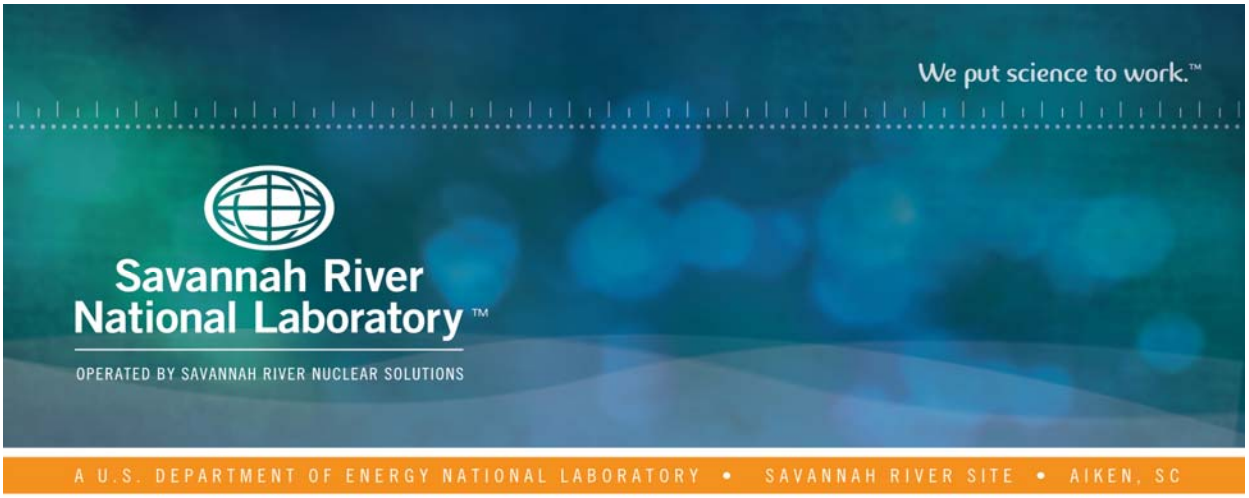

Review of Rheology Modifiers for Hanford Waste

J. M. Pareizs

September 2013

SRNL-STI-2013-00493

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Printed in the United States of America

Prepared for
U.S. Department of Energy

SRNL-STI-2013-00493
Revision 0

Keywords: *Rheology, WTP, Hanford*

Retention: *Permanent*

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Prepared for the U.S. Department of Energy under contract number DE-AC09-08SR22470.

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ACKNOWLEDGEMENTS

Funding for this report was provided by the Department of Energy – Office of River Protection under Inter-Entity Work Order (IEWO) M0SRV00091.

EXECUTIVE SUMMARY

As part of Savannah River National Laboratory (SRNL)'s strategic development scope for the Department of Energy – Office of River Protection (DOE-ORP) Hanford Tank Waste Treatment and Immobilization Plant (WTP) waste feed acceptance and product qualification scope, the SRNL has been requested to recommend candidate rheology modifiers to be evaluated to adjust slurry properties in the Hanford Tank Farm. SRNL has performed extensive testing of rheology modifiers for use with Defense Waste Processing Facility (DWPF) simulated melter feed – a high undissolved solids (UDS) mixture of simulated Savannah River Site (SRS) Tank Farm sludge, nitric and formic acids, and glass frit. A much smaller set of evaluations with Hanford simulated waste have also been completed. This report summarizes past work and recommends modifiers for further evaluation with Hanford simulated wastes followed by verification with actual waste samples.

Based on the review of available data, a few compounds/systems appear to hold the most promise. For all types of evaluated simulated wastes (caustic Handford tank waste and DWPF processing samples with pH ranging from slightly acidic to slightly caustic), polyacrylic acid had positive impacts on rheology. Citric acid also showed improvement in yield stress on a wide variety of samples.

It is recommended that both polyacrylic acid and citric acid be further evaluated as rheology modifiers for Hanford waste. These materials are weak organic acids with the following potential issues:

- The acidic nature of the modifiers may impact waste pH, if added in very large doses. If pH is significantly reduced by the modifier addition, dissolution of UDS and increased corrosion of tanks, piping, pumps, and other process equipment could occur. Smaller shifts in pH could reduce aluminum solubility, which would be expected to increase the yield stress of the sludge. Therefore, it is expected that use of an acidic modifier would be limited to concentrations that do not appreciably change the pH of the waste.
- Organics are typically reductants and could impact glass REDOX if not accounted for in the reductant addition calculations.
- Stability of the modifiers in a caustic, radioactive environment is not known, but some of the modifiers tested were specifically designed to withstand caustic conditions.
- These acids will add to the total organic carbon content of the wastes. Radiolytic decomposition of the acids could result in organic and hydrogen gas generation.

These potential impacts must be addressed in future studies with simulants representative of real waste and finally with tests using actual waste based on the rheology differences seen between SRS simulants and actual waste. The only non-organic modifier evaluated was sodium metasilicate. Further evaluation of this modifier is recommended if a reducing modifier is a concern.

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LIST OF ABBREVIATIONS

DOE-ORP	Department of Energy – Office of River Protection
DWPF	Defense Waste Processing Facility
PNNL	Pacific Northwest National Laboratory
SME	Slurry Mix Evaporator
SRAT	Sludge Receipt Adjustment Tank
SRNL	Savannah River National Laboratory
SRS	Savannah River Site
UDS	Undissolved solids
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1.0 Introduction

The Savannah River National Laboratory (SRNL) and the Pacific Northwest National Laboratory (PNNL) were tasked to jointly coordinate the engagement of the broader national laboratory community to solve technological challenges in initiative areas related to the Hanford tank wastes program. One of the focus areas was Waste Feed Acceptance and Product Qualification. Working with the Department of Energy – Office of River Protection (DOE-ORP) and Hanford contractor personnel, the laboratories completed a preliminary assessment of the technology gaps and potential areas for improvement in this area earlier in the fiscal year. Technical report, SRNL-STI-2012-00776/PNNL-22116,[1], was issued to document this assessment. The use of rheological modifiers as a potential means for altering the rheological properties of Hanford wastes was identified in this gap assessment. The Hanford Tank Waste Treatment and Immobilization Plant (WTP) Pretreatment facility currently has a very low rheology limit (yield stress and consistency) in the WAC for WTP transfers from the Tank Farm to the Pretreatment facility. To meet this limit, rheological modifiers may be necessary and must be effective in high pH environments. Even if the limit is increased, rheological modifiers may still be necessary depending on the properties of some of the Hanford wastes or they may provide a more attractive option than dilution through water addition.

In an April meeting between DOE-ORP, the Hanford contractors, and the laboratories, the laboratories were requested to recommend candidate rheology modifiers to be evaluated for use in the Hanford Tank Farm. The work scope is described in a SRNL Task Technical & Quality Assurance Plan.[2]

SRNL has performed extensive testing of rheology modifiers for use with Defense Waste Processing Facility (DWPF) simulated melter feed – a high undissolved solids (UDS) mixture of simulated Savannah River Site (SRS) Tank Farm sludge, nitric and formic acids, and glass frit.[3-6] A much smaller set of evaluations with Hanford simulated tank waste has also been completed (simulated Hanford tanks AZ-101 and AZ-102, some samples pretreated with a Cs ion exchange resin).[5, 7, 8] A review of available literature and data has been performed for applicability to Hanford tank waste conditions. Evaluated simulated wastes ranged from slightly acidic to pH 12. This report summarizes past work and recommends modifiers for further evaluation with Hanford simulated wastes.

2.0 Methodology

Available literature on the effect of rheological modifiers on Savannah River Site and Hanford simulated wastes were reviewed.[3-6, 8] Evaluations of modifiers at elevated temperatures was published,[4] but those results are not considered in this report as the conditions of interest were ambient temperature. A spreadsheet of the available results was created (see Appendix A). In these reports, three main categories of samples were evaluated: DWPF simulated melter feed, DWPF simulated Sludge Receipt and Adjustment Tank (SRAT) product (i.e., chemical processed feed), and Hanford simulated waste. A summary description of these categories is presented in Table 2-1.

Table 2-1. Description of Simulants Used in Modifier Testing

Sample Category	Description	Ref.
DWPF simulated SRAT Product Simulants (i.e., chemical processed feed)	SRS sludge with added formic and nitric acids (primarily for reduction of mercury and destruction of nitrite) Heated to boiling to facilitate reactions and concentrate solids Typical pH <7 Typical wt% UDS 10-20%	6
DWPF Simulated Melter Feed	SRS SRAT material with added frit (glass formers) Heated to boiling to concentrate solids Typical pH<7 Typical wt% UDS 35-50%	3-5, 8
Hanford Simulated Waste (Tanks AZ-101/102)	Hanford precipitated Tank AZ-101 simulants (precipitation via pretreatment with Cs ion exchange concentrate) pH 10-12 wt% UDS not published	7, 8
	Hanford Tank AZ-102 simulant pH not published wt% UDS 12.1%	5

For most of the studies, rheological measurements (specifically yield stress) of samples with modifier were compared to results with no modifier. Samples and modifiers which resulted in a 10% or greater decrease in yield stress were screened. That is, if a modifier did not decrease yield stress by at least 10% in any evaluation, it was removed from this evaluation. Examples of modifiers that did not meet this criterion are antifoams, which are typically used in processing to mitigate foaming. The results of this screening are presented in Table 2-2. Included in the table are brief descriptions of the modifiers. Excerpts from the source reports, with more detailed descriptions, are given in Appendix B. Over 90 percent of the remaining data for screening involved DWPF simulated melter feed.

