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**Comprehensive Remedial
Investigation/Feasibility Study for the Test
Area North Operable Unit 1-10 at the Idaho
National Engineering and Environmental
Laboratory**



Idaho National Engineering Laboratory

U.S. Department of Energy • Idaho Operations Office



**Comprehensive Remedial Investigation/Feasibility
Study for the Test Area North Operable Unit 1-10 at
the Idaho National Engineering and Environmental
Laboratory**

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Study for the Test Area North Operable
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Date

EXECUTIVE SUMMARY

The Idaho National Engineering and Environmental Laboratory (INEEL) was listed on the National Priorities List of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 in November 1989. In response to this listing, the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the State of Idaho negotiated a Federal Facility Agreement/Consent Order (FFA/CO) and Action Plan. This agreement described how the DOE, the EPA, and the State of Idaho would implement a remedial investigation/feasibility study (RI/FS) to characterize the nature and extent of the contamination and to evaluate to need to implement response actions.

Test Area North (TAN) is included as Waste Area Group (WAG) 1 of the 10 INEL WAGs identified in the FFA/CO. Operable Unit (OU) 1-10 is defined as the "WAG 1 Comprehensive RI/FS, including the Technical Services Facility (TSF) Paint Shop Floor Drain Leach Field (West of TAN-636)" in the FFA/CO. The remedial investigation/baseline risk assessment (RI/BRA) is designed to evaluate site characterization investigations conducted at WAG 1 to determine the cumulative and comprehensive risk posed to human health and the environment by past releases. The scope of the OU 1-10 RI/FS was defined in the *Work Plan for Waste Area Group 1 Operable Unit 1-10 Comprehensive Remedial Investigation/Feasibility Study* (Lewis et al. 1996).

Sites in the 10 WAG 1 OUs are classified into the following categories: remedial investigation (RI) sites, interim action (IA) sites, Track 2 sites, Track 1 sites, "no action" sites, and new and unevaluated sites (i.e., those sites that were not listed in the FFA/CO). To date one RI, four Track 2, and 43 Track 1 investigations have been performed at WAG 1. A Record of Decision (ROD) has been signed for OU 1-07B (TSF-05, Injection Well, and TSF-23, TSF Drinking Water Potential Contamination) and post-ROD remedial action is in progress. For this reason only the residual risk (post remediation contaminant levels) were included in the comprehensive BRA. An interim remedial action has been completed for OU 1-07A (TSF-05 and TSF-23). In addition, a surficial radiological soil contamination evaluation has been conducted at TAN under OU 10-06 (Jessmore et al. 1996). These investigations included evaluations of contaminated ponds and pits, aboveground and belowground storage tanks, acid and mercury spills, sewer and radioactive waste disposal systems, injection wells, and miscellaneous surface spills. The documents detailing these investigations, together with the OU 1-10 RI, were used in the development of the baseline risk assessment (BRA) detailed in this document.

The objectives of the WAG 1 Comprehensive RI/BRA are the following:

- To determine or define the nature and the extent of contamination associated with WAG 1 sites

- To determine the current and potential future cumulative and comprehensive risk to human health and the environment posed by WAG 1 sites.

To support the OU 1-10 RI/BRA, sampling was conducted at the Water Reactor Research Test Reactor (WRRTF) and the WRRTF injection well to fill the data gaps identified in the OU 1-10 RI/FS Work Plan. Additional data gaps identified in the RI/FS Work Plan were filled through evaluation of existing data to better characterize risk.

The BRA evaluated the potential adverse health effects on human and ecological receptors for both a current and future land-use scenario. The BRA considered risks associated with the “no action” alternative, and only evaluated contaminants that have been released to the environment by past disposal practices and incidental releases.

The results of the BRA indicate that, of the 94 TAN release sites, there are four WAG 1 release sites (the TSF-06 contaminated soil area, the TSF-07 disposal pond, the TSF-09/18 V-tank soil contamination and the TSF-26 PM-2A tank soil contamination area) that potentially pose risks in excess of $1E-04$ to future residents, and two release sites (the TSF-07 disposal pond and the TSF-08 mercury spill) that potentially produce hazard indices in excess of 1.0 for future residents. In addition, there are three sites (the WRRTF-01 burn pits, the TSF-03 burn pit, and the WRRTF-13 fuel oil spill) that contain contaminants at concentrations greater than regulatory limits. Finally, four currently operational co-located facilities [the Radioactive Parts Security Storage Area Pads, the TAN Hot Shop Facility, and the Radioactive Liquid Waste Treatment and Transfer/Storage buildings (TAN-616 and TAN-666)] have been identified as having the potential for producing releases at some point in the future.

