

1 **3. INEEL TREATMENT FACILITIES**

2 This section discusses the existing, planned, or commercial facilities, or other off-Site facilities
3 for the treatment of mixed waste. Mixed waste streams to be treated in these facilities are discussed in
4 Section 4, the schedules for design and operation of these facilities are included in Section 5 of this STP,
5 and the identification and relationship of waste streams to treatment facilities are included in Section 6.

6 **3.1 INEEL Treatment Facility Status**

7 Table 3-1 identifies each of the INEEL facilities designated to treat mixed waste. The table
8 provides basic design information and the status for each of the treatment facilities along with the
9 acceptable expected radionuclide-handling capabilities. The table also includes the status of facilities,
10 based on Life Cycle Asset Management (LCAM), made pursuant to DOE-ID Order 430.1 A:

- 11 • **Existing, Operating, Treating Mixed Waste**—Existing system is currently operating and
12 treating mixed wastes.
- 13 • **Existing, Planned to Treat Mixed Waste**—Existing system is not currently treating mixed
14 waste streams. The system may be treating other waste (low-level, hazardous, sanitary, etc.) or
15 may not be operating at this time but has begun cold testing.
- 16 • **Planned, DOE-Approved**—DOE-HQ has approved the mission need for the facility; the facility
17 has, at a minimum, begun design but has not yet reached the construction phase.
- 18 • **Planned, DOE-Unapproved**—Some planning has been initiated (e.g., engineering/feasibility
19 studies, functional design criteria) but has not yet received the approval of the mission need for
20 the facility.

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1 Table 3-1. INEEL Treatment Facilities.

Facility ID	Facility	System	Handling *	H L W	T R U	L L W	A L P H	Facility Status
IN-S150	Advanced Mixed Waste Treatment Project	Private Unit	CH	N	Y	N	Y	Existing, Operating
IN-S033	INTC Debris Treatment and Containment	Decontamination - Water Washing System	B	Y	Y	Y	Y	Existing, operating, treating mixed waste
IN-S030	INTC HEPA Filter Leaching System (CPP-659)	Extraction - HEPA Filter Leach	B	Y	Y	Y	Y	Existing, operating, treating mixed waste
IN-S152A	INTEC SBW Treatment	SBW Treatment Facility	B	N	Y	Y	Y	Planned, DOE Unapproved
IN-S152B	INTEC Calcine Disposition	Calcine Disposition Facility	B	Y	Y	Y	Y	Planned, DOE Unapproved
IN-S028	New Waste Calcining Facility (NWCF-CPP659)	Calcination	B	Y	Y	Y	Y	Existing, undergoing closure
AW-S007	Remote Treatment Project (ANL-W)	Sort, segregate, open/melt/drain, deactivation, neutralization, water reaction, stabilization	RH	N	Y	Y	Y	Planned, DOE-approved
AW-S037	Sodium Process Facility (ANL-W)	Water Reaction (Na to NaOH)/Wiped-Film Evaporator (NaOH to Na2CO3)	CH	N	N	Y	N	Existing, operating, treating mixed waste
AW-S038	Sodium Component Maintenance Shop (SCMS)	Deactivation, Open/Melt/Drain, Neutralization, Stabilization, Water Reaction	CH	N	Y	Y	Y	Existing, operating, treating mixed waste

Handling Key: RH=remote handled
 CH=contact handled
 B=both

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3.2 Description of Facilities Identified to Treat the MLLW at the INEEL

Facilities identified for MLLW treatment and the respective technologies employed at each are described in the sections below.