Table 2-2. Modifiers That Resulted in a 10% Decrease in Yield Stress

Modifier	Description	DWPF Simulated SRAT Product	DWPF Simulated Melter Feed	Hanford Simulated Waste
ADVA Cast 555	organic mixture [a]	Not Evaluated	X	Not evaluated
ADVA Flex	proprietary polycarboxylate,	Not Evaluated	X	Not evaluate
Alcosperse 149	sodium polyacrylate	Not Evaluated	Not Evaluated	X
Alcosperse 240	proprietary polyacrylate	Not Evaluated	Not Evaluated	X
Alcosperse 408	proprietary polyacrylate	Not Evaluated	Not Evaluated	X
Alcosperse 725	proprietary polyacrylate	Not Evaluated	Not Evaluated	X
Citric Acid	citric acid	Not Evaluated	X	X
Cytec P35	proprietary polyacrylate	Not Evaluated	Not Evaluated	X
Cytec P70	proprietary polyacrylate	Not Evaluated	Not Evaluated	X
Disperse-Ayd W-28	proprietary polyacrylate	X	X	Yield stress increased
Dolapix A88	organic mixture	Not Evaluated	X	Not evaluated
Dolapix CE64	proprietary polyacrylate	X	X	X
Dolapix PC75	synthetic polyelectrolyte	Not Evaluated	X	Not evaluated
Duramax 3005	polyglycol	Not Evaluated	Not Evaluated	X
Glycolic Acid Solution	glycolic acid	Not Evaluated	X	Not Evaluated
Polyacrylic Acid	polyacrylic acid	Not Evaluated	X	X
Pomosperse AL36	proprietary polyacrylate	Not Evaluated	Not Evaluated	X
Recover®	organic mixture [b]	Not Evaluated	X	Not Evaluated
Sodium Metasilicate	crystallized silicate	Not Evaluated	X	Not Evaluated
Sodium Polyphosphate	phosphate polymer	Not Evaluated	Not Evaluated	X
Sugar	glucose	Not Evaluated	X	Not Evaluated

[a] 2-propenoic acid, polymer with methyloxirane polymer with oxirane, sodium salt; acetic acid; polycarboxylate

[b] Methyl isothiocyanate; metrahydro-3, 5-dimethyl-2H- 5 - 8 1.1 - 1.2 Liquid 1,3,4-thiadiazine-2-thione; sodium gluconate

3.0 Discussion of Available Data

A review of several rheology modifier reports was completed and a screening of the effectiveness and potential applicability was completed. Based on this review, polyacrylic acid appeared to be most applicable for use with Hanford wastes. This modifier had positive impact on rheology for Hanford simulated waste and the relatively higher insoluble solids DWPF simulated melter feeds. Citric acid should also be investigated. Results with Hanford simulated waste with citric acid are comparable to the results with polyacrylic acid. Most tests with DWPF simulated melter feed and citric acid showed improvement in yield stress. For both modifiers, good results (greater than

40% reduction in yield stress) were observed with additions of less than 10,000 ppm (or 1%). Note that simple dilution of a sample with water will decrease yield stress, but added water will ultimately need to be removed. Thus, a low concentration of modifier is desirable.

Both polyacrylic and citric acids are weak acids and may impact pH and dissolution of UDS of caustic tank waste. Both acids are organic and may act as reductants in waste processing. These potential impacts must be addressed in future studies. The only non- organic modifier evaluated was sodium metasilicate. Further evaluation of this modifier is recommended if a reducing modifier is a concern.

Following are excerpts and brief discussion of the conclusions from the referenced reports.

In a study of several rheology modifiers with Hanford simulated waste, results, citric acid and polyacrylic acid improved rheology:[7] "…it was found that weak acid-type modifiers are much more efficient. Among the weak acid-type modifiers, CA [citric acid] and PAA [polyacrylic acid] turned out to be two of the most efficient rheological modifiers, reducing yield stresses by about 70% at 5000 ppm."

From Hansen[3]: "The results from this testing indicate that citric acid or polycarboxylate based rheology modifiers are the most effective in reducing the yield stress, by as much as 70% at the higher rheology modifier additions and were effective on most of the tested simulants." In a continuation of this work, in 2011[4]: "The most effective rheology modifiers were the polyacrylic series of modifiers, reducing yield stress as much as 90%, but they did have one drawback, they made the SME [Slurry Mix Evaporator] product [i.e., melter feed] much more adhesive in appearance as compared to the other modifiers and baseline conditions." In these studies, all samples tested were DWPF simulated melter feed samples. The rheology modifiers are organic, hence they can also be considered reductants in melter operations. Some modifiers are also acids and may impact aspects of pretreatment (i.e., undesirable dissolution of metals or radionuclides).

From the Kay[5] and Stone[6, 8] studies which included Hanford simulated wastes, two modifiers decreased yield stress by more than 30% - Alcosperse 240, a polyacrylate, and Dolapix CE64, an ethylene glycol. In the Stone studies with DWPF simulants (both melter feed and SRAT product),[6] Dolapix CE64, and Disperse-Ayd W28, a polyacrylate showed greater than 30% improvement in yield stress. However, in another study with DWPF simulated melter feed, Dolapic CE64 increased yield stress.[3]

Following are summaries of modifier results. More detailed results of the modifier tests can be found in Appendix A, and detailed modifier descriptions can be found in Appendix B.

3.1 ADVA Cast 555

ADVA Cast 555, an organic mixture (see Appendix B), was evaluated (16 tests) with simulated DWPF melter feed at concentrations from 1,000 to 16,000 ppm.[3] Yield stress decreased in most evaluations. Additions of greater than 10,000 ppm yielded greater than 50% reduction with several samples.

3.2 ADVA Flex

This modifier, a polycarboxylate, was tested with several DWPF simulated melter feed samples at concentrations from nominally 1,000 to 16,000 ppm.[3] Of the 15 tests, 6 had yield stress decreases of 50%. However, over 10,000 ppm of modifier was used for these results.

3.3 Alcosperse 240, 408, and 725

These modifiers, all polyacrylate based, were used at a concentration of 1,000 ppm with Hanford waste simulants.[8] With a total of 8 tests, one showed improvement of 2%, while the remaining samples ranged from 14 to 37%.

3.4 Citric Acid

Eighty runs of various DWPF simulated melter feed samples were completed with citric acid concentrations varying between 1,000 and 10,000 ppm.[3, 4] Of all the runs, 33 showed less than a 10% improvement or an increase in yield stress. Twenty-four runs showed improvement of greater than 30%. Greatest improvements in yield stress occurred at concentrations of 4,000 to 16,000 ppm citric acid. In a study with Hanford simulated waste, a decrease in yield stress of greater than 30% was observed with 1,000 ppm citric acid and a decrease of nearly 70% at a concentration of 5,000 ppm.[7]

3.5 Cytec P35 and P70

The Cytec modifiers, both polyacrylate based, were evaluated with Hanford waste simulants at concentrations of 1,000 ppm.[8] In all cases (4 runs – 2 simulants, 2 modifiers), yield stress improved between 4 and 30%.

3.6 Disperse-Ayd W-22 and W-28

These modifiers, both polyacrylate based, were tested with Hanford waste simulant, DWPF simulated melter feed, and DWPF simulated SRAT product.[5, 6] Twelve samples were evaluated with concentrations between 500 and 9,000 ppm. Yield stress was impacted positively in most cases with concentrations of 2,000 ppm or greater. Of the seven samples with 1,000 ppm or less addition, only one had a decrease in yield stress of greater than 10%.

3.7 Dolapix A88

This modifier, an organic mixture (see Appendix B), was tested with DWPF simulated melter feed. [3] Of the 13 tests, only 2 showed a decrease of greater than 10% in yield stress, while yield stress increased significantly with 10 evaluations. Concentrations ranged from 800 to 10,000 ppm. As modifier concentration increased, yield stress increased.

3.8 Dolapix CE64

This modifier, a polyacrylate, was tested with 32 DWPF simulated SRAT product and melter feed samples at concentrations from 600 to 16,000 ppm.[3, 6] Yield stress showed improvement in approximately two thirds of the evaluations with no correlation to modifier concentration.

3.9 Dolapix PC75

This modifier, a synthetic polyelectrolyte, was evaluated 12 times with DWPF simulated melter feed at concentrations from 1,000 to 16,000 ppm.[3] Yield stress decreased in 8 of the evaluations. There was a slight correlation between yield stress improvement and modifier concentration.

3.10 Duramax D3005

This modifier, a polyglycol, was used with three Hanford simulated wastes and one DWPF melter feed sample at 1,000 ppm.[5, 8] The modifier reduced yield stress by more than 10% for the Hanford simulants, but significantly increased yield stress for the DWPF melter feed simulant.

3.11 Glycolic Acid

Glycolic acid was evaluated with 52 combinations of DWPF simulated melter feed at concentrations from 1,000 to 14,000 ppm.[4] Yield stress decreased by 10% in only 14 of the tests. It should be noted that glycolic acid is currently being considered as the replacement acid/reductant in DWPF processing. It has been shown to provide consistent reduction in the yield stress of sludge during the DWPF chemical processing and melter feed preparation steps, but at much higher concentrations than those evaluated in testing as a rheological modifier.

3.12 Polyacrylic Acid

Polyacrylic acids at varying molecular weights and concentrations in the samples ranging between 900 and 14,000 ppm were evaluated with DWPF simulated melter feed (188 evaluations).[3, 4] A decrease in yield stress was observed in 161 of the tests. Reduction in yield stress also appears to correlate with concentration of modifier. In a study with Hanford simulated waste, yield stress decreased by over 50% as the modifier concentration was increased to 5,000 ppm.[1]

3.13 Pomosperse AL36

This polyacrylate based modifier was tested on two Hanford simulated wastes.[8] Yield stress decreased by 9 and 14%.

3.14 Recover®

Recover®, an organic mixture (see Appendix B for composition), was evaluated 76 times at concentrations from 1,000 to 16,000 ppm with DWPF simulated melter feed.[3, 4] In 14 trials, yield stress either was not affected or increased.

3.15 Sodium Metasilicate

Sodium metasilicate was evaluated four times with DWPF simulated melter feed at concentrations from 1,000 to 10,000 ppm.[3] Yield stress improved in all four evaluations, from 3 to 19%.

3.16 Sodium Polyphosphate

This modifier was evaluated 13 times with DWPF simulated melter feed and Hanford simulated waste at 1,000 to 10,000 ppm.[3, 8] Yield stress improved in only three evaluations.

3.17 Sugar

Sugar was evaluated four times with DWPF simulated melter feed at concentrations from 1,000 to 10,000 ppm.[3] Yield stress improved in all four evaluations, from 2 to 17%.

4.0 Conclusions

Based on the limited data available, the weak acids polyacrylic acid and citric acid positively affected rheology of Hanford simulated wastes. These materials also showed improvement with relatively higher UDS DWPF simulated melter feed. The only non-organic modifier, sodium metasilicate also showed potential for decreasing yield stress.

5.0 Recommendations

It is recommended that both polyacrylic acid and citric acid be further evaluated as rheology modifiers for Hanford waste. These materials are weak organic acids with the following potential issues:

- The acidic nature of the modifiers may impact waste pH, if added in very large doses. If pH is significantly reduced by the modifier addition, dissolution of UDS and increased corrosion of tanks, piping, pumps, and other process equipment could occur. Smaller shifts in pH could reduce aluminum solubility, which would be expected to increase the yield stress of the sludge. Therefore, it is expected that use of an acidic modifier would be limited to concentrations that do not appreciably change the pH of the waste.
- Organics are typically reductants and could impact glass REDOX if not accounted for in the reductant addition calculations.
- Stability of the modifiers in a caustic, radioactive environment is not known, but some of the modifiers tested were specifically designed to withstand caustic conditions.
- These acids will add to the total organic carbon content of the wastes. Radiolytic decomposition of the acids could result in organic and hydrogen gas generation.