The results of the WAG 1 ERA indicate that of the 94 TAN release sites there are nine WAG 1 release sites (LOFT-02, LOFT-07, TSF-03, TSF-07, TSF-08, TSF-10, WRRTF-01, WRRTF-03, and WRRTF-13) that produce potentially unacceptable risks for ecological receptors due to nonradionuclides.

The risk management considerations identified from the performance of the OU 1-10 BRA are based on the site and contaminant screening evaluations, nature and extent of contaminant evaluations, and the human health risk assessment described in Sections 3 through 6. Although risks to ecological receptors have been evaluated as part of this BRA, no risk management considerations were developed due to the inability to address comprehensive ecological risk at the WAG level. However, site wide data is currently being collected to support the WAG 10 ecological risk assessment and will be incorporated as appropriate in the OU 1-10 Feasibility Study (FS) phase.

This document presents the results of the RI/FS phase of the OU 1-10 Comprehensive RI/FS. A discussion of the INEL and TAN’s geographical setting, operational history, and physical characteristics is provided. A summary of the nature and extent of contamination currently present at TAN and conceptual

site model (CSM) presented. The BRA methodology, exposure scenarios, and results and conclusions are stated. Appendices contain OU 1-10 site characterization analytical data and other information to support the human health and ecological risk evaluation

The results of this RI/BRA were used in the preparation of the OU 1-10 Feasibility Study in respect to identifying those sites which pose unacceptable risk to human health and the environment and consequently requiring remedial action, contaminants of concern at these sites, and estimated volumes of media that will require remedial action. The environmental data collected previously and as part of this RI/BRA, although without some level of uncertainty, are considered to be adequate to support preparation of the Feasibility Study.

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ACRONYMS

ABS	absorption through skin
AEC	U.S. Atomic Energy Commission
AF	adjustment factor
AMWTF	Advanced Mixed Waste Treatment Facility
ANP	Aircraft Nuclear Propulsion
ARA	Auxiliary Reactor Area
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
ATSDR	Agency for Toxic Substance Disease Registry
AWQC	Ambient Water Quality Criteria
AWTF	Advanced Waste Treatment Facility
BAF	bioaccumulation factor
B(a)P	benzo(a)pyrene
BBS	breeding bird survey
bgs	below ground surface
BLM	Bureau of Land Management
BRA	Baseline Risk Assessment
C2	Category 2
CDC	Conservation Data Center
CDD	Polychlorinated dibenzodioxin
CDF	polychlorinated dibenofurans
CEC	cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEP	Catalytic Extraction Process

CF	concentration factor
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CMP	corrugated metal pipe
CoC	chain-of-custody
COC	contaminant of concern
COCA	Consent Order and Compliance Agreement
COLIWASA	composite liquid waste sampler
COPC	contaminant of potential concern
CRAVE	Carcinogen Risk Assessment Verification Endeavor
CRQL	contract-required quantification limit
CSM	conceptual site model
CTF	Contained Test Facility
D&D	decontamination and dismantlement
DAR	Document Action Request
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy-Idaho Operations Office
DQO	data quality objective
EBOR	Experimental Beryllium Oxide Reactor
EBSL	ecologically based screening level
ECAO	Environmental Criteria and Assessment Office
ED	exposure duration
EDF	Engineering Design File
EDTA	ethylenediaminetetraacetic acid

EPA	Environmental Protection Agency
ER	Environmental Restoration
ERA	ecological risk assessment
ERDF	Environmental Restoration Disposal Facility
ERIS	Environmental Restoration Information System
ER-SOP	Environmental Restoration Standard Operating Procedure
ESRP	Eastern Snake River Plain
FFA/CO	Federal Facilities Agreement/Consent Order
FS	feasibility study
FSP	Field Sampling Plan
G&A	general and administrative
GIS	Geographic Information System
GRA	general response actions
GWTF	
ha	hectare
HEAST	Health Effects Assessment Summary Tables
HEPA	high efficiency particulate air
HI	hazard index
HIC	high-integrity container
HQ	hazard quotient
HTRE	Heat Transfer Reactor Experiment
IAEA	International Atomic Energy Agency
ICPP	Idaho Chemical Processing Plant
ICRP	International Committee on Radiological Protection
IDAPA	Idaho Air Pollution Act

