

CHARACTERIZATION OF ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE COMBUSTIBLE WASTES

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ABSTRACT

During plutonium operations, the Rocky Flats Environmental Technology Site (RFETS) generated approximately 20 metric tons of combustible residues contaminated with nitric acid, or organic liquids (solvent and cutting oil), and plutonium metal. Based on the limited amount of characterization data and process knowledge, many of these combustible residues were considered High Risk, due to a potential for flammability, explosion or other hazard. Characterization testing was conducted involving inspection of material and packaging, differential thermal analysis, elemental analysis, head-space gas analysis and gas generation testing. Results of data analysis have indicated many of the perceived risks do not exist. Therefore, the original operations proposed for the combustible residue stabilization program are not required. As a result of combustible waste characterization, one group of combustible residues has been confirmed to be Low Risk. Characterization results have also of two High Risk groups indicates that the risk categorization associated with their storage and shipment is likely to be reduced from high to low. This will result in simplification of treatment requirements, increased processing throughputs, reduced operator exposure and significant cost savings

INTRODUCTION

Prior to 1991, the primary mission at the Rocky Flats Environmental Technology Site (RFETS) consisted of manufacturing fissile material weapons components and related components. Fissile material operations were two-fold; the (aqueous) purification of plutonium, and foundry operations generating metal weapons components. Common to both of these activities was the generation of combustible wastes. The combustible materials generated from aqueous activities are potentially contaminated with nitric acid solutions. The residue materials generated during foundry operations are considered to be potentially contaminated with organic liquids such as carbon tetrachloride and cutting oils..

There are 28 Item Description Codes (IDC) classified as combustibles, include sludges, fluorides, filters or filter media, material from cleanup (paper, cloth, plastic) and ion exchange resin. Some IDCs, such as the ion exchange resins, are already undergoing a stabilization process before final disposal. Others, such as plastics, are expected to be repackaged without requiring stabilization.

Stabilization was considered a requirement to reduce the risk associated with many combustible residues. Potential sources of risk were as follows:

- Flammability or ignitability of nitrated cellulose derived from the processing of cellulosic material in the presence of nitric acid.

- Pyrophoricity of residual plutonium or other reactive metal.
- Flammability of volatile and semi-volatile organics.
- Production and retention of hydrogen gas, leading to an explosion hazard.

The possibility of flammable gas retention was addressed by storing combustibles in vented drums, and testing the vent filters regularly. Depending on the process history of each IDC, one or more of the risk factors were attributed to the material, leading to a designation of the material as Low Risk or High Risk. Low Risk material did not necessarily need additional processing prior to being placed in a configuration for final disposal. Stabilization was planned for High Risk IDCs, but the details of the processing were not finalized. The characterization of combustible residues was undertaken to confirm or negate the anticipated level of risk associated with each IDC, and to better define the required path for stabilization.

Characterization of all combustibles was undertaken to examine each IDC for several anticipated risk factors. The statistical design of the program ensured that if there were no "hits" for a risk factor in an IDC, then there was 80% confidence that not more than 15% of the containers in the population would show that parameter. This was considered adequate confidence to confirm that a risk factor was not present, in the IDCs where that risk factor was not expected. Initial characterization of the High Risk IDCs did not show evidence of the potential risk factors. Additional characterization was recommended for these IDCs, to provide 95/5% confidence that the risk factors were absent, which would be sufficient to reclassify them as low risk.

Characterization to the 80/15% confidence level has been completed for all IDCs. Three IDCs (IDC 330 Dry Combustibles; IDC 331 Ful-Flo Filters; IDC 336 Wet Combustibles) have both an aqueous and an organic sub-component, due to different processing histories. These IDCs were divided into two populations for statistical sampling, to ensure 80/15% confidence on each sub-component. Results are discussed here for five IDCs.

