 and Playa 2. Measuring from the center of the MPF site, the center of Playa 1 is approximately 1,176 m (3,860 ft) northeast and the center of Playa 2 is approximately 1,584 m (5,200 ft) west (Robbins 2002). There would be no direct impacts to wetlands as there are no wetlands within the area proposed for construction of the MPF or any of the associated construction staging and laydown areas. Implementation of standard construction practices to minimize site runoff and erosion along with implementation of a stormwater pollution prevention plan would avoid the indirect degradation of Playas 1 and 2.

Operations Impacts

There would be no adverse impacts predicted to wetlands from implementation of any of the MPF production capacities. There would be no direct untreated effluent discharges to the

environment. With implementation and adherence to administrative procedures, along with facility design and engineering controls, MPF operations are not expected to adversely affect Playa 1, Playa 2, or other wetlands.

Sensitivity Analysis

There would be no impacts to wetlands during the two-shift operations.

5.4.6.3 Aquatic Resources

No Action Alternative

Under the No Action Alternative, impacts on aquatic resources would not occur since no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing environment and Pantex operations would continue to be an accurate portrayal of the site conditions and current and planned activities not connected with the MPF.

Modern Pit Facility Alternative

Construction Impacts

There are no perennial or seasonal aquatic habitats within the proposed MPF reference location. Thus, there would be no direct impacts to aquatic resources. Indirect effects to aquatic resources downslope and within the Pantex watershed would be avoided by implementation of standard construction practices to minimize site runoff and erosion along with implementation of a stormwater pollution prevention plan.

Operations Impacts

There would be no direct discharge of untreated operational effluent from MPF operations. Stormwater runoff from new facilities, roadways, parking lots, and other impervious areas is not predicted to result in any indirect adverse impacts on area aquatic resources. The quality of runoff waters would be similar to runoff from other Pantex built environments and the quantity would represent a very minor contribution to the watershed.

Sensitivity Analysis

There would be no impacts to aquatic resources during the two-shift operations.

5.4.6.4 Threatened and Endangered Species

No Action Alternative

Under the No Action Alternative, impacts to threatened and endangered species and other special interest species would not occur since no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing environment and operations would continue to be an accurate portrayal of the site conditions and current and planned activities not associated with the MPF.

Modern Pit Facility Alternative

Section 7 of the *Endangered Species Act* requires all Federal agencies to ensure that actions they authorize, fund, or carry out do not jeopardize the continued existence of endangered or threatened species. Agencies must assess potential impacts and determine if proposed projects may affect federally-listed or proposed-for-listing species. Table 4.4.6.4–1 identifies those Federal- and state-threatened and endangered listed species and other special interest species that occur or may occur within Carson County and Pantex.

Construction Impacts

Depending upon the MPF capacity, approximately 62-74 ha (152-182 ac) of restored shortgrass vegetation and habitat would be cleared or modified during MPF construction. It is highly probable that several special-interest species are present or use the area for foraging or hunting. Acreage temporarily modified from construction would be lost as potential habitat, foraging areas, or hunting habitat for special interest avian, mammalian, and reptile species until the area revegetates. Revegetation would probably occur within a 1-3 year timeframe depending upon site maintenance and climate conditions.

Operations Impacts

Depending upon pit production capacity, acreage permanently modified or lost as habitat, foraging areas, or as a prey base for species of special interest would range from 44-56 ha (110-138 ac). There would be no direct untreated effluent discharges to the environment and air emissions would be controlled to levels that would not be expected to adversely affect special-interest species. With implementation and adherence to administrative procedures, along with facility design and engineering controls for pit production, MPF operations would minimize the potential impacts to any individual within a special-interest species population.

However, there is similar habitat in more remote parts of the Pantex Site, and the USFWS has told Pantex that construction within Zones 11 and 12 would not have adverse impacts on threatened and endangered species. The contractor would be advised to move any Texas horned lizards encountered during fieldwork and to notify the Pantex Regulatory Compliance Department should any bird nests be discovered during fieldwork.

Sensitivity Analysis

There would be no impacts to threatened and endangered species during the two-shift operations.

5.4.7 Cultural and Paleontological Resources

5.4.7.1 Cultural Resources

No Action Alternative

Under the No Action Alternative, there would be no new facility and operations would remain at current and planned levels. Since there would be no construction activities and operations would remain unchanged, there would be no impact to prehistoric, historic, or Native American cultural

resources. The cultural resource environment would remain as described in Chapter 4 (Affected Environment).

Modern Pit Facility Alternative

Construction Impacts

Under this alternative, a block of land would be disturbed during construction of MPF. The size of the disturbed area would vary by the output of the facility, and would include Pantex buildings and structures (inside the PIDAS fence), security fencing and perimeter roads, support buildings and parking, a detention basin, a Concrete Batch Plant, a Construction Laydown Area, and a 9-m (30-ft) wide buffer zone surrounding the facility. For purposes of analyzing impacts to cultural resources, the three sizes of disturbed areas would be 61 ha (152 ac) (125 ppy), 63 ha (156 ac) (250 ppy), and 74 ha (182 ac) (450 ppy).

No cultural resources would be impacted during construction of the MPF at the reference location. Probabilities for resource impacts at other areas on the Pantex Site would depend on the locations, since some areas (near playas or in developed areas) can exhibit a higher density of cultural resources. Although the number of resources that would be impacted is unknown, the probability for resource impacts would increase with an increase in the number of acres disturbed.

Because the exact location of the MPF at Pantex is not yet determined, cultural resources impacts arising from construction (such as water, sewer, gas, electricity, access roads) are not analyzed here. They will be analyzed in the site-specific EIS. However, like the facility itself, the greater the number of acres disturbed, the greater the possibility for impacts to cultural resources.

Prior to any ground-disturbing activity, DOE would identify and evaluate any cultural resources that could potentially be impacted by the construction of MPF. Methods for identification could include field survey, shovel tests, archival research, and consultation with interested Native American tribes. DOE would determine the possibility for impacts to the resources and implement appropriate measures to avoid, reduce, or mitigate the impacts. Identification, evaluation, determination of impact, and implementation of measures would be conducted in consultation with the Texas SHPO and in accordance with the Cultural Resource Management Plan. If previously unknown cultural resources, such as subsurface resources, are discovered during construction, activities in the area of the discovery would stop and the discovery would be evaluated and treated appropriately, as determined by DOE in consultation with the Texas SHPO.

Operations Impacts

Operation of the MPF at any of the three capacity levels would have no impact on cultural resources.

Sensitivity Analysis

Utilization of the 450 ppy facility for two-shift operations would have no impact on cultural resources.

5.4.7.2 Paleontological Resources

No Action Alternative

Under the No Action Alternative, there would be no new facility and operations would remain at current and planned levels. Since there would be no construction activities and operations would remain unchanged, there would be no impact to paleontological resources. The paleontological resource environment would remain as described in Chapter 4 (Affected Environment).

Modern Pit Facility Alternative

Construction Impacts

Limited Late-Pleistocene fossil remains have been identified near Pantex boundaries. Thus, there is a possibility that paleontological resources would be impacted due to construction of the MPF or the associated infrastructure at the reference location. This is also true for any other area at Pantex. The probability for impacts to paleontological resources would increase with an increase in the number of acres disturbed.

Paleontological resources would be included in the scope of any cultural resource inventories conducted prior to the beginning of construction. If previously unknown paleontological resources are discovered during construction, activities in the area of the discovery would stop and the discovery would be treated appropriately, as determined by DOE.

Operations Impacts

Operation of the MPF at any of the three capacity levels would have no impact on paleontological resources.

Sensitivity Analysis

Utilization of the 450 ppy facility for two-shift operations would have no impact on paleontological resources.

5.4.8 Socioeconomics

5.4.8.1 Regional Economy Characteristics

No Action Alternative

Under the No Action Alternative, there would be no change in the workforce currently at Pantex. Therefore, there would be no impacts to the ROI employment, income, or labor force in the area.

Modern Pit Facility Alternative

Construction Impacts

Facility–125 ppy. Construction of the facility to produce 125 ppy would require a total of 2,650 man-years of labor. During peak construction, 770 workers would be employed at the site. In

addition to the direct jobs created by the construction of the facility, additional jobs would be created in other supporting industries. It is estimated that 660 indirect jobs would be created, for a total of 1,430 jobs. This represents approximately 1.3 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI and the fact that the construction industry only employs approximately 6 percent of the ROI labor force, it is estimated that many of the direct jobs would be filled by workers migrating into the ROI, at least temporarily during the construction period. Approximately 550 construction workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

The ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of \$26,100 for the construction industry, direct income would increase by \$20.1 million at peak construction. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately \$34.2 million (\$20.1 million direct and \$14.1 million indirect).

