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Plan

Sodium Components Maintenance Shop Site Treatment Plan Waste Backlog Acceleration

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Sodium Components Maintenance Shop Site Treatment Plan Waste Backlog Acceleration

PLN-4588

Project File No. 31470

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1. INTRODUCTION

This plan was developed in accordance with fiscal year 2014 program guidance to finalize a strategy for accelerating the disposition of the Idaho National Laboratory (INL) contact handled (CH) mixed low-level waste (MLLW) backlog inventory. In order to be dispositioned, CH MLLW must be treated at a permitted treatment facility prior to being disposed of in a permitted radioactive waste disposal facility. For any CH MLLW in storage at the INL longer than one year, disposition must be conducted in accordance with the INL Site Treatment Plan (STP) which is a consent order between the Department of Energy (DOE) and the Idaho Department of Environmental Quality (IDEQ).

The current revision of the STP identifies a CH MLLW backlog inventory assigned to the Materials and Fuel Complex (MFC) Sodium Components and Maintenance Shop (SCMS) for treatment. That inventory includes 101 waste items (boxes, drums, and free standing components) stored in permitted storage facilities at MFC. The list of items is provided in Appendix A. While the inventory is currently assigned to be treated in SCMS, the STP can be modified to reassign the backlog inventory to a different facility or capability. Any modification of the STP would have to be approved by the IDEQ. It is anticipated that the IDEQ would approve any reassignment of the backlog to another facility or capability that meets applicable regulatory requirements and accelerates disposition.

This plan identifies a preferred alternative for accelerating the disposition of the backlog inventory assigned to SCMS in the STP. Treating the CH MLLW backlog in SCMS without acceleration is considered the base case in the evaluation of alternatives. Selection of the preferred alternative was based on several factors including how fast the backlog could be dispositioned, total life-cycle cost savings, and which INL capabilities associated with waste disposition should be retained, expanded, or retired with respect to the enduring mission of the INL. This plan also provides the key activities, preliminary cost estimates, and high-level schedule that are required to implement the preferred alternative. The analysis and recommendations in this plan are applicable only to the CH MLLW backlog inventory assigned to SCMS in the STP.

1.1 Background

1.1.1 Regulatory Commitment

The INL STP and Consent Order (CO) is the official binding agreement between the IDEQ and the DOE regarding how the INL site will manage the generation, storage, treatment, and disposal of mixed waste (waste that is both hazardous in accordance with the Resource Conservation and Recovery Act [RCRA] and radioactive) in accordance with the requirements of the 1992 Federal Facility Compliance Act. The STP identifies the wastes streams, milestones, and planning dates for treating or developing the treatment capacity necessary to treat the mixed waste subject to the plan. Continued progress in treating and dispositioning of this waste is critical to DOE's relationship with the state of Idaho and their support of new and ongoing programs at INL. Failure to meet established milestones could result in potential fines and penalties for violations of the RCRA.

The IDEQ must approve any proposed revisions to the INL STP. DOE submits an annual report that provides the status of DOE's progress in treating and developing treatment capacity for wastes identified in the INL STP. The STP was originally approved in 1995, and revisions and updates have been submitted and approved each year. The most recent version of the STP was approved by IDEQ in November 2013.

The STP applies to all mixed waste at the INL including CH mixed transuranic waste (MTRU), remote handled (RH) MTRU waste, high-level waste, RH MLLW, and CH MLLW. The analysis and recommendations identified in this plan are applicable only to the CH MLLW backlog inventory assigned to SCMS in the STP.

The STP identifies the minimum volume of CH MLLW backlog that must be treated in SCMS for the next three fiscal years. Per the November 2013 STP revision, the INL must treat a minimum of 2 cubic meters in FY 2014, and a minimum of 4 cubic meters combined in FY 2015 and FY 2016. Since the STP was approved in 1995, SCMS has been required to treat a minimum of 2 cubic meters each year.

1.1.2 Current Waste Backlog, Treatment Capabilities and Treatment Status

The CH MLLW backlog inventory assigned to SCMS is defined in the STP as waste stream numbers CH-ANL-179, CH-ANL-180CH, CH-ANL-182CH, CH-ANL-506, and CH-ANL-722. As of December 19, 2013, the inventory is comprised of 101 items (boxes, drums, and free standing components) that have a total volume of approximately 32 cubic meters. The waste items range in size and configuration from small paint cans to large Experimental Breeder Reactor-II (EBR-II) sodium traps. The waste includes contaminated piping, reactor tools, pumps, valves, vapor traps, and other debris that was generated from the decommissioning of EBR-II and other various INL projects. Based on the historic treatment rate of 2 cubic meters per year, the current backlog inventory assigned to SCMS in the STP would not be dispositioned until FY 2029.

The SCMS backlog can be segregated into six subcategories based on the configuration and/or waste type. Subcategories and associated volume and containers are as follows:

- Small or sizable components that should be compatible with current treatment equipment – 5.5 m^3 (33 containers)
- Difficult or large components that are not compatible with current treatment equipment – 12.8 m^3 (26 containers)
- Bulk contaminated sodium that will require additional handling and treatment equipment – 2.6 m^3 (9 containers)
- Sodium potassium allow (NaK) contaminated components – 2.0 m^3 (23 containers)
- Miscellaneous contaminated alkali metals: lithium hydride, lithium chloride, potassium chloride – 6.1 m^3 (5 containers)
- Tin bismuth alloy with sodium aresol contamination – 2.5 m^3 (5 containers).

SCMS is a RCRA-permitted treatment and storage facility located in the northwest corner of MFC. During EBR-II operation, SCMS was used to clean sodium and sodium-potassium alloy (NaK)-contaminated components and was equipped with numerous treatment capabilities. Uniquely configured containers of ignitable, corrosive, reactive, and toxic metal-contaminated CH MLLW can be treated and stored at SCMS.

Today SCMS provides two distinct programmatic and regulatory compliance functions. The first is a radiological control work tent that provides MFC the capability to open containers of radioactive waste for inspection and, usually, subsequent waste management activities such as sizing or repackaging. Virtually all CH MLLW backlog containers being treated under the STP have been or will be opened in the SCMS tent. After backlog container contents are inspected, the waste is either sized and transferred to the SCMS water wash vessel for treatment, or repackaged for shipment to an off-site treatment facility. The work tent is also used for characterizing or repackaging radioactive waste that is not subject to the

STP. The work tent is the best location at MFC to inspect, size, characterize, and repackage CH contaminated material and waste. The work tent provides a capability at MFC that must be maintained (at SCMS or another RCRA permitted area) after the SCMS STP backlog inventory has been dispositioned. The work tent is considered an INL capability that supports the enduring mission of the INL.

The second function SCMS provides is permitted mixed waste treatment. The SCMS employs a water wash (reaction) vessel, caustic carbonation system, neutralization, and stabilization unit. Treatment technologies permitted at SCMS include deactivation, water reaction, neutralization, open/melt/drain, repackaging, and stabilization capabilities. While INL has been successfully treating smaller components by sizing and manually positioning items into the reaction vessel for treatment, capabilities are not sufficient for treating the larger, more difficult components in the existing tent and reaction vessel. Continued treatment of the waste backlog at SCMS will require an investment in facility modifications, safety equipment upgrades, and installation of a new alkali metal melt, drain, and transfer system.

1.2 Treatment Alternatives

To effectively accelerate treatment of the CH MLLW backlog, three alternatives were assessed and qualitatively evaluated. Alternatives considered include:

- On-site treatment at SCMS with facility upgrades and a dedicated INL crew
- On-site vendor treatment
- Off-site commercial treatment.

The evaluation considered anticipated costs, treatment duration, and impacts to the INL mission at the MFC. Data was collected from current operations, discussions with off-site vendors, and preliminary engineering evaluations. Rough order of magnitude (ROM) cost estimates for each alternative were developed based on budgetary estimates provided by off-site vendors, MFC operations personnel, and other operating contractors at the INL site. Formal cost estimates have not been requested or prepared. The uncertainty of the ROM estimates are typically +/-20%.