IDC 338 (Filter Media) was originally considered Low Risk. The characterization findings confirm the Low Risk designation, and indicate that stabilization is not required for this material. IDCs 291 (Fluoride Sludge) and 332 (Oily Sludge) were originally considered High Risk. All containers of these small IDCs were sampled, and the results indicated that the IDCs are actually low risk. IDC 331 (Ful-Flo Filters) and 336 (Wet Combustibles) were also considered High Risk. The 80/15% data for the aqueous sub-component of these populations does not confirm the High Risk designation, and suggests that, with additional characterization, it may be possible to reclassify these IDCs as Low Risk. Low risk IDCs do not require processing to reduce risk. Elimination of a requirement for processing translates into significantly reduced exposure for the operations crew handling the material, significantly reduced cost to dispose of the material, and the potential to accelerate the schedule and remove the combustibles from the Rocky Flats site much sooner.

BACKGROUND AND APPROACH

The characterization data required for risk re-evaluation of the combustible material is complete in some instances and in the process of being gathered for other IDCs. For the purposes of this

report, five specific IDCs were addressed. These IDCs are listed below and a description of the residue material follows. Characterization data collection is complete for IDC 338, 291, and 332, and data collection and analysis is still underway for IDC 331 and 336.

(High Efficiency Particulate Air - HEPA) Filter Media	IDC 338
Fluoride Sludges (Dried Laboratory Waste)	IDC 291
Oily Sludge	IDC 332
Ful-Flo (Polypropylene Cartridge) Filters – (aqueous)	IDC 331
Wet Combustible – (aqueous)	IDC 336

High Efficiency Particulate Air (HEPA) filters are used in glove box and ventilation plenum operations in all of the actinide storage and processing buildings at RFETS. These filters are replaced periodically or they are replaced when it is determined that they are fouled. Item Description Code 338 is described as the filter media portion of the used HEPA filters which is composed of a glass fiber paper, corrugated aluminum, an organic binder, an elastomeric adhesive, and a polyurethane sealant.

Item description code 291 is described as dried laboratory waste sludges containing fluoride, whereas IDC 332 is described as oily sludge. These IDCs could have been generated in either the aqueous or foundry operations, so it is possible that they are contaminated with either nitric acid or organic solvents.

Item description code 331 is described as polypropylene cartridge filters used in the aqueous or organic liquid processing operations. These materials were air dried prior to packaging, but free liquid has been observed in the IDC waste packages.

IDC 336 materials are described as combustible waste generated in glove box operations. The materials included are plastic bags, paper, rags, wood, cardboard, plastic containers, and other miscellaneous combustible materials. The IDC 336 residue materials were generated in both the aqueous and the foundry (organic contamination) operations.

Characterization Data Requirements

Characterization data requirements for all these were generated by Subject Matter Experts (SMEs) for materials based on the material type and existing characterization data base, the risk category, and process knowledge. The characterization requirements for both high and low risk IDCs included:

- Observations by the SME regarding the packaging configuration and packaging integrity.
- Measurement of radiation levels and contamination .
- Visual observation by the SME regarding the material type and configuration.
- Observation of free liquids (if seen, these are sampled).
- Observation of metal pieces (if seen, these are sampled).
- Observation of other anomalies.
- Sampling of specific materials for analysis.

Subject matter experts determined that special characterization requirements were needed for specific IDCs. The analyses requested on these various IDCs included the following:

- Differential Thermal Analysis (DTA): DTA was performed for thermal event mapping and pyrophoricity/flammability assessment.
- Total Semi-Volatile Organic Compounds (SVOC): Solid samples were analyzed for total semi-volatile organic compounds using gas Chromatography/Mass Spectroscopy (GC/MS).
- Total Volatile Organic Compounds (VOC): Solid samples were analyzed for total volatile organic compounds using GC/MS.
- Dispersibility: Particle size distribution to assess fines dispersibility was if dispersible material was present. Samples were screened through a series of sieves, then fines were examined microscopically.
- Moisture Content: Moisture content analysis was performed on selected samples where criticality moderation was a concern.