Facility–250 ppy. Construction of the facility to produce 250 ppy would require a total of 2,950 man-years of labor. During peak construction, 850 workers would be employed at the site. In addition to the direct jobs created by the construction of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 730 indirect jobs would be created, for a total of 1,580 jobs. This represents approximately 1.4 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI and the fact that the construction industry only employs approximately 6 percent of the ROI labor force, it is estimated that many of the direct jobs would be filled by workers migrating into the ROI, at least temporarily during the construction period. Approximately 630 construction workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

The ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of \$26,100 for the construction industry, direct income would increase by \$22.2 million at peak construction. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately \$37.8 million (\$22.2 million direct and \$15.6 million indirect).

Facility–450 ppy. Construction of the facility to produce 450 ppy would require a total of 3,800 man-years of labor. During peak construction, 1,100 workers would be employed at the site. In addition to the direct jobs created by the construction of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 940 indirect jobs would be created, for a total of 2,040 jobs. This represents less than 2 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI and the fact that the construction industry only employs approximately 6 percent of the ROI labor force, it is estimated that many of the direct jobs would be filled by workers migrating into the ROI, at least temporarily during the

construction period. Approximately 880 construction workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

The ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of \$26,100 for the construction industry, direct income would increase by \$28.7 million at peak construction. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately \$48.9 million (\$28.7 million direct and \$20.2 million indirect).

Operations Impacts

Facility–125 ppy. Operation of the facility to produce 125 ppy would require 988 workers. In addition to the direct jobs created by the operation of the facility, additional jobs would be created in other supporting industries. It is estimated that 710 indirect jobs would be created, for a total of approximately 1,700 jobs. This represents approximately 1.5 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI, it is estimated that some of the direct jobs would be filled by workers migrating into the ROI. Approximately 540 workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

The ROI income would increase 1.1 percent as a result of the new jobs created. Based on the ROI average earnings of \$36,500 for the government services industry, direct income would increase by \$36.1 million annually. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately \$61.8 million (\$36.1 million direct and \$25.7 million indirect).

Facility–250 ppy. Operation of the facility to produce 250 ppy would require 1,358 workers. In addition to the direct jobs created by the operation of the facility, additional jobs would be created in other supporting industries. It is estimated that 980 indirect jobs would be created, for a total of 2,340 jobs. This represents approximately 20 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI, it is estimated that some of the direct jobs would be filled by workers migrating into the ROI. Approximately 910 workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

The ROI income would increase 1.5 percent as a result of the new jobs created. Based on the ROI average earnings of \$36,500 for the government services industry, direct income would increase by \$49.6 million annually. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately \$84.9 million (\$49.6 million direct and \$35.3 million indirect).

Facility–450 ppy. Operation of the facility to produce 450 ppy would require 1,797 workers. In addition to the direct jobs created by the operation of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 1,290 indirect jobs

would be created, for a total of 3,090 jobs. This represents approximately 2.7 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI, it is estimated that some of the direct jobs would be filled by workers migrating into the ROI. Approximately 1,350 workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

The ROI income would increase 2 percent as a result of the new jobs created. Based on the ROI average earnings of \$36,500 for the government services industry, direct income would increase by \$65.6 million annually. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately \$112.3 million (\$65.6 million direct and \$46.7 million indirect).

Sensitivity Analysis

If the facility were operated on a two-shift system, additional employees would be required for the second shift. This would lead to additional increases in ROI employment and income.

5.4.8.2 Population and Housing

No Action Alternative

Under the No Action Alternative, there would be no change in the workforce currently at Pantex. Therefore, there would be no impacts to the ROI population or housing market.

Modern Pit Facility Alternative

Construction Impacts

Facility–125 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 1,400 new residents would be expected in the ROI, including workers and their families. This is less than a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Facility–250 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 1,600 new residents would be expected in the ROI, including workers and their families. This is less than a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Facility–450 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 2,300 new residents would be expected in the ROI, including workers and their families. This is a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Operations Impacts

Facility–125 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 1,400 new residents would be expected in the ROI, including workers and their families. This is less than a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Facility–250 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 2,400 new residents would be expected in the ROI, including workers and their families. This is a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Facility–450 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 3,500 new residents would be expected in the ROI, including workers and their families. This is a 1.5 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Sensitivity Analysis

If the facility were operated on a two-shift system, additional employees would be required for the second shift. This would lead to additional increases in ROI employment and income. There would be additional impacts to the ROI population and additional stress on the local housing market because most of these workers would come from outside the ROI.

5.4.8.3 Community Services

No Action Alternative

Under the No Action Alternative, there would be no change in the workforce currently at Pantex. Therefore, there would be no impacts to the ROI community services.

Modern Pit Facility Alternative

Construction Impacts

Facility–125, 250, or 450 ppy. The increase in population would put an increased demand on local community services. Because the population would increase by less than 1 percent, comparable levels of service could be maintained without increased staffing.

Operations Impacts

Facility–125, 250, or 450 ppy. The increase in population would not increase demand on local community services. Because the population would increase by less than 1.5 percent, comparable levels of service could be maintained without increased staffing.

Sensitivity Analysis

If the facility were operated on a two-shift system, additional employees would be required for the second shift. This would lead to additional increases in ROI employment and income. There would be additional impacts to the ROI population and additional stress on the local community services because most of these workers would come from outside the ROI.

5.4.9 Human Health and Safety

5.4.9.1 Radiological Impacts

No Action Alternative

Under the No Action Alternative, DOE would continue to use the plutonium pit manufacturing capability of PF-4 located in TA-55 at LANL. There would be no change in Pantex operations.

Construction Impacts

Under the No Action Alternative, there would be no radiological impacts on members of the public or workers because this alternative would not involve any construction.

Operations Impacts

Under the No Action Alternative, the radiological releases to the environment from Pantex would continue at the same rates described in Section 4.4.9. The associated impacts on the general public living within 80 km (50 mi) of Pantex and the offsite MEI would continue at the levels shown in Table 4.4.9.1–2. As shown in that table, the expected annual radiation dose to the offsite MEI would be much smaller than the limit of 10 mrem/yr set by both EPA (40 CFR 61) and DOE (DOE Order 5400.5) for airborne releases of radioactivity. The fatal cancer risk to the offsite MEI due to radiological releases from Pantex operations is estimated to be 8.1×10^{-11} , while 7.9×10^{-7} excess fatal cancers are projected in the population living within 80 km (50 mi) of Pantex from normal Pantex operations.

Under this alternative, the radiation dose received by Pantex workers would continue at the rates described in Section 4.4.9. These worker radiation doses at Pantex for the year 2000 are presented in Table 4.4.9.1–3. The number of projected fatal cancers among Pantex workers from normal operations in 2000 is 0.014.

Modern Pit Facility Alternative

Construction Impacts

No radiological risks would be incurred by members of the public from construction activities. Construction workers could be at a small radiological risk. They could receive doses above natural background radiation levels from exposure to radiation from other past or present activities at the site, including that associated with residual contamination at the facilities being upgraded. However, these workers would be protected through appropriate training, monitoring,

and management controls. Their exposures would be limited to ensure that doses were kept as low as reasonably achievable.

Operations Impacts

Impacts to the Public. DOE expects minimal public health impacts from the radiological consequences of MPF operations. Public radiation doses would likely occur from airborne releases only (Section 5.4.3). Table 5.4.9.1–1 lists incremental radiation doses estimated for the public (offsite MEI and collective population dose) and corresponding incremental LCFs. To put the doses into perspective, comparisons with natural background radiation levels are included in the table.

Table 5.4.9.1–1. Annual Radiological Impacts on the Public from MPF Operations at Pantex for All Three Pit Production Rates

Receptor	125 ppy	250 ppy	450 ppy
Population within 80 km			
Collective dose (person-rem)	1.2×10^{-7}	2.0×10^{-7}	3.6×10^{-7}
Percent of natural background radiation ^a	0.00000000088%	0.0000000014%	0.0000000025%
LCFs ^b	6.2×10^{-11}	1.0×10^{-10}	1.8×10^{-10}
Offsite MEI^c			
Dose (mrem)	1.7×10^{-8}	2.8×10^{-8}	5.0×10^{-8}
Percent of regulatory dose limit	0.00000017%	0.00000028%	0.00000050%
Percent of natural background radiation ^a	0.0000000051%	0.0000000084%	0.000000015%
Cancer fatality risk ^b	8.5×10^{-15}	1.4×10^{-14}	2.5×10^{-14}

^a The average annual dose from background radiation at Pantex is 335 mrem (see Section 4.4.9); the 422,287 people living within 80 km (50 mi) of Pantex in the year 2043 would receive an annual dose of 141,466 person-rem from the background radiation.

