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R E Broz

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7. Abstract

This document establishes the technical basis in support of Emergency Planning Activities for B Plant on the Hanford Site. The document represents an acceptable interpretation of the implementing guidance document for DOE Order 5500.3A. Through this document, the technical basis for the development of facility specific Emergency Action Levels and the Emergency Planning Zone is demonstrated.

9. Impact Level 3S

10. RELEASE STAMP

B PLANT/WESF HAZARDS ASSESSMENT

R. E. Broz

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2.1 Facility Mission

B Plant was one of the original World War II era chemical separation plants. It operated with this mission until 1952 when it went into standby after newer plants came on line. B Plant remained idle until 1968 when it was modified to separate the long-lived radionuclides strontium and cesium from liquid radioactive waste. A new facility, WESF, was built adjacent to the B Plant to complete the process. B Plant separated strontium and cesium from the liquid waste and delivered a liquid solution containing these isotopes to WESF. WESF converted the liquid to stable solid forms (strontium fluoride and cesium chloride) and then encapsulated the solid material. The WESF facility contains a water pool that is used to store the capsules. Cesium recovery was completed in 1983. Strontium recovery was completed in 1985. A total of 1575 cesium capsules and 625 strontium capsules were produced.

No additional liquid waste separation and processing is planned for either facility. WESF will continue to store the capsules until an alternative is developed. The long range plan for the majority of the 200 Area buildings is to decontaminate, demolish to ground level, and cap over the facilities.

2.2 Location

The B Plant/WESF complex is located in the northwest quadrant of the 200 East Area of the DOE Hanford Site. The Hanford Site is located in southcentral Washington State (Figure 2.1). The 200 East Area is located in the geographic center of the Hanford Site (Figure 2.2). The nearest site boundary is 16.7 kilometers (km) (10.3 miles) east. The Columbia River is 11.3 km to the north, and Highway 240 is 8 km to the south.

2.3 Facility Description

The B Plant complex consists of over thirty buildings which are described in detail in section 5 of the B Plant and WESF SARs. Figure 2.3 shows the B Plant/WESF location in the 200 East Area. The main facilities include the 271-B Services Building, the 221-B Canyon Building, and the WESF Facility (225-B). These buildings are briefly described below.

2.3.1 271-B Services Building

The 271-B Building has a basement and three floors and is attached to the north-center gallery side of the Canyon Building (221-B). 271-B is a reinforced concrete and cement block structure 48.8 meters (m) long, 14.6 m wide, and 18.3 m high.

The basement contains the building maintenance and instrument shops, process air compressor room, filters for the building ventilation air supply, and electrical distribution panels.

