S

DOE/ORP-99-09
Revision 0

Radioactive Air Emissions Notice of Construction for the Installation and Operation of a Waste Retrieval System in Tanks 241-AP-102 and 241-AP-104, Project w-211

Prepared for the U S Department of Energy

Project Hanford Management Contractor for the
U S Department of Energy under Contract DE AC06-99RL14047

Office of River Protection

P O Box 450
Richland Washington 99352

DOE/ORP-99-09
Revision 0

Radioactive Air Emissions Notice of Construction for the Installation and Operation of a Waste Retrieval System in Tanks 241-AP-102 and 241-AP-104, Project w-211

Date Published
November 1999

Prepared for the U S Department of Energy

Office of River Protection

P O Box 450
Richland Washington 99352

RELEASE AUTHORIZATION

Document Number	DOE/ORP-99-09
Document Title	Radioactive Air Emissions NOC for the Installation Operation of a Waste Retrieval Sys in Tanks 241-AP-102,241-AP-104 Project W-211

This document, reviewed in accordance with DOE Order 241 1, "Scientific and Technical Information Management," and DOE G 241 1-1, "Guide to the Management of Scientific and Technical Information," does not contain classified or sensitive unclassified information and is

APPROVED FOR PUBLIC RELEASE

Christine Willingham
C Willingham

11/22/99
Date

Lockheed Martin Services, Inc
Document Control / Information Clearance

Reviewed for Applied Technology Business Sensitive Classified Copyrighted Export Controlled Patent Personal/Private Proprietary Protected CRADA Trademark Unclassified Controlled Nuclear Information aw 11-19-99

INFORMATION CLEARANCE FORM

A Information Category

- [ ] Abstract
- [ ] Journal Article
- [ ] Summary
- [ ] Internet
- [ ] Visual Aid
- [ ] Software
- [ ] Full Paper
- [ ] Report
- [x] Other Permit Application

B Document Number DOE/ORP-99-09 Rev 0

C Title
Radioactive Air Emissions Notice of Construction for the Installation and Operation of a Waste Retrieval System in Tanks 241-AP-102 and 241-AP-104, Project W-211

D Internet Address

E Required Information

1 Is document potentially Classified? (●) No ( ) Yes (MANDATORY)

R H Engelmann 11-15-99
Manager's Signature Required

If Yes ______ ( ) No ( ) Yes Classified
ADC Signature Required

2 Internal Review Required? (●) No ( ) Yes
If Yes Document Signatures Below

Counsel ______

Program ______

3 References in the Information are Applied Technology (●) No ( ) Yes
Export Controlled Information (●) No ( ) Yes

4 Does Information Contain the Following (MANDATORY)

a New or Novel (Patentable) Subject Matter? (●) No ( ) Yes
If Yes Disclosure No ______

b Information Received in Confidence Such as Proprietary and/or Inventions?
(●) No ( ) Yes If Yes Affix Appropriate Legends/Notices

c Copyrights? (●) No ( ) Yes If Yes Attach Permission

d Trademarks? (●) No ( ) Yes If Yes Identify in Document

5 Is Information requiring submission to OSTI? ( ) No (●) Yes
If Yes UC- 630 and B&R- ______

6 Release Level? (●) Public ( ) Limited

7 Charge Code 102066

F Complete for a Journal Article

1 Title of Journal ______

G Complete for a Presentation

1 Title for Conference or Meeting ______

2 Group Sponsoring ______

3 Date of Conference ______

4 City/State ______

5 Will Information be Published in Proceedings? ( ) No ( ) Yes

6 Will Material be Handed Out? ( ) No ( ) Yes

H Author/Requestor
N A Homan [signature]
(Print and Sign)

Responsible Manager
R H Engelmann [signature] 11-15-99
(Print and Sign)

I Reviewers

Reviewers	Yes	Print	Signature	Public Y/N (If N complete J)
General Counsel	[x]	S D Stubblebine	[signature]	(Y) / N
Office of External Affairs	[ ]	N/A		Y / N
DOE ~~RL~~ ORP	[x]	D W Bowser, ORP	[signature]	(Y) / N
Other	[ ]			Y / N
Other	[ ]			Y / N

J If Information Includes Sensitive Information and is not to be released to the Public indicate category below

- [ ] Applied Technology
- [ ] Personal/Private
- [ ] Proprietary
- [ ] Business-Sensitive
- [ ] Predecisional
- [ ] UCNI
- [ ] Protected CRADA
- [ ] Export Controlled
- [ ] Procurement Sensitive
- [ ] Patentable
- [ ] Other (Specify) ______

Information Clearance Approval

APPROVED FOR RELEASE
OFFICIAL DOCUMENT
cw
Date 11-22-99

K If Additional Comments Please Attach Separate Sheet

A 6001-401 (02/98)

CONTENTS

CONTENTS (cont)

APPENDICES

FIGURES

TERMS

ALARA	as low as reasonably achievable
ALARACT	as low as reasonably achievable control technology
BARCT	best available radionuclide control technology
CAM	continuous air monitor
CAP 88	Clean Air Assessment Package 1988
CFR	Code of Federal Regulations
DST	double shell tank
DOE/ORP	U S Department of Energy Office of River Protection
DOE/RL	U S Department of Energy Richland Operations Office
EPA	U S Environmental Protection Agency
FIC	food industry corporation
GTAW	gas tungsten arc welding
HEPA	high efficiency particulate air
HPT	health physics technician
HNF	Hanford Nuclear Facility (document identifier)
ITRS	Initial Tank Retrieval Systems
LLCE	long length contaminated equipment
MEI	maximally exposed individual
NOC	notice of construction
PCM	periodic confirmatory measurements
PTE	potential to emit
RPP	River Protection Project
RWP	radiological work permit
SEPA	*State Environmental Policy Act of 1971*
SST	single shell tank
TEDE	total effective dose equivalent
TWRS	tank waste remediation system
WAC	Washington Administrative Code
WDOH	Washington State Department of Health
WHC	Westinghouse Hanford Company
WSCF	Waste Sampling and Characterization Facility

METRIC CONVERSION CHART

Into metric units | Out of metric units

If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25 40	millimeters	millimeters	0 0393	inches
inches	2 54	centimeters	centimeters	0 393	inches
feet	0 3048	meters	meters	3 2808	feet
yards	0 914	meters	meters	1 09	yards
miles	1 609	kilometers	kilometers	0 62	miles
Area			**Area**		
square inches	6 4516	square centimeters	square centimeters	0 155	square inches
square feet	0 092	square meters	square meters	10 7639	square feet
square yards	0 836	square meters	square meters	1 20	square yards
square miles	2 59	square kilometers	square kilometers	0 39	square miles
acres	0 404	hectares	hectares	2 471	acres
Mass (weight)			**Mass (weight)**		
ounces	28 35	grams	grams	0 0352	ounces
pounds	0 453	kilograms	kilograms	2 2046	pounds
short ton	0 907	metric ton	metric ton	1 10	short ton
Volume			**Volume**		
fluid ounces	29 57	milliliters	milliliters	0 03	fluid ounces
quarts	0 95	liters	liters	1 057	quarts
gallons	3 79	liters	liters	0 26	gallons
cubic feet	0 03	cubic meters	cubic meters	35 3147	cubic feet
cubic yards	0 76456	cubic meters	cubic meters	1 308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Energy			**Energy**		
kilowatt hour	3 412	British thermal unit	British thermal unit	0 000293	kilowatt hour
kilowatt	0 948	British thermal unit per second	British thermal unit per second	1 055	kilowatt
Force/Pressure			**Force/Pressure**		
pounds per square inch	6 895	kilopascals	kilopascals	1 4504 x 10 1	pounds per square inch

Source *Engineering Unit Conversions* M R Lindeburg PE , Second Ed , 1990 Professional Publications Inc Belmont California

APPROVAL SIGNATURES

11-15-99

R H Engelmann, Manager, FDH — Date
Project Environmental Documentation

11/15/99

J E Van Beek Manager LMHC — Date
Project W 211 Initial Tank Retrieval Systems

11/18/99

W T Dixon Manager, LMHC — Date
River Protection Project Environmental Services

This page intentionally left blank

RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION FOR INSTALLATION AND OPERATION OF A WASTE RETRIEVAL SYSTEM IN TANKS 241-AP-102 AND 241-AP-104, PROJECT W-211

1 0 INTRODUCTION

This document serves as a notice of construction (NOC) pursuant to the requirements of Washington Administrative Code (WAC) 246 247-060, and as a request for approval to modify pursuant to 40 Code of Federal Regulations (CFR) 61 07 for the installation and operation of one waste retrieval system in the 241 AP-102 Tank and one waste retrieval system in the 241 AP 104 Tank

Pursuant to 40 CFR 61 09 (a)(1) this application is also intended to provide anticipated initial start up notification Its is requested that EPA approval of this application will also constitute EPA acceptance of the initial start up notification

Project W 211 Initial Tank Retrieval Systems (ITRS) is scoped to install a waste retrieval system in the following double-shell tanks 241-AP 102 -AP 104 AN 102, AN 103, AN-104, AN 105, AY 102 AZ 102 and SY-102 between now and the year 2011 Because of the extended installation schedules and unknowns about specific activities/designs at each tank, it was decided to submit NOCs as that information became available

This NOC covers the installation and operation of a waste retrieval system in tanks 241 AP-102 and 241 AP 104 Generally this includes removal of existing equipment installation of new equipment and construction of new ancillary equipment and buildings Tanks 241 AP 102 and 241 AP 104 will provide waste feed for immobilization into a low activity waste (LAW) product (i e glass logs)

The total effective dose equivalent (TEDE) to the offsite maximally exposed individual (MEI) from the construction activities is 0 045 millirem per year The unabated TEDE to the offsite MEI from operation of the mixer pumps is 0 042 millirem per year

This page intentionally left blank

2 0 FACILITY LOCATION (REQUIREMENT 1)

The AP Tank Farm is located at

U S Department of Energy Office of River Protection
Hanford Site
200 East Area Tank Farms
Richland Washington 99352

The 241 AP Tank Farm is located northeast of the PUREX Plant in the 200 East Area at the corner of Canton Ave and Fourth Street Figure 1 shows the location of the Hanford Site and the location of 200 East Area within the Hanford Site Figure 2 shows the location of the AP Tank Farm within the 200 East Area

The geodetic coordinates for the center of the AP Tank Farm are as follows and the exhauster stack is registered as 296-A 40

46° 33' 04 ' north latitude 119° 30' 52" west longitude

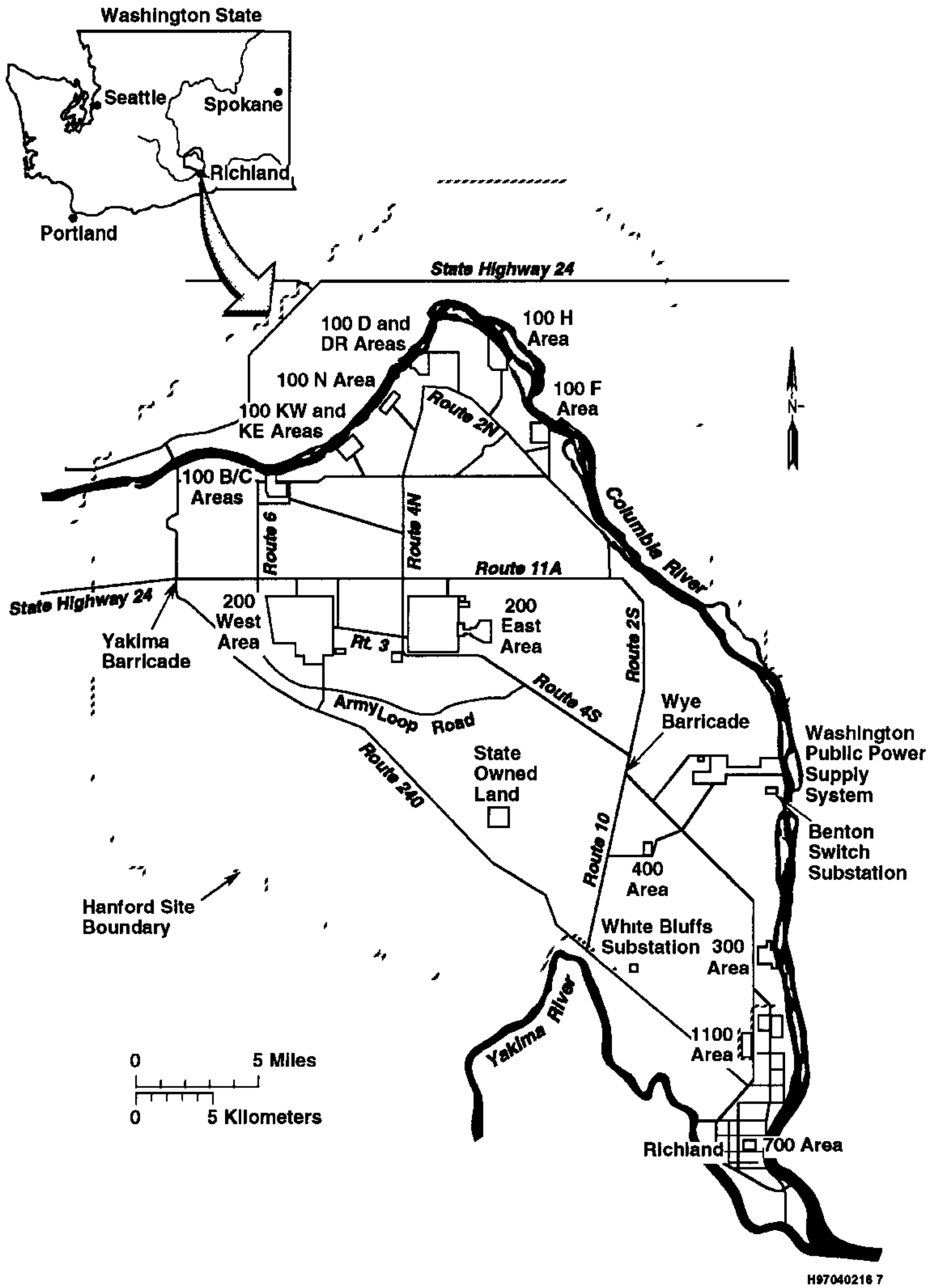

Figure 1 Hanford Site

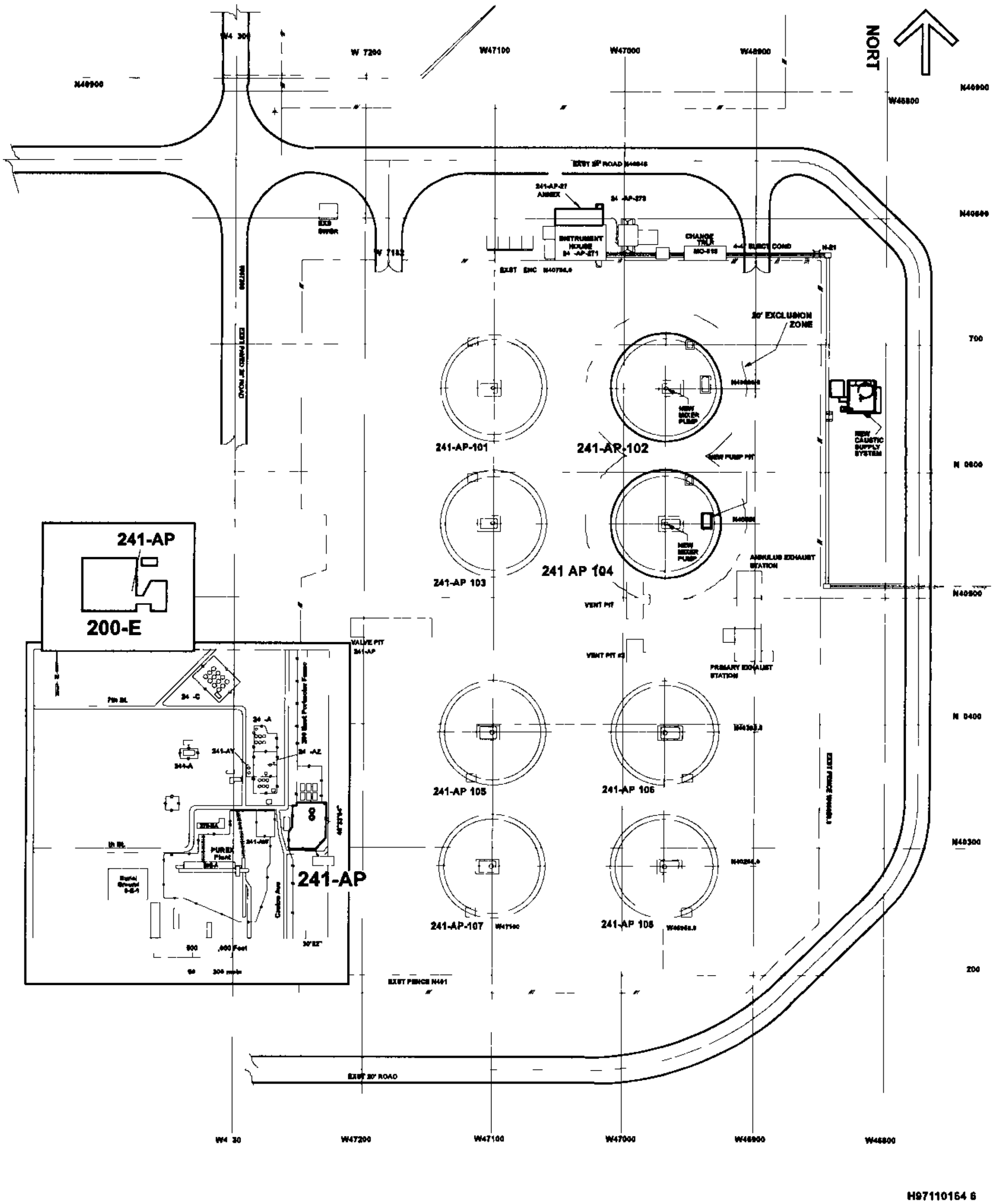

Figure 2 Location of the 241 AP Tank Farm Within the 200 East Area

This page intentionally left blank

3 0 RESPONSIBLE MANAGER (REQUIREMENT 2)

The responsible manager for the system is as follows

Mr R T French Manager
U S Department of Energy Office of River Protection
P O Box 550
Richland, Washington 99352
(509) 376-6677

This page intentionally left blank

4 0 TYPE OF PROPOSED ACTION (REQUIREMENT 3)

The proposed action represents an insignificant modification to an existing emission unit the 241 AP Tank Farm ventilated through the 296 A 40 Stack The proposed modification is to install and operate a waste retrieval system (one mixer pump and other required equipment) in the 241 AP 102 and the 241 AP-104 tanks The pumps will operate in a batch mode as needed The waste capacity of the tanks will not be altered nor will the ventilation system

This page intentionally left blank

5 0 STATE ENVIRONMENTAL POLICY ACT (REQUIREMENT 4)

The proposed activities are categorically exempt from State Environmental Policy Act (SEPA) requirements in accordance with WAC 197 11-845

This page intentionally left blank

6 0 PROCESS DESCRIPTION (REQUIREMENT 5)

The 241 AP-102 and 104 tanks are 75 foot diameter double shell tanks (DST) constructed from the latest generation of tank designs with a reinforced concrete shell and dome and an insulating concrete base A heat treated stress relieved, primary steel liner and a non-stress relieved outer steel liner are separated by a 2 5 foot annulus and contained inside the concrete shell The tanks have a flat bottom with a usable waste depth of approximately 35 feet (1 160 000 gallons)

Current design calls for modifications to the AP 102 and 104 tanks and associated equipment to allow installation of waste retrieval system equipment including the following major components

New In-Tank Equipment

- Installation of one mixer pump in each tank for mobilizing the settled solids The pumps will be equipped with an approximate 300 horse power motor with a variable speed drive to allow operation from approximately 60 percent speed to 100 percent speed The pump will be capable of pumping waste at a flow rate of approximately 5 200 gallons per minute through each of two, horizontally opposed discharge nozzles located approximately 18 inches above the bottom of the tank

- Installation of a high pressure spray wash system on top of each of the 42 inch risers used for the mixer pumps The spray wash system will be used for future decontamination of the mixer pumps as they are removed from the tank

- Installation of one decant/transfer pump in each tank for the transfer of waste The pumps will be capable of maintaining a variable waste transfer at a rate of up to 140 gallons per minute

- Installation of one closed circuit television system for each tank

New Ancillary Equipment and Buildings

- Construction of an annex to the existing 241 AP 271 Instrument Building to house retrieval instrumentation/electrical equipment and operator stations

- Installation of electrical power and instrument cables and other utility tie ins and/or upgrades (e g sanitary and raw water and telecommunications)

- Construction of a dilution system the Caustic Supply System to bring waste properties into compliance with the feed specifications to flush and preheat transfer lines It will be capable of providing approximately 140 gallons per minute of pH-adjusted water It will consist of a package boiler a chemical injection pump a diluent/flush pump, a diluent/flush tank (approximately 5 000 gallons) and a spill containment pad for caustic delivery trucks The system will be located outside of the east AP Tank Farm fence

- Construction of a new pump pit in AP Farm (241 AP 04D)

- Installation of new double-contained waste transfer piping water and diluent piping to and from the process pits and 8 inch diameter annulus ventilation piping A total of approximately 1 400 linear feet of piping will be installed approximately 5 feet underground

- Installation of new process jumpers inside existing (AP02A AP02D, and AP04A) and new (AP04D) AP Farm pits

- Installation of four new sets of pit cover blocks for the AP02A AP02D, AP04A and AP04D pits

Removal, Decontamination and Demolition of Existing Equipment

- Removal of one mixer pump from AP 102

- Removal of one transfer pump from AP 102 and one transfer pump from AP 104

- Removal of a slurry distributor from AP 104

- Removal of a drop leg jumper from AP 102

- Relocation of a dip tube assembly to a different riser (AP 104)

- Removal of jumpers from each of the three pits central pump pit cover blocks and pump pit cover blocks

- Removal of an existing 2-inch waste line approximately 15 linear feet

- Use of equipment and containers for removal cleaning decontamination transport storage and burial of in tank components and soil

- Removal of existing 8 inch diameter annulus ventilation piping approximately 32 feet

Miscellaneous

- Performance of miscellaneous activities in support of construction and operation activities that will not increase emissions above those estimated in Section 10 0 *Release Rates* of this NOC

6 1 CONSTRUCTION ACTIVITIES WITH THE POTENTIAL TO EMIT

Construction activities with the potential to emit include soil excavation work in pump pits pipe cutting removal of, and installation of in tank equipment Some of these activities are described in and will be done in accordance with an applicable Tank Farm ALARACT demonstration HNF-4327 latest revision *Control of Airborne Radioactive Emissions for Frequently Performed TWRS Work Activities* The specific activities and corresponding ALARACT demonstration are called out as they apply in the following text

If needed or chosen for use during these activities, the Regulated Guzzler a Portable/Temporary Radioactive Air Emission Unit and a HEPA Filtered Vacuum Radioactive Air Emission Unit may be used in accordance with the latest revisions of their NOCs (98-EAP 037, DOE/RL 96 75 and DOE/RL 97 50 respectively)

The AP Tank Farm is posted and maintained as a radiological buffer area free of surface contamination (entrance is made in street clothes) There are no recorded spills or leaks Therefore encountering contamination is not expected during soil excavation activities Because of the possibility of encountering previously undetected subsurface contamination all work is performed in accordance with the Hanford Site Radiological Control Manual and the RPP As Low As Reasonably Achievable (ALARA) Program requirements These requirements are carried out through the activity work packages and associated radiological work permit (RWP)

6 1 1 Soil Excavation

Soil will be excavated inside and outside the AP Tank Farm to install new piping and construct a new pump pit A total of approximately 1 000 cubic yards will be excavated which includes approximately 600 cubic yards inside the tank farm Backfill will be made with the original removed soil or controlled density fill (sand water and a small amount of cement) Areas to be excavated are shown in Figure 3

Soil excavation activities inside the tank farm fence will be performed in accordance with ALARACT Demonstration 5 *TWRS ALARACT Demonstration for Soil Excavation (Using Hand Tools)* Clean soil piles may be moved from one place to another within the tank farm with heavy equipment (backhoe, front end loader etc) Soil excavation outside the tank farm fence also may be performed with heavy equipment The Regulated Guzzler may also be used as described in its NOC for use in the A Tank Farm Complex (98-EAP 037)

6 1 2 Pipe Cutting

One existing 2-inch diameter waste transfer line will be cut and replaced with a new 3 inch diameter waste transfer line The cuts will be made inside a glove bag using appropriate equipment such as a sawzall or tri-tool The tie ins will be made at the new pit nozzles If any welding is required the glove bag will be removed and the weld made

One 12 inch diameter tank riser will be cut to fit into the new pit being constructed The riser will be opened and an expandable plug will be installed in the riser to maintain containment of the vapor space and prevent material from falling into the tank while the work takes place In order to perform the cut without a glove bag the riser will be surveyed/smeared to verify removable contamination levels are equal to or less than 10,000 dpm/100cm^2 beta gamma and 200 dpm/100cm^2 alpha The cut will be made above the plug with equipment such as a tri tool or sawzall If a glove bag is used it will be removed The plug will be removed and a flange welded in place Then the top of the riser flange will be sealed with a temporary shield plug

Approximately thirty-two feet of 8 inch diameter annulus ventilation pipe will be cut and rerouted to make room for the new 241-AP 04D pump pit The cuts will be made inside a glove bag using appropriate equipment such as a sawzall or tri tool The glove bag will be removed and the tie ins will be made by welding

If needed or chosen for use during these activities, a Portable/Temporary Radioactive Air Emission Unit and a HEPA Filtered Vacuum Radioactive Air Emission Unit may be used in accordance with the latest revisions of their NOCs (DOE/RL 96 75 and DOE/RL-97-50 respectively)

6 1 3 Pit Work

Work to be performed in pump pits includes replacing three existing sets of cover blocks with newly designed cover blocks core drilling (total of three 10 inch and one 6 inch holes) installing new nozzles removing existing jumpers and installing riser extensions (total of two 42 inch diameter)

Pit access and work will be performed in accordance with ALARACT Demonstrations 6 and 14 *TWRS ALARACT Demonstration for Pit Access* and *TWRS ALARACT Demonstration for Pit Work* Activities not covered in these ALARACTs are described below

If needed or chosen for use during these activities, a Portable/Temporary Radioactive Air Emission Unit and a HEPA Filtered Vacuum Radioactive Air Emission Unit may be used in accordance with the latest revisions of their NOCs (DOE/RL-96 75 and DOE/RL-97-50 respectively)

At the start of the pit work the cover blocks will be lifted off and radiologically surveyed to determine appropriate disposal protocol and packaged for disposal A new cover block will be installed when all work in the pit has been completed

Core drilling will be performed below grade level on the outside of the pit The hole will be drilled from the outside to the inside with the temporary pit cover in place The drilling bit will be water cooled Nozzle installation will generally proceed immediately after the hole is completed If immediate nozzle installation is not possible the hole will be temporarily sealed with a plug, tape or equivalent device until the nozzle can be installed