^b Based on a cancer risk estimate of 0.0005 LCFs per person-rem.

^c The offsite MEI is assumed to reside at the site boundary, 3,610 m (11,844 ft) north from the MPF an actual residence may not currently be present at this location.

As shown in the table, the expected annual radiation dose to the offsite MEI would be much smaller than the limit of 10 mrem/yr set by both EPA (40 CFR 61) and DOE (DOE Order 5400.5) for airborne releases of radioactivity. The risk of a LCF to this individual from operations would be less than or equal to 2.5×10^{-14} per year (i.e., about 1 chance in 40 trillion per year of a LCF). The projected number of fatal cancers to the population within 80 km (50 mi) would be less than or equal to 1.8×10^{-10} per year (i.e., about 1 chance in 5.6 billion per year of a LCF).

Impacts to Modern Pit Facility Workers. Estimates of annual radiological doses to workers involved with MPF operations are independent of geographical location. These dose estimates are solely a function of:

- The number of radiological workers, as determined in the development of the MPF staffing estimate for each throughput alternative. The current estimates were developed by application of a factor to the total workers for each workgroup based on operating experience in plutonium facilities. Approximately 60 percent of total operating staff are estimated to be radiological workers.

- The working dose rate at the glovebox surface for each unit operation or workstation. These dose rates were calculated based on the maximum mass (plutonium, americium) and form (metal, oxide) of material being handled. Standard “weapons grade” isotopic distribution, and americium content of 0.5 percent were assumed.
- The amount of time spent by direct operators/first line supervisors in the radiation area. This was determined from a time-motion estimate of direct “hands-in-gloves” labor required to perform each individual operation and the number of parts processed per year for a given pit production rate. Efficiency scaling factors were applied for various operations. For Foundry and Machining operations, this was assumed to be 50 percent; for Assembly and Post-Assembly & Testing, efficiencies were 90 percent.

As indicated above, the collective annual dose (mrem/yr) received by individual direct operators is calculated based on the number of operators required for the various production rates, the time spent in the radiation area, and the associated dose rates for each operation. The collective exposures for support group workers were added to these numbers and were calculated using empirical data that implies that exposure for these workers can be estimated as a percentage of direct operator exposure (e.g., Analytical Laboratory Technician ~25 percent of direct operator exposure). The average individual dose is calculated as the collective exposure divided by the estimated number of radiological workers for each throughput alternative.

The estimates of annual radiological doses to workers under each of the three pit production rates are provided in Table 5.4.9.1–2. As shown in the table, the annual doses to individual workers for all levels of production would be well below the DOE limit of 5,000 mrem (10 CFR 835.202) and the DOE-recommended control level of 1,000 mrem (10 CFR 835.1002). The projected number of fatal cancers in the workforce from annual operations involving 125 ppy would be 0.064 (or 1 chance in 16 that the worker population would experience a fatal cancer per year of operations). For rates of 250 ppy and 450 ppy, the projected number of fatal cancers would be 0.12 and 0.22, respectively (1 chance in 8 or 5, respectively, that the worker population would experience a fatal cancer per year of operations).

Table 5.4.9.1–2. Annual Radiological Impacts on MPF Workers at Pantex from Operations for All Three Pit Production Rates

Production Rate	125 ppy	250 ppy	450 ppy
Number of Radiological Workers	550	800	1,100
Individual Workers^a			
Average individual dose, mrem/yr	290	390	510
Average worker cancer fatality risk ^b	1.2×10^{-4}	1.6×10^{-4}	2.0×10^{-4}
Worker Population			
Collective dose (person-rem)	160	310	560
Cancer fatality risk ^b	0.064	0.12	0.22

^a The regulatory dose limit for an individual worker is 5,000 mrem/yr (10 CFR 835). However, the maximum annual dose to a worker would be kept below the DOE Control Level of 1,000 mrem/yr, as established in 10 CFR 835.1002. Further, DOE recommends that facilities adopt a more limiting 500-mrem/yr Administrative Control Level (DOE 1999e). To reduce doses to levels that are as low as reasonably achievable, an effective dose reduction plan would be enforced.

^b Based on a cancer risk estimator of 0.0004 LCFs per person-rem.

Sensitivity Analysis

DOE could operate MPF using a double shift to increase the plutonium pit manufacturing capability. Double-shift operation of MPF under any of the three capacities would approximately double the quantities of radioactive emissions from MPF presented for single-shift operation at each capacity. Thus, the calculated radiation dose and LCFs to the offsite MEI and the population living within 80 km (50 mi) of Pantex would approximately double.

Similarly, double-shift operation of MPF under any of the three capacities would approximately double the radiation dose to MPF workers presented for single-shift operation at each capacity. Thus, the calculated adverse health impacts to MPF workers would be approximately double.

5.4.9.2 Nonradiological Impacts

This section considers illness, injury, and fatality rates associated with construction and operation of the MPF on the Pantex workforce. Nonradiological impacts to workers were evaluated using occupational injury, illness, and fatality rates obtained from BLS, U.S. Department of Labor data. DOE values are historically lower than BLS values owing to the increased focus on safety fostered by complex-wide programs, including ISM and the VPP. Additionally, the small number of fatal accidents reported in the CAIRS makes associated calculated fatality rates statistically invalid.

No Action Alternative

Under the No Action Alternative, DOE would continue to use the plutonium pit manufacturing capability of PF-4 located in TA-55 at LANL. There would be no change in injury, illness, and fatality trends currently observed at Pantex.

Modern Pit Facility Alternative

Construction Impacts

The potential risk of occupational injuries and fatalities to workers constructing the MPF would be expected to be bounded by injury and fatality rates for general industrial construction. Using BLS data for 1997-2001, Total Recordable Cases, Lost Workday Cases, and Fatalities were estimated for both the peak workforce loading and for the duration of construction activities including site preparation (6¾ years). These values are shown below in Table 5.4.9.2–1.

No chemicals have been identified that would be a risk to members of the public from construction activities associated with any of the MPF operating capacities. Construction workers would be protected from hazardous chemicals by adherence to OSHA and EPA occupational standards that limit concentrations of potentially hazardous chemicals. Implementation of ISMS programs to construction activities would also decrease the potential for worker exposures by providing hazards identification and control measures for construction activities (WSRC 2002c).

Table 5.4.9.2–1. Injury, Illness, and Fatality Estimates for Construction of the MPF at Pantex

Injury, Illness, and Fatality Categories	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
Peak Annual Employment	770	850	1,100
Total Recordable Cases	66	73	95
Total Lost Workday Cases	32	35	46
Total Fatalities	0.16	0.17	0.023
Project Duration (6¾ years)			
Total Recordable Cases	228	254	328
Total Lost Workday Cases	110	122	157
Total Fatalities	0.54	0.60	0.78

Source: MPF Data 2003, BLS 2003b.

Operations Impacts

During normal (accident-free) operations, total facility staffing would range from approximately 988-1,797, depending on the operating capacity of the selected MPF. The potential risk of occupational injuries and fatalities to workers operating MPF would be expected to be bounded by injury and fatality rates for general chemical manufacturing. Using BLS data for 1997-2001, Total Recordable Cases, Lost Workday Cases, and Fatalities were estimated for facility populations for each of the operating capacities. These values are shown below in Table 5.4.9.2–2.

Table 5.4.9.2–2. Injury, Illness, and Fatality Annual Estimates for Normal Operations of the MPF at Pantex

Injury, Illness, and Fatality Categories	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
Total Recordable Cases	43	59	78
Total Lost Workday Cases	22	30	40
Total Fatalities	0.04	0.05	0.07

Source: MPF Data 2003, BLS 2003b.

No chemical-related health impacts are associated with normal (accident-free) operations of the MPF at the three identified operating capacities. Initial screens for the hazard analysis did not result in the identification of any controls necessary to protect the public or workers from direct chemical exposures. Facility design features that minimize the worker exposures during facility operations act as defense-in-depth controls. In addition to these controls, worker protection is augmented by facility safety programs such as ISMS, work planning, chemical hygiene, industrial hygiene personnel monitoring, and emergency preparedness (WSRC 2002c).