Figure 2.1 Location of the Hanford Site in Washington State

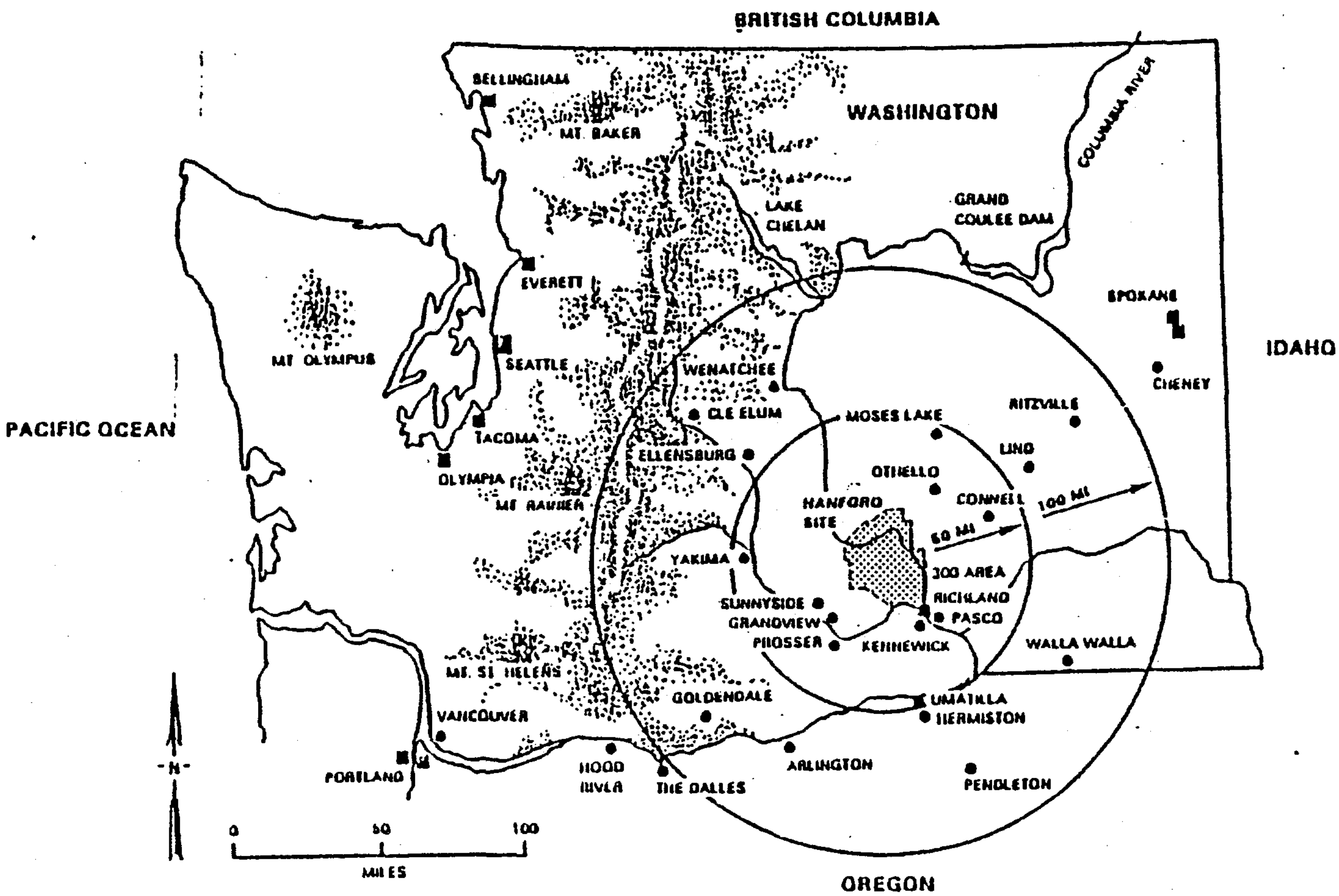


Figure 2.2 Location of the 200 East Area on the Hanford Site

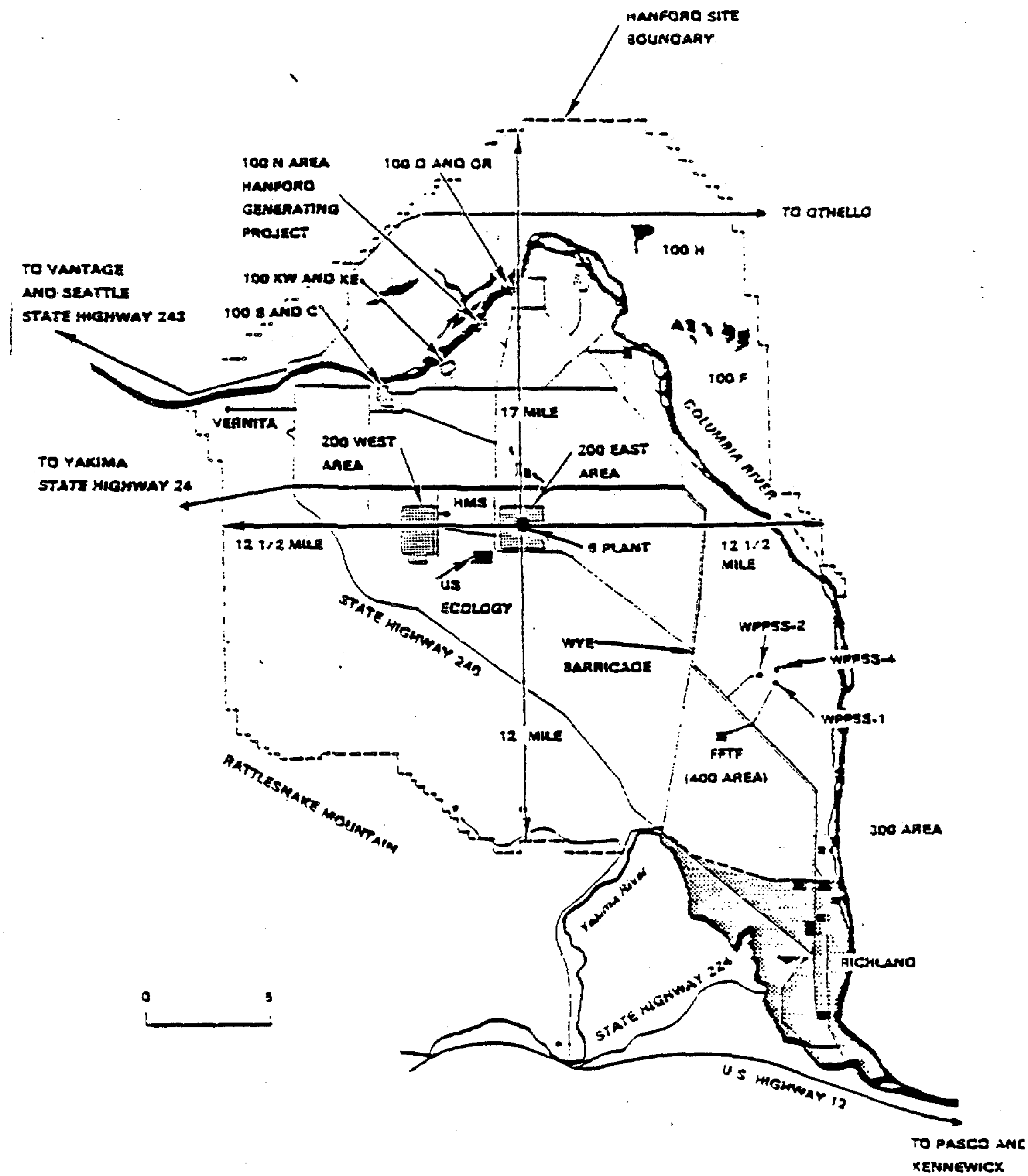
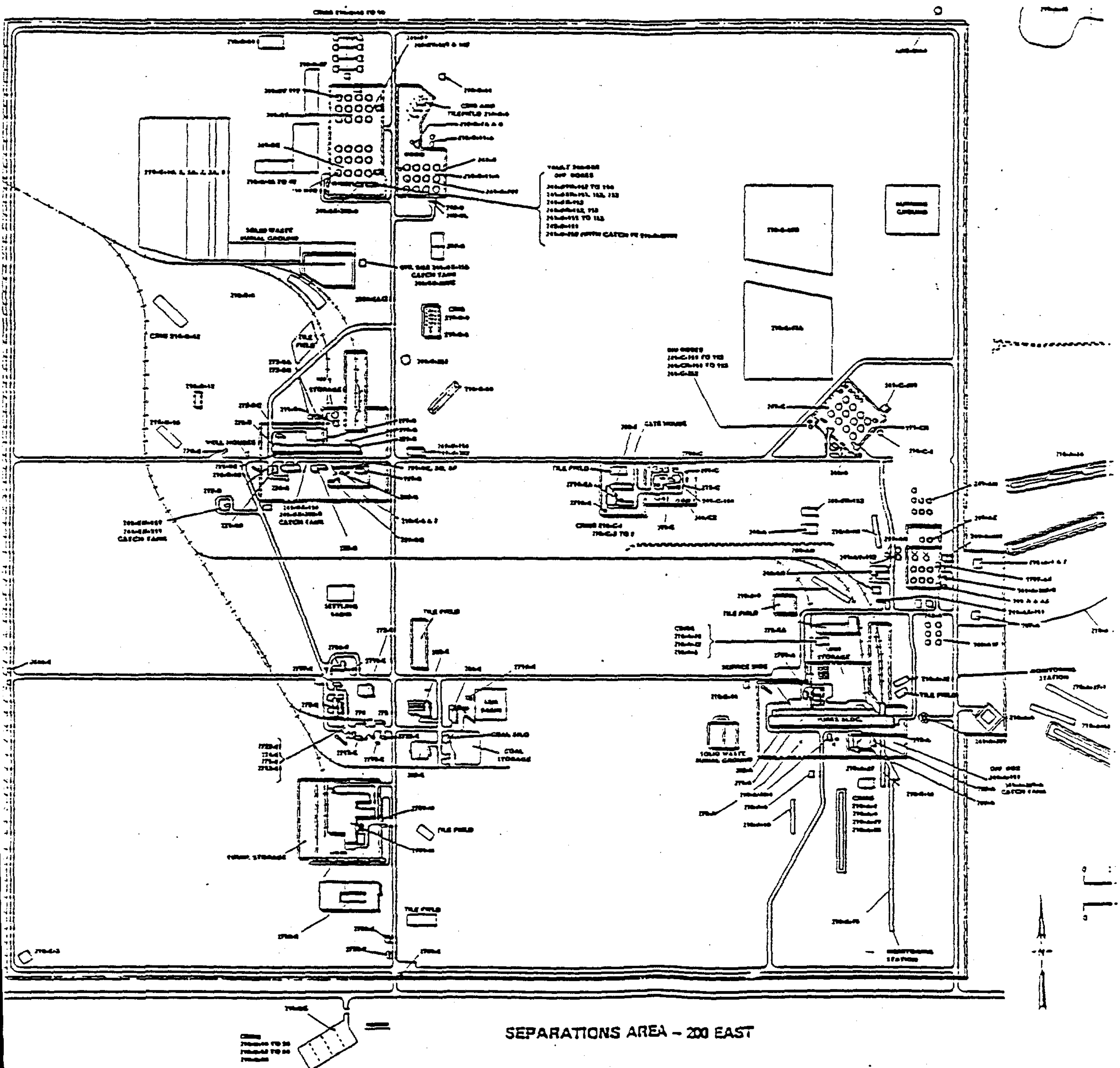


Figure 2.3 B Plant/WESF Location in the 200 East Area



The first floor provides space for offices, a locker room, and restrooms. The second floor contains administrative and supervisory offices and the lunch room. The third floor contains the bulk of the chemical make up head tanks, space for dry chemical storage, and the portable breathing air compressor.

2.3.2 221-B Canyon Building

The Canyon Building is a reinforced concrete structure that is 246.9 m long. The building is divided into twenty sections with transverse section joints at approximately 12.2 m intervals.

The canyon is comprised of cells, hot pipe trench, air tunnel, the crane cab gallery, the service area, and the operating, pipe, and electrical galleries. The cells provide segregation of the highly contaminated process vessels and equipment, and provide controlled access and storage space for waste and spare parts. There are forty cells, two cells per section, arranged in a single row running the length of the building.

2.3.3 225 B WESF Facility

The 225-B Building is a two story structure 47.8 m long by 29.6 m wide by 12.2 m high which joins the west end of B Plant. The floor plan is partitioned into several areas according to the functional requirements of each area. The process hot cell area contains seven hot cells that were used for chemical processing and encapsulation. The storage pool area provides storage space for the capsules. It includes 11 water basins, 10 of which are 1.4 m wide by 6.6 m long by 4.6 m deep, and one is 2.7 m by 6.6 m by 4.6 m. A narrow transfer aisle connects each of the storage basins. The basins are lined with Type 304L stainless steel.

Four separate HVAC supply systems and five separate exhaust systems are provided for the 225-B Building. The K-3 system which provides ventilation for the contaminated process cells is the most contaminated. Large amounts of both cesium and strontium have been found in the exhaust duct.

