APPENDIX K

EVALUATION OF THE NO ACTION ALTERNATIVE

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APPENDIX K

DETAILED EVALUATION OF THE NO ACTION ALTERNATIVE

Under the No Action alternative not only would current wastes not be removed from the site, but newly generated waste would be continually added to the current inventory. Probability of impacts would increase over time as volumes of waste increase and new storage facilities are constructed. The no action alternative would also have ramifications related to regulatory noncompliance.

K.1 RESOURCE IMPACTS

Under the No Action alternative, on-site storage of existing and newly generated waste would continue. No treatment or disposal activities would occur. The following sections discuss impacts resulting from the No Action alternative.

K.1.1 Land use

The No Action alternative would not affect land use classifications. However, new storage buildings would be required to store waste generated from ongoing operations through 2010 and beyond.

K.1.2 Geology and seismicity

The No Action alternative would not affect site geology or seismicity.

K.1.3 Soils and prime farmland

Prime farmland would not be affected. Approximately 3 acres of surficial and near-surface soils would be affected by the construction of the new waste storage building.

K.1.4 Water and water quality

Short-term and long-term impacts to surface water from the No Action alternative should be similar to those currently occurring from activities at the Paducah Site. The surface water data from 1998 {U.S. Department of Energy (DOE) 2000c] for the five Kentucky Pollutant Discharge Elimination System (KPDES) outfalls (Outfalls K001, K015, K017, K018, and K019) for which DOE has responsibility at the Paducah Site, and the six surface water environmental surveillance stations [SW 1 (upstream Bayou Creek), SW 5 (downstream Bayou Creek), SW 10 (downstream Little Bayou Creek), SW 11 (downstream Little Bayou Creek), SW 29 (upstream Ohio River), and SW 64 (Massac Creek reference)] can be used as a baseline condition. The water quality results for 1998 for radionuclides and nonradionuclides at these five KPDES outfalls and six environmental monitoring locations are briefly summarized in this section.

For radionuclides, DOE Orders 5400.1 and 5400.5 specify the requirements for effluent monitoring and annual dose standards for members of the public exposed to radionuclides resulting from DOE operations. Although no specific effluent limits for radiological parameters are included in the KPDES permit for the Paducah Site, DOE Order 5400.5 does list derived concentration guides (DCGs), which are concentrations of specific radionuclides that would result in an effective dose equivalent of 100 mrem/year (the maximum allowable annual dose to a member of the public via all exposure pathways from radionuclides from DOE operations). Total average uranium concentrations in each of the five KPDES outfalls (1.1 pCi/L at Outfall K017 to 71.1 pCi/L at Outfall K015) were all well under the DCG for uranium (600 pCi/L). Similarly, the average ^{99}Tc concentrations in the five outfalls (0 pCi/L at K019 to 16 pCi/L at K015) were far below the DCG for ^{99}Tc (100,000 pCi/L).

At the surface water environmental surveillance locations, comparisons of downstream data with upstream data and reference waters can be done to evaluate the influence of the Paducah Site effluents on Bayou and Little Bayou creeks as well as on the Ohio River. Comparison of upstream Bayou Creek (SW 1) with the downstream location (SW5) shows an increase in uranium but no change for ^{99}Tc. The downstream Little Bayou Creek location showed an increase in total uranium, ^{99}Tc, ^{239}Pu, and ^{230}Th compared to the upstream location. Although the Paducah Site does add small quantities of these radionuclides to Bayou and Little Bayou creeks, the impacts to water quality are negligible, because the concentrations are far below the DCGs.

Nonradionuclide parameters that are measured at the five KPDES outfalls are currently limited to acute toxicity measurements (DOE 2000c). For 1998, there were only two exceedances of the permit limit, and they were at Outfall K017 during the third quarter. The first exceedance was for a sample collected on October 6, 1998. Because the sample was toxic, a retest was conducted on December 21, 1998, and it also was toxic. Because the toxicity exceeded the permit limit in both tests, a Toxicity Reduction Evaluation (TRE) was required and conducted in 1999.

The purpose of the TRE was to identify the cause(s) of the toxicity and remedial measures to prevent it from occurring.

