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Environmental Assessment

**High Level Waste Tank Farm
Replacement Project
for the
Idaho Chemical Processing Plant
at the
Idaho National Engineering Laboratory**

June, 1993

**U.S. DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE**

MASTER

PREFACE

The Department of Energy (DOE) has prepared an environmental assessment (EA), DOE/EA-0831, for the construction and operation of the High-Level Waste Tank Farm Replacement (HLWTFR) Project for the Idaho Chemical Processing Plant located at the Idaho National Engineering Laboratory (INEL). The HLWTFR Project as originally proposed by the DOE and as analyzed in this EA included: (1) replacement of five high-level liquid waste storage tanks with four new tanks and (2) the upgrading of existing tank relief piping and high-level liquid waste transfer systems. As a result of the April 1992 decision to discontinue the reprocessing of spent nuclear fuel at INEL, DOE believes that it is unlikely that the tank replacement aspect of the project will be needed in the near term. Therefore, DOE is not proposing to proceed with the replacement of the tanks as described in this EA.

The DOE's instant decision involves only the proposed upgrades aspect of the project described in this EA. The upgrades are needed to comply with Resource Conservation and Recovery Act, the Idaho Hazardous Waste Management Act requirements, and the Department's obligations pursuant to the Federal Facilities Compliance Agreement and Consent Order among the Environmental Protection Agency, DOE, and the State of Idaho. The environmental impacts of the proposed upgrades are adequately covered and are bounded by the analysis in this EA.

If DOE later proposes to proceed with the tank replacement aspect of the project as described in the EA or as modified, it will undertake appropriate further review pursuant to the National Environmental Policy Act.

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ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental and Industrial Hygienists
ALARA	as low as reasonably achievable
Cd	cadmium
CEDE	Committed Effective Dose Equivalent
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CO	carbon monoxide
Cr	chromium
CX	categorical exclusion
DBF	design basis flood
D&D	decontamination and decommissioning
DHHS	U.S. Department of Health and Human Services
DOT	U.S. Department of Transportation
DOE	U.S. Department of Energy
EA	Environmental Assessment
ECA	Environmentally Controlled Area
EDE	Effective Dose Equivalent
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facilities Agreement and Consent Order
FWS	U.S. Fish and Wildlife Service
H-3	tritium
HBA	Hypothetical Bounding Accident
HEPA	high efficiency particulate air (filter)
HEU	highly enriched uranium
HF	hydrofluoric acid
Hg	mercury
Hg(NO ₃) ₂	mercuric nitrate
HLLW	high level liquid waste
HLWTR	High Level Waste Tank Farm Replacement
HNO ₃	nitric acid
HWMA	Hazardous Waste Management Act (Idaho)
I-129	Iodine-129 [radioiodine]

ICPP	Idaho Chemical Processing Plant
IDHW	Idaho Department of Health and Welfare
IDLH	Immediately Dangerous to Life and Health
INEL	Idaho National Engineering Laboratory
LET&D	Liquid Effluent Treatment and Disposal (Facility)
LOI	Letter of Intent
LLW	low-level waste
MEI	maximally exposed individual
Mn	manganese
Ni	nickel
NDE	non-destructive examination
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NON	Notice of Noncompliance
NO _x	nitrogen oxides
NWCF	New Waste Calcining Facility
Pb	lead
PEIS	Programmatic Environmental Impact Statement
PEW	Process Equipment Waste
PM-10	particulate material with a diameter $\leq 10 \mu\text{m}$
PSD	Prevention of Significant Deterioration
PTC	Permit to Construct
R&D	research and development
RAL	Remote Analytical Laboratory
ROI	Region of Influence
RCRA	Resource Conservation and Recovery Act
RWMC	Radioactive Waste Management Complex
SOP	standard operating procedure
SO _x	sulfur oxides
SPERT	Special Power Excursion Reactor Test (Facility)
TAP	toxic air pollutant
TLV-STEL	Threshold Limit Value - Short Term Exposure Limit
TLV-TWA	Threshold Limit Value - Time Weighted Average
TRA	Test Reactor Area
TRU	transuranic
TSD	Treatment, Storage, and Disposal (Facility)

TSP	total suspended particulate
UBC	Uniform Building Code
USC	United States Code
VOG	vessel offgas
WEB	Weather Enclosure Building
WINCO	Westinghouse Idaho Nuclear Company, Inc.
Zr	zirconium

UNITS

μm	micrometer
μg	microgram
ac	acre
Ci	curie
d	day
ft	feet
g	acceleration due to gravity
gal	gallon
h	hour
km	kilometer
kVA	kilovoltamperes
L	liter
m	meter
m^2	square meter
m^3	cubic meter
mg	milligram
min	minute
mm	millimeter
mrem	millirem
R	rad (radiation absorbed dose)
rem	Roentgen equivalent man
s	second
yd	yard
y	year

XXE+YY Number (XX) multiplied by 10 to the (YY) power; for example, $1\text{E}+06 = 1 \times 1,000,000 = 1,000,000$. Also may be expressed as 1×10^6 .

XXE-YY Number (XX) divided by 10 to the (YY) power; for example, $1\text{E}-06 = 1/1,000,000 = 0.000001$. Also may be expressed as 1×10^{-6} .

1. INTRODUCTION AND SUMMARY

This Environmental Assessment (EA) addresses the potential environmental impacts associated with the construction and operation of the proposed High Level Waste Tank Farm Replacement (HLWTFR) Project for the Idaho Chemical Processing Plant (ICPP) located at the Idaho National Engineering Laboratory (INEL) (Figure 1.1). It has been prepared in accordance with the National Environmental Policy Act (NEPA) (Title 42 United States Code [USC] 4321, *et seq.*), Council on Environmental Quality (CEQ) regulations (Title 40 Code of Federal Regulations [CFR] Parts 1500-1508), and U.S. Department of Energy (DOE) NEPA implementing procedures (10 CFR Part 1021 published in Volume 57 Federal Register [FR] 15122, April 24, 1992). As defined in the CEQ regulations (40 CFR Part 1508.9), the purpose of this EA is to provide sufficient evidence to determine whether to prepare an environmental impact statement (EIS) or whether there is a finding of no significant impact (FONSI).

The proposed HLWTFR Project would support the ongoing and planned activities at the ICPP (Figure 1.2). In April 1992, DOE announced that recovery of additional highly enriched uranium (HEU) was no longer required, and decided to phase out reprocessing of spent nuclear fuel for HEU recovery. The continuing ICPP mission is to safely and cost effectively receive and store DOE-assigned and government-owned nuclear fuel on an interim basis; conduct research and development (R&D) on spent nuclear fuel(s) waste treatment technologies; and manage existing and future high-level radioactive and hazardous wastes.

The proposed action involves an upgrade to portions of the ICPP Tank Farm where high level liquid waste (HLLW)¹ is temporarily stored. The Tank Farm is an integral and essential part of the ICPP waste recycling and management system. In the past, the Tank Farm provided temporary storage and surge capacity that allowed independent operation of the fuel reprocessing systems and the waste processing system (New Waste Calcining Facility). The Tank Farm also provided for segregation of the different

¹Because of its hazardous waste components, the HLLW temporarily stored in the ICPP Tank Farm is also classified as mixed waste.

Figure 1.1 Regional Location of the Idaho Chemical Processing Plant

LEGEND

- ① New Tank Area
- ② Access Road
- ③ Parking Area
- ④ Fabrication/Laydown Area
- ⑤ Temporary Construction Support Building Area
- ⑥ Stockpile Area
- Proposed Construction Support Area
- Alternate Construction Support Area
- In-Plant Main Construction Area

wastes generated by the variety of nuclear fuels reprocessed at the ICPP to maintain compatibility with materials of construction, to avoid precipitation of solids, and to assure the production of a calcine product that can be retrieved from the calcine storage bins for ultimate disposal. Although the April 1992 DOE decision to discontinue spent nuclear fuel reprocessing eliminated a principal feature from the previous mission of the ICPP, the Tank Farm will continue to be necessary to provide temporary storage and surge capacity, as well as waste segregation capabilities, in support of the continuing mission at the ICPP (Henry 1992).

The existing ICPP Tank Farm has eleven 300,000-gallon (gal) HLLW storage tanks individually located in concrete containment vaults. Since one of the tanks is maintained empty for emergency use, the nominal operational storage capacity of the Tank Farm is 3,000,000 gal. The present storage tanks, containment vaults, and associated transfer lines and valve boxes were designed and constructed between 1951 and 1965 in accordance with extant regulations and design standards. Based on the results from the best available mathematical models and scoping seismic evaluations, five of the existing tank containment vaults (VES-WM-182 through VES-WM-186) do not meet current INEL seismic criteria. In addition, the U.S. Environmental Protection Agency (EPA) alleged in a Notice of Noncompliance (NON) issued to DOE in January 1990, that the eleven containment vaults and most of the transfer lines and valve boxes do not meet current Resource Conservation and Recovery Act (RCRA) (42 USC 6901, *et seq.*) and Idaho Hazardous Waste Management Act (HWMA) (Idaho Code Section 39-4401, *et seq.*, as amended) regulations governing hazardous waste tank systems (40 CFR Part 265.193(c) and IDAPA 01.5009). The basis for the alleged regulatory noncompliance is that the concrete vaults for the existing tanks, and the various secondary containment systems for transfer lines and valve boxes, are not compatible with the waste handled.

The proposed action would support the continued operation of the ICPP Tank Farm by replacing the five HLLW storage tanks and containment vaults that do not meet current INEL seismic criteria. They would be replaced with four new 500,000 gal tanks, secondary containment

structures, and supporting systems, including a new stack, that are in compliance with current design standards and regulations, including INEL seismic criteria and RCRA/HWMA requirements. Since one of the new tanks, in addition to one of the remaining existing tanks, would be maintained empty for emergency use, the proposed action would not expand the existing Tank Farm operating storage capacity. The emergency reserve storage capacity in the Tank Farm would increase from the current 300,000 gal capacity to 800,000 gal as a result of maintaining one existing and one new tank empty. The five HLLW storage tanks (VES-WM-182 through VES-WM-186) to be replaced would be removed from service, emptied, and subject to decontamination and decommissioning (D&D) and RCRA closure.

The proposed HLWTFR Project would also upgrade normal tank venting (vessel offgas) and pressure-vacuum relief systems, ventilation systems, valve boxes, and transfer lines for some of the other existing Tank Farm facilities, and procure and install equipment for removal of the last approximately 5,000 to 20,000 gal of HLLW (the heel) in each of the five tanks being replaced that cannot be removed with existing tank transfer systems. These modifications to existing Tank Farm facilities would also be in compliance with current design standards and regulations, including RCRA/HWMA requirements. The proposed action would additionally include construction of new electrical feeder lines and other utility interfaces, an access road, parking lot, temporary warehouses, office trailers, construction laydown and fabrication areas, stockpile area, and security and construction fencing.

The purpose of the proposed action is to reduce the environmental health and safety risks associated with the storage of HLLW at the ICPP Tank Farm. The proposed HLWTFR Project would decrease the probability of a seismically induced accident, and the consequences of HLLW leaks, by providing a higher level of seismic protection and secondary containment than currently exists. The HLWTFR Project would also add state-of-the-art inspection, leak detection, and maintenance features and systems to ensure the long term integrity of the new tanks.

Several alternatives to the proposed HLWTFR Project were evaluated including retrofitting the existing tanks/vaults to meet current INEL seismic design criteria and RCRA and HWMA secondary containment requirements, reducing the generation of HLLW or increasing waste calcining processing capacity or rate to reduce Tank Farm storage requirements, and the no action alternative. The alternatives considered were shown to be not feasible, unable to reduce Tank Farm storage requirements, and/or unresponsive to the need for timely improvement of ICPP Tank Farm facilities.

The potential environmental impacts associated with HLWTFR Project construction, normal operation, and postulated accidents were thoroughly evaluated and the results are summarized in Table 1.1. Construction impacts would be minimal even considering disturbances to some ICPP Environmentally Controlled Areas (ECAs) that may contain contaminated soil (i.e., radioactive and/or mixed waste). These impacts would be closely monitored and controlled. Normal operation impacts would not be substantially different from the present Tank Farm with atmospheric releases within applicable standards. The probability of postulated accidents is very low, and the potential impacts from the postulated accidents would be small, except the construction blasting accident (tank/vault leak). The construction blasting accident would be precluded by mitigative measures that would provide, if required, an alternative to blasting (e.g., non-explosive demolition agents). The need to invoke an alternative to blasting would be determined through detailed geotechnical evaluations (see Section 5.4).

The environmental impacts of alternatives to the proposed action were also identified. The no action alternative would continue the risk of a leak or rupture in the five tanks that do not meet current INEL seismic criteria in the event of a large earthquake. Retrofitting the existing tanks/vaults, even if possible, would require high occupational radiation exposures. The alternative of decreasing generation of HLLW or increasing waste calcine processing capacity or rate to reduce Tank Farm storage requirements has also been shown to be insufficient to discontinue use of the five seismically vulnerable tanks/vaults without providing replacement tanks.

Table 1.1 Summary of Potential Environmental Impacts of the Proposed HLWTR Project

Impact Area	EA Section	Potential Impact
Construction - Radiological	5.1.1	Radiation exposure from construction in ECAs, demolition of existing valve boxes, transportation of low-level waste to RWM, and modifications to existing tank systems would be low to workers. Worker exposures would be strictly monitored and controlled and maintained ALARA. Offsite doses from radioactive airborne dust would be a very small fraction of the 10 mrem/y DOE limit for airborne emissions. Public doses from transportation would be minimal. Airborne releases during installation of heel removal equipment are not expected.
- Air Quality	5.1.2	Combined maximum construction effects from fugitive dust, construction equipment exhaust, and diesel generator emissions, when added to background concentrations, would be well within Idaho ambient air quality standards.
- Socioeconomic	5.1.3	Construction would be expected to produce a small beneficial impact.
- Other Impacts	5.1.4	Impacts to cultural resources, threatened and endangered species, and wetlands are not expected. Construction generated waste volumes would be small and easily accommodated within existing INEL waste disposal facility capacities.
Normal Operation - Radiological	5.2.1	Conservative estimates of radiological emissions from the new stack would result in onsite worker and offsite doses that are well below the DOE 5 rem annual occupational limit and the NESHAP standard of 10 mrem/y, respectively.
- Air Quality	5.2.2	Emissions from standby power diesel generator testing and the small quantities of toxic air pollutants (TAPs) released from the new stack would be well below Idaho ambient air quality and TAP standards.
- Other Impacts	5.2.3	Wastes generated during normal operation would be reduced from current levels.

Table 1.1 (Contd.) Summary of Potential Environmental Impacts of the Proposed HLWTR Project

Impact Area	EA Section	Potential Impact
Accidents - Transportation	5.3	Potential transportation accidents involving contaminated soil from ECA excavation would occur within the INEL boundaries. Onsite worker doses would be within the DOE 5 rem annual occupational limits. Offsite doses would be small.
- Tank/Vault Leak	5.3	The consequence of this postulated accident could potentially be an adverse impact on groundwater. Mitigation actions would be taken to preclude this event.
- Valve Box Leak	5.3	Onsite worker doses would be within the DOE 5 rem annual occupational limit. Offsite doses would be small. Nonradiological contaminant releases would be below regulatory limits.
- HEPA Filter Fire	5.3	Onsite worker doses would be within the DOE 5 rem annual occupational limit. Offsite doses would be small. Nonradiological contaminant releases would be below regulatory limits.
- Hydrogen Deflagration	5.3	Onsite worker doses would be within the DOE 5 rem annual occupational limit. Offsite doses would be small. Nonradiological contaminant releases would be below regulatory limits for credible accident scenarios.
- Criticality	5.3	Onsite worker doses would be within the DOE 5 rem annual occupational limit. Offsite doses would be small. Nonradiological contaminant releases would be below regulatory limits.
- Earthquake	5.3	Onsite worker doses would be within the DOE 5 rem annual occupational limit. Offsite doses would be small. Nonradiological contaminant releases would be below regulatory limits.
- Hypothetical Bounding Accident	5.3.4	Limited onsite ICPP worker health impacts may occur, but the occupational health risk is very low. Onsite INEL and offsite doses would be less than the 25 rem DOE siting guideline. Offsite nonradiological contaminant releases would be within occupational health limits.

In summary, the results of the analyses conducted for this EA indicate that impacts resulting from the proposed action would be minimal. Because the proposed project would replace existing facilities, the effects of construction would be the only adverse impacts above the current baseline. The HLWTFR Project would lower the existing probability of a seismically initiated accident and, by improving secondary containment, also reduce the consequences of an accidental HLLW leak. Although unquantified, these positive project impacts would overshadow the small transitory negative construction impacts. The HLWTFR Project would resolve the ICPP Tank Farm seismic deficiencies and would also meet a number of actions required by the Consent Order addressing alleged violations in the NON.

The information and assessments presented in subsequent chapters and appendices provide the basis for the above summary. Chapter 2.0 presents the purpose and need for the proposed action. A description of the proposed HLWTFR Project and alternatives that were considered is provided in Chapter 3.0. Pertinent background information on the affected environment is discussed in Chapter 4.0. Chapter 5.0 is the assessment of the potential environmental consequences of the proposed action. Required permits, approvals, and consultations are listed in Chapter 6.0. References are contained in Chapter 7.0. The appendices provide a discussion of required permits, approvals, and consultations; and documentation of consultations regarding threatened and endangered species and investigations of cultural resources.

2. PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to reduce the environmental health and safety risks associated with the storage of HLLW at the ICPP Tank Farm. As described in Chapter 1.0, the Tank Farm is an integral and essential part of the ICPP waste recycling and management system, and studies (Henry 1992) have demonstrated the continuing need for the Tank Farm's storage capacity to support the continuing mission of the ICPP.

The ICPP Tank Farm concrete containment vault designs include either pillar-and-panel construction (VES-WM-182 through VES-WM-186) or cast-in-place concrete construction (VES-WM-180, 181, and 187-190). Based on the results of the best available mathematical models and scoping seismic evaluations (e.g., Hashimoto 1988), the five pillar-and-panel containment vaults (i.e., VES-WM-182 through VES-WM-186) do not meet current INEL seismic criteria. These five vaults were not designed for seismic loads and they do not possess engineered features to resist seismic forces. Although continuous monitoring of these five tanks and vaults has not yielded any evidence to suggest a leak of HLLW to the environment, their age (approximately 35 years), seismic deficiencies, and the inability to remotely inspect and maintain these systems to completely ensure continued tank integrity make their long term use unacceptable. In addition, the eleven existing Tank Farm containment vaults and most of the associated transfer lines, valve boxes, and valve box drains may not meet current RCRA and HWMA regulations on secondary containment for hazardous waste tank systems. The EPA has issued a NON to DOE that cited these alleged Tank Farm secondary containment deficiencies (USEPA 1990a).

The HLWTFR Project is proposed to replace the five tank and vault systems (VES-WM-182 through VES-WM-186) that do not meet current INEL seismic criteria. The proposed action, which would correct the seismic deficiencies, would reduce the probability of a seismically induced accident. Construction, testing, and startup of the four new replacement tank/vault systems and other HLWTFR Project upgrades would also correct a number of the alleged RCRA/HWMA secondary containment deficiencies identified in the NON (Monson 1992). The improvements to secondary

containment would mitigate the consequences of accidental HLLW leaks and minimize potential impacts to the groundwater.