Cost estimates for the base case and the three alternatives are included in Table 1. Each alternative has higher throughput or processing rate over the base case which would meet the goal of accelerating the backlog treatment. The estimated cost for each alternative was developed using current, or FY 2014, dollars, so the estimates are present value (PV) costs. The PV was one factor used to select the recommended alternative. The other factors included duration, alignment with INL mission, and programmatic risk.

1.2.1 Alternative 1. On-Site Treatment at SCMS with Facility Upgrades and Dedicated INL Crew

The SCMS facility is permitted to treat the entire backlog inventory. When the STP was approved in 1995, SCMS had a wide range of active permitted treatment systems including water wash, cover gas deactivation, alcohol treatment system, and alkali metal melt and draining systems. Treatment of the backlog over the past twenty years was primarily completed with the water wash system, so the other capabilities were left idle or removed. The current operational approach and safety standards embraced at MFC makes it very difficult to operate the permitted treatment systems that were designed over twenty years ago. System upgrades or replacements are needed to improve performance and provide the range of capabilities identified in the permit.

The upgrades required for SCMS to complete treatment of the backlog inventory would cost up to $14M. The estimates are ROM and based on preliminary engineering evaluations and input from

operations and facility management personnel. Upgrades would include repairing or replacing the heating system, replacing the breathing air system, expanding the contamination work area, and updating the building exhaust system. An alkali metal melt capabilities would also need to be developed, tested, and installed to replicate the capability documented in the permit. Accelerating treatment of the backlog would require a dedicated full-time crew to operate the facility treatment systems. The crew would be comprised of a foreman, technicians, crafts, an alkali subject matter expert, waste disposal technicians, and system engineering and maintenance personnel.

1.2.2 Alternative 2. On-Site Vendor Treatment

This alternative consists of contracting a vendor to perform all activities associated with on-site treatment and final disposition of the remaining CH MLLW backlog. In this scenario, a subcontractor would bring in a mobile treatment unit or assume control and operation of SCMS. Cost and schedule data supporting the feasibility of this alternative is limited. Estimated costs for this alternative were based on selected portions of the recent Idaho Cleanup Program cost estimate to modify MFC-799 and treat sodium waste.

1.2.3 Alternative 3. Off-Site Commercial Treatment

This alternative includes preparation of the backlog inventory for shipment and treatment at a permitted off-site treatment vendor. The INL has contracted and utilized several off-site commercial treatment facilities in the past. The cost estimate for this option is based on budgetary estimates provided by off-site commercial vendors. The budgetary estimates are preliminary estimates based on a general description and quantity of waste that was provided to the vendors. Preliminary discussions with the vendors indicate that the backlog inventory could be treated at a much greater rate than current operations at SCMS.

1.3 Alternatives Comparison

The three alternatives for acceleration were assessed qualitatively and reviewed with MFC operations and management personnel. All three alternatives will accelerate the treatment schedule by approximately 7 years based on the current rate of 2 cubic meters per year. Four main factors were taken into consideration when comparing the alternatives:

- PV Cost
- Duration
- Mission alignment
- Risk.

Each alternative requires a different level of INL operational support and operational risk. Table 1 provides a comparison of the advantages and disadvantages for each alternative with respect to the current operations base case. The table also includes the PV ROM estimated cost and estimated duration for each alternative.

Table 1. Alternative comparison of advantages and disadvantages.

Alternative (Present Value/Duration)	Advantages	Disadvantages
Base Case On-site treatment at SCMS with facility upgrades ($32M/14-years)[a]	• Maintains minimal annual funding (aside from the SCMS upgrades) • Eliminates off-site shipments of MLLW	• Requires $14M SCMS upgrade with no enduring mission benefit to MFC • Increase safety risk to address more difficult components
Alternative 1 On-site treatment at SCMS with facility upgrades and a dedicated INL crew ($33M/7-years)[b]	• Eliminates off-site shipments of MLLW • SCMS upgrade increases capabilities to address larger components • Existing RCRA permit and treatment alternatives exist	• INL safety concerns and risks increase with more difficult waste • Will require development of a full-time crew and sodium subject matter expertise • SCMS throughput will still be limited • SCMS upgrade does not align with INL research mission
Alternative 2 On-Site vendor treatment ($27M/7-years)[c]	• Eliminates the INL support for packaging and shipping waste off-site • Allows MFC to refocus craft resources to other programs • Potential temporary transfer of SCMS to vendor for a treatment facility could result in cost savings	• INL oversight will be required during treatment operations • An operational event would negatively impact MFC research activities • Would require investment of new treatment capabilities at MFC with no enduring mission • If SCMS is transferred to vendor, permit modification and work tent relocation costs will be required (not included in cost estimate)
Alternative 3 Off-Site Commercial Treatment ($26M/7-years)[d]	• Lowers INL's risk associated with treatment • More than one commercial treatment option available for cost efficiency • Increased throughput can accelerate schedule • Cost avoidance with equipment purchases that do not have an enduring mission at the INL	• Large INL repackaging effort will be required • Risks exist with shipping some of the waste types • Risks with commercial vendor treatment exist such as bankruptcy, ability to receive certain waste, or return of waste to the INL

a. Includes SCMS upgrades and current base funding levels to process 2 cubic meters per year from FY 2017 through FY 2029. FY 2016 will require payment for LiH shipped to off-site treatment in FY 2015.
b. Includes SCMS upgrades, dedicated operations crew, processing rate of 5 cubic meters/year and waste disposal costs.
c. Includes vendor treatment costs, facility transfer coverage, and INL over-site.
d. Includes a focused INL packaging campaign, shipping cost and off-site vendor treatment costs.

All costs are in present value (FY14 dollars) and are based on the SCMS backlog as of December 19, 2013.

2. RECOMMENDED ALTERNATIVE

Based on a qualitative analysis of acceleration alternatives, MFC management considers Alternative 3, Off-Site Commercial Treatment, as the recommended alternative. Alternative 3 was chosen based on the following advantages:

- Lowest estimated PV cost of $26M and highest potential for further cost reduction
- Highest potential for further acceleration
- Best alignment with INL mission
- Lowest risk to MFC and best mitigation method.

The alternative provides the most advantages in each of the areas evaluated. The basis for the recommendation includes:

- Cost. The Off-Site Commercial Treatment alternative has a lower PV estimated cost than the base case and the other two alternatives. In addition, the PV cost estimate for the alternative was based on budgetary estimates from a treatment vendor and previous discussions with that vendor indicated that a volume discount of 15% to 20% may be viable if the entire inventory was contractually obligated. This could reduce the PV cost estimate of $26M even further. The off-site alternative has the lowest risk with respect to the PV cost estimate since there is a good chance that the costs could be substantially lower. While Alternative 2 has a $27M estimated PV cost, which is essentially the same as Alternative 3, it does not provide as high of a potential for getting a volume discount and presents a higher risk to MFC operations than Alternative 3.
- Duration. While the duration is the same for the three alternatives, the off-site treatment approach has the highest probability to accelerate the treatment schedule even further. Preliminary discussions with the same treatment vendor indicated the backlog could be treated in as little as 3 years depending on the treatment method and level of funding. It also has the lowest impact if funding levels varied from year to year, since a subcontractor would be more flexible in staff escalations and reductions.
- Mission Alignment. The off-site treatment alternative provides the best alignment with respect to the enduring mission of the INL. The other alternatives require investment into treatment systems and developing staff for the treatment of the backlog waste. After the backlog is eliminated, the SCMS treatment systems will not be needed for the low volume of sodium contaminated waste that may be generated as part of future missions. Upgrading SCMS would require specialized INL design and fabrication resources for waste management facilities that are not enduring mission areas for the INL. Similarly, development and maintenance of a skilled labor pool to operate SCMS is not an enduring mission area for the INL. Workers would have to be retrained and reassigned to other areas and the treatment equipment would require dismantlement and closure following the completion of backlog treatment.
- Risk. Risk associated with INL worker safety will be mitigated by contracting a vendor to treat the reactive metal waste. A concentrated repackaging campaign could be completed in the next year or two prior to natural attrition of the few remaining INL workers with knowledge of the waste containers and components. The INL will also avoid the costs and risk of unknowns associated with fabricating, operating, maintaining, and decommissioning a large scale alkali melt, drain, and treatment system.