At the surface water environmental surveillance locations, the concentrations for several constituents (acetone, aluminum, iron, uranium, chloride, suspended solids, and trichloroethylene) were reported for 1998 (DOE 2000c). Uranium and chloride concentrations increased in the downstream locations of Bayou and Little Bayou creeks, indicating that the Paducah Site contributes small quantities of these two constituents (Table 4.28). However, all the sample results for the Bayou and Little Bayou creeks are within the KPDES standards, which are based on warm water aquatic habitat criteria established by the Kentucky Division of Water (KDOW) [401 *Kentucky Administrative Regulations* 5:031].

Accident impacts to water quality from the worst-case on-site accident scenario (i.e., earthquake) involving radionuclides are described in detail in Appendix C. Assuming that 5% of the waste inventory is released, approximately 30,000 L of liquid would proceed down the conveyances. Therefore, it is likely that a spill of waste that travels undiluted to the Ohio River would adversely impact water quality until it was diluted in the river. This dilution would occur almost immediately upon the spill reaching the river. Therefore, the earthquake scenario is likely to cause harm to water quality in creeks draining into the Ohio River as a result of exposure to radionuclides, but the Ohio River water quality should not be adversely impacted.

K.1.5 Ecological resources

The No Action alternative would not adversely affect any threatened or endangered species. However, the vegetation and the wildlife using the vegetation on the 3-acre storage facility site would be affected. The vegetation would be permanently removed, and the birds, small mammals, and other wildlife using this habitat would be displaced.

Aquatic Biota. Short- and long-term impacts to aquatic biota from the No Action alternative should be similar to those currently occurring from the Paducah Site activities.

Table K.1. Selected nonradiological surface water surveillance results (average concentrations)

Parameter	SW 1 Upstream Bayou	SW 5 Downstream Bayou	SW 10 Downstream Little Bayou	SW 11 Upstream Little Bayou	SW 29 Upstream Ohio River	SW 64 Massac Creek
Acetone (µg/L)	ND	ND	1061	ND	ND	ND
Aluminum (mg/L)	4.58	ND	ND	ND	1.64	ND
Chloride (mg/L)	12.3	47.9	26.4	22.5	12.4	12.4
Iron (mg/L)	4.30	0.232	ND	0.534	1.63	1.13
Suspended solids (mg/L)	35.3	ND	10.8	ND	47	12
TCE (µg/L)	ND	ND	ND	1.3	ND	1.14
Uranium (mg/L)	0.006	0.007	0.008	ND	ND	ND

Source: DOE 2000c.
ND = Not detected.
SW = surface water environmental surveillance station
TCE = trichloroethylene

The impacts to aquatic biota can be evaluated by examining the results of the watershed monitoring program for Bayou and Little Bayou creeks. The watershed monitoring program for these two creeks has been conducted since 1987 and consists of three activities: (1) effluent toxicity monitoring, (2) bioaccumulation studies, and (3) fish community biosurveys (DOE 2000c). The results of these three studies for 1998 are briefly summarized below, and they provide an estimate of the impacts for the No Action alternative.

The results of the effluent toxicity tests for KPDES Outfalls K001, K015, K017, and K019 have already been discussed in Sect. 4.1. The only toxicity observed during the year was during two tests at Outfall K017. Because this outfall was toxic on two occasions, a plan for a TRE to identify the causes of the toxicity and remedial actions to eliminate it was submitted to KDOW for approval. Although the presence of toxicity at Outfall K017 is a direct indication of adverse impact to aquatic biota, the successful completion of the TRE should eliminate further toxicity.

The bioaccumulation study for polychlorinated biphenyls (PCBs) and mercury in fish focused on three locations in Bayou Creek [Bayou Creek kilometer (BCK) 12.5, BCK 10.0, and BCK 9.1], one location in Little Bayou Creek [Little Bayou Creek kilometer (LUK) 7.2], and one off-site reference location on Massac Creek (Massac Creek kilometer 13.8). These same locations were also used for the fish community biosurveys (DOE 2000c). Average PCB concentrations in fillets of longear sunfish *(Lepomis megalotis)* from Little Bayou Creek (0.11 to 1.33 mg/kg wet weight) were 2- to 133-fold higher than the average concentrations in longear sunfish from the reference site (DOE 2000c). In addition, the location in Little Bayou Creek closest to the Paducah Site had longear sunfish with the highest PCB concentrations. This indicates that the Paducah Site contributes PCBs to Little Bayou Creek, but the low concentrations also indicate that controls and remediation of PCB sources within the site are effective.