If free liquids were detected by visual observation, a liquid sub-sample was taken for further analysis. One of three analytical techniques, X-Ray Fluorescence, X-Ray Spectroscopy or ICP-Spectroscopy, can be used to determine plutonium concentration if free liquids are present. Ion Chromatography (IC) was performed on aqueous free liquids to determine the composition. In addition, if visual examination revealed unexpected material, X-Ray diffraction was performed to determine the crystallographic phases of material that appeared to be salt, ash, oxide and fluoride residues, to support identification.

During the characterization program, 14 IDC 338 items were subjected to characterization (11 removed from 55-gallon drums, 3 from other containers). In addition, two IDC 291 items and one IDC 332 item were sampled for characterization (all three samples were removed from 55-gallon drums). Samples were taken from ten 55-gallon drums of each of IDC 331 aqueous and IDC 336 aqueous.

PACKAGING CONFIGURATION

Observations

The packaging configuration of the 37 drums sampled was consistent in terms of the number of containment barriers and final barrier container (white 55-gallon drum). The material was placed inside a primary container and was bagged-out of the glove box in a PVC bag-out bag which was then placed in a polyethylene bag. This package was then placed into the secondary container. Both the primary and secondary containers were taped. The secondary container and its contents were placed into a drum that contained a rigid liner (without lid) which was lined with two polyethylene bags. All bags were twisted and sealed with plastic tape (pig tail). Figure 1 illustrates the typical packaging configuration.

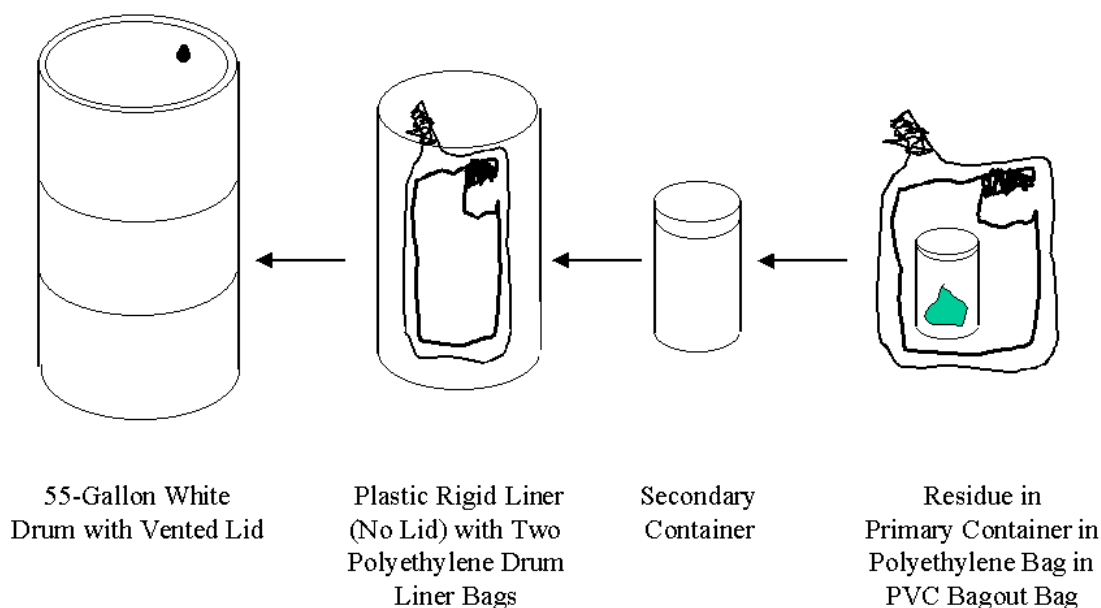


Fig. 1. Typical Packaging Configuration

Although there were many consistencies in the overall IDC packaging patterns, many inconsistencies were also noted. Table I describes the different types of primary and secondary containers used (each primary container was paired with the secondary container in the same row).