Sensitivity Analysis

DOE could operate the MPF using a double shift to increase the plutonium pit manufacturing capability. Double-shift operation of the 450 ppy facility would approximately double the

impacts to the Pantex Site illness and injury rates for facility associated activities. No chemical-related health impacts would be associated with this increase in operations.

5.4.10 Facility Accidents

This section presents the potential impacts on workers (both involved and non-involved) and the public due to potential accidents associated with operation of the MPF at Pantex. Additional details supporting the information presented here are provided in Appendix C.

An accident is a sequence of one or more unplanned events with potential outcomes that endanger the health and safety of workers and the public. An accident can involve a combined release of energy and hazardous materials (radiological or chemical) that might cause prompt or latent health effects. The sequence usually begins with an initiating event, such as a human error, equipment failure, or earthquake, followed by a succession of other events that could be dependent or independent of the initial event, which dictate the accident's progression and the extent of materials released. Initiating events fall into three categories:

- *Internal initiators* normally originate in and around the facility, but are always a result of facility operations. Examples include equipment or structural failures and human errors.
- *External initiators* are independent of facility operations and normally originate from outside the facility. Some external initiators affect the ability of the facility to maintain its confinement of hazardous materials because of potential structural damage. Examples include aircraft crashes, vehicle crashes, nearby explosions, and toxic chemical releases at nearby facilities that affect worker performance.
- *Natural phenomena initiators* are natural occurrences that are independent of facility operations and occurrences at nearby facilities or operations. Examples include earthquakes, high winds, floods, lightning, and snow. Although natural phenomena initiators are independent of external facilities, their occurrence can involve those facilities and compound the progression of the accident.

If an accident were to occur involving the release of radioactive or chemical materials, workers, members of the public, and the environment would be at risk. Workers in the facility where the accident occurs would be particularly vulnerable to the effects of the accident because of their location. The offsite public would also be at risk of exposure to the extent that meteorological conditions exist for the atmospheric dispersion of released hazardous materials. Using approved computer models, DOE predicted the dispersion of released hazardous materials and their effects. However, prediction of latent potential health effects becomes increasingly difficult to quantify for facility workers as the distance between the accident location and the worker decreases. This is because the individual worker exposure cannot be adequately defined with respect to the presence of shielding and other protective features. The worker also may be injured or killed by physical effects of the accident.

Emergency Preparedness

Each DOE site has established an emergency management program. This program has been developed and maintained to ensure adequate response for most accident conditions and to provide response efforts for accidents not specifically considered. The emergency management program incorporates activities associated with emergency planning, preparedness, and response.

5.4.10.1 No Action Alternative

Under the No Action Alternative, all current activities would continue at existing levels. Potential accident scenarios for the No Action Alternative are addressed in existing documentation included by reference (DOE 1996c).

5.4.10.2 Modern Pit Facility Alternative

Radiological Impacts

DOE estimated radiological impacts to three receptors: (1) the MEI at the Pantex boundary; (2) the offsite population within 80 km (50 mi) of Pantex; and (3) a non-involved worker 1,000 m (3,281 ft) from the accident location. DOE did not evaluate total dose to non-involved workers because of the uncertain nature of worker locations at the time of the accident.

Tables 5.4.10.2–1 through 5.4.10.2–3 show the frequencies and consequences of the postulated set of accidents for the public (offsite MEI and the general population living within 80 km [50 mi] of the facility) and a hypothetical non-involved worker for the three pit production rates. The dose shown in the tables are calculated by the MACCS computer code based on accident data. The LCF values are calculated using a dose-to-LCF conversion factor. For the MEI and the population, the conversion factor is 0.0005 LCFs per rem or person-rem, respectively. For workers, the dose-to-risk conversion factor is 0.0004 LCFs per rem. If the dose to an MEI or worker exceeds 20 rem, the dose-to-risk conversion factor is doubled to 0.001 and 0.0008, respectively. Tables 5.4.10.2–4 through 5.4.10.2–6 show the accident risks, obtained by multiplying the consequences by the likelihood (frequency per year) that an accident would occur. The accidents listed in these tables were selected from a wide spectrum of accidents described in the *Topical Report - Supporting Documentation for the Accident Impacts Presented in the Modern Pit Facility Environmental Impact Statement* (Tetra Tech 2003). The selection process, screening criteria used, and conservative estimates of material at risk and source term (see Appendix C) ensure that the accidents chosen for evaluation in this EIS bound the impacts of all reasonably foreseeable accidents that could occur at the MPF. Thus, in the event that any other accident that was not evaluated in this EIS were to occur, its impacts on workers and the public would be expected to be within the range of the impacts evaluated.

Table 5.4.10.2–1. MPF Alternative Radiological Accident Frequency and Consequences at Pantex for 125 ppy

Frequency (per year)	Offsite MEI		Offsite Population ^a		Non-involved Worker	
	Dose (rem)	LCFs ^b	Dose (person-rem)	LCFs ^c	Dose (rem)	LCFs ^b
Beyond Evaluation Basis Earthquake with Fire						
1×10^{-5}	29.1	0.029	8,320	4.16	232	0.19
Fire in a Single Building						
1×10^{-4}	15	0.0075	3,920	1.96	140	0.11
Explosion in a Feed Casting Furnace						
1×10^{-2}	17.6	0.0088	4,590	2.3	164	0.13
Nuclear Criticality						
1×10^{-2}	6.4×10^{-5}	3.2×10^{-8}	0.012	6.0×10^{-6}	0.0006	2.4×10^{-7}
Fire-induced Release in the CRT Storage Room						
1×10^{-2}	1.2	0.00059	306	0.15	10.9	0.0044
Radioactive Material Spill						
1×10^{-2}	0.35	0.00018	91.9	0.046	3.28	0.0013

CRT = Cargo Restraint Transporter.

^a Based on a year-2043 population of 422,287 persons residing within 80 km (50 mi) of Pantex.

^b Increased likelihood of LCF.

^c Increased number of LCFs.

Table 5.4.10.2–2. MPF Alternative Radiological Accident Frequency and Consequences at Pantex for 250 ppy

Frequency (per year)	Offsite MEI		Offsite Population ^a		Non-involved Worker	
	Dose (rem)	LCFs ^b	Dose (person-rem)	LCFs ^c	Dose (rem)	LCFs ^b
Beyond Evaluation Basis Earthquake with Fire						
1×10^{-5}	30	0.03	8,570	4.29	239	0.19
Fire in a Single Building						
1×10^{-4}	15.5	0.0078	4,060	2.0	145	0.12
Explosion in a Feed Casting Furnace						
1×10^{-2}	17.6	0.0088	4,590	2.3	164	0.13
Nuclear criticality						
1×10^{-2}	6.4×10^{-5}	3.2×10^{-8}	0.012	6.0×10^{-6}	0.0006	2.4×10^{-7}
Fire-induced Release in the CRT Storage Room						
1×10^{-2}	1.2	0.00059	306	0.15	10.9	0.0044
Radioactive Material Spill						
1×10^{-2}	0.35	0.00018	91.9	0.046	3.28	0.0013

^a Based on a year-2043 population of 422,287 persons residing within 80 km (50 mi) of Pantex.

^b Increased likelihood of LCF.

^c Increased number of LCFs.

Table 5.4.10.2–3. MPF Alternative Radiological Accident Frequency and Consequences at Pantex for 450 ppy

Frequency (per year)	Offsite MEI		Offsite Population ^a		Non-involved Worker	
	Dose (rem)	LCFs ^b	Dose (person-rem)	LCFs ^c	Dose (rem)	LCFs ^b
Beyond Evaluation Basis Earthquake with Fire						
1×10^{-5}	57.7	0.058	16,500	8.25	460	0.37
Fire in a Single Building						
1×10^{-4}	30.2	0.03	7,880	3.94	281	0.23
Explosion in a Feed Casting Furnace						
1×10^{-2}	17.6	0.0088	4,590	2.3	164	0.13
Nuclear Criticality						
1×10^{-2}	6.4×10^{-5}	3.2×10^{-8}	0.012	6.0×10^{-6}	0.0006	2.4×10^{-7}
Fire-induced Release in the CRT Storage Room						
1×10^{-2}	2.34	0.0012	613	0.31	21.9	0.018
Radioactive Material Spill						
1×10^{-2}	0.35	0.00018	91.9	0.046	3.28	0.0013

^a Based on a year-2043 population of 422,287 persons residing within 80 km (50 mi) of Pantex.