3.0 IDENTIFICATION AND SCREENING OF HAZARDS

The Emergency Management Guide on Hazards Assessment indicates that 40 CFR 355 Appendix A and 10 CFR 30.72 Schedule C provide screening quantities or thresholds that should be used to eliminate the need to analyze insignificant hazards. The screening quantity is called a Threshold Planning Quantity (TPQ). These lists are not entirely inclusive. Other hazardous materials may exist in sufficient quantity which when released to the environment may pose public health hazards to Hanford workers and the general public.

The hazardous radioactive material in the B Plant complex consists mainly of the cesium and strontium capsules, residual contamination, sludge and contamination in process vessels, and equipment and liquids in process tanks. Table 3.1 below from the facility Hazards Classification document (Semmens and Covey, 1993) summarizes the radionuclide inventory. The B Plant/WESF inventory exceeds the screening values specified in 10 CFR 30.72 Schedule C (1.11 E14 bequerels (Bq) (3,000 Ci) of ^{137}Cs and 3.33 E12 Bq of ^{90}Sr). Therefore, emergency planning is required for these facilities.

Large amounts of chemicals were used when B Plant and WESF were in operation. The chemicals were brought in by tank truck or rail car and stored primarily in the 211-B Tank farm. For example, there were three 30,282 liters (l) (8,000 gallon) tanks for nitric acid (currently empty) and a 10886 kilogram (kg) (24-ton) tank for carbon dioxide (the tank has been removed). The facilities are in the process of disposing of unneeded chemicals and many of them are already gone. Table 3.2 below shows the remaining inventory as of August 1994 with a comparison to 40 CFR 355 Appendix A.

Table 3.1 Radionuclide Inventory

Radionuclide		Activity
HEPA Filters	- ^{90}Sr	6.66 E15 Bq
	- ^{137}Cs	2.04 E16 Bq
Process Tanks	- ^{90}Sr	2.22 E14 Bq
	- ^{137}Cs	3.89 E15 Bq
Organic Tanks	- ^{90}Sr	2.26 E15 Bq
	- ^{137}Cs	3.26 E15 Bq
Miscellaneous	- ^{90}Sr	2.78 E16 Bq
	- ^{137}Cs	9.25 E15 Bq
WESF Capsules	- ^{90}Sr	9.25 E14 Bq/capsule
	- ^{137}Cs	1.55 E15 Bq/capsule
Totals		
B Plant	^{90}Sr	3.7 E16 Bq
	^{137}Cs	3.77 E16 Bq
WESF	^{90}Sr	9.25 E17 Bq
	^{137}Cs	1.55 E18 Bq

Table 3.2 Chemical Inventory

Hazardous Constituent	Maximum Quantity	TPQ
211-B Tank Farms		
Sodium Hydroxide (50 wt%)	54031 l	
Nitric Acid (57%)	208 l	453.6 kgs
211-BA Neutralization Facility		
Sulfuric Acid	1136 l (1905 kgs)	453.6 kgs
Sodium Hydroxide	757 l	
271-B Aqueous Make-up Area		
Sodium Nitrite	226.8 kgs	

Sodium Hydroxide is not considered a spill hazard due to the low vapor pressure. A spray pipe leak scenario is included below to characterize the hazard from this large inventory. At one time, there was a substantial inventory of nitric acid and it may be used in the future as part of the cleanout process. However, the nitric acid storage tanks are currently empty. Sulfuric acid is the only chemical in Table 3.2 above the threshold planning quantity. A release scenario is included below to characterize this hazard.

It is estimated that ~30282 l of organic liquids remain in B-Plant. These organics are not listed as extremely hazardous chemicals but are flammable and are therefore a concern to the ignition, HEPA filter plugging and pressure loss and ultimate release of radioactivity.

4.0 HAZARD CHARACTERIZATION

The screening process described above identified one chemical (sulfuric acid) and an extensive radionuclide inventory in both B Plant and WESF that exceed screening thresholds. In addition, there is a large inventory of sodium hydroxide. The radionuclide inventory consists primarily of the WESF capsules and large amounts of contamination in both facilities. The filters in both plants are one potential source of concentrated activity. The sulfuric acid inventory, sodium hydroxide inventory, WESF capsules and plant filters are briefly described below to characterize potential sources for hazardous material releases.

4.1 Sulfuric Acid

4.1.1 Inventory

Sulfuric acid is stored in a tank in the 211-BA building. The current inventory (8/94) is approximately 1136 l.

4.1.2 Properties

Sulfuric acid is a colorless, odorless, oily liquid. It is a very powerful, acidic oxidizer. When heated, it emits highly toxic fumes. However, at room temperature, it evaporates slowly. Sulfuric acid mixed with water produces a large quantity of heat. Sensitivity to sulfuric acid vapors varies with individuals. Normally 0.125-0.5 ppm may be mildly annoying and 1.5-2.5 ppm can be definitely unpleasant. 10-20 ppm is unbearable. Inhalation of concentrated vapor or mists from hot acid can cause rapid loss of consciousness with serious damage to lung tissue. The physical properties and exposure limits are summarized in the tables below.

Table 4.1 Physical Properties of Concentrated Sulfuric Acid

Molecular Weight	=	98.08
Specific Gravity	=	1.83
Melting Point	=	10.5°C
Boiling Point	=	290°C
Vapor Pressure	=	1 mm Hg @ 148.8°C (1.0E-6 mm Hg @ 25°C)

Table 4.2 Exposure Limit for Sulfuric Acid

TWA	1.0 mg/m^3	0.24 ppm
STEL	3.0 mg/m^3	0.74 ppm
IDLH	80 mg/m^3	19.6 ppm
ERPG 1	2 mg/m^3	0.49 ppm
ERPG 2	10 mg/m^3	2.45 ppm
ERPG 3	30 mg/m^3	7.35 ppm

Sulfuric acid has a low vapor pressure and, therefore, does not evaporate rapidly from a spill. The main concerns are a pressurized mist release, a release with a fire, and reactions with other chemicals such as sodium hydroxide that generate toxic gases.

4.1.3 Conditions of Storage and Use

The sulfuric acid is stored in a double walled polypropylene tank in building 211-BA. An identical tank only a few meters away is used to store sodium hydroxide. These tanks are part of the chemical sewer neutralization system. Liquid enters the chemical sewer lines at various locations on the B

Plant site. The effluent collects into a pump pit and then is pumped into the 211-BA Neutralization Building.

The pH of the effluent is monitored and sulfuric acid or sodium hydroxide added automatically as needed to maintain the liquid in the proper pH range. The effluent is then discharged to the 207B pond. Normal operation of the neutralization system is fully automated.

Filling of the sodium hydroxide and sulfuric acid tanks is performed by removing the access plate on top of the tanks. Chemicals are manually pumped into the tank from drums using a drum pump.

4.2 Sodium Hydroxide

4.2.1 Inventory

Sodium hydroxide solution is a potentially hazardous material used in small quantities for treatment of liquid wastes. The current inventory (8/94) is approximately 54030 l. Most of the inventory is in the 211-B tank farm.

4.2.2 Properties

NaOH (caustic Soda) 50% solution is corrosive to the skin and an eye irritant. Effects of inhalation of mists vary from mild irritation of the nose at 2 mg/m^3 to severe inflammation of the respiratory tract. NaOH solution possesses negligible fire hazard when exposed to heat or flame.

Table 4.3 Physical Properties of Sodium Hydroxide Solution

Molecular Weight	=	40.00
Specific Gravity	=	1.5
Melting Point	=	5-11 °C
Boiling Point	=	140 °C
Vapor Pressure	=	13 mm Hg @ 60 °C

Table 4.4 Exposure Limits for Sodium Hydroxide

TWA	2.0 mg/m^3
IDLH	250 mg/m^3
ERPG 1	2 mg/m^3
ERPG 2	40 mg/m^3
ERPG 3	100 mg/m^3

Sodium hydroxide has a low vapor pressure even at higher temperatures and therefore, has a low evaporation rate. The main concerns are a pressurized mist release and reactions with other chemicals such as nitric acid which could generate toxic gases.