The recommendation of Alternative 3, Off-Site Commercial Treatment, also included consideration of the following points:

- The SCMS work tent is available immediately and can be used for repackaging efforts to support shipping the backlog inventory to the offsite vendor.
- The SCMS work tent will be available to support other ongoing missions at the INL beyond the backlog disposition. The existing work tent and its location is the lowest cost and lowest risk option as a repackaging and characterization capability for future generated waste. This capability is needed as long as the INL continues operations at MFC. Moving the work tent to another facility to reduce operations and maintenance costs will merely shift the burden of the costs to another facility and provide only marginal cost savings, if any. Shifting the capability to existing facilities, such as the HFEF Hot Repair Area, would adversely impact the mission of HFEF. For the STP work scope, SCMS will need to remain viable until repackaging for off-site shipment is completed. This will provide adequate time to evaluate the risk associated with the selected vendor's financial and technical viability. If the risk becomes untenable, SCMS treatment could provide regulatory relief while a contractual remedy with the vendor is pursued.

The remainder of this plan will focus on implementing the commercial off-site treatment of the backlog. Until an official request for proposal to treat the INL's legacy CH MLLW is submitted to qualified vendors, the planning assumptions are based on preliminary discussions and ROM estimates.

2.1 Planning Basis

The following section describes the planning basis for the acceleration of commercial off-site treatment of INL's legacy CH MLLW. As additional information is obtained through further development, the plan will be updated and refined.

2.1.1 INL Planning Basis

- **Schedule** – At this time current treatment plans include shipment of ~6.30 cubic meters of backlog waste off-site to meet commitments for the next three years (2014 – 2016). This will provide the INL three years to prepare for and establish a long term off-site treatment contract for the balance of the backlog. Packaging campaigns and treatment facility preparations will begin in FY 2016 and off-site shipments to the long-term commercial vendor will commence in 2017.
- **Funding INL Operations** – Funding request will be made based on the DOE budget cycle and the first opportunity for additional funding will be 2016. If additional funding is provided earlier, scope can be accelerated. The costs associated with this plan include the current base operations and STP funding for operating SCMS until the backlog has been repackaged into DOT compliant packages and the alkali trained crew is no longer needed. Costs associated with closure and decontamination/decommissioning of existing treatment equipment or SCMS are not addressed in this plan.
- **Resources** – Substantial resources will be required to support waste characterization documentation, packaging and shipping evaluations, and physical repackaging of wastes for transport. Establishing a dedicated SCMS crew to complete the repackaging operations would accelerate the activity and expedite the STP scope associated with SCMS.
- **Ability to Ship** – As currently stored, some of the CH MLLW will not meet packaging and transportation regulations. It is assumed that all sodium waste can be shipped safely and in compliance by using readily available shipping containers or by repackaging. However, based on preliminary discussions with packaging and transportation personnel, NaK may need to be

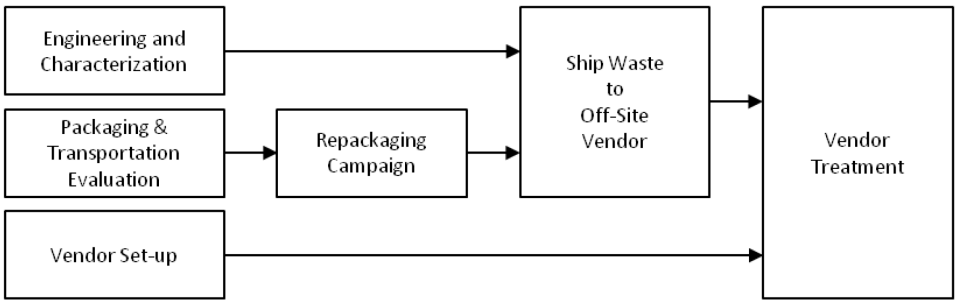
re-containerized. If so, an engineered system will need to be developed to drain and collect NaK so it can be transferred to an acceptable shipping container. Because NaK is a liquid at standard temperatures and will only need to be re-containerized, a drain system will be substantially less complex to build, operate, and maintain than a melt, drain, and treatment system.

2.1.2 Off-Site Vendor Planning Basis

- **Treatment Capabilities** – Based on past experience and preliminary discussions with potential vendors, there is more than one off-site treatment facility capable of treating reactive MLLW. Preliminary discussions indicate there will be upfront costs associated with upgrading equipment and processes to handle the components included in INL's legacy CH MLLW backlog. INL Funding will be required in FY 2016 for these preparation activities to ensure that sufficient time is provided prior to commencing waste shipments in 2017 and complying with INL STP milestones.
- **Throughput** – Per RCRA permit requirements, waste is required to be treated within one year of receipt. Therefore, shipments of waste from the INL will need to be spread over several years based on the facilities throughput capacity and funding levels.
- **Bulk Discount** – All budgetary estimates provided from off-site vendors are based on PV and individual containers. These estimates are considered ROM at this time and preliminary discussions indicate there could be a volume discount resulting in a cost savings of 15% to 20% if the INL were to award the entire scope and commit to funding the treatment of the entire backlog. The bulk discount will not be reflected until an official request for proposal can be issued and bids are received.

2.2 Key Activities

The accelerated schedule for commercial off-site treatment of INL's legacy CH MLLW is based on preliminary discussions with off-site vendors and the SCMS backlog inventory as of December 19, 2013. The final schedule will ultimately be driven by the vendor throughput and available funding. To address these assumptions and solidify plans, the INL must initiate the following key activities as soon as possible to gain additional certainty in the cost and schedule associated with commercial treatment alternatives for INL's legacy CH MLLW backlog. Figure 1 provides a high-level summary of activities and the anticipated sequence.



Activity Sequence

1. Engineering and characterization must be conducted somewhat concurrent with the P&T evaluation and repackaging to prepare containers and waste for shipping.
2. P&T evaluation will identify the containers and waste that need to be repackaged.
3. Vendor set-up will establish the capability to treat the waste.

Figure 1. Activities and sequence for off-site commercial treatment of CH MLLW backlog.

2.2.1 Engineering and Characterization

Each container/component in the CH MLLW backlog inventory presents unique configuration and challenges. Engineering Calculation and Analysis Reports (ECARs) must be generated for each container and made available to vendors for cost estimating purposes and to the Packaging and Transportation (P&T) group for shipment evaluations. This work should start as soon as funding is available and while key personnel with process knowledge are employed at the INL.

2.2.2 Packaging and Transportation Evaluation

A percentage of the inventory will require repackaging and/or sizing to ship off-site to a commercial vendor. P&T will need to evaluate each container and component against Department of Transportation (DOT) shipping requirements and the commercial treatment facility's acceptance criteria. They will also be tasked with evaluating and establishing a shipping exemption, if needed.

A significant concern exists of whether or not components with NaK can be shipped safely. Concerns have been raised that components with NaK could have formed a super oxide condition and may require the reactive liquid to be re-containerized. Knowing if this material can or cannot be shipped safely without a large scale effort to re-containerizing is crucial to the feasibility of off-site commercial treatment for this waste.

2.2.3 Vendor Selection and Set-up

Many cost and schedule assumptions are based on the treatment capacity of the commercial receiving facility. Once funding availability is confirmed, the INL will be able to comply with contracting requirements and request firm, fixed prices. A request for proposal will be requested from qualified vendors for competitive bids. This will allow the INL to refine funding levels, select and award the work scope, and establish shipping schedules.

2.2.4 Repackaging Campaign

Subsequent to a P&T evaluation, a repackaging campaign will be executed to size, repackage, or over pack containers so they are in DOT compliant shipping containers. MFC will utilize the SCMS work tent to execute this scope to the extent practical. If needed, a specialized containment system will be developed for re-containerizing NaK.

3. SCHEDULE

Commercial off-site treatment of INL's legacy CH MLLW backlog will be a multi-year evolution requiring support from multiple MFC organizations. Work scope will need to be balanced with available funding and will need to be coordinated with available resources and restrictions at both the INL and the off-site treatment facility. Figure 2 presents a conceptual schedule and sequence of activities required to establish a contract, characterize and repackage waste for DOT compliance, ship waste, and off-site treatment of the entire legacy CH MLLW backlog. The final duration will be based on treatment facility throughput and funding levels. As planning progresses and matures the schedule will be updated.