^b Increased likelihood of LCF.

^c Increased number of LCFs.

The results of the accident analysis indicate potential consequences that exceed the DOE exposure guidelines of 25 rem for a member of the public at the nearest site boundary. The analyses in these cases for NEPA purposes are based on unmitigated releases of radioactive material to select a site for the MPF. Following the ROD and selection of a site, additional NEPA action would be taken that would identify specific mitigating features that would be incorporated in the MPF design to ensure compliance with DOE exposure guidelines. These could include procedural and equipment safety features, HEPA filtration systems, and other design features that would protect radioactive materials from accident conditions and contain any material that might be released. Upon completion of MPF NEPA actions, DOE would prepare safety analysis documentation such as a safety analysis report to further ensure that DOE exposure guidelines would not be exceeded. The results of the safety analysis report are reflected in facility and equipment design and defines an operating envelope and procedures to ensure public and worker safety. Once specific mitigation measures are incorporated into the MPF design and operating procedures, the potential consequences will not exceed the DOE exposure guidelines of 25 rem for a member of the public at the nearest site boundary for any of the site alternatives.

The accident with the highest risk to the offsite population (see Tables 5.4.10.2–4 through 5.4.10.2–6) is the explosion in a glovebox feed casting furnace for the 125 ppy, 250 ppy, and 450 ppy production cases. The increased number of LCFs in the offsite population would be 0.023 per year (i.e., about 1 chance in 43 per year of a LCF in the total population) for all three production cases. The highest risk of a LCF to an offsite MEI located at a distance of 3,615 m (11,860 ft) north of the accident would be 8.8×10^{-5} per year (i.e., about 1 chance in 11,300 per

year of a LCF) for all three production cases. The highest risk of a LCF to a non-involved worker located 1,000 m (3,281 ft) from the accident would be 0.0013 per year (i.e., about 1 chance in 750 per year of a LCF) for all three production cases.

Table 5.4.10.2–4. Annual Cancer Risks Due to MPF Accidents at Pantex for 125 ppy

Accident	Offsite MEI ^a	Offsite Population ^{b,c}	Non-involved Worker ^a
Beyond Evaluation Basis Earthquake with Fire	2.9×10^{-7}	4.2×10^{-5}	1.9×10^{-6}
Fire in a Single Building	7.5×10^{-7}	0.0002	1.1×10^{-5}
Explosion in a Feed Casting Furnace	8.8×10^{-5}	0.023	0.0013
Nuclear Criticality	3.2×10^{-10}	6.0×10^{-8}	2.4×10^{-9}
Fire-induced Release in the CRT Storage Room	5.9×10^{-6}	0.0015	4.4×10^{-5}
Radioactive Spill Material	1.8×10^{-6}	0.00046	1.3×10^{-5}

^a Increased likelihood of LCF.

^b Increased number of LCFs.

^c Based on a year-2043 population of 422,287 persons residing within 80 km (50 mi) of Pantex.

Table 5.4.10.2–5. Annual Cancer Risks Due to MPF Accidents at Pantex for 250 ppy

Accident	Offsite MEI ^a	Offsite Population ^{b,c}	Non-involved Worker ^a
Beyond Evaluation Basis Earthquake with Fire	3.0×10^{-7}	4.3×10^{-5}	1.9×10^{-6}
Fire in a Single Building	7.8×10^{-7}	0.0002	1.2×10^{-5}
Explosion in a Feed Casting Furnace	8.8×10^{-5}	0.023	0.0013
Nuclear Criticality	3.2×10^{-10}	6.0×10^{-8}	2.4×10^{-9}
Fire-induced Release in the CRT Storage Room	5.9×10^{-6}	0.0015	4.4×10^{-5}
Radioactive Spill Material	1.8×10^{-6}	0.00046	1.3×10^{-5}

^a Increased likelihood of a LCF.

^b Increased number of LCFs.

^c Based on a year-2043 population of 422,287 persons residing within 80 km (50 mi) of Pantex.

Table 5.4.10.2–6. Annual Cancer Risks Due to MPF Accidents at Pantex for 450 ppy

Accident	Offsite MEI ^a	Offsite Population ^{b,c}	Non-involved Worker ^a
Beyond Evaluation Basis Earthquake with Fire	5.8×10^{-7}	8.3×10^{-5}	3.7×10^{-6}
Fire in a Single Building	3.0×10^{-6}	0.0004	2.3×10^{-5}
Explosion in a Feed Casting Furnace	8.8×10^{-5}	0.023	0.0013
Nuclear Criticality	3.2×10^{-10}	6.0×10^{-8}	2.4×10^{-9}
Fire-induced Release in the CRT Storage Room	1.2×10^{-5}	0.0031	0.00018
Radioactive Spill Material	1.8×10^{-6}	0.00046	1.3×10^{-5}

^a Increased likelihood of a LCF.

^b Increased number of LCFs.

^c Based on a year-2043 population of 422,287 persons residing within 80 km (50 mi) of Pantex.

Hazardous Chemicals Impacts

DOE estimated the impacts of the potential release of the most hazardous chemicals used at the MPF. A chemical's vapor pressure, acceptable concentration (ERPG-2) and quantity available

for release are factors used to rank a chemical’s hazard. The accident scenario postulates a major leak, such as a pipe rupture, and the released chemical forming a pool about one inch in depth in the area around the point of release. Additional information on the evaporation and dispersion of each chemical is provided in Appendix C. Tables 5.4.10.2–7 through 5.4.10.2–9 provide information on each chemical and the frequency and consequences of an accidental release. The source term shown represents the amount of the chemical that is accidentally released. The American Industrial Hygiene Association defines ERPG-2 as the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action. The distance from the release point to the points where the ERPG-2 concentration is reached in relation to the site boundary reflects the consequence of the chemical’s release. As the distance to the ERPG-2 point increases, the potential number of persons onsite and offsite that may be exposed to concentrations in excess of ERPG-2 would be expected to increase. The distance to the nearest site boundary is 2.5 km (1.6 mi). None of the chemicals released in an accident would exceed ERPG-2 limits offsite.

Table 5.4.10.2–7. MPF Alternative Chemical Accident Frequency and Consequences at Pantex for 125 ppy

Chemical Released	Quantity Released (kg)	ERPG-2 ^a		Concentration ^a		Frequency
		Limit (ppm)	Distance to Limit (km)	At 1,000 m (ppm)	At Site Boundary 2.5 km (ppm)	
Nitric acid	10,500	6	0.59	2.49	0.58	10 ⁻⁴
Hydrofluoric acid	550	20	0.59	5.25	0.99	10 ⁻⁴
Formic acid	1,500	10	0.16	0.37	0.87	10 ⁻⁴

^a Site boundary is at a distance of 2.5 km (1.5 mi) east.

Table 5.4.10.2–8. MPF Alternative Chemical Accident Frequency and Consequences at Pantex for 250 ppy

Chemical Released	Quantity Released (kg)	ERPG-2 ^a		Concentration ^a		Frequency
		Limit (ppm)	Distance to Limit (km)	At 1,000 m (ppm)	At Site Boundary 2.5 km (ppm)	
Nitric acid	21,000	6	0.88	4.82	1.14	10 ⁻⁴
Hydrofluoric acid	1,100	20	0.83	10.2	1.94	10 ⁻⁴
Formic acid	3,000	10	0.22	0.72	0.17	10 ⁻⁴

^a Site boundary is at a distance of 2.5 km (1.5 mi) east.

Table 5.4.10.2–9. MPF Alternative Chemical Accident Frequency and Consequences at Pantex for 450 ppy

Chemical Released	Quantity Released (kg)	ERPG-2 ^a		Concentration ^a		Frequency
		Limit (ppm)	Distance to Limit (km)	At 1,000 m (ppm)	At Site Boundary 2.5 km (ppm)	
Nitric acid	40,000	6	1.3	8.89	2.11	10 ⁻⁴
Hydrofluoric acid	2,000	20	1.1	18.2	3.46	10 ⁻⁴
Formic acid	5,500	10	0.3	1.28	0.3	10 ⁻⁴

^a Site boundary is at a distance of 2.5 km (1.5 mi) east.