3.2.1 Commercial Treatment Facilities

3.2.1.1 Waste Treatment Vendors and Treatment Capabilities.

- **Perma-Fix Environmental Services, Inc. (PESI)**—PESI owns and operates three licensed and permitted mixed waste treatment facilities. All three facilities operate under an NRC Agreement State Radioactive Materials License and a RCRA Part B permit. Each PESI facility has a variety of processes for the treatment of a wide range of mixed waste streams; however, final disposal occurs at Envirocare.
 - The PESI facility in Gainesville has unique capabilities for the treatment of problematic mixed waste streams. The facility is licensed and permitted to treat a variety of characteristic and listed mixed waste, soil, liquid, sludge, and debris to LDR standards.
 - The PESI/Diversified Scientific Services, Inc. (DSSI) facility is located in Kingston, TN. It employs thermal and non-thermal treatment technologies to treat high-organic (TOC) mixed waste streams. Wastes are combusted in a licensed industrial boiler to ensure that the contaminants in the waste are destroyed or bound to meet LDR standards.
 - The PESI/Materials and Energy Corporation facility is located in Oak Ridge, TN. The facility has the capability to treat a wide variety of mixed wastes. Six primary treatment processes (stabilization/solidification, combustion, macroencapsulation, direct chemical oxidation, PCB treatment, and mercury treatment) have been installed to treat both organic and inorganic mixed waste to meet the LDR criteria.
- **Waste Control Specialists LLC (WCS)**—WCS was formed in November 1995 and completed construction of the initial phase of its facility in Andrews, Texas, for the processing, treatment, storage, and disposal of certain hazardous (RCRA), toxic (TSCA), and low-level radioactive wastes. WCS holds a Low-level Radioactive Waste Treatment, Processing & Storage License issued by the Texas Department of Health. This license allows for the treatment, processing, and storage of low-level radioactive wastes. WCS holds an Industrial Solid Waste and Hazardous Waste Storage,

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1 Processing, and Disposal (RCRA) permit authorizing the treatment, storage, and land disposal of all
2 classifications of RCRA wastes. WCS is authorized by the EPA to store and dispose of TSCA waste.
3 WCS has also received CERCLA Offsite Rule Approval from the EPA. WCS offers treatment of
4 mixed waste by stabilization; however, it routinely utilizes outside technology vendors in situations
5 where typical solidification/oxidation technologies are not adequate.

- 6 • **Envirocare of Utah, Inc.**—Envirocare of Utah, Inc. (Envirocare) operates a treatment, storage and
7 disposal facility in Clive, Utah. Envirocare’s facility has been in operation since 1988. Envirocare
8 operates under an NRC Agreement State Radioactive Materials License and a RCRA Part B permit.
9 Envirocare has also received CERCLA Offsite Rule Approval from the EPA. Envirocare accepts
10 NORM, low-level, and low-level mixed waste for disposal. Treatment facilities are also in operation
11 for the RCRA treatment of solid and liquid mixed low-level waste prior to disposal. Current mixed
12 waste treatment technologies include stabilization, reduction/oxidation, deactivation, chemical
13 fixation, neutralization, macroencapsulation, and microencapsulation. Thermal treatment capabilities
14 are anticipated in the near future. Examples of waste routinely managed for treatment include soil,
15 concrete, sludge, resins, personal protective equipment (PPE), lead solids, ash, and building debris.

- 16 • **The TSCA Incinerator (TSCAI)**—The TSCAI is a rotary kiln incinerator with a secondary
17 combustion chamber that treats liquid and solid polychlorinated biphenyl (PCB), hazardous, and
18 low-level mixed radioactive wastes. These wastes are generated by operations at the Oak Ridge East
19 Tennessee Technology Park, the Oak Ridge Y-12 Plant, the Oak Ridge National Laboratory, and
20 other DOE off-Site facilities. The TSCAI is permitted to accept and treat PCB mixed waste, mixed
21 waste, and PCB low-level radioactive waste. Acceptable waste matrices include, oils, aqueous and
22 organic liquids, combustible debris, spent activated carbon, soils and absorbents, and sludge.

23
3.2.2 Debris Treatment and Containment Storage Building

24 The Debris Treatment and Containment Storage Building is a RCRA-permitted treatment unit
25 that comprises decontamination cubicles, a spray booth, a decontamination cell, and a low-level
26 decontamination room. Several treatment technologies are currently used to treat debris in accordance
27 with the RCRA Debris Rule (40 CFR 268.45 [alternative treatment standards]). These treatment
28 technologies include water washing, chemical washing, high-pressure water and steam sprays, and
29 ultrasonic cleaning.

1 Currently, the Debris Treatment and Containment Storage Building has been modified to provide
2 greater flexibility for treatment options and capabilities. These modifications will provide treatment by
3 liquid abrasive and/or CO₂ blasting and bulk washing.

4 **3.2.3 High-Efficiency Particulate Air Filter Leach System**

5 Contaminated high-efficiency particulate air (HEPA) filters will be treated in the
6 RCRA-permitted HEPA Filter Leach System, which uses chemical extraction to remove radionuclides
7 and other hazardous constituents from used HEPA filters. This system can treat both MLLW and
8 transuranic-contaminated waste. After leaching, the filters should be ready for packaging for LLW
9 disposal. The leachate generated by HEPA filter leaching will be managed in the Idaho Nuclear
10 Technology and Engineering Center's (INTEC's) liquid radioactive waste management system (process
11 equipment waste [PEW], liquid effluent treatment and disposal [LET&D], and INTEC Tank Farm).