Installation of new nozzles in existing pits will take place in an open pit All parts of the nozzle will be assembled ahead of time and will be lowered into position as a single unit The piping in the back of the nozzle will be threaded through the hole (from the inside of the pit to the outside) and pulled tight into place from the outside of the pit Grout will be used to secure and seal the nozzle into place The front opening of the nozzle inside the pit, will be fitted with a temporary cap/seal until a jumper is connected to it Once the nozzle(s) is installed the temporary pit cover will be replaced until other work inside the pit requires its removal

Installation of the 42 inch diameter riser extensions will take place in an open pit Only the risers that will house a mixer pump will have an extension installed The depth verification shield plug left in/on the riser from the previously removed mixer pump will be removed and replaced with the riser extension that has a temporary shield plug inserted at the bottom end The riser will be open during this step which takes approximately thirty minutes The extension will be sealed to the cover block with metal bellows The extensions will be equipped with spray wash rings that will provide a means of decontamination for future mixer pump removals They will also provide confinement between the pump and the inside of the pit during future pump removals which will be possible without removing the pit cover blocks

6 1 4 Removal of In-Tank Equipment

Various in tank equipment will be removed from both tanks to make room for the waste retrieval equipment or to be replaced with equivalent equipment built to withstand the mixer pump jet forces The existing flexible receiver equipment will be used to remove and decontaminate to acceptable levels a mixer pump (from a 42-inch riser) and two transfer pumps (from 12 inch risers) The remaining equipment will be removed from 4 inch 12 inch and 42 inch risers using the general bag out process (sleeving equipment with plastic or piping as it is removed)

Equipment removal will be performed in accordance with ALARACT Demonstration 13 *TWRS ALARACT Demonstration for Installation Operation and Removal of Tank Equipment* Activities not covered in this ALARACT are described below

If needed or chosen for use during these activities, a Portable/Temporary Radioactive Air Emission Unit and a HEPA Filtered Vacuum Radioactive Air Emission Unit may be used in accordance with the latest revisions of their NOCs (DOE/RL 96 75 and DOE/RL 97 50 respectively)

Decontamination of removed equipment is not anticipated the fewer decontamination activities undertaken the less exposure possibilities there are to the worker and the environment Contingency decontamination plans however are in place if needed The most likely equipment to be decontaminated would be sections of the flexible receiver If contingency decontamination is required a two roomed decontamination tent will be set up within the tank farm fence Decontamination work will take place in one room and the other will be maintained "clean"

Flexible Receiver Bagging Process Use of the flexible receiver involves connecting to and disconnecting from a tank riser or pit lifting/removing the equipment washing down/decontaminating the equipment, and bagging the equipment The flexible receiver can be used in a manual or a completely automated mode Various flexible receiver equipment includes a washer assembly a radiation monitoring and camera assembly a bag cinch and cut assembly a secondary bag seal assembly and an appropriately sized receiving bag

The connection process to risers in a concrete pit is different than that to risers outside at or below, grade level For risers in pits the cover block is removed and replaced with the flex receiver platform The gap between the pit and the platform is sealed with plastic and tape There is one opening in the platform that is directly above the equipment/riser The equipment is lifted off the riser to slightly above the platform, long enough to position the split plates that will support the equipment when it is lowered back down to the platform Generally this step takes less than fifteen minutes and during this time the riser is open around the equipment as it is raised The equipment is lowered to rest/seal on the split plates In some instances a gasket may be used between the split plates and the equipment to enhance the seal At this point confinement is considered restored and work can take place on the upper portion of the piece of equipment if needed to prepare it for removal Once the preparatory work is complete the equipment is raised slightly to remove the split plates and then lowered back down to rest/seal on the riser An adapter spool piece assembly (includes the spool piece, the spray wash unit, and alignment bellows) is placed over and around the riser and the equipment setting on top of the riser The adapter spool piece is equipped with a rubber seal on the bottom, which provides a seal against the floor of the pit and the alignment bellows are bolted to the platform providing a seal against the platform An impact limiter is installed on top of the platform, around the opening, as a precaution if the equipment free falls during the remote bagging process The piece of equipment is again raised to rest/seal on the impact limiter Here again the riser is open around the equipment during the approximately fifteen minute process to lift it to the top of the impact limiter Subsequent confinement is provided by the gaskets between equipment/assembly pieces and the rubber seal on the bottom of the adapter spool piece The remainder of the flex receiver equipment is bolted into place above the impact limiter

For risers that cannot accommodate an adapter spool piece (outside risers) a split spool piece is used to bolt the flex receiver equipment to the riser flange In this instance, a seal against a floor cannot be made, so a glove bag is used to confine contamination A glove bag with the spool piece in it is sealed around the riser the riser is opened the equipment is raised slightly to allow installation of the split spool piece onto the riser flange Generally this step takes less than fifteen minutes and during this time the riser is open (within the glove bag) around the equipment as it's raised The equipment is lowered back down to rest/seal on the split spool piece and the spray wash unit is bolted to the split spool piece The remainder of the flex receiver equipment in its entirety is swung into position the bottom component is slipped into the glove bag and then bolted to the spray wash unit within the glove bag

After the riser connection process has been completed the equipment is slowly lifted through the riser (approximately 1 foot per minute) The washing process takes place concurrently with lifting and uses preheated water pressurized up to 3 000 pounds per square inch Washing takes place outside of the vapor space and the run off is returned to the tank through the riser

After a section of the equipment has been washed it is pulled through the radiation monitoring assembly Here spectrum analysis is performed on the equipment and it is viewed via the camera to determine if the washing process needs to be repeated This process will be repeated until the equipment shows no visual signs of waste residue

Once washed and dripped dry the equipment is pulled into the flex receiver bag (herculite type) which expands as the equipment is hoisted up into it Once the equipment is completely in the bag an absorbent mat is attached inside the bag The mat can absorb up to 8 gallons of liquid if needed Next a mechanical sealing device cinches the bag closed with wire rope and crimps the bottom of the bag in two places one below the other The bag is then cut between the two crimps leaving a sealed top section containing the equipment and a sealed bottom section sealing the riser opening The bag is then hoisted into position for secondary bagging of the first seal Secondary bagging involves lowering the bagged equipment sealed end first into another bag that fits around the bottom of the first bag The secondary bag is also cinched closed with wire rope The portion of the first bag that was cinched at the riser is then removed and disposed of and the riser is closed From here the equipment is ready for waste packaging for storage and/or burial

LLCE Waste Packaging Process The waste packaging process takes place immediately after the equipment bagging process It is called the Long Length Contaminated Equipment (LLCE) Disposal System and was designed specifically for application at Hanford Tank Farms It packages non contact, remote handled, radioactive waste for storage or burial In general the process involves pushing the LLCE into a storage/burial container (polyethylene piping, various diameters and lengths) and filling the container with lightweight grout (perlite concrete) to attain a greater than or equal to 90 percent filled container Cold testing has shown that it takes approximately two hours to fill the largest container and dissection of the container has demonstrated that the voids around the bagged LLCE are filled 100 percent

The previously bagged equipment is placed into the skid assembly of the tilt trailer (vertical position) The skid assembly is lowered to the horizontal position and the equipment is slowly pushed into the container already in place on the transport trailer The endcap is welded closed using electrical current to fuse the polyethylene together and leak tested in place A vent penetration is installed at the top of the end cap for venting displaced air while filling Another penetration is also put into the endcap for installation of the "trimmie tube (distributes grout evenly into the container) The vent penetration is fitted with or piped to a high efficiency particulate air (HEPA) filter to satisfy ALARA requirements At the storage/burial area the container is removed from the transport trailer and placed for storage or burial

6 1 5 In-Tank Equipment Installation

Equipment installation will be performed in accordance with TWRS ALARACT Demonstration 13, *Installation Operation and Removal of Tank Equipment* A schematic of the tank (typical for AP 102 and AP 104) with the waste retrieval equipment installed is shown in Figure 4

6 2 WASTE STAGING AND RETRIEVAL PROCESS OVERVIEW

The retrieval process at the AP 102 and AP 104 tanks will provide feed stock to a waste treatment facility The low activity waste received from the source tanks may be conditioned and/or diluted to deliver compliant waste Mixing and dilution may also take place at the source tanks to meet the waste specifications of AP 102 and 104, i e solids content must be within a predetermined amount In-coming waste will be staged in the tank(s) until enough has been accumulated to send, and the treatment facility is ready to receive a batch The mixer pump will then be operated to maintain waste uniformity during staging and to mix the waste for a short period of time before transferring it The mixer pump will be operated at full speed until waste samples verify that adequate mixing has been achieved Waste samples will be collected in accordance with TWRS ALARACT Demonstration 7 *Tank Waste Grab Sampling* If dilution/conditioning is needed the pH and temperature of the diluent will be adjusted by means of the Caustic Supply System Once the waste is verified acceptable the transfer lines will be preheated/flushed with diluent and a decant waste transfer to the treatment facility will follow After the transfer the lines will be flushed again with diluent

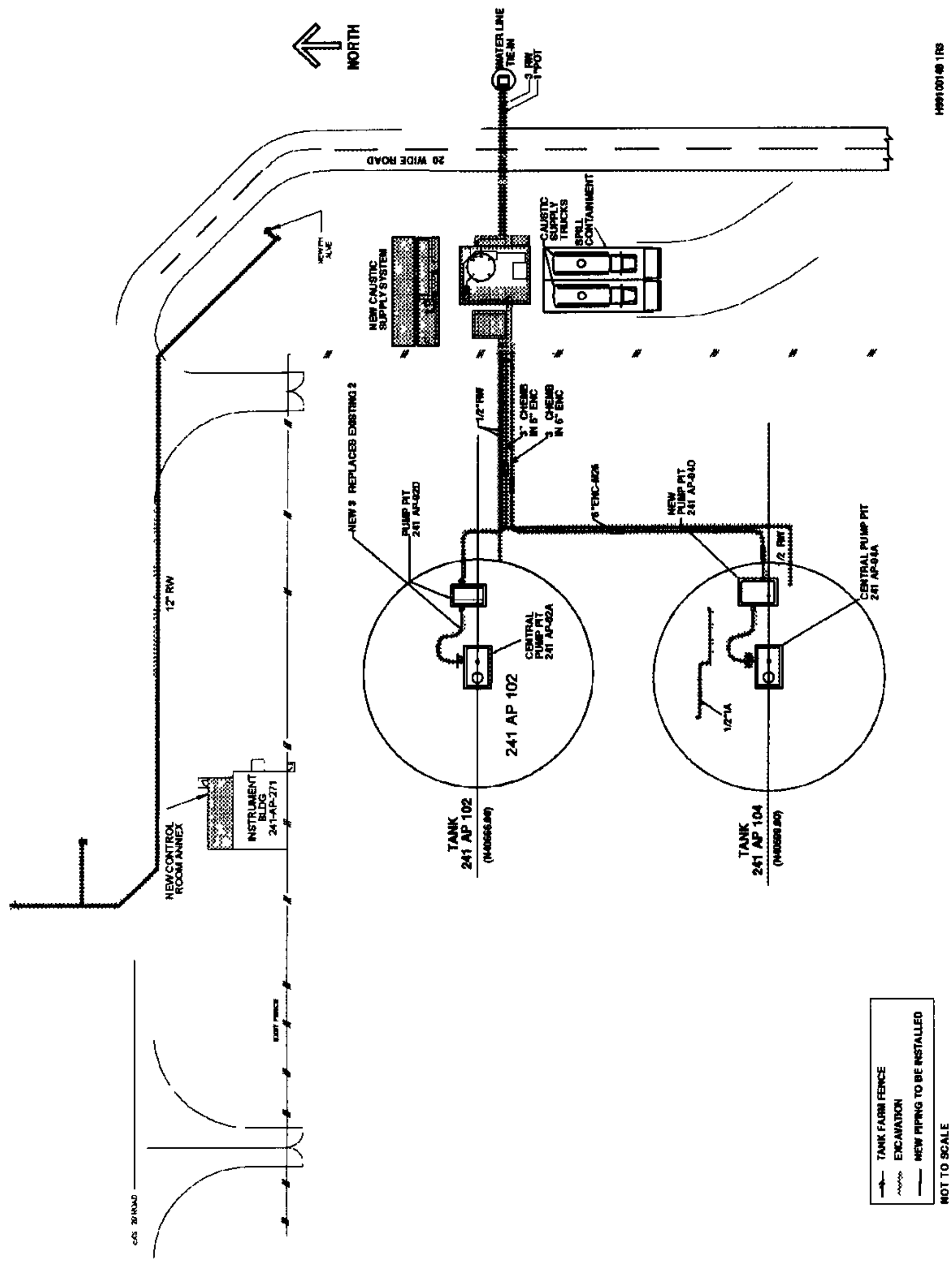

Figure 3 Areas to be Excavated

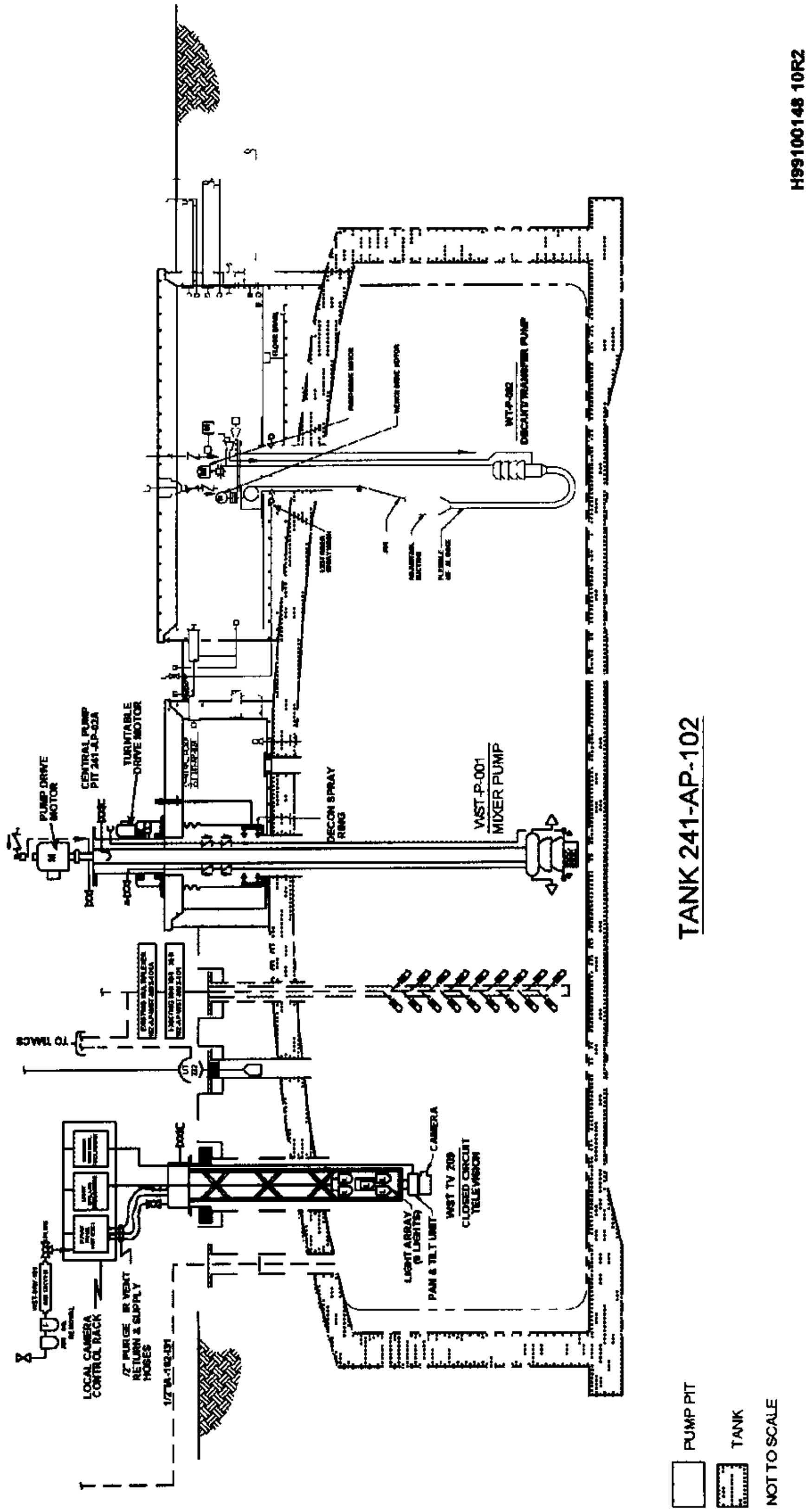

Figure 4 Typical AP Tank with Waste Retrieval Equipment Installed

This page intentionally left blank

7 0 ANNUAL POSSESSION QUANTITY AND PHYSICAL FORM
(REQUIREMENTS 8, 10 AND 11)

There are multiple sources of tank waste inventory information Each of the inventory reports contains the best inventory knowledge available at the time of their publication Some were based on previous work established by others and incorporated current operational practices at the time some were updated to reflect sampling data and others updated inventories with respect to specific constituents being studied at that time Also computer models exist based on historical data that do not directly correspond to any of the more recent inventory reports Not surprisingly the various inventory sources provide inconsistent inventory values

A task was initiated in 1996 to establish a standard inventory for chemicals and radionuclides in the tank wastes The goal was to resolve differences among the many reported inventory values and to provide a consistent technically defensible and reproducible inventory basis for all waste management and disposal activities Typical data sources reviewed included sample analyses process flow sheets waste transaction records computer modeling, reactor fuel data and essential material records The reconciliation process resulted in inventories for 46 radionuclides and 26 nonradioactive components The inventories presented in this NOC are those obtained through this reconciliation process and are now used as the standard for Hanford tank inventories (HNF SD WM TI-740 Rev 0A)

The waste retrieval systems to be installed in the AP 102 and AP 104 tanks may handle wastes from the 241 AN 102 AN 103 AN 104, AN 105 AN 106 AN 107, AW 101 SY-101 SY 102 and SY 103 tanks The current inventories in AP 102 and AP 104 are also included on a contingency basis because it has not yet been determined if these two tanks will be emptied prior to mixer pump installation or not A maximum envelope scenario was used to encompass all mixing/retrieval possibilities for the AP 102 and AP 104 tanks the tanks listed above or any other tank that falls within the maximum envelope values The maximum envelope consists of the highest curie value for each radionuclide from all the tanks listed above Individual tank inventories, as well as the maximum envelope are shown in Appendix A

This page intentionally left blank

8 0 CONTROL SYSTEM (REQUIREMENTS 6 AND 7)

8 1 CONTROLS UTILIZED DURING CONSTRUCTION ACTIVITIES

Emission controls utilized during the construction activities are administrative based in ALARA principles and consist of ALARA techniques They are discussed individually below with respect to their associated activities as described earlier in Section 6 0

8 1 1 Soil Excavation

Soil excavation activities will be performed in accordance with ALARACT Demonstration 5 *TWRS ALARACT Demonstration for Soil Excavation (Using Hand Tools)*, and will follow the radiological controls specified in that ALARACT

If the Regulated Guzzler is used to excavate soil radiological and administrative controls as described in its NOC for use in the A Tank Farm Complex (98 EAP 037) will be followed Description of the emissions control technology for the Regulated Guzzler is also provided in that NOC

8 1 2 Pipe Cutting

Pipe cutting and weld preparation will be performed in a glove bag if the levels of removable contamination in the cut and weld area are greater than 10 000 dpm/100cm^2 beta gamma and 200 dpm/100 cm^2 alpha HPT coverage will be provided Although the key measure relied upon to control air emissions during cutting is the glove bag, measures such as expandable foam or fixatives may be applied on or around a pipe cut as an additional measure to help fix contamination The decision to use expandable foam or fixatives will be made on a case by case basis after excavation exposes the pipe to be cut When used the expandable foam will help fix any contamination to the pipe wall in the area of the cut and will help prevent migration of contamination present in the pipe upstream or downstream of the cut Welding will commence once removable contamination levels in the cut and weld area are reduced to ALARA The goal will be equal to or less than 1 000 dpm/100 cm^2 beta gamma and 20 dpm/100 cm^2 alpha but may not always be attainable

Riser cutting and weld preparation will take place in a glove bag if the levels of removable contamination in the cut and weld area are greater than 10 000 dpm/100cm^2 beta gamma and 200 dpm/100 cm^2 alpha Welding will commence once removable contamination levels in the cut and weld area are reduced to ALARA The goal will be equal to or less than 1 000 dpm/100 cm^2 beta gamma and 20 dpm/100 cm^2 alpha, but may not always be attainable HPT coverage will also be provided during the work

Work in glove bags will not be performed if sustained wind speeds are greater than 30 miles per hour If a Portable/Temporary Radioactive Air Emission Unit or a HEPA Filtered Vacuum Radioactive Air Emission Unit is used during the pipe cutting activities controls as described in their NOCs (DOE/RL 96 75 and DOE/RL 97 50) will be followed Descriptions of the emissions control technology for those units are also provided in those NOCs

8 1 3 Pit Work

Pit access and work will be performed in accordance with ALARACT Demonstrations 6 and 14 *TWRS ALARACT Demonstration for Pit Access* and *TWRS ALARACT Demonstration for Pit Work* and will follow the radiological controls specified in those ALARACTs Controls not covered in these ALARACTs are described below

All pit work will be performed in an appropriately configured confinement structure as required by the applicable work package and its associated RWP to maximize ALARA for contamination migration while allowing entry to perform the work HPT coverage will be provided during all pit work Pit work will not be performed if sustained wind speeds are greater than 25 miles per hour The 42 inch riser extensions will be installed with continuous tank ventilation

If a Portable/Temporary Radioactive Air Emission Unit or a HEPA Filtered Vacuum Radioactive Air Emission Unit is used during the pit work activities, controls as described in their NOCs (DOE/RL 96 75 and DOE/RL-97 50) will be followed Descriptions of the emissions control technology for those units are also provided in those NOCs

8 1 4 Removal and Installation of In-Tank Equipment

Equipment removal and installation activities will be performed in accordance with ALARACT Demonstration 13 *TWRS ALARACT Demonstration for Installation Operation and Removal of Tank Equipment* and will follow the radiological controls specified in that ALARACT

Controls specific to the flexible receiver bagging processes include maintaining vapor space confinement through seals in the bolted on equipment, reducing surface contamination on the equipment through water washing and double sealing the equipment bag once the equipment is inside

Controls specific to the LLCE waste packaging process include fitting the vent penetration installed in the LLCE storage container with or piping it to a HEPA filter to filter displaced air while the container is being filled

If a Portable/Temporary Radioactive Air Emission Unit or a HEPA Filtered Vacuum Radioactive Air Emission Unit is used during the removal or installation of in-tank equipment activities controls as described in their NOCs (DOE/RL 96 75 and DOE/RL-97 50) will be followed Descriptions of the emissions control technology for those units are also provided in those NOCs

8 2 TANK VENTILATION AND EMISSIONS CONTROL SYSTEM

The existing ventilation and emissions control systems for the 241 AP Tank Farm will be used during the mixing and transferring of waste in the AP 102 and 104 tanks The system has been determined to be adequate to remove additional heat generated by the mixer pumps (Appendix B) Therefore no modifications will be made to the existing ventilation or emissions control systems The 241-AP Tank Farm exhaust system was built in 1984 and provides ventilation for all eight AP tank primary vapor spaces The system removes heat water vapor and particulates, and maintains a negative pressure on the tanks The reference for the following information is WHC SD-W314 ES 022 Rev 0 The emission point is the 296 A 40 Stack

Inlet aır for the AP 102 and 104 tanks ıs provıded through gaps ın theır pıt cover blocks Aır ıs exhausted from each tank ındependently through 12-ınch dıameter underground carbon steel ducts The ducts connect to a common 12 ınch dıameter header passıng underground to the Central Exhaust Statıon The exhaust statıon consısts of two filtratıon subsystems and the stack Eıther subsystem can collectıvely ventılate all the tanks together at a maxımum flow rate of approxımately 1 100 cubıc feet per mınute Only one system operates at a tıme whıle the other remaıns ın standby as a backup A schematıc of the AP Tank Farm exhaust system ıs shown ın Fıgure 5

Each filtratıon subsystem consısts of a de entraıner for the removal of moısture, an electrıc heater for lowerıng the relatıve humıdıty a pre filter for reducıng the number of large partıcles, and two stages of HEPA filters Eıther de-entraıner can be used wıth eıther heater/filter combınatıon by way of a ductıng crosstıe The de-entraıner vaults filter housıngs and related pıpıng are enclosed wıthın a 8-foot hıgh shıeldıng wall on the Central Exhaust Statıon pad The system fans and stack are located outsıde of the enclosure The stack ıs 10 ınches ın dıameter and 13 feet hıgh Stack exhaust temperatures ranged from 68°F ın March 1997 to 104°F ın September 1997 The maxımum expected temperature ıncrease at the tank, due to operatıon of a mıxer pump ıs 2 3°F per day (Appendıx B) The cumulatıve effect at the filtratıon system, however ıs neglıgıble because the exhaust streams from the two tanks are dıluted when mıxed wıth the aır streams from the other sıx tanks prıor to enterıng the filtratıon system

Each HEPA filter measures 2 feet by 2 feet by 11 5 ınches deep ıs rated for 100 cubıc feet per mınute and ıs equıpped wıth fluıd seals The HEPAs are ındıvıdually tested annually (per ASME N510) to a mınımum effıcıency of 99 95 percent for the removal of partıculates wıth a medıan dıameter of 0 3 mıcrons

It ıs proposed that the exıstıng AP Tank Farm ventılatıon and control systems be approved for as low as reasonably achıevable control technology (ALARACT) for operatıons of one mıxer pump ın each of the AP 102 and AP 104 tanks All the radıonuclıdes contrıbutıng 10 percent or more of the dose are ın partıculate form The WDOH has provıded guıdance ın the past that HEPA filtratıon ıs consıdered best avaılable radıonuclıde control technology (BARCT) for partıculate emıssıons