3. PROPOSED ACTION AND ALTERNATIVES

This chapter describes the proposed action (Section 3.1) and alternatives considered (Section 3.2). A more detailed description of the proposed action is contained in Shaffer (1993).

3.1 PROPOSED ACTION

The proposed action (HLWTFR Project) would support the continued operation of the ICPP Tank Farm and would consist of:

- Replacing five existing HLLW storage tanks, containment vaults, and ancillary equipment with four new storage tanks, containment vaults, and ancillary equipment; and
- Upgrading portions of existing storage tank systems.

The new tanks, vaults, ancillary equipment, and existing storage tank system upgrades would meet current, applicable design standards and regulatory requirements and would include state-of-the-art capabilities regarding inspection and maintenance, vessel offgas (VOG) control, waste sampling, decontamination, and other aspects. The design is specifically intended to reduce the potential environmental impacts and radiation exposure to workers from normal operations, and lower the likelihood and mitigate the consequences of accidents.

The following sections describe the new tanks, vaults, and ancillary equipment; modifications to existing storage tank systems; construction activities; and facility operations. Figure 3.1 shows the major features of the proposed HLWTFR Project.

3.1.1 New Tanks, Vaults, and Ancillary Equipment

The proposed action would include construction of four new 500,000-gal storage tanks. The tanks would be located in separate vaults within a common below ground concrete containment vault structure (Figures 3.1 and 3.2). The primary stainless steel storage tanks would be erected inside of a secondary containment barrier. The secondary

FIGURE 3.1 MAJOR FEATURES OF THE PROPOSED TANK FARM UPGRADE PROJECT

LEGEND:

- DARK LINES INDICATE TANK FARM UPGRADE CONSTRUCTION.
- EXISTING VALVE BOX OR MANHOLE.

Source: Taken from
United Engineers &
Constructors (1989)

Figure 3.2 Concept Elevation of Arrangement of Tanks,
Vault Containment Structure, and Enclosure Building

containment barrier would consist of either a free standing stainless steel vessel between the primary tank and the vault or a stainless steel liner attached directly to the interior of the vault. In either case, a separate secondary containment system would be designed to accommodate 110 percent of the volume for each of the primary tanks. The primary tanks would be approximately 60 feet (ft) in diameter, with a shell height of about 24-ft and a dome height of about 7-ft. The tanks and containment vault structure would be designed for a 50-year life.

Support systems for the tanks/vaults would include solids handling, tank cooling, waste sampling, VOG, vault ventilation, waste transfer, decontamination, fire protection, and remote maintenance. These systems would provide for the safe operation and maintenance of the proposed new facilities and would facilitate eventual decontamination and decommissioning (D&D). Since the new VOG and vault ventilation systems would produce air flows that exceed the handling capacity of the existing ICPP main stack, a new stack that would not exceed 65 meters in height is proposed. The new stack would be equipped with emission monitoring instrumentation meeting the specifications set forth in the National Emission Standards for Hazardous Air Pollutants (NESHAP) permit and the State of Idaho Permit to Construct (PTC).

The proposed VOG and vault ventilation systems would also service four (VES-WM-187 through VES-WM-190) of the six existing tanks and vaults remaining in use, as well as the proposed new tanks (i.e., VES-WM-194, VES-WM-195, VES-WM-197, and VES-WM-198). The pressure/vacuum relief from the four existing tanks (i.e., VES-WM-187 through VES-WM-190) would also be re-routed to the proposed new VOG system. The other two existing tanks and vaults that would remain in service (i.e., VES-WM-180 and VES-WM-181), as well as the five tanks and vaults to be taken out of service (i.e., VES-WM-182 through VES-WM-186), would continue to use the existing VOG system and discharge to the ICPP main stack (refer to Figure 3.3).

Three new enclosure buildings would be constructed as part of the proposed action. The largest of these would be the Weather Enclosure

Figure 3.3 Simplified Flow Diagram Showing Vessel Off-gas, Vault Ventilation, and Pressure/Vacuum Relief Modifications for the ICPP Tank Farm, HLWTR Project.

Building (WEB) situated directly over the proposed new tanks. The WEB would support operation, inspection, and maintenance activities. A Mechanical Building would house and/or support major Tank Farm systems including vault ventilation and VOG. An Electrical Building would house the standby diesel generator and electrical switchgear.

To supply electricity to operate the proposed HLWTR facilities, it would be necessary to construct new feeder lines (e.g., two lines of approximately 13.8 kVA are anticipated) from existing circuits (i.e., new duct banks and manholes). Alternate power would be supplied by a standby diesel generation system. A redundant solid state uninterruptable power supply consisting of batteries is also proposed for those items requiring an uninterruptable power supply. Other electrical systems would include exterior, interior, and emergency lighting; grounding; lightning protection; and cathodic protection. Other utility interfaces would include sewage, demineralized water, potable water, process equipment waste, steam, compressed air, decontamination systems, and steam condensate return.

3.1.2 Modifications to Existing Storage Tank Systems

The modifications to existing storage tank systems would be entirely within developed ICPP areas (Figure 3.1). Proposed modifications would include upgrading the vent relief piping for existing tanks VES-WM-180 through VES-WM-190; installing a ventilation system for existing tank vaults VES-WM-187 through VES-WM-190; re-routing the VOG from four existing tanks (VES-WM-187 through VES-WM-190) to the new VOG system; installing new HLLW lines and two new valve boxes; upgrading existing valve box piping, valves, and liners; and upgrading existing tile encased lines.

Equipment would also be installed in the five tanks being replaced (i.e., VES-WM-182 through VES-WM-186) to facilitate removal of the heel, and to clean and dry the interior of these tanks, as a precursor activity to their ultimate D&D and RCRA closure (see Section 5.7). Installation of this equipment is required because the existing tank transfer systems

cannot completely remove the tank inventories (i.e., the last approximately 5,000 to 20,000 gal of HLLW referred to as the heel).

3.1.3 Construction Activities

Site preparation activities for the proposed HLWTFR Project would include demolition or relocation of several existing buildings, possible structural shoring in areas to be excavated, and relocation or shutdown and removal of utilities (see Shaffer 1993 for details). Subsequent to site preparation, overburden would be excavated to the top of bedrock and the bedrock would be removed to the required depth. The overburden would be hauled to the stockpile area (Figure 1.2) for future use as backfill. The rock would be transported to the INEL sanitary landfill for disposal.

To support construction of the new HLWTFR facilities, an access road, parking lot, construction laydown and fabrication area, temporary warehouses, and office trailers outside the ICPP fence would be needed (approximately 15 to 20 acres [ac] combined total depending on whether the proposed or alternative construction support area is selected). A separate construction laydown and fabrication area (approximately 5 ac) and stockpile area (approximately 3 ac) inside the ICPP fence, and security and construction fencing, would also be needed (Figure 1.2).

As illustrated in Figure 3.4, construction of some of the proposed facilities would take place in areas that have been designated as Environmentally Controlled Areas (ECAs). ECAs are defined regions within the ICPP boundaries where a hazardous and/or radioactive waste spill/release has been documented. The ECA designation remains in spite of cleanup actions following the spill/release. These areas are also referred to as Solid Waste Management Units (SWMUs). Eight ECAs may be encountered during construction as follows:

- ECA-CPP-14: A sewage treatment plant located west of the Quality Inspection Office (CPP-664) processed the sanitary wastes from nine ICPP facilities from 1951 to 1982. During demolition of this facility in 1983, sludge was found to be contaminated and

vaults. The estimated volume of LLW generated during excavation is approximately 382 m³.

- ECA-CPP-20: Radioactive liquid waste was routinely unloaded from transport vehicles at the Waste Treatment Building (CPP-604) radioactive unloading area. The wastes were processed at the PEW evaporator. Occasional spills containing radioactive, and potentially hazardous wastes (e.g., chromium) occurred during unloading, but were cleaned up as they occurred. The proposed action is to replace existing transfer lines and install a new valve box which would require excavation of this unit. The estimated volume of LLW generated during this excavation is approximately 3 m³.
- ECA-CPP-25: In August 1960, the area north of the Waste Treatment Building (CPP-604) was found to be contaminated (i.e., radioactive HNO₃, and Hg(NO₃)₂) as a result of a ruptured transfer line. Approximately 7 m³ of contaminated soil were removed and sent to the RWMC. The proposed action is to replace existing transfer lines and install a new valve box which would require excavation of the entire area. The estimated volume of LLW generated during this excavation is approximately 7 m³.
- ECA-CPP-26: In May 1964, a hose coupling leak was detected during a steam flushing operation designed to remove radioactive contamination from existing pipelines. The contaminated fluid was dispersed over a 3-4 ac area inside the ICPP fence, but contamination above background was detected outside the fence (approximately 10 ac) as well. The contaminated material was removed and a building was later erected over a portion of the contaminated area. The radioactive fluid contained Ru-106, Ru-103, Pu-242, Ce-144, and Cs-137. This unit would be disturbed for the installation of a transfer line and the temporary security fence. To accommodate the security fence, approximately five boreholes (2.5-ft diameter and 6-ft deep), three camera mount holes (4-ft diameter and 6-ft deep), and six

18-inch diameter by 4-ft deep cable vehicle barrier post holes would be drilled in this unit. In addition, a series of conduits would be installed to a depth of 6-in. The estimated volume of LLW that would be generated during these activities is approximately 2 m³.

- ECA-CPP-28: In October 1974, contaminated soil reading up to 40 R/hr was discovered adjacent to a HLLW transfer line. It is estimated that as much as 120 gal of HLLW (i.e., radioactive waste containing HNO₃ and Hg(NO₃)₂) may have been released at a depth of 7-ft below grade. Roughly 46 m³ of contaminated soil was sent to the RWMC, but some contaminated soil was left in place. Based on soil measurements, it is estimated that approximately 4 m³ of contaminated soil remain in this area. This unit would be shored around and not disturbed, and therefore, the generation of LLW is not anticipated.
- ECA-CPP-30: In June 1975, contaminated soil was found southwest of VES-WM-187. Radiation levels in the vicinity of this valve box were 10 R/hr. Contaminated soil (i.e., radioactivity, HNO₃, and Hg(NO₃)₂) from a two square meter area was removed and sent to the RWMC. The proposed action is to excavate around two valve boxes to approximately 10-ft in depth (excavation of approximately 1.4 m²). An estimated 12 m³ of LLW would be generated during complete excavation of this unit.
- ECA-CPP-31: In September 1975, contaminated soil was found south of tank VES-WM-183. The contaminated zone extended 150-ft by 20-ft along a backfilled pipe at a depth of 12-20 ft. The discharged solution (i.e., radioactive waste containing HNO₃ and Hg(NO₃)₂), estimated to be approximately 14,000 gal, apparently came from a corroded carbon steel cooling water tie-in line. A valve and/or operator failure inadvertently allowed HLLW, containing HNO₃ and Hg(NO₃)₂, into a carbon steel cooling water tie-in line. About 30,000 curies (Ci) of radioactive material, consisting of Cs-137, Sr-90, and Y-90 were released. Due to the

depth of contamination, the soil was left in place. The soil on top of this unit (unit depth of 13-29 ft below surface) would be disturbed to a depth of approximately 3 to 4-ft for valve box modifications. Although disturbance of this unit is not anticipated because the excavation depth is above the level of contamination, it is conservatively assumed that approximately 1 percent (or 8 m³) of the total estimated volume of LLW in this unit would be excavated during the valve box modification.

- ECA-CPP-32: In December 1976, contaminated soil reading 2 R/hr was detected west of VES-WM-188. A leaking standpipe adjacent to the valve box was assumed to be the source. However, similar contamination readings were found in soil located approximately 50-ft northwest of the same valve box. The contaminated soil containing radioactivity, HNO₃, and Hg(NO₃)₂, was left in place. This unit would be disturbed to a depth of approximately 6 to 7-ft below grade for valve box modifications. The estimated volume of LLW generated during the activity is approximately 8 m³ assuming that roughly 60 percent (i.e., fraction of contaminated soil removed based on excavation depth and level of contamination) of the total estimated volume of LLW in this unit is removed during the valve box modification.

To ensure that the proposed project activities would not limit, prejudice, or otherwise affect the permanent disposition, remediation, or closure of these sites, the disturbance of the ECAs would be procedurally controlled (WINCO 1991c) in accordance with the terms and requirements of the Federal Facilities Compliance Agreement and Consent Order (FFACO) (USEPA 1991a) between DOE, EPA, and the State of Idaho.

Prior to the disturbance, each of these areas would be characterized to determine the spatial extent of the contamination, the classification and amounts of the wastes in the soil (i.e., radioactive, hazardous, and/or mixed waste), and whether the contaminants are below levels of regulatory concern. As required by the FFACO, this information would be utilized to perform a risk-based evaluation to identify the ultimate ECA

disposition and remediation requirements. The results of the characterization and risk-based studies would provide the necessary information to ensure that the construction activities do not compromise the remediation requirements. Approval from the tri-party representatives of the FFACO (DOE, EPA, and the State of Idaho) would be required prior to a disturbance.

The duration of construction is expected to be approximately five years.

3.1.4 Facility Operations

Once construction and acceptance testing are complete, operation of the ICPP Tank Farm would not differ substantially from current operations. The Tank Farm would operate 365 days per year, 24 hours per day in compliance with the requirements of the defining RCRA permit (i.e., either Part A interim status or Part B). The tanks would be operated so that one new and one existing tank are left empty to act as spares in case of emergency. Therefore, three of the new 500,000-gal and five of the existing 300,000-gal tanks would be utilized for storage of HLLW. The maximum heat generation rate of the waste in the new tanks would be limited to 100 watt/m³.

3.2 ALTERNATIVES

3.2.1 No Action

Continued operation of the existing ICPP Tank Farm would not resolve the existing seismic deficiencies with the five tanks/vaults (VES-WM-182 through VES-WM-186). There would be a continued risk of a leak or rupture in these five tanks/vaults in the event of a large earthquake. In addition, continued operation of the existing Tank Farm would not resolve alleged NON secondary containment violations of the RCRA and HWMA regulations that would be resolved by the proposed HLWTFR Project. RCRA regulations allow for variances (40 CFR Part 265.193(g)), but obtaining a variance for the Tank Farm is perceived to be unlikely due to the difficulties in performing the annually required leak detection tests.

3.2.2 Retrofit Existing Tanks/Vaults

Retrofitting the existing tank/vaults to meet current INEL seismic design criteria and RCRA and HWMA secondary containment requirements has been thoroughly evaluated. An extensive study of methods of upgrading the five concrete containment vaults with pillar-and panel construction (VES-WM-182 through VES-WM-186) to meet current INEL seismic design criteria was conducted (Jaafar 1991 and Beer et al. 1991). The study identified over fifty possible engineering concepts ranging from providing air bags in the annulus to improving vault structures. From these concepts, nine options warranting further study were evaluated. These nine options were internal bracing, driving pilings, removal of overburden, external support of vault roof, excavation and external bracing, filling annular space, grout curtain, vault column post-tensioning, and low pressure grout. Each of these options were assessed using safety, ALARA, reliability, construction risk, schedule, operating schedule, project cost, radioactive waste minimization, and regulatory constraints as the evaluation criteria. The conclusion from this study was that none of the options was feasible. In general, the reasons were that access into the vault structure would not be possible unless the current radiation fields (160 rem/hour) were lowered to an acceptable level (e.g., 0.2 rem/hour), that the technology does not exist at the present time to decontaminate the existing tanks to an acceptable level, that the congested external piping and its uncertainty does not allow work inside of or exterior to the vaults, and that the costs for performing work inside the vaults are prohibitive with current technology. Details of the study and specific reasons for rejecting each option are documented in Jaafar (1991) and Beer et al. (1991).

Even if an acceptable seismic retrofit was possible, a method to retrofit a secondary containment liner, especially underneath an installed tank, would also likely be impractical, if possible at all, for many of the same reasons stated above for the seismic retrofit. The age of the tanks and vaults (approximately 35 years) would also tend to discourage retrofitting.

3.2.3 Reduce HLLW Storage Capacity Requirements

This alternative involves potential means of reducing HLLW storage capacity requirements that could allow decommissioning the five tanks (VES-WM-182 through VES-WM-186) without replacing some or all of their storage capacity. A reduction in HLLW storage capacity requirements could be possible if generation of waste could be reduced or if the waste calcining processing capacity or rate were increased.

An evaluation of Tank Farm capacity and storage requirements by Henry (1992) examined several decontamination and decommissioning (D&D) and/or RCRA closure scenarios to estimate the minimum future ICPP waste generation rates assuming discontinuance of ICPP spent nuclear fuel reprocessing. These scenarios conservatively did not include wastes generated from future spent fuel R&D activities or consider the ICPP's continuing function as the radioactive liquid waste treatment center for the INEL. The assumptions for this evaluation are detailed in Henry (1992) and were optimized in all cases to result in the minimum waste generation rates (e.g., maximum calciner processing rates, minimum waste blending ratios, minimum production of sodium wastes, minimum calciner outage frequency, etc.)

The results of the Henry (1992) evaluation demonstrated that discontinuance of spent nuclear fuel reprocessing at the ICPP will not eliminate generation of large volumes of radioactive liquid waste. In fact, the D&D and/or RCRA closure activities have the potential to generate even greater waste volumes. Based on the estimated waste generation rates using the optimized assumptions, the evaluation concluded that some new Tank Farm storage capacity would be required to replace decommissioned tanks so as to retain the needed independence of waste generation operations from the waste treatment operations. The decoupling of these operations is necessary to provide time to characterize the waste solutions, perform maintenance on the treatment/processing systems, and allow for recovery from equipment failure. Future tankage requirements will be driven largely by the projected quantities and schedule for waste generated during D&D of selected ICPP facilities.

4. AFFECTED ENVIRONMENT

This section summarizes pertinent background information regarding the affected environment of the ICPP/INEL and surrounding area (Figure 1.1). The limited nature of the proposed action, the confinement of the action within or in the close vicinity of the developed ICPP site, and preliminary studies (USDOE 1990b) have narrowed the focus for impact analysis. This section briefly covers biological resources; regional and socioeconomic setting; meteorology and climatology; cultural resources; geology and seismology; and hydrology. More detailed site characterizations are available from several recent sources including EG&G 1984, USDOE 1987a, USDOE 1988, USDOE 1990c, and USDOE 1991b. These references provide an extensive discussion of the environmental characteristics of the proposed site.

4.1 BIOLOGICAL RESOURCES

Extensive documentation of the terrestrial ecology, aquatic ecology, and threatened and endangered species at the ICPP and INEL characterize the area potentially affected by the proposed action (see above references). The proposed project area is to a great extent already developed and utilized for current ICPP operations. The limited area outside the ICPP fence that would be disturbed during construction is predominantly in the sagebrush vegetative community which is the dominant community type at the INEL. The most significant aquatic resource near the ICPP is the Big Lost River. The Big Lost River aquatic environment has been characterized as highly unstable with intermittent flows, and the fish habitat adjacent to the ICPP does not support sport fishing because of low and no-flow water conditions and channelization of the pre-existing riverbed. No threatened or endangered plants are found on the INEL. The bald eagle is the only listed threatened or endangered animal species of potential concern near the ICPP as determined by review of the U.S. Fish and Wildlife Service (FWS) Species List (USFWS 1992).

