4.0 IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter evaluates the environmental consequences of the proposed action (Section 4.1) and of the alternatives (Section 4.2). The analysis focuses primarily on impacts associated with routine operation of the glass melter. In some instances (such as human health), additional analysis is provided for accident conditions.

4.1 THE PROPOSED ACTION

The proposed action was evaluated to determine the potential impacts of a number of environmental components, including air quality, surface water quality, and biological resources, as well as the potential effects to human health and safety. The potential impacts to these receptors are evaluated in the following subsections. No impact pathways were identified for land use, socioeconomics, or groundwater resources.

4.1.1 Air Quality

Operation of the glass melter will require approval of the Ohio EPA and/or the U.S. EPA Region V. The Mound facility is in Montgomery County, within the Metropolitan Dayton Intrastate Air Quality Control Region (AQCR). The region is under authority of the Regional Air Pollution Control Agency (RAPCA), which monitors ambient levels of criteria pollutants. Monitoring data are compared to the National Ambient Air Quality Standards (NAAQS), (Clean Air Act, as amended) and the state of Ohio air standards (listed in the Ohio Administrative Code, Title 3745). Montgomery County is currently classified as nonattainment for ozone and total suspended particulates.

Glass melter emissions are also regulated by the National Emission Standards for Hazardous Air Pollutants (NESHAP). The EPA regulations on NESHAP were promulgated under authority of the Clean Air Act, as amended. NESHAP regulations (40 CFR Part 61) cover a wide variety of toxic air pollutants, including beryllium, mercury, vinyl chloride, asbestos, and arsenic. They also cover certain radioactive emission sources from underground uranium mines, elemental phosphorus plants, and radioactive emissions from facilities licensed by the Nuclear Regulatory Commission. In addition, Subpart H establishes a national emission standard for radioactive emissions from facilities owned or operated by the DOE. The emission standard is 10 mrem/year effective dose equivalent.

Air quality will be impacted by emissions of particles and gaseous compounds generated by the combustion of waste materials in the glass melter. The waste feedstocks anticipated are listed in Table 2.1-3, and include volatiles, semi-volatiles, and nonvolatile materials, some of which are contaminated with radionuclides. Approximately one-sixth of the annual waste processed through the glass melter will be existing "backlog" waste, listed in Table 2.1-4. The average waste profile will therefore consist of:

Waste type	Table	kg/year	% of total
Nonrad hazardous	2.1-3	37,009	77
Mixed waste	2.1-3	1,858	4
Scintillation vials	2.1-3	455	1
Backlog mixed waste	2.1-4	8,678	18
Total		48,000	100

4.1.1.1 Impact of Nonradioactive Emissions

During normal operation of the glass melter, the impact of emissions from combustion of volatiles and semivolatiles will be negligible due to the high DRE demonstrated during tests of the glass melter (Section 2.1.2.1). Emission rates of nonvolatile hazardous materials, including metals and criteria pollutants, are listed in Table 2.1-5. Worst-case short-term ambient concentrations of these materials were projected by the PTPLU-2.0 dispersion model.

PTPLU-2.0 is an EPA guideline model for estimating the maximum short-term concentration in ambient air during each of the 49 combinations of wind speed and atmospheric stability customarily used for screening purposes. It was assumed that the glass melter will operate 40 hours per week, 52 weeks per year, and that the discharge rate for each pollutant will be relatively constant during operation. In Table 2.1-5, for example, the emission rate of arsenic, 56 g/year, was assumed to be 7.5E-06 g/sec for 2,080 hours. Other input data were: stack height = 57 ft, stack diameter = 6 in., gas temperature = 200°F, and stack velocity = 50 ft/sec.

Table 4.1-1 lists the emission rate and maximum predicted concentration of each nonradioactive pollutant. Each of the predicted concentrations represents the highest of the 49 concentrations calculated by PTPLU-2.0 and is therefore the maximum short-term concentration to be expected under worst-case meteorological conditions. In all cases, the maximum concentration occurred 220-m downwind, a location that can be either on site or off site, depending on wind direction.

Table 4.1-1. Maximum Short-Term, Ground-Level Concentrations of Pollutants Emitted by the Glass Melter

Nonradiological Pollutants

Pollutant	Emission Rate (g/sec)[a]	Predicted Conc. (g/m^3)	Applicable Standards: MAGLC (g/m^3)	Applicable Standards: Predicted Conc. minus MAGLC
Arsenic	7.50E-06	2.03E-09	2.00E-05	-2.00E-05
Cadmium	2.90E-06	7.86E-10	5.00E-06	-5.00E-06
Chromium	1.47E-05	3.98E-09	5.00E-05	-5.00E-05
Lead	1.47E-04	3.98E-08	1.50E-05	-1.50E-05
Carbon monoxide	2.64E-02	7.15E-06	5.50E-03	-5.49E-03
Hydrogen chloride	1.30E-03	3.52E-07	7.00E-04	-7.00E-04
Nitrogen oxides	1.30E-03	3.52E-07	6.00E-04	-6.00E-04
Particulates	3.00E-04	8.13E-08	3.00E-05	-2.99E-05

Radiological Pollutants

Pollutant	Emission Rate (Ci/sec)[a]	Predicted Conc. (Ci/m^3)	Standards[b]
Tritium	3.40E+01	9.21E-03	
Plutonium-238	1.00E-04	2.71E-08	
All others	3.33E-05	9.02E-09	

Note: To project maximum annual concentrations (g/m^3) at the property line, multiply emission rate (g/sec) by 2.72E-06.

a Based on data in Table 2.1-5.

b Short-term standards for these radionuclides do not exist. See Section 3.1.

Table 4.1-1 also compares predicted concentrations to MAGLCs for nonradioactive pollutants. MAGLCs were calculated according to the methodology employed by Ohio EPA, Division of Air Pollution Control (DAPC), which divides the time weighted average (TLV-TWA) for each pollutant by 10 to adjust the occupational standard to a short-term standard applicable to the general public. As shown in Table 4.1-1, the maximum predicted concentrations are lower than corresponding MAGLCs.

Glass melter stack emissions requirements have been determined based on criteria found in the EPA report "Guidance on Metals and Hydrogen Chloride Controls for Hazardous Waste Incinerators" (Draft final report 9/88). Permissible levels of metals emitted can be set in one of the following ways:

- Limits set on feed rates - "Tier I Limits"
- Limits set on emissions - "Tier II Limits"

Tier I limits assume all metals are emitted, and take no credit for partitioning of metals into the glass structure, or removal of metals from stackgases by air pollution control devices. Reasonable worst case dispersions are assumed. Tier II limits take into account metals partitioning and removal, by using actual stack emission rates. Worst case dispersion is assumed.

Limits for concentration of metals that could be present in trace quantities in waste feed streams for the glass melter have been determined based on Tier I limits in Table 4.1-2. For noncarcinogenic metals for which Tier I limits are too restrictive, and for carcinogenic metals, Tier II limits based on stack emissions have been estimated (see Table 4.1-2). In making these calculations, assumptions have been made relative to pollution control device efficiency and metals partitioning occurring in the system. These assumptions will be evaluated during the glass melter trial burn, and Tier II feed metal concentration limits will be revised in accordance with the data collected.

NO_2 and particulates are criteria pollutants for which there are NAAQS expressed as annual averages. The standards, 100 and 60 mg/m^3, respectively, are applicable to off-site locations. Accordingly, maximum annual average concentrations at the property line were estimated, using the Industrial Source Complex (ISC) dispersion model running in the long-term mode.