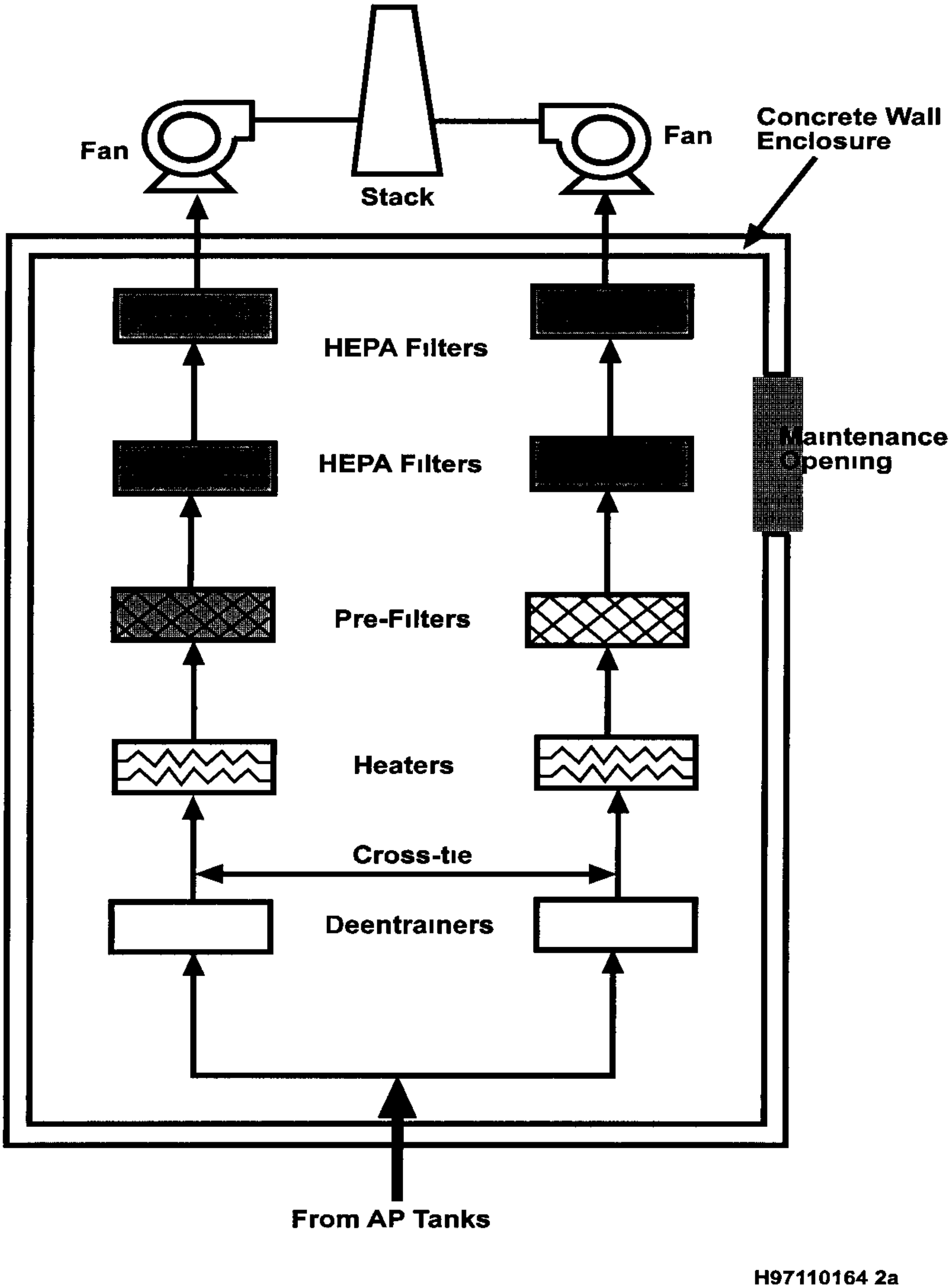

Fıgure 5 AP Tank Farm Exhauster and Control Equıpment Schematıc

This page intentionally left blank

9 0 MONITORING SYSTEM (REQUIREMENT 9)

The potential annual, unabated total effective offsite dose for installing and operating the waste retrieval systems in the AP Tank Farm in conjunction with the current potential unabated offsite dose from the AP Tank Farm is less than 0 1 millirem per year Therefore in accordance with 40 CFR 61 Subpart H periodic confirmatory measurements (PCM) will be made to verify the low emissions

9 1 MONITORING DURING CONSTRUCTION ACTIVITIES

During soil excavation activities, soil contamination surveys as described in Section 8 1 1 will constitute the PCM to verify low emissions If the Regulated Guzzler is used PCM will be performed as required by its NOC

During pipe cutting activities surface contamination surveys as described in Section 8 1 2, will constitute the PCM to verify low emissions If a Portable/Temporary Radioactive Air Emission Unit or a HEPA Filtered Vacuum Radioactive Air Emission Unit is used PCM will be performed as required by their NOCs

During pit work activities surface contamination surveys as described in Section 8 1 3, will constitute the PCM to verify low emissions If a Portable/Temporary Radioactive Air Emission Unit or a HEPA Filtered Vacuum Radioactive Air Emission Unit is used PCM will be performed as required by their NOCs

During in tank equipment removal and installation activities surface contamination surveys as described in Sections 8 1 4 will constitute the PCM to verify low emissions If a Portable/Temporary Radioactive Air Emission Unit or a HEPA Filtered Vacuum Radioactive Air Emission Unit is used PCM will be performed as required by their NOCs

9 2 MONITORING DURING OPERATIONS

Confirmatory measurements will be obtained through use of the AP Tank Farm s existing sampling and monitoring system (296 A 40 stack) Samples will be collected for approximately two weeks four times a year, and will include representative operation of the waste retrieval systems The samples will be analyzed for gross alpha and beta analysis While the 296 A-40 record sampler is operating, it will be inspected daily to ensure it is operating, and it will be calibrated in accordance with established practices

The sampling and monitoring system is a generic design consisting of a record sampler and a continuous air monitor (CAM) it collects samples near isokinetically at a sample flow rate of 120 ±12 cubic feet per hour Its design is based on ANSI 13 1 1969 and 40 CFR 60 Appendix A Test Methods however it does not comply fully with these standards Two sample probes (1 for the CAM 1 for the sampler) are located in the stack per 40 CFR 60 Appendix A, Method 1A The probe nozzles are configured in accordance with ANSI 13 1 1969 and are located 20 inches from the top of the stack A flow measurement anemometer is also installed just under these probes (not compliant with Method 1A) The sample tubing is heat traced insulated and approximately 13 5 feet (vertical and horizontal) The gas meter totaling the flow through the sampling system is well within the ±2 0 percent accuracy described by Method 2A The record sampler's collection efficiency during normal operations ranges between 38 and 74 percent for penetration of 10 micron particles (from *Deposition 2 0* calculations) A complete description of the sampling system is provided in WHC SD WM ES 291-1 Rev 1

10 0 RELEASE RATES (REQUIREMENTS 12 AND 13)

Emissions resulting from the construction and operation of a mixer pump in the AP-102 and AP 104 tanks are expected to be low Emissions fall into and are discussed below in two categories those generated from construction activities and those generated from mixer pump operations

10 1 POTENTIAL UNABATED EMISSIONS FROM CONSTRUCTION ACTIVITIES

Construction activities are scheduled to be completed within two years however for conservatism in the emissions estimate and flexibility to adapt to schedule changes the unabated emissions are assumed to be released over a one year period Potential unabated emissions from the following general categories of construction activities are discussed below and calculated in Appendices C D E and F

10 1 1 Soil Excavation

10 1 1 1 Manual Excavation

Unabated emissions for manual soil excavation activities were determined by assuming the entire volume of soil excavated (1 000 cubic yards) was at the same contamination concentration and the 40 CFR 61 Appendix D release factor for particulates was applied to the total volume

The AP Tank Farm is managed as a 'clean" farm There is no known surface contamination and no historical spills or leaks, therefore, no contamination is expected during excavation In order to determine a potential to emit if contamination is encountered, the administrative control points set in Section 8 1 1 for contamination as monitored by standard radiological field instrumentation will be used to envelope emissions The 100 000 dpm/100 cm^2 beta/gamma control point correlates to 10 000 cpm as used in the calculations and 35 dpm/100 cm^2 above background alpha correlates to 5 cpm however 10 cpm was used in the calculations to account for variations in obtaining background readings To determine the corresponding soil concentration in picocuries per grams of individual radionuclides conversion factors as developed in the study *Soil Contamination Standards for Protection of Personnel* (HNF 2418) were used The average soil density was assumed to be 1 570 kilograms per cubic meter The beta gamma contributing radionuclide was assumed to be Sr 90 and the alpha contributing radionuclide was assumed to be Am 241 The potential unabated emissions from manual soil excavation activities are shown in Appendix C

10 1 1 2 Regulated Guzzler Excavation

Unabated emissions for soil excavation with the Regulated Guzzler are included by reference from 98 EAP-037 The releasable curie values in the referenced NOC were multiplied by 0 286, the ratio between the total volume of soil to be excavated in the Guzzler NOC and the total volume of soil to be excavated in this NOC It is not known at this time if, or how much, soil will be excavated by the Regulated Guzzler therefore the entire soil volume was used to determine the potential emissions The potential unabated emissions from Regulated Guzzler excavation activities are also shown in Appendix C

10 1 2 Pipe Cutting

To determine the unabated emissions from pipe cutting activities it was assumed that a section of the pipe to be cut was full of AP 102 tank waste and the 40 CFR 61 Appendix D release factor for particulates was applied to that volume of pipe (using the pipe volume is conservative with respect to the volume of the cut) The pipe volume was derived from a 2-foot section of a 2 inch Sch 40 pipe (representing any needed cuts on a 2-inch pipe) a 2 foot section of an 8 inch Sch 40 pipe (representing any needed cuts on an 8 inch pipe) and a 2 foot section of a 12-inch Sch 40 riser (representing any needed cuts to lengthen the riser) The pipe volume was multiplied by the AP 102 tank inventory and then multiplied by the 1 0 E 03 release factor for particulates The potential unabated emissions from pipe cutting activities are shown in Appendix D

10 1 3 Pit Work

The unabated emissions estimate for pit work are based on smearable contamination data from the pits and the 40 CFR 61 Appendix D release factor for particulates The entire surface area from the walls and floors of the pit and the enclosed equipment was assumed to be uniformly contaminated at the highest smearable concentration levels noted on radiological survey reports Of the three pits surveyed for this NOC only one smear was above detectable limits (4 000 dpm/100 cm^2 beta gamma) and there was no visible waste depth in any of the pits The beta gamma contributing radionuclide was assumed to be Sr 90 The potential unabated emissions from pit work activities are shown in Appendix E

10 1 4 Removal of In-Tank Equipment

The unabated emissions estimate for the removal of in tank equipment was determined by assuming a 0 16 centimeter layer of the applicable tank inventory (AP 102 or AP 104) being uniformly distributed across the surface area of the equipment and applying the 40 CFR 61 Appendix D release factor for particulates to the total volume contained over that surface area The biggest equipment from each tank was chosen to represent the total unabated emissions for all removals and relocations That equipment includes a mixer pump from AP 102 a transfer pump from AP 102 a transfer pump from AP-104 and a slurry distributor from AP 104 Free liquids are not expected to be held up in this equipment because the equipment is designed as self draining The small amount of liquid (less than one liter) that may be trapped behind a transfer pump impeller will be immobilized in the absorbent mat secured inside the flex receiver bag and will not be released by the grouting process The potential unabated emissions from in tank equipment removals are shown in Appendix F

10 2 POTENTIAL ABATED EMISSIONS FROM CONSTRUCTION ACTIVITIES

Potential abated emissions from the construction activities have not been calculated because there are no control efficiencies available to apply to the ALARA type controls used to mitigate those emissions

10 3 POTENTIAL UNABATED EMISSIONS DURING MIXER PUMP OPERATIONS

Potential annual unabated emissions during mixer pump operations are based on the maximum envelope tank inventory presented in Section 7 0 and a measured partition fraction (1 02 E-09) representative of particulates generated in a double shell tank during the operation of two air lift circulators

(RHO RE SA 216P) This partition fraction was chosen because it would result in a more accurate estimate than the 40 CFR 61 Appendix D release factor for particulates and it would also provide a conservative estimate when applied to the operation of a mixer pump because air lift circulation is a more aggressive process than mixer pump circulation Justification for and proposal for use of this partition fraction for calculating potential emissions from a mixer pump process is presented in Appendix G

The partition fraction was derived from samples collected over a two hour period representing only two hours of air lift operations Mixer pump operations however will be intermittent for various amounts of time through out a year To apply the partition fraction over longer periods of operation, it was divided by two (air lift circulator hours) and multiplied by the hours of mixer pump operation in a year

The hours of mixer pump operation per year may vary from year to year depending on which source tanks or combination of source tanks provide waste to the AP tanks To find a maximum number of hours that would be flexible enough to account for source tank scheduling changes and keep emissions low (0 05 mrem/yr) a spreadsheet was used to calculate annual emissions while varying the times for the operational hours (Appendix H) A maximum of 450 hours a year of mixer pump operation was found to satisfy both requirements

The potential annual unabated emissions during mixer pump operations in the AP-102 and AP 104 tanks are shown in Appendix H

10 4 POTENTIAL ABATED EMISSIONS DURING MIXER PUMP OPERATIONS

The potential annual abated emissions during mixer pump operations are also shown in Appendix H The abated emissions were calculated from the unabated emissions and the decontamination factor for a single HEPA filter The decontamination factor for particulates of one HEPA filter is

1 - (1 efficiency) = 1 - (1 9995) = 2 000

The decontamination factor for constituents released in a vapor phase (Tritium Carbon-14 and Iodine 129) is 1 0 The abated emissions equal the unabated emissions divided by the decontamination factor

This page intentionally left blank

11 0 OFFSITE IMPACT (REQUIREMENTS 14 AND 15)

This section discusses the TEDE to the offsite MEI resulting from the unabated and abated emission estimates for operating a mixer pump in the AP 102 and AP 104 tanks and from unabated emissions from the construction activities The MEI for this application is located at the Hanford Site boundary 20 2 kilometers to the east/southeast of the 200 East Area (PUREX)

The unit dose factors and the information required to develop the unit dose factors from the Clean Air Assessment Package 1988 (CAP 88) PC computer model are included in *Calculating Potential to Emit Releases and Doses for FEMPs and NOCs* (HNF-3602) which has been previously submitted to the WDOH

The potential unabated offsite dose from all the construction activities combined together is 0 045 millirem per year (Appendices C D E & F) The radionuclides that contribute greater than 10 percent of the unabated TEDE to the MEI are Strontium 90 Cesium 137 and Americium 241

The potential unabated offsite dose from operation of the mixer pumps is 0 042 millirem per year (Appendix H) The radionuclides that contribute greater than 10 percent of the unabated TEDE to the MEI are Strontium 90 Cesium-137 and Americium 241 The potential abated offsite dose from operation of the mixer pumps is 2 17 E 05 millirem per year (Appendix H)

The current potential unabated offsite dose estimate for the AP Tank Farm exhauster stack is 0 0043 millirem per year (HNF SD EMP 031 Rev 3) The potential unabated dose for mixer pump operations is 0 042 millirem per year Mixer pump operations in the AP 102 and AP-104 tanks will not increase the current potential dose for the AP Tank Farm stack to 0 1 millirem per year

The total effective dose equivalent from all 1998 Hanford Site air emissions (point sources diffuse and fugitive sources and Radon and Thoron) was 0 038 millirem (DOE/RL 99 41) The emissions resulting from the construction and operation of a mixer pump in the AP 102 and AP 104 tanks in conjunction with other operations at the Hanford Site will not result in a violation of the National Emission Standard of 10 millirem per year

This page intentionally left blank

12 0 COST FACTORS AND FACILITY LIFETIME (REQUIREMENTS 16 AND 17)

It is proposed that the HEPA filtration system as described in Section 8 0 be approved as ALARACT for this application The WDOH has provided guidance in the past that HEPA filtration is considered best available radionuclide control technology (BARCT) for particulate emissions As such cost factors for construction, operation and maintenance of the control technology components and system have not been provided

The AP 102 and –104 retrieval systems have a design life of 20 years including component replacement as necessary The ventilation and emissions control systems have varying design lives depending on the component in question (duct work 15 heater & filters 23 fans 19) Emissions from the modification described in this NOC are based on the transfer/handling of LAW through the year 2011 It is also not unrealistic to anticipate continued operation of the mixer pumps in a batch mode until closure (retrieval) of the DST system which is currently scheduled for 2028

This page intentionally left blank

13 0 TECHNOLOGY STANDARDS (REQUIREMENT 18)

Operatıng a mıxer pump ın a batch mode ın the AP 102 and AP 104 tanks has the potentıal to emıt less than 0 1 mıllırem per year TEDE to the MEI Therefore the desıgn must meet as applıcable and to the extent justıfied by a cost/benefit evaluatıon, the technology standards lısted under WAC 246 247 110 (18) Thıs sectıon dıscusses complıance wıth major sectıons of these standards and provıdes justıficatıon to support adequacy of the desıgn for sectıons of these standards whıch are not met

Amerıcan Socıety of Mechanıcal Engıneers (ASME) AG-1 Thıs equıpment specıfic code consısts of five prımary sectıons whıch are applıcable to thıs unıt The applıcable sectıons are fans (Sectıon BA) ductwork (Sectıon SA) HEPA filters (Sectıon FC) dampers (Sectıon DA) and Qualıty Assurance (QA) (Sectıon AA)

The fan sectıon of AG-1 (Sectıon BA) covers the constructıon and testıng requırements for fans Thıs fan meets the applıcable crıterıa ıdentıfied ın AG 1 except for one area It can not be shown the shaft leakage crıterıa ıs met (Sectıon BA 4142 2) Thıs ıs acceptable because the leakage would be mınımal and the leakage poınt ıs located after the HEPA filters

The next applıcable requırement ıs the ductwork sectıon of AG 1 (Sectıon SA) As was the case for the fan thıs sectıon ıdentıfies several requırements for ductwork Thıs ıncludes acceptable materıal fabrıcatıon, and testıng crıterıa The ductwork used ıs metal and meets the applıcable crıterıa ıdentıfied ın ASME AG 1 However ıt can not be shown that the ductwork was pressure tested per the applıcable crıterıa ıdentıfied ın AG 1 and N510 prıor to operatıon The ductwork was ınstalled several years ago Thıs ıs acceptable because the ductwork ıs under negatıve pressure and has shown no sıgn of faılure or degradatıon

The HEPA filter sectıon of AG 1 (Sectıon FC) ıs also applıcable ın thıs ınstance The crıterıa ıdentıfied ın AG 1 were prevıously located ın mılıtary specıficatıon 51068 and ASME 509 The filters meet the applıcable sectıons of AG 1 except for two areas dealıng wıth filter qualıficatıon testıng Justıficatıon for thıs exceptıon was dıscussed wıth and approved by WDOH at the December 1998 Routıne Technıcal Assıstance Meetıng

The dampers ınstalled on the portable exhauster do meet the applıcable AG-1 crıterıa Thıs ıncludes desıgn, constructıon and testıng The manufacturer performs a generıc leak test on the butterfly valves prıor to shıppıng

The qualıty assurance sectıon of AG 1 relıes on ASME NQA 1 The general QA crıterıa are located ın Sectıon AA Specıfic component/system crıterıa are located ın each sectıon throughout AG 1 It can not be shown the overall system meets the applıcable qualıty assurance crıterıa However, based on past operatıng hıstory and evaluatıng the major components of the system (e g fans filter housıngs and HEPA filters) ıt can be shown those components meet the crıterıa

AG-1 contaıns several other sectıons however they do not apply to thıs system Fınally, several sectıons of AG 1 are not yet completed Thıs ıncludes the filter housıng sectıon and wıll be dıscussed below ın the N509 Sectıon

ASME N509 Thıs standard deals wıth the ındıvıdual components and how they relate to the overall system The prımary sectıon of N509 that wıll be dıscussed ıs the filter housıng sectıon and heater sectıon

The filter housings for the exhauster are compliant with the applicable sections of the N509 criteria This includes design of housing mounting frames, materials and testing

The heater used in this exhauster meets the N509 criteria The reason for the heater is to assure the relative humidity of the air stream is below 70% reducing the opportunity for condensation in the filter housing

ASME N510 This standard pertains to the testing of nuclear air cleaning systems The first requirement identified in N510 is to perform a pressure decay test This is to assure there are no infiltration or outward leak paths from the system This is a standard test for the filter housings at the housing manufacturer's facility However no documentation can be located to show whether or not the filter housings were pressure tested once installed in the field This is acceptable because of the past operating history of the system, and the fact the testing was completed at the manufacturing facility

This system meets the leak test criteria identified per N510 Test sections and manifolds are located in the exhaust train to allow for proper independent testing of both HEPA filters on both trains

ANSI/ASME NQA-1 Quality assurance is addressed by HNF-MP 599 latest revision "Project Hanford Quality Assurance Program Description" (Chapter 2 0, Section 3 3 and Chapter 7 0, Section 3 2) and by HNF 0528 3 "National Emission Standards for Hazardous Air Pollutants (NESHAP) Quality Assurance Project Plan for Radioactive Airborne Emissions" (all of Sections 2 0, 3 0 and 5 0) as a compatible alternative to NQA-1

40 CFR 60, Appendix A Method 2C (Determination of Stack Gas Velocity and Volumetric Flow Rate In Small Stacks or Ducts (Standard Pitot Tube) as identified in Appendix A is used However only one traverse is being taken in the stack due to instrumentation installed in the other port

ANSI N13 1 The probe position is a minimum of five diameters downstream from abrupt changes in flow direction and the system contains proper filter holders and support

The sampling probe configuration contains minimum radius bends and precisely tapered probe end edges

The sample tubing is minimized as much as physically practical there are bends located in the tubing and a long horizontal section which reduce the deposition efficiency Deposition losses for 10 micron sized particles have been estimated to be between 38 to 74 percent

This page intentionally left blank

14 0 REFERENCES

98 EAP-037 J E Rasmussen U S Department of Energy Richland Field Office to J Leitch U S Environmental Protection Agency, Region 10, *Short Form Radioactive Air Emissions Notice of Construction (NOC) for Guzzler Excavation and Backfilling Activities in Support of the 200 East Area A Farm Complex* January 30 1998

DOE/RL 99-41 *Radionuclide Air Emissions Report for the Hanford Site Calendar Year 1998* June 1999, U S Department of Energy Richland Washington

HNF 2418 *Soil Contamination Standards for Protection of Personnel* March 1998, P D Rittmann Fluor Daniel Northwest Richland Washington

HNF 3602, *Volume 1 Calculating Potential to Emit Releases and Doses for FEMPs and NOCs* July 1999 J S Hill P D Rittman Fluor Daniel Hanford Inc Richland Washington

HNF 4327 Rev 0 *Control of Radioactive Emissions for Frequently Performed TWRS Work Activities (ALARACT Demonstrations)* April 1999 D E Clark Lockheed Martin Hanford Corporation Richland Washington

HNF SD WM EMP 031 Rev 3, *Tank Farm Stack NESHAP Designation Determinations* August 1997 G M Crummel Lockheed Martin Hanford Company Richland Washington

HNF SD-WM TI 740 Rev 0A *Standard Inventories of Chemicals and Radionuclides in Hanford Site Tank Wastes*, August 18, 1997, M J Kupfer et al Lockheed Martin Hanford Corporation Richland Washington

RHO RE-SA 216P *Characterization of Air borne Radionuclide Particulates in Ventilated Liquid Waste Tanks* June 1987 R T Kimura, D W Lindsey, Rockwell Hanford Operations, Richland, Washington

WHC SD W314 ES 022 Rev 0 *Initial Assessment Report HVAC Systems* February 21 1996 J Kriskovich Westinghouse Hanford Company Richland Washington

WHC SD WM ES 291-1 Rev 1, *Tank Farm Stack Sampling System Configuration and Efficiency Study* 1994, G M Crummel, Westinghouse Hanford Company Richland Washington