12 **3.2.4 Sodium Process Facility**

13 The Sodium Process Facility (SPF) provides treatment for bulk MLLW sodium (Na) and
14 sodium-potassium (NaK) eutectic.

15 The SPF is located at Argonne National-West (ANL-W), metallic both Na (radioactive and
16 nonradioactive) require conversion to sodium hydroxide (NaOH).

17 The primary treatment process used at SPF to convert Na and NaK into a >69 wt% hydroxide
18 solution is water reaction where water is combined with Na and NaK in reaction vessel to produce a
19 hydroxide (NaOH and/or KOH) solution.

20 The hydroxide solution is delivered to the drum fill station through a caustic transfer line, where
21 71-gal square drums are filled. After filling, the drums are placed on pallets and remain in regulated
22 storage until the hydroxide solution solidifies. After solidification occurs, the drums are no longer
23 regulated by HWMA/RCRA storage requirements. The drums are shipped to an appropriate disposal
24 facility as low-level radioactive waste.

25 **3.2.5 Off-Site DOE Treatment Facilities**

26 The DOE off-Site facility currently identified as a preferred treatment option for INEEL waste
27 streams is the TSCAI at Oak Ridge, Tennessee.

1 **3.2.6 Sodium Components Maintenance Shop**

2 The Sodium Components Maintenance Shop (SCMS) is an existing, operating mixed waste
3 treatment facility located at ANL-W on the INEEL. The SCMS has been used for many years to cleanse
4 sodium (Na) and sodium potassium alloy (NaK) contaminated operational components associated with
5 the EBR-II reactor and now is permitted to treat mixed waste.

6 The SCMS is a unique facility at the INEEL that is capable of treating and storing uniquely
7 configured containers of ignitable, corrosive, reactive, and toxic metal-contaminated mixed waste. The
8 SCMS employs a water wash (reaction) vessel, caustic carbonation system, neutralization tank, and
9 stabilization unit. Treatment technologies available at SCMS include deactivation, water reaction,
10 neutralization, open/melt/drain, repackaging, and stabilization.

11 **3.3 Description of Facilities Required to Treat the Mixed**
12 **Transuranic-Contaminated Waste at the INEEL**

13 Mixed transuranic (MTRU) waste is mixed waste that contains more than 100 nCi of
14 alpha-emitting transuranic isotopes per gram of waste with half-lives greater than 20 years. Alpha-MLLW
15 (α -MLLW) contains between 10 and 100 nCi per gram of waste of transuranic isotopes with half-lives
16 greater than 20 years. DOE manages α -MLLW as MTRU waste and plans to treat or repackage all
17 transuranic-contaminated waste (both MTRU and α -MLLW) for disposal at the Waste Isolation Pilot
18 Plant (WIPP). The proposed INEEL facilities to treat mixed transuranic-contaminated waste include the
19 Remote Treatment Project (RTP) and the Advanced Mixed Waste Treatment Project (AMWTP).

20 DOE is currently evaluating capabilities needed to achieve disposal of remote-handled (RH)
21 MTRU waste that is currently stored at the Transuranic Storage Area. Options include the use of existing
22 or modified INEEL facilities, the RTP, or off-Site facilities. The facility will be chosen based on an
23 alternatives evaluation that will be driven by the WIPP final RH TRU waste acceptance criteria (WAC),
24 once approved. Some of the MTRU and α -MLLW waste also contain PCBs, regulated under the TSCA.
25 DOE is reviewing options for addressing TSCA requirements for disposal at the WIPP in the next
26 revision to the WIPP WAC.

1 **3.3.1 Remote Treatment Project**

2 The RTP is a DOE planned, approved INEEL treatment facility designed to receive, sort,
3 characterize, treat, and repackage RH transuranic, MTRU, and some MLLW waste. The essential features
4 of the RTP include an air atmosphere hot cell with 13 workstations, a hot repair area with access into the
5 hot cell, waste cask-handling capabilities including the 72B cask, a nondestructive analysis cell, and
6 direct linkage with HFEF via a cask tunnel. RH packages that are not cask compatible will enter the RTP
7 cell through the hot repair area.