These potential impacts must be addressed in future studies with simulants representative of real waste and finally with tests using actual waste based on the rheology differences seen between SRS simulants and actual waste. The only non-organic modifier evaluated was sodium metasilicate. Further evaluation of this modifier is recommended if a reducing modifier is a concern.

6.0 References

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Appendix A. Rheology Results: Summaries From Referenced Reports

The following table contains numerical results from references used in this report. The Applicable reference is given in the table.

UDS=undissolved solids
np=not published
Calc % Change = (Yield Stress w Mod – Yield Stress no Mod) / Yield Stress no Mod)

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
ADVA Cast 555	RuRhHg 1-9 Decanted SME	16,040	np	np	72.5	25.4	-65.0	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	08-SB5-12/13 SME	11,189	44.7	34.4	6.6	2.32	-64.8	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Cast 555	RuRhHg 1-9 Decanted SME	11,042	np	np	72.5	32.4	-55.3	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	08-SB5-12/13 SME	7,099	44.7	34.4	6.6	3.53	-46.5	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-23 SME	16,130	49.6	35.1	24.4	13.3	-45.5	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-23 SME	11,082	49.6	35.1	24.4	15.4	-36.9	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Cast 555	RuRhHg 1-9 Decanted SME	6,073	np	np	72.5	45.8	-36.8	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-24 SME	11,189	48.8	34.5	5.22	3.42	-34.5	5.14	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-23 SME	6,068	49.6	35.1	24.4	18.2	-25.4	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-24 SME	6,070	48.8	34.5	5.22	3.94	-24.5	5.14	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	08-SB5-12/13 SME	3,446	44.7	34.4	6.6	5.26	-20.3	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-24 SME	16,397	48.8	34.5	5.22	4.25	-18.6	5.14	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Cast 555	RuRhHg 1-9 Decanted SME	1,023	np	np	72.5	65.9	-9.1	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-24 SME	1,008	48.8	34.5	5.22	4.78	-8.4	5.14	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	09-SB5-23 SME	1,077	49.6	35.1	24.4	22.4	-8.2	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA CAST 555	08-SB5-12/13 SME	1,121	44.7	34.4	6.6	6.65	0.8	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Flex	RuRhHg 1-9 Decanted SME	16,011	np	np	72.5	21.7	-70.1	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Flex	RuRhHg 1-9 SME	16,080	51.55	42	13.4	4.1	-69.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	09-SB5-23 SME	16,120	49.6	35.1	24.4	9.4	-61.5	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Flex	RuRhHg 1-9 Decanted SME	11,005	np	np	72.5	31	-57.2	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Flex	RuRhHg 1-9 SME	11,069	51.55	42	13.4	5.8	-56.7	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	09-SB5-23 SME	11,007	49.6	35.1	24.4	12.1	-50.4	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Flex	RuRhHg 1-9 Decanted SME	5,994	np	np	72.5	42.9	-40.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Flex	RuRhHg 1-9 SME	6,023	51.55	42	13.4	8	-40.3	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	09-SB5-23 SME	6,142	49.6	35.1	24.4	15.2	-37.7	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
ADVA FLEX	09-SB5-24 SME	6,201	48.8	34.5	5.22	4.04	-22.6	5.14	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	09-SB5-24 SME	11,100	48.8	34.5	5.22	4.29	-17.8	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA Flex	RuRhHg 1-9 SME	1,115	51.55	42	13.4	11.1	-17.2	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	RuRhHg 1-9 Decanted SME	1,062	np	np	72.5	61.3	-15.4	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	09-SB5-23 SME	1,068	49.6	35.1	24.4	21.6	-11.5	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	09-SB5-24 SME	16,154	48.8	34.5	5.22	4.78	-8.4	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	09-SB5-24 SME	1,035	48.8	34.5	5.22	4.99	-4.4	5.14	SRNL-STI-2009-697	DWPF Simulated Melter Feed
ADVA FLEX	Melter Feed	1,000	47	41	10.3	30.3	194.2	6-7	WSRC-MS-2003-136	DWPF Simulated Melter Feed
Alcosperse 149	FIU AZ-101	1,000	np	np	10.36	7.37	-28.9	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Alcosperse 149	AZ-101	1,000	np	np	3.22	2.77	-14.0	12.23	SRNL-GPD-2004-40	Hanford Simulated Waste
Alcosperse 240	FIU AZ-101	1,000	np	np	10.36	6.5	-37.3	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Alcosperse 240	AZ-101	1,000	np	np	3.22	2.63	-18.3	12.23	SRNL-GPD-2004-40	Hanford Simulated Waste
Alcosperse 408	AZ-101	1,000	np	np	3.22	2.48	-23.0	12.23	SRNL-GPD-2004-40	Hanford Simulated Waste
Alcosperse 408	FIU AZ-101	1,000	np	np	10.36	8.14	-21.4	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Alcosperse 725	FIU AZ-101	1,000	np	np	10.36	8.2	-20.8	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Alcosperse 725	AZ-101	1,000	np	np	3.22	3.15	-2.2	12.23	SRNL-GPD-2004-40	Hanford Simulated Waste
Antifoam 747	AZ102 simulant	1,000	12.6	12.1	4.6	4.5	-2.2	np	WSRC-MS-2003-136	Hanford Simulated Waste
B52 antifoam	AZ102 simulant	1,000	12.6	12.1	4.6	5.6	21.7	np	WSRC-MS-2003-136	Hanford Simulated Waste
Citric Acid	SB6 SME-1	4,000	28.2	20.2	4.25	4.59	8.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-1	1,000	28.2	20.2	4.25	4.56	7.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6-1,2,3,4 SME	10,035	46.9	37.2	2.2	2.33	5.9	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-3	1,000	33	23.8	7.82	8.19	4.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-1	7,000	28.2	20.2	4.25	4.37	2.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6-1,2,3,4 SME	1,050	46.9	37.2	2.2	2.26	2.7	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-2	4,000	30.9	22.3	5.98	6.11	2.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-9	1,000	48.2	36.4	31.2	31.8	1.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-2	1,000	30.9	22.3	5.98	6.07	1.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-4	1,000	36	26.4	10.8	10.9	0.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6-1,2,3,4 SME	7,029	46.9	37.2	2.2	2.21	0.5	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-9	4,000	48.2	36.4	31.2	31.1	-0.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6-1,2,3,4 SME	3,523	46.9	37.2	2.2	2.16	-1.8	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-8	1,000	46.4	34.9	26.4	25.9	-1.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-3	4,000	33	23.8	7.82	7.67	-1.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-1	10,000	28.2	20.2	4.25	4.13	-2.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-7	1,000	43.6	32.4	24.9	24.1	-3.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-4	4,000	36	26.4	10.8	10.4	-3.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-2	7,000	30.9	22.3	5.98	5.74	-4.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-2	10,000	30.9	22.3	5.98	5.7	-4.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Citric Acid	SB6 SME-9	7,000	48.2	36.4	31.2	29.7	-4.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-7	4,000	43.6	32.4	24.9	23.6	-5.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-8	4,000	46.4	34.9	26.4	25	-5.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-5	1,000	38.6	28.3	14.5	13.7	-5.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-9	10,000	48.2	36.4	31.2	29.4	-5.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-6	1,000	41.5	30.8	19	17.9	-5.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-4	10,000	36	26.4	10.8	10.1	-6.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-3	7,000	33	23.8	7.82	7.3	-6.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-6	4,000	41.5	30.8	19	17.7	-6.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-5	4,000	38.6	28.3	14.5	13.4	-7.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-4	7,000	36	26.4	10.8	9.9	-8.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-8	10,000	46.4	34.9	26.4	24	-9.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-7	10,000	43.6	32.4	24.9	22.5	-9.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-6	7,000	41.5	30.8	19	17.1	-10.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-3	10,000	33	23.8	7.82	7.02	-10.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-7	7,000	43.6	32.4	24.9	22.3	-10.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	09-SB5-24 SME	10,054	48.8	34.5	5.22	4.65	-10.9	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-8	7,000	46.4	34.9	26.4	23.4	-11.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-5	7,000	38.6	28.3	14.5	12.7	-12.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-5	10,000	38.6	28.3	14.5	12.5	-13.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB6 SME-6	10,000	41.5	30.8	19	16.3	-14.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 SME	9,996	51.55	42	13.4	11.4	-14.9	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	08-SB5-12/13 SME	1,029	44.7	34.4	6.6	5.5	-16.7	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 Decanted SME	7,020	np	np	72.5	59.6	-17.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 Decanted SME	1,054	np	np	72.5	59.1	-18.5	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	09-SB5-24 SME	7,018	48.8	34.5	5.22	4.24	-18.8	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 Decanted SME	10,000	np	np	72.5	58.7	-19.0	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	09-SB5-23 SME	1,055	49.6	35.1	24.4	19.4	-20.5	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-2	1,000	43.9	36	4.02	3.17	-21.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 SME	7,006	51.55	42	13.4	10.4	-22.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 SME	1,001	51.55	42	13.4	10.3	-23.1	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	09-SB5-24 SME	1,049	48.8	34.5	5.22	3.96	-24.1	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 SME	3,518	51.55	42	13.4	10.1	-24.6	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	RuRhHg 1-9 Decanted SME	3,506	np	np	72.5	52.8	-27.2	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	09-SB5-23 SME	3,512	49.6	35.1	24.4	17.7	-27.5	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Citric Acid	09-SB5-24 SME	3,536	48.8	34.5	5.22	3.7	-29.1	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-5	1,000	51.9	42.5	23.8	15.7	-34.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	08-SB5-12/13 SME	3,590	44.7	34.4	6.6	4.3	-34.8	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-4	1,000	49.2	40.1	13.5	8.3	-38.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-1	1,000	41.2	33.7	3.05	1.83	-40.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	08-SB5-12/13 SME	7,064	44.7	34.4	6.6	3.9	-40.9	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-3	1,000	46.7	38.4	7.49	4.39	-41.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-2	4,000	43.9	36	4.02	1.96	-51.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	08-SB5-12/13 SME	10,005	44.7	34.4	6.6	3.2	-51.5	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	09-SB5-23 SME	7,065	49.6	35.1	24.4	11.6	-52.5	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-1	4,000	41.2	33.7	3.05	1.39	-54.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-2	7,000	43.9	36	4.02	1.71	-57.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-1	7,000	41.2	33.7	3.05	1.22	-60.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-3	4,000	46.7	38.4	7.49	2.91	-61.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-2	10,000	43.9	36	4.02	1.56	-61.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-4	4,000	49.2	40.1	13.5	5.2	-61.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-5	4,000	51.9	42.5	23.8	8.9	-62.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-1	10,000	41.2	33.7	3.05	1.11	-63.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	09-SB5-23 SME	10,055	49.6	35.1	24.4	8.5	-65.2	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-3	7,000	46.7	38.4	7.49	2.48	-66.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-3	10,000	46.7	38.4	7.49	2.4	-68.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-4	7,000	49.2	40.1	13.5	4.2	-68.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-4	10,000	49.2	40.1	13.5	4.1	-69.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-5	7,000	51.9	42.5	23.8	7.2	-69.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Citric Acid	SB4-SME-5	10,000	51.9	42.5	23.8	6.7	-71.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
CTAB	AZ102 simulant	1,000	12.6	12.1	4.6	7	52.2	np	WSRC-MS-2003-136	Hanford Simulated Waste
Cytec P35	FIU AZ-101	1,000	np	np	10.36	7.28	-29.7	np	SRNL-GPD-2004-40	Hanford Simulated Waste
Cytec P35	AZ-101	1,000	np	np	3.22	2.94	-8.7	np	SRNL-GPD-2004-40	Hanford Simulated Waste
Cytec P70	FIU AZ-101	1,000	np	np	10.36	8.83	-14.8	np	SRNL-GPD-2004-40	Hanford Simulated Waste
Cytec P70	AZ-101	1,000	np	np	3.22	3.1	-3.7	np	SRNL-GPD-2004-40	Hanford Simulated Waste
Darvan C	AZ102 simulant	1,000	12.6	12.1	4.6	4.4	-4.3	np	WSRC-MS-2003-136	Hanford Simulated Waste
Disperse-Ayd W-22	AZ102 simulant	1,000	12.6	12.1	4.6	4.6	0.0	np	WSRC-MS-2003-136	Hanford Simulated Waste
Disperse-Ayd W-28	AZ102 simulant	1,000	12.6	12.1	4.6	4.9	6.5	np	WSRC-MS-2003-136	Hanford Simulated Waste
Disperse-Ayd W-28	SME	460	np	np	10.5	10.8	2.9	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed
Disperse-Ayd W-28	SRAT	2,289	np	np	10.2	10.4	2.0	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Disperse-Ayd W-28	SRAT	1,147	np	np	10.2	9.6	-5.9	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Disperse-Ayd W-28	SRAT	460	np	np	10.2	9.5	-6.9	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Disperse-Ayd W-28	SME	1,147	np	np	10.5	8.6	-18.1	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed
Disperse-Ayd W-28	SME	2,289	np	np	10.5	6.1	-41.9	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed
Disperse-Ayd W-28	SRAT	2,289	np	np	3.9	1.8	-53.8	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Disperse-Ayd W-28	SRAT	4,554	np	np	3.9	1.5	-61.5	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Disperse-Ayd W-28	SRAT	6,798	np	np	3.9	0.82	-79.0	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Disperse-Ayd W-28	SRAT	9,020	np	np	3.9	0.6	-84.6	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix A88	08-SB5-12/13 SME	10,009	44.7	34.4	6.6	17	157.6	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	SB6-1,2,3,4 SME	10,055	46.9	37.2	2.2	5.12	132.7	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	08-SB5-12/13 SME	6,132	44.7	34.4	6.6	13.9	110.6	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	SB6-1,2,3,4 SME	6,149	46.9	37.2	2.2	4.25	93.2	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	08-SB5-12/13 SME	3,103	44.7	34.4	6.6	10.4	57.6	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	SB6-1,2,3,4 SME	3,058	46.9	37.2	2.2	3.24	47.3	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	SB6-1,2,3,4 SME	1,080	46.9	37.2	2.2	3.11	41.4	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	08-SB5-12/13 SME	1,057	44.7	34.4	6.6	8.7	31.8	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	RuRhHg 1-9 SME	9,838	51.55	42	13.4	16.4	22.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	RuRhHg 1-9 SME	847	51.55	42	13.4	12.9	-3.7	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	RuRhHg 1-9 SME	2,902	51.55	42	13.4	12	-10.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	RuRhHg 1-9 SME	5,889	51.55	42	13.4	11.9	-11.2	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix A88	Melter Feed	1,000	47	41	10.3	12.9	25.2	6-7	WSRC-MS-2003-136	DWPF Simulated Melter Feed
Dolapix CE64	SB6-1,2,3,4 SME	6,138	46.9	37.2	2.2	3.36	52.7	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SB6-1,2,3,4 SME	11,126	46.9	37.2	2.2	3.23	46.8	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	08-SB5-12/13 SME	11,009	44.7	34.4	6.6	9.5	43.9	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	08-SB5-12/13 SME	6,074	44.7	34.4	6.6	9	36.4	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SB6-1,2,3,4 SME	1,044	46.9	37.2	2.2	2.91	32.3	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	08-SB5-12/13 SME	16,057	44.7	34.4	6.6	8.5	28.8	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SB6-1,2,3,4 SME	16,049	46.9	37.2	2.2	2.65	20.5	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	08-SB5-12/13 SME	1,058	44.7	34.4	6.6	7.2	9.1	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SME	1,621	np	np	15.8	16.4	3.8	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed
Dolapix CE64	SRAT	649	np	np	10.2	10.4	2.0	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	RuRhHg 1-9 SME	946	51.55	42	13.4	12.5	-6.7	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SME	649	np	np	10.5	9.7	-7.6	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed
Dolapix CE64	SME	1,621	np	np	10.5	9.66	-8.0	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Dolapix CE64	SRAT	747	np	np	11.8	10.8	-8.5	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	RuRhHg 1-9 Decanted SME	1,095	np	np	72.5	65.4	-9.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SRAT	1,621	np	np	10.2	9.2	-9.8	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	SME	3,234	np	np	15.8	13.8	-12.7	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed
Dolapix CE64	SRAT	1,492	np	np	11.8	10.2	-13.6	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	SME	3,234	np	np	10.5	8.24	-21.5	np	WSRC-TR-2004-82	DWPF Simulated Melter Feed
Dolapix CE64	SRAT	3,234	np	np	10.2	8	-21.6	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	RuRhHg 1-9 SME	5,962	51.55	42	13.4	10.2	-23.9	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	RuRhHg 1-9 Decanted SME	6,015	np	np	72.5	50.5	-30.3	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	AZ-101	1,000	np	np	3.22	2.22	-31.1	np	SRNL-GPD-2004-40	Hanford Simulated Waste
Dolapix CE64	FIU AZ-101	1,000	np	np	10.36	7.01	-32.3	np	SRNL-GPD-2004-40	Hanford Simulated Waste
Dolapix CE64	SRAT	3,234	np	np	3.9	2.5	-35.9	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	RuRhHg 1-9 SME	10,928	51.55	42	13.4	8.5	-36.6	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SRAT	6,436	np	np	3.9	2.3	-41.0	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	RuRhHg 1-9 Decanted SME	11,001	np	np	72.5	42.2	-41.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	RuRhHg 1-9 SME	15,974	51.55	42	13.4	7.6	-43.3	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SRAT	9,606	np	np	3.9	2.1	-46.2	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix CE64	RuRhHg 1-9 Decanted SME	16,051	np	np	72.5	37.2	-48.7	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix CE64	SRAT	12,745	np	np	3.9	1.7	-56.4	np	WSRC-TR-2004-82	DWPF Simulated SRAT Product
Dolapix PC75	08-SB5-12/13 SME	16,055	44.7	34.4	6.6	6.6	0.0	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	08-SB5-12/13 SME	1,034	44.7	34.4	6.6	6.4	-3.0	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	SB6-1,2,3,4 SME	1,083	46.9	37.2	2.2	2.12	-3.6	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	08-SB5-12/13 SME	11,083	44.7	34.4	6.6	6.3	-4.5	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	08-SB5-12/13 SME	6,096	44.7	34.4	6.6	5.9	-10.6	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	SB6-1,2,3,4 SME	16,519	46.9	37.2	2.2	1.88	-14.5	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	SB6-1,2,3,4 SME	10,998	46.9	37.2	2.2	1.84	-16.4	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	RuRhHg 1-9 SME	984	51.55	42	13.4	11.1	-17.2	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	SB6-1,2,3,4 SME	6,084	46.9	37.2	2.2	1.78	-19.1	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Dolapix PC75	RuRhHg 1-9 SME	5,987	51.55	42	13.4	10	-25.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	RuRhHg 1-9 SME	11,001	51.55	42	13.4	9.2	-31.3	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Dolapix PC75	RuRhHg 1-9 SME	15,990	51.55	42	13.4	9.1	-32.1	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Duramax 3005	AZ102 simulant	1,000	47	41	4.6	3.8	-17.4	np	WSRC-MS-2003-136	Hanford Simulated Waste
Duramax 3005	FIU AZ-101	1,000	np	np	10.36	7.49	-27.7	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Duramax 3005	AZ-101	1,000	np	np	3.22	2.84	-11.8	12.23	SRNL-GPD-2004-40	Hanford Simulated Waste
Duramax D3005	Melter Feed	1,000	47	41	10.3	14.6	41.7	6-7	WSRC-MS-2003-136	DWPF Simulated Melter Feed
EDAPLAN 470	AZ-101	1,000	np	np	3.22	3.19	-0.9	np	SRNL-GPD-2004-40	Hanford Simulated Waste
EDAPLAN 470	FIU AZ-101	1,000	np	np	10.36	9.41	-9.2	np	SRNL-GPD-2004-40	Hanford Simulated Waste
EDAPLAN 472	AZ-101	1,000	np	np	3.22	3.34	3.7	np	SRNL-GPD-2004-40	Hanford Simulated Waste
EDAPLAN 472	FIU AZ-101	1,000	np	np	10.36	9.42	-9.1	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Glycolic Acid	SB6 SME-1	1,000	28.2	20.2	4.25	4.86	14.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-1	5,500	28.2	20.2	4.25	4.76	12.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-1	9,500	28.2	20.2	4.25	4.73	11.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-2	1,000	30.9	22.3	5.98	6.49	8.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-1	14,000	28.2	20.2	4.25	4.5	5.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-2	14,000	30.9	22.3	5.98	6.22	4.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-2	9,500	30.9	22.3	5.98	6.21	3.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-3	1,000	33	23.8	7.82	8.06	3.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-8	1,000	46.4	34.9	26.4	27	2.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-4	1,000	36	26.4	10.8	11	1.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-2	5,500	30.9	22.3	5.98	6.08	1.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-9	1,000	48.2	36.4	31.2	31.7	1.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-7	1,000	43.6	32.4	24.9	25.1	0.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-9	5,500	48.2	36.4	31.2	31.3	0.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-4	9,500	36	26.4	10.8	10.8	0.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-4	5,500	36	26.4	10.8	10.7	-0.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-6	9,500	41.5	30.8	19	18.8	-1.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-3	9,500	33	23.8	7.82	7.71	-1.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-6	1,000	41.5	30.8	19	18.7	-1.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-4	14,000	36	26.4	10.8	10.6	-1.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-3	5,500	33	23.8	7.82	7.64	-2.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-3	14,000	33	23.8	7.82	7.64	-2.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-6	5,500	41.5	30.8	19	18.4	-3.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-8	9,500	46.4	34.9	26.4	25.4	-3.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-9	9,500	48.2	36.4	31.2	30	-3.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-5	9,500	38.6	28.3	14.5	13.9	-4.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-8	5,500	46.4	34.9	26.4	25.1	-4.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-5	1,000	38.6	28.3	14.5	13.7	-5.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Glycolic Acid	SB6 SME-7	5,500	43.6	32.4	24.9	23.4	-6.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-8	14,000	46.4	34.9	26.4	24.8	-6.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-7	14,000	43.6	32.4	24.9	23.2	-6.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-6	14,000	41.5	30.8	19	17.7	-6.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-5	5,500	38.6	28.3	14.5	13.5	-6.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-5	14,000	38.6	28.3	14.5	13.3	-8.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-9	14,000	48.2	36.4	31.2	28.6	-8.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid	SB6 SME-7	9,500	43.6	32.4	24.9	22.6	-9.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-2	1,000	43.9	36	4.02	3.98	-1.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-4	1,000	49.2	40.1	13.5	12.5	-7.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-3	1,000	46.7	38.4	7.49	6.69	-10.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-1	1,000	41.2	33.7	3.05	2.67	-12.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-2	5,500	43.9	36	4.02	3.06	-23.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-2	9,500	43.9	36	4.02	2.57	-36.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-3	5,500	46.7	38.4	7.49	4.69	-37.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-4	5,500	49.2	40.1	13.5	8.3	-38.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-2	14,000	43.9	36	4.02	2.45	-39.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-1	9,500	41.2	33.7	3.05	1.85	-39.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-3	9,500	46.7	38.4	7.49	4.23	-43.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-1	5,500	41.2	33.7	3.05	1.72	-43.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-1	14,000	41.2	33.7	3.05	1.69	-44.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-3	14,000	46.7	38.4	7.49	3.67	-51.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-4	9,500	49.2	40.1	13.5	6.5	-51.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Glycolic Acid Solution	SB4-SME-4	14,000	49.2	40.1	13.5	6.3	-53.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Phenylboric Acid	RuRhHg 1-9 Decanted SME	1,045	np	np	72.5	66.8	-7.9	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Phenylboric Acid	RuRhHg 1-9 Decanted SME	3,506	np	np	72.5	66.3	-8.6	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Phenylboric Acid	RuRhHg 1-9 Decanted SME	7,033	np	np	72.5	68.4	-5.7	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Phenylboric Acid	RuRhHg 1-9 Decanted SME	10,018	np	np	72.5	66.1	-8.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	SB6-1,2,3,4 SME	1,025	46.9	37.2	2.2	3.25	47.7	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	SB6-1,2,3,4 SME	3,589	46.9	37.2	2.2	2.96	34.5	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	08-SB5-12/13 SME	3,575	44.7	34.4	6.6	8.7	31.8	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	09-SB5-24 SME	1,020	48.8	34.5	5.22	6.45	23.6	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	09-SB5-24 SME	3,528	48.8	34.5	5.22	6.08	16.5	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	08-SB5-12/13 SME	976	44.7	34.4	6.6	7.6	15.2	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	SB6-1,2,3,4 SME	7,010	46.9	37.2	2.2	2.38	8.2	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Polyacrylic Acid	09-SB5-23 SME	988	49.6	35.1	24.4	24.8	1.6	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	08-SB5-12/13 SME	7,166	44.7	34.4	6.6	6.5	-1.5	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	09-SB5-23 SME	3,548	49.6	35.1	24.4	20.6	-15.6	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	09-SB5-24 SME	7,096	48.8	34.5	5.22	4.12	-21.1	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	SB6-1,2,3,4 SME	9,996	46.9	37.2	2.2	1.61	-26.8	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 SME	937	51.55	42	13.4	8.4	-37.3	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 SME	9,954	51.55	42	13.4	8.1	-39.6	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 Decanted SME	992	np	np	72.5	39.5	-45.5	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 SME	6,930	51.55	42	13.4	6.9	-48.5	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	09-SB5-23 SME	6,986	49.6	35.1	24.4	12.5	-48.8	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	09-SB5-24 SME	10,158	48.8	34.5	5.22	2.67	-48.9	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 SME	3,466	51.55	42	13.4	6.8	-49.3	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	08-SB5-12/13 SME	10,509	44.7	34.4	6.6	3.3	-50.0	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 Decanted SME	10,003	np	np	72.5	26.7	-63.2	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 Decanted SME	3,491	np	np	72.5	25.2	-65.2	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	RuRhHg 1-9 Decanted SME	7,009	np	np	72.5	23.1	-68.1	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid	09-SB5-23 SME	10,010	49.6	35.1	24.4	5.7	-76.6	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-1	1,000	28.2	20.2	4.25	4.65	9.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-2	1,000	30.9	22.3	5.98	6.08	1.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-9	1,000	48.2	36.4	31.2	30.9	-1.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-4	1,000	36	26.4	10.8	10.5	-2.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-8	1,000	46.4	34.9	26.4	25.6	-3.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-3	1,000	33	23.8	7.82	7.38	-5.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-7	1,000	43.6	32.4	24.9	23.4	-6.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-5	1,000	38.6	28.3	14.5	13.5	-6.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-6	1,000	41.5	30.8	19	17.4	-8.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-1	4,000	28.2	20.2	4.25	3.75	-11.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-9	4,000	48.2	36.4	31.2	26.4	-15.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-2	4,000	30.9	22.3	5.98	5.03	-15.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-5	4,000	38.6	28.3	14.5	12.1	-16.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-8	4,000	46.4	34.9	26.4	22	-16.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-4	4,000	36	26.4	10.8	8.9	-17.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-9	7,000	48.2	36.4	31.2	25.6	-17.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-2	1,000	43.9	36	4.02	3.25	-19.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-3	4,000	33	23.8	7.82	6.27	-19.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Polyacrylic Acid, 1800 MW	SB6 SME-6	4,000	41.5	30.8	19	15.1	-20.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-5	1,000	51.9	42.5	23.8	18.6	-21.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-7	4,000	43.6	32.4	24.9	19.3	-22.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-4	1,000	49.2	40.1	13.5	9.9	-26.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-5	7,000	38.6	28.3	14.5	10.5	-27.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-1	1,000	41.2	33.7	3.05	2.19	-28.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-3	7,000	33	23.8	7.82	5.46	-30.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-2	7,000	30.9	22.3	5.98	4.17	-30.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-6	7,000	41.5	30.8	19	13.2	-30.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-3	1,000	46.7	38.4	7.49	5.14	-31.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-4	7,000	36	26.4	10.8	7.3	-32.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-8	7,000	46.4	34.9	26.4	17.7	-33.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-7	7,000	43.6	32.4	24.9	16.3	-34.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-1	7,000	28.2	20.2	4.25	2.78	-34.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-9	10,000	48.2	36.4	31.2	19.7	-36.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-5	10,000	38.6	28.3	14.5	9	-37.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-8	10,000	46.4	34.9	26.4	15.1	-42.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-7	10,000	43.6	32.4	24.9	14.1	-43.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-4	10,000	36	26.4	10.8	6.1	-43.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-6	10,000	41.5	30.8	19	10.7	-43.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-3	10,000	33	23.8	7.82	4.31	-44.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-1	10,000	28.2	20.2	4.25	2.15	-49.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB6 SME-2	10,000	30.9	22.3	5.98	3.02	-49.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-2	4,000	43.9	36	4.02	1.35	-66.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-1	4,000	41.2	33.7	3.05	0.96	-68.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-4	4,000	49.2	40.1	13.5	3.7	-72.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-3	4,000	46.7	38.4	7.49	2.04	-72.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-5	4,000	51.9	42.5	23.8	6.2	-73.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-1	7,000	41.2	33.7	3.05	0.53	-82.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-2	7,000	43.9	36	4.02	0.61	-84.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-3	7,000	46.7	38.4	7.49	0.94	-87.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-5	7,000	51.9	42.5	23.8	2.9	-87.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-4	7,000	49.2	40.1	13.5	1.6	-88.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-1	10,000	41.2	33.7	3.05	0.3	-90.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-2	10,000	43.9	36	4.02	0.35	-91.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-5	10,000	51.9	42.5	23.8	1.9	-92.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-3	10,000	46.7	38.4	7.49	0.58	-92.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 1800 MW	SB4-SME-4	10,000	49.2	40.1	13.5	1	-92.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-1	1,000	28.2	20.2	4.25	4.68	10.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Polyacrylic Acid, 2000 MW	SB6 SME-1	5,500	28.2	20.2	4.25	4.6	8.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-9	1,000	48.2	36.4	31.2	33	5.