This page intentionally left blank

APPENDIX A

INDIVIDUAL TANK INVENTORIES AND THE MAXIMUM ENVELOPE TANK INVENTORY

This page intentionally left blank

Radionuclide	Physical State	AN 102 Curies	AN-103 Curies	AN 104 Curies	AN 105 Curies	AN 106 Curies	AN-107 Curies	AP 102 Curies	AP 104 Curies	AW 101 Curies	SY 101 Curies	SY-102 Curies	SY 103 Curies	Maximum Envelope Curies
3H	Liquid	1 27E+00	9 31E+00	4 33E+01	1 41E+03	2 75E+01	9 29E+02	1 09E+01	1 36E+00	9 58E+02	1 38E+03	4 26E-01	3 16E+00	1 41E+03
14C	Liquid	6 48E-01	1 12E+02	1 04E+02	1 98E+02	3 57E+00	1 48E+02	2 09E+00	1 57E-02	1 24E+02	2 04E+02	2 86E+00	1 05E+02	2 04E+02
59Ni	Particulate	1 15E+01	7 58E+00	5 61E+00	1 11E+01	2 57E-01	6 49E+00	4 55E+00	0 00E+00	7 18E+00	1 30E+01	1 74E-01	6 51E+00	1 30E+01
60Co	Particulate	7 59E+02	1 12E+02	1 49E+02	1 24E+02	4 87E+00	2 00E+02	3 19E+02	4 03E-02	1 73E+02	2 28E+02	5 87E+01	1 05E+02	7 59E+02
63Ni	Particulate	1 14E+03	7 47E+02	5 52E+02	1 09E+03	2 21E+01	6 42E+02	4 47E+02	0 00E+00	7 07E+02	1 28E+03	1 70E+01	6 39E+02	1 28E+03
79Se	Particulate	1 01E+00	1 23E+01	1 13E+01	2 19E+01	4 58E 01	1 45E+01	8 82E-01	3 32E-05	1 48E+01	2 03E+01	6 41E-01	1 05E+01	2 19E+01
90Sr	Particulate	3 68E+05	8 03E+03	9 38E+04	3 36E+04	1 37E+02	5 54E+05	5 88E+03	8 07E+00	3 13E+04	1 25E+05	3 89E+04	7 90E+04	5 54E+05
90Y	Particulate	3 68E+05	8 03E+03	9 38E+04	3 36E+04	1 37E+02	5 54E+05	5 88E+03	8 07E+00	3 13E+04	1 25E+05	3 89E+04	7 90E+04	5 54E+05
93mNb	Particulate	7 38E+01	4 32E+01	4 02E+01	7 76E+01	1 62E+00	5 10E+01	2 76E+01	0 00E+00	5 24E+01	7 21E+01	2 31E+00	3 73E+01	7 76E+01
93Zr	Particulate	1 03E+02	5 96E+01	5 53E+01	1 06E+02	2 20E+00	7 13E+01	3 83E+01	0 00E+00	7 15E+01	9 95E+01	3 16E+00	5 15E+01	1 06E+02
99Tc	Particulate	4 97E+01	4 56E+02	3 45E+02	1 17E+03	2 63E+01	1 16E+03	3 58E+02	7 12E 02	9 22E+02	1 46E+04	2 04E+01	7 59E+02	1 46E+04
106Ru	Particulate	4 85E-02	5 33E-02	3 23E-02	5 60E 02	1 78E 03	3 56E-02	1 69E-02	1 39E+01	6 07E 02	4 16E-02	1 22E-03	2 16E 02	1 39E+01
113mCd	Particulate	5 65E+02	3 02E+02	2 90E+02	5 52E+02	1 09E+01	3 99E+02	2 05E+02	0 00E+00	3 62E+02	5 26E+02	1 63E+01	2 73E+02	5 65E+02
125Sb	Particulate	1 59E+02	8 65E+02	7 45E+02	1 33E+03	3 12E+01	9 51E+02	4 19E+02	0 00E+00	1 18E+03	9 89E+02	3 18E+01	5 23E+02	1 33E+03
126Sn	Particulate	3 15E+01	1 88E+01	1 72E+01	3 32E+01	6 99E 01	2 18E+01	1 18E+01	0 00E+00	2 26E+01	3 06E+01	9 75E-01	1 58E+01	3 32E+01
129I	Particulate	3 17E+00	8 32E+00	7 53E+00	1 10E+01	5 07E 02	2 25E+00	1 10E+00	5 90E-04	1 78E+00	2 79E+00	1 73E-01	2 58E 01	1 10E+01
134Cs	Particulate	1 97E+01	1 89E+02	1 23E+02	2 08E+02	5 28E+00	5 71E+01	1 44E+01	3 52E 01	2 65E+02	1 68E+01	9 44E-01	9 00E+00	2 65E+02
137mBa	Particulate	1 40E+06	2 19E+06	2 20E+06	7 94E+05	1 94E+04	1 42E+06	8 81E+05	3 59E+02	1 73E+06	2 09E+06	4 83E+04	1 07E+06	2 20E+06
137Cs	Particulate	1 49E+06	2 31E+06	2 32E+06	8 36E+05	2 05E+04	1 50E+06	9 31E+05	3 72E+02	1 83E+06	2 21E+06	5 10E+04	1 13E+06	2 32E+06
151Sm	Particulate	7 34E+04	4 36E+04	4 00E+04	7 72E+04	1 62E+03	5 08E+04	2 74E+04	0 00E+00	5 24E+04	7 14E+04	2 27E+03	3 69E+04	7 72E+04
152Eu	Particulate	4 07E+01	1 58E+01	1 45E+01	2 69E+01	5 36E-01	2 00E+01	9 74E+00	0 00E+00	1 79E+01	2 46E+01	7 82E-01	1 27E+01	4 07E+01
154Eu	Particulate	3 75E+02	6 04E+02	6 76E+02	5 65E+02	7 89E+01	3 03E+03	1 47E+03	1 11E 01	2 69E+03	3 73E+03	5 66E+02	1 62E+03	3 73E+03
155Eu	Particulate	3 22E+02	3 30E+03	4 73E+03	2 26E+03	3 32E+01	1 22E+03	5 82E+02	8 29E-01	1 14E+03	1 46E+03	4 93E+02	1 41E+03	4 73E+03
226Ra	Particulate	7 95E-04	5 81E-04	4 63E-04	9 14E-04	2 00E-05	5 29E-04	3 14E-04	4 81E+00	6 38E 04	8 54E-04	2 78E-05	4 36E-04	4 81E+00
227Ac	Particulate	4 90E-03	3 55E-03	2 86E-03	5 65E-03	1 24E-04	3 26E-03	1 96E-03	0 00E+00	4 02E 03	5 42E-03	1 76E-04	2 75E-03	5 65E-03
228Ra	Particulate	1 72E+00	1 05E+00	1 03E+00	2 03E+00	2 81E-02	2 05E+00	5 81E-01	0 00E+00	1 31E+00	8 65E 01	2 06E 02	5 56E-01	2 05E+00
229Th	Particulate	3 99E-02	2 43E-02	2 39E-02	4 71E-02	6 53E-04	4 74E-02	1 35E-02	0 00E+00	3 04E-02	2 03E 02	4 95E-04	1 30E-02	4 74E-02
231Pa	Particulate	2 35E-02	1 43E-02	1 28E-02	2 49E-02	5 10E-04	1 60E-02	9 17E-03	0 00E+00	1 71E 02	2 50E-02	1 00E-03	1 28E-02	2 50E-02
232Th	Particulate	1 83E-01	1 03E-01	1 09E-01	2 12E 01	2 71E-03	2 32E-01	5 73E-02	0 00E+00	1 27E 01	5 84E-02	2 27E 03	4 58E-02	2 32E-01
232U	Particulate	5 33E+00	3 59E+00	3 17E+00	6 32E+00	9 92E 02	5 48E+00	2 01E+00	0 00E+00	4 53E+00	4 40E+00	4 97E-02	2 41E+00	6 32E+00
233U	Particulate	2 04E+01	1 38E+01	1 21E+01	2 42E+01	3 80E 01	2 10E+01	7 71E+00	0 00E+00	1 74E+01	1 69E+01	1 91E-01	9 22E+00	2 42E+01
234U	Particulate	4 22E+00	4 87E+00	3 59E+00	5 50E+00	2 27E 01	2 69E+00	1 64E+00	0 00E+00	1 01E+01	4 75E+00	1 06E-01	2 39E+00	1 01E+01
235U	Particulate	1 68E-01	1 89E-01	1 40E 01	2 16E-01	8 76E 03	1 04E-01	6 56E-02	0 00E+00	3 90E-01	1 92E-01	4 45E-03	9 65E-02	3 90E-01
236U	Particulate	1 50E 01	2 85E 01	1 93E-01	2 49E 01	1 50E 02	9 51E-02	5 27E-02	0 00E+00	7 00E-01	1 49E-01	2 59E-03	7 52E 02	7 00E-01
237Np	Particulate	4 77E 01	3 10E+01	3 07E+01	2 58E+01	9 40E 02	3 98E+00	4 18E+00	2 74E 02	3 31E+00	5 24E+00	3 72E-01	2 74E+00	3 10E+01
238Pu	Particulate	1 17E+01	1 26E+01	7 97E+00	1 18E+01	5 28E 01	5 98E+00	6 81E-01	3 90E 03	8 34E+01	8 60E+00	3 48E+02	3 54E+01	3 48E+02
238U	Particulate	5 36E+00	4 84E+00	3 86E+00	6 53E+00	2 01E-01	4 07E+00	2 08E+00	0 00E+00	8 79E+00	5 56E+00	1 31E-01	2 86E+00	8 79E+00
239/240Pu	Particulate	5 75E+01	1 23E+01	9 70E+00	6 43E+00		2 61E+02	3 13E-01	3 50E 03		4 66E+01	3 17E+03	1 34E+02	3 17E+03
239Pu	Particulate					9 11E+00		1 03E+02		8 17E+02				8 17E+02
240Pu	Particulate					1 85E+00		1 79E+01		2 25E+02				2 25E+02
241Am	Particulate	8 13E+02	2 17E+01	5 00E+01	1 01E+01	1 14E+01	3 65E+03	1 75E+00	1 42E-02	3 88E+02	6 33E+02	2 48E+04	1 44E+03	2 48E+04
241Pu	Particulate	6 72E+02	1 06E+03	6 64E+02	9 20E+02	4 78E+01	4 29E+02	2 15E+02	0 00E+00	8 33E+03	5 84E+02	1 08E+01	2 95E+02	8 33E+03
242Cm	Particulate	1 39E-03	6 23E 01	5 24E-01	9 87E-01	2 16E-02	6 33E-01	4 68E 03	0 00E+00	6 98E 01	9 38E-01	1 72E-04	4 70E-01	9 87E-01
242Pu	Particulate	3 59E 03	4 97E-03	3 06E-03	4 57E-03	2 06E 04	2 29E-03	1 18E 03	0 00E+00	3 19E 02	3 21E-03	5 84E-05	1 62E-03	3 19E 02
243Am	Particulate	1 38E 02	2 09E 03	1 24E-03	1 88E-02	8 61E 04	9 91E-03	5 06E 03	0 00E+00	3 11E 02	1 23E-02	7 09E-04	6 32E-03	3 11E 02
243Cm	Particulate	5 13E 01	4 85E+00	4 80E-01	1 70E-01	2 17E 03	6 33E-02	1 73E 01	6 16E-04	7 12E-02	8 70E-02	1 19E-05	4 36E-02	4 85E+00
244Cm	Particulate	1 54E+01	1 30E+01	1 20E+01	4 10E+00	3 09E 02	4 63E-01	2 66E 01	1 47E-02	1 00E+00	8 41E-01	1 46E-04	4 21E-01	1 54E+01

This page intentionally left blank

APPENDIX B

THERMAL EVALUATION OF MIXER PUMP OPERATION IN THE AP-102 AND AP-104 TANKS

This page intentionally left blank

APPENDIX B

THERMAL EVALUATION OF MIXER PUMP OPERATION IN THE AP-102 AND AP-104 TANKS

Reference 1 WHC-SD W211 ER 002 Rev 0 Engineering Report Initial Tank Retrieval Systems Tank 241-SY 102 Waste Cooling Evaluation Project W 211 December 25 1995

Reference 2 Internal Memorandum 74220 95 BAC 030 B A Crea to W L Knecht Simplified DST Thermal Program ' August 7 1995

Reference 1 provided results of an evaluation of thermal effects on tank 241-SY 102 from planned operation of two 300-hp mixer pumps to be installed by W 211 The analysis was based on a program developed by Reference 2 that simulates the thermal effects on a double shell tank based on the additional heat input from mixing and the tank specific variables The results of the analysis concluded that the mixer pumps to be installed in tank 241 SY 102 could be operated in a controlled manner within the capabilities of the existing tank ventilation system

In order to verify that the planned operation of one 300 hp mixer pump in an AP tank can be accomplished within the capabilities of the existing AP farm ventilation system the thermal model program was run for tank 241 AP 102 This tank was selected as a representative case because the current tank inventory for tank 241 AP 104 is very low (26 000 gallons) whereas tank 241-AP 102 is almost full (1 095 000 gallons) It is unlikely that a tank with a low waste depth would be mixed without adding more waste prior to mixing And a full tank would require the most rigorous mixing scenario (higher speeds for longer durations) The results of the analysis are presented on the following two pages

As expected the analysis output shows that the planned operation of a 300-hp mixer pump will result in slow, controlled and easily observable increases in waste temperature without compromising the tank operating limits For example assuming an initial waste temperature of 80°F and the mixer pump operating continuously at full speed for two weeks the resulting waste temperature is predicted to be approximately 112°F a tank heat up rate of approximately 2 3°F per day The outlet air temperatures in the primary and annulus ventilation systems are predicted to be approximately 104°F and 111°F, respectively and the moisture content of the primary ventilation outlet will be approximately 0 05 lbm H_2O/lbm dry air This supports the conclusion that the existing ventilation system is adequate to support the planned mixer pump operations

AP 102 Full tank 1 300 hp mixer pump

WASTE DENSITY = 75 500 LBM/FT 3
WASTE SPECIFIC HEAT = 0 650 BTU/LBM DEG F
DECAY HEAT = 0 137 BTU/FT 3 HR
VAPOR PRESSURE WRT H20 = 0 800
FRACTION OF TANK COVERED BY CRUST = 0 000
DOME FLOW = 146 000 SCFM
ANNULUS FLOW = 1075 000 SCFM
INLET AIR TEMP = 77 000 DEG F

TIME (HRS)	OUTLET M R (LBMH20/LBMAIR)	TEMP WASTE(deg F)	PUMP POWER (HP)	LEVEL (FT)	OUTLET TEMP ANNULUS(deg F)	OUTLET TEMP DOME(deg F)
0 00	0 00	80 00	250 00	30 00	0 00	0 00
72 00	0 02	87 01	250 00	30 00	86 62	83 84
144 00	0 03	93 90	250 00	30 00	93 31	88 97
216 00	0 03	100 64	250 00	30 00	99 90	94 33
288 00	0 04	107 24	250 00	30 00	106 33	99 83
360 00	0 05	113 69	250 00	30 00	112 64	105 42
432 00	0 06	119 97	250 00	30 00	118 76	111 03
504 00	0 07	126 08	250 00	30 00	124 78	116 60
576 00	0 09	132 00	250 00	30 00	130 56	122 10
648 00	0 10	137 73	250 00	30 00	136 18	127 50
720 00	0 12	143 24	250 00	30 00	141 60	132 75
792 00	0 14	148 53	250 00	30 00	146 77	137 84
864 00	0 17	153 57	250 00	30 00	151 73	142 74
936 00	0 20	158 36	250 00	30 00	156 42	147 43
1008 00	0 23	162 88	250 00	30 00	160 86	151 88
1080 00	0 26	167 10	250 00	30 00	164 97	156 09
1152 00	0 29	171 02	250 00	30 00	168 86	160 02
1224 00	0 33	174 62	250 00	30 00	172 38	163 68
1296 00	0 37	177 88	250 00	30 00	175 56	167 03
1368 00	0 41	180 81	250 00	30 00	178 46	170 09
1440 00	0 46	183 41	250 00	30 00	181 06	172 83

TOTAL HEAT BTU/HR	PUMP POWER (%)	ANNULUS LOSS (%)	LATENT HEAT (%)	SENSIBLE HEAT (%)	DIRT LOSS (%)	TIME (DAYS)
653778 00	97 22	0 00	0 00	0 00	0 00	0 00
653778 00	97 22	1 64	1 80	0 16	6 01	3 00
653778 00	97 22	2 78	2 36	0 29	10 97	6 00
653778 00	97 22	3 90	3 02	0 42	15 14	9 00
653778 00	97 22	4 99	3 81	0 55	18 38	12 00
653778 00	97 22	6 06	4 73	0 68	20 75	15 00
653778 00	97 22	7 10	5 81	0 82	22 40	18 00
653778 00	97 22	8 12	7 06	0 95	23 45	21 00
653778 00	97 22	9 10	8 51	1 09	24 06	24 00
653778 00	97 22	10 05	10 16	1 22	24 31	27 00
653778 00	97 22	10 97	12 05	1 34	24 28	30 00
653778 00	97 22	11 84	14 19	1 47	24 04	33 00
653778 00	97 22	12 68	16 60	1 58	23 61	36 00
653778 00	97 22	13 48	19 28	1 70	23 03	39 00
653778 00	97 22	14 23	22 26	1 80	22 33	42 00
653778 00	97 22	14 93	25 51	1 91	21 51	45 00
653778 00	97 22	15 58	29 02	2 00	20 58	48 00
653778 00	97 22	16 18	32 77	2 09	19 58	51 00
653778 00	97 22	16 72	36 69	2 17	18 50	54 00
653778 00	97 22	17 21	40 72	2 24	17 35	57 00
653778 00	97 22	17 65	44 76	2 31	16 15	60 00

APPENDIX C

POTENTIAL UNABATED EMISSIONS AND DOSE FOR SOIL EXCAVATION ACTIVITIES

This page intentionally left blank

APPENDIX C

POTENTIAL UNABATED EMISSIONS AND DOSE FOR SOIL EXCAVATION ACTIVITIES

MANUAL SOIL EXCAVATION

MAXIMUM SOIL EXCAVATED	27000	FEET^3				
SOIL DENSITY	98	POUNDS/FEET 3				
TOTAL MASS OF SOIL	1 200E+09	GRAMS				
MAXIMUM ALPHA READING	10	CPM				
MAXIMUM BETA/GAMMA READING	10 000	CPM				
RELEASE FRACTION	1 00E 03					
ASSUMED ISOTOPE	**CONVERSION FACTOR (pCi/gram)/cpm (a)**	**TOTAL POSSESSION QUANTITY (b) Ci**	**UNABATED RELEASE Ci**	**OFFSITE DOSE FACTOR mrem/Ci**	**UNABATED DOSE mrem**	**% UNABATED OFFSITE DOSE**
Sr 90	0 35	4 252E+00	4 25E 03	1 10E 01	4 68E 04	17 43%
Am 241	14 20	1 704E 01	1 70E 04	1 30E+01	2 22E 03	82 57%
TOTAL					**2 68E-03**	100 00%
Notes						
(a)	FROM TABLE 4 HNF 2418					
(b)	WEIGHT OF SOIL X FIELD INSTRUMENT READING X CONVERSION FACTOR					

REGULATED GUZZLER EXCAVATION

Releases
Curie values are included by reference from 98 EAP 037 The values are multiplied by 0 186 the ratio between the total volume of soil to be excavated in the Guzzler NOC and the total volume of soil to be excavated in this NOC (27 00 ft^3/94 500 ft^3 = 0 286)

(2 23 E 01 curies of Strontium 90) X (0 286) = 6 38 E 02 curies Sr 90
(1 49 E 03 curies of Americium 241) X (0 286) = 4 26 E 04 curies Am 241

Offsite Dose
Sr 90 = (6 38 E 02Ci)(1 10 E 01 mrem/ Ci) = 7 02 E-03 mrem/yr
Am 241 = (4 26 E-04 Ci)(1 30 E+01 mrem/ Ci) = 5 54 E 03 mrem/yr
Total = 1 26 E 02 mrem/yr

This page intentionally left blank

APPENDIX D

POTENTIAL UNABATED EMISSIONS AND DOSE FOR PIPE CUTTING ACTIVITIES

This page intentionally left blank

APPENDIX D

POTENTIAL UNABATED EMISSIONS AND DOSE FOR PIPE CUTTING ACTIVITIES

HANFORD SITE AREA	200 EAST							
2 INCH SCH 40 PIPE	2 000	INCH						
8 INCH SCH 40 PIPE	8 000	INCH						
12 INCH SCH 40 PIPE	12 000	INCH						
TOTAL PIPE VOLUME (two linear feet per pipe size)	17 30	GALLONS						
TANK AP 102 TANK VOLUME	1 095 000	GALLONS						
Constituent Name	**State**	**Tank AP 102 Concentration Curies/Gal**	**Pipe Inventory Curies**	**Release Fraction**	**Unabated Release Curies**	**Offsite Dose Factor mrem/Curie (HNF 3602)**	**Offsite Unabated Dose mrem/year**	**Percent of Unabated Offsite Dose**
3H	Liquid	9 95E 06	1 72E 04	1 00E 03	1 72E 07	2 50E 05	4 31E 12	0 00%
14C	Liquid	1 91E 06	3 30E 05	1 00E 03	3 30E 08	1 90E 03	6 27E 11	0 00%
59Ni	Particulate	4 16E 06	7 19E 05	1 00E 03	7 19E 08	3 10E 04	2 23E 11	0 00%
60Co	Particulate	2 91E 04	5 04E 03	1 00E 03	5 04E 06	2 50E 01	1 26E 06	0 23%
63Ni	Particulate	4 08E 04	7 06E 03	1 00E 03	7 06E 06	2 60E 04	1 84E 09	0 00%
79Se	Particulate	8 05E 07	1 39E 05	1 00E 03	1 39E 08	1 30E 01	1 81E 09	0 00%
90Sr	Particulate	5 37E 03	9 29E 02	1 00E 03	9 29E 05	1 10E 01	1 02E 05	1 84%
90Y	Particulate	5 37E 03	9 29E 02	1 00E 03	9 29E 05	3 40E 04	3 16E 08	0 01%
93mNb	Particulate	2 52E 05	4 36E 04	1 00E 03	4 36E 07	2 10E 03	9 16E 10	0 00%
93Zr	Particulate	3 50E 05	6 05E 04	1 00E 03	6 05E 07	1 30E 03	7 87E 10	0 00%
99Tc	Particulate	3 27E 04	5 66E 03	1 00E 03	5 66E 06	2 30E 02	1 30E 07	0 02%
106Ru	Particulate	1 54E 08	2 67E 07	1 00E 03	2 67E 10	1 60E 02	4 27E 12	0 00%
113mCd	Particulate	1 87E 04	3 24E 03	1 00E 03	3 24E 06	1 30E 01	4 21E 07	0 08%
125Sb	Particulate	3 83E 04	6 62E 03	1 00E 03	6 62E 06	2 60E 02	1 72E 07	0 03%
126Sn	Particulate	1 08E 05	1 86E 04	1 00E 03	1 86E 07	4 70E 02	8 76E 09	0 00%
129I	Particulate	1 00E 06	1 74E 05	1 00E 03	1 74E 08	2 00E 01	3 48E 09	0 00%
134Cs	Particulate	1 32E 05	2 27E 04	1 00E 03	2 27E 07	1 00E 01	2 27E 08	0 00%
137Cs	Particulate	8 05E 01	1 39E+01	1 00E 03	1 39E 02	2 70E 02	3 76E 04	67 50%
151Sm	Particulate	8 50E 01	1 47E+01	1 00E 03	1 47E 02	7 50E 04	1 10E 05	1 98%
152Eu	Particulate	2 50E 02	4 33E 01	1 00E 03	4 33E 04	2 40E 01	1 04E 04	18 66%
154Eu	Particulate	8 89E 06	1 54E 04	1 00E 03	1 54E 07	2 00E 01	3 08E 08	0 01%
155Eu	Particulate	1 34E 03	2 32E 02	1 00E 03	2 32E 05	8 00E 03	1 86E 07	0 03%
226Ra	Particulate	5 32E 04	9 19E 03	1 00E 03	9 19E 06	4 60E 01	4 23E 06	0 76%
227Ac	Particulate	2 87E 10	4 96E 09	1 00E 03	4 96E 12	1 50E+01	7 44E 11	0 00%
228Ra	Particulate	1 79E 09	3 10E 08	1 00E 03	3 10E 11	1 90E 01	5 88E 12	0 00%
229Th	Particulate	5 31E 07	9 18E 06	1 00E 03	9 18E 09	1 60E+01	1 47E 07	0 03%
231Pa	Particulate	1 23E 08	2 13E 07	1 00E 03	2 13E 10	1 20E+01	2 56E 09	0 00%
232Th	Particulate	8 37E 09	1 45E 07	1 00E 03	1 45E 10	8 00E+00	1 16E 09	0 00%
232U	Particulate	5 23E 08	9 05E 07	1 00E 03	9 05E 10	1 10E+01	9 96E 09	0 00%
233U	Particulate	1 84E 06	3 18E 05	1 00E 03	3 18E 08	3 10E+00	9 84E 08	0 02%
234U	Particulate	7 04E 06	1 22E 04	1 00E 03	1 22E 07	3 10E+00	3 78E 07	0 07%
235U	Particulate	1 50E 06	2 59E 05	1 00E 03	2 59E 08	3 00E+00	7 77E 08	0 01%
236U	Particulate	5 99E 08	1 04E 06	1 00E 03	1 04E 09	2 90E+00	3 01E 09	0 00%
237Np	Particulate	4 81E 08	8 33E 07	1 00E 03	8 33E 10	1 20E+01	9 99E 09	0 00%
238Pu	Particulate	3 82E 06	6 60E 05	1 00E 03	6 60E 08	7 60E+00	5 02E 07	0 09%
238U	Particulate	6 22E 07	1 08E 05	1 00E 03	1 08E 08	2 80E+00	3 01E 08	0 01%
239Pu	Particulate	1 90E 06	3 29E 05	1 00E 03	3 29E 08	8 20E+00	2 69E 07	0 05%
240Pu	Particulate	2 86E 07	4 94E 06	1 00E 03	4 94E 09	8 20E+00	4 05E 08	0 01%
241Am	Particulate	9 41E 05	1 63E 03	1 00E 03	1 63E 06	1 30E+01	2 12E 05	3 80%
241Pu	Particulate	1 63E 05	2 83E 04	1 00E 03	2 83E 07	1 30E 01	3 68E 08	0 01%
242Cm	Particulate	1 60E 06	2 76E 05	1 00E 03	2 76E 08	4 10E 01	1 13E 08	0 00%
242Pu	Particulate	1 96E 04	3 40E 03	1 00E 03	3 40E 06	7 80E+00	2 65E 05	4 76%
243Am	Particulate	4 27E 09	7 39E 08	1 00E 03	7 39E 11	1 30E+01	9 61E 10	0 00%
243Cm	Particulate	1 08E 09	1 86E 08	1 00E 03	1 86E 11	8 50E+00	1 58E 10	0 00%
244Cm	Particulate	4 62E 09	7 99E 08	1 00E 03	7 99E 11	6 70E+00	5 36E 10	0 00%
TOTAL							**5 57E 04**	100 00%

This page intentionally left blank

APPENDIX E

POTENTIAL UNABATED EMISSIONS AND DOSE FOR PIT WORK ACTIVITIES

This page intentionally left blank

APPENDIX E

POTENTIAL UNABATED EMISSIONS AND DOSE FOR PIT WORK ACTIVITIES

PIT 102A SURFACE AREA	327 00	FT^2			
PIT 102D SURFACE AREA	429 00	FT^2			
PIT 104A SURFACE AREA	327 00	FT^2			
PIT 102A JUMPERS/STEEL SURFACE AREA	60 00	FT^2			
PIT 102D JUMPERS/STEEL SURFACE AREA	100 00	FT^2			
PIT 104A JUMPERS/STEEL SURFACE AREA	100 00	FT^2			
TOTAL PIT SURFACE AREA	1 343 00	FT^2			
TOTAL PIT SURFACE AREA	**1 25E+06**	**CM^2**			
HIGHEST SURFACE CONTAMINATION	**4 000**	**DPM/100 CM^2**			
CURIE (DEFINITION)	3 7E+10	DPS/CURIE			
RAD CONCENTRATION	**1 8E-09**	**CURIE/100 CM^2**			
RELEASE FRACTION	1 00E 03				
ASSUMED ISOTOPE	**TOTAL POSSESSION QUANTITY Ci**	**UNABATED RELEASE Ci**	**OFFSITE DOSE FACTOR mrem/Ci**	**UNABATED DOSE mrem**	**% UNABATED OFFSITE DOSE**
Sr 90	2 248E 05	2 25E 08	1 10E 01	2 47E 09	100 00%
TOTAL				**2 47E 09**	100 00%