Activity ID	Activity Name	Start	Finish
Site Treatment Plan - Scenario 1			
STP100	FY14 Offsite Waste Shipment (2.0 m3)	01-Oct-13	30-Sep-14
STP105	FY15 Offsite Waste Shipment (4.0 m3)	01-Oct-14	30-Sep-15
STP110	Submit Request for Increase in FY16 Funding	30-Jan-14	
STP115	Develop RFP for SCMS Waste Backlog / Review Bids	01-Jan-14	23-May-14
STP120	Award MLLW Treatment Contract for SCMS Waste Backlog		30-Dec-14
STP125	Conduct P&T Evaluation	01-Oct-14	30-Jun-15
STP130	Conduct NaK Evaluation	01-Jan-15	30-Aug-15
STP135	Develop Shipment Strategy	01-Apr-15	30-Sep-15
STP138	Submit Request for Increase in FY17 Funding	30-Jan-15	
STP140	Repackage Waste in DOT Compliant Containers	01-Oct-15	30-Sep-18
STP145	Conduct P&T Evaluation	01-Jan-16	30-Jun-16
STP150	Engineering & Characterization	01-Jan-16	30-Jun-16
STP151	Vendor Setup	01-Oct-15	30-Sep-16
STP152	Submit Request for Increase in FY18 Funding	30-Jan-16	
STP155	FY17 Offsite Shipment to Vendor (4.5 m3)	01-Oct-16	30-Sep-17
STP158	Submit Request for Increase in FY19 Funding	30-Jan-17	
STP160	FY18 Offsite Shipment to Vendor (4.5 m3)	01-Oct-17	30-Sep-18
STP162	Submit Request for Increase in FY20 Funding	30-Jan-18	
STP165	FY19 Offsite Shipment to Vendor (6.0 m3)	01-Oct-18	30-Sep-19
STP168	Submit Request for Increase in FY21 Funding	30-Jan-19	
STP170	FY20 Offsite Shipment to Vendor (5.5 m3)	01-Oct-19	30-Sep-20
STP172	Submit Request for Increase in FY22 Funding	30-Jan-20	
STP175	FY21 Offsite Shipment to Vendor (2.5 m3)	01-Oct-20	30-Sep-21
STP180	FY22 Offsite Shipment to Vendor (2.5 m3)	01-Oct-21	30-Sep-22

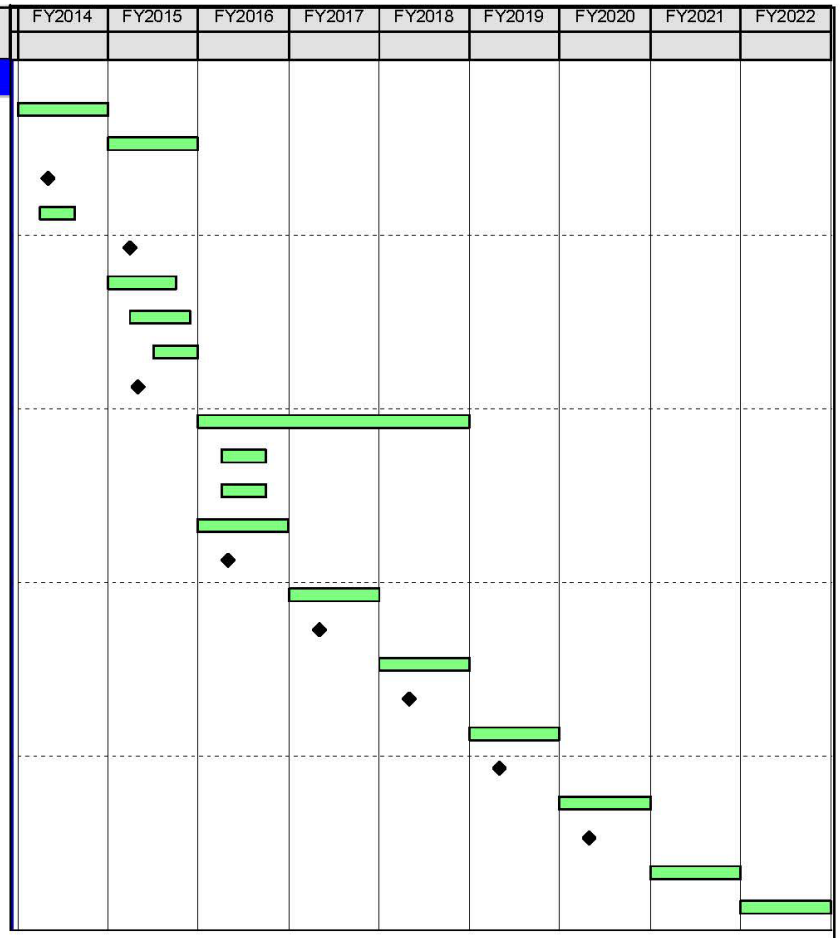


Figure 2. Conceptual accelerated CH MLLW STP treatment schedule.

3.1 FY 2014

3.1.1 Near-Term Waste Treatment Activities

- Establish contract with commercial treatment facility for treatment of ~2.2 cubic meters CH MLLW – December 20, 2013
- Prepare characterization, package, and shipping paperwork for off-site shipment of ~2.2 cubic meters CH MLLW – February 27, 2014
- Load and ship approximately 2.2 cubic meters of CH MLLW backlog (4-5 containers) to off-site vendor for treatment – June 30, 2014.

3.1.2 Activities to Support Long-Term Treatment of Entire Waste Stream

- Issue an expression of interest solicitation on the Federal Business Opportunities to identify available and interested commercial vendors for treatment of ignitable and/or reactive MLLW – December 20, 2013
- Submit FY 2016 budget increase request to support INL evaluations and estimated vendor start-up costs – January 30, 2014
- Container/component documentation development (i.e., characterization, source terms, drawings, pictures) for solicitation of off-site vendor bids – May 23, 2014
- Issue Request for Proposal to potential vendors for accelerated treatment – June 27, 2014
- Support vendor requests for waste information, answer questions, and support site visit(s). Receive accelerated treatment proposals including technical approach, cost, and schedule – September 30, 2014.

3.2 FY 2015

3.2.1 Near- Term Waste Treatment Activities

- Establish contract with commercial treatment facility for treatment of ~4.1 cubic meters CH MLLW – December 20, 2014 to meet STP commitment for FY 2015 and FY 2016
- Prepare characterization, package, and shipping paperwork for off-site shipment of ~4.1 cubic meters CH MLLW – January 30, 2015 to meet STP commitment for FY 2015 and FY 2016
- Load and ship approximately 4.1 cubic meters of CH STP backlog (1-2) containers to off-site vendor for treatment – February 28, 2015 to meet STP commitment for FY 2015 and FY 2016.

3.2.2 Activities to Support Long-Term Treatment of Remaining Backlog

- Review proposals and select qualified vendor(s). Major decision point – December 30, 2014
- Initiate characterization ECARs for compliant containers in compliant P&T packages – June 30, 2015
- Conduct a packaging and transportation evaluation to identify containers/material that will need to be handled or repackaged to meet P&T requirements – June 30, 2015
- Conduct evaluation on the NaK containers and develop strategy for shipment – August 30, 2015
- Develop shipment strategy and schedule with commercial treatment facility – September 30, 2015
- Submit budget request data to support FY 2017 budget request – January 30, 2015.

3.3 FY 2016

3.3.1 Short-Term Waste Treatment Activities

- None – Waste volume shipped off in 2015 will be applied to the 2016 STP commitment.

3.3.2 Activities to Support Long-Term Treatment of Entire Waste Stream

- Initiate a full repackaging campaign to address components that are acceptable at the treatment facility but not in DOT compliant drums – September 30, 2016
- Re-configure NaK (if necessary) to be safely shipped – September 30, 2016
- Complete all Rad characterization efforts for remaining containers – September 30, 2016
- Coordinate P&T efforts and planning for shipments starting in FY 2017 – June 30, 2016
- Submit budget request data to support FY 2018 budget request – January 30, 2016.