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-3	1,000	33	23.8	7.82	8.19	4.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-7	1,000	43.6	32.4	24.9	26	4.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-2	1,000	30.9	22.3	5.98	6.03	0.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-8	1,000	46.4	34.9	26.4	26.6	0.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-4	1,000	36	26.4	10.8	10.8	0.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-6	1,000	41.5	30.8	19	18.8	-1.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-5	1,000	38.6	28.3	14.5	14.3	-1.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-3	5,500	33	23.8	7.82	7.7	-1.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-9	5,500	48.2	36.4	31.2	30.6	-1.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-1	9,500	28.2	20.2	4.25	4.1	-3.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-7	5,500	43.6	32.4	24.9	23.9	-4.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-9	9,500	48.2	36.4	31.2	29.9	-4.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-8	5,500	46.4	34.9	26.4	25.1	-4.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-2	5,500	30.9	22.3	5.98	5.65	-5.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-4	5,500	36	26.4	10.8	10.2	-5.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-5	5,500	38.6	28.3	14.5	13.3	-8.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-7	9,500	43.6	32.4	24.9	22.7	-8.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-2	9,500	30.9	22.3	5.98	5.43	-9.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-4	1,000	49.2	40.1	13.5	12.2	-9.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-1	1,000	41.2	33.7	3.05	2.75	-9.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-6	5,500	41.5	30.8	19	17.1	-10.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-2	1,000	43.9	36	4.02	3.56	-11.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-8	9,500	46.4	34.9	26.4	23	-12.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-3	9,500	33	23.8	7.82	6.63	-15.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-6	9,500	41.5	30.8	19	15.8	-16.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-4	9,500	36	26.4	10.8	8.9	-17.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-2	14,000	30.9	22.3	5.98	4.92	-17.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-3	1,000	46.7	38.4	7.49	6.06	-19.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-5	9,500	38.6	28.3	14.5	11.6	-20.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-9	14,000	48.2	36.4	31.2	24.7	-20.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-7	14,000	43.6	32.4	24.9	19.5	-21.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-6	14,000	41.5	30.8	19	14.7	-22.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-8	14,000	46.4	34.9	26.4	20.4	-22.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-4	14,000	36	26.4	10.8	8.3	-23.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-1	14,000	28.2	20.2	4.25	3.17	-25.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-3	14,000	33	23.8	7.82	5.72	-26.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB6 SME-5	14,000	38.6	28.3	14.5	9.9	-31.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Polyacrylic Acid, 2000 MW	SB4-SME-1	5,500	41.2	33.7	3.05	1.54	-49.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-2	5,500	43.9	36	4.02	1.9	-52.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-4	5,500	49.2	40.1	13.5	6.2	-54.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-3	5,500	46.7	38.4	7.49	3.1	-58.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-1	9,500	41.2	33.7	3.05	0.84	-72.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-1	14,000	41.2	33.7	3.05	0.72	-76.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-2	9,500	43.9	36	4.02	0.93	-76.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-3	9,500	46.7	38.4	7.49	1.63	-78.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-3	14,000	46.7	38.4	7.49	1.37	-81.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-2	14,000	43.9	36	4.02	0.62	-84.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-4	9,500	49.2	40.1	13.5	1.9	-85.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 2000 MW	SB4-SME-4	14,000	49.2	40.1	13.5	1.7	-87.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-1	1,000	28.2	20.2	4.25	4.82	13.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-9	1,000	48.2	36.4	31.2	32.9	5.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-2	1,000	30.9	22.3	5.98	6.2	3.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-8	1,000	46.4	34.9	26.4	27.3	3.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-2	5,500	30.9	22.3	5.98	6.11	2.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-7	1,000	43.6	32.4	24.9	25.4	2.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-6	1,000	41.5	30.8	19	19.1	0.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-3	1,000	33	23.8	7.82	7.86	0.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-4	1,000	36	26.4	10.8	10.8	0.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-9	5,500	48.2	36.4	31.2	31	-0.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-5	1,000	38.6	28.3	14.5	14	-3.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-9	14,000	48.2	36.4	31.2	29.7	-4.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-7	9,500	43.6	32.4	24.9	23.6	-5.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-1	5,500	28.2	20.2	4.25	4.02	-5.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-5	1,000	51.9	42.5	23.8	22.4	-5.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-8	5,500	46.4	34.9	26.4	24.8	-6.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-1	1,000	41.2	33.7	3.05	2.85	-6.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-4	1,000	49.2	40.1	13.5	12.5	-7.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-9	9,500	48.2	36.4	31.2	28.7	-8.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-6	5,500	41.5	30.8	19	17.2	-9.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-2	1,000	43.9	36	4.02	3.62	-10.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-3	5,500	33	23.8	7.82	6.98	-10.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-4	5,500	36	26.4	10.8	9.6	-11.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-2	9,500	30.9	22.3	5.98	5.24	-12.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-7	5,500	43.6	32.4	24.9	21.8	-12.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-5	5,500	38.6	28.3	14.5	12.2	-15.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-3	1,000	46.7	38.4	7.49	6.3	-15.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Polyacrylic Acid, 5000 MW	SB6 SME-4	9,500	36	26.4	10.8	8.9	-17.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-1	9,500	28.2	20.2	4.25	3.49	-17.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-8	9,500	46.4	34.9	26.4	21.3	-19.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-6	9,500	41.5	30.8	19	15.3	-19.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-5	9,500	38.6	28.3	14.5	11.5	-20.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-3	9,500	33	23.8	7.82	6.07	-22.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-8	14,000	46.4	34.9	26.4	19.7	-25.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-1	14,000	28.2	20.2	4.25	3.05	-28.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-2	14,000	30.9	22.3	5.98	4.29	-28.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-5	5,500	51.9	42.5	23.8	16.8	-29.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-6	14,000	41.5	30.8	19	13	-31.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-2	5,500	43.9	36	4.02	2.72	-32.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-3	5,500	46.7	38.4	7.49	4.96	-33.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-3	14,000	33	23.8	7.82	5.15	-34.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-4	14,000	36	26.4	10.8	7	-35.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-4	5,500	49.2	40.1	13.5	8.6	-36.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-7	14,000	43.6	32.4	24.9	14.8	-40.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB6 SME-5	14,000	38.6	28.3	14.5	8.6	-40.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-1	5,500	41.2	33.7	3.05	1.67	-45.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-4	9,500	49.2	40.1	13.5	6	-55.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-1	9,500	41.2	33.7	3.05	1.14	-62.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-2	9,500	43.9	36	4.02	1.48	-63.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-5	9,500	51.9	42.5	23.8	8.4	-64.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-3	9,500	46.7	38.4	7.49	2.49	-66.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-4	14,000	49.2	40.1	13.5	3	-77.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-1	14,000	41.2	33.7	3.05	0.67	-78.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-5	14,000	51.9	42.5	23.8	5	-79.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-3	14,000	46.7	38.4	7.49	1.33	-82.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Polyacrylic Acid, 5000 MW	SB4-SME-2	14,000	43.9	36	4.02	0.71	-82.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Pomosperse AL36	AZ-101	1,000	np	np	3.22	2.93	-9.0	12.23	SRNL-GPD-2004-40	Hanford Simulated Waste
Pomosperse AL36	FIU AZ-101	1,000	np	np	10.36	8.92	-13.9	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Recover	SB6-1,2,3,4 SME	1,093	46.9	37.2	2.2	2.43	10.5	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB6 SME-1	5,500	28.2	20.2	4.25	4.55	7.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-8	1,000	46.4	34.9	26.4	28.2	6.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-7	1,000	43.6	32.4	24.9	26.2	5.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-6	1,000	41.5	30.8	19	19.9	4.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-1	9,500	28.2	20.2	4.25	4.45	4.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-2	1,000	30.9	22.3	5.98	6.23	4.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-1	1,000	28.2	20.2	4.25	4.42	4.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Recover	SB6 SME-8	5,500	46.4	34.9	26.4	27.3	3.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-1	14,000	28.2	20.2	4.25	4.39	3.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-3	14,000	33	23.8	7.82	8.04	2.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-9	1,000	48.2	36.4	31.2	31.9	2.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-2	14,000	30.9	22.3	5.98	6.1	2.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-2	5,500	30.9	22.3	5.98	5.98	0.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-9	5,500	48.2	36.4	31.2	31	-0.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-2	9,500	30.9	22.3	5.98	5.93	-0.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-4	1,000	36	26.4	10.8	10.7	-0.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-3	1,000	33	23.8	7.82	7.73	-1.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-7	5,500	43.6	32.4	24.9	24.6	-1.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-7	14,000	43.6	32.4	24.9	24.6	-1.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-5	5,500	38.6	28.3	14.5	14.3	-1.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-8	9,500	46.4	34.9	26.4	25.8	-2.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-3	5,500	33	23.8	7.82	7.64	-2.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-9	9,500	48.2	36.4	31.2	30.4	-2.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-9	14,000	48.2	36.4	31.2	30.4	-2.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-4	5,500	36	26.4	10.8	10.5	-2.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-7	9,500	43.6	32.4	24.9	24.2	-2.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	09-SB5-23 SME	1,044	49.6	35.1	24.4	23.7	-2.9	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-2	1,000	43.9	36	4.02	3.89	-3.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-8	14,000	46.4	34.9	26.4	25.5	-3.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-4	9,500	36	26.4	10.8	10.4	-3.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 Decanted SME	1,064	np	np	72.5	69.7	-3.9	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	08-SB5-12/13 SME	990	44.7	34.4	6.6	6.3	-4.5	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	09-SB5-24 SME	1,115	48.8	34.5	5.22	4.98	-4.6	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB6 SME-4	14,000	36	26.4	10.8	10.3	-4.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-6	9,500	41.5	30.8	19	18.1	-4.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-3	9,500	33	23.8	7.82	7.43	-5.0	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-6	5,500	41.5	30.8	19	17.9	-5.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-5	14,000	38.6	28.3	14.5	13.6	-6.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-5	1,000	38.6	28.3	14.5	13.3	-8.3	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-6	14,000	41.5	30.8	19	17.4	-8.4	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB4-SME-3	1,000	46.7	38.4	7.49	6.8	-9.2	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6 SME-5	9,500	38.6	28.3	14.5	13.1	-9.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 SME	1,007	51.55	42	13.4	12	-10.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-1	1,000	41.2	33.7	3.05	2.73	-10.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB4-SME-4	1,000	49.2	40.1	13.5	12	-11.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Recover	SB6-1,2,3,4 SME	6,103	46.9	37.2	2.2	1.91	-13.2	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-2	5,500	43.9	36	4.02	3.43	-14.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 Decanted SME	6,041	np	np	72.5	59	-18.6	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	08-SB5-12/13 SME	6,174	44.7	34.4	6.6	5.3	-19.7	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	09-SB5-23 SME	6,104	49.6	35.1	24.4	19.5	-20.1	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-1	5,500	41.2	33.7	3.05	2.39	-21.6	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	09-SB5-24 SME	6,010	48.8	34.5	5.22	4.06	-22.2	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 Decanted SME	11,026	np	np	72.5	56.3	-22.3	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 SME	6,006	51.55	42	13.4	10.4	-22.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-2	9,500	43.9	36	4.02	3.1	-22.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB4-SME-2	14,000	43.9	36	4.02	3.01	-25.1	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB6-1,2,3,4 SME	11,107	46.9	37.2	2.2	1.62	-26.4	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-4	5,500	49.2	40.1	13.5	9.9	-26.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	08-SB5-12/13 SME	10,897	44.7	34.4	6.6	4.7	-28.8	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 SME	10,918	51.55	42	13.4	9.4	-29.9	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	09-SB5-24 SME	11,156	48.8	34.5	5.22	3.64	-30.3	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 Decanted SME	16,006	np	np	72.5	50.4	-30.5	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-1	9,500	41.2	33.7	3.05	2.12	-30.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	09-SB5-23 SME	11,221	49.6	35.1	24.4	16.5	-32.4	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-1	14,000	41.2	33.7	3.05	2.06	-32.5	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB4-SME-3	5,500	46.7	38.4	7.49	5.04	-32.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	RuRhHg 1-9 SME	16,121	51.55	42	13.4	9	-32.8	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB6-1,2,3,4 SME	16,145	46.9	37.2	2.2	1.41	-35.9	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	08-SB5-12/13 SME	16,041	44.7	34.4	6.6	4.2	-36.4	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	09-SB5-24 SME	16,000	48.8	34.5	5.22	3.28	-37.2	np	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-4	9,500	49.2	40.1	13.5	8.4	-37.8	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB4-SME-3	14,000	46.7	38.4	7.49	4.65	-37.9	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	09-SB5-23 SME	16,108	49.6	35.1	24.4	15.1	-38.1	7.37	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Recover	SB4-SME-3	9,500	46.7	38.4	7.49	4.37	-41.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Recover	SB4-SME-4	14,000	49.2	40.1	13.5	7.6	-43.7	np	SRNL-STI-2011-674	DWPF Simulated Melter Feed
Sodium Metasilicate	RuRhHg 1-9 Decanted SME	1,019	np	np	72.5	70.1	-3.3	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Metasilicate	RuRhHg 1-9 Decanted SME	3,523	np	np	72.5	61.8	-14.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Metasilicate	RuRhHg 1-9 Decanted SME	7,044	np	np	72.5	58.9	-18.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed

Modifier	Sample	Mod conc, ppm	Total Solids, %	UDS, %	Yield Stress no Mod, Pa	Yield Stress w Mod, Pa	Calc % Change	pH	Ref	Category
Sodium Metasilicate	RuRhHg 1-9 Decanted SME	10,002	np	np	72.5	65.2	-10.1	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Polyphosphate	AZ-101	1,000	np	np	3.22	2.93	-9.0	12.23	SRNL-GPD-2004-40	Hanford Simulated Waste
Sodium Polyphosphate	FIU AZ-101	1,000	np	np	10.36	8.66	-16.4	9.85	SRNL-GPD-2004-40	Hanford Simulated Waste
Sodium Pyrophosphate Tetrabasic	SB6-1,2,3,4 SME	1,007	46.9	37.2	2.2	2.44	10.9	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	SB6-1,2,3,4 SME	7,104	46.9	37.2	2.2	2.46	11.8	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	SB6-1,2,3,4 SME	10,036	46.9	37.2	2.2	2.43	10.5	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	08-SB5-12/13 SME	1,125	44.7	34.4	6.6	7.3	10.6	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	08-SB5-12/13 SME	3,551	44.7	34.4	6.6	7.7	16.7	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	08-SB5-12/13 SME	7,078	44.7	34.4	6.6	8.2	24.2	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	08-SB5-12/13 SME	10,075	44.7	34.4	6.6	8.4	27.3	6.27	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	RuRhHg 1-9 SME	1,031	51.55	42	13.4	12.2	-9.0	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	RuRhHg 1-9 SME	3,488	51.55	42	13.4	14.8	10.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	RuRhHg 1-9 SME	7,002	51.55	42	13.4	19.7	47.0	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sodium Pyrophosphate Tetrabasic	RuRhHg 1-9 SME	9,983	51.55	42	13.4	23.9	78.4	4.7	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sugar	RuRhHg 1-9 Decanted SME	1,012	np	np	72.5	69	-4.8	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sugar	RuRhHg 1-9 Decanted SME	3,511	np	np	72.5	70.9	-2.2	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sugar	RuRhHg 1-9 Decanted SME	7,031	np	np	72.5	63.8	-12.0	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Sugar	RuRhHg 1-9 Decanted SME	10,012	np	np	72.5	59.9	-17.4	4.59	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Taylor Antifoam 747	SB6-1,2,3,4 SME	1,013	46.9	37.2	2.2	2.57	16.8	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Taylor Antifoam 747	SB6-1,2,3,4 SME	6,009	46.9	37.2	2.2	2.51	14.1	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Taylor Antifoam 747	SB6-1,2,3,4 SME	11,143	46.9	37.2	2.2	2.48	12.7	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed
Taylor Antifoam 747	SB6-1,2,3,4 SME	16,027	46.9	37.2	2.2	2.47	12.3	6.02	SRNL-STI-2009-697	DWPF Simulated Melter Feed