Involved Worker Impacts

For all of the accidents, there is a potential for injury or death to involved workers in the vicinity of the accident. Prediction of potential health effects becomes increasingly difficult to quantify as the distance between the accident location and the receptor decreases. This is because the individual worker exposure cannot be adequately defined with respect to the presence of shielding and other protective features. The worker also may be acutely injured or killed by physical effects of the accident.

The number of workers that would be at the MPF during operations would range from 988-1,797 (including security guards). Each process facility within the MPF would have attached safe haven structures designed in accordance with a number of life safety, fire protection, and safeguards and security requirements. These structures are required for personnel protection during various accident scenarios and are made of reinforced concrete similar in design to the process building wall construction. They would be designed to accommodate 120 percent of the building occupancy for a number of hours and would require their own independent ventilation systems (WSRC 2002b).

The facility ventilation system would control dispersal of any airborne radiological debris from the accident. Following initiation of accident/site emergency alarms, workers would evacuate the area in accordance with site emergency operating procedures and would not be vulnerable to additional radiological or chemical risk of injury.

5.4.11 Environmental Justice

Under Executive Order 12898, DOE is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. Minority persons are those who identify themselves as being Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and other Pacific Islander; or another non-White race; or persons of Hispanic or Latino ethnicity. Persons whose incomes are below the Federal poverty threshold are designated low-income.

At Pantex, the 80-km (50-mi) radius includes portions of Hartley, Moore, Hutchinson, Roberts, Oldham, Potter, Carson, Gray, Deaf Smith, Randall, Armstrong, Donley, Swisher, and Briscoe Counties in Texas. Table 5.4.11-1 provides the racial and ethnic composition of these counties based on the 2000 Census, as well as the number of people below the poverty level. Figure 5.4.11-1 shows the minority populations located with an 80-km (50-mi) radius of the site. Figure 5.4.11-2 shows the low-income populations located within the same 80-km (50-mi) radius. This study area corresponds to the region of potential radiological impacts. Figures 5.4.11-1 and 5.4.11-2 show the distribution of these populations throughout the area around the site.

In 2002, minority populations comprised 30.9 percent of the U.S. population and 43.7 percent of the Texas population. The percentage of minority populations in the area surrounding Pantex is 30.2 percent, less than that in the United States or Texas.

Low-income populations comprised 12.4 percent of the U.S. population, based on 1999 income, and 15.4 percent of the Texas population. Within the counties surrounding Pantex, 13.8 percent of the population lives below the poverty level.