3.4 FY 2017 - TBD

3.4.1 Coordinate Off-Site Shipping with Commercial Treatment Facility

- Ship initial batch of CH MLLW backlog waste to commercial treatment facility in accordance with long-term contract – December 30, 2016
- Continue MFC repackaging or re-containerization activities as needed
- Continue to ship CH MLLW backlog waste to commercial treatment facility in accordance with contract schedule until the balance of the CH MLLW backlog is gone – 2017 to Applicable Year.

4. FUNDING PROFILE

The amount of acceleration that can be realized will be governed by the funding provided to prepare, ship, and treat waste at an off-site commercial treatment facility and the facility's throughput. For planning purposes, a $4M/yr funding profile and estimated total cost (ETC) has been provided in Table 2 for the recommended alternative, Off-Site Commercial Treatment. The profile is based on the waste volumes as of December 19, 2013 and includes the nine activities and cost estimates required to complete the accelerated scope. As discussed in Section 2.1.2, the estimates are based on preliminary vendor estimates and are considered to be conservative since a volume discount is expected to be proposed by the off-site treatment vendor as part of the procurement process. The $4M annual funding profile is considered optimum since it is aggressive but allows time for contracting and resolution of technical issues such as NaK. Refer to Section 5 for more details.

The funding profile in Table 2 includes the current annual funding provided for MFC-793 surveillance and maintenance ($820K PV) and the STP funding ($450K PV) during the years when SCMS will be used to support the accelerated scope. The funding profile includes a 3% annual escalation using FY14 dollars to accurately represent the ETC.

The funding profile in Table 2 begins in FY 2016, since the ability to influence funding prior to FY 2016 may be problematic. The $4M/yr funding profile would eliminate the backlog by the end of FY 2022. Comparatively, a $3M/yr funding profile would eliminate the backlog by the end of FY 2024 with an ETC of $32M and a $5M/yr funding profile would eliminate the backlog by the end of FY 2020 with an ETC of $28M.

Table 2. Off-Site Commercial Treatment - $4M per year with 3% escalation ($26M PV).

Activity	Description	2016	2017	2018	2019	2020	2021	2022	Total (K)
1	MFC-793 Surveillance & Maintenance	870	896	923					2,689
2	Existing Repackaging Support	477*	492	293					943
3	Additional Repackaging Support	764	1,005						1,769
4	NaK Repackaging System		1,093						1,093
5	Engineering	504							504
6	Packaging & Transportation Evaluation	345							345
7	Shipping	11	11	34	46	48	49	25	224
8	Vendor Set-up	1,273							1,273
9	Vendor Treatment	*	874	3,253	4,591	4,728	4,870	2,572	21,206
	Total (K)	**4,244**	**4,371**	**4,502**	**4,637**	**4,776**	**4,919**	**2,597**	**30,046**
	Estimated Backlog Volume (m^3)		**4.5**	**4.5**	**6.0**	**5.5**	**2.5**	**2.5**	**25.5 m^3**

*$318K would be used to pay for waste shipped to off-site to meet FY 2015-2016 commitment to treat 4.0 cubic meters
Note: Escalation begins in FY 2014.

5. RISKS AND OPPORTUNITIES

The plan for off-site commercial treatment of INL's legacy CH MLLW backlog is based on preliminary information and includes risks based on the maturity of scope. There are unknowns associated with treatment of legacy wastes and with the planned use of an off-site vendor. Without having an established contract, the final cost and schedule is unknown. A summary of risks and opportunities are provided.

Risks

1. Preliminary vendor estimates for treatment of waste may not be accurate.

   Mitigation: The acceleration plan is based on the high end of the preliminary estimates received. As additional information is obtained, these estimates will be refined to support out-year budget requests.

2. Throughput or processing rate of the off-site vendor may be substantially lower than assumed, resulting in an extended schedule to treat the waste backlog and requiring prolonged INL operations support for shipments.

   Mitigation: Early engagement with vendors, coupled with additional characterization information, will aid in establishing a realistic schedule.

3. The ability to ship portions of the backlog could be cost prohibitive

   Mitigation: Early P&T evaluations will be initiated to determine if there are issues with shipping specific waste and if those issues can or cannot be overcome.

4. Funding availability

   Mitigation: The INL will ensure that funding requests are submitted on schedule and are brought to management's attention if priority is not provided.

5. Off-site vendor closure during contract

   Mitigation: The INL will consider this in selecting the approved vendor and will take precautions during the contract development to ensure business solidity. The INL will also keep SCMS in the event the commercial treatment facility alternative falls through.

6. MFC trained and qualified crew availability

   Mitigation: All efforts will be made to utilize the sodium subject matter experts while they are still in the workforce at MFC.

Opportunities

1. Structuring the request for proposal to allow flexibility for potential vendors.

   ***Impact*:** An INL cost savings could be realized if vendors were allowed flexibility when bidding on the work scope. Examples would include:

   - Bidding on certain portions of the waste or waste types (e.g., lithium hydride waste is more expensive to treat at one facility when comparing preliminary estimates).
   - Including the alternative for vendors to conduct the packaging and shipping
   - Allowing the alternative for vendors to SCMS for on-site treatment for items difficult to ship

2. Including additional alkali metal waste from other DOE facilities in the vendor treatment scope.

   Impact: A INL cost savings could be realized if the commercial treatment capability investment could be shared across multiple DOE facilities.

3. Purchasing specialized packaging and transportation equipment could reduce overall shipping cost.

   Impact: A cost savings could be realized if a reusable shipping container could be purchased to package multiple non-DOT compliant waste containers.

4. Transferring some or portions of the liability to DOE office of Environmental Management (EM).

   Impact: The EM contractor is currently treating reactive material at MFC using new adaptable treatment capability. Costs associated with their treatment methods may be comparable to the ETC of commercial treatment when packaging and transportation costs are no longer needed. Additionally, EM has accepted similar remote handled components (e.g., sodium traps) and it would be prudent to use CH components during design and testing phases.

Appendix A

Inventory of the CH MLLW Backlog Assigned to SCMS in the STP as of December 19, 2013

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
16991K	0.3142	CH-ANL-180	83 / GAL / DM	SODIUM - LLW-SLST T-7 experiment. This container consists of an 83-gal overpack drum that contains an HFEF Sodium Disposal container. The 30 gal Sodium Disposal container is sealed in a poly bag inside the overpack drum, and is braced in place with wooden blocks. Approx. 8 lbs of Na.	8
21026P	0.0379	CH-ANL-180	10 / GAL / CM	EBR-II N-1 Nozzle Vapor Trap, No. 1, Stainless Steel flanged Vapor trap. Sodium vapor/aerosol. Note: 25 in. wide, 31 in. tall	0.1
21031P	0.0151	CH-ANL-180	4 / GAL / DM	Control Rod Bellows Pipe w/ Primary Na Residue	1
21032P	0.0151	CH-ANL-180	4 / GAL / DM	Control Rod Bellows Pipe w/ Primary Na Residue.	1
21033P	0.0151	CH-ANL-180	4 / GAL / DM	Control Rod Bellows Pipe w/ Primary Na Residue.	1
21289P	0.2082	CH-ANL-180	55 / GAL / DM	This drum contains 1/2 in. piping from the sodium sample station in the SBB and 2 in. piping from the removal of the secondary cold trap. Piping was cut for sizing into the 55-gal drum, capped with a plastic thread protector and taped closed. The secondary Na contains H3. On 6/28/01 this container was opened to add the following metal cans 6.5 mR/hr: Four 1-lb cans Na One 1-qt can Li (these five items are combined in a PVC pouch, that was heat sealed closed) One 1-pt can Na - in a Ziploc bag (non-radioactive) see email from John Krsul to Jennifer Turnage about the history of the reagent grade Na and the Li used for experiments performed at ZPPR. On 8/8/01 this container was opened to add the following metal pint can 3 mR/hr: One 1-pt can Li inside two bags the, “Li metal is contained in a pint can inside two bags (the outer of which is yellow). I would estimate approximately 50 -100 grams of Li present (~half of a pint)” email Mary Adamic to Jennifer Turnage.	Na: 5 lbs Li: 1.6 lbs
23326P	0.0019	CH-ANL-180	0.5 / GAL / CM	767 Primary Na. Contaminated piping contains Na, no external contamination inside rad. waste bag, taped closed.	3

