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Pacific Northwest
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Estimate of Hanford Waste Rheology and Settling Behavior

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J. J. Davis
Department of Energy - Office of River Protection

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Yasuo Onishi Consulting, LLC

October 2007

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Test specification: N/A
Test plan: N/A
Test exceptions: N/A
R&T focus area: Pretreatment
Test Scoping Statement(s): SCN 007

Pacific Northwest National Laboratory
Richland, Washington, 99354

Completeness of Testing

This report summarizes the results of analyses of data obtained from the referenced analyses of Hanford waste. The analyses and the report, which used data from, but did not involve laboratory testing, followed the quality assurance requirements outlined in Pacific Northwest Division's Waste Treatment Plant Support Project Quality Assurance Requirements and Description Manual and are now compiled under the quality assurance requirements of the PNNL River Protection Project – Waste Treatment Plant Support Program (RPP-WTP) Quality Assurance Plan, RPP-WTP-QA-001.

The descriptions provided in this report are an accurate account of both the conduct of the work and the data analyses performed. A summary of the analysis results is reported. Also reported are any unusual or anomalous occurrences that are different from expected results. The analysis results and this report have been reviewed and verified.

Approved:

Gordon H. Beeman, Program Manager
RPP-WTP Support Program

10/26/07
Date

Testing Summary

The U.S. Department of Energy (DOE) Office of River Protection's Waste Treatment and Immobilization Plant (WTP) will process and treat radioactive waste that is stored in tanks at the Hanford Site. This report addresses the data analyses performed by the Rheology Working Group (RWG) and Risk Assessment Working Group. This group was composed of Pacific Northwest National Laboratory (PNNL), Bechtel National Inc. (BNI), CH2M HILL, DOE Office of River Protection (ORP), and Yasuo Onishi Consulting, LLC staff. The charter of the working group is the following:

1. To define the range of relevant waste properties that might be retrieved and handled at the Hanford Tank Farm.
2. To develop relationships that describe the solids settling and rheological behavior ranges for Hanford wastes.

The actual testing activities were performed and reported separately in referenced documentation. Because of this, many of the required topics below do not apply and are so noted.

Test Objectives

This section is not applicable. No testing was performed for this investigation.

Test Exceptions

This section is not applicable. No test specification as well as test exception applies to this investigation as there was no testing was performed.

Results and Performance Against Success Criteria

This section is not applicable. No success criteria were established as there was no testing performed for this investigation.

Quality Requirements

Since December 2001, Battelle – Pacific Northwest Division, under its use agreement with the Department of Energy (DE-AC05-76RL01831), has been providing support to BNI in accordance with the QA program approved under Subcontract No. 24590-101-TSA-W000-00004. This support has been provided under the WTP Support Project (WTPSP) QA Program and later the BNI Support Program (BNI-SP), for the technical support of the waste treatment plant being built in the 200 East area of the Hanford Site. In February 2007 the contract mechanism was switched to PNNL's Operating Contract DE-AC05-76RL01830, and the program was renamed the RPP-WTP Support Program.

The data represented in this report might refer to PNWD, PNNL, BNI-SP or WTPSP; both of these projects performed work to the same QA Program. As of February 2007, the Quality Assurance Program is described as follows:

PNNL's Quality Assurance Program is based on requirements defined in U.S. Department of Energy (DOE) Order 414.1C, Quality Assurance, and 10 CFR 830, Energy/Nuclear Safety Management, Subpart A–Quality Assurance Requirements (a.k.a. the Quality Rule). PNNL has chosen to implement the requirements of DOE Order 414.1C and 10 CFR 830, Subpart A by integrating them into the Laboratory's management systems and daily operating processes. The procedures necessary to implement the requirements are documented through PNNL's Standards-Based Management System.