Average mercury concentrations in spotted bass (*Micropterus punctulatus*) from Bayou Creek in 1988 (approximately 0.17 mg/kg wet weight) was much lower than from the previous year (approximately 0.4 mg/kg wet weight) (DOE 2000c). The trend in mercury concentration in spotted bass from Bayou Creek has been declining since 1992.

The fish community biosurvey results indicate a slight degradation in the fish communities downstream of the discharges from the Paducah Site (DOE 2000c). The greatest impacts to the fish community [low number of total species (11) and absence of more sensitive species such as benthic insectivores, suckers, and darters] were at BCK 10.0, which was nearest to the discharges from the Paducah Site. At location BCK 9.1, approximately 900 m (2950 ft) downstream from BCK 10.0, the fish community showed fewer signs of impact as evidenced by the larger number of total species (21) and intolerant species. Intolerant species are fish that do not tolerate pollutants or degraded conditions. The fish community at LUK 7.2 showed minor impacts associated with the Paducah Site, as evidenced by a decline in fish density (number of fish per square meter). It is likely that high temperatures in the effluents or increases in sedimentation may have caused the fish community impacts (DOE 2000c).

Accident impacts to aquatic biota from the worst-case accident scenario (i.e., earthquake) involving radionuclides are described in detail in Appendix C. As shown in Appendix C, Table C.1, the ratios of modeled exposure concentrations versus benchmark concentrations of individual radionuclides are all less than 6.00×10^{-5}. The sum of the ratios (the total risk) is about 7.5×10^{-5}. This value is far below any concentration that could cause chronic radiation damage. In addition, the benchmarks are for chronic exposure, and conditions for chronic exposure are not likely to occur. Therefore, the earthquake scenario is highly unlikely to cause harm to aquatic biota in the Ohio River as a result of exposure to radionuclides.

Aquatic receptors in Bayou and Little Bayou creeks and other water conveyances by which the waste would reach the Ohio River would likely be killed by the caustic nature of the waste. Radiation exposure to any survivors would be of an acute nature; ecological risk models for acute radiation of biota are not available, but it has been estimated that an acute dose of 24 rad/day is unlikely to cause long-term damage to aquatic snails (National Council on Radiation Protection and Measurements 1991). Assuming that 5% of the waste inventory is released, approximately 30,000 L of liquid would proceed down the conveyances. Therefore, it is likely that a spill of waste that traveled undiluted to the Ohio River would kill all aquatic biota in its path until it was diluted.

Accident impacts to aquatic biota from the worst-case accident scenario (i.e., earthquake) involving nonradionuclides are described in Appendix C. As shown in Appendix C, Table C.2, PCBs are the only constituents whose ratio of river concentration to toxicity benchmark (2.08) exceeds 1, indicating that PCBs could pose adverse impacts to aquatic biota in the Ohio River, as well as in Bayou and Little Bayou creeks. None of the other nonradionuclide contaminants would reach high enough concentrations in the Ohio River to pose adverse impacts to aquatic biota, according to the assumptions of the accident analysis.

Terrestrial Biota. Short- and long-term impacts to terrestrial biota from the No Action alternative should be similar to those currently occurring from the Paducah Site activities. Construction of the new storage building could result in short-term disturbance to terrestrial wildlife due to the activities of land-clearing equipment.

There would be minimal long-term adverse impacts to terrestrial biota, along with some beneficial ones, after implementation of the proposed action. For example, construction of the new storage building for wastes would result in the long-term loss of potential habitat equal to the size of the building footprint. The adverse impact from the building is anticipated to be minor due to the small size of the building in relation to habitat available on the DOE reservation and to the lack of overall suitable habitat within the Paducah Site boundary. As mentioned above, data from the annual deer harvest, nonroutine rabbit sampling, and nonroutine raccoon sampling for 1998 (DOE 2000c) provide some indication of impacts to terrestrial biota and are briefly discussed in this section.

The annual deer harvest examined eight deer from the West Kentucky Wildlife Management Area (WKWMA) and two from the Ballard Wildlife Management Area to serve as reference samples (DOE 2000c). Selected analyses for the deer tissues included radionuclides, PCBs, silver, beryllium, nickel, and vanadium. No radionuclides were detected in the background deer, but ^{230}Th was detected in muscle from three deer from the Paducah Site. Liver samples from all deer had no detectable radionuclides. None of the deer had detectable PCBs in fat, muscle, or liver. Of the detected inorganics, silver was detected in the muscle of two deer from the WKWMA area. Data for the rest of the Paducah Site deer were not substantially different from the reference site deer (DOE 2000c).