The ISC model is an EPA guideline model that accepts actual meteorological data and estimates ambient concentrations of pollutants at user-specified receptor locations. In this instance, the annual average of eight years of meteorological data recorded at the National Weather Service station at Dayton was used. A receptor was placed at the intersection of the property boundary with each of 36 radials, spaced 10° apart, emanating from the glass melter stack.

Table 4.1-2 Limits for Metals Concentrations in Waste Feed Streams

Table 4.1-2A		Table 4.1-2b	
Tier I		Tier II	
Metals	Feed Concentration [a] (ppm)	Metals	Feed Concentration [a] (ppm)
Non-carcinogenic		Non-carcinogenic	
Antimony	4,286	Antimony	14,286
Barium	71,429		
Lead	129	Lead	2,857
Mercury	2,857		
Selenium	1,000		
Silver	429		
Thallium	425	Thallium	14,286
Carcinogenic		Carcinogenic	
Arsenic	2.8	Arsenic	95
Cadmium	8	Cadmium	266
Chromium	11.4	Chromium	57
Beryllium	5.7	Beryllium	285

[a] Concentration determined based on 70 lb/hr. waste feed

The 36 radial distances from the stack to the property line ranged from 108 to 808 m. Using an assumed emission rate of 1 g/sec, the model calculated the annual average concentration at each of the 36 receptor locations. The highest concentration at the property boundary was 2.72 mg/m^3, which occurred 320 m due north of the glass melter stack. Since receptor concentrations are directly proportional to the source strength, the maximum annual average concentration (mg/m^3) of any pollutant listed in Table 4.1-1 can be obtained by multiplying the "emission rate (g/sec)" by 2.72. Accordingly, the maximum annual average concentrations of NO_2 and particulates are 0.0035 and 0.0008 mg/m^3, respectively. Both concentrations are negligible compared to NAAQS and will not adversely affect ambient air quality.

The release of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) from incinerators is an area of concern. The concern originated during testing of municipal waste incinerators (MWIs). These tests showed that PCDDs (up to 4.4 mg/m^3) and PCDFs were coming from the stacks of these incinerators in levels exceeding the assumed input levels of these compounds. PCDDs are considered to be carcinogens by EPA and promoters of carcinogenicity by Canada and some European countries. The potency factor for the worst PCDD is 1.56 x 10^5, which is the highest among all listed carcinogens (EPA, 1986b). The potential for release of these compounds from the glass melter is discussed in Appendix B and summarized in the following paragraphs.

PCDDs are not known to be formed by any biological activity, and all known sources of PCDDs involve oxidation and/or chlorination of organic compounds that are precursors or building blocks for PCDDs. Therefore, the source of dioxins from the glass melter will be either dioxins introduced into the furnace, either intentionally or as a contaminant (eg., trace contaminant of paper), or dioxins formed in the furnace and ancillary equipment from precursor chemicals. The high destruction and removal efficiency of the melter, up to 99.9999%, (Table 4.1-3) ensures that in the unlikely event that PCDDs are formed in the glass melter, their destruction will also be nearly complete. The high combustion efficiency will destroy most precursor chemicals before they are able to form PCDDs. Dioxins are formed in the temperature range of 200 to 730°C (approximately 390 to 1,350°F) and are destroyed at temperatures exceeding 750°C (1,380°F). The formation of dioxins is virtually impossible due to operating temperatures in the combustion zone of 1,400 to 2,750°F and the very rapid cooling below the formation temperature by the quench water in the wet scrubber. The rapid quenching below formation temperature is the method recommended by EPA for minimizing PCDD emissions from municipal waste incinerators.

The conclusion drawn in Appendix B is that the high system combustion efficiency will ensure the destruction of virtually all trace dioxins and dioxin precursors, and rapid quenching below dioxin-formation temperatures will prevent the creation of PCDDs and PCDFs. Release of any PCDDs or PCDFs will not be in excess of acceptable standards.

In addition, dioxin formation in the ash is not expected because the ash constituents are incorporated into the glass and maintained at high temperatures for

Table 4.1-3. DRE Test Burns Conducted with the Glass Melter System January 14-31, 1985

Waste Name	Physical State	Components	%	POHC?	Minimum Chamber Temperature (^oF)	DREs			
Sludge-Wastewater Treatment Waste A Run 7	Sludge	Acrylonitrile	1.4	Y	1,906	99.99998	99.99999	99.99998	
		Carbon Tetrachloride	1.5	Y		99.99998	99.99999	99.99998	
		Chlorobenzene	1.0	Y		99.99972	99.99990	99.99993	
		Phenol	1.2	Y		99.99978	99.99998	99.99998	
		Water	60	N					
		Waste Treatment Solids	Bal	N					
Sludge-Wastewater Treatment Water A Run 8	Sludge	Acrylonitrile	2.8	Y	1,974	99.99998	99.99999		
		Carbon Tetrachloride	3.0	Y		99.99998	99.99999		
		Chlorobenzene	2.1	Y		99.99993	99.99976		
		Phenol	2.4	Y		99.99998	99.99999		
		Water	47	N					
		Waste Treatment Solids	Bal	N					
Sludge-Wastewater Treatment Waste A Run 9	Sludge	Acrylonitrile	2.8	Y	1,745	99.99994			
		Carbon Tetrachloride	3.0	Y		99.99998			
		Chlorobenzene	2.1	Y		99.99966			
		Phenol	2.4	Y		99.99997			
		Water	47	N					
		Waste Treatment Solids	Bal	N					
Acetonitrile Waste Waste C Run 1	Clear Liquid	Acetonitrile	77	Y	1,769	99.99995	99.99999		
		Acrylonitrile	3	Y		99.99988	99.99994		
		Water	20	N					
Acetonitrile Waste Waste C Run 2	Clear Liquid	Acetonitrile	75	Y	2,135	99.99999	99.99999		
		Acrylonitrile	5	Y		99.99997	99.99998		
		Water	20	N					
Acetonitrile Waste C Run 3	Clear Liquid	Acetonitrile	75	Y	1,759	99.99998			
		Acrylonitrile	5	Y		99.99995			
		Water	20	N					
"Cocktail" Waste Waste D Run 4	Liquid	Kerosene	91	N	1,781				
		Carbon Tetrachloride	2.0	Y		99.99986	99.99998	99.99992	99.99983
						99.99990	99.99992	99.99993	
		Chlorobenzene	2.2	Y		99.99987	99.99989	99.99993	99.99984
						99.99992	99.99989	99.99994	

Table 4.1-3. DRE Test Burns Conducted with the Glass Melter System January 14-31, 1985 (continued)

Waste Name	Physical State	Components	%	POHC?	Minimum Chamber Temperature (°F)	DREs
		Phenol	2.3	Y		99.99987 99.99989 99.99993 99.99985 99.99990 99.99992 99.99992
		Xylene	ppm	Y		99.99841 99.99843 99.99906 99.99764 99.99929 99.97484 99.99954
"Cocktail" Waste Waste D Run 5	Liquid	Kerosene	88	N	1,799	
		Carbon Tetrachloride	2.9	Y		99.99990
		Chlorobenzene	3.6	Y		99.99992
		Phenol	2.7	Y		99.99990
		Xylene	ppm	Y		99.99929
"Cocktail" Waste Waste D Run 6	Liquid	Kerosene	88	N	1,714	
		Carbon Tetrachloride	2.9	Y		99.99992 99.99993
		Chlorobenzene	3.6	Y		99.99989 99.99994
		Phenol	2.7	Y		99.99992 99.99992
		Xylene	ppm	Y		99.97484 99.99954

Source: Mound, 1987.