8 The waste handling equipment currently identified for installation at RTP includes a container
9 disassembly and waste-sizing station, an automated waste sorting and compaction station, a sodium
10 removal station, an induction furnace, a HEPA-filtered preparation station, and a waste repackaging
11 station.

12 The RTP has a DOE-approved Mission Need Statement, which constitutes endorsement of the
13 RTP project need, project objectives, management approach, and preliminary acquisition and
14 environmental strategies. The schedule milestones for the RTP are included in Section 5, "INEEL
15 Treatment Facility Schedules."

16 **3.3.2 Advanced Mixed Waste Treatment Project**

17 The AMWTP has the ultimate goal of treating Transuranic Storage Area (TSA) waste to produce
18 final waste forms that are certified for disposal at the WIPP in New Mexico. The AMWTP is designed to
19 process approximately 65,000 m³ of primarily alpha low-level waste and transuranic contact-handled
20 (CH) mixed waste and radioactive waste only from the TSA, plus an additional 20,000 m³ of waste
21 (similar in content to the 65,000 m³) during the first 13 years of operations. The TSA-stored waste slated
22 for the AMWTP waste management units is retrieved from storage, characterized for storage, treatment or
23 direct shipment, stored (if necessary), treated (as required), packaged, and certified for disposal at WIPP.

24 **3.4 Description of Facilities Required to Treat Waste Associated With**
25 **Reprocessing at the INEEL**

26 High-level waste (HLW) is highly radioactive waste material resulting from the reprocessing of
27 spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived
28 from such liquid waste that contains fission products in sufficient concentrations. The INEEL currently

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1 manages both calcine solids and sodium-bearing waste (SBW). The calcine solids are considered to be
2 HLW. SBW was the subject of an in process Waste Incidental to Reprocessing (WIR) determination that
3 was being prepared in accordance with DOE Order 435.1. The WIR process under DOE Order 435.1 is
4 the subject of litigation. The environmental impacts of alternative treatment and disposal options for this
5 waste (as either HLW or TRU) were analyzed in the Idaho High-Level Waste & Facilities Disposition,
6 Final Environmental Impact Statement (DOE/EIS-0287; September 2002).

7 The current plan for the SBW at INTEC is pretreatment in the High-Level Liquid Waste
8 Evaporator and final treatment in the SBW Treatment Facility followed by disposal at an off-Site facility.

9 The current treatment plan for calcine solids is a Calcine Disposition Facility that will include, at
10 a minimum, retrieval from the bin sets and packaging capabilities. Minimal treatment may be required
11 pending the WAC for the disposal facility. The packaged calcine will be stored on-Site pending shipment
12 to a deep geological repository for disposal.

13 In the Settlement Agreement and Consent Order issued by the Court on October 17, 1995, in the
14 actions *Public Service Co. of Colorado v. Batt*, No. CV 91-0035-S-EJL (D.Id.) and *United States v. Batt*,
15 No. CV-91-0054-S-EJL (D.Id.), the DOE agreed to accelerate efforts to evaluate alternatives for the
16 treatment of calcined waste. There are several activities identified in the Settlement Agreement related to
17 the treatment of calcined waste. The activities that will be performed as a result of the Settlement
18 Agreement will be coordinated and incorporated into the schedules for HLW mixed waste treatment in
19 Section 5, as appropriate, and be consistent with the Settlement Agreement milestones.

20 3.4.1 Calcine Disposition Facility

21 The Calcine Disposition Facility proposed for processing calcine solids at INTEC into a form
22 suitable for permanent disposal will be consistent with the proposed action in the Idaho High-Level Waste
23 & Facilities Disposition Final Environmental Impact Statement published in September 2002 (DOE/EIS-
24 0287). The steps in the proposed action include:

- 25 • Prepare the mixed HLW calcine solids so they will be suitable for disposal in a repository
- 26 • Treat and dispose of associated radioactive wastes
- 27 • Provide safe storage of HLW calcine destined for a repository

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- 1 • Provide the capabilities for retrieval, packaging, and shipment of calcine solids from the Calcined
2 Solids Storage Facility.

3 3.4.2 SBW Treatment Facility

4 The SBW Treatment Facility is proposed for processing liquids and associated solids (SBW) at
5 INTEC into solid forms suitable for permanent disposal and will also be consistent with the Idaho
6 High-Level Waste & Facilities Disposition Final Environmental Impact Statement published in
7 September 2002 (DOE/EIS-0287). The steps for the proposed action will be the same as those for the
8 Calcine Disposition Facility. These schedules are found in Section 5.