At the request of the Kentucky Department of Fish and Wildlife Resources (KDFWR), rabbit sampling was conducted in 1998 and analyzed for radionuclides, PCBs, and inorganics (DOE 2000c). Six rabbits were harvested from the WKWMA. No radionuclides or PCBs were detected in the rabbits. Copper, iron, manganese, and zinc were detected in several muscle samples. However, these are all nutrients for mammals, so their presence is not unexpected.

At the request of KDFWR, raccoon sampling was conducted, with several raccoons being trapped from the WKWMA and Ballard Wildlife Management Area, which was used as the reference location (DOE 2000c). The raccoons were analyzed for PCBs and heavy metals. The study concluded that raccoons were being exposed to PCBs and metals at both locations, but it made no conclusions as to what impact the constituents had on the raccoons (Texas Tech University 1999).

Impacts to terrestrial biota from the modeled worst-case spill accident scenario (i.e., earthquake), along with soil concentrations, screening benchmarks, and results for individual radionuclides, are shown in Appendix C, Table C.1. The scenario for chronic radionuclide exposure as a result of the modeled worst-case spill indicated that the sum of chronic terrestrial exposures would be about 7×10^{-10} of the tolerable daily radiation dose as indicated by no further action (NFA) levels. Therefore, in even this worst-case accident scenario, long-term radiation effects to soil biota would be negligible.

Accident impacts to terrestrial biota from the worst-case accident scenario (i.e., earthquake) involving nonradionuclides are described in Appendix C. As shown in Appendix C, Table C.2, two organics (PCBs and 1,2,4-trichlorobenzene) and two inorganics (cadmium and chromium) have modeled concentrations that exceed the Paducah Site NFA benchmarks. PCBs in soil exceed the Paducah Site NFA benchmark by the largest ratio (65.8), followed by chromium (63.1). The soil cadmium modeled concentration exceeds the Paducah Site NFA benchmark by a ratio of 22.9. These ratios indicate that these constituents would likely pose adverse impacts to soil biota if the worst-case spill accident occurred.

K.1.6 Noise

There would no anticipated change in noise levels at the Paducah Site.

K.1.7 Cultural and archaeological resources

The No Action alternative is not expected to adversely impact any known cultural or archaeological resources. Should any new or suspected resources be discovered during the site preparation or construction activities for the new storage building, the State Historic Preservation Officer would be notified immediately, and consultations would begin to determine how to proceed.

K.1.8 Air quality

The No Action alternative would result in the continuation of current DOE waste management activities. Under the No Action alternative, potential impacts resulting from on-site treatment and disposal apply.

K.1.9 Socioeconomics and environmental justice

Socioeconomic Impacts. The No Action alternative would result in no net change in employment and, therefore, would have no notable socioeconomic impact on the region of influence.

Environmental Justice. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations," requires agencies to identify and address disproportionately high and adverse human health or environmental effects its activities may have on minority and low-income populations. For the No Action alternative considered in this ecological assessment (EA), populations considered are those that live within 80 km (50 miles) of the Paducah Site.

Impacts from noise, air emissions, radiological emissions, and accidents would be low for both the residents closest to the site and the low-income communities. Exposures for the general public and the relevant workers would continue at historical levels for the Paducah Site.

The total radiation dose to the maximally exposed individual of the general public for all the Paducah Site operations has been estimated at 1 mrem/year (DOE 1999a), which is 1% of the radiation dose limit (100 mrem/year) set for the general public for operation of a DOE facility (DOE Order 5400.5). The external radiation dose for Paducah Site workers has ranged from 0 to 11 mrem/year in recent years (DOE 1999a). These doses are well below both the DOE administrative procedures dose limit (2000 mrem/year) and the regulatory limit of 5000 mrem/year (DOE 1999a; 10 *Code of Federal Regulations* 835). The U.S. Environmental Protection Agency limit is 25 mrem/year for an individual member of the public from all sources. All of these exposures are a very small fraction of the 360 mrem/year dose received by the general public and workers from natural background and medical sources.