Bal = balance

extended periods of time, which should destroy precursors; available formation sites will be minimized because of the liquid nature of the melted glass.

4.1.1.2 Impact of Radioactive Emissions

During normal operation of the glass melter, radionuclides will be released during the combustion of mixed wastes. The portion released from the waste but not captured by the glass, the scrubber system, or the HEPA filters will be discharged from the glass melter stack. Maximum anticipated stack emission rates of the two principal radionuclides, ^{3}H and ^{238}Pu, are 34.0 and 0.0001 Ci/year, respectively, as shown in Table 2.1-5. The combined emission rate of all other radionuclides listed is estimated to be 0.000033 Ci/year, which was modeled as ^{230}Th (for purposes of analysis). ^{230}Th was chosen because of the relatively high dose-conversion factors associated with inhalation and ingestion, the two predominant pathways for human uptake of the radionuclides listed in Table 2.1-5. The population dose[3] was estimated by the MICROAIRDOS™ model (Moore et al., 1989), which is a microcomputer version of AIRDOS designed and written by the author of the original AIRDOS Radionuclide Dispersion and Dose Assessment Code. For purposes of evaluating compliance with 40 CFR Part 61 NESHAPS, the dose to the maximally exposed individual was estimated using the AIRDOS-PC computer code (USEPA,1989).

As with AIRDOS-EPA, MICROAIRDOS™ couples the output of the atmospheric transport models with the terrestrial food-chain models of the U.S. Nuclear Regulatory Commission's (NRC's) Regulatory Guide 1.109 to estimate the radionuclide concentrations in produce, leafy vegetables, milk, and meat for human consumption. Dose conversion factors are input to the code, and doses to humans at each distance and direction specified are estimated for total body and individual organs through the following exposure modes: 1) immersion in air containing radionuclides, 2) exposure to contaminated ground surface, 3) inhalation of radionuclides in air, 4) ingestion of food produced in the area, and 5) ingestion of water containing ^{3}H. The code will accept up to 12 radionuclides and will estimate the highest sector-averaged or centerline dose to an individual, or the annual population dose. Similarly, AIRDOS-PC is a microcomputer adaptation of AIRDOS-EPA, developed by EPA specifically for evaluating NESHAPS compliance.

Using EPA dose conversion factors, the source terms above, and the meteorological and stack data previously cited, the highest effective dose equivalent

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[3] When ionizing radiation passes through matter, some of its energy is imparted to the matter. The amount absorbed per unit mass of irradiated material is called the dose and is measured in rems and rads. Effective dose equivalent means the sum of the products of absorbed dose and appropriate factors to account for differences in biological effectiveness due to the quality of radiation and its distribution in the body of reference man. The unit of the effective dose equivalent is the rem. The method for calculating effective dose equivalent and the definition of reference man are outlined in the International Commission on Radiological Protection's Publication No. 26 (ICRP).

(based on standard man) to a hypothetical individual located at the property boundary was estimated to be 0.073 millirem/year (mrem/year). The location of the individual was 470 m north-northeast from the glass melter stack. Contributions to the total dose by ^{3}H, ^{238}Pu, and ^{230}Th were approximately 40%, 50%, and 10%, respectively. Contributions by inhalation and ingestion pathways were 60% and 40%, respectively.

The estimated dose and the associated risks are very low. Recently promulgated National Emission Standards for Hazardous Pollutants (NESHAPS) limit the effective dose equivalent to 10 mrem/year for an individual. (The previous limit for a person living near an NRC-licensed facility was 10% of the occupational limit of 5,000 mrem/year, or 500 mrem/year.) Under NESHAPS, an operating permit and emission monitoring are required for any new source projected to result in more than 0.10 mrem/year effective dose equivalent to any individual.

Based on the 1990 population distribution surrounding the Mound facility, the collective effective dose equivalent (CEDE) to the total population residing within 80 km of the facility (approximately 3,035,000) was estimated to be 2.6 person-rem/year. The collective dose equivalent projected for operation of the glass melter facility is very small; no somatic or genetic effects are anticipated.

4.1.2 Surface Water Quality

Operation of the glass melter would not result in the direct discharge of effluents to surface or ground water sources. Discharge of scrubber liquid, if any, would be a minor stream to a wastewater treatment facility which discharges at an NPDES permitted outfall. This liquid would be characterized for waste feed RCRA hazardous components prior to release to ensure that pretreatment standards were met, and that toxic materials were not released to the treatment facility. Based on the control systems which would be in place, impacts on surface and ground water quality from glass melter operation would be predicted to be negligible.

4.1.3 Biological Resources

Air emissions from melter operation and resulting changes in air quality are considered to be the pathways by which biological resources could be potentially impacted. The air quality analysis indicates no measurable change in air quality with respect to priority pollutants; hence, no adverse impact is projected from this source. Radioactive emissions are predicted to result in a maximum fence line dose of 0.18 mrem/year. This is considered sufficiently low to be indicative of negligible impact to biological resources.

4.1.4 Human Health and Safety During Routine Operations

Use of the glass melter for treatment of mixed wastes could impact the health and/or safety of on-site personnel and the general public during routine operations. The following sections provide information on the potential impacts and their magnitudes.

4.1.4.1 On-Site Population

Routine operation of the glass melter could impact the on-site population in a variety of ways. These effects are grouped into three major areas:

- radiation exposure,
- industrial safety, and
- industrial hygiene.

Potential impacts to worker health and safety in each of these areas are summarized in the following subsections. Further discussion of the impacts is provided in Appendix D. Consideration was given to established procedures designed to minimize adverse effects.

Radiation Exposure. Radiological hazards to employees associated with the operation of the glass melter are expected to be minimal, based on the limited concentrations of the radionuclides in the waste and on facility design features which reduce direct employee contact with radioactive materials. The primary radionuclides treated at the glass melter include ^3H and Pu. Information on potential exposures to the general public during routine operations is given in Section 4.1.4.2.

Mound has an active program to keep employee exposures as low as reasonably achievable (ALARA). Extensive radiation protection procedures have been developed and implemented at the facility. Technical Manual MD-10019, *Mound Radiological Protection Program,* describes the program, including the methods used for monitoring employee exposures, applicable standards, training, personnel protection measures, and emergency procedures.

Glovebox and stack alpha radiation detectors and alarms are in place downstream of the HEPA filters, in addition to the personnel monitoring program. For any operation of the glass melter involving tritium, a room ^3H monitor will be employed. Special surveys made during a test run in 1985 indicated that some contaminants are present on the interior surfaces of the glass melter. Radioactive contamination levels on external surfaces of equipment to which personnel are exposed will be maintained <20 disintegrations per minute (d/min)/100 cm^2 alpha transferable or <100 d/min/100 cm^2 transferable ^3H, which are lower levels than the DOE guidelines.

Industrial Safety. The operation and design of the glass melter thermal unit present a number of industrial safety hazards. These hazards are grouped into the following categories: materials handling, hazardous materials spills, falls from heights, contact with heated surfaces, and contact with energized circuits.

The hazards identified in Table 4.1-3 present the greatest probability of serious injuries to personnel.

- *Materials Handling.* There are three strenuous manual materials-handling tasks performed during the glass melter operations. These include:

  — the transferring of 5-gal metal buckets filled with molten glass (100 lb) extracted from the furnace to an adjacent storage area,

  — the movement of 55-gal drums of waste liquids to the feed system hood, and

  — the loading of buckets of glass frit into the unit glovebox.