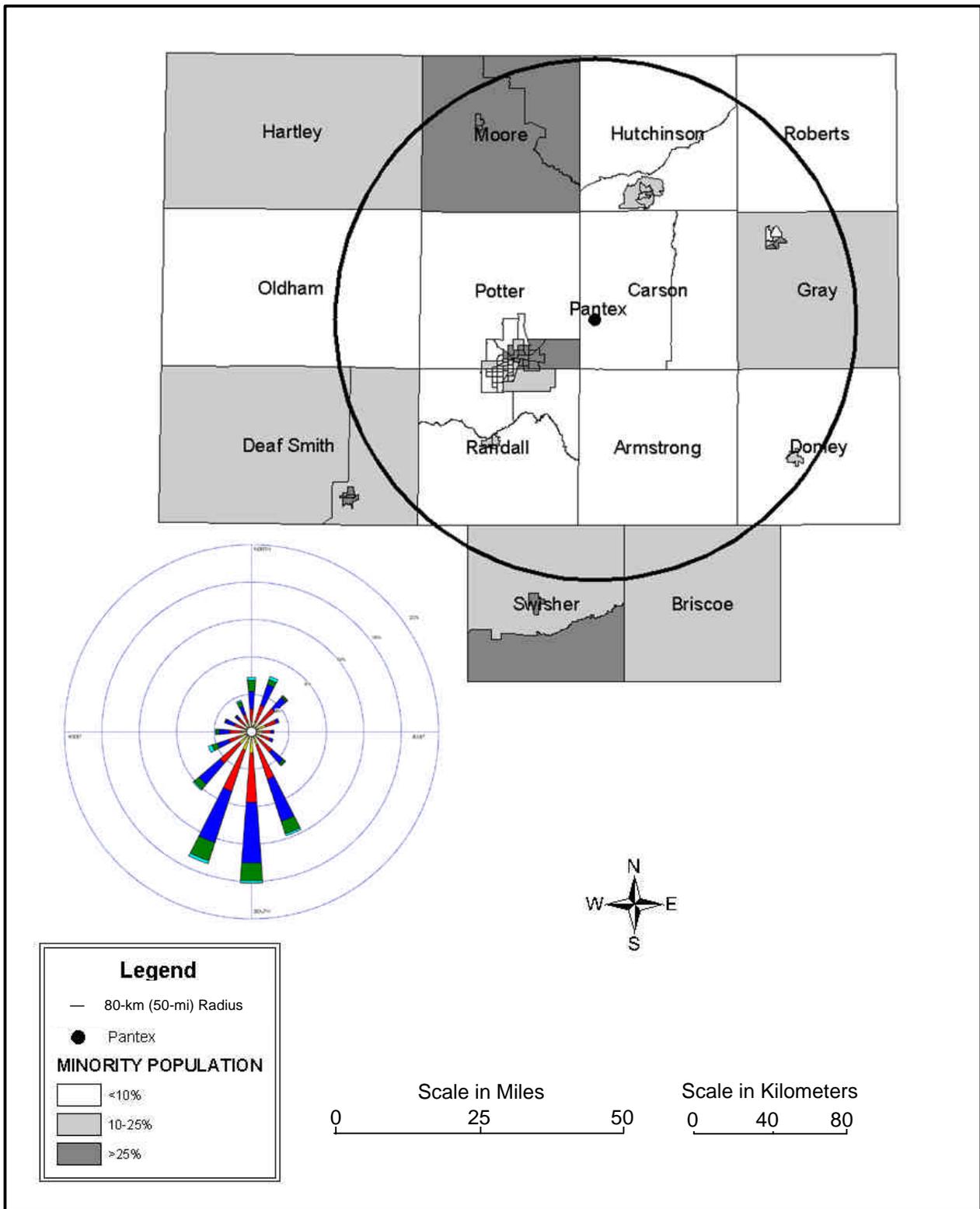


Figure 5.4.11-1. Distribution of the Minority Population Surrounding Pantex

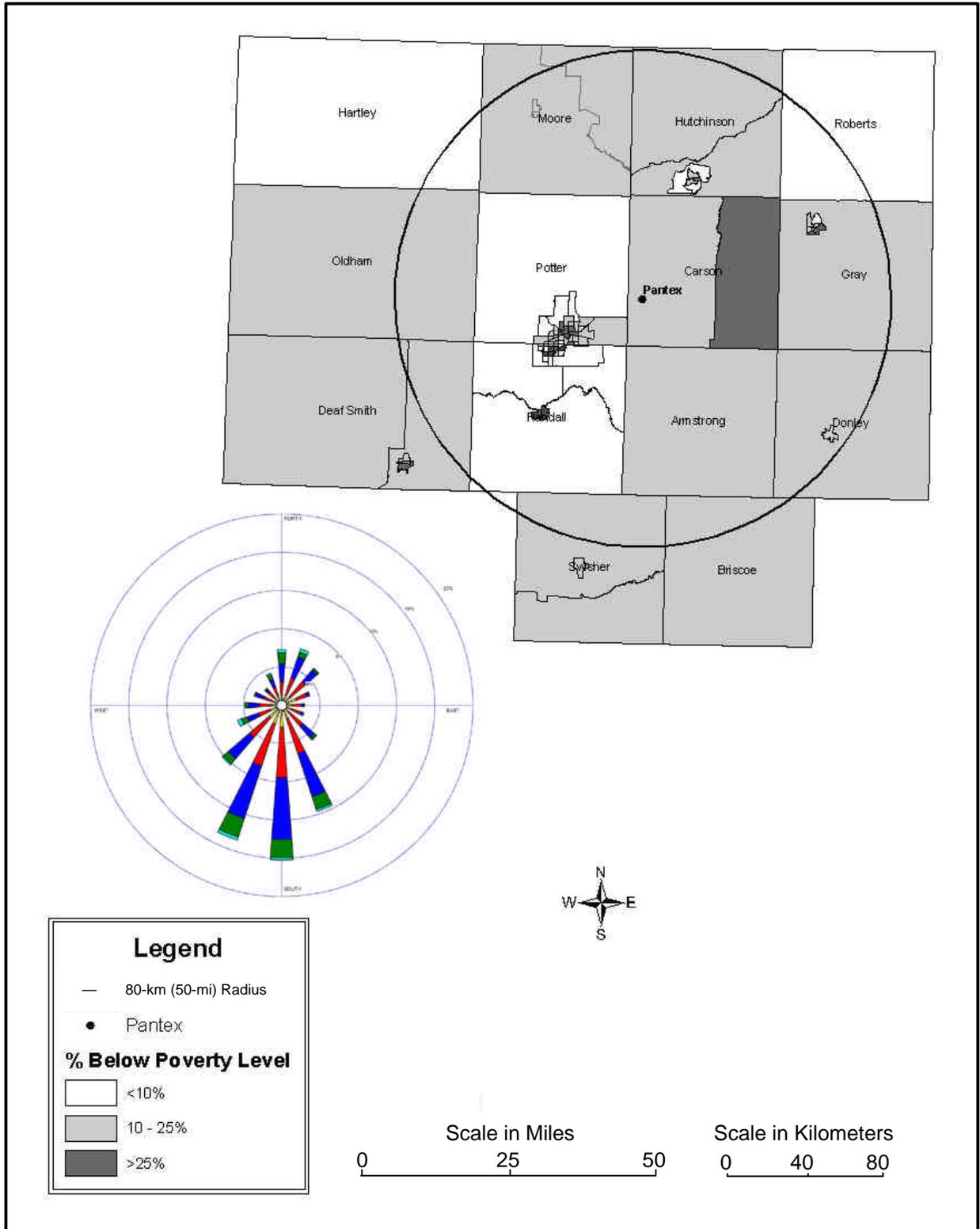


Figure 5.4.11-2. Distribution of the Low-Income Population Surrounding Pantex

Table 5.4.11–1. Racial, Ethnic, and Socioeconomic Composition Surrounding Pantex

Population Group	Population	Percent of Total
Hispanic or Latino	74,518	22.3
Black or African American	15,977	4.8
American Indian and Alaska Native	1,963	0.6
Asian	4,231	1.3
Native Hawaiian and Other Pacific Islander	68	0.0
Other Race	190	0.1
Two or More Races	3,710	1.1
White	233,753	69.9
Total	334,410	100

As shown in Section 5.4.9, Human Health and Safety, there are no large adverse impacts to any populations. Therefore, there would be no disproportionately high and adverse impacts to minority or low-income populations.

5.4.12 Transportation

Impacts to the human environment from transportation can result from two sources: operation of the vehicle and the presence of the cargo. Vehicle-related impacts could include increased emissions, traffic congestion, noise, and traffic accidents. Cargo-related impacts could include incident-free radiation dose to those on and near the highway and radiation dose or chemical exposure from the cargo when the containers are breached following an accident.

This EIS is primarily concerned with determining a candidate DOE site for the MPF. A second EIS would be prepared once a DOE site is identified for more detailed analysis. Accordingly, this EIS focuses on a limited suite of analyses that will most specifically aid decisionmakers in distinguishing transportation impacts among the five DOE sites under consideration. NNSA has selected for quantitative analysis incident-free radiation dose to workers and the public, accident radiation dose-risk (which includes the probability of the accident occurring) to all individuals affected by the accident, and traffic accident fatalities. In addition, the analysis presents a qualitative discussion on traffic impacts near the DOE facility under both construction and operations. Traffic impacts would result from commuting workers and construction deliveries.

Other potential analytical endpoints are roughly proportional to the analyzed endpoints and would yield similar relative distinction among the five DOE sites. Appendix D presents DOE’s methodology in analyzing the selected analytical endpoints and provides some detail on the calculations, including the more important analytical parameters.

5.4.12.1 No Action Alternative

Under the No Action Alternative, transportation between Pantex and LANL would result in impacts that are assigned to LANL. See Section 5.2.12.1.

5.4.12.2 Modern Pit Facility Alternative

Construction Impacts

Construction of the MPF at Pantex would result in increased traffic due to commuting construction workers and deliveries of construction materials and equipment. Although this traffic increase would tend to increase congestion on local roads, the increase would be small compared to the average daily traffic levels reported in Section 4.4.10 and would be temporary.

Operations Impacts

Radiological transportation under the MPF Alternative for Pantex would include recycle of enriched uranium parts to and from the Y-12 (Oak Ridge, Tennessee), shipment of TRU waste to WIPP (near Carlsbad, New Mexico), and shipment of LLW to NTS (Nye County, Nevada). The pits would already reside at Pantex. DOE’s analysis includes options for processing 125, 250, and 450 ppy. Table 5.4.12.2–1 presents the number of shipments for the MPF Alternative. Tables 5.4.12.2–2 and 5.4.12.2–3 present incident-free impacts from this transportation. Tables 5.4.12.2–4 and 5.4.12.2–5 present the accident impacts.

Table 5.4.12.2–1. Number of Shipments per Year at Pantex for the MPF Alternative

Transported Materials	125 ppy	250 ppy	450 ppy
EU Parts	10	20	36
TRU Waste	74	93	142
LLW	136	217	331
Total	220	330	509

EU = enriched uranium.

The addition of 988-1,797 new employees under the three capacity options would represent an increase in Pantex employment ranging from 33-59 percent, with a corresponding increase in commuting traffic. Although this traffic increase would tend to increase congestion on local roads, the increase is small compared to the average daily traffic levels reported in Section 4.4.10, and the roads have the capacity to absorb this additional traffic.

Sensitivity Analysis

Should DOE elect to operate a new 450 ppy facility at Pantex in two shifts, the impacts would increase. The incident-free doses for the 450 ppy facility reported in Tables 5.4.12.2–1 and 5.4.12.2–2 would increase by approximately the factor 1.8 because the numbers of shipments would increase. The accident values in Table 5.4.12.2–3 would also increase by a factor of 1.8 because of increased probability of the accident; however, the consequences of an accident, should one occur, would not change. The duration of traffic congestion during shift change would increase.

Table 5.4.12.2–2. Annual Incident-Free Transportation Impacts to Workers at Pantex for the MPF Alternative

Transported Materials	125 ppy		250 ppy		450 ppy	
	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs
EU parts	0.12	4.9×10^{-5}	0.24	9.8×10^{-5}	0.44	1.8×10^{-4}
TRU waste	0.65	2.6×10^{-4}	0.81	3.3×10^{-4}	1.2	5.0×10^{-4}
LLW	3.5	1.4×10^{-4}	5.5	2.2×10^{-3}	8.4	3.4×10^{-3}
Total	4.2	1.7×10^{-3}	6.6	2.6×10^{-3}	10	4.0×10^{-3}

Table 5.4.12.2–3. Annual Incident-Free Transportation Impacts to the General Public at Pantex for the MPF Alternative

Transported Materials	125 ppy		250 ppy		450 ppy	
	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs
EU parts	0.17	8.3×10^{-5}	0.33	1.7×10^{-4}	0.60	3.0×10^{-4}
TRU waste	1.1	5.4×10^{-4}	1.4	6.8×10^{-4}	2.1	1.0×10^{-3}
LLW	2.2	1.1×10^{-3}	3.5	1.7×10^{-3}	5.3	2.6×10^{-3}
Total	3.4	1.7×10^{-3}	5.2	2.6×10^{-3}	8.0	4.0×10^{-3}

Table 5.4.12.2–4. Annual Transportation Accident Radiological Impacts at Pantex for the MPF Alternative

Transported Materials	125 ppy		250 ppy		450 ppy	
	Dose Risk (person-rem)	LCFs	Dose Risk (person-rem)	LCFs	Dose Risk (person-rem)	LCFs
EU parts	1.8×10^{-10}	9.0×10^{-14}	3.6×10^{-10}	1.8×10^{-13}	6.4×10^{-10}	3.2×10^{-13}
TRU waste	4.6×10^{-4}	2.3×10^{-7}	5.8×10^{-4}	2.9×10^{-7}	8.9×10^{-4}	2.9×10^{-7}
LLW	6.5×10^{-4}	3.2×10^{-7}	1.0×10^{-3}	5.2×10^{-7}	1.6×10^{-3}	5.2×10^{-7}
Total	1.1×10^{-3}	5.5×10^{-7}	1.6×10^{-3}	8.1×10^{-7}	2.5×10^{-3}	8.1×10^{-7}

Table 5.4.12.2–5. Annual Nonradiological Fatalities from Transportation Accidents at Pantex for the MPF Alternative

Transported Materials	125 ppy		250 ppy		450 ppy	
	Number of Accidents	Number of Fatalities	Number of Accidents	Number of Fatalities	Number of Accidents	Number of Fatalities
EU parts	4.2×10^{-3}	3.0×10^{-4}	8.4×10^{-3}	6.0×10^{-4}	0.015	1.1×10^{-3}
TRU waste	0.012	7.7×10^{-4}	0.015	9.6×10^{-4}	0.023	1.5×10^{-3}
LLW	0.041	2.6×10^{-4}	0.066	4.1×10^{-3}	0.10	6.3×10^{-3}
Total	0.057	3.7×10^{-3}	0.089	5.7×10^{-3}	0.14	8.9×10^{-3}

5.4.13 Waste Management

This section considers the burden that waste generation associated with construction and operations of MPF places on the Pantex waste treatment, storage, and disposal infrastructure. Impacts are evaluated based on routine waste generation, excluding wastes generated from environmental restoration or D&D activities. Impacts associated with transportation of radioactive waste from Pantex to offsite disposal facilities are provided in Section 5.3.12.

