WERF INCINERATOR OPERATIONS UPGRADE FOR MACT OR SHUTDOWN AND FIND TREATMENT ALTERNATIVES

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ABSTRACT

This paper presents the results of a alternatives analysis for treating the INEEL incinerable mixed low-level waste. Several areas were considered during the analysis; current volume of waste for incineration currently identified in the INEEL Site Treatment Plan (STP), risk analysis pertaining to the facility upgrades for MACT, and an economic analysis based on funding allocation for DOE-HQ. A joint team of DOE-ID and BBWI personnel was involved in performing this work.

WERF INCINERATOR EVALUATION

Decision Process

Risk Evaluation for the WERF Incinerator MACT Decision

The Department of Energy – Idaho Operations Office (DOE-ID) and Bechtel BWTX Inc. (BBWI) performed an analysis of the factors associated with the two core options, the INEEL upgrading the Waste Experimental Reduction Facility (WERF) incinerator to meet MACT or performing RCRA closure and using alternative treatments. Regardless of the path forward for the WERF incinerator, there are many factors and assumptions to the Idaho National Engineering and Environmental Laboratory (INEEL) for incinerable MLLW treatment, which are essentially the same for both options:

- Potential compliance road blocks with INEEL Site Treatment Plan (STP) milestones
- The accuracy of the waste projection estimates (over/under estimated)
- Availability of MLLW for treatment
- Unforeseen/unidentified waste generation from Environmental Restoration activities, and reclassified mixed waste etc
- Known inaccuracies with the existing MLLW treatment baseline, and zero funding post 2003
- Impacts of the implementation of the MLLW/LLW PEIS ROD
- Potential increases in WERF incinerator operating cost or commercial price for treatment

These factors and assumptions along with the associated mitigating actions, are consistent between both options. The following address in detail the principle factors and assumptions for the two options being analyzed.

Comply with MACT by upgrading WERF Incinerator

To upgrade the WERF incinerator to MACT standards, the facility itself must be permitted with new emission control equipment and pass a performance test to facilitate continued treatment of MLLW. The incinerator would be shutdown for, at a minimum, of one year. The WERF incinerator has an existing treatment schedule for the treatment of onsite and offsite mixed waste. The resultant changes to the treatment schedule as a result of the shutdown and the possibilities of WERF being unable to pass the MACT performance test, would necessitate that other mitigating actions must be taken while the upgrades and testing were taking place:
• Re-map, negotiate and develop contracts for debris waste to alternative treatments for waste requiring treatment prior to the completion of upgrades
• Re-map, negotiate and develop contracts for non-debris waste to other thermal treatment options
• Negotiate with DEQ for a path forward as early as possible on the permitting and testing of MACT upgrades
• Negotiate change in schedule with Complex wide generators to store waste at the generators site until WERF MACT upgrades were completed

These actions are essentially the same for both the WERF incinerator shutdown and MACT upgrading options.

Cost of MACT Compliance

The MACT upgrade has been estimated at $.4.2 M in capital costs based upon the feasibility study prepared by BBWI for DOE-ID. A complete conceptual design was not completed to verify this estimate. Nor, were any like process upgrades evaluated for comparison, which would address potential uncertainties in the cost estimate. The technical basis in the feasibility study used off-the-shelf equipment in a unique operating process. Programmatic changes would increase project costs, in particular the areas of project management and construction. If the cost exceeded GPP limits of $5.0M for capital costs, then the project would most likely have to be submitted as a line-item project. No construction or upgrade activities could occur until the funding is appropriated. This would not be supportive of the MACT implementation standards and time frames.

Evaluating Volumes for Treatment

The INEEL STP identifies mixed waste currently in storage and future generation at the INEEL. It also identifies mixed waste from off-site sources, which is planned to be treated at the INEEL. The table below summarizes the mixed waste identified for treatment at the WERF incinerator between 2000-2005. Waste identified as coming from off-site sources is taken from the corresponding DOE STP from these off-site sources.

Incinerable MLLW volume targeted for WERF Incineration (as of March 2000)

<table>
<thead>
<tr>
<th>Description</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>INEEL MLLW in storage</td>
<td>1950 m³</td>
</tr>
<tr>
<td>INEEL Generated MLLW (5yr)</td>
<td>51 m³</td>
</tr>
<tr>
<td>INEEL ER MLLW (3yr)</td>
<td>601 m³</td>
</tr>
<tr>
<td>Off-site MLLW in storage (off-site)</td>
<td>508 m³</td>
</tr>
<tr>
<td>Off-site Generated MLLW (5yr)</td>
<td>355 m³</td>
</tr>
<tr>
<td>Total (2000-2005)</td>
<td>3465 cubic meters (on and off site)</td>
</tr>
</tbody>
</table>