  The weight and forces combined with bending, twisting, and reaching motions make the performance of these manual tasks difficult and could lead to strain-type injuries. Appropriate mechanical aids would be provided to assist in the movement of the drums containing waste liquids.

- *Hazardous Materials Spills.* Employees could be exposed to minor spills of hazardous and radioactive liquid wastes from the movement of drums inside and outside of the glass melter building. The chemical compositions of these mixed-wastes are given in Table 2.1-3.

  Impairments to the respiratory, nervous, cardiovascular, lymphatic, integumentary, and other functional systems which could result from acute exposure to these waste solvents are not expected during routine operation.

  Site policy, as contained in the *Mound Safety and Hygiene Manual*, requires employees to wear appropriate protective clothing and respiratory equipment. Employee awareness of the hazards associated with exposures to solvents is also addressed in this manual. The Mound Toxic Material Advisory Committee and the Chemical Spill Committee provide health and safety guidance in relation to hazardous chemicals and outline appropriate actions in the event of an emergency situation.

- *Falls from Heights.* Employees operating the glass melter furnace may be exposed to potential falls from heights during the loading of the solid waste feed system. The solid waste feed system is located at a height of approximately 3 m (approximately 10 ft) above the floor. Access to the system currently requires climbing around obstructions which could cause employees to lose their balance and fall. The *Mound Safety and Hygiene Manual* addresses inspection for and correction of fall hazards.

- *Contact with Heated Surfaces.* The operation of the glass melter unit presents the potential for employees to receive burns from bodily contact with the heated furnace skin while manually transferring the 5-gal metal buckets containing molten glass extract to the adjacent storage area. Burns may also result from contact with molten glass escaping the furnace through a break in the refractory. This potential is low since the glass normally hardens to seal the exposed surfaces.

The potential for contact with the furnace skin exists during access to the gloveboxes for the loading of glass frit and shredded solid waste. An exposure also exists when removing the buckets containing molten glass extract.

The *Mound Safety and Hygiene Manual* outlines the policy and procedures that require employees to wear the appropriate personal protective equipment. Glass melter employees are provided with welder gloves for protection from burns.

- *Contact with Energized Circuits and Energized Components.* Contact with energized circuits does not present a major risk during furnace operation. Contact with energized components is possible during water lance application to refractory breeches if electrodes are not de-energized as a preliminary precaution.

Industrial Hygiene. Employee health risks from the operation of the glass melter are divided into four categories: noise exposure, heat exposure, toxic contaminant exposure, and heavy-metal exposure.

- *Noise Exposures.* Glass melter employees are exposed to noise levels in excess of the established Mound guidelines as indicated by noise exposure readings performed during 1988 by the industrial hygiene staff. The primary noise sources are the offgas handling equipment and the propane burner on the furnace. The Site Hearing Conservation Policy, found in Technical Manual MD-10286, *Mound Safety and Hygiene Manual*, outlines the present hearing protection program. This policy is more conservative, and thus more protective, than current Occupational Safety and Health Administration (OSHA) policy for general industry found in 29 CFR Part 1910.95, Occupational Noise Exposure. The Mound Industrial Hygiene Department has identified the offgas scrubbing system area as a high noise area requiring hearing protection for all employees while engineering controls are evaluated and installed.

- *Heat Exposure.* It is expected that employees operating the glass melter furnace will be exposed to relatively high room temperatures while in the immediate vicinity of the unit and while at the glovebox located above the furnace near the room ceiling. No heat exposure data are available. Given the high furnace temperature and projected operating time, it is reasonable to conclude that a heat stress potential could exist. Heat stress guidelines are being developed for this facility.

- *Toxic Contaminant Exposure*. Personnel operating the glass melter may receive exposures to toxic contaminants when hazardous waste and mixed-waste vapors escape to the work area atmosphere during routine activities.

  During furnace tests in January 1985, personal sampling conducted by Mound industrial hygienists indicated that the exposures exceeded established standards, as shown in Table 4.1-4. The toxic substances of concern in the January 1985 sample were acrylonitrile and carbon tetrachloride. Both are considered by ACGIH to be known human carcinogens.

  Technical Manual MD-10161, *Mound Respiratory Protection Program*, provides that process hazards be evaluated and appropriate respiratory protection be provided.

  Exposure of personnel in the adjacent facility to toxic contaminants from this unit are not expected. Exposures which exceed established limits outside the glass melter and offgas equipment rooms should be precluded by the lack of direct contact with contaminants and the negative pressure maintained in the furnace offgas rooms.

  Skin contact with toxic substances is another source of exposure which should not occur. The selection and use of appropriate personal equipment minimizes the risk of direct skin contact.

- *Heavy-Metal Exposures*. Table 2.1-7 provides a list of heavy metals that could be present in the wastes. The metals of primary concern are arsenic and cadmium, which have low TLVs and are known carcinogens. These metals pose a risk to employee health if ingested or inhaled as metal oxide fumes. Table 4.1-5 indicates extremely high temperatures are necessary to vaporize all of the oxides except As_2O_3. Therefore, Cd, Cr, and Pb heavy-metal exposures are not considered an employee health risk under normal or accidental conditions.

  Arsenic and other heavy metals are readily soluble in the molten glass, and also subject to effective removal in the offgas system. Source term quantities shown in Table 2.1-5 are not sufficient to cause worker health risk if extrapolated over a year of operation, even if the total daily quantities were re-entrained into the workplace.

Table 4.1-4. Glass Melter Facility Hazard Identification

Hazard	Source/Risk Exposure	Consequences	Controls
Noise	Propane burner on the furnace and the offgas handling equipment	Potential hearing loss, noise levels in excess of standards	Evaluation of noise levels — dosimetry and sound level readings. Implementation of engineering controls, i.e., barriers, ear protection — annual hearing tests
Exposure to hazardous air contaminants	Spills of drums containing hazardous wastes to be burned—vaporization release from offgas system	Adverse health effects—narcosis irritation and other impairments exposure to carcinogens	Use of appropriate respiratory protection
Contact with hazardous materials	Unloading/feeding of solid and liquid wastes, spills	Potential of severe skin irritation and other health effects	Use of appropriate respiratory protection, gloves, goggles, protective clothing
Fire/explosion	Propane leak, flammable liquids, combustibles in feeder	Injuries to personnel, damage to property	Furnace equipment inspection and maintenance, housekeeping efforts to minimize combustible loading
Strains	Mound materials handling tasks — loading of glass frit, movement of molten glass-end product	Low back strains and other strain related injuries	Task evaluations, ergonomic redesign and weight limitations
Burns/heat exposure	Contact with furnace skin, offgas pipe, and molten glass. High room temperature and at the glovebox above the furnace	Severe burns, heat stress	Evaluation of exposure levels. Development of heat stress guidelines. Use of heat resistant gloves and clothing
Electrical shock	Contact with electrodes, unprotected contact points	Shock, death	Maintenance of present controls
Steam flash	Water in screw shaft, water lance contacting molten glass or furnace shell	Steam burns	Use of protective clothing, development of proper procedure
Falls from heights	Unprotected or inadequately protected elevated walkways and platforms	Injury to employee	Adequate means of access/egress and appropriate railings

Table 4.1-5. Heavy Metal Vapor Pressures

		Metal Oxide	
Element	Metal Oxide	Vapor Pressure (atm)	At Temp
(^{o}C)			
Arsenic	As_2O_3	1.0	855
Cadmium	CdO	1.0	2838
Chromium	Cr_2O_3	1.0	7232
Lead	PbO	1.0	2682

Source: CRC, 1988.