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
ANL020023	0.1136	CH-ANL-180	30 / GAL / DM	Fermi MEDEC Test Chamber (4 in. OD × 28 in. long). Inerted with argon/sealed contains 3-15 grams of sodium. Six way cube (6 in. × 6 in. square) inerted contains 3-15 grams of Na. Tools and debris included.	0.0331
ANL020026	0.1552	CH-ANL-180	41 / GAL / CW	FFTS shafts contaminated with sodium. Internally packaged in plastic tubing inside box. Items are double bagged, no external contamination on the bags. Note: 10 in. × 7.5 in. × 19.75 in.	1
ANL020027	1.6996	CH-ANL-180	449 / GAL / CW	Instat cutters contaminated with sodium. Packaged in yellow poly tube inside wooden box. Note: 30 ft × 15 ft. 5 in. × 12 in.	1
ANL020406	0.0303	CH-ANL-180	8 / GAL / DM	FASB MEDEC Tests in Glovebox Debris - 2 filters, 3 empty Na containers, 1 NaCO3	1
ANL030319	0.0379	CH-ANL-180	10 / GAL / DM	The 10-gal drum holds 4, 1-gal paint cans. Two cans contain steel piping full of sodium and two cans contain steel piping with sodium residues. Each can was inerted prior to closure.	32
ANL1423	0.0087	CH-ANL-180	2.3 / GAL / CM	Vapor Trap, 4 in. diameter stainless steel (SS) pipe with bolted 8 in. flanges about 3.5 ft long. Note: 8 in. diameter, 44 in. long	18.6
ANL1427	0.0780	CH-ANL-180	20.6 / GAL / CM	20.6 gal Na drain tank Note: 34 in. diameter, 50 in. long	83
ANL1437	0.0076	CH-ANL-180	2 / GAL / CM	Estimated 133.3 grams of sodium. Waste originally in 2-gal capped cans packed in dry sand in 5-gal cans. Miscellaneous elemental sodium and waste. Note: This has alpha contamination.	3
ANL1448	0.0568	CH-ANL-180	15 / GAL / CM	15 gal can (7 lb Na). Pipe containing Na scrap from TREAT “R” series experiments. Pipe inside 15 gal drum.	7
ANL1451	0.1136	CH-ANL-180	30 / GAL / DM	Sodium Pot from FASB TED Glovebox. Approx. 3 lb of Na with zirconium chips. Container - 30-gal. 17H DOT drum. Ends on sodium pot were capped and drum is filled with sand. RSSF cargo container #5.	3
ANL1453	0.0189	CH-ANL-180	5 / GAL / DM	Origin AL. One 2.5 in. irradiated TED. 2-3 grams of Na inside the TED. TED double bagged, placing 1 gal can inside a 5 gal DOT drum. 1-gal can is surrounded by silica sand.	0.007

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
ANL1454	0.0568	CH-ANL-180	15 / GAL / CM	15 gal can (7 lb Na). Pipe containing Na scrap from TREAT "R" series experiments. Pipe inside 15 gal drum.	7
ANL1459	0.0354	CH-ANL-180	1.25 / FT3 / CW	Contained in a 4 in. carbon steel pipe with welded end caps. Two sodium filters from R-2, 3, 4, and 5 series filter elements only. Est. 1 lb Sodium. Note: 5 ft × 6 in. × 6 in. Wood Box	1
ANL1470	0.0069	CH-ANL-180	0.245 / FT3 / CM	Amount estimated 1/2 lb Na. TREAT scrap sodium. Note: 3 ft diameter, 5 ft long	0.5
ANL1483	0.2082	CH-ANL-180	55 / GAL / DM	Origin TREAT. Gross weight estimated at 100 lb. Estimated at 21 lbs. Sodium. Residual Na from TREAT operations.	21
ANL1486	0.0492	CH-ANL-180	13 / GAL / DM	Origin TREAT. Estimated 20 lbs. Sodium. Double contained in a 13 gal drum. TREAT R-series waste Na.	20
ANL1489	0.0492	CH-ANL-180	13 / GAL / CM	Origin TREAT. 15 gal can (7 lb Na). Pipe containing Na scrap from TREAT "R" series experiments. Pipe inside 15 gal drum.	7
ANL1491	0.2082	CH-ANL-180	55 / GAL / DM	Origin TREAT. Gross weight estimated. Used in TREAT R-series experiments. Sodium originally from 55 gal drums (EBR-II initial sodium fill) at ANL-W. Is radioactively contaminated. 24 lb of sodium. No Nuclide Data Available for this container.	24
ANL1493	0.2082	CH-ANL-180	55 / GAL / DM	Origin TREAT. Gross Weight estimated. Used in TREAT R-5 experiment. Sodium originally from 55 gal drums (EBR-II initial fill sodium) at ANL-W. Is radioactively contaminated. 24 lb sodium.	24
ANL1494	0.2082	CH-ANL-180	55 / GAL / DM	Origin Treat. Estimated 8 lb Na. 13 gal drum contained in a 55 gal drum with sand. TREAT R-8 U tube waste Na.	8
INEL10176	0.2082	CH-ANL-180	55 / GAL / DM	Origin 797. Average Rad @ contact was added to this container. This average was figured only from using RSSF CC-4 containers. This drum contains smaller containers that were consolidated into drum storage to free up floor space. The drum contains containers with Barcodes ANL1460, 1461, 1462, 1463, 1464, 1471, 1472, 1473, 1474 and 1477. See the individual waste container sheets for more information. Note: (10) 2-gal cans inside the drum.	160
MFC090025	0.0700	CH-ANL-180	0.07 / M3 / DM	This drum contains a N-2 nozzle. It only occupies 1/3 of the drum. It could not be easily handled/treated in the WWV.	1

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
MFC100112	0.3218	CH-ANL-180	85 / GAL / DM	TREAT R-3 series waste Sodium Note: 85-gal DM	21
MFC100113	0.3218	CH-ANL-180	85 / GAL / DM	Sodium - LLW:EBR-II sodium items from SCMS Note: 85-gal DM	30
MFC110153	0.3218	CH-ANL-180	85 / GAL / DM	This drum contains the following overpacked containers. ANL000348 Na TEDs (total of 7 TEDs) in a 1/2 Pint Metal Can. TED sodium volume assigned 1 gram each. ANL1447 Est. 0.75 lbs (340 grams) of sodium packaged in argon atmosphere in 1 and 2-gal paint cans with soldered lids, packed in dry sand in 5 gal cans. Miscellaneous glovebox waste. ANL1480 Amount estimated at 8 lb Na. Metal SS can, 16 in. dia. × 22 in. TREAT scrap sodium.	8.772
MFC110154	0.2082	CH-ANL-180	55 / GAL / DM	This drum contains the following overpacked container: MFC090168 Debris and Equipment Contaminated with Sodium - Contact Handled. 1 item in drum/occupies only 5 gal. Approx. 8 lbs Na.	8.00705
16936K	0.2832	CH-ANL-180	74.8051948 / GAL / CW	Origin 785. Wooden box contains 2 MK-II loops, packaged in secondary cans (Loops E-4 and H-2). Each loop contains approximately 1 liter of sodium. The loops were filled at ANL-E. The box was marked with ID# CS-81-8 #29, also marked on one end with CS-74-49. Note: 14 in. × 12 in. × 10 ft	4.24
16958K	0.1976	CH-ANL-180	52.2 / GAL / CM	SODIUM - LLW- CGCS Aersol Filter. CTP condenser (16 in. × 60 in.) containing Na. Pipe penetrations are capped, crimped or seal welded. Sodium content is not known definitively, but IWTS Container Profile lists 7 gal.	56
17197K	0.3028	CH-ANL-180	80 / GAL / CM	80 gal Charging Tank with residual Na in bottom Note: 39 in. diameter, 66 in. Tall	0.1