This page intentionally left blank

APPENDIX F

POTENTIAL UNABATED EMISSIONS AND DOSE FOR IN-TANK EQUIPMENT REMOVAL ACTIVITIES

This page intentionally left blank

APPENDIX F

POTENTIAL UNABATED EMISSIONS AND DOSE FOR IN-TANK EQUIPMENT REMOVAL ACTIVITIES

TANK AP 102								
MIXER PUMP SURFACE AREA	500	FT 2						
TRANSFER PUMP SURFACE AREA	44	FT 2						
TOTAL CONTAMINATED SURFACE AREA	544	FT 2						
WASTE LAYER THICKNESS	0 063	INCH						
WASTE VOLUME ON EQUIPMENT	21 196	GALLONS						
TANK VOLUME	20 000 0	GALLONS						
Constituent Name	**Tank Inventory Curies**	**Concentration Curies/gallon**	**Inventory On Equipment Curies**	**Release Fraction**	**Unabated Release Curies**	**Offsite Dose Factor mrem/Curie (HNF 3602)**	**Offsite Unabated Dose mrem/year**	**Percent of Unabated Offsite Dose**
3H	1 09E+01	5 45E 04	1 16E 02	1 00E 03	1 16E 05	2 50E 05	2 89E 10	0 00%
14C	2 09E+00	1 05E 04	2 21E 03	1 00E 03	2 21E 06	1 90E 03	4 21E 09	0 00%
59Ni	4 55E+00	2 28E 04	4 82E 03	1 00E 03	4 82E 06	3 10E 04	1 49E 09	0 00%
60Co	3 19E+02	1 60E 02	3 38E 01	1 00E 03	3 38E 04	2 50E 01	8 45E 05	0 29%
63Ni	4 47E+02	2 24E 02	4 74E 01	1 00E 03	4 74E 04	2 60E 04	1 23E 07	0 00%
79Se	8 82E 01	4 41E 05	9 35E 04	1 00E 03	9 35E 07	1 30E 01	1 22E 07	0 00%
90Sr	5 88E+03	2 94E 01	6 23E+00	1 00E 03	6 23E 03	1 10E 01	6 85E 04	2 36%
90Y	5 88E+03	2 94E 01	6 23E+00	1 00E 03	6 23E 03	3 40E 04	2 12E 06	0 01%
93mNb	2 76E+01	1 38E 03	2 93E 02	1 00E 03	2 93E 05	2 10E 03	6 14E 08	0 00 ⁄
93Zr	3 83E+01	1 92E 03	4 06E 02	1 00E 03	4 06E 05	1 30E 03	5 28E 08	0 00%
99Tc	3 58E+02	1 79E 02	3 79E 01	1 00E 03	3 79E 04	2 30E 02	8 73E 06	0 03%
106Ru	1 69E 02	8 45E 07	1 79E 05	1 00E 03	1 79E 08	1 60E 02	2 87E 10	0 00 ⁄
113mCd	2 05E+02	1 03E 02	2 17E 01	1 00E 03	2 17E 04	1 30E 01	2 82E 05	0 10%
125Sb	4 19E+02	2 10E 02	4 44E 01	1 00E 03	4 44E 04	2 60E 02	1 15E 05	0 04%
126Sn	1 18E+01	5 90E 04	1 25E 02	1 00E 03	1 25E 05	4 70E 02	5 88E 07	0 00%
129I	1 10E+00	5 50E 05	1 17E 03	1 00E 03	1 17E 06	2 00E 01	2 33E 07	0 00%
134Cs	1 44E+01	7 20E 04	1 53E 02	1 00E 03	1 53E 05	1 00E 01	1 53E 06	0 01%
137Cs	9 31E+05	4 66E+01	9 87E+02	1 00E 03	9 87E 01	2 70E 02	2 66E 02	91 76%
151Sm	2 74E+04	1 37E+00	2 90E+01	1 00E 03	2 90E 02	7 50E 04	2 18E 05	0 08%
152Eu	9 74E+00	4 87E 04	1 03E 02	1 00E 03	1 03E 05	2 40E 01	2 48E 06	0 01%
154Eu	1 47E+03	7 35E 02	1 56E+00	1 00E 03	1 56E 03	2 00E 01	3 12E 04	1 07%
155Eu	5 82E+02	2 91E 02	6 17E 01	1 00E 03	6 17E 04	8 00E 03	4 93E 06	0 02%
226Ra	3 14E 04	1 57E 08	3 33E 07	1 00E 03	3 33E 10	4 60E 01	1 53E 10	0 00%
227Ac	1 96E 03	9 80E 08	2 08E 06	1 00E 03	2 08E 09	1 50E+01	3 12E 08	0 00%
228Ra	5 81E 01	2 91E 05	6 16E 04	1 00E 03	6 16E 07	1 90E 01	1 17E 07	0 00%
229Th	1 35E 02	6 75E 07	1 43E 05	1 00E 03	1 43E 08	1 60E+01	2 29E 07	0 00%
231Pa	9 17E 03	4 59E 07	9 72E 06	1 00E 03	9 72E 09	1 20E+01	1 17E 07	0 00⁄
232Th	5 73E 02	2 87E 06	6 07E 05	1 00E 03	6 07E 08	8 00E+00	4 86E 07	0 00%
232U	2 01E+00	1 01E 04	2 13E 03	1 00E 03	2 13E 06	1 10E+01	2 34E 05	0 08%
233U	7 71E+00	3 86E 04	8 17E 03	1 00E 03	8 17E 06	3 10E+00	2 53E 05	0 09%
234U	1 64E+00	8 20E 05	1 74E 03	1 00E 03	1 74E 06	3 10E+00	5 39E 06	0 02%
235U	6 56E 02	3 28E 06	6 95E 05	1 00E 03	6 95E 08	3 00E+00	2 09E 07	0 00⁄
236U	5 27E 02	2 64E 06	5 59E 05	1 00E 03	5 59E 08	2 90E+00	1 62E 07	0 00%
237Np	4 18E+00	2 09E 04	4 43E 03	1 00E 03	4 43E 06	1 20E+01	5 32E 05	0 18%
238Pu	6 81E 01	3 41E 05	7 22E 04	1 00E 03	7 22E 07	7 60E+00	5 49E 06	0 02%
238U	2 08E+00	1 04E 04	2 20E 03	1 00E 03	2 20E 06	2 80E+00	6 17E 06	0 02%
239Pu	1 03E+02	5 15E 03	1 09E 01	1 00E 03	1 09E 04	8 20E+00	8 95E 04	3 08%
240Pu	1 79E+01	8 95E 04	1 90E 02	1 00E 03	1 90E 05	8 20E+00	1 56E 04	0 54%
241Am	1 75E+00	8 75E 05	1 85E 03	1 00E 03	1 85E 06	1 30E+01	2 41E 05	0 08%
241Pu	2 15E+02	1 08E 02	2 28E 01	1 00E 03	2 28E 04	1 30E 01	2 96E 05	0 10%
242Cm	4 68E 03	2 34E 07	4 96E 06	1 00E 03	4 96E 09	4 10E 01	2 03E 09	0 00%
242Pu	1 18E 03	5 90E 08	1 25E 06	1 00E 03	1 25E 09	7 80E+00	9 75E 09	0 00%
243Am	5 06E 03	2 53E 07	5 36E 06	1 00E 03	5 36E 09	1 30E+01	6 97E 08	0 00%
243Cm	1 73E 01	8 65E 06	1 83E 04	1 00E 03	1 83E 07	8 50E+00	1 56E 06	0 01%
244Cm	2 66E 01	1 33E 05	2 82E 04	1 00E 03	2 82E 07	6 70E+00	1 89E 06	0 01%
TOTAL							**2 90E-02**	**100 00 ⁄**

APPENDIX F

TANK AP 104								
SLURRY DISTRIBUTOR	8	FT 2						
TRANSFER PUMP SURFACE AREA	50	FT 2						
TOTAL CONTAMINATED SURFACE AREA	58	FT 2						
WASTE LAYER THICKNESS	0 063	INCH						
WASTE VOLUME ON EQUIPMENT	2 260	GALLONS						
TANK VOLUME	50 000 0	GALLONS						
Constituent Name	Tank Inventory Curies	Concentration Curies/gallon	Inventory On Equipment Curies	Release Fraction	Unabated Release Curies	Offsite Dose Factor mrem/Curie (HNF 3602)	Offsite Unabated Dose mrem/year	Percent of Unabated Offsite Dose
3H	1 36E+00	2 72E 05	6 15E 05	1 00E 03	6 15E 08	2 50E 05	1 54E 12	0 00%
14C	1 57E 02	7 85E 07	1 77E 06	1 00E 03	1 77E-09	1 90E 03	3 37E 12	0 00%
59Ni	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	3 10E 04	0 00E+00	0 00%
60Co	4 03E 02	2 02E 06	4 55E 06	1 00E 03	4 55E 09	2 50E 01	1 14E 09	0 07%
63Ni	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	2 60E 04	0 00E+00	0 00%
79Se	3 32E 05	1 66E 09	3 75E 09	1 00E 03	3 75E 12	1 30E 01	4 88E 13	0 00%
90Sr	8 07E+00	4 04E 04	9 12E 04	1 00E 03	9 12E 07	1 10E 01	1 00E 07	6 30%
90Y	8 07E+00	4 04E 04	9 12E 04	1 00E 03	9 12E 07	3 40E 04	3 10E 10	0 02%
93mNb	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	2 10E 03	0 00E+00	0 00%
93Zr	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 30E 03	0 00E+00	0 00%
99Tc	7 12E 02	3 56E 06	8 05E 06	1 00E 03	8 05E 09	2 30E 02	1 85E 10	0 01%
106Ru	1 39E+01	6 95E 04	1 57E 03	1 00E 03	1 57E 06	1 60E 02	2 51E 08	1 58%
113mCd	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 30E 01	0 00E+00	0 00%
125Sb	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	2 60E 02	0 00E+00	0 00%
126Sn	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	4 70E 02	0 00E+00	0 00%
129I	5 90E 04	2 95E 08	6 67E 08	1 00E 03	6 67E 11	2 00E 01	1 33E 11	0 00%
134Cs	3 52E 01	1 76E 05	3 98E 05	1 00E 03	3 98E 08	1 00E 01	3 98E 09	0 25%
137Cs	3 72E+02	1 86E 02	4 20E 02	1 00E 03	4 20E 05	2 70E 02	1 13E 06	71 27%
151Sm	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	7 50E 04	0 00E+00	0 00%
152Eu	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	2 40E 01	0 00E+00	0 00%
154Eu	1 11E 01	5 55E 06	1 25E 05	1 00E 03	1 25E 08	2 00E 01	2 51E 09	0 16%
155Eu	8 29E 01	4 15E 05	9 37E 05	1 00E 03	9 37E 08	8 00E 03	7 49E 10	0 05%
226Ra	4 81E+00	2 41E 04	5 44E 04	1 00E 03	5 44E 07	4 60E 01	2 50E 07	15 70%
227Ac	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 50E+01	0 00E+00	0 00%
228Ra	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 90E 01	0 00E+00	0 00%
229Th	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 60E+01	0 00E+00	0 00%
231Pa	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 20E+01	0 00E+00	0 00%
232Th	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	8 00E+00	0 00E+00	0 00%
232U	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 10E+01	0 00E+00	0 00%
233U	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	3 10E+00	0 00E+00	0 00%
234U	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	3 10E+00	0 00E+00	0 00%
235U	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	3 00E+00	0 00E+00	0 00%
236U	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	2 90E+00	0 00E+00	0 00%
237Np	2 74E 02	1 37E 06	3 10E 06	1 00E 03	3 10E 09	1 20E+01	3 72E 08	2 33%
238Pu	3 90E 03	1 95E 07	4 41E 07	1 00E 03	4 41E 10	7 60E+00	3 35E 09	0 21%
238U	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	2 80E+00	0 00E+00	0 00%
239Pu	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	8 20E+00	0 00E+00	0 00%
240Pu	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	8 20E+00	0 00E+00	0 00%
241Am	1 42E 02	7 10E 07	1 60E 06	1 00E 03	1 60E 09	1 30E+01	2 09E 08	1 31%
241Pu	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 30E 01	0 00E+00	0 00%
242Cm	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	4 10E 01	0 00E+00	0 00%
242Pu	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	7 80E+00	0 00E+00	0 00%
243Am	0 00E+00	0 00E+00	0 00E+00	1 00E 03	0 00E+00	1 30E+01	0 00E+00	0 00%
243Cm	6 16E 04	3 08E 08	6 96E 08	1 00E 03	6 96E 11	8 50E+00	5 92E 10	0 04%
244Cm	1 47E 02	7 35E 07	1 66E 06	1 00E 03	1 66E 09	6 70E+00	1 11E 08	0 70%
TOTAL							1 59E-06	100 00%

APPENDIX F

TOTALS FOR TANKS AP-102 & 104					
Constituent Name	**Tank Inventory Curies**	**Inventory On Equipment Curies**	**Unabated Release Curies**	**Offsite Unabated Dose mrem/yr**	**Percent of Unabated Offsite Dose**
3H	1 23E+01	1 16E 02	1 16E 05	2 90E 10	0 00%
14C	2 11E+00	2 22E 03	2 22E 06	4 21E 09	0 00%
59Ni	4 55E+00	4 82E 03	4 82E 06	1 49E 09	0 00%
60Co	3 19E+02	3 38E 01	3 38E 04	8 45E 05	0 29%
63Ni	4 47E+02	4 74E 01	4 74E 04	1 23E 07	0 00%
79Se	8 82E 01	9 35E 04	9 35E 07	1 22E 07	0 00%
90Sr	5 89E+03	6 23E+00	6 23E 03	6 86E 04	2 36%
90Y	5 89E+03	6 23E+00	6 23E 03	2 12E 06	0 01%
93mNb	2 76E+01	2 93E 02	2 93E 05	6 14E 08	0 00%
93Zr	3 83E+01	4 06E 02	4 06E 05	5 28E 08	0 00%
99Tc	3 58E+02	3 79E 01	3 79E 04	8 73E 06	0 03%
106Ru	1 39E+01	1 59E 03	1 59E 06	2 54E 08	0 00%
113mCd	2 05E+02	2 17E 01	2 17E 04	2 82E 05	0 10%
125Sb	4 19E+02	4 44E 01	4 44E 04	1 15E 05	0 04%
126Sn	1 18E+01	1 25E 02	1 25E 05	5 88E 07	0 00%
129I	1 10E+00	1 17E 03	1 17E 06	2 33E 07	0 00%
134Cs	1 48E+01	1 53E 02	1 53E 05	1 53E 06	0 01%
137Cs	9 31E+05	9 87E+02	9 87E 01	2 66E 02	91 76%
151Sm	2 74E+04	2 90E+01	2 90E 02	2 18E 05	0 08%
152Eu	9 74E+00	1 03E 02	1 03E 05	2 48E 06	0 01%
154Eu	1 47E+03	1 56E+00	1 56E 03	3 12E 04	1 07%
155Eu	5 83E+02	6 17E 01	6 17E 04	4 94E 06	0 02%
226Ra	4 81E+00	5 44E 04	5 44E 07	2 50E 07	0 00%
227Ac	1 96E 03	2 08E 06	2 08E 09	3 12E 08	0 00%
228Ra	5 81E 01	6 16E 04	6 16E 07	1 17E 07	0 00%
229Th	1 35E 02	1 43E 05	1 43E 08	2 29E 07	0 00%
231Pa	9 17E 03	9 72E 06	9 72E 09	1 17E 07	0 00%
232Th	5 73E 02	6 07E 05	6 07E 08	4 86E 07	0 00%
232U	2 01E+00	2 13E 03	2 13E 06	2 34E 05	0 08%
233U	7 71E+00	8 17E 03	8 17E 06	2 53E 05	0 09%
234U	1 64E+00	1 74E 03	1 74E 06	5 39E 06	0 02%
235U	6 56E 02	6 95E 05	6 95E 08	2 09E 07	0 00%
236U	5 27E 02	5 59E 05	5 59E 08	1 62E 07	0 00%
237Np	4 21E+00	4 43E 03	4 43E 06	5 32E 05	0 18%
238Pu	6 85E 01	7 22E 04	7 22E 07	5 49E 06	0 02%
238U	2 08E+00	2 20E 03	2 20E 06	6 17E 06	0 02%
239Pu	1 03E+02	1 09E 01	1 09E 04	8 95E 04	3 08%
240Pu	1 79E+01	1 90E 02	1 90E 05	1 56E 04	0 54%
241Am	1 76E+00	1 86E 03	1 86E 06	2 41E 05	0 08%
241Pu	2 15E+02	2 28E 01	2 28E 04	2 96E 05	0 10%
242Cm	4 68E 03	4 96E 06	4 96E 09	2 03E 09	0 00%
242Pu	1 18E 03	1 25E 06	1 25E 09	9 75E 09	0 00%
243Am	5 06E 03	5 36E 06	5 36E 09	6 97E 08	0 00%
243Cm	1 74E 01	1 83E 04	1 83E 07	1 56E 06	0 01%
244Cm	2 81E 01	2 84E 04	2 84E 07	1 90E 06	0 01%
TOTAL		**1 03E+03**	**1 03E+00**	**2 90E 02**	**100 00%**

This page intentionally left blank

APPENDIX G

RELEASE FACTOR FOR ESTIMATING MIXER PUMP EMISSIONS IN NOTICES OF CONSTRUCTION

This page intentionally left blank

APPENDIX G

RELEASE FACTOR FOR ESTIMATING MIXER PUMP EMISSIONS IN NOTICES OF CONSTRUCTION

1 0 INTRODUCTION

The purpose of this document is to propose the use of a release factor, other than the one provided as a default value in 40 CFR 61 Appendix D for estimating radionuclide particulate emissions The document provides background and supplemental information subsequent to a meeting held with the Washington State Department of Health (WDOH) covering the same subject on May 8 1998 Various projects supporting waste feed delivery to the private contractor for waste vitrification are scoped to install waste retrieval systems (mixer pumps and associated equipment) in double shell tanks (DST) Notices of Construction (NOC) for these modifications will be prepared for individual tanks and/or groups of tanks The intention is to use the same release factor for all mixer pump emissions estimates, until such time that release factor measurements from actual mixer pump operations are obtained All of the associated emission points with the exception of one are classified as minor Estimating with the new release factor will not affect the designation status of those minor emission points

The subject release factor was calculated from sample data representative of particulates generated in a DST during the operation of two airlift circulators (RHO RE SA 216P) This release factor was used because it more accurately estimates the emissions from the mixer pump process than does the 40 CFR 61 Appendix D release factor and the release factor provides a conservative estimate with respect to a mixer pump process

The RHO RE SA-216P data sampling was performed under the quality assurance guidelines of DOE Order 5700 6C, *Quality Assurance* The 40 CRF 61 Appendix B Method 114 was not in place at the time of the data sampling However, upon review of the RHO RE SA 216P sampling system configuration and results the system compares very favorably to the NESHAP Method 114 sampling done today as detailed in the NESHAP Quality Assurance Project Plan for Radioactive Air Emissions Data (HNF-EP 0528 3) For example the sample lines were kept as short as possible and only one 90 degree 6 inch radius bend was allowed The filter papers were Versapor 3000 Supported Membrane Filters with a 3 micron diameter pore size These are the same filters required by the NESHAP QAPP Sample volumes were small however they were sufficient to keep detection levels well above those required by the NESHAP QAPP This can be seen by looking at the ratio of the measured activity on the sample papers to the corresponding sample volumes The on site lab was the 222 S Lab

2 0 DEFINITION OF TERMS

1 **Annual Possession Quantity (APQ)** The sum of the quantity of a radionuclide on hand at the beginning of the calendar year and the quantity of the radionuclide received or produced during the calendar year (246 247 030 (5))
APQ = PQ/yr = Ci/yr

2 **Partition Fraction (PF)** The ratio of a radionuclide's concentration in the air space to the concentration of the same radionuclide in the liquid waste A partition fraction is unitless but is developed from a specific process over a specific time frame
$PF/time_{(pf)}$

3 **Release Rate (RR)** The amount of a radionuclide released to the vapor space per unit time
RR = APQ * PF = Ci/yr * PF

4 **Release Factor or Fraction (RF)** The ratio of the amount of radionuclide in the air to the amount of the same radionuclide in the waste This can be calculated by multiplying the release rate by the overall time frame (annual in this case) and dividing by the annual possession quantity

$$RF = \frac{(RR) * Time}{APQ} = \frac{(APQ * PF/time_{(pf)}) * Time}{APQ} = \frac{(Ci/yr * PF/time_{(pf)}) * Time}{Ci/yr} = \frac{Air\ Quantity\ (Ci)}{Liquid\ Quantity\ (Ci)}$$

The subject release factor is based on a partition fraction developed from the sample data collected under RHO RE SA-216P Sample data used to develop a partition fraction are collected over a period of time, rendering that partition fraction dependent on the same period of time when it is applied to other scenarios The RHO-RE SA 216P data were collected over a 2-hour period That means every 2 hours the process that the data were collected under (airlift circulation) would release that fraction of the liquid constituent into the air space

The 40 CFR 61 Appendix D release factor for particulates is a ratio of a radionuclide s amount in the air to the amount of the same radionuclide in the source term The Appendix D release factor was derived to envelop any generic process that generates particulates Also the 40 CFR 61 Appendix D release factor implies or assumes a 1 year period of process operations by the fact that regulations require emission estimates to be based on the annual possession quantity and be presented as an annual rate Estimating tank waste releases with this release factor produces an overly conservative emissions estimate for mixer pump operations

3 0 COMPARISON OF THE RHO-RE-SA-216P PARTITION FRACTION TO THE 40 CFR 61 APPENDIX D RELEASE FACTOR

To compare the two ratios they must be representative of the same time duration (comparing equivalent units) To do this, the RHO RE SA 216P partition fraction can be annualized as follows 1 02 E 09 /2hr * 24 hr/day * 365 day/yr = 4 47 E-06 /yr The 40 CFR 61 Appendix D release factor is 1 0 E 03 /yr The annualized RHO release factor (based on actual measurements) is approximately three orders of magnitude smaller than the 40 CFR 61 Appendix D release factor Utilization of the RHO-RE SA 216P partition fraction in an NOC would result in approximately one order of magnitude of conservatism from its annualized release factor because the partition fraction would only be applied over 450 hours of operations per year

4 0 COMPARISON OF THE RHO-RE-SA-216P PARTITION FRACTION TO OTHER PARTICULATE GENERATION AND AEROSOL LOADING KNOWLEDGE

To ensure that using the RHO RE-SA 216P partition fraction would not underestimate emissions from mixer pump operations two comparison checks were made

One comparison used a dry aerosol source term of 10 mg/m^3 In 1994 Pacific Northwest National Laboratory (PNNL) conducted a literature search and review, including analyzing data, relevant to the potential aerosol source term generated during DST waste retrieval operations with mixer pumps (DSTRTP CY94-003) The dry aerosol source term during mixer pump operations based on mass concentration was estimated to be less than 0 1 to 10 mg/m^3 A ranking of the generation of aerosol source terms also was performed for the following tank operating modes (1) normal operation without air lift circulators (2) mixer pump operation without air lift circulators (3) normal operation with air lift circulators, (4) mixer pump operation with low liquid levels, and (5) sluicing The result of the ranking, from least to greatest expected concentration was 1<2 <=3 < 4 <<5 (Method 1 generates the least amount of aerosols Method 1 generates less than Method 2, which generates less than Method 3 but is about equal to Method 3 Method 3 generates less than Method 4 which generates much less than Method 5 Of the methods studied Method 5 generates the most amount of aerosols)

The PNNL report demonstrates that mixer pump operations generate fewer aerosols than airlift circulator operations and that the concentration of aerosols from mixer pump operations would be less than 0 1 to 10 mg/m^3 Therefore using a partition fraction developed from air lift circulator sample data would conservatively estimate mixer pump emissions and using the highest concentration from the range of aerosols generated during mixer pump operation would bound a mixer pump emissions estimate

The calculations in Section 7 0 use the 10 mg/m^3 aerosol concentration to determine the corresponding partition fractions based on a full year of operation (annualized release factor) and on 450 hours of operation (hours of mixer pump operation anticipated in mixer pump NOCs) The calculations also compare the release factors from the 10 mg/m^3 aerosol concentration and the RHO RE-SA 216P partition fraction based on 450 hours of operation These two release factors compare very favorably being almost the same This comparison supports the validity of the RHO-RE SA 216P partition fraction

5 0 COMPARISON OF THE RHO-RE-SA-216P PARTITION FRACTION TO HEPA FILTER NDA DATA

The other comparison used was from partition fractions developed from high-efficiency particulate air (HEPA) filter nondestructive assay (NDA) data obtained from two active tank farm stacks, the AP Tank Farm stack and the AW Tank Farm stack These two stacks are of particular interest because two tanks in the AP Tank Farm and one tank in the AW Tank Farm are targeted to receive mixer pumps The AW Tank Farm comparison is especially pertinent because the RHO RE SA-216P partition fraction was based on data measured from AW tanks in 1987 Source terms (HEPA and tank waste) and volumes of air needed for these calculations were obtained from published documents the NESHAP designations for the stacks (HNF SD WM EMP-031 Revs 1 and 3) and the annual radionuclide emissions reports (DOE/RL 95 49 & DOE/RL-96 37) This comparison was made to show general correlations between the HEPA filter partition fractions and the RHO RE SA 216P partition fraction

The AP Tank Farm stack ventilates eight DSTs None are equipped with air lift circulators All the tanks actively receive and transfer waste The prefilter and HEPA filters were in service for over 2 years NDA data included the prefilter, first stage HEPA filter, and six HEPA filters from another tank farm exhaust system (all were in the same burial box on which NDA was performed) The added source term from the additional HEPA filters makes the resulting partition fraction very conservative when applied only to the AP Tank Farm The partition fractions calculated from the beta and gamma emitting radionuclides ranged between 6 90 E 12 and 7 38 E-10

The AW Tank Farm stack vents six DSTs with one of the tanks being equipped with air lift circulators All tanks actively receive and transfer waste Records are not available to determine if the air lift circulators were in operation during the lifetime of the HEPA filters therefore the conservative assumption was made that they were not NDA was done collectively on all four HEPAs and the prefilters in the exhaust train The prefilters and HEPA filters were in place for over 2 years The partition fractions calculated from the beta and gamma emitting radionuclides (on which the RHO RE SA 216P partition fraction also was based) ranged between 2 18 E-11 and 8 48 E-10

The spreadsheet calculations for these comparisons are shown in Section 8 0 These annualized partition fractions from HEPA filter source terms are lower than the annualized RHO RE SA 216P partition fraction (E 12 versus E-6) This was expected because these partition fractions are representatives of a less aggressive aerosol generating process the waste transfer process Ratioing the RHO-RE-SA 216P partition fraction (air lift circulation process) to the highest and lowest partition fractions obtained from the AP Tank Farm HEPA filter data (waste transfer process) indicates that emissions estimated with the RHO RE-SA 216P partition fraction will be between 6,000 and 640,000 times greater than normal waste transfer emissions This comparison is significant because by comparing the magnitudes of emissions between the waste transfer process and the air lift circulator process to PNNL s relative magnitudes of aerosol generation between waste transfers and mixing, it can be seen that using the RHO RE SA 216P partition fraction to estimate emissions for a mixing process produces very conservative results

A summary of all the partition fraction comparisons is provided in Table 1

6 0 CONCLUSIONS

Using the RHO RE-SA 216P partition fraction is an appropriate approach to estimate emissions from mixer pump operations This was shown by comparing the partition fraction against other partition fractions developed from separate methods that achieved similar and confirming outcomes The considerable conservatism in the comparison methods (choosing 10 mg/m^3 over an average of the given range and the additional source term in the HEPA filter NDA) ensures that mixer pump emissions will not be underestimated by using the RHO RE SA 216P partition fraction

7 0 CALCULATIONS FOR PARTITION FRACTION BASED ON 10 MG/M³ AEROSOL LOADING

241 AP Tank Farm Ventilation Flowrate

$$Q_{AP} = 31\ 2 \frac{m^3}{min}$$

$$Number_{tanks} = 8$$

$$Q_{Tank} = \frac{Q_{AP}}{Number_{tanks}}$$

$$Q_{Tank} = 3\ 9 \cdot \frac{m^3}{min}$$

$$Volume_{tank} = 1\ 10^6\ gal$$

Using a Temperature of 20 Celcius

$$density = 998\ 204 \frac{kg}{m^3}$$

$$density = 62\ 316 \cdot \frac{lb}{ft^3}$$

$$Mass_{tank} = Volume_{tank}\ density$$

$$Mass_{tank} = 8\ 33 \cdot 10^6\ \ lb$$

Literature search for mixer pump operation gave a particulate vapor space loading range of 0 1 to 10 mg/meter^3 Using the maximum value specified