4.1.4.2 General Public

Routine operation of the glass melter will release small quantities of airborne radioactive and hazardous materials. A summarization of the potential impacts to the health of the general public as a result of these sources is addressed in Section 4.1.1.

Radiological Effects. Routine operations at the glass melter will involve the thermal treatment of mixed wastes containing the isotopes ^{3}H and ^{238}Pu. A conservative evaluation of the off-site radiological hazards presented by the release of ^{238}Pu and ^{3}H was performed with meteorological data from the Dayton, Ohio, area. Other input parameters and analysis details are provided in Section 4.1.1. The results indicate that the dose to the nearest resident will be less than 0.10 mrem/year.

Nonradiological Effects. Routine operation of the glass melter has been evaluated for nonradiological hazards that might affect the general public. A distance of 108 m was used as the nearest point to the site boundary. The nearest resident is 427 m from the facility. Any releases that could be measured above the levels known to impact human health were addressed. Two potential hazards were considered: (1) toxic vapor releases and (2) noise generated from equipment operation.

- Toxic vapor releases from the drum-storage area are not anticipated to exceed the TLV in the vicinity of closed drums. In addition, air mixing between the drum storage area and the closest property line (108 m) would render any routine evaporating vapors below regulatory limits. No hazardous releases of toxic vapors off site are predicted during routine operations.

- Noise levels inside the glass melter facility are primarily due to fan noise from the offgas handling equipment. Recorded noise levels exceed the Mound guidelines inside the facility. Attenuation by the building walls and loss of sound pressure energy at 108 m are predicted to reduce the noise levels below levels that are considered harmful to human hearing. Noise generated during the operation of the melter should not be harmful to any persons outside the melter facility and will not exceed the OSHA standard (90 db) on site or any applicable ambient noise limits of state or local jurisdictions off site.

4.1.5 Human Health and Safety During Nonroutine Operations

Potential accidents that could occur during operation of the glass melter are summarized in this section. The postulated accident initiating events pertinent to the glass melter operations are further discussed in Section 4.1.5.2 where the maximum credible accident is fully evaluated.

Initiating events were systematically determined following:

- a review of the Preliminary Hazard Analysis (Review Report #77-12, 1986),
- a review of the glass melter facility process descriptions,
- "what if" discussions with technical personnel responsible for operation of the glass melter, and
- a visual inspection of the glass melter facility.

This systematic evaluation identified potential initiators and resulted in the classification of the initiators into three categories: natural phenomena, external events, and process-related events.

- *Natural Phenomena.* Wind and earthquake extremes may adversely affect glass melter operations resulting in the release of radioactive and hazardous materials.
- *Externally Induced Events.* Most safety-related occurrences are the result of failures within the system or the result of some actions intentionally directed toward the system. It is possible, however, for damage to be inflicted on a system as a result of some occurrence originating outside the system. An aircraft crash into the WD building and an explosion or fire from external sources are two externally induced events that were evaluated.
- *Process-Related Initiators.* Process-related initiators are those accident initiators that are a direct result of the glass melter operation. The process-related initiators are grouped according to the energetics involved: high-energetic events, medium-energetic events, and low-energetic events. Adverse impacts to the glass melter operations were evaluated independently at these levels.

4.1.5.1 Response and Prevention of Accident Conditions

In addition to the programs discussed in Section 4.1.4.1, the following programs are in effect to properly manage accident conditions at the Mound facility:

- fire protection,
- criticality safety, and
- emergency preparedness.
- emergency response/contingency

The following subsections provide a summary of these programs; additional information can be found in Appendix D.

Fire Protection. A fire at the glass melter facility, which could include the associated storage and offgas handling/equipment areas, represents an accident with a potentially large release of toxic and radioactive materials. This could result in exposures to employees, emergency response personnel, employees in adjacent facilities, and the public. For this reason, fire protection is an important consideration with regard to the safe operation of this facility.

- *Fire Hazards (Fuel & Ignition Sources).* The normal fire load for the glass melter is low since the administrative controls restrict the quantities of combustibles in the facility. No more than ten drums of waste liquids are allowed at any given time on the outdoor loading dock. This is consistent with the requirements of 29 CFR Part 1910.106 for flammable and combustible liquids. The drum containing the wastes being destroyed is located in the offgas handling room away from the furnace during the waste-liquid pumping operation. Solid wastes in shredded form are transferred by hand to the furnace glovebox. The dry solid constitutes a transient fire load if stored in the furnace area.

  The primary ignition source for combustibles is the furnace, which operates at ~871° C (~1600° F). Under normal operating conditions, the negative pressure of the furnace prevents flash fires from occurring. Molten glass breaching the unit and contacting combustibles is considered a low probability event, as is an electrical failure in the vicinity of a flammable vapor mixture. Ignition sources at the loading dock include spontaneous combustion and external sources.

- *Fire Protection Program.* The *Mound Fire Protection Program Manual* (MRC, 1987d) describes the fire protection program for the entire Mound facility. This program provides detailed descriptions of facility provisions for inspection, testing, and maintenance of fixed and portable equipment and for fire and emergency response training.

- *Fire Protection Equipment.* The indoor areas of the glass melter facility are protected from fire by a wet pipe sprinkler system, and portable equipment including a Halon 1211 Unit rated for Class B (flammable/combustible liquids) and Class C (electrical) fires. Additional fire protection is provided for this facility per NFPA-10 (National Fire Protection Association), Portable Fire Extinguishers.

- *Effects of a Fire.* The anticipated effects of a fire in or near the glass melter will vary widely with the quantity of materials involved, the components of the waste stream, and the location of the fire with respect to any permanent fire protection system.

  The maximum credible accident scenario would be a drum fire in the outside storage area that fully involves all wastes present on the dock. Such a fire could expose unprotected individuals in the glass melter and adjacent facilities to a variety of toxic, carcinogenic, and/or radioactive combustion products.

Fire fighting and recovery personnel operate under the *Mound Fire Protection Program Manual*, which requires self-contained breathing apparatus (SCBA), appropriate fire fighting apparel, as well as personal protective equipment and respiratory protection for cleanup operations.

- *Emergency Response and Cleanup*. Emergency response and cleanup crews operate under directives of the OSHA/RCRA HAZWOPER regulations, which define affected areas and set up control areas and decontamination operations. Protective clothing and respiratory protection requirements are established to be conservative until monitoring and analysis results can justify reductions in the level of protection. No impact on clean up crews is anticipated as a result of any credible Glass Melter accident.

(?)

Criticality Safety. The prevention of an uncontrolled nuclear chain reaction is the purpose of the criticality safety program. The glass melter will not be processing large ~~significant~~ quantities (<0.24 kg ^{238}Pu per year) of fissile material and will not require an assessment from the Criticality Safety Committee. The WD building is currently not a Criticality Control Area (CCA). Critical quantities of fissile material are controlled in accordance with Mound Technical Manual MD-10038, *Nuclear Criticality Precautions*.

Emergency Preparedness. Emergency conditions at the glass melter facility that could impact the health and safety of personnel, normal operations, adjacent facilities, or the environment include:

- hazardous substance spills,
- fire/explosion,
- personal injury, and
- acts of nature.

Emergency conditions presented as a single incident source or in combination could result in catastrophic conditions, causing injury to personnel or extensive damage to the glass melter building and adjacent buildings.

Emergency Preparedness System Contingency Plans have been developed to reduce the impacts of an emergency event and to ensure effective response by appropriately trained personnel and off-site response agencies. These plans are consolidated in Mound Systems Manual 721. Individual plans are reviewed and updated annually.