4.2.3 Conditions of Storage and Use

Sodium hydroxide was used in B Plant as part of the cesium and strontium separation process. It was received in railway tank cars as a 50% aqueous solution and stored in three 60565 l mild steel horizontal tanks, SQ-141, SQ-142, and SQ-143. A total of about 54030 l remain in these tanks. The concentration has been diluted below 50% by steam leaks. The only current use for sodium hydroxide is waste neutralization. A 757 l sodium hydroxide tank is located in the 211-BA building as part of the chemical sewer neutralization system. It is a double walled 757 l polypropylene tank. These tanks are part of the chemical sewer neutralization system that is described in section 4.1 above.

4.3 Cesium

4.3.1 Inventory and Physical Properties

Inventory of the cesium that is involved in the postulated accidents is shown in Table 3.1. Resuspension factors are different for the various scenarios and are included in the calculation to determine the effective dose equivalent (EDE). The resuspension factors are provided in the FSAR, Part 2, Accident Calculations. Cesium's critical organ is the whole body with the resultant dose factored into the EDE.

4.3.2 Conditions of Storage and Use

4.3.2.1 Cesium Capsules

Cesium and strontium capsules are currently stored in the WESF building water storage pools. The capsules are doubly encapsulated in closed-end stainless steel metal cylinders. The outer capsule container is approximately 6.7 centimeters in diameter and 52 centimeters long. Tables 4.5 and 4.6 below summarize the capsule dimensions and contents.

The WESF cesium capsules passed all Special Form tests and were qualified as Special Form in 1975. The tests verified that the capsules will retain their contents if subjected to the following conditions:

1. Free drop - A free drop through a distance of 9.1 m onto a flat essentially unyielding horizontal surface.

2. Percussion - Impact of the flat circular end of a 2.54 E-2 m diameter steel rod weighing 3 pounds, dropped through a distance of 1.0 m.

3. Heating - Heating in air to a temperature of 1475° F and remaining at that temperature for a period of 10 minutes.

4. Immersion - Immersion for 24 hours in water at room temperature.

The regulations were subsequently amended to require additional leak tests after each special form test and an increased temperature for the immersion test. The WESF cesium capsules were shown to meet these additional requirements although they were exempt from the additional requirements by a grandfather clause in the revised regulation.

A WESF cesium capsule failure was detected in June, 1988 at a commercial irradiation facility, Radiation Sterilizers Inc. (RSI), in Decatur, Georgia. A subsequent investigation concluded that all WESF cesium capsules met Special Form requirements when fabricated. However, a total of 12 cesium capsules in the field have failed the clunk test described below indicating degradation of the double encapsulation system. The contributing cause appears to be thermal cycling at the facility. Eleven of these were identified at the RSI facility and one from the Westerville, Ohio facility.

Clunk testing is a method to determine if the inner cesium capsule will slide inside the outer cesium capsule. If a cesium capsule passes this simple test, then the inner cesium capsule has not deformed to the outer cesium capsule inner diameter. All the cesium capsules that failed the clunk test, with the exception of one that was destructively examined, now reside in the 327 building large storage pool. All swollen capsules appear stable once removed from the thermal cycling environment.

Table 4.5 Physical Data and Curie Loading of a Cesium Chloride WESF Capsule

Capsule Property	Inner Capsule	Outer capsule
Material	316L Stainless Steel	316L Stainless Steel
Inner diameter, cm	5.024	5.977
Outer Diameter, cm	5.715	6.668
Total Length, cm	50.10	52.77
Cesium Chloride		
Quantity, kg	2.7	
CsCl chemical Purity, wt %	90 to 95	
^{137}Cs Isotopic content, %	30.2	
Density, g/cm^3	2.6	
Maximum Nominal Capsule Activity, Bq of ^{137}Cs	2.6E+15	
Maximum Thermal Power, W	333	
Melting Point,* °F (°C)	1195 (646)	

* Dependent on purity

4.3.2.2 WESF Exhaust Filters

Other than the capsules, the largest inventory of radioactive material in the WESF facility is the contamination in the K-3 exhaust system and filters. Exhaust air from the WESF canyon and cells is filtered through two stages of HEPA filters connected in series and located in the K-3 exhaust filter building. The filter exhaust is discharged via one of two centrifugal fans to the atmosphere via the stack.

The K-3 filter building is approximately 4.9 m wide by 11.3 m long by 3.4 m deep and is constructed from 0.3 m reinforced concrete. The top of the building is at grade elevation. The building is partitioned into 5 sections by reinforced concrete dividers. Each section is equipped with cover blocks for remotely replacing the filters. The exhaust fans are located on a concrete pad at the south end of the building and connected to the last filter section via a 0.6 m diameter duct.

4.4 Strontium

4.4.1 Inventory and Physical Properties

Inventory of the strontium and yttrium that is involved in the postulated accidents is shown in Table 3.1. Resuspension factors are different for the various scenarios and are included in the calculation to determine the EDE. The resuspension factors are provided in the FSAR, Part 2, Accident Calculations. Strontium's critical organ is the bone surface and the resultant dose factored into the EDE.

At least six engineering studies have been conducted to estimate the B-Plant filter loading. The most recent estimates (Marusich, 1993) are as follows:

Table 4.6 B Plant Filter Loading (Bq)

	Minimum		Maximum	
Filter	^{90}Strontium	^{137}Cesium	^{90}Strontium	^{137}Cesium
A	1.8E+13	7.6E+13	4.4E+14	6.7E+14
B	2.2E+13	9.6E+13	1.1E+15	1.6E+15
C	0	4.3E+14	5.9E+14	1.7E+15
D	1.3E+15	1.2E+16	1.85E+15	2.0E+16

The large range emphasizes the uncertainty involved with the many assumptions necessary to make the estimates.

4.4.2 Conditions of Storage and Use

4.4.2.1 WESF Capsules

Strontium capsule physical properties are shown in Table 4.6 below and are described above in section 4.3.2. The capsules are stored in water pools inside the 225-B building. The capsule pool cells are 1.35 m wide by 6.63 m long by 5.49 m deep and are lined with 304 stainless steel. Each of these pools contain three stainless steel capsule racks and can hold up to 663 capsules. The pool cells are filled with demineralized water for radiation shielding and heat removal purposes. A water depth of at least 3.29 meters is required to provide adequate shielding. Approximately 4 meters of water depth is maintained during normal operation. There is a heat exchange system to maintain pool temperature and an ion exchange system to maintain water purity.

The capsule return program will involve unloading the shipping cask and inspecting the capsule in F or G hot cell. The capsule will then be repaired, if necessary, in the hot cell before transfer to the storage pool. Capsules are transferred individually to the capsule storage area via a capsule chute between G-cell and the transfer aisle. The capsule chute is equipped with a trolley device for lowering the capsules into the transfer aisle.

Table 4.7 Physical Data and Curie Loading of a Strontium Fluoride WESF Capsule

Capsule Property	Inner Capsule	Outer capsule
Material	Hastelloy C-276	316L Stainless Steel
Inner diameter, cm	5.11	6.07
Outer Diameter, cm	5.72	6.68
Total Length, cm	48.4	51.1
Strontium Fluoride		
Quantity, kg		2.8
Chemical Purity, wt %		95
^{90}Sr Isotopic content, %		55
Density, g/cm^3		2.9
Maximum Nominal Capsule Activity, Bq of ^{90}Sr		5.1E+15
Maximum Thermal Power, W		850
Melting Point,* °F (°C)		1560 to 2010 (850 to 1100)

* Dependent on purity

4.4.2.2 B Plant Exhaust Filters

Ventilation air from the 221-B canyon, vessel vent 1 and 212-B is exhausted through filters before being discharged to the atmosphere. There are five existing high efficiency particulate air filter cells and a sand filter. These filters are located underground and are not replaceable. The sand filter, which was built in 1948 to serve the plant when it was operated as a plutonium separation plant, is on emergency standby and the air flow is capable of being automatically diverted to it in the event of a fire in a process cell. When the plant was converted to high-level waste fractionization in 1964, the increased exhaust ventilation air requirements exceeded the capacity of the sand filter. As a part of the plant conversion, two new filter cells, each having the capability of handling the increased air flow, were constructed in parallel with the sand filter. Three more filter cells were added later. The A, B and C filters have reached end-of-life and have been removed from service. The fourth (D) HEPA filter cell completed in December 1975 is currently on line.