The condition of the packaging seemed to vary. Plastic materials (tape and bags) were often noted to be in good condition. In a few instances the tape and/or bag was extremely discolored and lacked integrity. Metal containers for IDC 338 were often slightly corroded but generally in good condition (with the exception of the lead-lined container that was breached). Primary metal containers for IDC 291 were noted to have extensive interior corrosion. Containment external to the secondary container was in good condition. However, three IDC 338 drum filters were noted to have signs of corrosion. The 55-gallon drums of IDC 336 were noted to have spotty to heavy corrosion on the interior, and the drums of IDC 331 generally showed heavy corrosion. Corrosion of the filters of both these IDCs was also noted.

There were no problems encountered with contamination or high radiation levels on IDCs 291, 332 or 338. Several drums in both IDCs 331 and 336 could not be sampled due to contamination inside the outer drum, or inside one of the inner containment barriers. Both IDCs also included drums where the radiation level inside the drum was too high to allow sampling to proceed (the suspension limit is 500 mRem/hr). Several IDC 336 drums were opened to reveal a single internal container (e.g. a large bag) rather than multiple smaller containers.

Table I. Types of Primary and Secondary Containment

	Primary Container	Secondary Container	IDC
Container Type	4-liter Wide Mouth HDPE Bottle	None – primary container in PVC bag inside Polyethylene bag	338
	1-liter Volrath® 8801 Metal Can	2-liter Volrath® 8802 Metal Can	291, 338
	1-liter Volrath® 8801 Metal Can	Plastic Freezette®	332
	1-gallon Metal Paint Can	None – primary container in PVC bag inside Polyethylene bag	338
	4-liter Wide Mouth HDPE Bottle	Plastic Clam Shell (4 liter)	338
	Plastic Clam Shell (4 liter)	None – primary container in PVC bag inside Polyethylene bag	331, 336
	2-liter Plastic Bottle	None – primary container in PVC bag inside Polyethylene bag	336
	Multiple Layers of PVC and Polyethylene Bags	None – primary container in PVC bag inside Polyethylene bag	331, 336
	Lead-lined metal container (probably SST can with lead tape)	None – primary container in PVC bag inside Polyethylene bag	338

Importance

The packaging observations illustrate the range of packages that will have to be handled during repackaging operations, thus providing some guidelines for the type of facility required to complete all repackaging. The observation of a single large bag inside a drum is particularly important, because the usual practice unloading a drum involves opening the drum in a contamination-cell, then transferring smaller containers through a glove-port into a glove-box line for further operation. A special facility is required to transfer drum-sized packages into the glove-box. The observation of high radiation levels and contaminated containers provide additional constraints for the repackaging facility.

MATERIAL DESCRIPTIONS**Observations – IDCs 291 and 332**

The material contained in the primary container was described by the subject matter expert (SME) present when the item was opened. The SME descriptions for IDC 291 were as a light brown to beige material, having the appearance of dirt. The IDC 332 material was described as black pieces, coarse to fine, with the appearance of moisture but no free liquids. The IDC 291 and 332 sludges showed similar characteristics in that the materials appeared to have been stored with high moisture contents and had dried in storage. The material had decreased in total mass

indicating evaporation of moisture. Many of the items were described to contain materials not expected in the IDCs such as glass, plastic and metal (other than aluminum).

Importance – IDCs 291 and 332

The information that might cause concern is that which points to the possibility of significant moisture present in these materials when initially packaged. Although these samples did not contain free liquid, other packages from the same IDCs might not have undergone the drying process observed with these three material samples.

Observations – IDC 338

The IDC 338 material was described either as the expected filter media (6 items), furnace insulation (5 items – possibly IDC 438), americium oxide (1 item – probably pyrochemical salt), graphite (1 item), or not described (1 item). The filter media (IDC 338) is described as black or gray, usually containing paper/fibrous material with aluminum or metal separators, with particle size ranging from a few inches in diameter to fine (all of which is consistent with filter media).

The material described as insulation usually consisted of a material gray in color, with particle sizes 0.5” to fine. The insulation descriptions seem to significantly different than those of the filter media. The materials described as “graphite and “americium oxide” were, without question, in the wrong drums. The noted observations, the information on primary container labels, and descriptions of the material verify the material type.