4.2 REGIONAL AND SOCIOECONOMIC SETTING

Based on the 1990 U.S. Bureau of the Census data, the population within 80 km of INEL is 118,644. The population within 80 km of the INEL is estimated to be 176,475 in the year 2020 (EG&G 1991a) based on a U.S. Bureau of the Census statistical extrapolation from the 1980 census population estimate (i.e., 110,268). Since the comparable 2020 population extrapolation for the 1990 census data is not presently available, the 1980 extrapolated value was used as the basis for the collective population dose estimates in Section 5.0 (Tables 5.1 and 5.5). Based on the known population increase during the 1980 to 1990 period, however, extrapolation of the 1980 census data to 2020 is conservative and represents a bounding estimate of the collective population doses.

The draft New Production Reactor environmental impact statement (USDOE 1991b), and its cited references, provide a comprehensive description of the socioeconomic and community characteristics (i.e., economic activity, population, housing, community services, fiscal structure, and quality of life) of the INEL area. Ninety-eight percent of INEL employees reside in a six county Region of Influence (ROI) surrounding the site within which most of the project's socioeconomic effects are likely to occur. INEL is the largest employer in the region with approximately 11,000 employees and a 1987 payroll of \$318 million. Total personal income in the region was approximately \$2.3 billion in 1986, with an average 1987 annual per-capita income of \$10,500.

Sixteen school districts provide public education services and facilities in the ROI, and with one exception, the larger school districts are operating either near or over capacity. The ten hospitals servicing the six county area are operating well below capacity. Public safety services are offered by a variety of state, county, and municipal agencies.

4.3 METEOROLOGY AND CLIMATOLOGY

The climate of the INEL exhibits semiarid steppe characteristics with generally low precipitation and humidity, rapid evaporation, and large daily and seasonal temperature ranges. Meteorological data have been collected by the National Oceanic and Atmospheric Administration and its predecessor agency, the U.S. Weather Bureau, at more than 45 locations at and near the INEL since 1949 (Clawson, et al. 1989). Meteorological and air quality data collected at the Grid III meteorological tower (61 m level), located 1.1 miles north northwest of the ICPP, have been used to establish the baseline for impact analysis (EG&G 1991a).

4.4 CULTURAL RESOURCES

Two cultural resource archival searches were conducted for the proposed and alternate parking lots and access road areas (Figure 1.2) resulting in a determination that cultural and archaeological resources are not present in these areas (Lowrey 1991 and Ringe 1991) (Appendix C).

4.5 GEOLOGY AND SEISMOLOGY

Subsoils at the site for the new HLLW storage tanks generally consist of thin surface layers of fill and natural sand, silt, and clay overlying a thick layer of relatively dense, sandy gravel. The gravel is underlain at a depth of approximately 45-ft by a basalt rock formation.

Although no major recorded earthquakes have originated beneath the INEL, large magnitude earthquakes do occur in the adjacent seismic areas. The largest earthquake recorded near the INEL was the Borah Peak earthquake that occurred on October 28, 1983 (magnitude 7.3 on the Richter scale). Peak ground accelerations measured at the INEL ranged from 0.022 to 0.078 g (Jackson 1987).

To ensure the capability to safely withstand potential seismic events, the proposed project would meet the Seismic Zone 2B design criteria of the Uniform Building Code (UBC) standard that is applicable

to the INEL (WINCO 1991a). In addition, those portions of the project that are classified as Moderate and High Hazard Facility Use Categories (as defined in Kennedy, et al. 1990) would be designed for Design Basis Earthquakes (DBEs) of 0.18 g and 0.24 g, respectively.

4.6 HYDROLOGY

The ICPP is located approximately 0.5 miles east of the Big Lost River. To prevent flood water from entering or damaging the proposed facilities, openings in the new HLWTRF Project structures at or below the Design Basis Flood (DBF) elevation would be sealed. The DBF represents a flood that would potentially result in a maximum water elevation of 4916.6 ft above sea level with a recurrence interval in excess of 10,000 years (Niccum 1973 and Koslow 1988). Since the design elevation of the HLWTRF Project is 0.4 foot higher (i.e., 4917 ft) than the DBF elevation of 4916.6 (WINCO 1991a), the proposed facilities would be protected from the worst case flooding conditions (Kennedy, et al. 1990).

The water table beneath the ICPP (the Snake River Plain Aquifer) is at approximately 450-ft below the surface and fluctuates seasonally and year-to-year. The Snake River Plain Aquifer has been designated as a sole source aquifer by the EPA (56 FR 50634, October 7, 1991) which supplies the drinking water in this area. Movement of water through the unsaturated zone underlying the ICPP is impeded by the presence of the sedimentary interbeds and sediment-filled fractures and vesicular zones of the basalt. Perched water has been found on these less-permeable layers at depths ranging from 40 to 377 ft (Thomas, 1988; Chipman 1989).

5.0 ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the environmental consequences that would potentially result from construction (Section 5.1), normal operation (Section 5.2), and accidents (Section 5.3) associated with the proposed action. Mitigation measures, cumulative impacts, irreversible and irretrievable commitment of resources, and decontamination and decommissioning and RCRA closure are discussed in Sections 5.4 to 5.7. The assessment focuses on those environmental impacts with the highest potential for significant consequences.

5.1 CONSTRUCTION

The potential impacts that could result from construction of the proposed HLWTFR Project are discussed in this section. Possible radiological impacts to workers and the public from construction in ECAs and demolition of, or modifications to, existing storage tank systems are assessed in Section 5.1.1. Air Quality impacts (Section 5.1.2), impacts on socioeconomic resources (Section 5.1.3), and other impacts (Section 5.1.4) from construction activities are also addressed in this section.

As described in Section 3.1.3, there would be a potential to encounter various types of contaminated wastes (i.e., radioactive, hazardous, mixed) during construction activities in the ECAs. Because the characterization of these areas is currently incomplete, there is some uncertainty as to the types, locations, and quantities of waste likely to be encountered. To eliminate these uncertainties, a characterization plan would be prepared and implemented to identify and quantify the wastes present in the construction areas (i.e., both ECA and non-ECA areas) prior to construction activities.

In the absence of complete characterization data for the construction site, the analysis of potential impacts associated with the generation, transportation, and disposal of the wastes excavated from construction areas was based on the supposition that hazardous and mixed wastes would not be discovered during construction activities. Although by definition, the HLLW released to these areas (see Shaffer 1993) would

be classified as a mixed waste due to the characteristic hazardous components (i.e., acidity and metals), the assumption of no hazardous or mixed waste in the ECAs is valid for two reasons. First, with the exception of two ECAs that would be disturbed by the proposed action, most, if not all, of the HLLW contaminated soil in the ECAs was cleaned up at the time of the accidental release. Second, existing characterization data for HLLW releases in ECAs adjacent to the Tank Farm has not provided any evidence of mixed or hazardous waste (USDOE 1991d). For these reasons, there is no basis to expect either hazardous or mixed wastes in these areas, and these wastes would not, therefore, be expected to be unearthed during construction in the ECAs. However, for the purpose of enveloping the EA analysis, a conservative estimate (based on engineering judgement) of mixed waste has been included in the quantity of construction wastes generated (see to Section 5.1.4.2).

The primary waste type classification expected to be generated during construction would be low-level waste (LLW) in the form of radioactively contaminated soil from excavation in the ECAs, and construction debris from valve box demolition activities. The volume of LLW expected to be produced during excavation in the ECAs was based on recent estimates compiled for all of the ICPP ECAs (Earle 1991). These estimates provide a conservative approximation of the anticipated volume of LLW in the ECAs to be disturbed by this project. The volume of LLW produced during the valve box demolition work was conservatively estimated based on the known dimensions of the structures.

5.1.1 Radiological

The radiological impacts that could potentially result from construction of the proposed HLWTFR Project are:

- Radiation exposure to workers during construction in ECAs and demolition of existing valve boxes, during transportation of excavated radiologically contaminated soil and other low-level waste to the RWMC, and during modifications to existing tank systems, including the installation of the equipment to remove the heel and to clean and dry the five tanks proposed for replacement (i.e., VES-WM-182 through VES-WM-186).

- Radiation exposure to the public from contaminated airborne dust during construction in ECAs, from transportation of excavated contaminated soil and other low-level waste to the RWMC, and from possible airborne releases from VES-WM-182 through VES-WM-186 during installation of equipment to remove the heel and to clean and dry these tanks.

The assessment of potential radiation exposure to workers and to the public during construction are presented below in Sections 5.1.1.1 and 5.1.1.2, respectively.

5.1.1.1 Occupational Exposures. This section first provides a brief overview of the administrative radiological controls at the ICPP followed by an assessment of the potential occupational exposure impacts associated with (1) construction work in the ECAs, (2) removal and disposal of radiologically contaminated soil and construction debris (e.g., LLW soil from ECAs and materials resulting from valve box demolition), and (3) modifications to existing tank piping systems including installation of equipment to remove the tank heel and to clean and dry the replaced tanks.

Construction worker exposure to radiation and radioactive contamination are closely monitored and administratively controlled at the ICPP. The objective of radiological control programs at the ICPP (WINCO 1989) is not only to maintain doses within occupational limits, but to maintain doses to individuals and the total workforce as low as reasonably achievable (ALARA) consistent with DOE requirements. The ICPP administrative dose guidelines limit occupational exposure to 1.8 rem per calendar quarter and 3.0 rem per calendar year which are more restrictive than the DOE Order 5480.11 limit of 5.0 rem annual effective dose equivalent.

To assess the potential magnitude of the ICPP occupational worker impact, worker exposure during construction activities in the ECAs was estimated. The analysis included the radiation dose from direct exposure and inhalation of airborne dust. The level of radioactive soil contamination was based on available data from the ECAs within the HLWTRF Project construction area. An effective dose equivalent (EDE) of approximately 3.7 person-rem was calculated (McCoy 1991) based on ECA

excavation activities taking approximately 2250 hours. The estimated man-hours assumed that excavation activities in the ECAs would require approximately 0.5 percent (ratio of contaminated to clean soil that would require hand excavation) of the total estimated excavation hours (United Engineers and Constructors 1989). Since the EDE would be distributed among involved construction workers, the maximally exposed worker would receive a dose that is well within the quarterly and annual ICPP administrative dose guides and the DOE Order 5480.11 limit for the individual worker.

Worker exposures during packaging, loading, and transporting the estimated 422 m³ of radioactive LLW soil to the RWMC have not been analyzed, but are expected to be small, and well within acceptable occupational exposure guidelines, due to strict adherence to administrative controls that are based on the ALARA principle. Administrative Dose Guides for workers are established at 300 rem per week. Worker doses from removal and disposal of an estimated 68 m³ of low-level waste resulting from demolition of existing valve boxes are also expected to be small due to these same administrative controls.

As described in Section 3.1.2, the proposed HLWTRF Project includes modifications to existing storage tank systems. Minor occupational exposures would be expected during these modifications, but would be carefully limited by administrative controls. During installation of heel removal equipment in the five tanks being replaced, the use of remote and robotic technologies, coupled with the installation and use of innovative shielding techniques, would maintain the exposures ALARA.

5.1.1.2 Public Exposures. This section summarizes the potential construction radiological exposure impact to the public resulting from (1) the offsite release of radioactive airborne dust, (2) the transportation of LLW, and (3) the installation of heel removal equipment in the existing tanks proposed for replacement.

Radiological effects on the public, as well as two onsite receptor locations within the INEL boundary, from radioactive airborne dust during

construction in the ECAs have been conservatively estimated (EG&G 1991a). A conservative source term of 2 curies per cubic meter was used, which is well above that expected in the estimated 422 m³ of contaminated soil to be excavated. The peak fugitive dust emission rate calculated for the air quality evaluation (see Section 5.1.2) was utilized as the basis for the radioactive airborne dust emission rate. The peak emission rate will last only four months, but it was conservatively assumed to last a full year. The CAP-88 computer code (USEPA 1990b) was utilized to model atmospheric dispersion and estimate doses using standard modelling assumptions and annual average meteorology. Health effects were calculated using a dose conversion factor of 4E-04 cancer fatalities per person-rem for occupational exposure (worker) and 5E-04 cancer fatalities per person-rem for public exposures.¹ The results are presented in Table 5.1. The total EDE for workers at CFA (1.0E-03 mrem) and TRA (5.2E-04 mrem) are well within the DOE occupational worker dose limit of 5 rem/y specified in DOE Order 5480.11. The offsite exposure of 1.1E-03 mrem for the Maximally Exposed Individual (MEI) is 0.01 percent of the National Emission Standards for Hazardous Air Pollutants (NESHAP) limit of 10 mrem/y (40 CFR 61 Subpart H). The MEI is a hypothetical individual that continuously resides at a location on the INEL site boundary where the individual would receive the maximum dose. The background exposure in southeast Idaho is 350 mrem (USDoe 1991e). The collective 80 km population dose is 5.2E-03 person-rem. The collective 80 km population health effects are 2.6E-06 LCF.

The dose to the public resulting from the transportation of low-level waste from the ECAs and other low-level waste from demolition

¹ Health risks are correlated with radiation dose by the use of a dose conversion factor which provides an estimate of the statistical latent cancer fatalities (LCF) that might occur in the person or population receiving the dose. The factors used in this environmental assessment are 4E-04 LCF/person-rem for workers and 5E-05 LCF/person-rem for the public. (U.S. Nuclear Regulatory Commission, 56 FR 23363, May 21, 1991). The dose conversion factor for the public is higher because it includes all age groups. These factors may be interpreted as meaning that there is statistical probability that of 0.0004 (worker) or 0.0005 (public) that an LCF would occur as a result of receiving a dose of one person-rem or, alternatively, that a dose of 2500 person-rem (worker) or 2000 person-rem (public) would result in one LCF on the average.

Table 5.1 Summary of Radiological Effects from Contaminated Airborne Dust During Construction of the Proposed HLWTFR Project^a

Receptor Location	^b Total Effective Dose Equivalent (mrem)	^e Health Effects
^a CFA	1.0E-03	4.0E-10
^b TRA	5.2E-04	2.1E-10
^c MEI	1.1E-03	5.5E-10
^d 80 km Population	5.2E-03 (person-rem)	^f 2.6E-06
<p>^a Central Facilities Area (CFA) at 4600 m SSW.</p> <p>^b Test Reactor Area (TRA) at 2400 m NW.</p> <p>^c Maximally exposed individual at the site boundary, located 14.8 km SSW.</p> <p>^d Collective population dose.</p> <p>^e Lifetime fatal cancer risk, i.e., the increased probability of fatal cancer in the exposed individual.</p> <p>^f Lifetime fatal cancer risk, i.e., the number of increased cancer fatalities in the 80 km population.</p> <p>^g Numbers in this and other tables in this document are expressed in scientific notation where, for example, 1E-04 is equal to 1×10^{-4}, or 0.0001.</p> <p>^h Total EDE (effective dose equivalent) is the sum of the 50-year CEDE (committed effective dose equivalent) from internal exposures and the EDE from external exposures for the assumed one year. For onsite workers (CFA and TRA) doses were calculated from inhalation, immersion, and contaminated ground surface pathways. For persons offsite (MEI and 80 km population) the ingestion pathway was also included.</p>		

of existing valve boxes to the RWMC was also assessed (EG&G 1991a). The disposal of the estimated 490 m³ of radioactive soil and other low-level waste would require approximately 45 trips between the ICPP and the RWMC (assumed distance per shipment is 15 km, see Figure 1.1). Transportation

of the radioactive soil and low-level waste would be conducted in accordance with U.S. Department of Transportation (DOT) regulations (49 CFR Parts 170-179). Impacts were calculated using the computer code RADTRAN 4.0 (Neuhauser and Readron 1989). The collective dose to members of the public was estimated to be $5.6E-04$ person-rem and no adverse health effects would be expected.

Installation of the heel removal equipment would utilize existing tank/vault penetrations and risers to provide access for the equipment and a tie-in point with existing HLLW transfer systems. Since the majority of the tank contents would have been removed using existing tank transfer systems prior to the equipment installation, and the tanks and vaults would be continuously under negative pressure during this process, the atmospheric release of radioactive material during equipment installation should be negligible.

5.1.2 Air Quality

Potential construction impacts on ambient air quality from fugitive dust, construction equipment exhaust, and diesel generator emissions were evaluated (EG&G 1991a). To conservatively bound potential air quality impacts during the entire construction period, air quality impacts were calculated during the 4-month excavation phase in the Tank Farm construction area when construction emissions would peak.

Fugitive dust would result from land clearing, site excavation, and wind erosion of disturbed areas. A peak fugitive dust emission rate for HLWTRF Project construction activities was calculated based on the size of the disturbed area, the time the area is disturbed, and EPA emission factors, with a 50 percent reduction for water sprinkling dust control, from AP-42 (USEPA 1985).

Engine exhaust emissions from operating heavy-duty diesel construction equipment were based on peak excavation activities involving three scrapers and one bulldozer. Peak and annual emission rates were calculated for carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides

(SO_x), and particulates using AP-42 emission factors for heavy-duty, diesel powered construction equipment.

Since diesel generators may be used for peak power loads during construction, peak and annual emission rates for CO, NO_x, SO_x, and particulates were calculated based on AP-42 emission factors for stationary large bore diesel engines. The maximum anticipated use is three days per year for eight hours per day, and the maximum anticipated diesel power rating is 2000 horsepower.

Air quality impacts were estimated for receptors located along US Highway 20/26, which is the closest public access point to the ICPP (approximately 6 km), and at the INEL southern boundary. Although the prevailing winds are from the south of the INEL, receptors along US Highway 20/26 or at the southern INEL boundary would, nonetheless, be exposed to the highest potential concentration of pollutants because of their close proximity to the emission source. The Industrial Source Complex Short-Term (ISCST) computer model (USEPA 1987) was used for the analysis. ISCST is the EPA-preferred steady-state Gaussian plume model. Additional detail regarding the construction air quality analyses is contained in EG&G 1991a.

Table 5.2 lists the maximum impacts on ambient air quality at US Highway 20/26 and the southern INEL boundary. The combined construction (fugitive dust, construction equipment exhaust, and diesel generator emission) and background concentrations are well within the Idaho ambient air quality standards for all pollutants and averaging times.