$Conc = 10 \frac{mg}{m^3}$

For a full year of operation

$Time = 8760 \cdot hr$

$Mass_{vapor} = Q_{Tank} \cdot Conc \cdot Tim$

$Mass_{vapor} = 45\ 191 \cdot lb$

$Release\_Fraction = \frac{Mass_{vapor}}{Mass_{tank}}$

$Release\_Fraction = 5\ 425 \cdot 10^{-6}$

For a 450 hours of operation

$Time = 450 \cdot hr$

$Mass_{vapor} = Q_{Tank} \cdot Conc \cdot Tim$

$Mass_{vapor} = 2\ 321 \cdot lb$

$Release\_Fraction = \frac{Mass_{vapor}}{Mass_{tank}}$

$Release\_Fraction = 2\ 787 \cdot 10^{-7}$

Based on one year of continuous operation using method submitted in NOC

$Time = 24\ 365\ hr$

$Time = 8760 \cdot hr$

$Partition\_Fraction = \frac{1\ 02\ 10^{9}}{2\ hr}$

$Partition\_Fraction = 5\ 1 \cdot 10^{-10} \cdot hr^{1}$

$Release\_Fraction = Partition\_Fraction \cdot Tim$

$Release\_Fraction = 4\ 468 \cdot 10^{-6}$

Based on 450 hours of operation using method submitted in NOC

$Time = 450\ hr$

$Partition\_Fraction = \frac{1\ 02\ 10^{9}}{2\ hr}$

$Partition\_Fraction = 5\ 1 \cdot 10^{-10} \cdot hr^{1}$

$Release\_Fraction = Partition\_Fraction \cdot Tim$

$Release\_Fraction = 2\ 295 \cdot 10^{-7}$

Based on 450 hours of operation

Release fraction based on maximum particulate loading of 10 mg/m^3 is 2 8E-07

Release fraction submitted in NOC based on air lift circulation data is 2 3E-07

8 0 CALCULATIONS FOR PARTITION FRACTIONS BASED ON HEPA FILTER NDA DATA

241 AP Tank Farm (296 A-40 Stack) Annualized Partition Fractions

1994 Air Volume	2 00E+07 m3	**Total Waste Volume**	7 29E+06 gal
1995 Air Volume	1 40E+07 m3		2 76E+04 m3

Nuclide	HEPA Loading (over 2 yrs) Ci	Tank Inventory Ci	Tank Waste Concentration Ci/m3	Air Concentration Over HEPAs (2 yrs of volume) Ci/m3	Partition Fraction (Annualized)
60 Co	3 20E 06	3 20E+02	1 16E 02	9 41E 14	8 11E 12
90 Sr	6 10E 03	6 70E+03	2 43E 01	1 79E 10	7 38E 10
90 Y	6 10E 03	6 70E+03	2 43E 01	1 79E 10	7 38E 10
134 Cs	1 42E 05	1 67E+03	6 06E 02	4 18E 13	6 90E 12
137 Cs	2 52E 02	1 71E+06	6 20E+01	7 41E 10	1 20E 11

Notes
Air volumes from annual rad emissions reports DOE/RL 95 49 & DOE/RL 96-37
Tank waste volume from NESHAP stack designation WHC SD WM EMP 031 Revs 1 & 3
HEPA inventory from NESHAP stack designation HNF SD WM EMP 031 Rev 3
HEPA loading was collected over two years therefore the volume used to calculate the air concentration is also representative of two years This in effect annualizes the partition fraction

241 AW Tank Farm (296 A 27 Stack) Annualized Partition Fractions

1994 Air Volume	1 90E+07 m3	**Total Waste Volume**	5 87E+06 gal
1995 Air Volume	1 80E+07 m3		2 22E+04 m3

Nuclide	HEPA Loading (over 2 yrs) Ci	Tank Inventory Ci	Tank Waste Concentration Ci/m3	Air Concentration Over HEPAs (2 yrs of volume) Ci/m3	Partition Fraction (Annualized)
60 Co	7 86E 06	1 60E+02	7 20E 03	2 12E 13	2 95E 11
90 Sr	2 26E 01	1 60E+05	7 20E+00	6 11E 09	8 48E 10
90 Y	2 26E 01	1 60E+05	7 20E+00	6 11E 09	8 48E 10
134 Cs	1 49E 04	3 00E+03	1 35E 01	4 03E 12	2 98E 11
137 Cs	1 89E 01	5 20E+06	2 34E+02	5 11E 09	2 18E 11

Notes
Air volumes from annual rad emissions reports DOE/RL 95-49 & DOE/RL 96 37
Tank waste volume and inventory from NESHAP stack designation WHC SD WM EMP 031 Rev 1
HEPA inventory from NESHAP stack designation WHC SD WM EMP 031 Rev 1
HEPA loading was collected over two years therefore the volume used to calculate the air concentration is also representative of two years This in effect annualizes the partion fraction

9 0 REFERENCES

DOE/RL-95 49 *Radionuclide Air Emissions Report for the Hanford Site Calendar Year 1994* June 1995 U S Department of Energy Richland Washington

DOE/RL 96 37, *Radionuclide Air Emissions Report for the Hanford Site Calendar Year 1995* June 1996 U S Department of Energy, Richland Washington

DSTRTP CY94-003 *Aerosol and Vapor Source Term produced During Double Shell Tank Waste Mobilization and Retrieval Literature Reviews and Recommendations* February 1994 Pacific Northwest Laboratory, Richland, Washington

HNF SD WM EMP 031 Rev 3 *Tank Farm Stack NESHAP Designation Determinations* August 1997 Lockheed Martin Hanford Corporation Richland Washington

RHO-RE SA 216P *Characterization of Airborne Radionuclide Particulates in Ventilated Liquid Waste Tanks* June 1987 Rockwell Hanford Operations Richland Washington

WHC SD WM EMP 031 Rev 1 *Tank Farm Stack NESHAP Designation Determinations* August 1995 Westinghouse Hanford Company, Richland Washington

Table 1 Summary of Partition Fraction Comparisons

DATA SOURCE	PROCESS	PNNL PROCESS RANKING (1 to 5 least to most aggressive)	PARTITION FRACTION (PF)	PARTITION FRACTION COMPARISON to RHO 216P (annual) (RHO PF/PF)	RESULTING EMISSIONS COMPARISON	COMMENTS
RHO 216P	Air Lift Circulation	3	4 5 E 06 (annual)	1	N/A	Standard other PFs compared to this one
40 CFR 61 Appx D	Generic Particulates	N/A	1 0 E 03 (annual)	0 0045		
RHO 216P as applied in an NOC	Mixer Pump Circulation	2	2 3 E 07 (450 hr/yr)	19 6	Emissions estimated with this PF would be 19 6 times less than those estimated with the RHO 216P (ann) PF	Both of these PFs were expected to be less because the hours of operation are less Both of these PFs produce similar results which substantiates the PNNL ranking and that the use of the RHO 216P PF for a mixer pump process will be conservative
PNNL 10 mg/m3 particulate loading	Mixer Pump Circulation	2	2 8 E 07 (450 hr/yr)	16 1	Emissions estimated with this PF would be 16 1 times less than those estimated with the RHO 216P (ann) PF	
AP Farm HEPA NDA (highest)	Waste Transfer	1	7 4 E 10 (annual)	6 100	Emissions estimated with this PF would be 6 100 times less than those estimated with the RHO 216P (ann) PF	Both of these PFs show that measured emissions from a waste transfer process are much much less than emissions estimated with the RHO 216P PF
AP Farm HEPA NDA (lowest)	Waste Transfer	1	6 9 E 12 (annual)	650 000	Emissions estimated with this PF would be 650 000 times less than those estimated with the RHO 216P (ann) PF	

This page intentionally left blank

APPENDIX H

POTENTIAL UNABATED AND ABATED EMISSIONS AND DOSE FOR MIXER PUMP OPERATIONS

This page intentionally left blank

APPENDIX H

POTENTIAL UNABATED AND ABATED EMISSIONS AND DOSE FOR MIXER PUMP OPERATIONS

HANFORD SITE AREA			200-EAST
NUMBER OF HEPA FILTERS			1
HEPA FILTER EFFICIENCY			99 95%
PARTITION FRACTION			1 020E 09
PARTITION FRACTION ACTUAL TIME DURATION	HOURS		2
MAXIMUM TIME FOR MIXER PUMP OPERATION PER YEAR	HOURS		450

Constituent Name	Maximum Envelope Inventory Curies	Release Factor	Release State	Unabated Release Curies	Abated Release Curies	Offsite Dose Factor mrem/Curie (HNF-3602)	Offsite Unabated Dose mrem/year	Offsite Abated Dose mrem/year	Percent of Unabated Offsite Dose	Percent of Abated Offsite Dose
3H	1 41E+03	2 30E 07	Vapor	3 24E-04	3 24E 04	2 50E 05	8 09E 09	8 09E 09	0 00%	0 04%
14C	2 04E+02	2 30E 07	Vapor	4 68E-05	4 68E 05	1 90E 03	8 90E 08	8 90E 08	0 00%	0 41%
59Ni	1 30E+01	2 30E 07	Particulate	2 98E 06	1 49E 09	3 10E-04	9 25E 10	4 62E 13	0 00%	0 00%
60Co	7 59E 02	2 30E-07	Particulate	1 74E 04	8 71E 08	2 50E-01	4 35E-05	2 18E-08	0 10%	0 10%
63Ni	1 28E+03	2 30E 07	Particulate	2 94E 04	1 47E 07	2 60E 04	7 64E 08	3 82E 11	0 00%	0 00%
79Se	2 19E 01	2 30E-07	Particulate	5 03E 06	2 51E 09	1 30E 01	6 53E 07	3 27E 10	0 00%	0 00%
90Sr	5 54E+05	2 30E-07	Particulate	1 27E 01	6 36E 05	1 10E 01	1 40E 02	6 99E-06	33 17%	32 25%
90Y	5 54E 05	2 30E-07	Particulate	1 27E 01	6 36E-05	3 40E 04	4 32E 05	2 16E 08	0 10%	0 10%
93mNb	7 76E+01	2 30E-07	Particulate	1 78E 05	8 90E 09	2 10E 03	3 74E 08	1 87E 11	0 00%	0 00%
93Zr	1 06E 02	2 30E-07	Particulate	2 43E 05	1 22E-08	1 30E 03	3 16E 08	1 58E 11	0 00%	0 00%
99Tc	1 46E+04	2 30E-07	Particulate	3 35E 03	1 68E-06	2 30E 02	7 71E 05	3 85E 08	0 18%	0 18%
106Ru	1 39E 01	2 30E 07	Particulate	3 19E 06	1 60E 09	1 60E 02	5 10E 08	2 55E 11	0 00%	0 00%
113mCd	5 65E+02	2 30E 07	Particulate	1 30E-04	6 48E 08	1 30E 01	1 69E 05	8 43E 09	0 04%	0 04%
125Sb	1 33E+03	2 30E 07	Particulate	3 05E 04	1 53E 07	2 60E-02	7 94E 06	3 97E 09	0 02%	0 02%
126Sn	3 32E+01	2 30E 07	Particulate	7 62E 06	3 81E 09	4 70E 02	3 58E 07	1 79E 10	0 00%	0 00%
129I	1 10E+01	2 30E 07	Vapor	2 52E 06	2 52E 06	2 00E 01	5 05E-07	5 05E 07	0 00%	2 33%
134Cs	2 65E+02	2 30E-07	Particulate	6 08E 05	3 04E 08	1 00E 01	6 08E-06	3 04E-09	0 01%	0 01%
137Cs	2 32E+06	2 30E 07	Particulate	5 32E 01	2 66E-04	2 70E 02	1 44E 02	7 19E-06	34 09%	33 15%
151Sm	7 72E 04	2 30E 07	Particulate	1 77E 02	8 86E 06	7 50E 04	1 33E 05	6 64E-09	0 03%	0 03%
152Eu	4 07E+01	2 30E 07	Particulate	9 34E 06	4 67E 09	2 40E 01	2 24E 06	1 12E 09	0 01%	0 01%
154Eu	3 73E+03	2 30E 07	Particulate	8 56E 04	4 28E 07	2 00E 01	1 71E 04	8 56E 08	0 41%	0 39%
155Eu	4 73E+03	2 30E 07	Particulate	1 09E-03	5 43E 07	8 00E 03	8 68E 06	4 34E 09	0 02%	0 02%
226Ra	4 81E+00	2 30E 07	Particulate	1 10E-06	5 52E 10	4 60E 01	5 08E-07	2 54E 10	0 00%	0 00%
227Ac	5 65E-03	2 30E 07	Particulate	1 30E 09	6 48E 13	1 50E+01	1 95E-08	9 73E 12	0 00%	0 00%
228Ra	2 05E 00	2 30E 07	Particulate	4 70E 07	2 35E 10	1 90E 01	8 94E 08	4 47E 11	0 00%	0 00%
229Th	4 74E 02	2 30E 07	Particulate	1 09E 08	5 44E 12	1 60E 01	1 74E 07	8 70E 11	0 00%	0 00%
231Pa	2 50E 02	2 30E 07	Particulate	5 74E 09	2 87E 12	1 20E 01	6 89E 08	3 44E 11	0 00%	0 00%
232Th	2 32E 01	2 30E 07	Particulate	5 32E 08	2 66E 11	8 00E 00	4 26E 07	2 13E 10	0 00%	0 00%
232U	6 32E+00	2 30E 07	Particulate	1 45E-06	7 25E 10	1 10E 01	1 60E 05	7 98E 09	0 04%	0 04%
233U	2 42E+01	2 30E 07	Particulate	5 55E-06	2 78E 09	3 10E+00	1 72E 05	8 61E 09	0 04%	0 04%
234U	1 01E+01	2 30E 07	Particulate	2 32E 06	1 16E 09	3 10E+00	7 19E 06	3 59E 09	0 02%	0 02%
235U	3 90E-01	2 30E 07	Particulate	8 95E 08	4 48E 11	3 00E+00	2 69E-07	1 34E 10	0 00%	0 00%
236U	7 00E-01	2 30E 07	Particulate	1 61E 07	8 03E 11	2 90E+00	4 66E-07	2 33E 10	0 00%	0 00%
237Np	3 10E+01	2 30E 07	Particulate	7 11E 06	3 56E 09	1 20E 01	8 54E 05	4 27E-08	0 20%	0 20%
238Pu	8 34E 01	2 30E 07	Particulate	1 91E 05	9 57E-09	7 60E+00	1 45E 04	7 27E-08	0 34%	0 34%
238U	8 79E 00	2 30E 07	Particulate	2 02E 06	1 01E-09	2 80E+00	5 65E 06	2 82E 09	0 01%	0 01%
239Pu	8 17E+02	2 30E 07	Particulate	1 88E 04	9 38E 08	8 20E+00	1 54E 03	7 69E 07	3 65%	3 55%
240Pu	2 25E+02	2 30E 07	Particulate	5 16E 05	2 58E 08	8 20E 00	4 23E 04	2 12E 07	1 00%	0 98%
241Am	3 65E+03	2 30E 07	Particulate	8 38E 04	4 19E 07	1 30E+01	1 09E 02	5 44E 06	25 83%	25 11%
241Pu	8 33E+03	2 30E 07	Particulate	1 91E-03	9 56E 07	1 30E 01	2 49E 04	1 24E-07	0 59%	0 57%
242Cm	9 87E-01	2 30E 07	Particulate	2 27E 07	1 13E 10	4 10E 01	9 29E-08	4 64E 11	0 00%	0 00%
242Pu	3 19E-02	2 30E 07	Particulate	7 32E 09	3 66E 12	7 80E 00	5 71E-08	2 86E 11	0 00%	0 00%
243Am	3 11E 02	2 30E 07	Particulate	7 14E-09	3 57E 12	1 30E 01	9 28E 08	4 64E 11	0 00%	0 00%
243Cm	4 85E 00	2 30E 07	Particulate	1 11E 06	5 57E 10	8 50E+00	9 46E 06	4 73E-09	0 02%	0 02%
244Cm	1 54E 01	2 30E-07	Particulate	3 53E 06	1 77E 09	6 70E+00	2 37E-05	1 18E 08	0 06%	0 05%
TOTAL							4 22E-02	2 17E-05	100 00%	100 00 /.

This page intentionally left blank

ATTACHMENT 2

HNF-4327, *Control of Airborne Radioactive Emissions for Frequently Performed TWRS Work Activities*

(Consisting of 63 pages, including cover)

DOE/ORP-99-09, Rev 0

Control of Airborne Radioactive Emissions for Frequently Performed TWRS Work Activities (ALARACT Demonstrations)

David E Clark
Lockheed Martin Hanford Corporation, Richland, WA 99352
U S Department of Energy Contract DE-AC06-96RL13200

EDT/ECN	626592	UC	2030
Org Code	7B200	Charge Code	101785/CA30
B&R Code	EW3120071	Total Pages	62

Key Words ALARACT, Radioactive Emissions, Environmental, Washington State Department of Health

Abstract This document contains ALARACT Demonstrations identifying agreements made between LMHC, FDH, DOE-RL, and the Washington State Department of Health for frequently performed work activities in TWRS These ALARACTs do not cover new activities, modifications, construction, or decontamination and decommissioning activities

---

4/20/99

Release Approval Date

DATE HANFORD RELEASE ID
STA A 2
APR 20 1999
Release Stamp

Approved for Public Release

A 6400 073 (01/97) GEF321

ATT-2

DOE/ORP-99-09, Rev 0

ATT-3

DOE/ORP-99-09, Rev 0

Control of Airborne Radioactive Emissions for Frequently Performed TWRS Work Activities (ALARACT Demonstrations)

D E Clark
Lockheed Martin Hanford Corp

Date Published
April 1999

Prepared for the U S Department of Energy

FLUOR DANIEL HANFORD, INC.
P O Box 1000
Richland Washington

Hanford Management and Integration Contractor for the
U S Department of Energy under Contract DE AC06 96RL13200

ATT -4

DOE/ORP-99-09, Rev 0

Control of Airborne Radioactive Emissions for Frequently Performed TWRS Work Activities (ALARACT Demonstrations)

ATT-5

1 0 PURPOSE AND SCOPE

This document describes the requirements, responsibilities, and actions for ensuring compliance with As Low As Reasonably Achievable Control Technology (ALARACT) requirements in TWRS

The purpose of these ALARACT demonstrations are to document those activities that are conducted by Department of Energy contractors within tank farm facilities and are not to be used for new activities, modifications, construction, or D&D as defined in WAC 246-247 ALARACT demonstrations may be used to cover "SIMILAR WORK" in a Notice of Construction by attaching a copy of the applicable ALARACT The applicable sections of an ALARACT are the methods of radiological control, monitoring, and records/documentation that will be followed when conducting a portion of a new activity These sections must be adhered to Any potential emissions associated with the use of an ALARACT demonstration must be captured in the potential emissions estimate

The Washington State Department of Health requested that these frequently performed activities be described and formalized into specific ALARACT Demonstrations for individual activities, thus describing the operations (including the necessary controls and periodic confirmatory measurements required) Attachment A contains each approved ALARACT Demonstration that shall be used for frequently performed TWRS work activities

Many activities in the Tank Farms have been performed over the past several years through an approved Routine, Exempt and Approved Tank Farms Activities (Routine List) list (dated 1/9/96) The activities described in the Routine List were grouped as follows

1 Routine activities that occurred at registered sources, or that do not create a potential new pathway for air emissions from unregistered sources

2 Activities providing a new pathway for potential emissions to the air

3 Use of containment tents

4 Pit Decontamination within Tank Farms & Ancillary Facilities

5 Size Reduction of Waste Equipment for Disposal

6 Removal of contaminated equipment from Tank Farms and Ancillary Facilities

7 Characterization Activities

Each activity provided examples of routine operations and environmental controls associated with the operation These activities will now be covered under the following distinct ALARACT demonstrations

Some of the ALARACT Demonstrations reference the Containment Selection Guide This is contained in Attachment B for ease of operations use

2 0 SOURCES

The following is a list of the Washington State Department of Health approved ALARACT Demonstrations

1 ALARACT 1, "TWRS ALARACT Demonstration for Riser Preparation/Opening "

2 ALARACT 2, "TWRS ALARACT Demonstration for Installation/Operation/Removal of Push Mode Core Sampling Equipment "

3 ALARACT 3, "TWRS ALARACT Demonstration for Installation/Operation/Removal of Auger Sampling Equipment "

4 ALARACT 4, "TWRS ALARACT Demonstration for Packaging and Transportation of Waste "

5 ALARACT 5, "TWRS ALARACT Demonstration for Soil Excavation (using hand tools) "

6 ALARACT 6, "TWRS ALARACT Demonstration for Pit Access "

7 ALARACT 7, "TWRS ALARACT Demonstration for Tank Waste Grab Sampling "

8 ALARACT 8, "TWRS ALARACT Demonstration for Vapor Sampling "

9 ALARACT 9, "TWRS ALARACT Demonstration for Light Duty Utility Arm (LDUA) (Passive) "

10 ALARACT 10, "TWRS ALARACT Demonstration for Water Lancing "

11 ALARACT 11, "TWRS ALARACT Demonstration for Waste Transfers "

12 ALARACT 12, "TWRS ALARACT Demonstration for Packaging and Transportation of Equipment and Vehicles "

13 ALARACT 13, "TWRS ALARACT Demonstration for Installation, Operation, and Removal of Tank Equipment "

14 ALARACT 14, "TWRS ALARACT Demonstration for Pit Work "

3 0 DEFINITIONS

The following definitions have been agreed upon for use in the ALARACT Demonstrations

Contained "Containing" an item or area is not limited to the concept of total enclosure but also includes engineered barriers, which may be applied in varying degrees, to prevent the spread of contamination

Continuous HPT Coverage This is sufficient to immediately influence or stop work based on observed radiological conditions and/or work practices

Decontamination Includes draining of Liquids in a system if applicable

Existing Any system, component, riser, inlet port etc that currently is in the farms and may act as an emission source

Intermittent Coverage This should be sufficient to monitor and verify radiological conditions and frequent enough to exclude any reasonable potential for unmonitored change

Periodic Confirmatory Measurement Requirement that the Washington State Department of Health accepts as monitoring data to ensure that the ALARACT demonstrations are being met

Post-Job HPT to perform post-job survey of work area to verify radiological conditions are at pre-job levels or better

Radiological Surveys The ALARACT demonstrations were developed for WDOH for the purpose of air emissions The radiological surveys indicated for the demonstrations are swipes for removable contamination These demonstrations do not exempt dose rate and direct contamination surveys from being performed in the assessment of radiological work conditions

Swipes/Smears These items are interchangeable The term swipe is used in the ALARACT demonstrations

4 0 PROCESS FOR UPDATING APPROVED ALARACT DEMONSTRATIONS

The purpose of these ALARACT demonstrations are to document those activities that are conducted by Department of Energy contractors within tank farm facilities and are not to be used for new activities, modifications, construction, or D&D as defined in WAC 246-247 ALARACT demonstrations may be used to cover "SIMILAR WORK" in a Notice of Construction by attaching a copy of the applicable ALARACT The applicable sections of an ALARACT are the methods of radiological control, monitoring, and records/documentation that will be followed when conducting a portion of a new activity These sections must be adhered to Any potential emissions associated with the use of an ALARACT demonstration must be captured in the potential emissions estimate

If it is determined by LMHC, FDH, DOE-RL, or WDOH that an approved TWRS ALARACT Demonstration needs to be updated, corrected, or amended, the following change process shall be followed

1) The party that identifies the need for a change(s) shall send an electronic mail message to the other signing parties identifying that a change is needed to ALARACT #

2) A conference call shall be arranged with on-site representatives of LMHC, FDH, DOE-RL, and WDOH to discuss the issue and determine if a change is necessary If it is agreed that no change to the ALARACT Demonstration is required, no further action is needed and a telecon memo will be generated

3) If a change to the text of an ALARACT Demonstration form is necessary, the agreed upon text changes will be made by the LMHC representative and provided to FDH, DOE-RL, and WDOH for review/concurrence An electronic mail message from each of the four parties will be sufficient to signify agreement with the final wording If necessary, a conference call shall be arranged with all parties involved for any final adjustments to the wording of the agreed changes

4) Upon receipt of an electronic mail message from all parties that the revised or added wording to the ALARACT Demonstration is acceptable, the new ALARACT Demonstration will be initialed by all required signatories, with copies provided to each, and issued for implementation

5 0 ALARACT DEMONSTRATION SIGNATURES

Attachment C lists the ALARACT Demonstration approval signatures

ATTACHMENT A

TWRS ALARACT DEMONSTRATIONS

DOE/ORP-99-09, Rev 0

TWRS ALARACT DEMONSTRATION FOR RISER PREPARATION/OPENING

John Martell for AWC Washington State Department of Health	10 29-98 Date
D Bryson U S Department of Energy - Richland Operations	9/1/98 Date
William D Adam Fluor Daniel Hanford	8/27/98 Date
Lockheed Martin Hanford Corporation	8/25/98 Date

ATT- 11

TWRS ALARACT DEMONSTRATION FOR RISER PREPARATION/OPENING

1 Description of Activity

Risers may have screw caps, blind flanges, shield plugs, or equipment installed in them Preparation may include the following

Screw caps A pre-work survey is completed of the riser and the area around the riser Soil covering is installed around the riser If the riser or screw cap is highly contaminated, a glove bag may be installed to control contamination spread Slight contamination is wiped off the riser with damp rags

Blind flanges A pre-work survey is completed of the riser and the immediate work area around the riser, a glove bag may be used to contain the blind flange during removal Slight contamination is removed with damp rags

Shield plugs and other equipment to be removed from risers Risers may have various types of equipment installed The equipment will be installed and removed per ALARACT 13 To open the riser, it will be necessary to remove the equipment A pre-work survey is completed of the riser, installed equipment, and the area around the riser Soil covering is installed around the risers If necessary, glove bags or sleeving may be used on smaller pieces of equipment to be removed Larger items may require the need for a windbreak or containment tent

When the riser is opened, Industrial Hygiene samples may be taken

All containments used are in accordance with the containment matrix guide found in HNF-IP-0842, latest revision

Soil covering may be of a material such as, plastic sheeting, rubber matting, foil backed paper, griflon, or any material which will prevent possible contamination from reaching the soil

The riser will be closed after all riser activities are completed

- Emission Pathway - Existing active and passive point sources
- TWRS Facility Description - All TWRS facilities

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Follow TWRS ALARACT demonstration for "Installation, Operation, and Removal of Equipment (ALARACT 13)
- Pre-job survey is performed
- Use approved containment guideline matrix from HNF-IP-0842, latest revision
- Do not open risers if sustained winds are >25 mph
- Open riser time will be minimized
- HPT coverage will be performed as specified in the Radiological Work Permit

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

TWRS ALARACT DEMONSTRATION FOR
INSTALLATION/OPERATION/REMOVAL OF PUSH MODE CORE SAMPLING EQUIPMENT

John Martell for AWC	9-2-98
Washington State Department of Health	Date
D Bryson	9/1/98
U S Department of Energy - Richland Operations	Date
William D. Adams	8/27/98
Fluor Daniel Hanford	Date
DHS	7/20/98
Lockheed Martin Hanford Corporation	Date