Planned FY2000 Treatment of MLLW at the INEEL

<table>
<thead>
<tr>
<th>Description</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Disposal at Envirocare</td>
<td>600 m³</td>
</tr>
<tr>
<td>TAN V-tank Waste (incineration)</td>
<td>300 m³</td>
</tr>
<tr>
<td>INTEC 1617 (incineration)</td>
<td>145 m³</td>
</tr>
<tr>
<td>INTEC 1617 (consolidation)</td>
<td>110 m³</td>
</tr>
<tr>
<td>Misc. INEEL MLLW (incineration)</td>
<td>57 m³</td>
</tr>
<tr>
<td>Off-site MLLW (incineration)</td>
<td>37 m³</td>
</tr>
<tr>
<td>Total FY2000 Treated MLLW</td>
<td>1249 m³</td>
</tr>
</tbody>
</table>
Planned FY2001 Treatment of MLLW at the INEEL

- Direct Disposal at Envirocare: 300 m$^3$
- INEEL MLLW Incineration: 150 m$^3$

**Total FY-2001 Treated MLLW:** 450 m$^3$

At the end of FY-2001 approximately 1700 m$^3$ of MLLW would remain untreated in the INEEL STP. Approximately 1000 m$^3$ of this volume is INEEL on-site waste and approximately 700 m$^3$ is from off-site generators.

The post FY 2001 INEEL volume of 1000 m$^3$ can be split into 20-50 m$^3$ non-debris and 950-980 m$^3$ debris. Debris can be treated using an alternate treatment standard in accordance with 40 CFR 268.45 (e.g., macroencapsulation). Non-debris will require treatment to reduce organic concentration to below the treatment standard in accordance with 40 CFR 268. (e.g. thermal treatment or chemical oxidation).

The post FY 2001 off-site volume of 700 m$^3$ of waste is currently listed in DOE Site Treatment Plan from off-site sources. This waste is split into 70% non-debris and 30% debris. The majority of non-debris offsite waste is from the following four DOE generators: Portsmouth, Hanford, Los Alamos, and Rocky Flats.

**Impacts of Shutdown**

**DOE Complex**

Since the completion of the DOE STP’s in 1995, the WERF incinerator has been a leader in assisting the DOE Complex in the Treatment of MLLW. Various DOE facilities, and DOD Naval Reactor Programs, have identified the INEEL WERF Incinerator as the primary treatment for much of their MLLW. These waste streams were identified and included in the INEEL Site Treatment Plan. The volume of this waste was approximately 500 cubic meters. However, DOE-ID has decided that the WERF incinerator is to be shutdown. Therefore the individual DOE/DOD sites must find alternative treatment of this waste in accordance with the requirements in the STP’s. These sites will need to renegotiate with their Individual State regulatory agencies to determine the treatment paths for those waste streams.

**INEEL**

The INEEL has identified approximately 2000 cubic meters of MLLW for treatment in the WERF incinerator. The decision to shutdown will require that approximately 60 waste stream be evaluated for alternative treatment and modification to the existing treatment paths in the INEEL STP.

The INEEL STP was modified to reflect the loss of the WERF incinerator and the addition of Commercial Treatment as the new treatment option. This was proposed to the State of Idaho Department of Environmental Quality (DEQ) during the November 2000 STP quarterly meeting and was approved by DEQ. The fate of the WERF incinerator was sealed when the DEQ denied the Resource Conservation and Recovery Act (RCRA) operating permit, withdrew the RCRA interim status by-which the WERF incinerator operated and required the submittal of a RCRA closure plan.

**Closure Plan**

The boundaries of the system to be closed are summarized below.

**WERF incinerator unit** – The WERF incinerator unit consists of the incinerator system and Air Pollution Control System (APCS). The incinerator components that will be dismantled and removed include the primary and secondary combustion chambers, ash ram/housing, bottom ash handling system, solid waste feed chute, combustion air system, the primary dilution air system, and incinerator offgas ducting. The incinerator components that were part of the treatment system but not in contact with the
waste include the solid waste feeding (conveyor) system, fuel system, propane system, steam generator system, and associated components of the distributed control system.

The APCS components that will be dismantled and removed include the heat exchanger, spark arrestor, secondary dilution air system, baghouse collectors, dust transfer system, HEPA filtration unit, isokinetic sampling system, continuous emissions monitoring system, offgas blowers, and north exhaust stack, and offgas ducting. The APCS components that were part of the system but not in contact with the waste treatment system include the halon fire protection system, plant air system, and the associated components of the distributed control system.

WERF drum/feed blending unit – The entire WERF drum/feed blending unit will be removed from PER-609 under this closure. This unit includes the liquid waste feed pump, two filters, associated feed lines, valves, piping, and the secondary containment pan.

WERF repackaging unit – The ventilation from the repackaging unit in the basement of WERF unit provides secondary dilution air to the WERF incinerator system. The spark arrestors and ducting associated with WERF repackaging unit will be dismantled and removed from the facility during closure.