K.2 RADIOLOGICAL AND NONRADIOLOGICAL IMPACTS FROM THE NO ACTION ALTERNATIVE

The No Action alternative is typically used as a baseline for evaluation of effects for proposed alternatives. Storage and management of low level radioactive waste (LLW) and transuranic (TRU) waste produce environmental resource impacts as well as economic impacts. These effects are added to those of the other waste management, operations, and environmental restoration activities at the Paducah Site. Storage buildings must be maintained, enlarged, and replaced as necessary to ensure the safety of the workers, public, and environment. If the No Action alternative were selected and construction of a new facility were required at a later date, the previously prepared EA that addressed storage facility construction would be reviewed for adequacy and revised if needed.

The No Action alternative would result in continued storage of LLW and TRU waste but would not address the long-term need for a final disposal plan. Potential impacts to the workers, public, and environmental resources are presented in this section.

K.2.1 Potential exposure of workers to radiological emissions

Workers are exposed to radiological emissions in the course of conducting waste management activities at the Paducah Site. These activities include, but are not limited to, routine inspections of storage areas for LLW and for TRU waste. The inspections are conducted to identify deteriorating or leaking containers and to verify inventories, placement of new waste, replacement of labels degraded by exposure to weather conditions, etc. In addition, repackaging of waste containers, checking radiation monitors, and replacement of barricades and postings are part of the routine maintenance activities. If a leak or spill occurs, workers in the immediate area and emergency response personnel may also receive radiological doses in proportion to the size of the spill and type of waste.

Exposure to radiation contributes incrementally to cancer risks for workers. Exposure levels and subsequent health impact evaluations are reported on an annual basis per DOE requirements. The

Paducah Site Annual Environmental Report provides the annual worker dose and latent cancer fatalities (LCFs) as a result of routine and nonroutine operations. The waste management activities associated with storage of LLW and TRU waste are part of the current operations at the Paducah Site. According to the latest annual report (DOE 1999a), the risks are well within the DOE controlled administrative and site-specific administrative levels. An estimate of the radiological dose and health impacts to workers from storage of LLW and TRU waste for the No Action alternative are presented in Table 4.29. Radiological dose and resultant LCFs are presented per waste type for the worker population expected to handle or work in the vicinity of the storage locations. As shown in this table, worker doses result in less than one latent cancer fatality per waste type based on a worker population of 30 full-time employees. The estimated radiological doses in this table are highly conservative, since it is not likely that workers would spend the entire workday in the waste storage areas. This estimate presents an upper bounding level that is unlikely to be approached due to the "as low as reasonably achievable" approach practiced at the Paducah Site. Steps taken to keep worker exposures as low as possible include limiting the time employees spend in each storage area, monitoring all worker exposure to avoid exceeding established control limits, prohibiting storage of liquids in outdoor storage areas, ensuring proper maintenance of emergency equipment, and undertaking waste minimization efforts. However, if waste quantities increase beyond current foreseeable projections, then the subsequent radiological impacts would increase incrementally on a cumulative population basis.

K.2.2 Potential exposure of the public to radiological emissions

The potential for public exposure to radiological emissions resulting from LLW and TRU waste management activities is limited at the Paducah Site. Since radiological emissions are minimized by time, distance, and shielding, it is unlikely that routine waste management activities would result in measurable quantities of radiological emissions at the Paducah Site boundaries. A perimeter-monitoring program and warning system are in place around the Paducah Site boundaries and elsewhere to evaluate impacts from routine operations as well as emergency conditions. There are off-site regulatory limits that are adhered to by the Paducah Site as well. Environmental monitoring activities are conducted routinely and reported in the Annual Environmental Monitoring Report (DOE 1999a). This report has not indicated any adverse impact from the Paducah Site operations that include waste management activities. Therefore, it is unlikely that the No Action alternative would impact the public above current levels in terms of radiological impacts from continued storage of LLW and TRU waste.

K.2.3 Nonradiological risks to workers from the No Action alternative

There are nonradiological safety risks associated with industrial facilities including activities at the Paducah Site. Workers can be injured or become ill due to workplace chemical hazards, work involving physical activity such as work around equipment, improper lifting, tripping hazards, etc. These risks are generally increased with an increase in the number of workers. These safety-related risks can be minimized through safety standards and worker safety awareness training at the Paducah Site as at other industrial facilities. Continued storage of LLW and TRU waste at the Paducah Site under the No Action alternative would increase these safety risks by requiring additional handling of the waste as maintenance and repackaging activities are needed. In addition, there would be routine monitoring activities in the storage locations that can present typical safety risks. These risks have been evaluated based on the average industrial accident rates for operations at similar industries. The estimated number of total recordable cases (TRCs) for the 30 workers associated with the No Action alternative would be 0.78 cases per year. A TRC is a case that includes work-related death, illness, or injury that resulted in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid. The estimated lost workdays (LWDs) due to occupational illness or injury would be approximately 11 per year. The LWD is the number of workdays (consecutive or not) beyond the day of injury or onset of illness that the employee was away from work or limited to restricted work activity because of an occupational injury or illness. These estimates are based on the DOE and contractor illness and injury statistical averages for 1999 (CAIRS 1999).