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
17224K	0.5663	CH-ANL-180	20 / FT^3 / CM	S-C-88-1, Throttle Valve #1, 30 mR/hr beta-gamma @ 2 ft, no external contamination. Note: 14.5 ft long, 1 ft diameter	1
17225K	0.5663	CH-ANL-180	20 / FT^3 / CM	S-CS-88-2, Throttle Valve #2, 10 mR/hr Beta, Gamma at 2 in., no external contamination. Note: 14.5 ft long, 1 ft diameter	1
19804P	0.0568	CH-ANL-180	15 / GAL / CM	S-CS-88-2, Throttle Valve #2, 10 mR/hr Beta, Gamma at 2 in., no external contamination. Moved to RSSF on 8/7/98. Stored as MW-S-98-023 in RSSF. Note: 19 in. wide, 47 in. Tall	1
21010P	0.0946	CH-ANL-180	25 / GAL / CM	ACS A-3 Nozzle Outlet Piping. Approximately 4 ft × 4 ft metal (SS) pipe. Pipe has four flanges of which 3 are taped shut with a metal disk and one is flanged and bolted with a blind flange. The nozzle piping is ~1/2 full of sodium. Sodium is from the primary system. Note: 43 in. × 15 in. × 34 in.	4
21268P	0.2082	CH-ANL-180	55 / GAL / CM	EBR-II N-1 Nozzle Vapor Trap, No. 1, Stainless Steel flanged Vapor trap. Sodium vapor/aerosol.	1
21290P	0.4391	CH-ANL-180	116 / GAL / CM	Sodium Trap (secondary). The total volume of sodium contained in the EBR-II Secondary Sodium Purification system is 100 gal, 96 gal contained in the cold trap and economizer and 4 gal contained in the associated loop piping. The cold trap annulus contains a calculated 16 gal of NaK. The Process capacity for the EBR-II Secondary Sodium Purification System is 116 gal.	Na: 803 lbs NaK: 113 lbs
21291P	0.1893	CH-ANL-180	50 / GAL / CM	Large valve from the secondary sodium tank encased in heat resistant lagging (May be asbestos). Valve contains Na aerosol. Ends are tapped shut - there is a clear bag around the valve. Note: 4.5 ft × 3.5 ft × 2 ft	1
21297P	0.0757	CH-ANL-180	20 / GAL / CM	Transfer port with Na aerosol. Metal equipment in radiation bag. Ends are capped and transfer port is bagged and tapped closed. Primary Na. Note: 42 in. × 15 in. × 12 in.	1

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
23343P	2.5000	CH-ANL-180	2.5 / M3 / CW	Argon Cooling System (ACS) Heat Exchanger. Contaminated with Primary Sodium aerosol. Long item 9 ft 10 in. × 35 in. × 36 in. rectangle shape inside two layers of poly. This item was put into a 10 ft × 3 ft × 3 ft wooden box (w/ reinforced 2 in. × 4 in. across the top) on 8/16/00, to ensure no loose contamination from storing a MW item in poly. The box was also moved to 703 for RCRA storage.	1
ANL010306	0.1378	CH-ANL-180	36.4 / GAL / CM	FFTF Shipping Container, empty ~residual sodium inside container (very small quantity of sodium). Note: This is an 11 ft long vessel	0.1
ANL020024	1.5168	CH-ANL-180	400.7 / GAL / CW	FFTS shafts contaminated with sodium. Internally packaged in plastic tubing inside box. Note: 27 in. × 17 in. × 17 ft	1
ANL020028	2.9148	CH-ANL-180	770 / GAL / CW	770 gal container with main core gripper contaminated w/ Na. Note: 20 in. × 24 in. × 33.5 ft	1
ANL1422	0.0087	CH-ANL-180	2.3 / GAL / CM	Vapor Trap, 4 in. diameter stainless steel (SS) pipe with bolted 8 in. flanges about 3.5 ft long.	18.6
ANL1425	0.0556	CH-ANL-180	14.7 / GAL / CM	ETR SLSF Cold Trap: 14.7 gal cold trap with residual Na Note: 30 in. diameter, 42 in. long	59
ANL1426	0.0556	CH-ANL-180	14.7 / GAL / CM	ETR SLSF Cold Trap: 14.7 gal cold trap with residual Na Note: 23 in. diameter, 47 in. long	59
ANL1469	0.0587	CH-ANL-180	15.5 / GAL / CM	SODIUM - EBR-II sodium: 15.5 gal metal keg full of Na Note: 17 in. diameter, 26 in. tall	120
ANL1497	0.1133	CH-ANL-180	4 / FT3 / CM	Sodium Trap (secondary). In stainless steel tank 32 in. diameter. EBR-II secondary cold trap that operated from April 1977 to September 1979. Contains tritium. Note: 41 in. diameter, 66 in. tall	250
ANL990120	0.5863	CH-ANL-180	0.5863 / M3 / CW	F1 Nozzle 200 mR/hr @ 2 in. on the item, 1000 counts smearable on the item, sleeved when pulled. Na aerosol contamination is estimated at <1/2 gal. Note: 15 in. × 15 in. × 13 ft 3 in.	4

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
ANL990122	0.8700	CH-ANL-180	0.87 / M3 / CW	Pull Pipe because of 4 in. hex tube, bagged both ends of the item for rad. contamination control. 600 counts were on the hex tube. 1/2-gal Na residual is estimated as amount of Na that didn't drip off the hex tube. Barcodes 16937K and 23324P FTP Hex Tubes were put into this box in March of 2001, because, they were in storage in poly bags and the decision was made to not store any mixed waste in rad bags. Long items belong in a wooden box and there was room in ANL990122 for these two items. The HPT sticker was updated with the new radiation reading of 130 mR/hr at contact and 10 mR/hr at 1 meter. See decommissioned barcodes 16937K and 23324P for historical information.	4
INEL10174	0.1703	CH-ANL-180	45 / GAL / CM	45 gal Na pump with ~1gal Na Note: 33 in. wide, 18 in. deep, 33 in. high	8
INEL10175	0.1703	CH-ANL-180	45 / GAL / CM	45 gal Na pump with ~1gal Na Note: 32 in. wide, 20 in. deep, 30 in. high	8
MFC120095	0.3218	CH-ANL-180	85 / GAL / DM	This container holds components left from repack/treatment of ANL990119. There are (2) vapor traps.	2
MFC130132	0.3218	CH-ANL-180	85 / GAL / DM	FERD Pump from ANL010200	64
ANL1232	0.2082	CH-ANL-506	55 / GAL / DM	ETR/SLSF Loop Sodium: 55 gal drum of Na	400
ANL1235	0.2082	CH-ANL-506	55 / GAL / DM	ETR/SLSF Loop Sodium: 55 gal drum of Na	400
ANL1253	0.2082	CH-ANL-506	55 / GAL / DM	Sodium/Sodium Oxide: 55 gal drum 1/2 full of Na/NaO	200
ANL1421	0.2233	CH-ANL-180	59 / GAL / CM	OLSS HOLD TANK: 59 gal tank Note: 24 in. diameter × 30 in. high	243
ANL1468	0.3171	CH-ANL-180	11.2 / FT3 / CM	Estimated amount at 700 lb Na (100 gal). Stainless steel welded container. Sodium scrap from TREAT "R" series. Note: 3 ft diameter, 4 ft high	700
ANL1495	0.0821	CH-ANL-180	2.9 / FT3 / CM	Origin EBR-II. Metal sealed container. Amount est. at 180 lb Na. EBR-II scrap sodium. Listed in the Radioactive Storage Records notebook on the HS-7 as non-radioactive. Note: 13 in. diameter, 37 in. tall	180
ANL905	0.4542	CH-ANL-506	120 / GAL / CM	EBR-II Secondary Loop Sodium: 120 gal tank filled with Na	964
ANL906	0.4542	CH-ANL-506	120 / GAL / CM	EBR-II Secondary Loop Sodium: 120 gal tank filled with Na	964