- *Hazardous Substance Spills.* Hazardous substance spills could result in emergency conditions from toxic air contaminant releases, fires, or explosions. The mixed-waste liquid chemical components are listed in Table 2.1-3. The percentages of each component can vary depending on production waste streams. The properties of the mixed waste (i.e., flash point, explosive limits, and toxicity) are variable since they are influenced by the component percentages found in each drum.

  Guidelines for effective response to toxic chemical spills involving nonradioactive materials are provided for in Response Plan-9, *Contingency Plan* (EG&G, 1991). This plan is initiated upon the release of any hazardous substance and assures response by a spill management team. The plan also addresses notification of off-site agencies, team responsibilities, and available cleanup resources. Response procedures to spills of radioactive materials, including low-level mixed wastes, are provided for in Response Plan-2, *Health Physics Nuclear Emergency Procedure* (EG&G, 1991), and Response Plan-7, *DOE/Mound Radiological Assistance Team Plan* (EG&G, 1991).

- *Fire/Explosion.* Emergency situations involving fires or explosions could result from these identified sources:

  — leakage and ignition of propane gas supplied to the glass melter burners,
  — electrical deficiencies,
  — ignition of hazardous waste liquids spills, or
  — externally induced ignition of wastes.

  Appropriate response actions are described in the *Mound Safety and Hygiene Manual*, the *Fire Protection Program Manual*, and in various emergency preparedness system contingency plans. The *Fire Protection Program Manual* establishes the framework for organization, detection of causative factors, and effective response to fires. The *Emergency Brigade Plan* is addressed in Response Plan-142 (EG&G, 1991). Procedures for outside assistance from Miamisburg Fire Department have been established and implemented.

- *Personal Injury.* Emergency conditions resulting from fires, explosions, hazardous materials spills, acts of nature, or other causes could result in injuries to personnel in the glass melter building and adjacent facilities. Contingency plans to address appropriate responses to emergencies involving injuries to personnel are presented in the *Emergency Preparedness System: Master Plan*, Response Plan-1 (EG&G, 1991), and in Response Plan-3, *Emergency Medical Plan* (EG&G, 1991). These plans ensure on-site emergency medical capabilities, an accurate medical records system, and medical consultation to crisis management teams.

- *Acts of Nature.* Lightning, tornadoes, earthquakes, and other acts of nature could present emergencies involving fire, explosions, release of hazardous materials, and injuries to personnel. Emergency response actions to these potentially catastrophic events are provided in the *Fire Protection Plan* and the *Emergency Preparedness System Contingency Plan*, Response Plan-9 (EG&G, 1991).

4.1.5.2 Impacts Under Maximum Credible Accident Conditions

Possible accident scenarios were developed to identify the accidental occurrence that would result in the greatest harmful release to the environment. From the analysis of potential events (Appendix D), a fire in the drum storage area of the loading dock, resulting in complete vaporization of the contents of ten waste storage drums, was selected as the maximum credible accident. The probability of this event was estimated to be 0.00001. Such an accident would cause airborne releases of both radioactive and nonradioactive contaminants. These releases would take place during the burn time of the fire.

Assuming that the specific gravity of the drummed waste is 1.0, the total content of the ten drums would be 2,080 kg. The burn time of the waste can be estimated by applying a burn rate of 40 grams/square meter-second (g/m^2sec), the approximate burn rate for acetonitrile, a typical solvent. Assuming a burn area approximately 2 ft in diameter per drum (a total burn area of 2.7 m^2), the burn time would be approximately 5.4 h, (although emergency response measures would likely reduce the burn time substantially).

Typical amounts of radioactive and nonradioactive constituents of the drummed waste are shown in Tables 2.1-3, 2.1-4, and 2.1-5. Assuming a uniform release rate during a 5.4-h period, emission rates were calculated, and downwind concentrations of nonradioactive pollutants were projected by the SCREEN dispersion model.

Impact of Nonradioactive Emissions. SCREEN is a personal computer model that performs all the calculations in EPA-450/4-88-010 (EPA, 1988), *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources*. At each user-specified downwind distance, the model will calculate the maximum concentration to be expected during worst-case meteorological conditions. In addition to calculating impacts from a stack source or area source, the model will calculate downwind concentrations from a flare.

For the drum fire application, the model was run as a flare, 1 m above ground. Five toxic compounds were chosen for modeling, based on their abundance in the drummed waste and their relatively low TLV-TWAs. Downwind concentrations of each of the five compounds were projected by the SCREEN model at selected distances between 25 and 1,000 meters. These concentrations are presented in Table 4.1-6, along with the emission rate and TLV/10 for each toxic compound. The concentrations listed are the highest that can be expected under worst-case meteorological conditions. Maximum concentrations occurred 69 m downwind and were well below the TLV/10 guideline exposure limit for employees and the general public.

Impact of Radioactive Emissions. Assuming that the entire 2,080 kg of wastes is consumed during the drum fire scenario, radioactivity released to the atmosphere can be estimated by referring to the waste composition data (Ci/kg of waste) in Table 2.1-5. Accordingly, the radioactivity released to ambient air by the two principal radionuclides, ^{3}H and ^{238}Pu, is 10.5 and 0.00021 Ci, respectively. (Laboratory tests of organic solvent fires containing dissolved uranium indicate that less than 1% of the uranium becomes airborne. Assuming similar results from a plutonium/solvent mixture, the radioactivity released to ambient air by ^{238}Pu would not exceed 0.00021 Ci). The combined release from all other radionuclides listed in Table 2.1-5 is estimated to be one-third of that from ^{238}Pu, or 0.00007 Ci, which will be modeled as Thorium-230 (^{230}Th) (for purposes of analysis). (^{230}Th was chosen for the same reasons cited in Section 4.1.1.2). The three source terms above were modeled to determine the dose to the maximally exposed individual.

The AIRDOS model is designed for continuous releases of radionuclides during a 1-year period and is best suited for instances where the release rate is relatively constant throughout the year. The dose from a short-term event can be estimated, however, by using artificial meteorological data in the model. A conservative estimate can be made by assuming worst-case meteorological conditions, namely:

- low wind speed (1 m/sec),
- worst-case atmospheric stability ("A" stability class, in this instance),
- constant wind direction (blowing from the fire directly toward the maximally exposed individual).

Using these assumptions and source terms, the dose to the maximally exposed individual was estimated by the MICROAIRDOS™ model, which is described in Section 4.1.1.2. The fire was modeled as a source 1 m above ground, releasing 200,000 calories of heat per second.[4] Human receptors were assumed to be located at the following downwind distances: 108, 150, 200, 500, 1,000, 2,000, and 5,000 m.

The effective dose equivalent to the maximally exposed individual was estimated by the model to be 0.20 mrem. The location of the maximally exposed individual was approximately 200 m downwind, which could be either on site or off site, depending on wind direction at the time of the fire. The contributions to the effective dose equivalent to

[4] Heat causes plume buoyancy, which promotes dispersion. Two hundred thousand calories/second is a conservative estimate of heat released during combustion of the waste materials.