PNNL implements the RPP-WTP quality requirements by performing work in accordance with the *River Protection Project – Waste Treatment Plant Support Program (RPP-WTP) Quality Assurance Plan (*RPP-WTP-QA-001, QAP*)*. Work will be performed to the quality requirements of NQA-1-1989 Part I, Basic and Supplementary Requirements, NQA-2a-1990, Part 2.7 and DOE/RW-0333P, Rev 13, *Quality Assurance Requirements and Descriptions (QARD)*. These quality requirements are implemented through the *River Protection Project – Waste Treatment Plant Support Program (RPP-WTP) Quality Assurance Manual* (RPP-WTP-QA-003, QAM).

This report is based on data from testing as referenced. The PNNL assumes that the data from these references has been fully reviewed and documented in accordance with the analysts' QA Programs. PNNL only analyzed data from the referenced documentation. At PNNL, the performed calculations, the documentation and reporting of results and conclusions were performed in accordance with the *RPP-WTP Quality Assurance Manual* (RPP-WTP-QA-003, QAM). Internal verification and validation activities were addressed by conducting an independent technical review of the final data report in accordance with PNNL procedure QA-RPP-WTP-604. This review verifies that the reported results are traceable, that inferences and conclusions are soundly based, and that the reported work satisfies the Test Specification Success Criteria. This review procedure is part of PNNL's *RPP-WTP Quality Assurance Manual*).

Test Conditions

The scope of the RWG effort is specified in the approved WTP issue response plan (24590-WTP-PL-ENG-06-0013) and defined in subcontractor change notice (SCN) 007 and Test Specification 24590-PTF-TSP-RT-06-007, Rev 0.

> Demonstrate the simulant properties used for testing *bracket expected actual waste properties*. For non-cohesive solids (Phase 1) this includes particle size, solids density, solids concentration, liquid density, and liquid viscosity. For cohesive solids (Phase 2) this includes bulk slurry density, particle size, particle density, *slurry rheology (such as consistency and yield stress) and shear strength of settled, aged sediments, as well as settled layer (heel) thickness.*

Waste received at the WTP will be subject to a feed specification supporting plant design and as agreed to in an Interface Control Document. This report compiles the existing Hanford Tank Farm rheological data addressed in italicized text above and establishes expected ranges for these properties for as-retrieved Hanford Tank Farm wastes. Various processes will be performed on these retrieved wastes which are expected to alter these property ranges from the as-retrieved conditions. Simulant development activities should focus on the expected properties of the waste streams under such processing conditions.