5.1.3 Socioeconomic

Construction of the proposed HLWTR Project would be expected to produce a small beneficial impact on the socioeconomic resources of the six county Region of Influence (ROI) surrounding the INEL through the creation of new employment opportunities for local and in-migrant workers. Using an employment multiplier of 2.36 (Hoffman, et al. 1986), peak direct (300) and indirect (410) employment would amount to approximately 710 persons, approximately one-half of 1 percent of

Table 5.2 Summary of Maximum Air Quality Impacts During Construction of the Proposed HLWTR Project

Pollutant	Averaging Time	Receptor Concentration ($\mu\text{g}/\text{m}^3$) ^a		Background ($\mu\text{g}/\text{m}^3$)	Background plus 20/26 Receptor Concentration ($\mu\text{g}/\text{m}^3$)	Background plus Site Boundary Receptor Concentration ($\mu\text{g}/\text{m}^3$)	Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$)	
		20/26	Site Boundary				Primary	Secondary
SO ₂	3-h	21	10	14 ^a	35	24	none	1300
	24-h Annual	4.4 < 0.1	1.9 < 0.1	8 ^a 0.2 ^a	12.4 < 0.3	9.9 < 0.3	365 80	none none
NO ₂	Annual	< 0.1	< 0.1	4.7 ^a	< 4.8	< 4.8	100	Same as Primary
CO	1-h	100	42	— ^b	100	42	40,000	Same as Primary
	8-h	32	11	— ^b	32	11	10,000	Primary
TSP	24-h Annual	26 0.2	11 < 0.1	88 ^c 40 ^c	114 40.2	99 < 40.1	260 75	150 60
	24-h Annual	12 < 0.1	5 < 0.1	32 ^d 14 ^d	44 < 14.1	37 < 14.1	150 50	Same as Primary

^a Source: "INEL Site Environmental Surveillance Data for the Fourth Quarter, 1989," April 1990. Samplers located at the intersection of Van Buren Blvd and U.S. Highway 20/26.
^b Background data are not available.
^c Source: Average of the 1989 monitoring data from TSP sampler at Central Facilities Area (R. G. Mitchell, personal communication).
^d Estimated using a PM-10/TSP ratio of 0.36 for fugitive dust.
^e The calculated concentrations at these receptors reflect the predicted concentration based on emission rates from fugitive dust, construction equipment exhaust, and diesel generator emissions only. Addition of the background concentration in column 5 to these receptor concentrations (columns 3 and 4) provides the total predicted concentration at the receptor locations as shown in columns 6 and 7.
^f Source: Rules and Regulations for the Control of Air Pollution in Idaho, IDAPA 16.01.1101.01.

employment in the ROI. Based on recent past analyses, the local infrastructure (e.g., housing and public services) would be able to accommodate the additional population associated with potential in-migrants without causing substantial impacts (USDOE 1988; Hoffman, et al. 1986; and USDOE 1991b). The small increase in construction traffic to and from the ICPP would not significantly increase the number of vehicle accidents based on an assessment in USDOE 1991b.

5.1.4 Other Impacts

Other environmental impacts resulting from the proposed action are expected to be minimal. The following subsections provide an assessment of the potential impacts on land use, threatened and endangered species, wetlands, floodplains, and cultural resources (5.1.4.1); impacts from disposition of wastes (e.g., radioactive, hazardous, mixed) generated during construction (5.1.4.2); impacts of wastewater generated during preoperational testing (5.1.4.3); impacts from heel removal, cleaning, and drying operations in the replaced tanks (5.1.4.4); and impacts associated with occupational injuries during construction (5.1.4.5).

5.1.4.1 Impacts on Land Use, Threatened and Endangered Species, Wetlands, Floodplains, and Cultural Resources. Impacts to land use would be limited to the areas outside the ICPP fence associated with the construction of the parking lot, access road, temporary warehouses, office trailers, and construction laydown and fabrication areas (approximately 15 to 20 ac) since other potential project areas are already developed. As determined through informal consultation with the U.S. Fish and Wildlife Service, impacts to the bald eagle, which is the only threatened or endangered animal species of potential concern near the ICPP, are not expected (Appendix B). Although areas within (i.e., sewage treatment ponds) and adjacent to the ICPP (i.e., the Big Lost River) have been identified as potential wetlands (USFWS 1991), these areas are not within the construction area. The construction area would also not be within the Big Lost River floodplain and an exclusion area would be maintained between the river channel and the construction area to prevent potential impacts on the Big Lost River aquatic environment. As noted in Section 4.4, impacts to cultural resources are not expected.

Impacts to cultural resources discovered during construction would be minimized through an avoidance procedure which would include stopping construction in the area, determining the significance of the resource, and, if required, consulting with the State Historic Preservation Officer (Lowrey 1991).

5.1.4.2 Impacts From Wastes Generated During Construction. As shown in Table 5.3, potential impacts from wastes produced during construction are expected to be small due to the small amounts of radioactive, hazardous, mixed, and construction wastes produced (Lord 1991). Approximately 422 m³ of low-level waste (LLW) would be generated by excavation of radioactive soil in the ECAs (Earle 1991). An additional 68 m³ of LLW would be generated during demolition of seven valve boxes and replacement of selected valve box hatch covers as described in Shaffer (1993). This waste would be disposed of at the RWMC, where it would represent approximately 15 percent of the 10 year annual average waste stream accepted (USDOE 1990a), and less than one-half of 1 percent of the remaining capacity (Wells 1991). It is expected that minimal amounts of liquid mixed waste (approximately 0.5 m³ from decontamination fluids), solid mixed waste (approximately 21 m³ from disturbed areas in ECAs), and hazardous wastes (approximately 20 m³ from solvent contaminated rags, primers and paint, and ammonium hydroxide) would be generated during construction. The estimate of solid mixed waste is conservative since existing data have not provided any indications for the presence of hazardous waste in the areas to be disturbed. Liquid mixed waste would either be stored off-site at an approved interim mixed waste storage area on the INEL, but outside of the ICPP facility area (see discussion of solid mixed waste below), or treated at the Process Equipment Waste (PEW) Evaporator where it would represent less than 1.0E-02 percent of annual throughput (Chinich 1991). Solid mixed wastes would be stored at the Special Power Excursion Reactor Test (SPERT) facility, which is an approved interim mixed waste storage area, pending development of treatment and disposal facilities. Hazardous wastes would be stored at a permitted RCRA hazardous waste treatment, storage, and disposal (TSD) facility.

Table 5.3 Summary of Wastes Generated by Construction of the Proposed HLWTR Project

Type of Waste	Proposed Action	Presently Generated at ICPP ^a
Solid Mixed Waste	21 m ³	5.7 m ³
Liquid Mixed Waste	0.5 m ³	N/A ^b
Solid Radioactive Waste		
Combustible ^d	42 m ³	1007 m ³
Compactible ^e	21 m ³	426 m ³
Non-compactible ^f	490 m ³	797 m ³
Hazardous Waste ^g	20 m ³	44 m ³
Solid Non-Radioactive Waste		
Clean Soil	24,000 m ³	NM ^c
Demolition Wastes	3,000 m ³	NM ^c
Transuranic Waste	0	6.9 m ³
Asbestos Waste	0	NM ^c
^a Data for calendar year 1990 ^b N/A - The volume of liquid mixed waste is included in the above solid mixed waste estimate ^c NM - Not monitored by the ICPP ^d Combustible materials include, for example, contaminated wood (i.e., used for construction of portable enclosures for valve box modifications) and clothing (anti-contamination or anti C's). ^e Compactible materials include, for example, contaminated polyvinyl-chloride (PVC) materials and small metal objects (i.e., shovels or other small excavation tools). ^f Non-compactible materials include, for example, contaminated soil, concrete, asphalt, etc. ^g Construction hazardous wastes would include solvent contaminated rags, primers and paints, and ammonium hydroxide (NH ₄ OH) from blueprint operations.		

Approximately 27,000 m³ of clean soil and rock and demolition waste would be generated during excavation activities and subsequently disposed of at the INEL landfill. Construction wastes would not contain asbestos materials since they are not present in the buildings to be demolished (MacConnel 1991) and would not be used in new construction.

No transuranic (TRU) waste would be anticipated in ECAs requiring disturbance. The documented TRU content in one area (ECA-CPP-26) (USDOE 1989) is below the INEL TRU waste acceptance criteria (USDOE 1987b) and, therefore, this waste would be classified as LLW.

5.1.4.3 Impacts From Wastewater Generated During Preoperational Testing.

Wastewater requiring treatment may also be generated during initial testing of the new HLWTR Project facilities. To verify the integrity of the primary containment vessels and transfer piping prior to hot startup, a preoperational integrated leak test would have to be performed on the proposed vessels, as well as the associated piping. This integrity evaluation could conservatively produce an estimated 500,000 gallons of potentially contaminated water (e.g., metals that may be leached from the vessel or piping surfaces) that may require some degree of treatment prior to discharge to the environment. Disposition of the water following integrity testing would be determined by chemically analyzing the water and either discharging directly to the service waste (i.e., if found to be within acceptable limits), or processing the water through the PEW and LET&D (i.e., if found to be contaminated). Appropriate actions would be taken to minimize the potential for contamination (e.g., cleaning of the tanks and piping prior to actual testing), and therefore eliminate a requirement to treat and/or process the water. No adverse environmental impacts to the groundwater would be expected since the chemical analyses and/or treatment of the water, prior to discharge, would ensure that all contaminants are below levels of regulatory concern.

5.1.4.4 Impacts From Heel Removal, Cleaning, and Drying Replaced Tanks.

The removal of the final approximately 5,000 to 20,000 gal of HLLW (i.e., the heel) from the five tanks proposed for replacement (VES-WM-182

through VES-WM-186) would be an existing, normal Tank Farm operation. The heel removal equipment that would be installed by the HLWTFR Project would tie into existing transfer systems. The heel, and subsequent HLLW produced during tank cleaning, would be transferred to the other Tank Farm storage tanks, the PEW, or directly to the NWCF using existing operating procedures, that include sampling of the waste to be transferred as appropriate. Drying of the tanks (passively or actively) would be performed after the tanks were cleaned and effluent air from drying would exit through the normal exhaust system. The removal of the heel, cleaning, and drying of tanks VES-WM-182 through VES-WM-186 is, therefore, encompassed in the normal operation of the existing Tank Farm and introduces no new environmental impact.

5.1.4.5 Impacts From Occupational Injuries. During construction, accidents could occur that would result in worker injuries and fatalities. The rate of occurrence of injuries and fatalities associated with DOE facilities is generally low in comparison to that of other industries. Based on the assessment in USDOE 1988, the number of injuries during HLWTFR Project construction would be less than 100. The injuries would be predominantly minor, such as cuts, bruises, and abrasions. There would be no expected fatalities.

5.2 NORMAL OPERATION

Following construction, testing, and startup, the four new tanks and other upgrades would be operated as an integral part of the ICPP Tank Farm. Normal environmental releases of radioactive and nonradioactive pollutants would occur from the new VOG system serving the four proposed new tanks and four of the existing tanks (VES-WM-187 through VES-WM-190). The emissions would be from the proposed new stack (see Section 3.1.1). There would also be emissions from periodic testing of the standby power diesel generator. Evaluation of these normal operation emissions are presented in Sections 5.2.1 (Radiological) and 5.2.2 (Air Quality). Other potential impacts of normal operation are addressed in Section 5.2.3.

5.2.1 Radiological

The radionuclide effluent source term from the new stack for normal operations was based on maximum operational HLLW storage volumes, bounding radionuclide compositions for the stored wastes, and conservative operational assumptions for the VOG system. The radiological emission estimate considered the release of radionuclides to the VOG system from volatilization of radioiodine and tritiated water vapor, as well as entrainment of nonvolatile radionuclides (particulates) in liquid droplets. A removal efficiency of $1.5\text{E-}08$ (net reduction due to filtration) was assumed for the particulates that are released through the VOG system (i.e., 90 percent efficiency for the prefilter, 99.97 percent efficiency for the first HEPA, and 99.95 percent for the second HEPA filter). No removal was assumed for radioiodine and tritium. This radionuclide effluent source term provides an upper bound estimate for the annual releases, from not only the four new tanks, but also from the four existing tanks connected to the new VOG. The twelve dominant radionuclides contributing greater than 99.99 percent of the offsite dose to the public are provided in a simplified source term listing shown in Table 5.4. A detailed description of the source term and supporting calculations can be found in Schindler 1991.

Table 5.4 Simplified Source Term for Normal Operation of the HLWTR Project*

Isotope	Atmospheric Release Rate (Ci/y)
H-3	2.27E+02
Sr-90	5.71E-07
Y-90	5.71E-07
Ru-106	7.61E-08
Rh-106	7.61E-08
I-129	6.77E-01
Cs-134	3.81E-07
Cs-137	5.71E-07
Ba-137m	5.71E-07
Ce-144	7.61E-07
Pr-144	7.61E-07
Pu-238	1.90E-09
* The complete source term listing can be found in Schindler 1991 or USDOE 1991c.	

The offsite radiological doses from normal operation of the new and four existing tanks, released to the atmosphere via the new stack, were evaluated for workers at three locations within the INEL boundary (at 100 m; at CFA, 4600 m SSW; and at TRA, 2400 m NW), for the Maximally Exposed Individual (MEI) (a hypothetical individual that continuously resides at a location on the INEL site boundary (i.e., 14.8 km SSW) where the individual would receive the maximum dose), and for the projected population in the year 2020 within 80 km of the ICPP. The CAP-88 computer code (USEPA 1990b) was utilized to model atmospheric dispersion and estimate doses using standard modeling assumptions and annual average meteorology (EG&G 1991a). Health effects were calculated using a dose conversion factor of 4E-04 cancer fatalities per person-rem for worker exposure and 5E-04 cancer fatalities per person-rem for public exposure.

The results of these analyses are summarized in Table 5.5. The results demonstrate that the estimated total effective dose equivalent (EDE) to workers at INEL is a small fraction of the DOE occupational (worker) dose limit of 5 rem/y specified in DOE order 5480.11. The calculated EDE dose for the MEI is $2.8\text{E-}01$ mrem/y, which is well below the National Emission Standards for Hazardous Air Pollutants (NESHAP) standard of 10 mrem/y (40 CFR Part 61 Subpart H). The comparatively higher EDE for the MEI (i.e., as opposed to the 100 m, CFA, and TRA onsite workers) reflects the assumed consumption of contaminated foodstuffs whereas the ingestion pathway is not considered for the onsite workers, who would not consume food grown onsite. The collective effective dose equivalent received by the population within 80 km is $1.9\text{E-}01$ person-rem/y. This low dose increment would result in an estimated $9.5\text{E-}05$ /y increase in cancer fatalities in the 80 km population.

A comparison was made of the maximum dose that an individual would receive from operations of the existing Tank Farm versus that following the proposed action. The calculations were based on previous findings (Schindler 1991, USDOE 1991c) which indicated that (1) I-129 is the dominant dose contributor from the Tank Farm emissions, and (2) the fractional release of I-129 is controlled primarily by the volume of airflow in the VOG system. Utilizing the maximum postulated air flows for the new and existing tanks, and assuming all other conditions are equal, the calculations show that approximately 37 percent of the I-129 inventory would be released following the proposed action as compared to the approximately 7.5 percent from the existing Tank Farm. Converting to an approximate dose, the EDE from the proposed and existing Tank Farm would be approximately $2.8\text{E-}01$ mrem/y and $6\text{E-}02$ mrem/y, respectively.

Although the emissions from the proposed action could increase the EDE for the MEI by a factor of five, the calculations for the proposed facility were based on conservative flow rate assumptions, and the actual operating flows are expected to be much lower. Moreover, the increase in the emissions is based entirely on the increased VOG flows associated with (1) a regulatory requirement to obtain a representative sample of the wastes, and (2) safety considerations to prevent the accumulation,

Table 5.5 Summary of Radiological Effects from Normal Operation

Receptor Location	^a Total Effective Dose Equivalent (mrem/y)	^a Health Effects
100 m	2.7E-02	1.1E-08
^c CFA	1.3E-02	5.2E-09
^b TRA	7.6E-03	3.0E-09
^e MEI	2.8E-01	1.4E-07
^d 80 km population	1.9E-01 (person-rem/y)	^f 9.5E-05
^a Central Facilities Area (CFA) at 4600 m SSW ^b Test Reactor Area (TRA) at 2400 m NW ^c Maximally exposed individual at the site boundary, located 14.8 km SSW. ^d Collective population dose. ^e Lifetime fatal cancer risk, i.e., the increased probability of fatal cancer in the exposed individual ^f Lifetime fatal cancer risk, i.e., the number of increased cancer fatalities in the 80 km population. ^g Total EDE (effective dose equivalent) is the sum of the 50-year CEDE (committed effective dose equivalent) from internal exposure and the EDE from external exposures for one year.		

and potential deflagration, of hydrogen in the tanks. In either case, both of the calculated doses are low compared with the existing standards and both are inconsequential from an environmental impact perspective.

5.2.2 Air Quality

Maximum ambient air effects of nonradiological pollutants were calculated for weekly testing of the new standby power diesel generator and normal emissions from the new VOG system. Emissions from the diesel generator would include NO_x, SO_x, CO, and particulates. Small quantities of toxic air pollutants (TAPs) would be released from the VOG system through the new stack as vapors and entrained liquid during normal

operation. Estimated peak and annual emission rates for the diesel generator were calculated using a maximum diesel power rating of 2000 horsepower, emission factors for stationary large bore diesel engines from AP-42 (USEPA 1985), and a maximum operation schedule of 2 hours per week, 52 weeks per year (EG&G 1991a). Maximum hourly and annual emission rates from the new stack were calculated in Schindler 1991 and conservatively did not take credit for a condenser that is currently in the VOG system design.

The Industrial Source Complex Short-Term (ISCST) computer model (USEPA 1987) was used to estimate the air quality impacts of nonradiological pollutant emissions during normal operation using standard modeling assumptions and annual average meteorology (EG&G 1991a). For the air quality modeling, receptors were located along US Highway 20/26 on the INEL and at the southern INEL boundary. The receptor along US Highway 20/26 represents the closest public access point and is specifically required by the State of Idaho (i.e., Idaho Air Quality Bureau). The receptor at the southern INEL boundary, based on annual average meteorology, represents the point of maximum potential air pollutant concentration. Specific details of the air quality modeling protocol and calculated emission rates are provided in EG&G 1991a and Abbott 1991.

The results of the analyses are presented in Tables 5.6 and 5.7. Based on these results, the nonradiological air pollutants released from the periodic testing of the diesel generator and the VOG system emissions from the new stack would have a minimal impact on air quality. In comparison to the Idaho ambient air quality standards and TAP standards, the estimated addition to the ambient concentrations at either US Highway 20/26 or the nearest INEL boundary is several orders of magnitude below the standards.

Table 5.6 Summary of Air Quality Effects from Normal Operation of the Standby Diesel Generator

Pollutant	Averaging Time	Receptor Concentration ^b ($\mu\text{g}/\text{m}^3$)		Background ($\mu\text{g}/\text{m}^3$)	Background Plus 20/26 Receptor Concentration ($\mu\text{g}/\text{m}^3$)	Background Plus Site Boundary Receptor Concentration ($\mu\text{g}/\text{m}^3$)	Idaho Standard ($\mu\text{g}/\text{m}^3$) ^e	
		20/26 ^a	Site Boundary ^b				Primary	Secondary
SO ₂	3-h	9.8	5.0	14 ^c	23.8	19	none	1300
	24-h	2.0	1.0	8 ^c	10	9	365	none
	Annual	1.6E-03	6.3E-04	0.2 ^c	0.2	0.2	80	none
NO ₂	Annual	1.4E-02	5.4E-03	4.7 ^f	4.7	4.7	100	Same as Primary
CO	1-h	60	23	-- ^d	60	23	40,000	Same as Primary
	8-h	11	4.9	-- ^d	11	4.9	10,000	Primary
TSP	24-h	1.7	0.78	88 ^g	90	89	260	150
	Annual	1.4E-03	5.4E-04	40 ^g	40	40	75	60
PM-10	24-h	1.7	0.78	32 ^f	34	33	150	Same as Primary
	Annual	1.4E-03	5.4E-04	14 ^f	14	14	50	Primary

^a Maximum location on US Highway 20/26 approximately 6 km SW of ICPP

^b Site boundary location where the concentration is the highest

^c Source: "INEL Site Environmental Surveillance Data for the Fourth Quarter, 1989," April 1990. Samplers located at the intersection of Van Buren Blvd. and U.S. Highway 20/26.