The closure strategy for the WERF systems will meet the closure performance standards for interim status treatment, storage, and disposal facilities (TSDFs) identified in IDAPA 58.01.05.009 (40 CFR 265.111, “Closure Performance standard”) and will include:

- Minimizing the need for further maintenance
- Removing and properly managing all hazardous waste inventories and hazardous waste residues
- Controlling, minimizing or eliminating, post closure escape of hazardous waste and hazardous decomposition products to the environment
- Minimizing the amount of hazardous waste generated during closure activities.

In addition, the performance standard specified for incinerators, IDAPA 58.01.05.009 (40 CFR 265.351, “Incinerators Closure”), is removal of all hazardous waste and hazardous waste residues from the incinerator.

The proposed strategy for RCRA closure of the WERF interim status units includes removing waste residuals as necessary, dismantling and removing from PER-609 the process equipment associated with the WERF incinerator, drum/feed blending, and repackaging units. MLLW will be sent to a permitted TSDF for treatment (e.g. macroencapsulation, stabilization, etc.) and disposal. Ancillary equipment that is industrial waste will be disposed of in the INEEL Landfill Complex, and LLW will be disposed of at the RWMC. Some ancillary equipment may be reused at the INEEL. Final decontamination activities of the facility walls and floors will be performed on the affected areas of PER-609 following the dismantling and removal activities.

Facility components, such as blowers, and fire protection systems, utilities, and the bridge crane, that will not be removed during closure will be uniquely identified before starting closure.

FINDING ALTERNATIVES

The INEEL STP was modified to reflect the loss of the WERF incinerator and the addition of Commercial Treatment as the new treatment option. This was proposed to the State of Idaho during a STP quarterly meeting and was approved. However, DOE-ID must detail the individual treatment technologies to be use by Commercial Treatment no later that April 25, 2001. At this time the INEEL is evaluating those affected
waste stream and determining if non-thermal treatment (is macroencapsulation, or stabilization) can be used for debris type waste. For those waste streams that have hazardous constituents that require incineration, a commercial treatment unit is being determined. At this time the INEEL is evaluating waste characterization documentation and determining the alternative treatments that may be used. The direct disposal of some mixed low-level waste is also being evaluated. The amount of waste to be directly disposed, may be as much as 50% of the total volume of waste that was originally identified for incineration. Macroencapsulation may be used to treated an additional 30%. Commercial incineration and stabilization will be used to treat the remaining 20% of the MLLW volume. At this time these percentage amount are strictly estimates.

**STP PROCESS**

**Dealing with Home State**

When DOE made the decision to close the WERF incinerator, the State of Idaho was contacted and at the STP quarterly meeting the addition of Commercial Treatment was proposed. The State approved the concept of using commercial treatment. However they requested that the specific treatment technologies to be used be identified no later that April 25, 2001. All waste streams from offsite generators that had the WERF incinerator identified as the primary treatment will be removed from the STP no later than January 24, 2001. Those waste stream generated at the INEEL are being evaluated for commercial treatment (i.e. macroencapsulation, stabilization, or commercial thermal treatment). This evaluation and modification to the treatment plans found in the STP must be completed, and proposed to the State of Idaho for there approval, no later April 25, 2001. The INEEL is now working to modify/revise the INEEL STP to reflect these changes to covered waste streams.

**Dealing with other State (Equity Issues)**

DOE is required to assess all waste destined for treatment at an out-of-state DOE facility, to conduct equity discussions between both the sending and receiving state regulatory agencies. The receiving state is required to assess the acceptability of the waste at the receiving DOE treatment facility. The equity discussion allow the state regulatory agencies to discussion any particular or unique issue for handling the waste. Specifically, these discussion involve the criteria for waste to be returned, either treated or untreated, to the generating DOE facility should direct disposal not be an option for that particular waste. DOE-ID will be assessing the waste streams currently in the INEEL STP and will be identifying the specific waste streams that need to entertain equity discussions.

**INEEL’S ROLE IN THE DOE/EM COMPLEX**

The INEEL’s role is the assess the waste streams currently in the INEEL STP and determine if treatment can occur at the INEEL without the use of incineration. We will be working with the DOE Site that identified the WERF Incinerator as the preferred option to find alternative treatment for those waste streams. Part of this assistance will include looking at other potential treatment options at the INEEL for these waste streams.

The INEEL will be assessing the waste streams generated on-site and originally slated for treatment in the WERF incinerator to determine the appropriate treatment options for these waste streams. We will be looking at on-site treatment as the first potential option, followed by an assessment of the treatment capabilities and capacity at other DOE or commercial sites. Upon completion of this evaluations, we will be meeting with the State of Idaho to get their approval to the modification to the INEEL STP and to conduct any necessary equity discussion with potential other State regulatory agencies that maybe requested to receive waste from the INEEL.