TWRS ALARACT DEMONSTRATION FOR INSTALLATION/OPERATION/REMOVAL OF PUSH MODE CORE SAMPLING EQUIPMENT

1 Description of Activity

Push Mode Core Sampling (PMCS) is conducted with the Rotary Mode Core Sampling (RMCS) System The RMCS System can operate in either push mode or rotary mode The preferred mode of RMCS sampling is push mode, which does not involve rotation of the drill string or significant purge gas flow, and is the subject of this ALARACT demonstration Each RMCS System consists of the sample truck, an optional diesel powered electric generator, an optional in-tank video camera, a pressurized nitrogen supply, and other support equipment In addition to the three RMCS Systems, there is one PMCS System that operates only in push mode

Core Sampling system set up and sampling are controlled by operating procedures Prior to moving the RMCS truck and equipment onto a tank, a walk down is performed The walk down identifies any physical obstructions/barriers to truck placement and verifies the riser locations The Core Sampling truck and equipment are then moved to the tank farm for system set up System set up includes installation of the riser sleeve and riser equipment This requires that the riser flange cover be removed Following removal of the riser flange cover, the riser sleeve and riser adapter equipment are installed This equipment seals against the riser flange, protecting the air pathway The time between the removal of the flange cover and installation of the riser adapter equipment is kept to the minimum necessary to safely complete the task HPT coverage is provided the entire time the riser is open

The operation of core sampling begins by inserting a drill string made up of drill rod sections, into the waste The first section to be installed is the core barrel in which the core sampler itself is seated The rotary mode core samplers contain a seal against the bottom of the core barrel The seal is designed to prevent back flow of tank waste into the drill string This protects the air pathway out of the tank The remaining drill rod sections are screwed on to the drill string and inserted into the tank until the starting point for the first core sample segment is reached

After the first core sample segment has been taken, additional drill string sections and samplers may be added as needed During push mode sampling, nitrogen gas (or other fluid such as water) is used only in amounts sufficient to maintain the hydrostatic head and prevent or minimize movement of tank waste into the core barrel

When the segment is complete, the drill string is disconnected from the core sample truck and is capped The core sampler truck platform is rotated to align and connect the shielded receiving vessel ("shielded receiver") with the drill string During the connection the air pathway is protected by closed valves on the shielded receiver and on the adapter on the end of the drill string

When the sampler is removed from the tank, it is placed directly into the shielded receiver without disturbing the air tight seal between the shielded receiver and the drill string The isolation valves on the shielded receiver and the drill string adapter are closed before disconnecting the shielded receiver from the drill string The truck platform then rotates to place the shielded receiver either directly over a shipping cask, or the shielded receiver may be positioned over an x-ray machine to allow the sampler to be x-rayed In either case, the sealed drill string remains in place at the tank riser to maintain the seal to the atmosphere From the shielded receiver, the sampler is mechanically lowered into a transport cask Once the sampler is in the transport cask and the shielded receiver has been disconnected, the cask is immediately sealed

While the sampler is being replaced after each segment, with the RMCS System, nitrogen is injected into the drill string at approximately 0 03 cubic meter per minute This maintains the hydrostatic head in the drill string, minimizing waste from entering the drill string This also allows for pressurization and depressurization of the shielded receiver, as necessary, for sampler change out For the PMCS System, water is used to maintain the hydrostatic head

Once a complete core has been obtained, the RMCS truck can be repositioned on the same riser or moved to a different riser on the same tank to obtain additional cores During RMCS breakdown, the drill string is sleeved as it is removed from the tank and placed into a waste container When sampling is complete at one tank, the RMCS system will be disconnected and moved to the next tank

- Emission pathway - Existing active and passive point sources (Displacement gas used in drill string which is a closed system and has minimal/no emission impact)

- TWRS facility description - All SST's, DST's and IMUST's

2 Radiological Controls

- When opening riser, use TWRS ALARACT demonstration controls for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- HPT coverage will be performed as specified in the Radiological Work Permit
- Do not initiate sampling activities if sustained winds are >25 mph
- Valves, caps, plugs, used to minimize open riser time
- Core sampler seal in place
- Threaded connections and/or cam-locks
- Verify passive or active HEPA filtration on tanks

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

TWRS ALARACT DEMONSTRATION FOR
INSTALLATION/OPERATION/REMOVAL OF AUGER SAMPLING EQUIPMENT

John Martell for AWC 9-2-98
Washington State Department of Health Date

D Bryson 9/1/98
U S Department of Energy - Richland Operations Date

William D Adams 8/27/98
Fluor Daniel Hanford Date

7/20/98
Lockheed Martin Hanford Corporation Date

TWRS ALARACT DEMONSTRATION FOR INSTALLATION/OPERATION/REMOVAL OF AUGER SAMPLING EQUIPMENT

1 Description of Activity

Auger sampling represents one technique to remove a sample from tanks which have less than 25 vertical inches of hardened waste material The auger sampling assembly uses the auger "bit" to obtain a sample of tank waste Auger sampling equipment consists of an auger "bit", auger rod, auger sleeving assembly, receiving cask, and an on-site transfer cask (OTC)

To begin, a tank riser is opened and the auger adapter sleeving assembly is installed into the tank headspace The installation of the auger sleeving assembly reduces open riser time The auger sleeving assembly provides lateral strength to the auger bit and auger rod, and extends from the riser to the top of the waste surface The receiver cask is then mounted on top of the auger adapter sleeving assembly via a camlock fitting This camlock fitting seals the receiver cask to the auger adapter assembly which is sealed to the riser, thereby minimizing the open riser time
The auger rod and auger bit assembly are lowered through the top of the receiver cask assembly, through the interior of the auger sleeving assembly, down to the surface of the tank waste The portion of the auger rod extending above the riser is then hand rotated forcing the auger bit to penetrate the tank waste The tank waste material fills the grooves (flutes) of the auger bit and this constitutes the waste sample

The auger bit (now containing the sample) and auger rod are pulled up from the tank waste surface, through auger sleeving, and into the receiver cask on top of the riser During this sample removal step, the auger rod exits the top of the receiver cask into the ambient environment The auger rod is surveyed for contamination as it is extracted and contained if found to be contaminated When the auger bit (sample) is within the receiver cask, a ball valve, mounted on the bottom of the receiver cask is closed The receiver cask is then isolated by placing a temporary cover over the auger rod port

The receiver cask is moved via crane to the OTC Once the receiver cask has been connected by a cam lock to the OTC, a handle is connected to the auger bit through the top of the receiver cask and the sample is lowered into the cask The OTC is sealed and then provides a shipping container for the auger sample

- Emission pathway - Existing active and passive point sources
- TWRS facility description - All TWRS SST's, DST's and IMUST's

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- HPT coverage will be performed as specified in the Radiological Work Permit
- Do not initiate auger sampling if sustained winds are >25 mph
- Use valves, caps, and plugs to minimize open riser time
- Cam locks used to secure receiving cask to riser and shipping cask
- Verify passive or active HEPA filtration on tanks
- Contain contaminated equipment
- Temporary cover placed on top of receiving cask
- Sample contained when in shipping cask

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

TWRS ALARACT DEMONSTRATION FOR PACKAGING AND TRANSPORTATION OF WASTE

For AINC Washington State Department of Health	10/22/98 Date
For D Bryson U S Department of Energy - Richland Operations	10/5/98 Date
Fluor Daniel Hanford	9/30/98 Date
Lockheed Martin Hanford Corporation	9/16/98 Date

Rev 0
9/16/98

ATT-21

TWRS ALARACT DEMONSTRATION FOR PACKAGING AND TRANSPORTATION OF WASTE

1 Description of Activity

Some materials become contaminated during work conducted within all TWRS facilities Such contaminated materials, which are not released or otherwise controlled, are handled as radioactive waste Radioactive waste generated from Tank Farms operations activities such as pit work, excavations, surveillances, housekeeping, maintenance and tank sampling, will be double contained at a minimum A radiological survey is conducted prior to storage or transportation of the outer-most container to verify that removable contamination meets the requirements under the Radiological Controls section

- Emission pathway - Existing passive point sources
- TWRS facility description - All TWRS facilities (Except special nuclear material in 2718-E)

2 Radiological Controls

- Double contained and closed (At a minimum)
- <1,000 dpm/100cm^2 beta/gamma on the outer-most container
- <20 dpm/100cm^2 alpha on the outer-most container (Unless exempted by the latest revision of the "Justification for Dual Survey Exemption in Tank Farm Facilities," HNF-3391)

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey(s)

4 Records/Documentation

- Radiological survey report(s)
- Radiological work permit

TWRS ALARACT DEMONSTRATION FOR SOIL EXCAVATION (USING HAND TOOLS)

Washington State Department of Health	4-5-99 Date
U S. Department of Energy - Richland Operations	3/15/99 Date
Fluor Daniel Hanford	3/1/99 Date
Lockheed Martin Hanford Corporation	2/20/99 Date

Rev 0
2/18/99

ATT-23

TWRS ALARACT DEMONSTRATION FOR SOIL EXCAVATION (USING HAND TOOLS)

1 Description of Activity/Requirements

Soil is routinely excavated in the TWRS facilities to support riser preparation, repair and maintenance activities, soil sampling, cleanup of contamination, removal of vegetation and biological hazards, and operational activities (laying conduit or cables for power) An initial survey is performed of the area to be excavated Surveys are performed throughout the excavation to assure that worker safety and environmental protection is maintained Once the excavation begins, water is used, as necessary, to prevent the spread of dust To the extent practicable using hand held instrument field survey techniques, the clean soil is separated from the soil identified as contaminated The contaminated soil has a fixative applied or is covered by plastic at the end of the shift, and as necessary, to stabilize the contaminated soil The activities covered by this ALARACT demonstration do not include D&D All radioactively contaminated soil excavation is conducted using hand tools

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- HPT coverage will be performed as specified in the radiological work permit
- A beta-gamma survey of the ground surface is required prior to excavation in Contamination Areas (CA's), High Contamination Areas (HCA's), Soil Contamination Areas (SCA's), and Underground Radioactive Material Areas (URMA's) An alpha survey may be required prior to excavation per the "Justification for Dual Survey Exemption in Tank Farm Facilities" HNF-3391
- For excavation in CA's, HCA's, SCA's, and URMA's, if beta-gamma activity greater than 1000 dpm/probe area (5000 dpm/100cm^2) is identified, alpha surveys will also be performed
- Suppressants such as water, fixatives, covers, or windscreens will be used as necessary, including at the end of each shift or when sustained or predicted winds are >20mph
- If the net alpha for the general area is greater than 140 dpm/probe area, OR if the net beta-gamma activity for the general area is greater than 500,000 dpm/probe area, work will be suspended and worker safety evaluated by TWRS Radiological Control Direct contact will also be made to WDOH After it is determined that there is no threat to worker safety, WDOH has been

contacted, and the proper controls (e g , water fixatives, covers, windscreens) have been put in place, excavation may continue A contact of WDOH will not be needed if the contamination consists of a hot speck If hot specks are detected during the radiological surveys, the specks will be removed and contained before the activity is allowed to continue unless located in the bottom of the trench after excavation has been completed Specks found in the bottom of the completed trench may be covered with clean fill A hot speck will be defined as a very small amount (i e less than or equal to 100 cm^2) of contamination reading greater than or equal to 1,000,000 dpm/probe size beta-gamma and/or greater than or equal to 490 dpm/probe size alpha

3 Monitoring

- Radiological surveys (direct surveys of soil)
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

5 Emission Pathway

- Existing passive (fugitive/diffuse)

6 TWRS Facility Description

- All TWRS facilities

TWRS ALARACT DEMONSTRATION FOR PIT ACCESS

P John Martell for AWC
Washington State Department of Health — Date 4-5-99

U S Department of Energy - Richland Operations — Date 3/15/99

2-26-99
Fluor Daniel Hanford — Date 3/1/99

2-18-99
Lockheed Martin Hanford Corporation — Date 2/20/99

Rev 0
2/18/99

ATT-26

TWRS ALARACT DEMONSTRATION FOR PIT ACCESS

This ALARACT demonstration applies to all pits except 241-ER-152, 241-S-151, 241-UX-154, 241-TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT

1 Description of Activity/Requirements

PREPARATION WORK A pre-job survey is performed on the exterior surface of the pit and the surrounding area A fall protection handrail is installed around the pit The fall protection is draped in plastic sheeting that extends to the top of the pit This establishes a splash guard around the pit Before the cover blocks are removed, an approved fixative may be applied inside the pit or the pit may be decontaminated as described below These processes are generally performed through an access port If there is no access port(s), the cover blocks are raised and suspended, a radiological survey is performed, and/or a fixative may be applied inside the pit as described in Section 2, Radiological Control The cover blocks are removed

DECONTAMINATION Uniformly distributed removable contamination levels in the pit are decontaminated/fixed to less than 100,000 dpm/100cm^2 beta/gamma and 2,000 dpm/100cm^2 alpha by washing and/or an approved fixative is applied to pit surfaces Fixative will matrix the contamination to ensure minimization of potential airborne contamination If a high pressure (up to 3,000 psi) or low pressure (approximately 125 psi) whirly is installed, it is done through an opening (if one exists) in the cover blocks and the pit is washed down The cover blocks are lifted and contained if the removable level is greater than 50,000 dpm/100 cm^2 beta/gamma and 20 dpm/100 cm^2 alpha The cover blocks are then moved to a storage area With the cover blocks off, additional decontamination activities may include the use of chemicals, peel and strip paints, water, or manual scrub brushes When decontamination activities are complete, other work may begin or a temporary cover is installed over the pit

CLOSURE After all activities in the pit are completed, the cover blocks are reinstalled and the splash guard is removed

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Use of a splash guard extending to the edge of the pit

- Uniformly distributed removable contamination levels within the pit are decontaminated or fixed so that a swipe reads less than 100,000 dpm/100 cm^2 beta/gamma and 2,000 dpm/100 cm^2 alpha An approved fixative will be applied to pit surfaces if contamination levels exceed the limits stated above or as needed Note The fixative will matrix the contamination to ensure minimization of potential airborne contamination

- *Splash guard will be taped or sealed to the edge of the pit*

- Pit work will not be performed if sustained winds are >25 mph

- HPT coverage will be performed as specified in the Radiological Work Permit

3 Monitoring

- Radiological surveys of the work area as required by the work package Swipes for removable contamination are required

- Swipes will be taken to determine that splash guards are to be maintained below 50,000 dpm/100 cm^2 beta/gamma and 20 dpm/100 cm^2 alpha

- Post job survey(s)

4 Records/Documentation

- Work package

- Radiological work permit

- Radiological survey report(s)

5 Emission Pathway

- Existing passive non-point sources

6 TWRS Facility Description

- Pits at all TWRS facilities

- This ALARACT demonstration applies to all pits except 241-ER-152, 241-S-151, 241-UX-154, 241-TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT

TWRS ALARACT DEMONSTRATION FOR TANK WASTE GRAB SAMPLING

For AWE — Washington State Department of Health — 10-29-98 Date

For D Bryson — U S Department of Energy - Richland Operations — 10/22/98 Date

Fluor Daniel Hanford — 10/12/98 Date

Lockheed Martin Hanford Corporation — 9/24/98 Date

TWRS ALARACT DEMONSTRATION FOR TANK WASTE GRAB SAMPLING

1 Description of Activity

Grab sampling is used to obtain small volume samples of tank waste materials Individual samples are typically <1 liter, but multiple samples can be taken from the tank The sampled material consists of liquid, sludges, and solids Grab sampling techniques are suitable for relatively soft waste If the waste material is too thick or hard, other sampling techniques (such as core sampling) may be required

Grab samples are acquired through tank risers A riser is prepared for grab sampling by first installing a riser adapter called a 'top hat' The top hat acts as a temporary seal for the open riser to minimize open riser time The next step is to install a glove bag over the tank riser

The sampling assembly consists of a sample device suspended on a wire cable The most commonly used sample devices are a bottle in a weighted bottle holder, and a finger sampler The bottle is used when the waste material is primarily liquid, while the finger sampler is used to sample relatively solid material

The sample assembly is placed into the glovebag, the glovebag is closed and the riser is opened The sample device is lowered with a hand operated winch, the waste sample collected, and retrieved from the tank If the collected sample is a bottle, the bottled is capped, bagged and placed into a shielded container If the sample is collected in a finger sampler, the waste is transferred to a secondary container, bagged and placed into the shielded container The shielded container with the waste sample is then transferred outside the glovebag through an ante-chamber The glovebag ante-chamber isolates the open riser during sample transfer

When sampling is finished, the glove bag is collapsed, venting air through a small HEPA type filter, and all contaminated sampling equipment contained inside is disposed as waste

A small percentage of grab sampling jobs are performed on top of a tank riser without a glovebag An example would be raising a saltwell pump (accessed from within a pit) and sampling between the pump legs and the saltwell screen Such sample jobs are controlled through work planning utilizing the Radiological Control Containment Guide Matrix (contained in HNF-IP-0842, latest revision)

- Emission pathway - Existing active and passive point sources
- TWRS facility description - All TWRS SST's, DST's and IMUST's

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Follow TWRS ALARACT demonstration for "Pit Access" (ALARACT 6), if applicable
- HPT coverage will be performed as specified in the Radiological Work Permit
- Do not initiate sampling if sustained winds are >25 mph
- Use riser adapter to minimize open riser time
- Samples contained prior to placement in a shielded container
- Sample contained when in shipping cask
- Contain contaminated equipment
- Use approved containment guideline matrix from HNF-IP-0842, latest revision

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

TWRS ALARACT DEMONSTRATION FOR
VAPOR SAMPLING

For AWC 10-29-98
Washington State Department of Health Date

For P Bryson 10/22/98
U S Department of Energy - Richland Operations Date

10/12/98
Fluor Daniel Hanford Date

9/24/98
Lockheed Martin Hanford Corporation Date

TWRS ALARACT DEMONSTRATION FOR VAPOR SAMPLING

1 Description of Activity

There are two methods to collect vapor samples from waste tanks grab sampling (with SUMMA canisters), and In-Situ Vapor Sampling (ISVS or Type IV) equipment SUMMA is an evacuated container Other equivalent evacuated containers may be used in its place

SUMMA VAPOR SAMPLING

SUMMA sampling equipment consists of a riser adapter (not used for drill string vapor samples), sample tubing, and SUMMA canisters

To begin SUMMA sampling, a tank riser is opened and the riser adapter is installed The riser adapter contains sampling tubes that extend above the top of the riser and continue down into the tank headspace The sampling tubes are fitted with isolation valves An installed riser adapter with the sample tube valve closed isolates the tank vapor space from the ambient environment

In the first step, the sampling tube is purged using portable industrial hygiene instruments and the headspace vapor is drawn into the tube A tank headspace sample is collected by attaching a SUMMA canister to the top end of a sampling tube and opening the valve The SUMMA canister, an evacuated container, allows the tank headspace gas to be pulled into the container The self-contained sample canister is shipped to a laboratory for analysis

When vapor sampling is finished, the riser adapter/tubing assembly is removed, surveyed by an HPT, and placed into containment sleeving if found contaminated If a riser is used, a cap or flange is then installed

TYPE IV VAPOR SAMPLING

The second method of vapor sampling is the In-Situ Vapor sampling (ISVS or Type IV sampling) method Contrasting SUMMA grab sampling, ISVS sample media is directly exposed to tank vapor gases by placement in the tank headspace The ISVS sampling equipment consists of a riser adapter, an air pump mounted on a handcart, a manifold for connecting sample tubing, tube bundle assembly which has a sampling head containing the sample media, and the sample media

The sampling begins by opening a tank riser designated for sampling, installing the riser adapter, inserting the plastic sleeved sample tubes (with the sampling head/media attached) into the riser to the required sampling depth, attaching the sample tubes to the air pump handcart, sampling for a period of time, removal of the sample lines and sample media, removal of the riser adapter and closing the riser, packaging the samples for shipment to a laboratory, packaging waste for eventual disposal

- Emission pathway - Existing active and passive point sources
- TWRS facility description - All TWRS SST's, DST's and IMUST's

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- HPT coverage will be performed as specified in the Radiological work permit
- Use riser adapter to minimize open riser time
- Verify passive or active HEPA filtration on tanks
- HEPA-type filtration in sample line
- Contain contaminated equipment
- Sample contained when in shipping container

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

TWRS ALARACT DEMONSTRATION FOR LIGHT DUTY UTILITY ARM (LDUA)

Washington State Department of Health	4-5-99 Date
U S Department of Energy - Richland Operations	3/4/99 Date
Fluor Daniel Hanford	2/21/99 Date
1/19/99 Lockheed Martin Hanford Corporation	12/28/98 Date

Rev 0
10/23/98

TWRS ALARACT DEMONSTRATION FOR LIGHT DUTY UTILITY ARM (LDUA)

1 Description of Activity/Requirements

The Light Duty Utility Arm is a long robotic manipulator arm that is installed, operated, and removed in waste tanks through existing tank risers A variety of tools (called 'end effectors') can be installed on the end of the arm to perform activities such as sampling waste materials, tank surveillance and inspections, manipulating in-tank equipment, and performing in-tank analysis of waste properties The end effectors may be locally waste disturbing near the waste surface (up to 12 inches deep) by probing, scraping, grabbing or sampling tank waste at various locations within the tank In addition, the end effectors may be used to place monitoring equipment onto or into tank waste

The manipulator arm is maintained in a housing on a truck that transports the equipment The truck contains equipment for vertical and horizontal positioning of the arm and housing The manipulator arm, housing, and positioning equipment is collectively called the Vertical Positioning Mast (VPM)

The riser is opened per ALARACT 1 and a riser isolation valve is installed The VPM is connected to the riser isolation valve with the Tank Riser Interface and Confinement (TRIC) system The TRIC provides radiological confinement when the riser isolation valve is open The TRIC contains gloved ports for hands-on activities, access to change end effectors, and to allow vapor sampling The TRIC is equipped with a HEPA-type filter

A decontamination system provides for gross removal of external contamination from the mast, arm, and end effector The decontamination system is attached to the bottom of the confinement enclosure The decontamination system sprays a ring of water through which the mast, arm, and end effector are withdrawn from the tank and into the housing of the VPM

When the LDUA is operated in a waste tank, a purge system provides a constant low volume flow of instrument grade air into the LDUA, VPM, and any end effectors The purge air creates a positive pressure inside the system This is required for operation in flammable gas environments and also minimizes radioactive contamination from entering the in-tank components The purge gas exits through the TRIC HEPA-type filter or the tank ventilation system

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- HPT coverage will be performed as specified in the Radiological Work Permit
- Verify passive or active HEPA filtration on tanks
- The LDUA TRIC will not be set up or removed if sustained winds are >25 mph
- Riser isolation valve minimizes open riser time
- HEPA-type filter equipped TRIC The HEPA-type filter is tested by the manufacturer and used once per tank evolution
- VPM Housing

3 Monitoring

- Radiological surveys of the work area as required by the work package Swipes for removable contamination are required
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

5 Emission Pathway

- Existing active and passive point sources

6 TWRS Facility Description

- All TWRS SST's, DST's, and IMUSTs

DOE/ORP-99-09, Rev 0

TWRS ALARACT DEMONSTRATION FOR WATER LANCING

for AWC

Washington State Department of Health — Date 11-18-98

For D. [illegible]

U S Department of Energy - Richland Operations — Date 11/12/98

Fluor Daniel Hanford — Date 10/27/98

Lockheed Martin Hanford Corporation — Date 10/8/98

Rev 0
9/30/98

ATT-38

TWRS ALARACT DEMONSTRATION FOR WATER LANCING

1 Description of Activity

Water lancing the waste in an underground storage tank is performed to determine the depth of the tank from the riser location and to prepare for equipment installation, such as salt well screens, jet pump assemblies and liquid observation wells There are two types of water lances

a) A long pipe approximately 7 62 cm in diameter with a single nozzle at the end This design uses hot water (supplied by a truck) at low pressure, approximately 1034 kilopascals (150 psi) Use of this design may require the lance to be raised and lowered into the waste multiple times so that a large enough hole can be formed in the waste to accommodate the equipment to be installed in the hole

b) A newer design lance has a 28 cm diameter pipe and multiple nozzles on the bottom to facilitate waste penetration It is designed to create a large hole with one insertion of the lance into the waste This design requires less (hot) water volume and operates at higher pressure, 20685 kilopascals (3000 psi)

In each case, a hose from a water truck is connected to the top end of the water lance The water lance is inserted into a tank riser which has a water spray ring mounted within the riser Additionally, a plastic sleeve is staged and tied off at the top of the lance for deployment during lance retrieval During insertion of the water lance, air emissions are controlled by the use of the water spray ring The water spray ring sprays water in the annulus between the outside diameter of the water lance and the inside diameter of the riser The water lance is lowered until it penetrates the solid portions of the waste which need to be broken up to allow insertion of the saltwell screen or other equipment The water lance withdrawal steps are the reverse of the insertion sequence The water spray ring is used to wash radioactive tank waste from the outside of the water lance Hand wiping of the lance may also take place immediately above the riser and below the plastic sleeving Washing is repeated until radiation readings are <100 mrem/hr If the lance cannot be decontaminated below 100 mrem/hr, the lance will be sleeved in plastic, removed from the tank, and stored The pit or riser will be closed

Contingency plans within the scope of this ALARACT demonstration are

a) Removing the lance from the tank for further decontamination by washing, wiping or brushing The activities will be conducted in accordance with the containment matrix guide found in HNF-IP-0842, latest revision

b) Replacement of contaminated parts if they cannot be adequately decontaminated as noted in (a) above This activity will be conducted in accordance with the containment matrix guide found in HNF-IP-0842, latest revision

c) Packaging, storing and transporting the lance "as is" if the external dose rates exceed 100 mrem/hr

As the water lance is withdrawn from the tank, it is placed inside a plastic sleeve (during the withdrawal process), surveyed, and stored until its next use

The actual water lancing time (residence time in waste) usually ranges from 10 minutes to 4 hours with an average time of about 30 minutes Riser open time is minimized

- Emission pathway - Existing active and passive point sources
- TWRS facility description - All TWRS SST's, DST's, and IMUSTs

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Follow TWRS ALARACT demonstration for "Pit Access" (ALARACT 6), if applicable
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Equipment" (ALARACT 12)
- During insertion and removal, radionuclide control is achieved by spraying the annulus between the lance outside diameter and riser inside diameter with water
- Verify passive or active HEPA filtration on tanks
- Use approved containment guideline matrix from HNF-IP-0842, latest revision
- HPT coverage will be performed as specified in the Radiological Work Permit

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

TWRS ALARACT DEMONSTRATION FOR WASTE TRANSFERS

for AWC	4-5-99
Washington State Department of Health	Date
	3/15/99
U.S. Department of Energy - Richland Operations	Date
2-26-99 William Adair	3/1/99
Fluor Daniel Hanford	Date
2-18-99 DS	2/20/99
Lockheed Martin Hanford Corporation	Date