^d Data not available

^e Source: Average of the 1989 monitoring data from TSP sampler at Central Facilities Area (R. G. Mitchell, personal communication)

^f Estimated using a PM-10/TSP of 0.36 for fugitive dust

^g Source: Rules and Regulations for the control of Air Pollution in Idaho, IDAPA 16.01.1101.01.

^h The calculated concentrations at these receptors reflect the predicted concentration from the new standby diesel generator only. Addition of the background concentration in column 5 to these receptor concentrations (columns 3 and 4) provides the total predicted concentration at these receptor locations as shown in columns 6 and 7.

Table 5.7 Summary of Air Quality Effects From New Stack Emissions During Normal Operation

Pollutant	Averaging Time	Receptor Concentration ($\mu\text{g}/\text{m}^3$)		Background ($\mu\text{g}/\text{m}^3$)	TAP Standard ($\mu\text{g}/\text{m}^3$)
		20/26 ^a	Site Boundary ^b		
HNO ₃	8-h	4.2E-2	2.4E-2	-- ^c	50
HF	8-h	3.0E-3	1.8E-3	-- ^c	25
Hexone	8-h	5.4	3.1	-- ^c	2050
Hg	8-h	2E-13	1E-13	-- ^c	0.1
Cd ^d	8-h	2E-12	1E-12	-- ^c	5.6E-4
Cr	8-h	1E-13	8E-14	-- ^c	5
Ni ^e	8-h	7E-17	4E-17	-- ^c	4.0E-3
Pb ^f	8-h	2E-16	1E-16	-- ^c	1.5
Zr	8-h	1.4E-11	8.3E-12	-- ^c	50
Mn	8-h	2.7E-16	1.6E-16	-- ^c	10

^a Maximum location on US Highway 20/26 approximately 6 km SW of ICPP
^b Site boundary location where the air concentration is the highest
^c Background data are not available for the TAP
^d TAP - Toxic Air Pollutant Standard expressed as 1/100 of the Occupational Exposure Limit (OEL)
^e Probable human carcinogens. The State of Idaho TAP policy for Cd and Ni is the Acceptable Ambient Level for a Carcinogen (AALC) that corresponds to an increase in cancer risk of 1.0E-06. For inorganic Pb dust, the AALC has not yet been published; the current Pb OEL is 150 $\mu\text{g}/\text{m}^3$.

5.2.3 Other Impacts

Table 5.8 presents a summary of the estimated volumes of solid mixed waste, solid radioactive waste, hazardous waste, solid nonradioactive wastes, and liquid mixed waste generated during normal operation of the Tank Farm now and after the proposed action (Lord 1991). Solid radioactive waste volumes are expected to substantially decrease because of the proposed action. This reduction would principally result from the new remote maintenance features that would substantially reduce the requirement for contaminated area entry and inspection of existing valve boxes. Because the existing solid radioactive waste volumes in the Tank Farm are produced primarily through valve box maintenance activities and virtually all of this work would be performed remotely following the proposed action, the radioactive wastes subsequent to this action would decrease to a small fraction of the existing level. A small volume of solid mixed waste (1-2 m³) could be produced during periodic HEPA filter replacement. Disposition of these wastes would be handled in accordance with existing State and federal regulations. The volume of hazardous waste, solid nonradioactive waste, and liquid mixed waste would remain unchanged.

Table 5.8 Summary of Wastes Generated Annually During Normal Operation of the ICPP Tank Farm Now and Subsequent to the Proposed Action

Waste Type	Existing Tank Farm Waste Volumes (m ³)	Subsequent to Proposed Action Waste Volumes (m ³)
Solid Mixed Waste ^a	^b	1-2
Solid Radioactive Waste ^c		
Combustible	73	3
Compactible	31	2
Non-Compactible	58	3
Hazardous waste ^d	15	15
Solid Nonradioactive Waste ^e	5	5
Liquid Mixed Waste ^f	2	2
^a Solid mixed waste would principally include HEPA filters ^b Because a common set of HEPA filters serve not only the Tank Farm, but other ICPP facilities as well, the estimated volume of solid mixed waste that would result from the Tank Farm contribution (i.e., HEPA filter changeout) cannot be readily calculated. The estimated fraction of solid mixed waste from the existing Tank Farm is, however, assumed to be very low and certainly less than 1 m ³ ^c Solid radioactive waste would include contaminated materials generated primarily during valve box maintenance ^d Hazardous waste would include RCRA wastes (e.g., chromate solutions used as a corrosion inhibitor in cooling systems) ^e Solid nonradioactive waste would include uncontaminated materials such as paper, boxes, etc. utilized during routine operation of the facility ^f Liquid mixed wastes would include decontamination solutions		

5.3 ACCIDENTS

This section describes the radiological and nonradiological impacts from postulated accidents. Because the design of the HLWTR Project incorporates numerous redundant safety features, most of the analyzed events would have a low probability of occurring during the design life of the facility. Nonetheless, accidents with the highest potential for releasing substantial quantities of radionuclides and hazardous pollutants to either the atmosphere or the groundwater were analyzed, and these accidents provide a conservative approximation of the consequences for unplanned releases from the proposed action.

The accidents cover a spectrum that ranges from anticipated events that may occur once or more during facility life, unlikely events that may occur but are not expected during facility life, design basis accidents, and hypothetical bounding accidents. The analyses include two construction accidents, four operating accidents, an accident resulting from a design basis earthquake, and a hypothetical bounding accident (HBA). The construction, operating, and design basis earthquake accident scenarios are described in Section 5.3.1. The analysis methodology for these seven accidents is summarized in Section 5.3.2, and the results and conclusions are discussed in Section 5.3.3. The HBA is addressed in Section 5.3.4. Complete details of the accident consequence analyses are contained in WINCO 1991d, f (source term calculations); EG&G 1991a, b (radiological modeling); Golder 1991 (hydrogeological modeling); and Rood 1991a, b, c (nonradiological modeling and HBA analysis).

5.3.1 Accident Scenario Descriptions

A summary of the postulated construction, operating, and design basis earthquake accident scenarios is presented in Table 5.9. A brief description of each accident is presented below.

5.3.1.1 Transportation. During construction, the radiologically contaminated soil (LLW) removed from the ECAs would be transported to the RWMC for disposal. The LLW soil is assumed to contain no hazardous constituents (refer to Section 5.1 for basis) and would be packaged and

Table 5.9 Summary of Postulated Credible Accidents During Construction and Operation of the Proposed HLWTR Project

Postulated Accident	EA Section	Estimated Probability of Occurrence (per year)	Initiating Event	Potential Consequences	Preventive or Mitigative Features*
Transportation	5.3.1.1	2.6E-06	Transport carrier accident during shipment of low-level waste	Airborne release and exposure to site workers and the public	Adherence to DOT shipping regulations; limited travel on public highway
Tank/Vault Leak	5.3.1.2	1.0E-03	An operator error during construction blasting produces shock waves capable of rupturing existing tank/vault	Unmitigated release of HLLW to the groundwater	Blasting conducted in accordance with civil engineering plan; structural integrity of site structures evaluated to withstand anticipated blasting shock; alternative excavation techniques to blasting would be implemented as required to preclude event
Valve Box Leak	5.3.1.3	1.0E-02	Valve failure in valve box	Release of volatile radionuclides to the atmosphere	Batch transfers limit volume; portable enclosures with HEPA filtration would mitigate release; leak detection present in valve box; releases terminated upon detection.
HEPA Filter Fire	5.3.1.4	2.6E-04	An internal, external, or earthquake induced HEPA filter fire	Release of HEPA filter particulate inventory to the atmosphere	Limitations on the quantities of flammable liquids in facility; fire protection systems for the HEPA filters; dedicated fire department and emergency teams at the INEL
Hydrogen Deflagration	5.3.1.5	<1.0E-07	Buildup and ignition of radiolytic hydrogen	Destruction of the primary vessel and VOG HEPA filters; release of HEPA filter particulate inventory to the atmosphere	Hydrogen monitors and alarms in each tank; hydrogen dilution air system maintains H ₂ concentration below lower explosive limit (4 percent)
Criticality	5.3.1.6	2.8E-06	Critical mass forms in an optimum array	Atmospheric release of noble gases, other fission products, and HLLW entrained in the criticality steam	Process waste controlled upstream to limit U-235 concentration; primary tank sump is designed geometrically favorable; periodic removal of sludge would limit occurrence
Earthquake	5.3.1.7	1.0E-04	Earthquake induced damage to VOG and ventilation systems	Displacement of VOG filters; unmitigated release to atmosphere	VOG system designed to withstand 0.18 g earthquake
* The ICPP and INEL emergency response plans will also minimize the consequences from accidents					

transported in accordance with the applicable DOT and DOE regulations for radioactive wastes. During the shipment of these wastes, the transport route crosses a public highway with unrestricted access. In modeling this accident, it was assumed that (1) a shipment of low-level waste is being transported from the ICPP to the RWMC and an accident occurs, (2) the low-level waste on the carrier conservatively contains the entire estimated waste volume from ECA-CPP-31 which is documented to potentially contain the most bounding volume of radioactivity in the construction area (i.e., approximately 8.0 m^3 with an assumed activity of 31 Ci/m^3), and (3) a portion of the material is released in aerosol form and is assumed to travel away from the immediate vicinity of the accident in a particulate plume. This accident was modeled as a ground level radiological release and the worker or individual near the accident was assumed to be exposed to the plume for the entire duration (EG&G 1991b).

5.3.1.2 Tank/Vault Leak. Blasting during construction could produce shock waves capable of threatening the integrity of the existing 300,000 gal HLLW tanks and associated pillar-and-panel containment vaults (i.e., VES-WM-182 through VES-WM-186). Damage to the tanks and vaults could result in a leak to the subsurface soil and subsequently to the groundwater, either through fractures in the degraded vault panel seals or via a complete rupture of the secondary containment vault. For this accident, it is assumed the blasting of the bedrock during site preparation causes a rupture in one of the existing 300,000 gal primary containment tanks, releasing the entire contents of the tank to the secondary containment vault. The tank is at full capacity with existing wastes when the accident occurs. The composition and radionuclide concentrations for the existing waste are conservatively assumed to be identical to the proposed 100 watt/m^3 waste in the new tanks, except for I-129 which reflects actual measurements. Since the existing tank vaults do not have vault ventilation, there is no atmospheric release. The vault sump jet is assumed to remain intact following the accident. The plant operators would have immediate indication of the failed tank and begin transferring the contents of the leaking tank and vault sump to a spare tank at a rate of 50 gal/min. In modeling this event, it is assumed that 5 percent of the vault seals fail and the liquid head

pressure of the waste in the vault changes linearly with the rate at which the waste is transferred to an empty tank and the rate at which the waste is lost through the failed vault seals.

The accident was modeled as a groundwater release for two separate cases. First, it was assumed that the vault develops cracks in the panel seals and that the release rate from the vault varies over time in proportion to the head pressure of the liquid in the vault and the capacity of the soil to absorb the liquid released. Second, it was assumed that the construction blasting results in a catastrophic failure of both the primary and secondary containment structures. In this case, no mitigative measures (e.g., the vault sump) are assumed present and the entire 300,000 gal of waste is lost to the subsurface.

5.3.1.3 Valve Box Leak. This accident is assumed to occur in a valve box during the transfer of HLLW into or out of a HLLW storage tank. It is assumed that (1) a valve bonnet in a valve box leaks and the HLLW is released into the valve box containment and collected in the valve box sump, (2) the volume of air ($1.53\text{E}+05$ liters) in the valve box becomes saturated with the volatile constituents I-129, H-3, and HNO_3 , HF, and hexone (3) all of the HLLW that leaks into the valve box is transferred back to one of the HLLW storage tanks and only the saturated vapor remains, and (4) the entrainment of non-volatile (particulates) radionuclides into the valve box air is assumed to be negligible since there is no aerosol mechanism and the discharge through the ventilation system is HEPA filtered.

The accident was modeled as a stack release that begins when the valve box hatch is removed for entry and inspection. Because the atmosphere of the vault is continuously maintained at a slight negative pressure and the vault is interconnected with the valve boxes via the secondary containment for the transfer lines, removal of a valve box hatch would create a pathway by which the contaminated air could be transported to the stack. The saturated air vapor is therefore released into the tank vault via the line encasements, and discharged to the

atmosphere out the new stack following the valve box hatch removal. The duration of the release is 15 minutes.

5.3.1.4 HEPA Filter Fire. A fire in the VOG HEPA filters has been postulated to occur via three different mechanisms including (1) an external fire (e.g., a fuel oil storage facility (CPP-701A) fire), (2) an internal fire (e.g., vehicle fire), and (3) an earthquake induced fire. It is assumed for this accident that one of these initiating events occurs, that no mitigative features are present, and that the fire is allowed to burn until the HEPA filters are completely consumed.

The VOG contains two redundant filtration trains in parallel with each train containing three filters in series. All filters in the operable train are assumed to be fully loaded, with the contact exposure readings on the prefilter, first HEPA, and second HEPA of 25 R/h, 2.5 R/h, and $3.5\text{E-}02$ R/h, respectively (the total inventory of activity released from the filters is therefore based on approximately 28 R/h). Since operational constraints would normally limit the buildup of radioactivity on the filters to less than 500 mR/h, the assumption of maximum loading on the filters is conservative. The particulate inventory on the filters is released into the atmosphere and the event is modeled as an unmitigated stack release over a duration of 30 minutes. It is assumed that the VOG, following the 30 minute interval, would either be bypassed to the standby VOG HEPA train or the vault ventilation HEPA filters, thereby terminating the unmitigated release.

5.3.1.5 Hydrogen Deflagration. A hydrogen deflagration in a HLLW storage tank has been postulated to occur via the buildup and ignition of radiolytic hydrogen in the air space overlying the HLLW. This event is classified as a beyond the design basis accident with a probability of occurrence of less than $1.0\text{E-}07$. Although this accident is extremely unlikely and preventive features would be specifically designed and installed to prevent conditions that would allow this event, the accident is nonetheless postulated to have sufficient force to rupture the primary tank and destroy all three stages of filters (i.e., 1-prefilter and 2-HEPA filters) in the VOG. The entire volume of HLLW in the primary tank is released into the secondary containment. It is assumed that the

secondary containment and the concrete vault remain intact, thus eliminating potential release to the groundwater.

The event is modeled as a series of three unmitigated releases. The first release is associated with the destruction of the VOG filters and the release of the radiogenic and non-radiogenic filter inventories, as well as the release of the vapors (saturated with I-129, H-3, HNO_3 , HF and hexone) in the tank void space to the atmosphere. This release is assumed to occur over a 1 minute duration. The second is associated with the generation of an aerosol (with the same composition as the HLLW) at the time of the deflagration, and the release (unmitigated) of the aerosol over a period of 15 minutes. The last release assumes that the vault containment air becomes 10 percent saturated with volatile vapors following the release of the tank contents to the secondary containment. Although the airborne vapor concentrations in the vault would decrease exponentially over time with respect to the vault air exchange rate (i.e., approximately one air volume exchange per hour), it is conservatively assumed that the vapor concentrations are maintained at steady state (i.e., at 10 percent) during the time required to transfer the contents of the ruptured tank to a spare tank (i.e., 10,000 minutes). This saturated vault air is discharged out through the vault ventilation system over a period of 10,000 minutes.

5.3.1.6 Criticality. A criticality has been postulated to occur in one of the new 500,000 gal tanks by one of two mechanisms: (1) transfer of concentrated uranium solutions from other ICPP facilities, and (2) accumulation of the uranium bearing solids (UBSs) into an optimum array. The initiating event for either scenario is a criticality that results from the accumulation of a sufficient mass of U-235 in a geometrically unsafe configuration in the primary containment vessel. The atmospheric release of noble gas fission products, other fission products, as well as HLLW aerosol entrained in the steam, was evaluated for both criticality events (i.e., solution transfer and solids accumulation). For the solution criticality, it is assumed that (1) a critical mass forms an optimum array during a waste transfer operation with 60 inches of HLLW waste present in the tank, (2) a criticality

occurs resulting in the total release of $3E+19$ fissions over a duration of 16 minutes, (3) the criticality and subsequent boiling occurs in a 1.5 m^3 sphere resulting in the fractional release of I-129, H-3, and HNO_3 , and (4) the criticality and boiling produce an entrained aerosol with the same composition as the HLLW. The release of noble gases, fission products, and entrained aerosol is modeled as an exponential release based on the calculated residence time for the gases in the tank.

For the solids criticality, it is assumed that (1) a critical mass forms an optimum array during solids removal and all HLLW has been removed from the tank, and (2) a criticality occurs resulting in the total release of $1E+19$ fissions over a duration of 16 minutes. The release of noble gases and fission products is modeled as an exponential release based on the calculated residence time for the gases in the tank. It is assumed in both criticality events that there will be no structural damage to the containment structures or equipment. This assumption is based on the absence of such effects during the three criticalities that have occurred at the ICPP (CPP-601 facility) complex in the past.

5.3.1.7 Earthquake. The VOG and ventilation exhaust system in the proposed action would be designed as Moderate Hazard Use (0.18 g earthquake) and Low Hazard Use (UBC Seismic Zone 2B) facilities, whereas the primary containment and secondary containment system, as well as the concrete superstructure, would be designed for a 0.24 g earthquake (High Hazard Use Facility). It is postulated that an earthquake greater than 0.18 g, but less than 0.24 g ground acceleration, could damage the VOG and ventilation system without affecting the integrity of the HLLW containment system (i.e., primary and secondary). This accident postulates that (1) the prefilters and HEPA filters in both the VOG and ventilation systems are displaced from their filter housings during the earthquake, (2) that the filter housings in both the VOG and ventilation systems remain intact, and (3) that the particulate inventory on the filters is physically removed from the filters and released into the atmosphere during the earthquake event. The degraded VOG system is assumed to remain on-line for six operational tanks (i.e., three new and three existing). The release mechanism for this accident includes HLLW

entrainment in the VOG air and the release of the particulate inventory from the pre- and HEPA filters. The event is modeled as an unfiltered and unmitigated stack release over a duration of 30 days. The 30-day release interval is a highly conservative approximation of the time required for maintenance personnel to repair the degraded VOG system.

5.3.2 Analysis Methodology

With the exception of the tank/vault leak, the radiological and nonradiological consequences for the accidents were evaluated using the RSAC-4 computer code (Wenzel 1990a). Conservative meteorology (stability class F, 2 m/s wind speed) (Start 1989) and fumigation conditions, as appropriate, were assumed. The radiological impacts were evaluated at three onsite receptor locations (100 m, CFA, and TRA) and the Maximally Exposed Individual (MEI) at the nearest site boundary (13.7 km). The 100 m and nearest site boundary receptors were evaluated in the nonradiological impact analysis.

The results of the radiological consequence analysis were evaluated with respect to the DOE Order 6430.1A guideline (0200-1.3 Radiological Siting Guidelines) of 25 rem and the DOE Order 5480.11 limit of 5 rem for occupational workers. An acute dose in the range of 5 to 25 rem would not be expected to cause any significant or observable health effects in an exposed individual. The 25 rem dose guideline from DOE Order 6430.1A is not, however, intended to imply that this dose constitutes an acceptable limit for an emergency dose to the public under accident conditions. Rather, this value is a reference value that can be used in the evaluation of non-reactor facility design and site evaluations with respect to potential accidents of exceedingly low probability of occurrence and low risk of public exposure to radiation.