Importance – IDC 338

The most important conclusion to be made from this information is that there is a very high probability that a significant percentage of the IDC 338 population will contain non-IDC 338 items. As a result, repackaging of the material for final disposal must include a step where the material is examined to verify its identity. Many of the items were described to contain materials not expected in the IDCs such as glass, plastic and metal (other than aluminum).

Observations – IDC 331 and 336

The contents of IDC 331 were consistent with the material description (Ful-Flo Filters). The most significant observation was the frequent presence of moisture or free liquid. IDC 336 contained highly varied material, including gloves, towels, glass vials and Tygon tubing. Presence of acid odors was occasionally noted. Moisture and free liquids were sometimes present.

Importance – IDC 331 and 336

Both IDCs 331 and 336 will require some sort of treatment to eliminate free liquids. Due to the variability of material observed, IDC 336 will require examination of individual articles to ensure nothing is encountered that requires special handling. Industrial Hygiene support will be requested during handling of these materials to ensure that the odors observed during sampling do not indicate a hazard to the operations staff.

ANALYTICAL DATA

Each IDC was required to undergo a specific set of analytical tests, determined by the hazards expected to be associated with that IDC. If a sample did not appear to be the IDC indicated, additional analytical tests were performed to either (1) fulfill requirements for testing of the actual IDC or (2) determine the type of material.

Particle Size Distribution

Particle size distribution analyses were conducted on all samples of IDCs 291, 332 and 338. The test was conducted to determine if significant quantities of fines (below 10 μ) were present in the residue which would constitute a dispersibility hazard. The particle size distribution analysis is conducted with a series of sieves with as many as 11 size ranges from less than 2.5 μ to greater than 1180 μ . The results indicate that the great majority of the material had a wide range of particle sizes greater than 45 μ up to greater than 1" in length. The two exceptions were filter media samples (IDC 338) where the majority of the material fell within ranges of the sieves rather than having a large weight percent greater than 1180 μ . Very few particle size analyses were performed on IDC 331 or 336 samples. The majority of containers included no fine material. Only three containers of IDC 331 and one of IDC 336 were observed to have any fine particulate material.

These combustible IDCs would not be expected to have large quantities of fine material. The only credible source of fines would be particulate material associated with the filter IDCs, which became dislodged from the filters during packaging. Such material could include Pu metal particles, which would be both dispersible and hazardous. The low incidence of observed fine particles supports the contention that these IDCs are not High Risk.

Moisture Content

Presence of free liquids (which require removal or treatment) was determined by visual observation. Moisture content was determined for non-liquid samples by heating to a maximum temperature of 210°C with the purpose being to drive off all interstitial water.

IDC 331 included free liquids in three containers and two others were described as moist. IDC 336 included liquids in one container, and three others were described as moist. The moisture content was variable but high in all measurements for these IDCs, reaching 12% in IDC 331 and 38% in IDC 336. The presence of free liquids and high moisture indicates that repackaging plans need to include a step to remove liquids or add some sort of drying agent.

IDC 338 containers showed no free liquid, and moisture content averaged 1.3%. The IDC 338 material described as filter media had a higher average moisture content (1.7%) than the material described as insulation (1.0%). The concern exists that combustible materials might contain flammable nitrate contaminate cellulosid residue which might pose a fire hazard. The probability of significant quantities of nitric acid contamination of this material (nitrated cellulose) is very low based on the consistently low moisture content of the samples.

Free liquid was not observed in the sludge IDCs. The average moisture content for IDC 291 was 4.4%, and the IDC 332 sample indicated 10.0%. Both sludge material IDC 291 containers are thought to have lost a great deal of moisture during storage. The bulk weight lost for the two items were 157 grams and 75 grams total bulk. If all of the material loss was indeed water, the original moisture content of these materials would have been 23.5% and 14.9% respectively. These initial moisture contents could have been an indication of free liquid, which has subsequently evaporated.