The out-of-service filters are isolated from the exhaust stream by water seals. The B and C filters are the only filters with inlet seals, but every filter has an outlet seal. The water for filling the inlet and outlet seals is supplied to concrete valve pits. In each pit there is a valve on the water supply line and a valve to the respective seal fill line. A rubber hose line with quick disconnect fittings is provided for connecting the supply to the fill line, and is always disconnected when not in use to prevent inadvertent addition to the wrong seal or potential flooding through a leaking valve.

5.0 EVENT SCENARIOS

The B Plant and WESF SARs identified various scenarios that could breach the barriers that maintain control over each of the hazardous materials discussed in the previous sections. However, many of these scenarios are no longer appropriate since the facilities are not operating to fractionalize waste and produce capsules. Many of the potential accidents have been eliminated by disposing of hazardous chemicals and transferring radiological inventory to Tank Farms. The paragraphs below describe scenarios that are still appropriate for the facilities.

A goal of the DOE emergency preparedness system is to quickly classify the severity of an accident. Preplanned actions are then implemented for each emergency class. The emergency classification is based, in part, on projected dose and concentration values at the facility and Hanford Site boundaries for preanalyzed accident scenarios.

5.1 Non-Radiological Hazardous Material Releases

5.1.1 Sulfuric Acid Pressurized Spray

5.1.1.1 Failure of Primary Barrier

The scenario is that a hole is formed in the dispersion leg of the transfer jet from the sulfuric acid storage tank, and a fraction of the sulfuric acid inventory is aerosolized into the atmosphere. The aerosol release rate is estimated to be a maximum of 0.11 l per minute. The sulfuric acid release rate from the building will be less than this value since the acid is diluted with water in the transfer jet and part of the spray will be deposited within the building. The sulfuric acid release rate from the building is estimated to be 1% of the aerosol flow through the postulated hole or 3.2 mg/s. The primary barrier which fails in this scenario is the piping containment.

5.1.1.2 Effects of Other Barriers

Administrative controls (procedures) are an important secondary barrier.

5.1.2 Pressurized Pipe NaOH Leak/Spray

5.1.2.1 Failure of Primary Barrier

This scenario is from the 211-B Chemical Tank Farm PSAR (SD-W010H-PSAR-001). A leak is postulated in a pipeline fitting, valve, or pump in the 211-B chemical tank farm during transfer of NaOH. The PSAR estimates a source term of 23.6 mg/s from the equivalent of a 0.16 cm. diameter hole. This hole size results in the generation of the largest amount of respirable aerosols. The primary barrier is the piping which fails in this scenario.

5.1.2.2 Effects of Other Barriers

Administrative controls (procedures) are an important secondary barrier.

5.2 Radiological Release Events

This section briefly describes several scenarios from the SARs and other safety documents that are applicable to the current status of the facilities. The projected consequences from these events are used to establish the size of the emergency planning zone and to provide guidance for establishing Emergency Action Levels (EALs).

5.2.1 B Plant Filter Release

5.2.1.1 Failure of Primary Barrier

This scenario is taken from a recent study (Marusich, 1993) of the B-Plant exhaust filter outlet seals. The results reported in the document have been updated for the latest estimate of the filter inventory and the bounding release fraction.

This scenario postulates that the water seals for A, B and C filters are lost by evaporation or some other mechanism but the exhaust flow continues releasing a portion of the filter's contents out the stack. The seals are the primary barriers. The bounding release fraction of 0.12% (Marusich, 1993) is assumed.

5.2.1.2 Effects of Other Barriers

Administrative controls which assure that the water seals are maintained are considered the secondary barrier.

5.2.2 B Plant Filter Release From Organics Fire

5.2.2.1 Failure of Primary Barrier

This scenario is taken from SD-WM-SAR-013. The results reported in the SAR state that the HEPA filters (primary barrier) if hit with burning debris causing material on the glass filters to decompose, will release a fraction of the radioactive material that is on the HEPA filters. The scenario assumes a release of 1.3 E+12 Bq of ^{90}Sr, ^{90}Y, and 1.3 E+12 Bq of ^{137}Cs.

5.2.2.2 Effects of Other Barriers

A 18.9 l/min fire foam system will extinquish the flame, the HEPA filters are protected by metal fire screens, and the ventilation system is protected by a ventilation diversion system in case of fire.

5.2.3 WESF K-3 Filter Drop

5.2.3.1 Failure of Primary Barrier

This scenario is taken from the WESF SAR. The scenario postulates that a release of duct contamination occurred that loaded the filter to twenty times the normal replacement level or 5.9E+14 Bq total (90% Sr,Y, 10% Cs). The K-3 filter is raised with a crane during the replacement operation. The scenario postulates that the filter is dropped during replacement and 0.1 percent of the radionuclide inventory is released in a respirable form.

5.2.3.2 Effects of Other Barriers

Administrative controls (procedures) are an important secondary barrier.

5.2.4 WESF Hydrogen Induced Explosion in Pool Cell

5.2.4.1 Failure of Primary Barrier

This scenario is taken from the WESF SAR. The scenario postulates that a buildup of H_2 gas occurs because the ventilation in the vapor space was completely shut off. It is calculated to take 38 minutes or longer to pressurized the vapor space and a spark ignites the gas. The K-1 filters are the primary barrier and they will not be breached in this accident. Because the primary barrier is not impacted this scenario will not be discussed further.

5.2.5 B-Plant Ion Exchange Column, Nitric Acid Reaction

5.2.5.1 Failure of Primary Barrier

This scenario is taken from the B-Plant SAR. The scenario postulates that nitric acid is misrouted to the ion exchange column with the evolution of heat and gasses. The gas concentration is reduced by the K-1 filters which are the primary barrier and are not breached in this accident. Because the primary barrier is not impacted this scenario will not be discussed further.

5.3 Natural Emergencies

Seismic events, high winds/tornados, floods, ash/snow roof loading, and range fires are natural phenomena with potential emergency consequences. Guidance for classifying these events is provided below based on the scenario results above and the general Hanford policy on events of this type.

5.3.1 Earthquake

The filter release from the stack (section 5.2.1) is used to create an inventory which could be released as a result of the earthquake. The 291-B stack is likely to fail because of an earthquake and falls on the 291-B HEPA filters which mechanically releases the inventory at ground level.

5.3.2 High Winds/Tornado

Some damage is expected if high winds or a tornado strike the B Plant/WESF complex, but the offsite impact is not expected to be significant. The survivability varies with building. For example, a tornado may topple the B plant stack but cause little damage to the WESF ventilation system. The buildings have experienced two wind storms in recent years with gust to 3.6E+1 m/second (1972) and 3.4E+1 m/second (1990) with no damage. A graded precautionary approach is recommended for high winds at the B Plant/WESF complex.

5.3.3 Range Fire

The Hanford Site is in a semiarid region with sagebrush and grasses growing between areas. Range fires periodically occur and can sweep over large regions before they are controlled. The summer months are historically the most likely time for a large fire to occur because of the combustible condition of the natural grasses.

The B Plant/WESF complex would probably not be affected by a range fire since the ground near the buildings is devoid of vegetation. Furthermore, many of the buildings are concrete and, therefore, not particularly susceptible to a fire initiated from outside the building.