The results of the nonradiological consequence analysis were evaluated with respect to the following exposure criteria: Threshold Limit Value - Time Weighted Average (TLV-TWA), Threshold Limit Value - Short Term Exposure Limit (TLV-STEL), and the Immediately Dangerous to Life or Health (IDLH). The TLV-TWA is defined as the time-weighted average concentration for a normal eight hour work day and 40 hour work

week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effects. The TLV-STEL is defined as a 15 minute time-weighted average exposure which should not be exceeded at any time. The IDLH is defined as the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without experiencing any escape-impairing or irreversible health effects. In addition, mercury has a ceiling limit which is the concentration that should not be exceeded for any period of time. These criteria are only applicable to the worker. The State of Idaho has used 1/100 TLV-TWA as a measure of acceptability for members of the general public for routine, non-accident releases. This guidance was used as a measure of severity in this analysis.

The tank/vault leak was modeled as a groundwater release. The vertical transport through the vadose zone (unsaturated interbed and basalt) and migration of the radiological and nonradiological contaminants in the Snake River Aquifer were modeled. Transport in the vadose zone was computed from a one-dimensional vertical transport model that accounted for liquid/solid phase partitioning during migration through the subsurface. Migration of the contaminants in the Snake River Aquifer was calculated using an analytical solution (i.e., TPLUME) for contaminant transport in a uniform field flow. The analytical solution accounts for advection in one dimension and dispersion in three dimensions, and thus assumes a uniform unidirectional flow field. Consequences of these releases were evaluated at two receptor locations located hydraulically down gradient from the proposed project site and included a drinking water well at the Central Facilities Area (5 km) and a municipal water supply well at Atomic City (18 km). Specific details regarding the modeling approach, assumptions, and transport systematics can be found in Golder 1991.

5.3.3 Results and Conclusions

Sections 5.3.3.1 and 5.3.3.2 present the radiological and nonradiological results, respectively, for the accidents, except the results of the tank/vault leak which are presented in Section 5.3.3.3.

5.3.3.1 Radiological Consequences. Table 5.10 summarizes the radiological effects from the accidents analyzed (EG&G 1991a and b). The results show that the total effective dose equivalents (EDEs), even at 100 m, are below the DOE 5 rem occupational dose limit. The total EDEs to the MEI were well below the DOE 25 rem guideline. The MEI doses are dominated by the ingestion dose which is not applicable to onsite workers. Since interdiction of contaminated foodstuffs is an integral part of the INEL emergency plans, the MEI dose in the event of an accident would be reduced still further. Adverse health effects that would result from these postulated accidents are expected to be minimal.

5.3.3.2 Nonradiological Consequences. The nonradiological consequences from the postulated accidents are summarized in Table 5.11. The calculated air concentrations for mercury (Hg), cadmium (Cd), chromium (Cr), nickel (Ni), lead (Pb), zirconium (Zr), manganese (Mn), nitric acid (HNO₃), hydrofluoric acid (HF), and hexone were below the regulatory limits for all accidents, except for the Hg concentration at the 100 m receptor for the hydrogen deflagration (32 m stack case only). During the initial release pulse (1 minute) of this accident, the calculated Hg concentration at the plume centerline was 0.11 mg/m³ which slightly exceeds the 0.10 mg/m³ ceiling limit. This conservatively calculated result assumed:

- 100 percent release from the HEPA filters whose Hg loading was maximized.
- 95 percent meteorology, i.e., 95 percent of the time atmospheric dispersion conditions would be better and would lower the calculated Hg air concentration.

Table 5.10 Summary of Radiological Effects from Postulated Accidents

Accident Scenario	Total Effective Dose Equivalent (rem) ^a				Health Effects (number) ^b			
	Onsite Worker at 100 m	Onsite Worker at TRA	Onsite Worker at CFA	MEI ^c	Onsite Worker at 100 m	Onsite Worker at TRA	Onsite Worker at CFA	MEI ^c
Transportation	5.4E-03	3.3E-05	1.5E-05	9.5E-05	2.2E-06	1.3E-08	6.2E-09	4.8E-08
Valve Box Leak	4.5E-06	6.5E-08	3.8E-08	1.1E-04	1.8E-09	2.6E-11	1.5E-11	5.5E-08
HEPA Filter Fire	1.3	1.9E-02	1.1E-02	6.6E-02	5.2E-04	7.6E-06	4.4E-06	3.3E-05
Hydrogen Deflagration	1.2	1.7E-02	9.8E-03	3.0E-01	4.8E-04	6.8E-06	3.9E-06	1.5E-04
Criticality-Solution	3.1	1.9E-02	7.5E-03	1.4E-02	1.3E-03	7.6E-06	3.0E-06	7.0E-06
Criticality-Solids	4.0E-01	2.6E-03	1.1E-03	3.1E-03	1.6E-04	1.0E-06	4.4E-07	1.6E-06
Earthquake	1.9	2.7E-02	1.5E-02	4.5E-02	7.6E-04	1.1E-05	6.0E-06	2.3E-05

^a Total EDE (effective dose equivalent) is the sum of the 50-year CEDE (committed effective dose equivalent) from internal exposures and the EDE from external exposures

^b Health effects are defined as the latent cancer fatalities. A conversion factor of 4E-4 cancer fatalities/person-rem for worker exposure and 5E-4 cancer fatalities/person-rem for public exposure was used for this analysis.

^c MEI - The maximally exposed individual at the nearest site boundary, located 13.7 km south from the ICPP

Table 5.11 Summary of Nonradiological Effects from Postulated Accidents

Accident Scenario	Contaminant	Release Duration	Release Rate (g/s)	Peak Receptor Concentration (mg/m ³) ^a				Exposure Criteria (mg/m ³)			
				100 m Receptor		13.7 km Site Boundary Receptor		TLV-TWA ^{b,i}	TLV-STEL ^{c,j}	IDLH ^{d,k}	Ceiling ^e
				32 m stack	65 m stack	32 m stack	65 m stack				
HEPA Filter Fire	Cd Hg Cr Ni Pb Zr Mn	0-30 min	7.8E-03	4.8E-02 ^a	2.4E-02 ^a	1.3E-04 ^b	6.3E-05	1.0E-02	---	---	---
			6.1E-04	3.8E-03	1.9E-03	1.0E-05	5.0E-06	1.0E-02	3.0E-02	---	1.0E-01
			4.7E-04	2.9E-03	1.4E-03	3.1E-05	1.5E-05	5.0E-02	---	2.5E+02	---
			2.0E-03	1.2E-03	6.1E-04	1.32E-05	6.5E-06	1.0E-01	---	---	---
			2.4E-04	1.5E-03	7.4E-04	1.6E-05	7.8E-06	1.5E-01	---	---	---
			2.7E-02	1.7E-03	8.3E-02	1.8E-03	8.8E-04	5.0E+00	1.0E+01	5.0E+02	---
			6.0E-04	3.7E-03	1.8E-03	4.0E-05	1.9E-05	1.0E+00	3.0E+00	1.0E+04	---
Hydrogen Deflagration	HNO ₃ HF Hexone Cr Ni Pb Zr Mn Cd Hg Cd Hg Cr Ni Pb Zr Mn HNO ₃ HF Hexone	0-1 min	5.2E-01	3.2E+00	1.6E+00	8.5E-03	4.2E-03	5.2E+00	1.0E+01	2.5E+02	---
			1.4E-03	8.7E-03	4.3E-03	9.3E-05	6.5E-05	2.6E+00	2.6E+00	2.6E+01	---
			2.0E+00	1.2E+01	6.1E+00	1.3E-01	6.5E-02	2.05E+02	3.08E+02	2.0E+4	---
			1.4E-02	8.7E-02 ^a	4.3E-02	9.3E-04	4.6E-04	5.0E-02	---	2.5E+02	---
			6.0E-03	3.7E-02	1.8E-02	4.0E-04	2.0E-04	1.0E-01	---	---	---
			7.1E-03	4.4E-02	2.2E-02	4.7E-04	2.3E-04	1.5E-01	---	---	---
			8.1E-01	5.0E+00 ^a	2.5E+00	5.4E-02	2.6E-02	5.0E+00	1.0E+01	5.0E+02	---
			1.8E-02	1.1E-01	5.5E-02	1.2E-03	5.9E-04	1.0E+00	3.0E+00	1.0E+04	---
			2.3E-01	1.4E+00 ^a	7.1E-01 ^a	3.8E-03 ^b	1.9E-03 ^b	1.0E-02	---	---	---
			1.8E-02	1.1E-01	5.6E-02 ^a	3.0E-04 ^b	1.5E-04 ^b	1.0E-02	3.0E-02	---	1.0E-01
		1-16 min	2.8E-04	2.0E-03	8.5E-04	4.6E-06	2.3E-06	1.0E-02	---	---	---
			2.2E-05	1.4E-04	6.8E-05	3.7E-07	1.8E-07	1.0E-02	3.0E-02	---	1.0E-01
			1.7E-05	1.1E-04	5.2E-05	1.1E-06	5.5E-07	5.0E-02	---	2.5E+02	---
			7.0E-06	4.4E-05	2.5E-05	4.7E-07	2.3E-07	1.0E-01	---	---	---
			8.3E-06	5.2E-03	2.9E-03	5.5E-07	2.7E-07	1.5E-01	---	---	---
			9.5E-04	5.9E-03	2.9E-03	6.3E-05	3.1E-05	5.0E+00	1.0E+01	5.0E+02	---
			2.1E-05	1.3E-04	6.4E-05	1.4E-06	6.8E-07	1.0E+00	3.0E+00	1.0E+04	---
			1.6E-02	1.0E-01	4.9E-02	---	---	5.2E+00	1.0E+01	2.5E+02	---
		1-10,000 min	1.4E-03	8.7E-03	4.3E-03	9.3E-05	4.6E-05	2.5E+00	2.6E+00	2.6E+01	---
			2.0E+00	1.2E+01	6.1E+00	1.3E-01	6.5E-02	2.05E+02	3.08E+02	2.0E+04	---
Criticality	HNO ₃ HF Hexone	0-16 min	1.0E+00	6.3E+00 ^a	3.1E+00	1.7E-02	8.1E-03	5.2E+00	1.0E+01	2.5E+02	---
			2.4E-03	1.5E-02	7.4E-03	1.6E-04	7.8E-05	2.5E+00	2.6E+00	2.6E+01	---
			1.5E+00	9.3E+00	4.6E+00	9.9E-02	4.9E-02	2.05E+02	3.08E+02	2.0E+04	---

Table 5.11 (Contd.) Summary of Nonradiological Effects from Postulated Accidents

Accident Scenario	Contaminant	Release Duration	Release Rate (g/s)	Peak Receptor Concentration (mg/m ³)*				Exposure Criteria (mg/m ³)			
				100 m Receptor		13.7 km Site Boundary Receptor		TLV-TWA ^{b,i}	TLV-STEL ^u	IDLH ^{d,j}	Ceiling ^g
				32 m stack	65 m stack	32 m stack	65 m stack				
Earthquake ^l	Cd	0-30 d	3.9E-06	2.4E-05	1.2E-05	6.4E-08	3.1E-08	1.0E-02	---	---	---
	Hg		3.1E-07	1.9E-06	9.4E-07	5.1E-09	2.5E-09	1.0E-02	---	---	1.0E-01
	Cr		2.3E-07	1.4E-06	7.0E-07	1.5E-08	7.5E-09	5.0E-02	---	2.5E+02	---
	Ni		1.0E-07	6.2E-07	3.1E-07	6.6E-09	3.3E-09	1.0E-01	---	---	---
	Pb		1.2E-07	7.5E-07	3.7E-07	7.9E-09	3.9E-09	1.5E-01	---	---	---
	Zr		1.3E-05	8.1E-05	4.0E-05	8.6E-07	4.2E-07	5.0E+00	1.0E+01	5.0E+02	---
	Mn		3.0E-07	1.9E-06	9.2E-07	2.0E-08	9.8E-09	1.0E+00	3.0E+00	1.0E+04	---
Valve Box Leak	HNO ₃	0-15 min	5.6E-04	3.4E-03	1.7E-03	9.2E-06	4.5E-06	5.2E+00	1.0E+01	2.5E+02	---
	HF		2.8E-04	1.7E-03	8.6E-04	1.9E-05	9.1E-06	2.5E+00	2.6E+00	2.6E+01	---
	Hexone		2.5E-01	1.6E+00	7.7E-01	1.7E-02	8.1E-03	2.1E+02	3.1E+02	2.0E+04	---

^a Both the 32 m and 65 m stack heights were modeled to bound potential design.
^b Threshold Limit Value - Time Weighted Average (8-hour) (ACGIH 1990).
^c Threshold Limit Value - Short Term Exposure Limit (15-minute) (ACGIH 1990).
^d Immediately Dangerous to Life and Health (USDHHS 1985).
^e The American Conference of Governmental and Industrial Hygienists (ACGIH) has assigned a "ceiling" Limit for Hg; the ceiling limit is the concentration in air that should not be exceeded for any period of time.
^f The HNO₃ concentration for either stack height release at the 13.7 km site boundary was bounded by the initial release rate of 5.17E-01 g/s for the hydrogen deflagration (i.e., 0-1 min release).
^g The concentration when averaged over the regulatory time limit (i.e., eight hour for TLV-TWA or 15 minutes for TLV-STEL) did not exceed the concentration limit.
^h These concentrations were below 1/100 of the TLV-TWA value when time averaged over eight hours.
ⁱ For certain contaminants, the exposure criterias (i.e., TLV-TWA, TLV-STEL, IDLH) are classified according to whether the contaminant exists as a dust, metal or is water soluble. In all cases, the most conservative criteria are reported in this table.
^j The effluent source term for the Earthquake accident includes (1) the release of the particulate inventory from the HEPA filters over a 30-min period, and (2) the unmitigated release of HLLW entrained in the V06 airstream over a 30-day period (refer to Section 5.3.1.7). Since the consequences of the 30-min HEPA filter release are identical to the HEPA Filter Fire accident (see Section 5.3.1.4), only the peak receptor concentrations for contaminants associated with the 30-day release are presented here.

- Fumigation conditions, which occur between 2 and 4 percent of the time at ICPP (Wenzel 1990b). Without fumigation conditions, the plume from the stack release would not reach ground level at the 100 m location.

Considering the conservative source term and the additional conservatism of worst case atmospheric dispersion and fumigation conditions at the time of the accident, a more realistic assessment of this event would result in an air concentration lower than the ceiling limit. Details of the calculations and assumptions are found in Rood 1991a and c.

5.3.3.3 Radiological and Nonradiological Consequences of the Tank/Vault Leak. The results from the groundwater modeling of the tank/vault leak are presented in Tables 5.12 and 5.13 (Golder 1991).

Of five identified nonradioactive constituents which could pose a potential for possible health hazards in groundwater, only two (nitrate and sulfate) were found to have a potential to be transported to the receptor sites. The other modeled constituents (cadmium, lead, and mercury) would not reach the receptor locations at concentrations that would pose an unacceptable health risk or that would exceed current regulatory water quality standards.

Table 5.12 provides a comparison of the calculated concentrations of nitrate and sulfate versus three drinking water standards. As shown in Table 5.12, the concentrations of nitrate and sulfate would not exceed current drinking water regulatory standards or risk-based health criteria. Even when the concentration of nitrate that already exists in the aquifer (reported in the past at about 18 mg/L at CFA) is added to the accident concentration, this conclusion is unchanged.

The only radionuclides calculated to reach the downgradient receptor locations were tritium (H-3), technetium-99 (Tc-99), and iodine-129 (I-129). Other modeled radionuclides (e.g., strontium-90, cesium-134 and -137, and plutonium-238) would be adsorbed in the solid phase and would not reach the aquifer. Table 5-13 provides a comparison of the calculated concentrations of H-3, Tc-99, and I-129 versus two risk based

Table 5.12 Summary of Nonradiological Effects From the Tank/Vault Leak Accident

Analyte	Calculated Concentration (mg/L)				Drinking Water Standards (mg/L)		
	Joint Leak Scenario		Rupture Scenario		Concentrations in Drinking Water at Primary MCL	Concentrations in Drinking Water at Oral Reference Dose	Other Drinking Water Quality Criteria
	Onsite Well 5 km Downgradient	Offsite Well 18 km Downgradient	Onsite Well 5 km Downgradient	Offsite Well 18 km Downgradient			
Nitrate	1.5	0.4	12.4	3.4	44	37	---
Sulfate	0.03	0.01	0.23	0.06	---	---	250
<ul style="list-style-type: none"> • Primary maximum contaminant level (MCL), 40 CFR 161 • This is the chronic concentration which is the amount of a chemical that even a sensitive individual could be exposed to over a lifetime without developing associated adverse health effects. It is calculated using standard residential exposure parameters (OSWER Directive No. 9285.6-03) and a reference dose of 1 mg/kg/day (USEPA, 1991. Integrated Risk Information System). • Secondary maximum contaminant level (MCL), 40 CFR 143 							

Table 5.13 Summary of Radiological Effects From the Tank/Vault Leak Accident

Radionuclide	Calculated Concentration (Ci/L)				Drinking Water Concentration (Ci/L) Associated with a 1.0E-06 Cancer Risk Using:		Drinking Water Maximum Contaminant Level (MCL) ^c
	Joint Leak Scenario		Rupture Scenario		ICRP-26-30 ^a	EPA Unit Risk ^b	
	Onsite Well 5 km Downgradient	Offsite Well 18 km Downgradient	Onsite Well 5 km Downgradient	Offsite Well 18 km Downgradient			
H-3	3.2E-08	5.0E-09	2.7E-07	4.2E-08	3E-09	4E-10	2E-08
Tc-99	2.0E-09	5.8E-10	1.7E-08	4.8E-09	1E-10	2E-11	4E-09
I-129	4.1E-13	1.2E-13	3.4E-12	9.6E-13	7E-13	1E-13	2E-11
^a Drinking water concentration (Ci/L) that represents a 1.0E-06 mortality risk due to cancer based on ICRP-26 risk factor of 1.0E-02/100 rems and ICRP-30 annual limit of intake.							
^b Drinking water concentration (Ci/L) that represents a 1.0E-06 excess cancer risk based on EPA Pathway-Specific Unit Risk.							
^c MCLs for man-made radionuclides are established in 40 CFR 141 and radionuclide concentrations in drinking water shall not produce an annual dose equivalent greater than 4 mrem/year.							

level (MCL) standard. The calculated concentrations of H-3, Tc-99, and I-129 exceed the most restrictive EPA Unit Risk concentration for both the tank/vault joint leak and rupture accident scenarios at both receptor locations. The least restrictive MCL standard is also exceeded for H-3 and Tc-99 in the tank/vault rupture scenario at both receptor locations. These results indicate that the radioactive constituents released to the soil, and that subsequently migrate to the groundwater following a tank/vault leak accident, could adversely impact the drinking water quality downgradient from the ICPP. Because of this finding, mitigative measures would be required to preclude the adverse impacts of one of the existing tanks/vaults being damaged during blasting for construction of new tanks. Mitigative measures (see Section 5.4) to prevent damage during blasting include analyses of blast effects, blasting plans, and possibly use of non-explosive demolition agents.