IDEMS	Integrated Data Environmental Management System
IDHW	Idaho Department of Health and Welfare
IET	Initial Engine Test
INEEL	Idaho National Engineering and Environmental Laboratory
INEL	Idaho National Engineering Laboratory
INPS	Idaho Native Plant Society
INWMIS	Industrial Non-radioactive Waste Management Information System
IR	ingestion rate
IRIS	Integrated Risk Information System
keV	kiloelectron volt
L&V	Limitation and Validation
LMITCO	Lockheed Martin Idaho Technologies Company
LOAEL	lowest-observed-adverse-effect level
LOFT	Loss-of-Fluid Test Facility
MCLs	maximum contaminant levels
MCP	management control procedure
MeV	megaelectron volts
MF	modifying factor
MS	matrix spike
MSD	matrix spike duplicate
NaI	sodium iodine
NAS	National Academy of Science
NCP	National Contingency Plan
NESHAP	National Emission Standard for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration

NOAEL	no-observed-adverse-effect level
NPV	net present value
NRC	Nuclear Regulatory Commission
NRTS	National Reactor Testing Station
OU	Operable Unit
ORNL	Oak Ridge National Laboratory
PAH	polynuclear aromatic hydrocarbon
PBF	Power Burst Facility
PCB	polychlorinated biphenyl
PEW	Process Equipment Waste
PPE	personal protective equipment
PRG	primary remediation goal
PUF	plant uptake factor
QA/QC	Quality Assurance/Quality Control
QAPjP	Quality Assurance Project Plan
QC	Quality Control
QCE	quantified critical exposure
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RESL	Radiological and Environmental Sciences Laboratory
RESP	Radiological Environmental Surveillance Program
RfC	reference concentration

RfD	reference dose
RI	Remedial Investigation
RI/BRA	Remedial Investigation/Baseline Risk Assessment
RI/FS	Remedial Investigation/Feasibility Study
RML	Radiological Measurement Laboratory
RO	reverse osmosis
ROD	Record of Decision
RPSSA	Radioactive Parts Security Storage Area
RRWAC	Reusable Property, Recyclable Materials, and Waste Acceptance Criteria
RWMC	Radioactive Waste Management Complex
RWP	radiation work permit
SARA	Superfund Amendments and Reauthorization Act of 1986
SDGA	screening and data gap analysis
SESP	Site Environmental Surveillance Program
SF	slope factor
SLERA	screening level ecological risk assessment
SLQ	screening level quotient
SMC	Specific Manufacturing Capability
SMO	Sample Management Office
SNAPTRAN	System for Nuclear Auxiliary Power Transients Program
SOP	standard operating procedure
SOW	statement of work
SRP	Snake River Plain
SRPA	Snake River Plain Aquifer
STP	Sewage Treatment Plant

SUF	site use factor
SVOC	semivolatile organic compound
T/E	threatened or endangered
TAN	Test Area North
TANO	Test Area North Operations
TAPs	toxic air pollutants
TBC	to-be-considered
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TIC	tentatively identified compound
TMI-2	Three Mile Island Unit 2
TOC	total organic carbon
TOX	total organic halogens
TPH	total petroleum hydrocarbon
TPR	technical procedure
TRA	Test Reactor Area
TRPH	total recoverable petroleum hydrocarbon
TRU	transuranic
TRV	toxicity reference values
TSCA	Toxic Substances Control Act
TSF	Technical Services Facility
UCL	upper confidence level
UF	uncertainty factor
USC	United States Code
USFS	United States Forest Service

USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
UST	underground storage tank
UTL	upper tolerance level
VOA	volatile organic analysis
VOC	volatile organic compound
WAG	Waste Area Group
WERF	Waste Experimental Reduction Facility
WIPP	Waste Isolation Pilot Plant
WRRTF	Water Reactor Research Test Facility
WWP	Warm Waste Pond