5.3.4 Ash Fall

Table 5.6 below indicates the estimated ash depth deposited at the Hanford Site from past volcanic eruptions in the region. Although a heavy deposition could present health hazards to site workers due to respiration of ash, water supply contamination, and collapse of some of the older roofs, it is not expected that such an event would cause a significant release from the

B Plant and WESF facilities. There would probably be ample warning of an approaching large ash fall and the facility could be placed in a stable condition and steps taken to protect workers. Therefore, a large release is not expected even if roof damage occurred.

Table 5.6 Estimated Ash Depth from Major Eruptions

Volcano	Time	Depth of Ash	Equivalent Roof Loading Dry (psf)*	Wet (psf)*
Glacier Peak	12,000 B.P.	0.025 m	6	8.4
Mt Mazama	6,000 B.P.	0.15 m	36	50
Mt. St. Helens	3,600 B.P.	0.025 m	6	8.4
Mt. St. Helens	1980	0.013 m	3	4.2

* pounds per square foot
B.P. = Before present

5.3.5 Flooding

The Probable Maximum Flood (PMF), calculated by the Corps of Engineers, is based on the concurrence of the worst of several natural phenomena, including a record snowfall in the Columbia River watershed, no melting of this snow until late spring, then warm, heavy rain. This hypothetical flood would have a flow of 2.4 E+9 l/hr and is estimated to be well below the level of B Plant/WESF (SD-WM-SAR-013). No emergency level declaration should be made even though normal operations would be impacted.

5.4 Security Contingencies

DOE Order 5500.3A specifies that the facility hazards assessment shall consider the broad range of emergency events that could affect the facility. These events may result from hostile attack, terrorism, sabotage, or malevolent acts as well as the more traditional accidents and natural phenomena covered in the SAR. Closely related DOE Order 5630.3 requires a graded assessment of radiological and toxicological sabotage vulnerability. Events of this type are not within the scope of a SAR. The paragraphs below reflect the general Hanford emergency preparedness policy toward events of this type and the potential for onsite and offsite significant consequences.

5.4.1 Explosive Device

The presence of an explosive device in the 291-B HEPA filters is assumed. Section 5.2.1 inventories and assumptions were used.

5.4.2 Sabotage

Confirmed physical damage from sabotage which threatens facility integrity is classified as an emergency since there is a potential for loss of confinement/containment of hazardous materials.

5.4.3 Hostage Situation/Armed Intruder

A confirmed hostage situation, armed intruder, credible security threat, or ongoing security compromise involving physical attack on the building is classified as an emergency since there is a potential for loss of confinement/containment of hazardous materials.

5.4.4 Aircraft Crash

The range of possible releases from an aircraft crash is quite large and not calculated in the SAR. A light aircraft crash near the facility may not release any material whereas a direct hit from a commercial jet liner could cause extensive damage to the facility and a large release. The suggested approach is to classify any aircraft crash near or at the facility as an emergency since there is a potential for loss of confinement/containment of hazardous materials.

6.0 EVENT CONSEQUENCES

6.1 Calculational Models

Environmental radiological releases shown in the various facility safety documents were confirmed by modeling with the Hanford Unified Dose Utility computer code (HUDU). This code is the primary emergency response tool for radiological releases on the Hanford Site and in the Unified Dose Assessment Center (UDAC). It employs a straight line Gaussian plume model, Pasquill-Gifford stability classes, and dose conversion factors consistent with ICRP 26 and 30. Release source terms considered only the respirable fraction, nominally 0.1 percent (DOE-STD-0013-93) unless specified in the Safety Analysis Report.

Release of radionuclides into the environment occurs either through a facility stack, or by loss of facility containment integrity. By convention, release heights less than 10 meters default to ground level releases. In these analysis plume rise is not considered, producing conservative dose estimates.

6.1.1 Non-Radiological Hazardous Material Releases

6.1.1.1 Sodium Hydroxide Release Consequence

The downwind concentration is calculated by using the EPI program and the release rate of 23.6 mg/s. Using the program, the facility (100 meter) and site boundary (20.3 kilometers) concentrations for this release are 0.38 mg/m^3 and 3.5E-07 mg/m^3. These values are below the criteria for an Alert Level Emergency and will not be considered further.

6.1.2.1 Sulfuric Acid Release Consequence

The downwind concentration is calculated by using the EPI program and the release rate of 0.0003 gallons per minute. The facility (100 m) and site boundary concentrations for this release are 1.6 mg/m^3 and 2.6E-04 mg/m^3. These values are below the criteria for an Alert Level Emergency and will not be considered further.

6.2.1 Radiological Releases

6.2.1.1 B Plant Filter Release

The scenario is a release of 2.5E+12 Bq of ^{90}Sr,^{90}Y and 3.8E+12 Bq of ^{137}Cs out the stack. The HUDU calculated EDE for the onsite receptor was 0.002 Sv at 0.4 km and EDE for the offsite receptor was 0.0001 Sv at 20.9 km. Assumptions were a 61 m stack, 1 m stack radius, 3.0E+9 l/hr stack flow, and A Stability for the onsite receptor and F Stability for the offsite receptor. These results place the conservative B Plant filter release event in the SITE AREA Emergency category.

6.2.1.2 B Plant Filter Release From Organic Fire

The scenario is a release of 1.3 E+12 Bq of ^{90}Sr, ^{90}Y, and 1.3 E+12 Bq of ^{137}Cs out the stack. The HUDU calculated highest EDE for the onsite receptor was 0.0003 Sv at 0.5 km and EDE for the offsite receptor was 0.00001 Sv at 20.3 km. Assumptions were a 61 m stack, 1 m stack radius, 8.34E+2 m^3/s stack flow, and A Stability for the onsite receptor and F Stability for the offsite receptor. These results place the conservative B Plant filter release organic fire event below any level at which an emergency declaration is necessary.

6.2.1.3 WESF K-3 Filter Drop

The source term is 0.1% of the total filter loading of 5.9E+14 Bq (90% Sr,Y 10% Cs).

^{90}Sr (0.001)(5.9E+14)(0.9) = 5.3E+11 Bq
^{90}Y (0.001)(5.9E+14)(0.9) = 5.3E+11 Bq
^{137}Cs (0.001)(5.9E+14)(0.1) = 5.9E+10 Bq

The HUDU calculated onsite EDE is 0.31 Sv and the nearest offsite EDE (20.3 kilometer) is 0.0001 Sv. The assumptions used for this scenario include F Stability, ground level release and a 1 meter/second wind speed. The drop of a loaded WESF K-3 filter is a SITE AREA Emergency based on the projected dose values.

6.3 Natural Emergencies

6.3.1 Earthquake

A seismic event which causes building damage was calculated using the same inventory as the stack release but at ground level and without the building ventilation running. One HUDU calculation was performed which supports this declaration. If both HEPA filters and the roughing filter are destroyed and all radioactive material is released, the onsite EDE was calculated to be 0.18 Sv and the 20.3 kilometer offsite EDE was 0.00056 Sv. Assumptions include a release of 3.8E+12 Bq of ^{137}Cs and 2.5E+12 Bq of ^{90}Sr and ^{90}Y, ground level release and F Stability. This event would require the plant to declare a SITE AREA Emergency since the facility boundary EDE is greater than 0.01 Sv.

6.3.2 High Winds/Tornado

An ALERT LEVEL Emergency should be declared if sustained winds exceed 90 mph and damage from high winds is observed. The 4.0E+1 m/second wind speed is suggested for consistency with the EALs at other Hanford facilities. A SITE AREA Emergency should be declared if a tornado strikes the B Plant/WESF complex and causes extensive damage. One HUDU calculation was performed which supports this declaration. If both HEPA filters and the roughing filter are destroyed and all radioactive material is released, the onsite EDE was calculated to be 0.18 Sv and the 20.3 kilometer offsite EDE was 0.00056 Sv. Assumptions include a ground level release of 3.8E+12 Bq of ^{137}Cs and 2.5E+12 Bq of ^{90}Sr and ^{90}Y, and F Stability with a wind speed of 1 meter/second.