From: Chun, J.; Poloski, A. P.; Hansen, E. K., Stabilization and control of rheological properties of Fe2O3/Al(OH)3-rich colloidal slurries under high ionic strength and pH. *Journal of Colloid and Interface Science* **2010,** 348, 280-288.

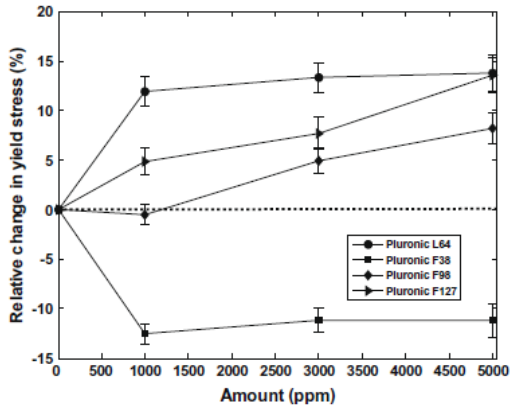


Fig. 4. Values of relative change in yield stress for Pluronic surfactants. Four different Pluronic surfactants are used: L64, F38, F98, and F127. Error bars indicate the uncertainty less than 2% in terms of relative change in yield stress.

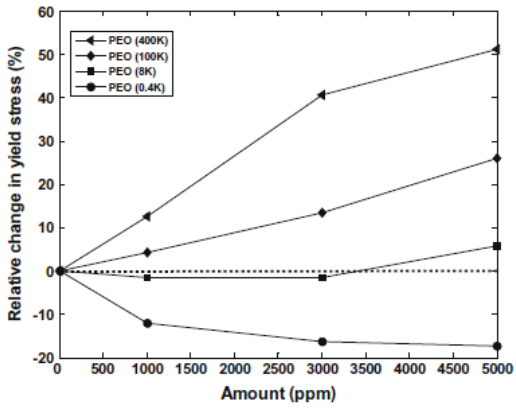


Fig. 5. Values of relative change in yield stress for PEO with four different molecular masses: 400, 8000, 100,000, and 400,000 g/mol. Note that experimental uncertainties are less than symbols.

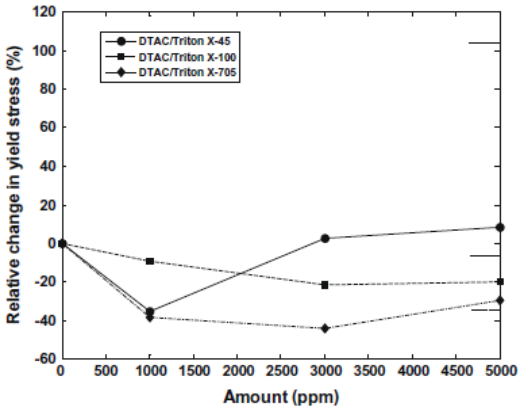


Fig. 6. Values of relative change in yield stress for DTAC/Triton X-45, DTAC/Triton X-100, and DTAC/Triton X-705 combinations. Solid, dashed, and dash–dot lines correspond to values at 5000 ppm only with Triton X-45, Triton X-100, and Triton X-705, respectively. Note that experimental uncertainties are less than symbols.

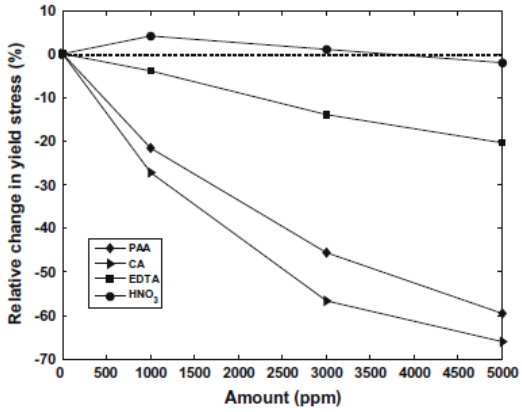


Fig. 7. Values of relative change in yield stress for three weak acids (polyacrylic acid (PAA), citric acid (CA), and ethylenediaminetetraacetic acid (EDTA)) and nitric acid. Note that experimental uncertainties are less than symbols.

Appendix B. Evaluated Rheological Modifiers: Excerpts From Reference Documents

From: Stone, M. E. *Summary of Rheological Modifier Testing on RPP Simulants*; SRNL-GPD-2004-0040; Savannah River National Laboratory: Aiken, SC, 2004.

Table 1. Rheological Modifiers Tested

Additive	Type	Manufacturer
Sodium Polyphosphate	Phosphate polymer	Various
Duramax 3005	Ammonium Polyacrylate	Rohm and Haas
Dolapix CE64	Proprietary Polyacrylate	Zschimmer and Schwartz
Alcosperse 149	Sodium polyacrylate	Alco Chemical
Alcosperse 240	Proprietary Polyacrylate	Alco Chemical
Alcosperse 408	Proprietary Polyacrylate	Alco Chemical
Alcosperse 725	Proprietary Polyacrylate	Alco Chemical
EDA Plan 470	Proprietary Polyacrylate	Ultra Additives
EDA Plan 472	Proprietary Polyacrylate	Ultra Additives
Pomosperse AL36	Proprietary Polyacrylate	Piedmont Chemical Co.
Cyanamer P-35	Proprietary Polyacrylate	Cytec
Cyanamer P-70	Proprietary Polyacrylate	Cytec

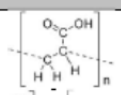
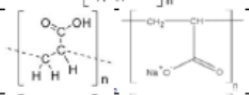
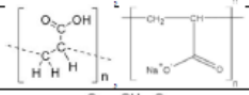
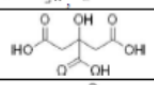
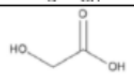
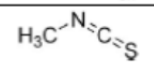
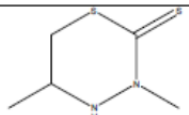
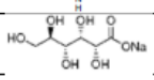
From: Stone, M. E.; Marinik, A. R.; Marsh, D. M. *Rheological Modifier Testing with DWPF Process Slurries*; WSRC-TR-2004-00082; Savannah River National Laboratory: Aiken, SC, 2004.