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
ANL907	0.4542	CH-ANL-506	120 / GAL / CM	EBR-II Secondary Loop Sodium: 120 gal tank filled with Na	964
16931K	0.2100	CH-ANL-182	0.21 / M3 / DM	Drum contains NaK filled pressure switches and NaK containing or contaminated items such as MSA pipe caps, valves and drip cups. Note: 55-gal DM	1
16934K	0.0298	CH-ANL-182	7.86 / GAL / CM	Cold Finger contains NaK inside flanged cover. Dimensions are 8.5 in. diameter by 32 in. long, with larger flanged bottom with short legs. Penetrations are capped or seal-welded. The Cold Finger contains unused NaK. Note: 19 in. diameter, 42 in. tall	25
23376P	0.2082	CH-ANL-182	55 / GAL / DM	Primary sodium system Na/NaK Heat Exchanger, ~15-gal NaK filled transducers from secondary cold traps.	106
ANL010041	0.0019	CH-ANL-182	0.5 / GAL / CM	NaK, Oxidized NaK (contaminated with dirt, grime, etc. from cleanup of spill) in a 1/2 gal metal can.	3.5
ANL010042	0.0019	CH-ANL-182	0.5 / GAL / CM	NaK, Oxidized NaK (contaminated with dirt, grime, etc. from cleanup of spill) in a 1/2 gal metal can.	3.5
ANL010043	0.0019	CH-ANL-182	0.5 / GAL / CM	NaK, Oxidized NaK (contaminated with dirt, grime, etc. from cleanup of spill) in a 1/2 gal metal can.	3.5
ANL010044	0.0019	CH-ANL-182	0.5 / GAL / CM	NaK, Oxidized NaK (contaminated with dirt, grime, etc. from cleanup of spill) in a 1/2 gal metal can. Also, contains a 10 ft Metal-Cased tape measure.	3.5
ANL010094	0.4542	CH-ANL-182	120 / GAL / CM	EBR-II Primary Purification System NaK. Draining completed by Cory Landon Container #2, ~3/26/01, tritium contaminated no sampling data, process knowledge. Note: 31 in. diameter, 57 in. tall	734
ANL010095	0.4542	CH-ANL-182	120 / GAL / CM	EBR-II Primary Purification System NaK. Draining completed by Cory Landon Container #1, ~3/26/01, tritium contaminated no sampling data, process knowledge. Note: 31 in. diameter, 57 in. tall	734
ANL010212	0.1136	CH-ANL-182	30 / GAL / CM	~15-gal of NaK from Cold Finger and NaK deactivation project, in Argon atmosphere, in a 30-gal MSA container. Added waste code D007 to this container due to sample results from Analytical sample Record # 082372. The sample was taken from the MSA container as an oxide of NaK. Note: 21: diameter, 43 in. tall	106

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
ANL010213	0.2082	CH-ANL-182	55 / GAL / DM	55-gal drum of 11 empty NaK carbon steel pans filled with soda ash. The NaK was removed from the pans and the pans were packed with soda ash.	1
ANL010214	0.0010	CH-ANL-182	1 / L / CM	~350 ml of NaK from Cold Finger. Liquid in ~1/2-gal stainless steel container with two 1/2 in. swedge lock fittings. Note: 1-gal can	0.65
ANL010215	0.0189	CH-ANL-182	5 / GAL / CM	1-gal can sealed w/ Ar w/ 3/4 gal NaK sand mixture (sand on top) inside a 2-gal can, may have an Ar purge inside a ~5-gal carbon steel bucket w/ Ar purge and duct tape. NaK from Primary Cold Trap removal.	5.4
ANL010216	0.0114	CH-ANL-182	3 / GAL / CM	1-gal can with NaK/Sand mix purged w/ Ar. NaK - Oxidized. NaK vol = <1 pint, Sand vol. ~2 qts. (mostly sand) inside a 3-gal carbon steel bucket. NaK from Primary Cold Trap removal. Tritium.	7
ANL010223	0.0038	CH-ANL-182	1 / GAL / CM	NaK Tubing from Treatment of Secondary Na Level Probe	1
ANL010225	0.0038	CH-ANL-182	1 / GAL / CM	NaK Fitting	1
ANL010226	0.0189	CH-ANL-182	5 / GAL / CM	2-gal can of NaK packed in soda ash inside a 5-gal can	14
ANL010227	0.0379	CH-ANL-182	10 / GAL / CM	2-gal can of NaK packed in soda ash inside a 10-gal can	14
ANL010228	0.0189	CH-ANL-182	5 / GAL / CM	1-gal can of NaK packed in soda ash inside a 5-gal can	7
ANL010236	0.0114	CH-ANL-182	3 / GAL / CM	One 3-gal can with a 1-gal can inside. 1-gal can holds NaK/Soda Ash mixture. Generated from EBR-II Shutdown Cooler Deactivation Project.	7
ANL1498	0.1000	CH-ANL-182	3.53 / FT3 / CM	42-lbs NaK in a stainless steel NaK bubble pot, 18 in. dia. × 24 in. high. Supposed to be used to purify argon makeup gas stream at EBR-II but may have never been used.	42
ANL1499	0.1000	CH-ANL-182	3.53 / FT3 / CM	42-lbs NaK in a stainless steel NaK bubble pot, 18 in. dia. × 24 in. high. Supposed to be used to purify argon makeup gas stream at EBR-II but may have never been used.	42
MFC090161	0.0189	CH-ANL-182	0.0191138714318607 / M3 / DM	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy	1

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
ANL000168	0.3218	CH-ANL-722	85 / GAL / DM	Radioactive Contaminated Alkali Metal. 85 gal overpack of 55-gal drum containing lithium hydride (LiH) cans containing LiH material from the Zero Power Physics Reactor (ZPPR) storage area and 1-gal bag of LiH getter bags (<1 lb). Generator: Tom Zahn WDDF# MFC-10-002 55 gal metal drum overpacked into 85 gal metal drum	164.3
ANL000382	4.1626	CH-ANL-722	147 / FT3 / CW	Lithium Hydride - Shields Stored at TREAT. Contains the following: 2- 5 ft × 5 ft × 7 ft @ 895 lb and 882 lb 1 - 5 ft × 5 ft × 6 ft @ 750 lb 1 - 5 ft × 5 ft × 4 ft @ 650 lb 1 - 5 ft × 5 ft × 2 ft @ 345 lb	2476.6
ANL000383	1.2743	CH-ANL-722	45 / FT3 / CW	Lithium Hydride - Shields Stored at TREAT. Contains the following: 2 - 3 ft × 3 ft × 3 ft @ 125 lb and 125 lb 1 - 3 ft × 3 ft × 2 ft @ 97 lb 1 - 3 ft × 3 ft × 1.5 ft @ 65 lb 2 - 3 ft × 3 ft × 1 ft @~50 lb	339
MFC090054	0.0757	CH-ANL-722	20 / GAL / DM	Radioactive Contaminated Alkali Metal. Inventory: Gallon Metal Paint Can #1-Li Metal, in 1 qt can, 203.28 g, packed in Argon, SAA MFC-752-B127, origin Na Glovebox Gallon Metal Paint Can #2-Li Metal, in 1 qt can, 268.28 g, packed in Argon, SAA-MFC-752-B127, origin Na Glovebox	3.99
MFC110232	0.3218	CH-ANL-722	85 / GAL / DM	55 gal metal drum of Lithium Hydride stainless steel tubes from Zero Power Physics Reactor (ZPPR). Some of the stainless steel tubes are breached and there is loose powder inside the 55 gal drum. The 55 gal metal drum is overpacked into a 85 gal metal drum.	122
16933K	0.2082	CH-ANL-179	55 / GAL / DM	55 gal DM of Na contaminated Tin/Bismuth Alloy	1

Waste Container Barcode	STP Vol. M^3	STP ID	Container Size / Units / Type	Additional Information	Lbs of Reactive Material
ANL1436	0.7334	CH-ANL-179	25.9 / FT3 / CW	SODIUM-CONTAMINATED TIN-BISMUTH ALLOY. Metal cans in poly bags inside 1/2 in. lead-lined wood box. Trace amounts of sodium. Note: 39 in. × 41 in. × 28 in. wood box	1
ANL1479	0.9046	CH-ANL-179	239 / GAL / CW	SODIUM-CONTAMINATED TIN-BISMUTH ALLOY. Metal cans in poly bags inside 1/2 in. lead-lined wood box. Trace amounts of sodium. Note: 48 in. × 48 in. × 24 in. wood box	1
MFC100115	0.3218	CH-ANL-179	85 / GAL / DM	85-gallon drum sodium contaminated tin-bismuth alloy	1
MFC100116	0.3218	CH-ANL-179	85 / GAL / DM	85-gallon drum sodium contaminated tin-bismuth alloy	1