5.3.4 Hypothetical Bounding Accident

To ensure the accident risks from the proposed action are acceptably enveloped in this EA, a hypothetical bounding accident (HBA) was analyzed (Rood 1991b and c). The event is a hydrogen deflagration accident, similar to the deflagration described in Section 5.3.1.5, but with the additional assumption of loss of secondary containment integrity. Loss of secondary containment integrity may result in release of HLLW to the concrete containment vault structure and possibly direct release to the atmosphere of limited quantities of HLLW in the form of an aerosol. The probability of this HBA would be in the $1.0\text{E-}07$ to $1.0\text{E-}8$ range (WINCO 1991g).

Failure of the secondary containment vessel/liner following a postulated hydrogen deflagration which ruptures the primary tank would result in HLLW releases to the concrete containment vault structure. The concrete vault would contain the HLLW until it was transferred to one of the spare tanks maintained for such emergencies. No HLLW release to the soil is expected because the vault structure (basement, walls, and ceiling) would be designed as a reinforced concrete structure in accordance with American Concrete Institute (ACI) Standard 318. Reinforcing details at construction joints would be designed to assure

structural integrity across all joints. Some minor surface cracking is anticipated due to concrete shrinkage and design stresses, but ACI provisions limit the size and depth of these cracks so that significant flow paths would not develop through the reinforced concrete.

Direct release of HLLW to the atmosphere as a result of the hydrogen deflagration is not expected. For the HBA, however, it is assumed that HLLW is released, via an opening in the containment vault structure ceiling, into the Weather Enclosure Building (WEB) constructed over the vault, and from there to the environment. At the instant of the deflagration, it is postulated that the integrity of the primary and secondary containment systems is violated, and that HLLW is released from the ruptured primary vessel and entrained into the WEB. It is assumed that the pathway from the vault structure to the WEB is through a vault hatch that was either open at the time of the accident or displaced during the deflagration (e.g., by generated missiles). It is conservatively assumed that the HLLW release into the WEB instantly produces the maximum aerosol concentration of 100 mg/m^3 (Elder, et al. 1986) in the entire air volume space (i.e., $5.1\text{E}+04 \text{ m}^3$). The contaminated cloud is then assumed to be unencumbered by the WEB and is dispersed as a ground level release using the methodology and assumptions described in Section 5.3.2.

Table 5.14 presents the results of the HBA radiological and nonradiological consequences. The results in Table 5.14 add the effects of the aerosol release to the results in Tables 5.10 and 5.11 for the design basis hydrogen deflagration accident. As seen in Table 5.14, the onsite ICPP radiation dose would potentially cause some minor adverse health effects. However, considering the probability of the accident ($1.0\text{E}-07/\text{y}$) and the calculated latent cancer fatalities ($7.2\text{E}-04$), the risk is $7.2\text{E}-11$ cancer fatalities per year for the onsite worker at 100 m. The doses at CFA, TRA, and to the MEI are less than the DOE 25 rem siting guideline and below the DOE 5 rem occupational dose limit.

The MEI dose is dominated by the ingestion pathway and the INEL emergency plans would ensure a substantial reduction in this dose (i.e.,

Table 5.14 Summary of Radiological and Nonradiological Effects from the HBA

Radiological Effects								
Exposure Group		Total EDE ^a (rem)			Health Effects ^b			
Onsite Worker at 100 m		1.8E+00			7.2E-04			
Onsite Worker at TRA		4.8E-01			1.9E-04			
Onsite Worker at CFA		2.3E-01			9.2E-05			
MEI ^c		1.3E+00			6.5E-04			
Nonradiological Effects								
Contaminant	Receptor Location	Receptor Concentration (mg/m ³)			Exposure Criteria (mg/m ³)			
		Peak	15-min Average	8-hr Average	TLV-TWA ^d	TLV-STEL ^e	1/100 TLV-TWA ^f	Ceiling ^g
Cd	100 m	1.6E+00	9.9E-02	11.4E-04	1.0E-02	---	---	---
	13.7 Km	4.2E-03	--- ^h	1.6E-05	---	---	1.0E-04	---
Hg	100 m	1.2E-01	7.3E-03	2.4E-04	1.0E-02	3.0E-02	---	1.0E-01
	13.7 Km	3.3E-04	--- ^h	1.2E-06	---	---	1.0E-04	1.0E-01
Cr	100 m	4.4E+00	2.9E-01	9.2E-03	5.0E-02	---	---	---
	13.7 Km	1.4E-03	9.6E-05	3.0E-06	---	---	5.0E-04	---
Ni	100 m	1.9E+00	1.3E-01	3.9E-03	1.0E-01	---	---	---
	13.7 Km	6.1E-04	4.1E-05	1.3E-06	---	---	1.0E-02	---
Pb	100 m	2.2E+00	1.5E-01	4.6E-03	1.5E-01	---	---	---
	13.7 Km	7.2E-04	4.8E-05	1.5E-06	---	---	1.5E-03	---
Zr	100 m	2.5E+02	1.7E+01	5.3E-01	5.0E+00	1.0E+01	---	---
	13.7 Km	8.2E-02	5.5E-03	1.7E-04	---	---	5.0E-02	---
Mn	100 m	5.6E+00	3.7E-01	1.2E-02	1.0E+00	3.0E+00	---	---
	13.7 Km	1.8E-03	1.2E-04	3.8E-06	---	---	1.0E-02	---
HNO ₃	100 m	4.7E+00	3.5E-01	1.1E-01	5.2E+00	1.0E+01	---	---
	13.7 Km	1.3E-02	--- ^h	---	---	---	5.0E-02	---
HF	100 m	4.2E+00	2.9E-01	1.7E-02	2.6E+00	2.5E+00	---	---
	13.7 Km	5.7E-04	1.2E-04	9.4E-05	---	---	2.6E-02	---
Hexone	100 m	3.2E+01	1.4E+01	1.3E+01	2.05E+02	3.08E+02	---	---
	13.7 Km	1.3E-01	1.3E-01	1.3E-01	---	---	2.05E+00	---

a Total EDE (effective dose equivalent) is the sum of the 50-year CEDE (committed effective dose equivalent) from internal exposures and the EDE from external exposures

b Health effects are defined as latent cancer fatalities and a conversion factor of 4E-4 cancer fatalities/person-rem for worker exposure and 5E-4 cancer fatalities/person-rem for public exposure was used for this analysis

c MEI - The maximally exposed individual at the nearest site boundary, located 13.7 km S from the ICCP

d Threshold Limit Value - Time Weighted Average (8-hour) (ACGIH 1990); only applicable to the 100 m receptor

e Threshold Limit Value - Short Term Exposure Limit (15-minute) (ACGIH 1990); only applicable to the 100 m receptor

f State of Idaho has assigned 1/100 TLV-TWA as a measure of acceptability for members of the general public for routine, non-accident conditions. This guidance was used as a measure of severity to the public in this analysis.

g The American Conference of Governmental and Industrial Hygienists (ACGIH) has assigned a "ceiling" limit for Hg; the ceiling limit is the concentration in air that should not be exceeded for any period of time.

h There are no applicable limits or guidelines that apply to a 15-min average concentration at the maximum site boundary location (13.7 km).

i The 8-hr concentration is bounded by the peak concentration that is less than 1/100 of the TLV-TWA of 5.0E-02 mg/m³.

conservatively 90 percent).

The nonradiological effects of the HBA would also result in some adverse health effects to onsite ICPP workers. The risk again would be very low and with credit for onsite emergency response, protection offered by building, etc., the health effects would be limited. The concentrations of nonradiological contaminants at the site boundary are below the applicable health limits. Emergency response actions would also be expected to evacuate offsite personnel, if necessary, in the approximate 2 hours it would take the plume to reach the site boundary.

Although the consequences of the HBA would result in some adverse health effects to onsite ICPP workers, the risk to onsite workers is very low. There would be minimal adverse radiological or nonradiological health effects on other INEL workers or offsite.

5.4 MITIGATION MEASURES

Due to the high level of environmental consideration given to design and construction for the proposed action, only minimal mitigation measures would be necessary to protect the environment during construction. These construction mitigation measures are described below and would be imposed in the construction contracts.

- **Cultural Resources:** If cultural resources are encountered during construction, construction would be stopped in that area until appropriate mitigation measures are determined in consultation with the State Historical Preservation Officer, if required.
- **Soil and Erosion:** Surface disturbance would be minimized through design and construction staff training. Impacts from erosion and runoff would be mitigated by adopting measures such as diversion, retention of flow, etc. as required. Vehicle maintenance would be restricted to previously disturbed areas.
- **Construction Restrictions:** No excavation or construction activities would be allowed within the Big Lost River channel. An exclusion area would be maintained between the channel and construction activities (exclusion area would provide a separation distance of approximately 400 ft. at the nearest approach).

- **Construction Area Characterization:** A sampling and analysis plan would be developed and implemented to identify and characterize hazardous and/or radioactive material contamination that may exist in ECAs and other areas to be disturbed by HLWTFR Project construction.
- **Vegetation:** Following construction, areas previously covered with native vegetation would be revegetated. Topsoil and associated seed sources would be separated from other spoil and replaced at surface level during backfilling operations.
- **Worker Radiological Safety:** Worker exposure to radiation and radioactive contamination would be strictly monitored and controlled in accordance with the WINCO Radiological Control Manual (WINCO 1989), especially during construction in ECAs.
- **Hazardous Waste Safety:** Consistent with the requirements of 29 CFR 1910.120, construction personnel that would be required to perform hazardous waste operations or be exposed to hazardous substances would complete the necessary Hazardous Waste Operations and Emergency Response training course(s). Appropriate safety and health control equipment and procedures would protect site personnel from identified hazards.
- **Air Quality:** Disturbed areas would be watered during construction to mitigate fugitive dust emissions.
- **Construction Blasting:** The requirement for stringent blasting limitations or prohibition would be determined through detailed geotechnical studies that would analyze potential structural effects from blasting on the existing tank containment vaults. The geotechnical studies would utilize state-of-the-art techniques to determine whether the existing containment vaults could accept the dynamic forces resulting from the proposed blasting. If the results of these studies demonstrate that the vaults are structurally capable of resisting the intensity of the blasting-induced motions, a detailed construction excavation plan would be required and provide the necessary control measures and constraints during any identified blasting. Alternatives to blasting are available and practical (e.g., non-explosive demolition agents) and would be used, if required, to preclude adverse impacts to the public and on existing ICPP facilities. These actions would mitigate potential for release to the aquifer resulting from damage to the existing tanks during blasting for new tank construction.

The proposed project design integrates features sufficient to mitigate the potential impacts from normal operations. Impacts from postulated accidents would also be acceptably prevented or mitigated by design and operating requirements with the incorporation of the potential blasting restrictions during construction described above. The acceptability of the facility design and operating requirements will be demonstrated in the safety analysis report (SAR).

5.5 CUMULATIVE IMPACTS

The radiological and air quality assessments in Sections 5.1 and 5.2 show that the effects from construction and normal operation of the proposed action are a small fraction of regulatory limits. The cumulative radiation dose equivalent from all atmospheric releases from the entire INEL is reported annually in environmental reports (e.g., DOE 1992). In addition to these reported doses, the effects of several major proposed actions (including the HLWTFR Project), would add to the cumulative dose. Radiological doses from existing and major planned INEL activities are shown in Table 5.15. Data presented in Table 5.15, exposures from cumulative INEL emissions, are considered to be radiologically low values. It should also be noted that the MEI locations are different for each INEL facility, so exposures are not additive. As can be seen from Table 5.15, exposures from cumulative INEL emissions will be quite low.

Cumulative impacts associated with construction waste would be minimal because of the small volume of wastes estimated to be generated (Table 5.3). Impacts to the capacity of the RWMC from storage of contaminated debris that would be disposed of from construction (approximately 490 m³) would represent less than 1 percent of remaining capacity.

Cumulative socioeconomic impacts during construction would not be expected since existing or proposed major construction projects would not significantly compete for construction workers at the same time. The proposed HLWTFR Project peak construction work force of 250 to 300 workers is relatively small and is expected to be generally accommodated by the regional labor pool. There is an ongoing expansion of the work force supporting environmental restoration activities at the INEL. Because the growth of this environmental restoration work force would be steady and long term, there should be minimum cumulative effects with the proposed HLWTFR Project.

Table 5.15 Cumulative Radiological Doses from Existing and Planned INEL Activities

Activity/Facility	EDE	
	MEI (mrem/y)	Population (person-rem/y)
Present INEL	4.1E-03 ^a	-- ^b
RWMC Retrieval and Remediation	1.3E-01 ^d	2.7E-01
Test Reactor Area Evaporation Basin	1.6E-04 ^a	-- ^b
WERF		
Incineration	< 9.6E-02 ^f	<3.7E-01
Compaction, sizing	< 6.8E-02 ^f	<2.E-01
HLWTFR	1.1E-03 ^e	5.2E-03
Total	<3.0E-01	<8.5E-01
a. Calculated value based on measured emissions (DOE 1992) b. Not calculated in DOE 1992 c. Calculated values based on maximum release scenarios d. Staley 1992a - includes Pit 9, Waste Characterization Facility, and Waste Storage Facility e. DOE 1991f f. Staley 1992b		

Because the proposed action would replace or upgrade existing ICPP Tank Farm facilities there would be no significant cumulative effects subsequent to the construction, testing, and startup of the new facilities. The reduction in waste generated during normal operation (Table 5.6) would have a positive cumulative impact.

5.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed action minimizes irreversible or irretrievable commitments of resources. Most of the land areas are already developed and development of areas with native vegetation is minimized (approximately 15 to 20 ac). The materials used to construct the new facilities would not be available for other purposes, but are not in short supply, and the quantities are relatively small and would have no significant effect on local or national supplies. The resources required

for operation of the new facilities would be relatively small and would not significantly affect supplies. No significant use of scarce or strategic material would be required for the construction or operation of the proposed HLWTR Project.

5.7 DECONTAMINATION AND DECOMMISSIONING AND RCRA CLOSURE

The proposed new facilities (tanks, containment vaults, ancillary systems, and piping system upgrades) and the five tanks and piping systems being taken out of service would eventually require decontamination and decommissioning (D&D) and RCRA closure. DOE Order 5820.2A establishes the policies and guidelines for the management and D&D of radioactively contaminated facilities. DOE is also committed to compliance with RCRA requirements and to manage radioactively contaminated facilities in a safe, cost effective manner to assure that release of and exposure to radioactivity and other hazardous materials comply with federal and State standards.

In accordance with DOE Orders 5820.2A and 6430.1A, Section 1300-11, the new facilities would be designed to facilitate D&D (see Shaffer 1993). D&D of the proposed new facilities and the five tanks and piping systems that would be taken out of service would be included in an overall site D&D plan. Projections of impacts specific to the proposed action and existing tanks and piping systems have not been made. However, impacts from D&D are expected to be small due to the required planning and reviews of D&D actions and the rigorous procedures that would be adopted once the D&D method(s) is (are) selected. In addition, it is expected that D&D technology will continue to improve with time, resulting in even lower potential impacts than would be estimated at this time. The future specific action for D&D of the proposed new facilities and the existing Tank Farm facilities being taken out of service will be covered by a separate NEPA review.

The existing five tanks and piping systems are currently operating under RCRA part A interim status as per the requirements of 40 CFR 265. The proposed new and modified facilities would be operated under Part A interim status, or RCRA 40 CFR 264 following application and receipt of a Part B permit for the Tank Farm. Both 40 CFR 264 and 40 CFR 265 require that RCRA closure activities be conducted. These activities would be integrated with the D&D program to ensure that (1) all potentially hazardous and radioactive materials have been removed from the site to eliminate the escape or migration of waste decomposition products to the environment, and (2) the need for post-closure maintenance and control is minimized. Closure activities of the replaced facilities would be in accordance with a RCRA closure plan (40 CFR 265.112) as approved by the State of Idaho after the required public review and comment period (40 CFR 265.112(d)4). Upon receipt of the RCRA Part B permit, the closure activities of the Tank Farm, including the proposed new facilities, would be guided by the closure plan portion of the RCRA Part B Permit. The RCRA Part B permit would be approved by the State of Idaho after the required public review and comment period (40 CFR 124.10).

6.0 REQUIRED PERMITS, APPROVALS, AND CONSULTATIONS

This chapter lists the required permits, approvals, and consultations associated with construction and operation of the proposed HLWTFR Project. Appendices A, B, and C provide additional information and the status of those permits, approvals, consultations, and other regulatory compliance items.

Required air quality permits and approvals for the HLWTFR Project include:

- National Emission Standards for Hazardous Air Pollutants (NESHAP) approval from the EPA.
- A Prevention of Significant Deterioration (PSD)/Permit to Construct (PTC) from the Idaho Department of Health and Welfare, and
- A Permit to Operate (PTO) from the IDHW.

The proposed HLWTFR project would require disturbance of a number of Environmentally Controlled Areas (ECAs). Disturbance of ECAs may require coordination and notification of the EPA, and the State of Idaho in accordance with the CERCLA-based INEL FFACO.

In accordance with the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection act informal consultation is required with the U.S. Fish and Wildlife Service regarding the proposed project impacts on threatened and endangered species.

The ICPP is currently operating under RCRA interim status. Preparation of a RCRA Part B permit would also be required for the proposed facility.

Cultural resource investigations of the proposed project areas to be disturbed are required by the National Historic Preservation Act.

Consultations with U.S. Department of Interior Fish and Wildlife Service (refer to letter in Appendix C) in September 1991 and semiannual followups. Consultations with state of Idaho Department of Environmental Quality-Personal meetings.

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APPENDIX A

REQUIRED PERMITS, APPROVALS, AND CONSULTATIONS

This appendix summarizes the required permits, approvals, and consultations associated with construction and operation of the proposed HLWTFR Project. The sections that follow provide a brief discussion of each regulatory compliance item.

A.1 NOTICE OF NONCOMPLIANCE WITH THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

On January 29, 1990, the U.S. Environmental Protection Agency (EPA) issued a Notice of Noncompliance (NON) under RCRA to the U.S. Department of Energy Idaho Operations Office (DOE-ID). NON violation number 20 is applicable to this project as it alleges that the eleven existing high level liquid waste (HLLW) tanks/vaults and ancillary equipment (e.g., transfer lines, valve boxes) at the Idaho Chemical Processing Plant (ICPP) Tank Farm are out of compliance with RCRA due to incompatibility of the secondary containment with the waste handled, in violation of 40 CFR Part 265.193(c)(1) (USEPA 1990a).

The Idaho Department of Health and Welfare (IDHW), EPA and DOE agreed during a settlement conference in mid-1990 that resolution of the NON would be resolved by execution of a Consent Order between the IDHW and DOE, and as concurred and approved by the EPA. The Consent Order was signed into effect during March/April 1992, and as specified therein, resolution of the alleged NON violation number 20 requires the DOE to either (a) cease permanent use of selected transfer lines, valve boxes, and tanks/vaults in the Tank Farm within scheduled deadlines, and/or (b) upgrade the existing systems (i.e., transfer lines, valve boxes, or tanks/vaults) or replace with new systems that are in compliance with the Idaho Hazardous Waste Management Act (HWMA) secondary containment standards.