6.3.3 Range Fire

As a precaution, it is suggested that an ALERT LEVEL Emergency be declared if a range fire or intra 200 East Area fire threatens the B Plant/WESF complex. The Alert Emergency is based on the potential degradation of safety at the facility. An actual uncontrolled fire within the B Plant/WESF complex would be classified as an ALERT LEVEL or SITE AREA Emergency depending upon the severity of the fire and the inventory at risk.

6.4 Security Contingencies

6.4.1 Explosive Device

Discovery of an explosive device is classified as an ALERT LEVEL Emergency. Activation of the emergency response organization will assist in building evacuation and access control. Furthermore, activation of the emergency response organization when the device is found will speed the response if the device detonates. A confirmed detonation of an explosive device within the B Plant/WESF complex may warrant an upgrade to a SITE AREA Emergency if a substantial inventory of hazardous material such as the 291-B HEPA filters, is threatened. One HUDU calculation was performed which supports this declaration. If both HEPA filters and the roughing filter are destroyed and all radioactive material is released the onsite EDE was calculated to be 0.18 Sv and the 20.3 kilometer offsite EDE was 0.00056 Sv. Assumptions include a release of 3.8E+12 Bq of ^{137}Cs and 2.5 E+12 Bq of ^{90}Sr and ^{90}Y, ground level release, F Stability, and 1 meter/second wind speed.

6.4.2 Sabotage

Discovery of a sabotage is classified as an ALERT LEVEL Emergency since the level of safety has been degraded and there could be additional damage that has not yet been discovered. Any release that occurs due to sabotage is classified based on the known or potential severity of the release.

6.4.3 Hostage Situation/Armed Intruder

A confirmed hostage situation, armed intruder, credible security threat, or ongoing security compromise involving physical attack on the building has not been discussed or calculated in the SAR but is classified as an ALERT LEVEL Emergency based on the guidance for emergency classification. Any release that occurs from the action of intruders should be classified based on the known or potential severity of the release.

6.4.4 Aircraft Crash

The range of possible releases from an aircraft crash is quite large. A light aircraft crash near the facility may not release any material and is classified as an ALERT LEVEL Emergency, whereas a direct hit from a commercial jet liner could cause extensive damage to the facility and a large release. One scenario which could result in a SITE AREA Emergency is the plane crashing into the 291-B filters and releasing the entire contents such as the scenario discussed in sections 6.3.1, 6.3.2 and 6.4.1. The suggested approach is to classify any aircraft crash near or at the facility as an emergency since there is a potential for loss of confinement/containment of hazardous materials.

7.0 THE EMERGENCY PLANNING ZONE

The Emergency Planning Zone (EPZ) is an area within which special planning and preparedness efforts are warranted since the consequences of a severe accident could result in Early Severe Health Effect (ESHE). DOE Order 5500.3A endorses the EPZ concept and requires that the choice of an EPZ for each facility be based on an objective analyses of the hazards associated with the facility. The Emergency Management Guide on Hazards Assessment provides several pages of guidance on establishing the size of the EPZ. The suggested approach is to determine the emergency classification of the events analyzed in the Hazards Assessment and then base the EPZ size on the larger of a default size for each emergency class or the maximum distance that an ESHE Threshold is exceeded. A final step is to make adjustments to the area, if necessary, based on reasonableness tests in the guidance document. For example, the selected EPZ should conform to natural and jurisdictional boundaries where reasonable. The selection of the EPZ for the B-Plant/WESF is based on this review of the SAR accident scenarios is described below.

7.1 The Minimum EPZ Radius

The highest emergency classification for the scenarios described above is a SITE AREA Emergency. The minimum EPZ required for the B Plant/WSEF is two (2) km. The Emergency Management Guide Hazards Assessment document provides the following criteria for ESHE's.

Radiological

External or uniformly distributed internal emitters	1 Sv
Thyroid	30 Sv
Skin	12 Sv
Ovary	1.7 Sv
Bone Marrow	1.65 Sv
Testes	4.4 Sv
Other Organs	5.5 Sv

Non-Radiological

A peak concentration of the substance in air that equals or exceeds the ERPG-3 value, or equivalent.

Conclusion

The highest emergency classification for the scenarios described above is a SITE AREA Emergency. The EPZ size is the larger of 2 km (the default size for a SITE AREA Emergency) or the maximum radius for ESHE. The Emergency Management Guide Hazards Assessment document provides the following criteria for ESHEs.

One EPZ will be recommended for the entire 200 East Area when the Hazards Assessments are complete for all of the facilities. The B Plant/WESF facility will likely not be the limiting facility. The tank farms will probably set the size of the EPZ in this area. All the reasonableness tests will be applied to the larger EPZ for the entire area.

7.2 Tests of Reasonableness

1. Are the maximum distances to PAG/ERPG-level impacts for <u>most</u> of the analyzed accident scenarios equal to or less than the EPZ radius selected?

   The unlikely release of radioactive material in the 291-B HEPA filters is an event analyzed that results in a SITE AREA Emergency and the minimum EPZ (2 km) does not extend beyond the minimum 200 Area EPZ of 16.1 km.

2. Is the selected EPZ radius large enough to provide for extending response activities outside the EPZ if conditions warrant?

   The 2 km EPZ does not extend beyond the 16.1 km 200 Area EPZ that is already established and as such meets this test of reasonableness.

3. Is the EPZ radius large enough to support an effective response at and near the scene of the emergency?

   The 16.1 km radius within the 200 Area EPZ encompasses the nearest other occupied Hanford facilities and the access roads.

4. Does the proposed EPZ conform to natural and jurisdictional boundaries where reasonable, and are other expectations and needs of the offsite agencies likely to be met by the selected EPZ?

   The geo-political EPZ boundaries have been established for the Hanford Site. These boundaries fall totally within the 200 Area 16.1 km EPZ and within the county and state emergency planning agencies existing plans.

5. What enhancement of the facility and site preparedness stature would be achieved by increasing the selected EPZ radius?

   None.

8.0 EMERGENCY CLASSES, PROTECTIVE ACTIONS, AND EMERGENCY ACTION LEVELS

8.1 Emergency Classes

A goal of the DOE emergency preparedness system is to quickly classify the severity of an accident. Preplanned actions are then implemented for each emergency class. The emergency classification is based, in part, on projected dose and concentration values at the facility and Hanford site boundaries for pre analyzed accident scenarios. The emergency classification criteria are shown in table 8.1 and 8.2 below.

Table 8.1 Radiological Release Criteria

Emerg. Category	Criteria*

Alert	> 0.001 Sv committed dose equivalent at facility boundary > 0.005 Sv thyroid (worker) dose at facility boundary > 0.05 Sv skin dose at facility boundary
Site Area	≥0.01 Sv committed dose equivalent at facility boundary > 0.05 Sv thyroid (worker) dose at facility boundary > 0.5 Sv skin dose at facility boundary
General	≥0.01 Sv committed dose equivalent at site boundary > 0.05 Sv thyroid (infant) dose at site boundary > 0.5 Sv skin dose at site boundary

Table 8.2 Non-Radiological Release Criteria

Emerg. Category	Criteria*
Alert	> ERPG 1 at facility boundary
Site Area	≥ERPG 2 at facility boundary
General	≥ERPG 2 at site boundary

*The criteria apply to a peak concentration of the substance in air. If ERPG values have not been established for a substance, alternative criteria specified in the Emergency Management Guide for Hazards Assessments shall be used.

There are also general criteria for emergency classification in addition to the numerical values in the tables above. The threshold between reportable occurrences and the Alert classification is difficult to establish based solely on a numerical value. The following general criteria apply in addition to the airborne release concentration values specified in the tables above.

ALERT

An ALERT LEVEL Emergency shall be declared when events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the facility with an increased potential for a release.

