

**Rocky Flats**  
**Aqueous and Oil / Organic Liquid TRU Waste**  
Solidification Method Test Plan and Summary

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The TRU/TRM Liquid Solidification treatment options and the resulting waste forms were evaluated against the following criteria to assess whether the process would produce waste that could be certified for transportation and disposal at WIPP:

- The solidified aqueous and/or organic/oil waste form can be non-destructively assayed with sufficient accuracy and reproducibility to meet WIPP shipping and disposal requirements. This criterion will be met when at least one NDA machine/method has been qualified for assay of the waste produced by the Solidification Process according to the requirements listed in Appendix A4 of the TWMM.
- The solidified aqueous and/or organic/oil waste form meets the requirement for no-free liquids in packages to be shipped to WIPP. Sections 5.4.1.1 and 6.2.6.2 of the TWMM list the specific requirements regarding free liquids. This criterion will be met when samples representing the potential range of aqueous and/or organic/oil wastes have been solidified using the Solidification Process and the resulting waste form(s) have been verified as solid in accordance with PRO-1031-WIPP-1112 TRU/TRM Waste Visual Verification (V2) and Data Review. Selected containers of solidified waste will be tested after a period of time, to ensure that the waste has remained solidified. Real Time Radiography (RTR) may be used to augment the visual verification for the purpose of demonstrating that the criterion has been met.
- The solidified aqueous and/or organic/oil waste form meets the requirement that headspace of any package to be shipped to WIPP does not contain flammable mixtures of gases (H<sub>2</sub>, methane, and flammable volatile organic compounds [VOCs]) during shipment<sup>2</sup>. Sections 5.5.5 and 6.5.2 of the TWMM list the specific requirements regarding VOC and hydrogen/methane gas generation limits for analytical and test category waste. Compliance with the TRUPACT-II design pressure limit of 50 psig is accomplished by theoretical analysis of the calculated and/or measured gas generation rates for the individual containers.<sup>3</sup> This criterion will be met when it has been demonstrated that samples representing the potential range of aqueous and/or organic/oil wastes have been solidified using the Solidification Process and the resulting waste form(s) meet the applicable requirement for non-flammable mixtures of gases in the headspace.

The conditions above do not represent all WIPP acceptance criteria, but they do represent the most critical elements that must be addressed up-front to determine acceptability. Since WIPP does not require waste to meet any leachability criteria, leach tests are not required even though extremely interesting. Other acceptance criteria, such as the fissile gram equivalent or the surface dose rate limits will be met on a container-by-container basis using various WIPP approved characterization techniques.

After successful demonstration of the ability of PetroBond to create a WIPP-disposable waste form, Rocky Flats once again put the NOCHAR products to test. Rocky Flats generates a large array of aqueous based TRU waste liquids, including the highly aggressive cerium nitrate decontamination solution. Rocky Flats scientists conducted a series of treatability tests on

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<sup>2</sup> This requirement is specified in Revision 19 of NRC-Docket 71-92, TRUPACT-II Safety Analysis Report (SARP).

<sup>3</sup> The method for determining compliance is outlined in RS-020-001, Gas Generation Testing Program Quality Assurance Project Plan.

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various aqueous based liquids using five different polymer-based absorbents. Nochar AcidBond was demonstrated to be the most versatile of all the polymers tested and is now the mainstream treatment for aqueous based TRU liquids and sludge waste throughout Rocky Flats.

### **3.0 CONCLUSION**

As a result of the extensive testing for WIPP in this project, Nochar's extensive line of polymers have become baseline technology at Rocky Flats for the stabilization/solidification of liquid and sludge waste streams, both organic and aqueous based.