Rev 0
2/18/99

TWRS ALARACT DEMONSTRATION FOR WASTE TRANSFERS

1 Description of Activity/Requirements

Wastes are transferred to, from, and within actively ventilated tank farm storage facilities (i e double-shell tanks), chemical processing facilities, receiver vaults, mobile tanks, and evaporators Wastes are also transferred from single-shell tanks during (and due to) salt well pumping Transfers are made through a network of existing or to be installed above or below ground pipelines, operating equipment Transfers also utilize the existing network of controls or transfer structures (currently in use, or constructed under a Notice of Construction) such as diversion boxes, valve pits, double contained receiver tanks, and diverter stations

Jet, submersible, or transfer pumps are used to transfer waste at flow rates up to 300 gallons (1,132 liters) per minute The cover blocks are reinstalled on the pits before starting any waste transfer operation

Occasionally, water is added to a tank or transfer system to prevent or remove plugs Other techniques to free blockages include chemical flushing, pressurization, temporary jumpers, hydraulic scouring, and the use of heat tracing Flow rates and pressures used are determined by engineering evaluations Flow into the sending/receiving tank is exhausted using a HEPA filtered vent

2 Radiological Controls

- Verify HEPA filtration on receiving tanks
- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Follow TWRS ALARACT demonstration for "Pit Access" (ALARACT 6)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Equipment and Vehicles" (ALARACT 12)
- Follow TWRS ALARACT demonstration for "Installation and Removal of Equipment from Tanks" (ALARACT 13)
- Follow TWRS ALARACT demonstration for "Pit Work" (ALARACT 14)

3 Monitoring

- Process parameters monitored include tank pressure alarms and annulus and primary tank exhaust CAMs
- Record samplers
- Radiological surveys of the work area as required by the work package Swipes for removable contamination are required
- Post job survey(s)

4 Records/Documentation

- Flow rate and pressure engineering evaluations
- Work package
- Radiological work permit
- Radiological survey report(s)

5 Emission Pathway

- Existing active and passive point sources and fugitive non-point sources

6 TWRS Facility Description

- All TWRS facilities

TWRS ALARACT DEMONSTRATION FOR PACKAGING AND TRANSPORTATION OF EQUIPMENT AND VEHICLES

P John Martell for AWC — 1-5-99
Washington State Department of Health — Date

12/29/98
U S Department of Energy - Richland Operations — Date

William D. Adams — 12/18/98
Fluor Daniel Hanford — Date

12/10/98
Lockheed Martin Hanford Corporation — Date

Rev 0
11/19/98

TWRS ALARACT DEMONSTRATION FOR PACKAGING AND TRANSPORTATION OF EQUIPMENT & VEHICLES

1 Description of Activity

Equipment and vehicles that become contaminated during work activities are reused when possible If the equipment or vehicle is to be reused or stored in a contamination area, the removable activity levels on the surface of the item, or the outer-most container, must be in accordance with HSRCM-1, Table 2-4 (or latest revision) If the equipment or vehicle is to be transported to another facility, the surface of the item, or the outermost container, must meet the requirements under the Radiological Controls section listed below

- Emission pathway - Fugitive/diffuse sources
- TWRS Facility Description - All TWRS facilities

2 Radiological Controls

Removable contamination on the surface of the item, or the outer-most container, must be <1,000 dpm/100cm^2 beta/gamma and/or <20 dpm/100cm^2 alpha if the equipment or vehicle is leaving the contamination area

3 Monitoring

- Radiological surveys (swipes for removable contamination) of work area
- Post job survey

4 Records/Documentation

- Radiological work permit
- Radiological survey report(s)

TWRS ALARACT DEMONSTRATION FOR INSTALLATION, OPERATION, AND REMOVAL OF TANK EQUIPMENT

Washington State Department of Health	4-5-99 Date
U S Department of Energy - Richland Operations	3/15/99 Date
2-26-99 Fluor Daniel Hanford	3/1/99 Date
2-18-99 Lockheed Martin Hanford Corporation	2/20/99 Date

Rev 0
2/18/99

TWRS ALARACT DEMONSTRATION FOR INSTALLATION, OPERATION, AND REMOVAL OF TANK EQUIPMENT

1 Description on Activity/Requirements

This ALARACT demonstration does not provide approval for the following activities waste sampling, sluicing, lancing, operations of mixer pumps, and use of the LDUA While operating under these activities, the applicable ALARACT demonstrations must be complied with

A multitude of equipment may be installed, operated, and removed from tanks (actively and passively ventilated)

When installing and removing equipment from tanks, risers and pits are opened ALARACT 1 (Riser Preparation/Opening) and ALARACT 6 (Pit Access) describe the activities necessary to prepare the risers and pits

If water lancing is performed to assist in the installation of equipment, it will be done in accordance with ALARACT 10 (Water Lancing)

Equipment is lowered into and removed from tanks either manually or remotely (e g using a crane) Once the equipment is installed, mating surfaces of the equipment and riser are sealed

All equipment removed from tanks is contained using glovebags, sleeving, or other containment devices in accordance with the latest revision of the containment matrix guide from HNF-IP-0842

The riser is closed under ALARACT 1 (Riser Preparation/Opening) and the pit is closed under ALARACT 6 (Pit Access) following installation or removal of equipment

Waste is packaged and transported per ALARACT 4 (Packaging and Transportation of Waste) Equipment is packaged and transported per ALARACT 12 (Packaging and Transportation of Equipment and Vehicles)

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Follow TWRS ALARACT demonstration for "Pit Access" (ALARACT 6)
- Follow TWRS ALARACT demonstration for "Water Lancing" (ALARACT 10)

- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Equipment and Vehicles" (ALARACT 12)
- Equipment is decontaminated or contained when removed from tanks
- Swipes will be taken to determine that the surface of the item or the outermost surface of the container are maintained <50,000 dpm/100cm^2 beta/gama and/or <20 dpm/ 100cm^2 alpha
- HPT coverage will be performed as specified in the Radiological Work Permit
- Do not install or remove equipment if sustained winds are >25 mi/hr
- When containment is used, it will be in accordance with the latest revision of the containment matrix guide from HNF-IP-0842

3 Monitoring

- Radiological surveys of the work area as required by the work package Swipes for removable contamination are required
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

5 Emission Pathway

- Existing passive or active point & non-point sources

6 TWRS Facility Description

- All TWRS facilities

TWRS ALARACT DEMONSTRATION FOR PIT WORK

Washington State Department of Health — Date: 4-5-99

U.S. Department of Energy - Richland Operations — Date: 3/15/99

Fluor Daniel Hanford — Date: 3/1/99

Lockheed Martin Hanford Corporation — Date: 2/20/99

Rev 0
2/18/99

TWRS ALARACT DEMONSTRATION FOR PIT WORK

This ALARACT demonstration applies to all pits except 241-ER-152, 241-S-151, 241-UX-154, 241-TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT

1 Description of Activity/Requirements

When entering or exiting the pit, ALARACT 6 "Pit Access" must be complied with

All equipment removed from the pit is decontaminated or contained A temporary or permanent cover is placed over the pit if ever left unattended

Installing pit leak detectors, unplugging drains, and housekeeping/waste removal activities are performed following the above description

Specific activities performed in pits follows

Jumper Work

Before any jumper work takes place, the affected lines are flushed (if possible) and an approved fixative is applied The fixative will be applied in accordance with ALARACT 6 "Pit Access" and reapplied as necessary

Swipes of the splash guard will be taken during the jumper work If a used jumper is to be removed from the pit, it is drained and a fixative is applied If removable contamination is greater than 50,000 dpm/100 cm^2 beta/gamma and/or 20 dpm/100 cm^2 alpha, the jumper will be contained and/or decontaminated

If jumpers are cut, they are cut by hydraulic shears or a portable band saw within the pit The pieces are contained before they are removed from the pit

Pressure Testing Lines

A pressure test assembly is installed on the line to be tested in one pit A blank with a drain is installed on the other end of the line in a separate pit Temporary and/or permanent covers are placed over the pits during the pressure test

2 Radiological Controls

- Follow TWRS ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Follow TWRS ALARACT demonstration for "Pit Access" (ALARACT 6)
- Follow TWRS ALARACT demonstration for "Packaging and Transportation of Equipment and Vehicles" (ALARACT 12)
- A splash guard will extend to the edge of the pit were it is taped or sealed
- Uniformly distributed removable contamination levels within the pit are decontaminated or fixed so that a swipe reads less than 100,000 dpm/100 cm^2 beta/gamma and 2,000 dpm/100 cm^2 alpha An approved fixative will be applied to pit surfaces if contamination levels exceed the limits stated above or as needed Note The fixative will matrix the contamination to ensure minimization of potential airborne contamination
- If a used jumper is to be removed from the pit, it is drained and a fixative is applied If removable contamination is greater than 50,000 dpm/100 cm^2 beta/gamma and/or 20 dpm/100 cm^2 alpha, the jumper will be contained and/or decontaminated
- A temporary or permanent cover is placed over the pit if the pit is ever left unattended
- Pit work will not be performed if sustained winds are >25 mph
- HPT coverage will be performed as specified in the Radiological Work Permit

3 Monitoring

- Radiological surveys of the work area as required by the work package Swipes for removalbe contamination are required
- Swipes will be taken to determine that splash guards are maintained below 50,000 dpm/100 cm^2 beta/gamma and 20 dpm/100 cm^2 alpha
- Post job survey(s)

4 Records/Documentation

- Work package
- Radiological work permit
- Radiological survey report(s)

5 Emission Pathway

- Existing passive non-point sources

6 Locations

- All TWRS facilities
- This ALARACT demonstration applies to all pits except 241-ER-152, 241-S-151, 241-UX-154, 241-TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT

ATTACHMENT B

CONTAINMENT SELECTION GUIDE (PER HNF-IP-0842, Volume VII, Section 3 1)

Some of the ALARACT Demonstrations reference the Containment Selection Guide This is contained in Attachment B for ease of operations use

> **NOTE**
>
> The copy of the Containment Selection Guide in Attachment B was current when HNF-4327, Revision 0 was issued Since the ALARACTs require use of the "latest revision" of the matrix, check HNF-IP-0842, Volume VII, Section 3 1 to ensure that the most recent version is use to implement the ALARACTs

Attachment B

Containment Selection Guide
(Attachment A of HNF-IP-0842, Volume VII, Section 3 1)

1 0 BASIS

The appropriate containment for a given task should be selected based on the fundamental concepts of contamination control and personnel safety Table A-1, "Recommended Containments for Specific Work Activities", provides a worksheet format applying the guidance contained in this section

The level of containment is broken down into four "risk" categories very low, low, moderate, and high These categories are somewhat subjective in nature and because of this, the table is a guide from which to begin the planning and evaluation process and is not intended to be the sole means of determining what level of containment should be used Other considerations should include impact of containment failure, area dose rates, waste minimization, ventilation, etc When all factors are considered, the final determination may vary from the matrix

2 0 ASSESSMENT CRITERIA

Three primary criteria are used to determine the appropriate level of containment removable contamination levels, contamination stability, and the work activity to be performed

Secondary criteria are also considered as a second check of the result to allow for common sense adjustments These other considerations should include impact of containment failure, area dose rates, waste minimization, ventilation, etc When all factors are considered, the final determination may vary from the matrix

In essence, the primary criteria are independent of the area the job takes place in, the secondary criteria customize the selection to the work area, ensuring the decision is appropriate

2 1 Removable Contamination Levels

Removable contamination is defined as radioactive material that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing, or washing The table breaks the criteria down into three distinct categories 1) less than 10 times Table 2-2 (<10,000 dpm $\beta\tau$, 200 dpm α), 2) 10 to 100 times Table 2-2 (10,000 to 100,000 dpm β-τ or 200 to 2000 dpm α), or 3) greater than 100 times Table 2-2 (>100,000 dpm β-τ, 2000 dpm α)

NOTE IF the likely contamination levels cannot be obtained from survey or historical data, THEN the most limiting category should be used

2 2 Contamination Stability

As noted above, removable contamination is defined as radioactive material that can be removed from surfaces by casual contact Stability is a qualitative assessment of how easily this transfer occurs and how easily the contamination may be transported from surface to surface or surface to air Contamination stability is broken into three categories high, medium, and low For example, contamination that, if disturbed, readily resuspends into the air would be categorized as low stability, while contamination suspended in liquid, or on a moist or oily surface, would generally be considered high stability, other contaminated surfaces would generally fall between these criteria based on surface texture, weathering, and a variety of other factors to be considered

Table A-1 Recommended Containments for Specific Work Activities

Removable Contamination Level	Contamination Stability	Operation	Containment Category
<10 times Table 2-2 6	Very Stable 4	Simple material movement 5	Very Low Risk Total = 15-20
<100 times Table 2-2 12	Moderately Stable 8	Vigorous material movement 10	Low Risk Total = 21-31
>100 times Table 2-2 18	Low Stability 12	Use of power tools in area or manual cutting, shaping or abrading of material 15	Moderate Risk Total = 32-45
		Use of low velocity power tools to cut, shape or abrade material 20	High Risk Total >45
		Use of high velocity power tools to cut, shape or abrade material 25	
___	+ ___	+ ___	= ___

Instructions Select the appropriate block from each of the first three columns Add the numbers from the appropriate block in each column and select the appropriate containment class

NOTES

1 Removable contamination level refers to the DOE Radiological Control Manual Table 2 2

2 Containment requirements may be revised up or down based on general area contamination levels or dose rates and personnel protection afforded (for example respirators ventilation engineering controls)

3 When contamination levels cannot be verified either by survey or historical data the most limiting level for contamination should be used

4 The values on the chart call for subjective analysis The Radiological Control organization is responsible for making the final determination of the level of containment This should be done in consultation with the line organization

2 3 Work Activity

Work activities are those actions which will be performed in the contaminated portion of the work area The containment selection process breaks work activities into five categories

1 Simple material movement such as walking, lifting, carrying

2 Vigorous material movement such as repackaging waste, HEPA filter manipulation, packing replacement, etc

3 Using power tools in the area or manually cutting, abrading, or shaping the material

4 Using low velocity power tools (portable band saws, electric drills operated at low speeds, etc) on the contaminated components

5 Using high velocity power tools (grinders, high-speed drills, etc) on the contaminated components

3 0 CONTAINMENT CATEGORIES

3 1 Very Low Risk

For tasks involving a very small risk of contamination spread, no specific containment beyond the administrative controls of good work practices would apply This does not preclude using containment, experience and training of the work force would be the basis for containment selection In this category, containment might be a damp rag, sleeving, an air curtain, or even a plastic bag

No health physics technician certification or work package description of the containment is routinely required

3 2 Low Risk

Tasks where the risk of contamination spread is low, but the containment device is specified Examples of devices in this category are catch containments, drip pans, bull pens, sleeving, air curtains, etc

No health physics technician certification of the containment is routinely required, but the work package describes the containment device/method

3 3 Moderate Risk

Tasks where the risk of contamination spread is moderate and containment becomes total enclosure such as heavy sleeving, glovebags, or containment tents

Health physics technician certification of the containment device is required The work package should contain a certification checklist for the appropriate style of containment

3 4 High Risk

Tasks where the risk of contamination spread is high and containment should be accomplished by ventilated tents or glovebags, used independently or in conjunction with each other

Health physics technician certification of the containment device is required The work package must contain a certification checklist (see below) for the appropriate style of containment

Containment Tent Certification Checklist

Location		Work Package #
Activity		
Check if waived *	**Check if adequate at installation**	**CRITERIA**
		1 The tent is free of tears loose seams cuts or other loss of integrity
		2 The tent is properly oriented and supported
		3 Sharp objects are properly covered to prevent inadvertent penetration of the tent
		4 Installed services use service sleeves and are taped
		5 Unused service sleeves are sealed or taped closed
		6 Radiological postings and protective clothing removal procedures are prominently posted at the entrance/exit
		7 Proper lighting is provided
		8 Doors work properly
		9 The tent seal to the component is properly made
		10 If HEPA filtered ventilation is used the system is properly installed including connections proper labeling proper flow and current efficiency test label
		11 Step-off pad(s) and clothing and waste receptacles are in place
		12 If welding grinding or burning is to be done inside or near a containment tent the affected areas are covered with flame resistant materials
		13 The inspection certification is posted on or near the containment
		14 Other
		15 Other
		16 Other

Comments ______________________________

____

____

* *Checkoffs in this column must be supported by comments and/or approval signatures If no criteria are waived or added approval signatures are not required*

Approval Health Physics______________________________

Operations______________________________

ATT-60

Glovebag Certification Checklist

Location		Work P kag #
Activity		
Check if Waived *	Check if adequate at installation	CRITERIA
		1 The glovebag is free of holes tears or defects in materials
		2 Components and surfaces inside the glovebag are covered to minimize decontamination
		3 The containment is protected from sharp objects internal and external
		4 The glovebag and installed service sleeves are properly supported
		5 The gloves are properly attached and free of cracks splits or holes
		6 The glovebag seal to the component is adequate and inside seals are used (if possible)
		7 The glovebag is properly aligned to allow access to the work
		8 If a drain is used it is located in the low point of the glovebag is unobstructed and is securely fastened to an appropriate collection system
		9 If a vacuum is used with the glovebag it is HEPA filtered and has a current efficiency test label
		10 Other
		11 Other
		12 Other

Comments ______________________________

____

____

____

* Checkoffs in this column must be supported by comments and/or approval signatures If no criteria are waived or added approval signatures are not required

Approval Health Physics ______________________________

Operations ______________________________

ATTACHMENT C

ALARACT DEMONSTRATION SIGNATURES

ATTACHMENT C

The individuals who signed the ALARACTs are designated in the below table

ALARACT DEMONSTRATIONS	TERRY KISSONG (LMHC)	CHARLES RICE (LMHC)	WILLIAM ROSS (LMHC)	WILLIAM (BILL) ADAIR (FDH)	DANA BRYSON (DOE RL)	MARK RAMSAY (DOE RL)	MICHAEL ROYACK (DOE RL)	JOHN MARTELL (WDOH)	JOHN SCHMIDT (WDOH)
ALARACT 1		X		X	X			X	X
ALARACT 2			X	X	X			X	X
ALARACT 3			X	X	X			X	X
ALARACT 4		X		X			X	X	X
ALARACT 5		X		X			X	X	X
ALARACT 6		X		X			X	X	X
ALARACT 7			X	X			X	X	X
ALARACT 8			X	X			X	X	X
ALARACT 9			X	X			X	X	X
ALARACT 10	X			X			X	X	X
ALARACT 11		X		X			X	X	X
ALARACT 12		X		X		X		X	X
ALARACT 13		X		X			X	X	X
ALARACT 14		X		X			X	X	X

ATTACHMENT 1

Radioactive Air Emissions NOC for Installation and Operation of a Waste Retrieval System in Tanks 241-AP-102 and 241-AP-104, Project W-211

(Consisting of 96 pages, including cover)

Mr J Leitch Chief
Radiation and Indoor Air Section
U S Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Mr A W Conklin, Manager
Air Emissions and Defense Waste Section
Division of Radiation Protection
Washington State Department of Health
7171 Cleanwater Lane, Bldg 5
Post Office Box 47827
Olympia Washington 98504-7827

Dear Messrs Leitch and Conklin

RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION FOR INSTALLATION AND OPERATION OF A WASTE RETRIEVAL SYSTEM IN TANKS 241-AP 102 AND 241-AP-104, PROJECT W 211

Enclosed is a copy of the subject notice of construction (NOC) and the reference document for the Tank Waste Remediation System (TWRS) As Low as Reasonably Achievable Control Technology (ALARACT) Demonstrations, HNF-4327 Rev 0, *Control of Airborne Radioactive Emissions for Frequently Performed TWRS Work Activities (ALARACT Demonstrations)* The NOC is being submitted to the U S Environmental Protection Agency (EPA), Region 10 and the Washington State Department of Health, Division of Radiation Protection for approval pursuant to Title 40, Code of Federal Regulations (CFR), Part 61 07 and Washington Administrative Code 246 247 040 With EPA's approval, this application will also provide initial start up notification pursuant to 40 CFR 61 09 (a)(1)

Approval of this NOC is requested by January 1, 2000 Approval of the NOC will allow work for installation and operation of a waste retrieval system in tanks 241-AP 102 and 241 AP-104 The activities described in this NOC are estimated to provide a potential unabated offsite total-dose equivalent to a hypothetical maximally exposed individual of 0 045 millirem (mrem) per year for construction activities and 0 042 mrem per year for operations

This correspondence involves work conducted by the U S Department of Energy, Office of River Protection (ORP) The ORP point of contact for questions on this matter is
Mr D W Bowser at 373-2566

Sincerely,

S H Wisness Director
Office of Site Services

Enclosure
NOC DOE/RL 98 14 Rev 0
ALARACT Demonstrations HNF-4327 Rev 0

Lockheed Martin Hanford Corporation
P O Box 1500
Richland WA 99352 1505

LOCKHEED MARTIN

November 19, 1999

LMHC-9958581

Mr J C Peschong, Director
Management Systems Office
U S Department of Energy S7-51
Office of River Protection
Post Office Box 550
Richland, Washington 99352

Dear Mr Peschong

CONTRACT NUMBER DE-AC06-99RL14047, RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION FOR INSTALLATION AND OPERATION OF A WASTE RETRIEVAL SYSTEM IN TANKS 241-AP-102 AND 241-AP-104, PROJECT W-211

The attached letter is to be transmitted to the Washington State Department of Health and the U S Environmental Protection Agency no later than November 24, 1999 The Lockheed Martin Hanford Corporation, River Protection Project concurs with the information provided in this letter

If there are questions or comments concerning this matter, please contact Mr D J Carrell at 372-2374

Sincerely,

E E Mayer, Director
Environment, Safety, Health
and Quality Assurance

ljt

Attachments

DOE/ORP-99-09, Rev 0

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence No
D E Clark, LMHC 373-1029	J C Peschong, ORP	LMHC 9958581

Subject CONTRACT NUMBER DE-AC06-99RL14047, RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION FOR INSTALLATION AND OPERATION OF A WASTE RETRIEVAL SYSTEM IN TANKS 241-AP-102 AND 241-AP-104, PROJECT W-211

DISTRIBUTION

Approval	Date	Name	Location	w/att
		LMHC Correspondence Control	H7-09	X
		Lockheed Martin Hanford Corporation		
		D I Allen	R2-50	
		J J Badden	S5-07	
		S D Brumley	H7-07	
X DJ Carrell	11-16-99	D J Carrell	R1-51	
X [signature]	11-16-99	D E Clark	R1-51	
		M P DeLozier	H6-08	
		M L Dexter	R1-51	X
X WT Dixon	11/18/99	W T Dixon	R3-01	
		L R Dunbar	H7-07	
		M D Ebben	H7-07	
		B G Erlandson	R1-51	
		E E Mayer	R2-50	
		M A Payne	R2-58	
		J E Van Beek	S2-48	
		R F Wood	H7-07	
		7B200 LB	R1-51	
		U S Department of Energy, Office of River Protection		
		D W Bowser	H6-60	
		J J Short	H6-60	
		Waste Management Federal Services of Hanford		
		E M Greager	G1-29	
		N A Homan	G1-29	X
		Central Files	B1-07	X
		DOE READING ROOM	H2-53	X
		HANFORD TECH LIB	P8-55	✓
		DPC	H6-08	

A 6001 538S (02/98)

DISTRIBUTION

	MSIN
U S Department of Energy, Richland Operations Office	
P J Krupin	A5-15
S H Wisness	A5 18
Public Reading Room	H2-53
U S Department of Energy, Office of River Protection	
D W Bowser	H6 60
J E Peschong	H6 60
B L Nicoll	H6-60
R T Winward	H6 60
Fluor Daniel Hanford, Inc	
R H Engelmann	G1-30
N A Homan	G1 29
J C Sonnichsen	G1 30
AOP File	G1 29
Lockheed Martin Hanford Corp , River Protection Project	
C B Bryan	R2 58
D J Carrell	R1-51
W T Dixon	R1 51
P C Miller	R1 51
L L Penn	S7 03
J E Van Beek	S2 48
Pacific Northwest National Laboratory	
Hanford Technical Library	P8 55
Lockheed Martin Services, Inc	
Central Files	B1 07
DPC	H6 08
EDMC (2)	H6 08

DISTRIBUTION

MSIN

J Leitch
United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle Washington 98101

A W Conklin
Washington State Department of Health
7171 Cleanwater Lane, Building 5
Olympia Washington 98504

R S Acselrod
Washington State Department of Health
PMB 385
2839 W Kennewick Avenue
Kennewick Washington 99336

J W Schmidt
Washington State Department of Health
PMB 385
2839 W Kennewick Avenue
Kennewick Washington 99336

Dirk A Dunning
Oregon Office of Energy
625 Marrian Street N E Suite 1
Salem OR 97301 3742

J Wilkinson
Confederated Tribes of the Umatilla Indian Nation
P O Box 638
Pendleton Oregon 97801

P Sobotta
Nez Perce Tribe
P O Box 365
Lapwai Idaho 93540

R Jim, Manager
Environmental Restoration/Waste Management Program Yakima Indian Nation
P O Box 151
Toppenish Washington 98948

Document No /Title DOE/ORP-99-09, Rev0 Page 1 of 169

Legends: Tab Divider; Blank Page; Foldout

DOCUMENT ASSEMBLY/PAGINATION SHEET

	Front	Back		Front	Back		Front	Back
1	Dist	—	26	10-1	10-2	51	APP G9	APP G10
2	Letter	—	27	10-3	10-4	52	APP Hi	APP Hii
3	Letter	—	28	11-1	11-2	53	APP H1	APP H2
4	attachment page 1	—	29	12-1	12-2	54	ATT-1	ATT-2
5	cover	—	30	13-1	13-2	55		
6	Title	RA	31	13-3	—	56		
7	iii	iv	32	14-1	14-2	57		
8	v	vi	33	APP A-i	APP A-ii	58	ATT-9	ATT-10
9	vii	viii	34	APP A-1	APP A-2	59		
10	1-1	1-2	35	APP B-i	APP Bii	60		
11	2-1	2-2	36	APP B-1	APP B 2	61		
12	2-3	2-4	37	APP Ci	APP Cii	62		
13	3-1	3-2	38	C-1	C-2	63	ATT-19	ATT-20
14	4-1	4-2	39	Di	Dii	64		
15	5-1	5-2	40	D1	D2	65		
16	6-1	6-2	41	Ei	Eii	66		
17	6-3	6-4	42	E1	E2	67		
18	6-5	6-6	43	Fi	Fii	68	ATT-29	ATT-30
19	6-7	6-8	44	F1	F2	69		
20	6-9	6-10	45	F3	F4	70		
21	7-1	7-2	46	Gi	Gii	71		
22	8-1	8-2	47	G1	G2	72		
23	8-3	8-4	48	G3	G4	73		
24	8-5	—	49	G5	G6	74		
25	9-1	9-2	50	APP G7	APP G8	75	ATT-62	ATT-63

Remarks

Instructions Fill correct page number (including blank page) in the proper box, according to the order in which you want the final copies assembled