A.2 AIR QUALITY

In accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP), promulgated pursuant to the Clean Air Act, DOE is to notify and obtain approval from EPA for the normal atmospheric radionuclide emissions associated with the proposed project (40 CFR Part 61 Subpart H). A Prevention of Significant Deterioration (PSD)/Permit to Construct (PTC) will also be required to be submitted to the IDHW. The PSD permit is required since radioactive releases pursuant to NESHAPs are a regulated emission for which there is not a *de minimis* level and this project would be considered a modification of an existing major source. The PTC is required since the proposed action creates a new radionuclide and nonradioactive contaminant emission point source. A Permit to Operate (PTO) may also be required in the future.

The NESHAP Subpart H Construction Permit Application (USDOE 1991c) was approved by the EPA in September 1991 (USEPA 1991b). Submittal of the PSD/PTC

APPENDIX A
REQUIRED PERMITS, APPROVALS, AND CONSULTATIONS

AIM

Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910
301/587-8202

Centimeter

Inches

MANUFACTURED TO AIM STANDARDS
BY APPLIED IMAGE, INC.

2 of 2

permit application to the IDHW is scheduled well before construction of the new HLLW tanks/vaults.

A.3 CHARACTERIZATION AND DISTURBANCE OF ENVIRONMENTALLY CONTROLLED AREAS (ECAs)

Shaffer (1993) provides a description of the ECAs that may be disturbed during construction of the proposed HLWTR Project. It also provides a summary of the ECA characterization requirements, an overview of the risk-based approach to identify ECA disposition and remediation requirements, and a brief description of a procedure (WINCO 1991c) that is designed to control the disturbance of ECAs and that specifically ensures disturbances do not hinder the eventual permanent ECA disposition/remediation. This procedural guidance provides for full integration and coordination with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and ensures compliance with the Federal Facilities Agreement and Consent Order (FFACO) (USEPA 1991a) between DOE, the State of Idaho, and the EPA.

The ECA characterization activities are currently in progress. If the findings from these activities demonstrate an absence of contamination, as anticipated for many of the ECAs, the site(s) would be classified as "no action" units (i.e., no remediation required) and closed in accordance with the FFACO. In these cases, disturbance of an ECA would not require formal approval or notification of the FFACO tri-party representatives (i.e., DOE, State of Idaho, and the EPA) as described in Shaffer (1993). Alternatively, if the results provide evidence of contamination, the site(s) may be categorized as an "interim action" unit(s), additional characterization information obtained as necessary, and the disposition evaluated in accordance with the risk-based approach as defined in the FFACO. In these cases, disturbance of the ECA would follow the notification and approval processes outlined in Shaffer (1993), and would be rigidly controlled in accordance with the implementing procedural guidance (WINCO 1991c).

The framework for implementation of CERCLA at INEL, as described in the FFACO, will accommodate the requirements of NEPA, and DOE-ID is developing a plan for integrating the CERCLA and NEPA requirements for environmental restoration activities at INEL as required by DOE Order 5400.4. In accordance with the expected CERCLA/NEPA Integration Plan, a categorical exclusion (CX) for site characterization of ECA-CPP-14 (USDOE 1991a) and a CX for site characterization and other geotechnical studies required to support the proposed HLWTR Project (WINCO 1991b) have been approved. The environmental impacts associated with ECA disturbance required for the HLWTR Project are addressed in this EA. CERCLA/NEPA documentation ranging from a CX to an environmental impact statement may be required to support the additional permanent remedial action for the ICPP ECAs which is beyond the scope of the proposed action.

A.4 BIOLOGICAL RESOURCES

In accordance with the Endangered Species Act (16 USC Section 1531, *et seq.*), the Migratory Bird Treaty Act (16 USC Section 703, *et seq.*), and the Bald and Golden Eagle Protection Act (16 USC Sections 668-668d), DOE is required to informally consult with the U.S. Fish and Wildlife Service regarding the proposed project. Documentation of the required consultation has been completed and is included in Appendix C.

A.5 RCRA PERMITTING

The ICPP, as part of the INEL, is currently operating under RCRA interim status. The most recent revision to the RCRA Part A permit application (September 1990) included the proposed action. Approval of the application was granted by the IDHW in March 1991 (IDHW 1991). Preparation of a RCRA Part B permit would also be required for the proposed facility.

A.6 WATER QUALITY

The proposed project would not require any water quality permits or approvals.

APPENDIX B

THREATENED AND ENDANGERED SPECIES INFORMAL CONSULTATION

This appendix documents the informal threatened and endangered species consultation between the U.S. Department of Energy, Idaho Operations Office (DOE-ID) and the U.S. Fish and Wildlife Service (FWS) per Section 7 of the Endangered Species Act (16 USC Section 1531, *et seq.*), the Migratory Bird Treaty Act (16 USC Section 703, *et seq.*), and the Bald and Golden Eagle Protection Act (16 USC Sections 668-668d). The FWS concurs with the conclusion that no jeopardy would be posed to the bald eagle as a result of the proposed action. The bald eagle is the only listed threatened or endangered species of potential concern near the ICPP as determined by review of the FWS Species List (USFWS 1992).

APPENDIX B

**THREATENED AND ENDANGERED SPECIES
INFORMAL CONSULTATION**

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Boise Field Station
4696 Overland Road, Room 576
Boise, Idaho 83705

September 19, 1991

Robert D. Jones
Department of Energy
Idaho Operations Office
785 DOE Place
Idaho Falls, Idaho 83402

Re: Tank Farm Relocation Project
1-4-91-I-109
SE FILE# 6003.2220

Dear Mr. Jones:

The Fish and Wildlife Service is writing in regards to your meeting with Jeri Williams of this office. It was agreed that the Tank Farm Relocation project would have no adverse effect on bald eagles found in the project area. No take of bald eagles should occur, therefore it is not necessary to seek a permit under the Eagle Protection Act. It was also understood that impacts to the Big Lost River streambed and corridor vegetation will be avoided and that no other wetland impacts are likely to occur.

Thank you for your interest in endangered species and wetlands.

Sincerely,

Charles H. Lobdell
Field Supervisor

cc: IDFG, Region 6

APPENDIX C

DOCUMENTATION FOR CULTURAL RESOURCES INVESTIGATIONS

This appendix documents the cultural resources investigations performed for the proposed project area in compliance with the National Historic Preservation Act (16 USC Part 661, *et seq.*). Archival research and field surveys of the proposed and alternative parking lot and access road resulted in findings that the proposed action would have no adverse effect on significant cultural resources and archaeological clearance is recommended for all project activities.

APPENDIX C
DOCUMENTATION FOR CULTURAL RESOURCES INVESTIGATIONS

March 5, 1991

Mr. H. A. Jaafar
Westinghouse Idaho Nuclear Company, Inc.
Box 400
Idaho Falls, Idaho 83403

ARCHIVAL SEARCH ACTION REQUEST FOR PROPOSED CONSTRUCTION PARKING LOT
EXTENSION AND ACCESS ROAD PROJECT - IDAHO CHEMICAL PROCESSING PLANT (ICPP) -
DLL-09-91

Reference: Reed, William G., Jeffrey W. Ross, Brenda L. Ringe, and Richard
N. Holmer, 1987, Archaeological Investigations on the Idaho
National Engineering Laboratory: 1984-1985, Revised Edition.
Swanson/Crabtree Anthropological Research Laboratory Reports of
Investigations 87-1. Pocatello, Idaho

Dear Mr. Jaafar:

On February 22, 1991, the Staff of EG&G Idaho, Inc.'s Cultural Resource Management (CRM) section received a request to initiate an archival file search to insure that no potentially significant cultural resources will be adversely affected during construction of a gravel parking lot and access road adjacent to ICPP facilities on the Idaho National Engineering Laboratory (INEL). The gravel parking lot and access road are part of overall construction activities associated with the High Level Waste Tank Farm Replacement (HLWTFR) Project, which, unlike the parking lot and access road, will be constructed inside the ICPP perimeter fence. As Attachment (1) shows, the proposed parking lot and access road are situated to the west/northwest of the ICPP facility along a channelized portion of the Big Lost River. The estimated area of direct impact due to construction is 2.75 acres. The ICPP facility and the project area are located in Section 24, T3N, R29E, Butte County, Idaho (See Attachment 2).

A systematic review of previous survey reports and maps was conducted at EG&G Idaho's Archaeological Research Center in Idaho Falls. This facility maintains a complete record of all archaeological research conducted on the INEL. During the records search it was determined that several surveys designed to assess the effect of INEL activities have been conducted in the vicinity of ICPP. The earliest of these, beginning in 1979, consisted of

Mr. H. A. Jaafar
March 5, 1991
DLL-09-91
Page 2

small scale project specific examinations (see Reed et al. 1987 for a summary). The most recent and intensive survey was conducted by personnel from the Swanson/Crabtree Anthropological Laboratory, or SCAR/LAB, in 1986 (Reed et al. 1987-1: 262-263). All work during the 1986 survey was performed at 15-20 meter intervals in a manner consistent with the Department of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and the Archaeological Survey: Methods and Uses as well as Identification of Historic Properties: A Decision Making Guide for Managers, issues jointly by the Advisory Council on Historic Preservation and the National Park Service.

The various surveys conducted in the vicinity of the ICPP have provided information about two potentially significant historic sites, 10BT269, a homestead, and 10BT1035, a trash scatter. Both of these resources are well beyond project boundaries and should not be adversely affected by construction activities. In general, the density of cultural resources is fairly low in the floodplain deposits that surround the facility.

Although no cultural resources have been found along the banks of the Big Lost River near ICPP, surveys in nearby areas have shown it to be an extremely sensitive archaeological zone (Reed et al. 1987-1: 577). Due to this sensitivity, it was necessary to return to the river bed and survey recent erosional deposits which can annually expose new resources. On February 28, 1991, EG&G archaeologists Brenda L. Ringe and Dino L. Lowrey surveyed approximately 1/4 mile along the exposed river banks in 5 meter pedestrian intervals. No resources were located during this survey and it appears that construction of the gravel parking lot/access road will have no adverse effect on significant cultural resources and archaeological clearance is recommended for all project activities.

Please bear in mind that protection of significant sites is mandated by a number of federal laws including but not limited to: the Antiquities Act of 1906, the Historic Conservation Act of 1974, the National Historic Preservation Act of 1966 as amended, the National Environmental Policy Act of 1969, Executive Order No. 11593 of 1971, and the Archaeological Resources Protection Act of 1979 as amended. Therefore, if cultural materials are unexpectedly encountered at any time during subsurface excavation, work must come to a temporary halt until members of EG&G Idaho's CRM staff can assess the significance of the materials. Any extension of project activities beyond the area shown in Attachment (1) will also require an additional pedestrian survey due to the high archaeological sensitivity of the river area.

Mr. H. A. Jaafar
March 5, 1991
DLL-09-91
Page 3

If you have any questions, please contact me at 6-0533 or Brenda L. Ringe at 6-9748.

Sincerely,

Dino L. Lowrey

Dino L. Lowrey
Cultural Resources Management

po

Attachments:
As Stated

cc: G. E. Bingham, WINCO, MS 5306
K. D. Bitton, WINCO, MS 5114
A. R. Eberle, WINCO, MS 2304
T. L. Perkins, DOE-ID, MS 1146
P. B. Summers, WINCO, MS 2304

CONSTRUCTION PARKING LOT
& ACCESS ROAD PROJECT
BOUNDARY

AREA MAP

CONSTRUCTION AREA

SH	DWG NO.	REV.	DATE
1	280005	1-1	18
2	280006	C-1	18
3	280007	C-2	18

1" = 100' (1" = 100')

1" = 100' (1" = 100')

1" = 100' (1" = 100')

1" = 100' (1" = 100')

ATTACHMENT 2

Construction Parking Lot
and Access Road Project Boundary

April 8, 1991

Mr. H. A. Jaafar
High Level Waste Tank Farm Replacement (HLWTFR) Project
Westinghouse Idaho Nuclear Company, Inc.
Box 4000
Idaho Falls, Idaho 83403

ARCHAEOLOGICAL CLEARANCE RECOMMENDATION FOR ALTERNATE PLACEMENT OF PARKING
LOT AND ACCESS ROUTE - BLR-21-91

- References:
- (a) H. A. Jaafar letter to C. F. Marler, HAJ-24-91, High Level Waste Tank Farm Replacement (HLWTFR) Project - Historic and Archaeological Evaluation, February 21, 1991
 - (b) D. L. Lowrey letter to H. A. Jaafar, DLL-09-91, Archival Search Action Request for Proposed Construction Parking Lot Extension and Access Road Project - Idaho Chemical Processing Plant (ICPP), March 5, 1991
 - (c) Reed, William G., Jeffrey W. Ross, Brenda L. Ringe, and Richard N. Holmer, 1987, Archaeological Investigations on the Idaho National Engineering Laboratory: 1984-1985, Revised Edition, Swanson/Crabtree Anthropological Research Laboratory Reports of Investigations: 87-1

Dear Mr. Jaafar:

On April 1, 1991, the EG&G Cultural Resource Management staff received your request to assess the potential impact of an alternative site for construction of a new parking area and access route associated with the High Level Waste Tank Farm Replacement (HLWTF) Project and located just north of the Idaho Chemical Processing Plant (ICPP) on the Idaho National Engineering Laboratory (INEL). As Attachments (1) and (2) show, this alternative construction area is located in the NW 1/4 of Section 19, T3N, R29E, Butte County and is immediately east of the project as originally proposed (Jaafar 1991).

A review of INEL cultural resource archives housed at EG&G's Archaeological Research Center shows that the alternate area proposed for parking lot and access route construction was surveyed intensively by the Swanson/Crabtree Anthropological Research Laboratory in 1986 (Reed et. al. 1987). No cultural resources were identified in the area proposed for ground disturbance during this original survey and our more recent reconnaissance efforts (Lowrey 1991) indicate that no significant remains are likely to be

Mr. H. A. Jaafar
April 8, 1991
BLR-21-91
Page 2

encountered. If all activities are restricted to one of the two areas depicted in Attachments (1) and (2), the project will have no adverse effect on significant cultural resources and archaeological clearance is recommended for construction of the new lot and access road. However, if cultural materials are unexpectedly encountered during construction, all work must come to a temporary halt until the EG&G Cultural Resource Management staff is consulted. Please contact me at 526-9748 or Dino Lowrey at 526-0533 if questions arise.

Sincerely,

Brenda L. Ringe
Cultural Resource Management

blr

Attachments:
As Stated

cc: G. E. Bingham, WINCO, MS 5306
A. R. Eberle, WINCO, MS 2304
T. L. Perkins, DOE-ID, MS 1146
~~Per B. Summers, WINCO, MS 2304~~
J. O. Zane, EG&G Idaho, (w/o attachments) MS 3600

ATTACHMENT 1: Location of the proposed HLWTFR Project parking lot/access road construction areas near the ICPP.

The map illustrates the proposed construction areas for the Idaho Chemical Plant. Key features include:

- ORIGINAL CONSTRUCTION AREA:** Indicated by a solid line and an arrow pointing to the central area.
- ALTERNATE CONSTRUCTION AREA:** Indicated by a dashed line and an arrow pointing to the area to the right of the original area.
- Idaho Chemical Plant:** The central facility, labeled "ID, A, H, O" and "CHEMICAL PLANT".
- Wells:** Numerous wells are marked with dots and labels, including "Well 4920", "Well 4921", "Well 4922", "Well 4923", "Well 4924", "Well 4925", "Well 4926", "Well 4927", "Well 4928", "Well 4929", "Well 4930", "Well 4931", "Well 4932", "Well 4933", "Well 4934", "Well 4935", "Well 4936", "Well 4937", "Well 4938", "Well 4939", "Well 4940", "Well 4941", "Well 4942", "Well 4943", "Well 4944", "Well 4945", "Well 4946", "Well 4947", "Well 4948", "Well 4949", "Well 4950", "Well 4951", "Well 4952", "Well 4953", "Well 4954", "Well 4955", "Well 4956", "Well 4957", "Well 4958", "Well 4959", "Well 4960", "Well 4961", "Well 4962", "Well 4963", "Well 4964", "Well 4965", "Well 4966", "Well 4967", "Well 4968", "Well 4969", "Well 4970", "Well 4971", "Well 4972", "Well 4973", "Well 4974", "Well 4975", "Well 4976", "Well 4977", "Well 4978", "Well 4979", "Well 4980", "Well 4981", "Well 4982", "Well 4983", "Well 4984", "Well 4985", "Well 4986", "Well 4987", "Well 4988", "Well 4989", "Well 4990", "Well 4991", "Well 4992", "Well 4993", "Well 4994", "Well 4995", "Well 4996", "Well 4997", "Well 4998", "Well 4999", "Well 5000".
- Gravel Pits:** Several gravel pits are marked with dots and labels, including "Gravel Pit 4921", "Gravel Pit 4922", "Gravel Pit 4923", "Gravel Pit 4924", "Gravel Pit 4925", "Gravel Pit 4926", "Gravel Pit 4927", "Gravel Pit 4928", "Gravel Pit 4929", "Gravel Pit 4930", "Gravel Pit 4931", "Gravel Pit 4932", "Gravel Pit 4933", "Gravel Pit 4934", "Gravel Pit 4935", "Gravel Pit 4936", "Gravel Pit 4937", "Gravel Pit 4938", "Gravel Pit 4939", "Gravel Pit 4940", "Gravel Pit 4941", "Gravel Pit 4942", "Gravel Pit 4943", "Gravel Pit 4944", "Gravel Pit 4945", "Gravel Pit 4946", "Gravel Pit 4947", "Gravel Pit 4948", "Gravel Pit 4949", "Gravel Pit 4950", "Gravel Pit 4951", "Gravel Pit 4952", "Gravel Pit 4953", "Gravel Pit 4954", "Gravel Pit 4955", "Gravel Pit 4956", "Gravel Pit 4957", "Gravel Pit 4958", "Gravel Pit 4959", "Gravel Pit 4960", "Gravel Pit 4961", "Gravel Pit 4962", "Gravel Pit 4963", "Gravel Pit 4964", "Gravel Pit 4965", "Gravel Pit 4966", "Gravel Pit 4967", "Gravel Pit 4968", "Gravel Pit 4969", "Gravel Pit 4970", "Gravel Pit 4971", "Gravel Pit 4972", "Gravel Pit 4973", "Gravel Pit 4974", "Gravel Pit 4975", "Gravel Pit 4976", "Gravel Pit 4977", "Gravel Pit 4978", "Gravel Pit 4979", "Gravel Pit 4980", "Gravel Pit 4981", "Gravel Pit 4982", "Gravel Pit 4983", "Gravel Pit 4984", "Gravel Pit 4985", "Gravel Pit 4986", "Gravel Pit 4987", "Gravel Pit 4988", "Gravel Pit 4989", "Gravel Pit 4990", "Gravel Pit 4991", "Gravel Pit 4992", "Gravel Pit 4993", "Gravel Pit 4994", "Gravel Pit 4995", "Gravel Pit 4996", "Gravel Pit 4997", "Gravel Pit 4998", "Gravel Pit 4999", "Gravel Pit 5000".
- Snake River:** The river is shown flowing through the area, with a "Borrow Pit 4921" and "Gaging Station 24" located near the river.
- Highway 420:** The highway is shown running horizontally across the middle of the map.
- North Arrow:** A north arrow is located in the upper right corner of the map.
- Scale Bar:** A scale bar is located in the lower right corner of the map.

NORTH

**DATE
FILMED**

9/8/93

END