In addition, as waste inventories grow over time, additional storage facilities or expansion of current capacity would be needed. This would require the use of heavy equipment and would introduce accident risks during facility construction. The added risk of construction activity would be evaluated as required when more specific details are known.

K.3 ACCIDENT ANALYSIS OF THE NO ACTION ALTERNATIVE

During the No Action alternative, the packaged waste containers would be transported to an on-site location and stored. The containers would be inspected periodically to verify that the containers are intact and repaired if required. These containers would be subject to the same conditions as the stored containers in the proposed action. They would, however, be at risk for a longer period of time.

The transformers are estimated to remain in place within the process buildings and not be subject to the risks of vehicle impacts and fires. In the event of an accident, the combustion products of fires would be contained to the buildings, thus minimizing on-site and off-site consequences.

Similar to the proposed action, accidents are postulated with the potential to breech the steel containers of the stored wastes and release the contents. The waste characteristics and the accident consequence methodology are the same as discussed for the proposed action. The accident selection and analysis results are discussed in Appendix C. The risks for both the proposed action and No Action alternative are compared in Sect. 4.2.4.

K.3.1 Accident selection and analysis

The accidents selected for evaluation of the No Action alternative based on the process discussed for the proposed action are shown in Table I.3.

As aforementioned, the PCB-containing transformers are estimated stored indoors and are not subject to the hazards estimated in the proposed action. Since other packaged wastes do not have notable radionuclide or toxic metal concentrations, fire accidents are not considered for the No Action alternative.

In summary, two bounding accidents are selected for evaluation: an evaluation-basis earthquake (EBE) and a vehicle impact/container mishandling accident. Since the waste characteristics and the accident scenarios are the same as those evaluated for the proposed alternative, the accident consequences are identical to those computed and discussed in Sect. 4.1. However, while the frequency of the earthquake accident is the same for both alternatives, the frequency of vehicle impact/mishandling accidents is much lower due to the lower activity level. It is estimated that vehicle impact/mishandling accidents occur with a frequency of 0.1/year for the No Action alternative versus 1/year for the proposed action. The conditional probability of striking a particular drum or set of drums is the same as discussed for the proposed action: 1.8×10^{-5} for the ThF_4 drum and 4.3×10^{-4} for the TRU waste drums. The corresponding frequencies for accidents involving these drums are, respectively, 1.8×10^{-6}/year for the ThF_4 drum and 4.3×10^{-5}/year for the TRU waste drums. The risks for the accidents occurring in the No Action alternative are summarized below based on the revised accident frequencies and the 100-year institutional control period.

Table K.2. Radiological impacts to workers from the No Action alternative

Waste type	Dose rate at 1 m (mrem/hr)	Annual impact worker population dose (person-rem/year)	LCF[a]
Acids/bases	0.028	1.75	0.001
Activated carbon	3.69	230.26	0.092
Batteries	NA[b]	NA	NA
Ash UF_6MgF_2	2.41	150.38	0.060
Contact cement	16.21	1011.50	0.405
Debris and rubble	2.41	150.38	0.060
DMSA liquid	11.79	735.70	0.294
DMSA solid	0.2	12.48	0.005
Grease	16.69	1041.46	0.417
Lab waste	2.7	168.48	0.067
LLW asbestos	0.21	13.10	0.005
LLW misc. equip	2.89	180.34	0.072
LLW other solids A	2.89	180.34	0.072
LLW other solids B	2.41	150.38	0.060
LLW other solids C	2.41	150.38	0.060
MLLW liquids A	0.23	14.35	0.006
MLLW liquids B	11.79	735.70	0.294
MLLW liquids C	11.79	735.70	0.294
MLLW other solids	0.21	13.10	0.005
MLLW solids A	0.23	14.35	0.006
MLLW solids B	0.27	16.85	0.007
MLLW soft solids A	0.23	14.35	0.006
MLLW soft solids B	0.23	14.35	0.006
Oil filters	8.43	526.03	0.210
PCB caps	3.98	248.35	0.099
PCB transformers	NA	NA	NA
Petroleum jelly	16.21	1011.50	0.405
Pure Th F	16.21	1011.50	0.405
Radium source	16.21	1011.50	0.405
RPCB liquids	11.79	735.70	0.294
RPCB solids	0.41	25.58	0.010
RPCB soft solids	0.21	13.10	0.005
RPCB soils A	0.42	26.21	0.010
RPCB soils B	0.26	16.22	0.006
Soil/trash/gravel	NA	NA	NA
Tc-99 grout tile	16.21	1011.50	0.405
T-99 waste	2.41	150.38	0.060
TRU liquids	0.46	28.70	0.011
TRU solids	0.74	46.18	0.018