In general, the ALERT classification is appropriate when the severity and/or complexity of an event may exceed the capabilities of the normal operating organization to adequately manage the event and its consequences.

SITE AREA

A SITE AREA emergency shall be declared when events are in progress or have occurred which involve actual or likely major failures of facility functions needed for protection of workers and the public.

GENERAL

A GENERAL EMERGENCY shall be declared when events are in progress or have occurred that involve actual or imminent catastrophic failure of facility safety systems with a potential for loss of confinement or containment integrity.

There is additional emergency classification guidance in the Emergency Management Guide on Event Classification and Emergency Action Levels. The Hazards Assessment in the following sections is based primarily on a comparison of calculated consequences with the numerical criteria in the tables above. However, some recommendations are provided based on the more general emergency classification criteria.

8.2 Emergency Action Levels

The facility accidents, trigger events, and recommended emergency action levels are provided in Appendix A.

9.0 MAINTENANCE/REVIEW OF THIS HAZARDS ASSESSMENT

The Operating Contractor, Manager of Emergency Preparedness, is responsible for ensuring that this Hazards Assessment is regularly reviewed and maintained current.

10.0 REFERENCES

Department of Energy, June 26, 1992, Emergency Management Guide, Guidance for Hazards Assessment, U.S. Department of Energy, Washington, D.C.

Department of Energy, April 30, 1991, Planning and Preparedness for Operational Emergencies, DOE Order 5500.3A, U.S. Department of Energy, Washington, D.C.

Department of Energy, July 1993, Recommendation Values and Technical Bases for Airborne Release Fractions (ARFs), Airborne Release Rates (ARRs), and Respirable Fractions (RFs) at DOE Non-Reactor Nuclear Facilities, DOE-STD-0013-93, U.S. Department of Energy, Washington, D.C.

Emergency Predictive Information Code, Homann Associates, INC., Fremont, CA, 1993.

Marusich, R. M., 1993, B-Plant Exhaust Filter Outlet Seals, WHC-SD-WM-TI-554, Westinghouse Hanford Company, Richland, Washington

Napier, B. A., et al., GENII - The Hanford Environmental Radiation Dosimetry Software System, PNL-6584, Battelle Pacific Northwest Laboratory, Richland, WA.

Rittmann, P.D., 1983, "WESF SAR Accident Dose Computations," (Internal Letter 72320-83-WU-402, with attachment BP-RE-PDR-113-83 to R.G. Sewell, Rockwell Hanford Operations, 12/15/83.

Scherpelz, R. I., February 1991, HUDU - The Hanford Unified Dose Utility Computer Code, PNL-7636, Pacific Northwest Laboratory, Richland, Wa.

SD-WM-SAR-005, Waste Encapsulation and Storage Facility Safety Analysis Report, Building 225-B, Westinghouse Hanford Company, Richland, Washington

SD-WM-SAR-013, B Plant Safety Analysis Report, Westinghouse Hanford Company, Richland, Washington

Semmens, L. S. and Covey, L. I., 1993, B Plant/Waste Encapsulation Storage Facility Hazard Classification, WHC-SD-WM-HC-006, Westinghouse Hanford Company, Richland, Washington

WHC-SD-W010H-PSAR-001, Preliminary Safety Analysis Report B Plant Environmental Compliance Upgrade, Westinghouse Hanford Company, Richland, Washington

APPENDIX A B-PLANT/WESF INDEX OF EMERGENCY CONDITIONS

No. 1A
FACILITIES EMERGENCY EVENTS
(sheet 1 of 1)

RADIATION RELEASE

Initiating Condition	Emergency Action Level	Event Classification
B Plant filter release occurs.	B Plant HEPA filter release occurs AND Stack CAM alarms	**ALERT LEVEL EMERGENCY**
B Plant filter release occurs or WESF filter is dropped during changeout.	B Plant HEPA filter or WESF filter is dropped during changeout AND Container carrying WESF filter is breeched.	**SITE AREA EMERGENCY**

Note: No General Emergency class identified.

No. 2A
NATURAL EMERGENCIES
(sheet 1 of 1)

SEISMIC EVENT

Initiating Condition	Emergency Action Level	Event Classification
A seismic event occurs in the 200 Area.	An event felt by personnel in the B-Plant/WESF facilities, with some breakage of glass and disturbance of tall objects.	**ALERT LEVEL EMERGENCY**
A seismic event occurs in the 200 Area.	An event felt by personnel in the 200 Area, with evidence of falling building debris AND HEPA filter containment breached.	**SITE AREA EMERGENCY**

Note: No General Emergency classes identified.

No. 2B
NATURAL EMERGENCIES
(sheet 1 of 1)

HIGH WINDS/TORNADO

Initiating Condition	Emergency Action Level	Event Classification
High wind or tornado occurs in the 200 Areas.	Sustained high winds observed in the 200 Area which could cause extensive damage to the B-Plant/WESF facilities.	**ALERT LEVEL EMERGENCY**
A tornado observed striking B-Plant facilities.	A tornado observed striking and causing extensive damage to the B-Plant filters.	**SITE AREA EMERGENCY**

Note: No General Emergency classes identified.

No. 2C
NATURAL EMERGENCIES
(sheet 1 of 1)

RANGE FIRE

Initiating Condition	Emergency Action Level	Event Classification
Range Fire enters 200 Area and is threatening to involve facilities.	A range fire observed to have entered the 200 East Area and is threatening the B-Plant/WESF facilities.	**ALERT LEVEL EMERGENCY**

Note: No Site Area and General Emergency classes identified.

No. 3A
SECURITY CONTINGENCIES
(sheet 1 of 1)

EXPLOSIVE DEVICE

Initiating Condition	Emergency Action Level	Event Classification
Explosive device in B-Plant/WESF facilities.	A confirmed explosive device is located on the B-Plant HEPA filters.	**ALERT LEVEL EMERGENCY**
Explosive device in B-Plant/WESF facilities.	A confirmed explosive device is located on the B-Plant/WESF filters. AND The device has been detonated.	**SITE AREA EMERGENCY**

Note: No General Emergency class identified.

No. 3B
SECURITY CONTINGENCIES
(sheet 1 of 1)

SABOTAGE

Initiating Condition	Emergency Action Level	Event Classification
Confirmed sabotage to B-Plant/WESF facilities.	Confirmed damage to confinement/containment of hazardous materials in the B-Plant/WESF facilities.	**ALERT LEVEL EMERGENCY**

Note: No Site Area or General Emergency classes identified.

No. 3C
SECURITY CONTINGENCIES
(sheet 1 of 1)

HOSTAGE SITUATION

Initiating Condition	Emergency Action Level	Event Classification
Hostage situation.	A confirmed hostage situation is occurring within a B-Plant/WESF facility.	**ALERT LEVEL EMERGENCY**

Note: No Site Area or General Emergency classes identified.

No. 3D
SECURITY CONTINGENCIES
(sheet 1 of 1)

ARMED INTRUDER

Initiating Condition	Emergency Action Level	Event Classification
Armed intruder(s) within a B-Plant/WESF facility.	A confirmed armed intruder(s) are located within any B-Plant/WESF facilities.	**ALERT LEVEL EMERGENCY**

Note: No Site Area or General Emergency classes identified.

No. 3E
SECURITY CONTINGENCIES
(sheet 1 of 1)

AIRCRAFT CRASH

Initiating Condition	Emergency Action Level	Event Classification
An aircraft crash has occurred at or near one of B-Plant/WESF facilities.	An aircraft crash has occurred AND has or is likely to have an adverse affect on B-Plant/WESF's safety, or has or is likely to release radioactive material to the environment.	**ALERT LEVEL EMERGENCY**
An aircraft has crashed into the B-Plant HEPA filters.	An aircraft has crashed into the B-Plant HEPA filters AND containment is breached.	**SITE AREA EMERGENCY**

Note: No General Emergency classes identified.