Table 4.1-6. Downwind Concentrations of Toxic Compounds from Drum Fire

Compound	Emission Rate (g/sec)	TLV/10 (mg/m^3)	Concentrations (mg/m^3) at Downwind Distances (m)								
			25m	50m	69m[a]	100m	108m[b]	150m	200m	500m	1000m
Methylene chloride	8.33	17.5	0.1	2.0	2.4	2.0	2.0	1.7	1.4	0.7	0.4
Acetone	12.42	178	0.2	2.9	3.6	3.1	2.9	2.5	2.1	1.1	0.6
1, 1, 2 Trichloroethane	2.18	4.5	<0.1	0.5	0.6	0.5	0.5	0.4	0.4	0.2	0.1
Tetrahydrofuran	7.79	59	0.1	1.8	2.2	1.9	1.8	1.6	1.3	0.7	0.4
Acetonitrile	7.79	7.0	0.1	1.8	2.2	1.9	1.8	1.6	1.3	0.7	0.4

[a] Maximum concentrations occur 69 m downwind.

[b] Distance to nearest property line is approximately 108 m.

the maximally exposed individual by ^{3}H, ^{238}Pu, and ^{230}TH were approximately 10, 74, and 16%, respectively. Contributions by inhalation and ingestion pathways were 73 and 22%, respectively.

Even with the conservative assumptions about meteorology during the accidental fire, the calculated dose is very small, far below the EPA Protective Action Guides (PAGs). No measurable somatic or genetic effects for the downwind population (employees or the general public) are anticipated.

4.1.5.3 Co-Location Considerations

The glass melter and associated equipment are located in an annex to the WD building in the northwest portion of the Mound facility. This location is approximately 108 m from the nearest property line. Predominant winds from the south and west put the majority of the Mound facility downwind of the glass melter (Figure 2.1-1).

The location of the glass melter in close proximity to other buildings initiated a review to determine whether the maximum credible accident (a drum fire on the loading dock) could adversely impact the health or safety of personnel, cause significant property damage, cause a loss of production capability, or initiate an accident at another building.

Physical damages that could be experienced from the maximum credible accident include fire damages, principally to the exterior of the glass melter, WD building, and shower/change facility. Fire ratings of the exterior walls preclude damage to the functional areas of these buildings, and fire loading at the loading dock is within limits established under OSHA (29 CFR Part 1910.106).

Fires such as that postulated as the maximum credible accident are known to produce missiles. The unpredictable nature of drum fires precludes quantifiable risk calculations. Fire-incident command training provided by Professional Loss Control, Inc., of Oak Ridge, Tennessee, instructs responders to drum fires to withdraw all personnel within a 1,000-ft radius (304.8 m) and observe conditions prior to initiating fire fighting efforts.

Information obtained from Tennessee Emergency Management Agency (TEMA) personnel regarding actual drum fires indicates projectiles are not known to travel in excess of 100 m. If an additional 50 m is added to the predicted maximum travel distance of missiles to account for the facilities to the south being downgrade, structures within a 150-m radius of the glass melter loading docks could be within range of the missiles. The glass melter building and WD building provide an intervening barrier which would prevent solvent drums from reaching structures to the north and east; however, buildings 19, 24, 27, 42, 43, 52, 64, and 67, as shown in Figure 2.1-1, fall within the 150-m radius.

Building	No.
Storage warehouse	19
Water treatment building	24
Explosives processing building	27
Pyrotechnic Component Fabrication Facility	42
Explosives preparation building	43
Magazines	52, 64
Office	67

These buildings are considered vulnerable because of a lack of missile protection in the roofs. Missiles from a maximum credible fire might also serve as an initiator of an accident at these facilities.

Emergency procedures for the various facilities at Mound allow for safe shut-down of operations in the event of an emergency.

4.1.6 Conservation

The primary energy source for the glass melter is electricity. Electricity is used (resistance heating) to maintain the glass in a molten state. The initial melt (startup) is accomplished by means of a propane burner. There are additional energy requirements associated with normal operation (air conditioning, lighting, etc.) and maintenance of the glass melter building. The annual propane requirements will be approximately 440 m (15,527 ft^3), assuming three 3-day startup cycles each year. Approximately 310,500 kW of electricity will be required to operate the glass melter, assuming one 2,000-h operational cycle per year. Waste preparation and incidental building operation (air conditioning, hot water, etc.) energy requirements were not determined.

Operational byproducts (wastes) will be placed in steel containers and shipped to a disposal site. This will result in consumption of fuel and lubricants by the truck(s). There are no estimates of consumptive water use. However, some water may be lost if system sludges are immobilized in concrete (an operational option).

The proposed action will result in an irreversible and irretrievable commitment of electricity, propane, fuel (transportation), steel, glass, water, and concrete. The quantities involved represent a negligible loss of these resources.

4.1.7 Solid Waste

The Resource Conservation and Recovery Act (RCRA) of 1976 (Pub. L. 94-580) and the Hazardous and Solid Waste Amendments of 1984 (Pub. L. 98-616) set forth basic objectives to protect human health and the environment and conserve valuable material and energy resources. The core of RCRA is the hazardous waste program mandated by Subtitle C (Sections 3001 through 3013); the intent is a "cradle-to-grave" regulatory control program for hazardous wastes.

RCRA requires every owner or operator of a treatment, storage, or disposal (T/S/D) facility to obtain a permit. The Mound facility is currently operating on a RCRA Interim Status Permit while the RCRA Part B Permit Application undergoes review and revision. The glass melter was operated in an experimental test mode in 1985 under RCRA Interim Status and was put in cold shutdown mode once the testing had been completed.

Although classified as a thermal treatment unit, the glass melter will be required to meet the performance standards in 40 CFR Part 264, "Standards for Owners and Operations of Hazardous Waste Treatment, Storage, and Disposal Facilities," specifically, standards for incineration of hazardous waste. No major problems are anticipated since the melter met incineration regulatory requirements during a set of test burns.

Current and future steps to permitting the glass melter for routine operation include: 1) approval of a Part B permit application by the State of Ohio; 2) approval of a Trial Burn Plan which defines conditions under which the unit will be operated, and details the methodology to be used to demonstrate that the unit can meet hazardous waste incinerator standards; 3) conduct of a Trial Burn, under conditions established in the Trail Burn plan; 4) securing of the Part B permit, which allows operation of the unit under strictly controlled conditions.

4.1.8 Ecological Resources

Endangered Species Act. The Endangered Species Act of 1973, as amended, requires each federal agency to ensure that any action it authorizes, funds, or performs does not jeopardize the continued existence of endangered or threatened species, and does not result in the destruction or adverse modification of their critical habitat. Section 7 of the act specifies procedures to be followed in the consultation process. These steps are outlined in the *Environmental Guidance Program Book* (DOE, 1988).

To date the U.S. Fish and Wildlife Service (FWS), Reynoldsburg Field Office, has been contacted and a letter received (Appendix A) identifying the Indiana bat (*Myotis sodalis*) as the only federally listed endangered species which may be found in the Miamisburg, Montgomery County, Ohio, vicinity. The proposed action is not anticipated to adversely affect this species; there are no known critical habitats of this species near the Mound site. DOE is in compliance with the provisions of the Endangered Species Act regarding this proposed action.

Floodplain Management Executive Order. Executive Order 11988, Floodplain Management, requires each federal agency to take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. Specifically, the order requires each agency to determine whether the proposed action will occur in a floodplain and, if it does, to consider alternatives to avoid adverse effects and incompatible development.

The proposed use of the glass melter as described in this EA involves no property located in a floodplain. The 100-year flood level is at an elevation of 701 feet above sea level. The 500-year flood plain is at an elevation of 704 feet above sea level (McCann, 1988). Most of the Mound site is above 800 feet, with elevations in the developed area ranging from 710 to 870 feet (Mound, 1987). One small area in the southwestern corner of the property is located within the 100-year floodplain; however, in cognizance of Executive Order 11988, no structures are scheduled for construction here (Mound, 1987). The proposed action will not involve use of this property.