[a]LCF = Estimated number of latent cancer fatalities from annual exposure.
[b]NA = Not enough data available.
DMSA = DOE Material Storage Area
LLW = low-level radioactive waste
MLLW = mixed low-level waste
PCB = polychlorinated biphenyl
RPCB = radiological polychlorinated biphenyl
TRU = transuranic

Table K.3. Accidents selected for evaluation of the No Action alternative

Accident	Wastes affected	Estimated frequency
EBE	all (12,000 m^3)	10^{-2} to 10^{-4}/year
Ground vehicle impact/mishandling	1 m^3	>10^{-2}/year

Earthquake:

MIW/MUW risk = 1.5×10^{-7} expected fatalities
MEI risk = 9.5×10^{-9} expected fatalities
Population risk = 7.5×10^{-8} expected fatalities

Vehicle impact/mishandling—ThF_4 container:

MUW risk = 7.9×10^{-8} expected fatalities
MEI risk = 1.1×10^{-9} expected fatalities
Population risk = 2.3×10^{-9} expected fatalities

Vehicle impact/mishandling—TRU containers:

MUW risk = 1.7×10^{-8} expected fatalities
MEI risk = 2.4×10^{-10} expected fatalities
Population risk = 5.2×10^{-10} expected fatalities

As shown, the risks for the No Action alternative increase for the earthquake by a factor of 10 due to the longer period at risk. The risks, however, for the impact accidents remain the same due to the compensating longer risk period and lower annual frequencies. Similar to the risks for the proposed action, these risks are considered minor.

In contrast to the accident consequences affecting the waste packages, the consequences of industrial accidents are smaller on a yearly basis due to the smaller work force required. During the No Action alternative, it is estimated that the stored wastes are monitored for possible deterioration on a periodic basis. It is estimated that this activity requires 30 full-time equivalents or 60,000 person-h/year over the 100-year alternative duration. Based on the 3.4×10^{-3}/200,000 person-h industrial fatality rate, the result would be 1.0×10^{-3} fatalities/year. Over the 100-year duration of the No Action alternative, 0.1 fatalities are expected. This represents a factor of 5 increases in the risk over the proposed alternative due to the longer duration.

K.4 COMPARISON OF ACCIDENT RISKS

As discussed in Sects. 4.1.3 and 4.3.3, risks have been computed for both process accidents and industrial accidents for the proposed action and the No Action alternatives. The highest radiological accident risk was 1.5×10^{-7} expected fatalities for the maximally exposed involved worker/maximally exposed uninvolved worker at the edge of the waste storage area during and following an earthquake. This risk was computed for the 100-year no-action institutional period. The second highest risk, 7.9×10^{-8} expected fatalities, was computed for the vehicle impact/mishandling accident impacting the ThF_4

container during the 10-year proposed action operating period. The risks are the same for both alternatives, but the proposed action has a shorter duration. These risks are minor.

The industrial accident risks, while higher than the radiological accident risks, were small. The computed risk for the proposed action was 0.02 expected fatalities over the 10-year operating period. The corresponding industrial accident risk for the No Action alternative was 0.1 expected fatalities over the 100-year institutional control period. Neither the risks nor the differences between them are considered notable.

K.4.1 Transportation Impacts

Under this alternative no Paducah waste would be transported off-site. Therefore, there are no transportation impacts associated with this alternative.

K.4.2 On-site Treatment Impacts

Under this alternative no on-site treatment would occur. All wastes would be maintained in storage facilities. Therefore, no treatment impacts are associated with this alternative.

REFERENCES

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