Gas Generation Testing

Gas generation testing was conducted on five IDC 338 55-gallon drums, as part of the development of a gas generation testing program to meet the Waste Isolation Pilot Plant Waste Acceptance Criteria (WIPPWAC) criteria. All of these drums were different than those used for the other characterization testing outlined in this document. Table II summarizes all of the gas generation data gathered for IDC 338 drums. The hydrogen gas generation rate data for each drum is reviewed to determine if an individual drum meets the limit. For the five drums tested, all hydrogen generation rates fall below the $7.298\text{E-}09$ moles/second limit specified by WIPP. Tests were conducted at both room temperature and at 146°F . These preliminary developmental tests will not be used as waste certification data for WIPP. However, the information provides an indication that the gas generation rates are relatively low.

Table II. IDC 338 Gas Generation Testing Data

Drum	H ₂ (moles/sec)	Watts	G _{eff} (molecule H ₂ /100 EV)	Total Gas (moles/sec)	Pass/Fail (H ₂ Gen.)	Temp. of Test	Date Tested
D55010	2.95E-10	0.332	0.009	--	Pass	Room	6/97
D49295	1.68E-09	0.355	0.045	--	Pass	Room	7/97
D49761	3.38E-09	0.453	0.072	3.59E-06	Pass	146°F	6/98
D44615	3.12E-09	0.416	0.072	3.16E-07	Pass	146°F	6/98
D06288	3.15E-10	0.148	0.020	3.01E-07	Pass	146°F	7/98
Average	1.758E-09	0.341	0.044	1.40E-06	--	--	--
WIPP Limit	7.298E-09	0.0207	--	--	--	--	--

X-ray Fluorescence (XRF)

The analytical laboratory performed XRF on three IDC 338 samples, two of which were described as insulation, and one as graphite fines. The purpose of the analysis was to determine the metal content of the sample (including plutonium), to help establish the actual identity of the material. All items indicated 1 to 4 weight percent zinc. The sample described as graphite fines showed extremely high levels of Pu (62.2 wt%), U (13.2 wt%) and Mg (13.5 wt%), which is

most likely metal resulting from a foundry operations (graphite material). The XRF data was consistent with the designation of the third item as graphite fines, rather than filter media. All weight percentages are based on total metal content and not total bulk material.

Differential Thermal Analysis (DTA)

This analytical technique is used to determine if a material exhibits significant heat generation (an exotherm) at low temperatures. Storage and transportation scenarios involve possible temperatures up to about 60°C, so exotherms at or below 60°C indicate a possible fire hazard. All exotherms below 150°C were examined to determine if any unexpected, energetic reactions were occurring. Endothermic reactions could indicate evaporation of water or volatile organics. Endothermic reactions were compared to the VOA/SVOA results to determine if volatile organic material flammability hazards exist.

For the two IDC 291 sludge samples, no exotherms were identified below 150°C. Endotherms were identified as low as 30°C with total mass losses for the items at 23% and 7%, when heated from room temperature to 210°C (this appears to be evaporation of water). No exotherms were identified below 150°C for the IDC 332 sludge material sample or the single IDC 338 sample that was tested. No exotherms were identified below 150°C for the nine items of IDC 331 or the nine items of IDC 336 that were tested.

Therefore, there is no evidence of energetic reactions which would pose a threat of fire during storage or transportation for these IDCs.

X-ray Diffraction (XRD)

Only one sample for IDC 338, the sample tentatively identified as americium oxide, was submitted for XRD. The purpose of this technique is to identify unknown compounds or elements. The method is accurate to a few percent (semi-quantitative) and can only identify species present in relatively large amounts. Results of the analysis indicated that the material was 70 weight percent CaF_2 , 18 % MgO and 12 % PuO_2 . This information indicates that this material is probably a form of pyrochemical salt residue, and should be directed to the salt project for further disposition.

Volatile Organic Compounds (VOC)

Volatile organic materials are identified for the purpose of RCRA designation. Even low levels of the compounds can imply large quantities of these materials in the residue container. The VOA data are reviewed by RFETS subject matter experts in order to distinguish between hazardous and non-hazardous compounds and compound levels. Table III lists the volatile organic compounds that were identified in each of the IDC 291 and Table IV lists the compounds for IDC 332 samples. Also listed are lower explosive limits (LEL) for various compounds identified in the residue material.