Table 1. Rheological Modifiers Tested

Additive	Type	Manufacturer
Sodium Meta-Silicate	Crystalized silicate	Various
Sodium Polyphosphate	Phosphate polymer	Various
Darvan 7	Polymethylacrylate, anionic	Vanderbilt Co. Inc.
Duramax 3005	Ammonium Polyacrylate	Rohm and Haas
Dolapix CE64	Proprietary Ethylene Glycol	Zschimmer and Schwartz
Disperse-Ayd W22	Proprietary Polyacrylate	Elementis Specialties
Disperse-Ayd W28	Proprietary Polyacrylate	Elementis Specialties
Disperse-Ayd W30	Proprietary Polyacrylate	Elementis Specialties
Disperse-Ayd W39	Proprietary Polyacrylate	Elementis Specialties
Alcosperse 149	Sodium polyacrylate	Alco Chemical
Alcosperse 240	Proprietary Polyacrylate	Alco Chemical
Alcosperse 408	Proprietary Polyacrylate	Alco Chemical
Alcosperse 725	Proprietary Polyacrylate	Alco Chemical
EDA Plan 470	Proprietary Polyacrylate	Ultra Additives
EDA Plan 472	Proprietary Polyacrylate	Ultra Additives
Pomosperse AL36	Proprietary Polyacrylate	Piedmont Chemical Co.
Cyanamer P-35	Proprietary Polyacrylate	Cytec
Cyanamer P-70	Proprietary Polyacrylate	Cytec
Sugar	Glucose	Various

From: Hansen, E. K. *2011 EM/SRNL Rheology Modifiers Summary Report*; SRNL-STI-2011-00670; Savannah River National Laboratory: Aiken, SC, 2011.

Table 6 Rheology Modifiers Used in SRNL FY-2010 Testing

Vendor	Chemical Name	Components of Admixture	Structure	wt%	pH	Density	NOTES
Aldrich Chemical Co.	Poly (Acrylic Acid)	Polyacrylic acid, average molecular weight is 1800		100%	-	-	Solid
ACROS Organics	Poly(acrylic acid), 63 wt% aqueous solution	37% H_20, 47 wt % 2000 MW polyacrylic acid, 16 % sodium polyacrylate		60%	2.2 – 3.0	1.230	Liquid
ACROS Organics	Poly(acrylic acid), 50 wt% aqueous solution	50% H_20, 37 wt % 2000 MW polyacrylic acid, 13 % sodium polyacrylate		50%	2.2 – 3.0	1.180	Liquid
NOAH Technologies	Citric Acid, anhydrous	$C_6H_8O_7$		100%	-	-	Solid
Aldrich Chemical Co	Glycolic Acid, technical, 70 wt%	$C_2H_4O_3$		70	-	1.25	Liquid
W. R. Grace	Recover®	Methy isothiocyanate, C_2H_3NS		0.004	5 - 8	1.1 - 1.2	Liquid
		Tetrahydro-3, 5-dimethyl-2H-1,3,4-thiadiazine-2-thione		0.04			
		Sodium Gluconate, $NaC_6H_{11}O_7$		-			

From: Kay, E. D.; T. B. Calloway, J.; Koopman, D. C.; Brigmon, R. L.; Eibling, R. E. *Rheology Modifiers for Radioactive Waste Slurries*; WSRC-MS-2003-00136; Westinghouse Savannah River Company: Aiken, SC, 2003.

Table 2 - Rheology Modifiers Tested/Not Tested.

Name	Type	Use	Industry	Manufacturer	Tested in This Study	Future Testing Recommended
Antifoam 747	Organo-modified siloxane	Wetting agent	DOE Nuclear Waste Evaporation	DeBourg Corporation	Yes	Yes
Antifoam B52	Sodiumdioctyl sulfosuccinate in polyethylene	Wetting agent	DOE Nuclear Waste Pretreatment	Cytec	Yes	No
D-3005[7]	Polyglycol	Wetting agent	Ceramics	Duramax	Yes	Yes
Sodium metasilicate[7]	Crystalized silicate	Wetting agent, Detergent	Clay processing, De-inking paper	Aldrich	No	Yes
Darvan C[9]	Polymethacrylate, anionic	Dispersant	Ceramics	Vanderbilt Co. Inc.	Yes	Yes
Lomar A22-Na[9]	Anionic, Napthalene sulfonate	Dispersant	Ceramics	Cogniz Corp.	No	Yes
Lomar A23-NH_3[9]	Anionic, Napthalene sulfonate	Dispersant	Ceramics	Cogniz Corp	No	Yes
SDS[6]	Anionic surfactant	Wetting agent, Detergent	Textiles	Aldrich	No	Yes
CTAB[6]	Cationic surfactant	Surfactant	Semiconductors	Aldrich	Yes	No
Disperse-Ayd W22[10]	Proprietary anionic/nonionic surfactant, Polyacrylate	Pigment wetting agent	Paint & Coatings	Elementis Specialties	Yes	No
Disperse-Ayd W28	Proprietary anionic and nonionic surfactant, Polyacrylate	Pigment wetting agent	Paint & Coatings	Elementis Specialties	Yes	No
Dolapix CE64[10]	Ammonium polyacrylate	Deflocculant	Ceramics	Zschimmer & Schwartz	No	Yes
Surfynol	Ionic Surfactant	Wetting agent	Ink	Dow Chemical	No	Yes

From: Hansen, E. K. *Summary of 2009 Rheology Modifier Program*; SRNL-STI-2009-00697; Savannah River National Laboratory: Aiken, SC, 2009.

Table 3-15 Rheology Modifiers Used in SRNL FY-2009 Testing

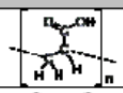
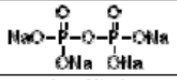
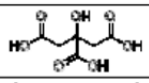
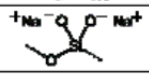
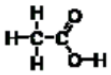
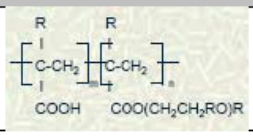
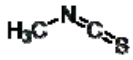
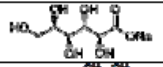
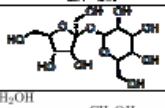
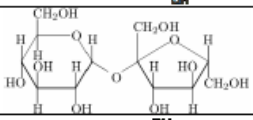
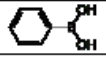
Vendor	Chemical Name	Components of Admixture	Structure	wt%	pH	Density	NOTES
Aldrich Chemical Co.	Poly (Acrylic Acid)	Polyacrylic acid, average molecular weight is 2000		100%	-	-	Solid
Sigma Aldrich	Sodium Pyrophosphate tetrabasic	$Na_4O_7P_2$		100%	-	-	Solid
NOAH Technologies	Citric Acid, anhydrous	$C_6H_8O_7$		100%	-	-	Solid
Sigma Chemicals	Sodium Metasilicate	Na_2SiO_3		100%	-	-	Solid
Zschimmer & Schwarz	Dolapix A88	1-propanol, 2-amino-2-methyl-	-	90	11	0.95	Liquid
Zschimmer & Schwarz	Dolapix CE64	Ethylene glycol, $C_2H_6O_2$		<10	7	1.2	Liquid
Zschimmer & Schwarz	Dolapix PC75	Synthetic polyelectrolyte	-	25	8.5	1.1	Liquid
W.R. Grace	ADVA Cast 555	2-propenoic acid, polymer with methyloxirane polymer with oxirane, sodium salt	-	10-25	3 - 5	1.0 - 1.1	Liquid
		Acetic Acid, $C_2H_4O_2$		<1			
		Polycarboxylate	See ADVA Flex	1 – 10			

Table 3-15 Rheology Modifiers Used in SRNL FY-2009 Testing

Vendor	Chemical Name	Components of Admixture	Structure	wt%	pH	Density	NOTES
W. R. Grace	ADVA Flex	Polycarboxylate, proprietary		10 - 25	4 - 6		Liquid
W. R. Grace	Recover®	Methy isothiocyanate, C_2H_3NS		0.004	5 - 8	1.1 - 1.2	Liquid
		Tetrahydro-3, 5-dimethyl-2H-1,3,4-thiadiazine-2-thione	-	0.04			
		Sodium Gluconate, $NaC_6H_{11}O_7$		-			
		Sucrose, $C_{12}H_{22}O_{11}$		-			
Domino	Sugar	Disaccharide		100%	-	-	Solid
Aldrich Chemicals Co.	Phenylboronic acid	$C_6H_7BO_2$		100%	-	-	Solid
Taylor	Antifoam 747	Polyether Siloxane	-	> 70%			Liquid

From: Chun, J.; Poloski, A. P.; Hansen, E. K., Stabilization and control of rheological properties of Fe2O3/Al(OH)3-rich colloidal slurries under high ionic strength and pH. *Journal of Colloid and Interface Science* **2010,** 348, 280-288.

As weak acid-type rheological modifiers, we used polyacrylic acid ($M_w \sim 1800$ g/mol), citric acid, ethylenediaminetetraacetic acid, oxalic acid, nitrilotriacetic acid, gluconic acid, glycolic acid, iminodiacetic acid, and L-tartaric acid. As nonionic/polymer surfactant-type rheological modifiers, Triton X-45, X-100, X-705 (Dow Chemicals), Pluronic L64, F38, F98 (BASF), and polyethylene oxides with four different molecular masses (400, 8000, 100,000, and 400,000 g/mol) were used. Polyethylene oxide with 8000 g/mol was obtained from Dow Chemicals. A cationic surfactant, dodecyltrimethyl-ammonium chloride (DTAC), was used to observe synergetic effects with Triton X-45, X-100, and X-705. Rheological modifiers used in the previous studies, sodium lignosulfonate ($M_w \sim 52{,}000$ g/mol), sodium metasilicate, and Duramax D-3005 (Rohm & Haas), were tested for comparison. Note that Duramax D-3005 is known as an ammonium salt of acrylic polymer. All chemicals were purchased from Sigma–Aldrich unless otherwise indicated. Three different concentrations, 1000, 3000, and 5000 ppm (or μg per a gram of slurry), were typically added.

Distribution:

SRNL
S. L. Marra, 773-A
T. B. Brown, 773-A
D. R. Click, 999-W
S. D. Fink, 773-A
C. C. Herman, 773-A
E. N. Hoffman, 999-W
F. M. Pennebaker, 773-42A
W. R. Wilmarth, 773-A
Records Administration (EDWS)

E. K. Hansen, 999-W
D. T. Herman, 735-11A
D. K. Peeler, 999-W
M. R. Poirier, 773-42A
S. H. Reboul, 773-42A
M. E. Stone, 999-W

SRR
J. M. Bricker, 704-27S
K. H. Subramanian, 241-156H

PNNL
R. D. Peterson

DOE-ORP
S. L. Charboneau
J. A. Diediker
T. W. Fletcher
B. J. Harp
C. C. Harrington
W. R. Wrzesinski

WTP
A. V. Arakali
S. M. Barnes
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M. R. Hamlet
J. Markillie

WRPS
S. T. Arm
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P. Certa
T. W. Crawford
W. G. Ramsey
J. G. Reynolds
P. L. Rutland
S. A. Saunders
M. G. Thien