



U.S. DEPARTMENT OF  
**ENERGY**

OFFICE OF  
**ENVIRONMENTAL  
MANAGEMENT**

## **Citizens Advisory Board**

# **Integrated Waste Treatment Unit Update**

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## *Summary of IWTU Simulant Runs*

- Based on three simulant runs, significant progress has been made in equipment and process reliability.
- Our focus continues to be on the successful commissioning and safe operations of IWTU:
  1. Simulant runs provide valuable plant and operations data.
  2. Decision on “hot operations” will be based on that data.

## *Results of Second Simulant Run*

- Initiated second simulant run, ran 8,500 gallons of simulated waste before the Process Gas Filter (PGF) problem was identified. Initiated “Outage F” to evaluate filter issues.
- A visual inspection showed about 10 percent of PGF elements had failed.
- A problem with a filter guide-plate allowed thermal expansion to breach some of the PGF filters. The guide-plate was fixed, all the PGF filters were replaced, and the unit was returned to service.
- Extent of condition inspections were initiated to inspect the Off-Gas Filter, (OGF), Product Receiver Filter (PRF) and Product Handling Vacuum Filter (PHVF) filter vessels.
- Inspection of the PRF and OGF showed no issues. Two filter elements in the PHVF were damaged. The two damaged filter elements were sealed.

## *Results of Third Simulant Run*

- Initiated third simulant run in November, ran another 30,683 gallons of simulated waste before shutting down to evaluate conditions that caused temperature variations in the DMR.
- The facility ran at normal operating pressures and temperatures for over a month, and overall, mechanical performance was very good.
- Inspections and maintenance activities, planned as “Outage G,” began in January and are expected to last about two months.

- Post-shutdown inspection confirmed that all systems, other than the DMR, behaved as expected and components were found in acceptable condition.
- Detailed inspection after removal of the materials from the DMR revealed significant wear on the four fluidizing rails and the ring header. The cause for this erosion remains under investigation.
- Inspection of the Super Heater revealed warping of a heat exchanger requiring repair.



Photos show evidence of erosion on DMR ringheader and nozzles.

- Wall scale – referred to as “bark,” was found on the internal surfaces of the DMR, and in the bed material after shutdown.
- The bark coating was not as extensive, nor as firmly bound to the equipment (it was flaking off and more easily removed) as that found in January 2015.



Wall scale – “bark” material – found in the DMR.



# *Status of IWTU Adjustments*

1. “Bark” (wall scale) Formation in the Denitration/Mineralization Reformer (DMR): Changed DMR bed material from bauxite to alumina and adjusted operating parameters. Bark formation, while significantly reduced, is still a concern and under investigation.
2. Carbon Reduction Reformer (CRR) Refractory Lining: Repairs and curing of refractory lining completed. Inspection of refractory complete: no issues.
3. Off-Gas Filter (OGF) Material Transfer: Installation of a larger transfer jet, and air flow upgrades to CRR ATG nozzles, have resolved OGF problems.
4. Off-Gas Blowers: Vendor has replaced three of the four blower shafts and completed testing. Fourth shaft satisfactory and will not be replaced. All blowers running satisfactorily.

- Complete current inspection and maintenance “Outage G,” respond to any issues identified.
- Auger-grinder enhancements.
- Replace super heater element and heat exchanger shell
- Resolve chemistry issues related to bark formation and erosion.
  - “Chemistry Summit,” featuring experts from IWTU, other national laboratories and industry, held this week to address bark and erosion issues.
- Conduct simulant run to test recommendations from summit
- Carry out maintenance and inspection “Outage H.”
  - Replace DMR ringheader.
  - Address any issues from simulant run

## *Progress Over the Last Year*

- Simulant runs continue to yield valuable information on the reliability of the process and equipment. The decision to advance to “hot operations” will be made based on data collected during the simulant runs.
- In total, we have processed simulated waste equal to more than 10 percent of the volume of actual tank waste that will be processed.
- Most of the plant equipment is operating reliably and as designed. The list of significant issues is being narrowed largely to two: bark and erosion.
- Testing and simulant runs have provided significant hands-on experience and confidence to operate the facility.
- Start-up process to bring facility to operations mode (waste feed addition) is more well-defined (from weeks to days).
- Safety has been and will continue to be the No. 1 priority.