Many of these compounds are flammable and should be cause for concern. In addition, many of these organic compounds have high vapor pressures and can be identified even when small amounts are present in the residue material. However, calculations confirm that these levels in the solids do not infer an approach to the lower explosive limits in the headspace of the drum for any of the identified VOCs. For example, in IDC 332, given 12000µg acetone per kg of bulk

residue, the residue net weight in the drum of 2.6kg, an assumed drum void space of 27.5 gallons (one half of the 55-gallon drum), the acetone lower explosive limit of 2.15 volume percent, and assuming that all of the acetone in the residue were to volatilize, the calculated volume percent acetone is approximately 0.6 percent of the acetone LEL. This level is not significant and should not be cause for flammability concerns.

Table III. IDC 291 Volatile Organic Compounds

Compound	Level (µg/kg)	LEL* (Vol. %)
Acetone	1200	2.15
2-Butanone	2400	—
Chloroform	1400	—
Benzene	1900	1.40
Toluene	760	1.27
Ethyl benzene	860	—
Styrene	5200	—

* LEL – Lower Explosive Limit

Table IV. IDC 332 Volatile Organic Compounds

Compound	Level (µg/kg)	LEL* (Vol. %)
Acetone	12000	2.15
2-Butanone	5500	—
4-Methyl-2-Pentanone	1900	—

* LEL – Lower Explosive Limit

Volatile organic compound data should be considered along with the DTA data in order to identify potential flammability concerns. In this case (IDC 291 and IDC 332 VOC data), the DTA data from the same material samples empirically demonstrates that there were no flammability hazards (exothermic reactions) present at temperatures below 150°C.

SUMMARY AND RECOMMENDATIONS

IDC 291 and 332

Based on the results of volatile organic compound analysis, IDC 291 and IDC 332 materials might contain significant levels of VOCs. However, calculations verify that completed evaporation of each VOC would result in drum head space VOC levels less than a few percent of the lower explosive limit. The resulting indication is that there are no significant quantities of explosive volatile organic material. In addition, DTA data from the same material empirically demonstrated that there were no flammability hazards (exothermic reactions) present at temperatures below 150°C.

High moisture content may indicate free liquid in other IDC 291 and IDC 332 containers. These materials will need to be inspected and any free liquids will be removed and processed. If significant quantities of moisture (not as free liquid) are present in the sludge waste, operations personnel may consider removal of a fraction of the moisture through calcination.

IDC 331 and 336

Because free liquids were identified in the IDC 331 and IDC 336 residue materials, each individual package will need to be inspected, liquids removed and treated as necessary. The high variability of IDC 336 material indicates an additional need for inspection to identify unusual items. The DTA testing gave no indication of energetic material, which was the primary basis for considering these IDCs to be high risk. Thus, further characterization data might allow recategorization of the IDCs as low risk.

IDC 338

Much of the material in this sample population can not be verified as belonging to IDC 338 (8 of the 14 items) indicating that there is a very high probability that a significant percentage of the IDC 338 population will contain non-IDC 338 items. This means that the operators will need to sort, open and inspect each individual package, when processing this IDC, in order to remove non-IDC 338 material.

Packaging, particle size, moisture content and gas generation data help to characterize the filter media as innocuous. Packaging and particle size information will be useful to operations personnel during drum opening and material sorting operations and when attempting to distinguish between IDC 338 and non-IDC 338 material. Moisture content and gas generation testing (at both room temperature and at 146°F) verifies that the IDC 338 drums are not likely to have significant quantities of liquids and that the material will not violate the WIPPWAC hydrogen gas generation limit for this material.

CONCLUSION

Characterization has allowed confirmation of the Low Risk status of one IDC and recategorization of 2 others from high risk to low risk. It has provided some guidelines to ensure effective repackaging of the material for final disposal. Initial characterization of two High Risk IDCs indicates that further characterization may allow the IDCs to be reclassified as Low Risk, greatly simplifying the required processing.