5.4.13.1 No Action Alternative

Under the No Action Alternative, DOE would continue to use the plutonium pit manufacturing capability of PF-4 located in TA-55 at LANL. There would be no change to the current and planned Pantex waste management activities described in Section 4.4.11.

5.4.13.2 Modern Pit Facility Alternative

Construction Impacts

Construction of MPF would generate solid and liquid sanitary waste and liquid hazardous waste. Table 5.4.13.2–1 summarizes the total volume of waste generated over the 6 years of construction activity for the three proposed MPF operating capacities.

Table 5.4.13.2–1. Total Waste Generation from Construction of the MPF (m³)

Waste Type	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
Hazardous waste	4.9	5.1	5.9
Sanitary waste	7,110	7,870	11,200
Sanitary wastewater	37,500	41,300	54,100

Source: MPF Data 2003.

MPF construction wastes would increase Pantex’s annual routine hazardous waste generation by less than 1 percent. The hazardous waste would be sent offsite for treatment and disposal at a commercial facility. Commercial treatment is readily available and currently used to treat Pantex’s hazardous waste. The onsite Hazardous Waste Treatment and Processing Facility (HWTPF) may also be used to treat hazardous waste generated from MPF construction activities.

Solid nonhazardous waste from MPF construction activities would result in a two- to threefold increase in the annual routine sanitary waste volume managed at Pantex. The waste would be disposed of onsite in the Construction Debris Landfill or at offsite facilities, such as the City of Amarillo Landfill. These disposal facilities, or their replacements, are expected to have adequate capacity to handle the projected amount of waste.

Sanitary wastewater generated during MPF construction would be treated in the onsite WWTF. DOE recently completed upgrades to this facility to provide flexibility to increase the treatment volume. The anticipated volume of sanitary wastes from MPF construction activities could be accommodated by the Pantex wastewater treatment system.

A detention pond would be constructed to manage stormwater runoff from the entire MPF site including the Construction Laydown Area and Concrete Batch Plant. The basin would be sized

to limit stormwater discharge from the developed site to no greater than the pre-existing conditions, with a basin area of approximately 0.4 ha (1 ac) per 16 ha (40 ac) of developed land.

A Concrete Batch Plant would operate at the MPF site during the construction phase. The Concrete Batch Plant would include a basin to manage wastewater from equipment washout activities. The facility would be located on approximately 4 ha (10 ac) adjacent to the PIDAS. The Concrete Batch Plant would be disassembled and the area would be restored once MPF construction is completed.

Operations Impacts

Normal operation of the MPF would generate TRU waste, LLW, mixed LLW, hazardous waste, and sanitary waste. Table 5.4.13.2–2 summarizes the estimated waste generation rates for the three proposed MPF operating capacities.

Table 5.4.13.2–2. MPF Operations Annual Waste Generation (m³)

Waste Type	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
TRU waste	590	740	1,130
LLW	2,070	3,300	5,030
Mixed LLW—solid	1.5	2.0	3.5
Mixed LLW—liquid	0.2	0.4	0.7
Hazardous waste—solid	2.5	3.0	5.0
Hazardous waste—liquid	0.3	0.4	0.6
Sanitary waste	5,500	5,800	6,900
Sanitary wastewater	45,000	61,900	81,800

Source: MPF Data 2003.

Normal operations at Pantex do not generate TRU waste. While there are archived procedures to manage TRU waste if it were generated, there is no TRU waste management infrastructure at Pantex at this time. MPF operations would result in between 590-1,130 m³ (20,836-39,906 ft³) of TRU waste annually, depending on the operating capacity. TRU waste generated from plutonium pit manufacturing includes gloves, filters, and other operations/maintenance waste from the MPF gloveboxes. Americium process waste would be solidified and packaged as TRU waste. About 36 percent of the TRU waste would be mixed waste. The TRU waste would be transferred from the MPF process buildings to the Waste Staging/TRU Packaging Building, which would be located outside of the PIDAS. The Waste Staging/TRU Packaging Building would include a staging area with capacity for approximately 1,200 TRU waste drums (about 250 m³ [8,800 ft³] of TRU waste). A drum loading area equipped with overhead bridge cranes would load the waste drums into TRUPACT-II shipping containers and load the TRUPACT-II containers onto trucks for transport to WIPP. The size of the Waste Staging/TRU Packaging Building (approximately 1,950 m² [21,000 ft²]) is not expected to vary with the MPF operating capacity. Section 6.5 discusses the availability of WIPP for disposal of TRU waste resulting from MPF operations.

LLW from MPF operations would include job control waste, failed equipment, and other general operations/maintenance waste. Any liquid LLW resulting from MPF operations would be solidified prior to leaving the facility. LLW generation for the three proposed MPF operating

capacities would increase the annual routine LLW generation at Pantex by a factor of 25, 41, and 59, respectively. The LLW would be transferred to NTS for disposal. Due to the large increase in routine LLW generation, additional storage capacity would be needed to manage the waste until it can be shipped offsite for disposal. Section 5.4.12 describes the impacts for LLW transportation from Pantex to NTS.

MPF operations would generate small amounts of hazardous waste and mixed LLW. These wastes include lead acid batteries, lubricating oils/fluids, rags, and sorbents. The projected hazardous waste volumes from MPF operations represent about 2-4 percent of the annual routine waste volumes managed by Pantex. Commercial treatment is readily available and currently used to treat most Pantex hazardous wastes.

Pantex's routine mixed LLW generation is small. The majority of the mixed LLW is transferred offsite to commercial facilities for treatment and disposal. MPF operations would increase the annual routine mixed LLW generation by 20-48 percent over current Pantex operations. The waste would be managed in accordance with the Pantex Site Treatment Plan. The mixed LLW would be managed onsite at the HWTPF or shipped offsite to commercial facilities. The impact to the capacity of these onsite or commercial facilities would be small.

Nonhazardous waste from MPF operations includes sanitary solid waste and wastewater. Sanitary solid wastes would generally be disposed of at offsite facilities, such as the City of Amarillo Landfill. Some waste may be suitable for disposal onsite in the Construction Debris Landfill. Annual routine sanitary waste volumes would increase by a factor of 9-11 relative to current Pantex operations. This increase could accelerate the rate at which DOE consumed the available capacity of the onsite or offsite facilities.

Sanitary wastewater would be treated in the onsite WWTF. DOE recently completed upgrades to this facility to provide flexibility to increase the treatment volume. There would be adequate capacity to manage the sanitary wastewater from MPF operations.

MPF operations are not expected to generate radioactive wastewater. However, the potential does exist for generating radioactively contaminated water from the operation and maintenance of safety showers in contamination areas, the operation of decontamination stations, the mopping of floors in contamination areas, and the testing of fire sprinkler systems located in contamination areas. Wastewaters that could potentially be contaminated would be collected, sampled, and analyzed prior to discharge. Any contaminated wastewater would be solidified by processing through the liquid-process waste facilities for the plutonium purification process (MPF Data 2003).

Sensitivity Analysis

DOE could elect to operate the MPF using a double shift to increase the plutonium pit manufacturing capability. Double-shift operation of the 450 ppy facility would approximately double the impacts to the waste management infrastructure from those described above for the single-shift operation. The projected waste volumes from MPF operations would substantially increase Pantex's routine waste generation. Potential impacts include the need to expand onsite storage capacity for LLW and accelerate the rate at which onsite or offsite waste disposal capacity is consumed. See Section 6.5 for a discussion of the availability of WIPP for disposal of TRU waste resulting from MPF operations.