The Federal Emergency Management Agency (FEMA) flood insurance rate map (FIRM) for the city of Miamisburg, Ohio, was used in determining the 100-year floodplain boundaries and the DOE study referred to above was used in determining the 500-year floodplain.

<u>Protection of Wetlands Executive Order.</u> Executive Order 11990, Protection of Wetlands, requires each federal agency to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Specifically, each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

The only wetland of any appreciable size is the Great Miami River, which is at least 1/2 mile from the glass melter. Since the proposed action involves no new construction in wetlands, DOE is fully compliant with Executive Order 11990.

4.1.9 Transportation

At least six laws impact the transportation of hazardous wastes and substances: RCRA, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Superfund Amendments and Reauthorization Act (SARA), SARA Title III, Occupational Safety and Health (OSH) Act and the Hazardous Materials Transportation Act (HMTA) (SAIC, 1988).

The preparation of hazardous materials and their transport from the glass melter to an off-site disposal area will involve the hazardous materials transportation regulations promulgated under HMTA (Pub. L. 93-633) as well as RCRA (for RCRA wastes). It is assumed that CERCLA, SARA, and SARA Title III will not be involved. The OSH Act prohibits OSHA from exercising regulatory authority over working conditions of employees where another federal agency has already exercised its regulatory authority. However, DOE and DOE contractors are subject to OSHA's Hazard Communication Standard (29

CFR Part 1910.1200) by virtue of DOE Order 5480.4, which adopts 29 CFR Part 1910 as mandatory as a matter of policy (SAIC, 1988).

The key to compliance in this complex regulatory environment is properly identifying exactly what wastes are involved. These compliance issues can be adequately addressed when the exact engineering options for waste stream generation are selected. It is assumed that compliance issues will be a composite of those faced in shipments of radioactive and hazardous waste currently taking place at the facility.

4.1.10 Archaeological and Historical Resources

National Historic Preservation Act. The National Historic Preservation Act of 1966, Section 106, specifies that federal agencies must evaluate the effect of any federal, federally assisted, or federally licensed undertaking on historic resources. Federal agencies are required to afford the Advisory Council on Historic Preservation an opportunity to review and comment on the effects of proposed actions on historic resources (DOE, 1988). Specifically, DOE must request a list of resources potentially affected by the proposed project from the State Historic Preservation Office (SHPO) and, depending on the status of known resources, proceed in accordance with basic compliance steps spelled out in the DOE *Environmental Guidance Program Book*, (DOE, 1988).

Information received from the Ohio Historic Preservation Office, indicates that there will be no impacts on historical resources or archaeological remains resulting from normal operation or maximum credible accident conditions. (See letter from the Ohio Historical Society in Appendix A)

4.2 EVALUATION OF ALTERNATIVES

This section provides a qualitative evaluation of the ramifications for each of the alternatives to the proposed action.

4.2.1 No-Action Alternative

Under the no-action alternative, existing waste disposal practices at Mound would continue. Selection of this alternative would entail the continued shipment of 143 m^3 of hazardous wastes and the on-site storage of current inventory and eight drums of newly generated mixed waste per year. The environmental effects associated with the transportation of the hazardous wastes would remain unchanged from those currently experienced. Since existing authorized storage capacity has been exhausted, additional storage capacity is required. Therefore, construction-related impacts are entailed under the no-action alternative. The major impact will be the disturbance of approximately 23 m^2 (247 ft^2) of land associated with the storage building, plus an equivalent area associated with construction laydown. Minor, short-term impacts include changes in air quality due to the operation of machinery and equipment and to land-disturbance activities. Increased runoff may also have minor, short-term impacts on water quality. The only direct source of impact from this alternative is the possible effects on archaeological resources during land-disturbance activities. The magnitude of these effects cannot be evaluated until a specific site is selected for the storage facility. The Mound site has known archaeological resources; and, while much of the site has been previously disturbed, selection of this alternative will require that this issue be evaluated in detail.

4.2.2 On-Site Alternative

Adoption of new administrative actions that reduce wastes produced at Mound would have minor positive effects on the environment. Such actions have, in fact, been adopted by EG&G at Mound Plant (EG&G, 1992) as part of a waste minimization program. While these actions will significantly reduce the amount of mixed waste generated at Mound Plant, they will not totally eliminate the generation of such wastes, and will have no impact on backlog wastes. As a result, it is expected that additional mixed-waste treatment and disposal capabilities will continue to be required.

4.2.3 Off-Site Alternatives

Impacts associated with each off-site alternative would arise primarily from transportation, and treatment or disposal activities at the off-site location. Each facility considered for off-site treatment or disposal presently exists, but the precise physical and regulation capabilities of the facilities to accept Mound waste vary and in all cases are not completely known. Analysis of impacts associated with disposal at these facilities should be subsumed within the independent and site-specific environmental compliance requirements for those facilities. No site-specific analyses of these facilities are presented in this section.

Transportation associated with the off-site alternatives could potentially affect traffic load, air quality (through engine exhaust), and socioeconomics (through labor requirements). These sources of impact are considered trivial, given the relatively few (4) shipments per year. Table 4.2-1 summarizes the requirements for off-site treatment or disposal, and Table 4.2-2 summarizes the transportation requirements for the proposed action. These requirements are even lower than those for the off-site alternatives. In either case, the associated impacts are independent of the type of waste transported. Since the distances involved for any of the off-site options are similar (refer to Table 4.2-1), the resulting impacts are dependent only on the number of trips involved. Since fewer trips are involved in the proposed action, fewer impacts would be expected.

Off-site treatment or disposal is currently being used for hazardous and other nonradioactive waste. No off-site options are available at the present time for radioactive mixed wastes.

Table 4.2-1. Transportation Requirements* for Off-Site Alternatives

Alternative Facility or Company	Location	Waste(s) Accepted	Trip Distance km (Approximate)	Maximum Number of Shipments Annually	Annual Total km
GSX	Various	Hazardous	1,100 avg. (684 miles)	3	3,300 (2,050 miles)
Quadrex	Florida	Scintillation fluids and ignitable hazardous	1,450 (900 miles)	3	4,350 (2,703 miles)
INEL	Idaho	LSA radioactive and hazardous	2,970 (1,846 miles)	3	8,910 (5,536 miles)
Los Alamos	New Mexico	Low-level radioactive (current priority)	2,500 (1,554 miles)	1	2,500 (1,554 miles)

*Note: Annual disposal of approximately 39,000 kg of waste requires 4 shipments to an appropriate combination of the above options.

Table 4.2-2. Transportation Requirements* for Proposed Action

Assumed Disposal Site	Waste Involved	Trip Distance in km (Approximate)	Maximum Number of Shipments	Annual Total km
Southeast	LSA radioactive	1,350 (839 miles)	3	4,050 (2,517 miles)
Southwest	LSA radioactive	2,750 (1,709 miles)	3	8,250 (5,126 miles)
Northwest	LSA radioactive	2,900 (1,802 miles)	3	8,700 (5,406 miles)

*Note: Annual disposal of approximately 30 LSA Boxes (4 ft x 4 ft x 8 ft) to an appropriate combination of the above options, for a total of 3 shipments to the same combinations of sites.

REFERENCES

29 CFR (Code of Federal Regulations) Part 1910.1200.

40 CFR (Code of Federal Regulations) Part 61.

40 CFR (Code of Federal Regulations) Part 264.

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SAIC (Science Applications International Corporation). 1988. Transportation of Hazardous Wastes and Substances Training Manual. Prepared for U.S. Department of Energy, Transportation Management Division.