Simulant Use

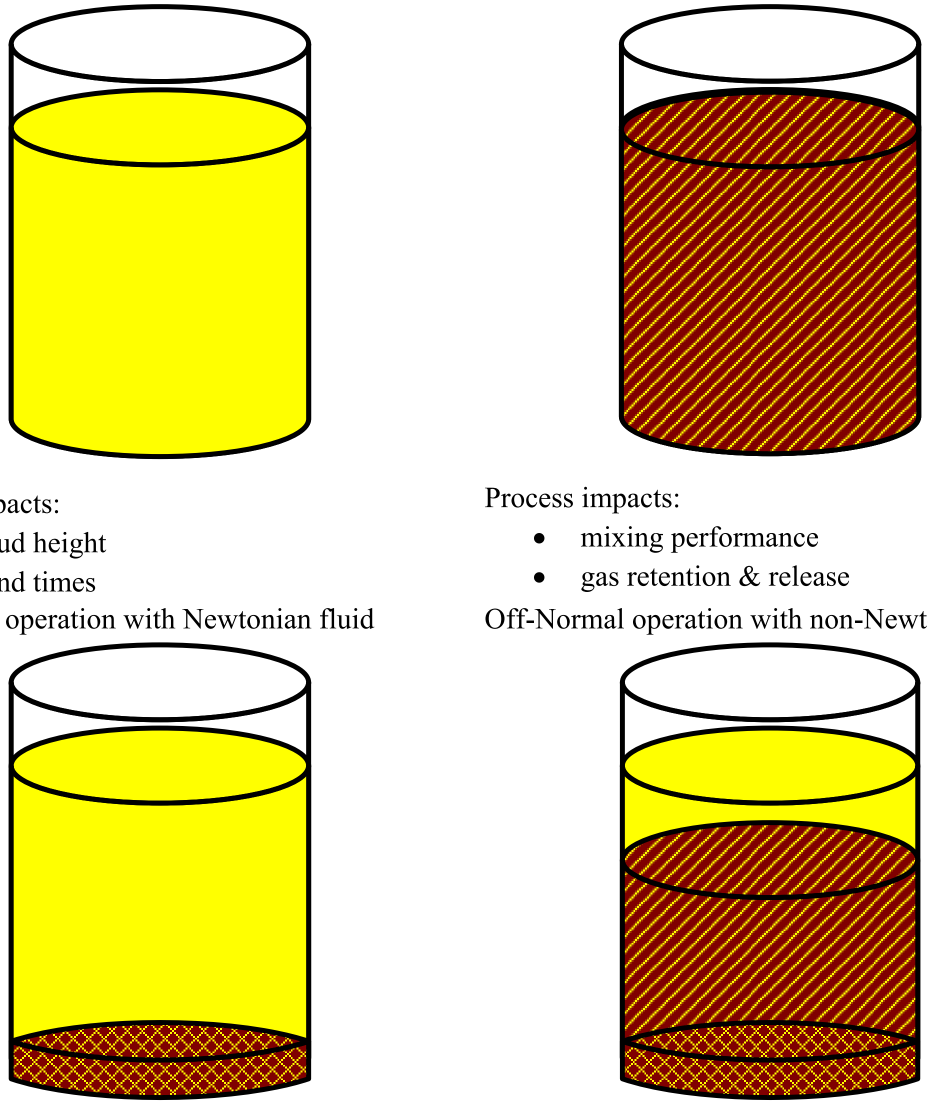
This section is not applicable. No testing was performed for this investigation.

Results of Data Analysis

The data discussed in this report can be applied to the feed systems of the WTP pretreatment facility. These data primarily consist of rheological and sedimentation data from Hanford tank farm core samples and core samples diluted with process water. An analysis of the affects of WTP process operations on these properties is not provided. Despite these limitations, three major process systems where these data apply are flow within process vessels, vertical piping, and horizontal piping. In these systems, several sludge configurations can be identified as potential operational scenarios. These scenarios and sludge configurations are shown in Figures S.1, S.2, and S.3 for process vessels (e.g. WTP EFRT issue M3), vertical piping, and horizontal piping (e.g. WTP EFRT issue M1).

Table S.1 provides a summary of the rheological parameters for each of the fluid layers shown in the associated process scenario figures. Dilution with water may result in rheological property maxima as zeta potential, particle size, and chemical composition of the solid and liquid phases change with dilution level. This table was compiled from the sections on sedimentation, shear strength, Bingham rheological parameters, and supernatant viscosity. In addition, the section discussing transient rheological modeling is summarized to provide an indication of the timescales for rheology regrowth at various process length scales. Process scales simulated include 0.1 m which is representative of process piping, 1 m represents small scale vessels, and 10 m represents large scale vessels. The timescales for each of the fluid layers to develop at each scale are shown schematically in Figure S.4. Timescales for the sediment heel to fully develop at different length scales are summarized in Table S.1.

Recovery from these slurry configurations will require the processing slurries through all of the parameters identified in Table S.1. Initially the sediment will be gelled to some extent and will possess a shear strength threshold that must be overcome. After the sediment is mobilized, the Bingham consistency and yield stress parameters will be elevated due to the large concentration of undissolved solids in the sediment bed. As mixing proceeds and supernatant liquid is blended into the sediment, the rheological properties will drop to the normal operation range when the slurry is fully suspended. This is shown graphically in Figure S.5.



Normal operation with Newtonian fluid

Process impacts:

- cloud height
- blend times

Normal operation with non-Newtonian fluid

Process impacts:

- mixing performance
- gas retention & release

Off-normal operation with Newtonian fluid

Process impacts:

- off-bottom resuspension of solids
- blend time of solids layer

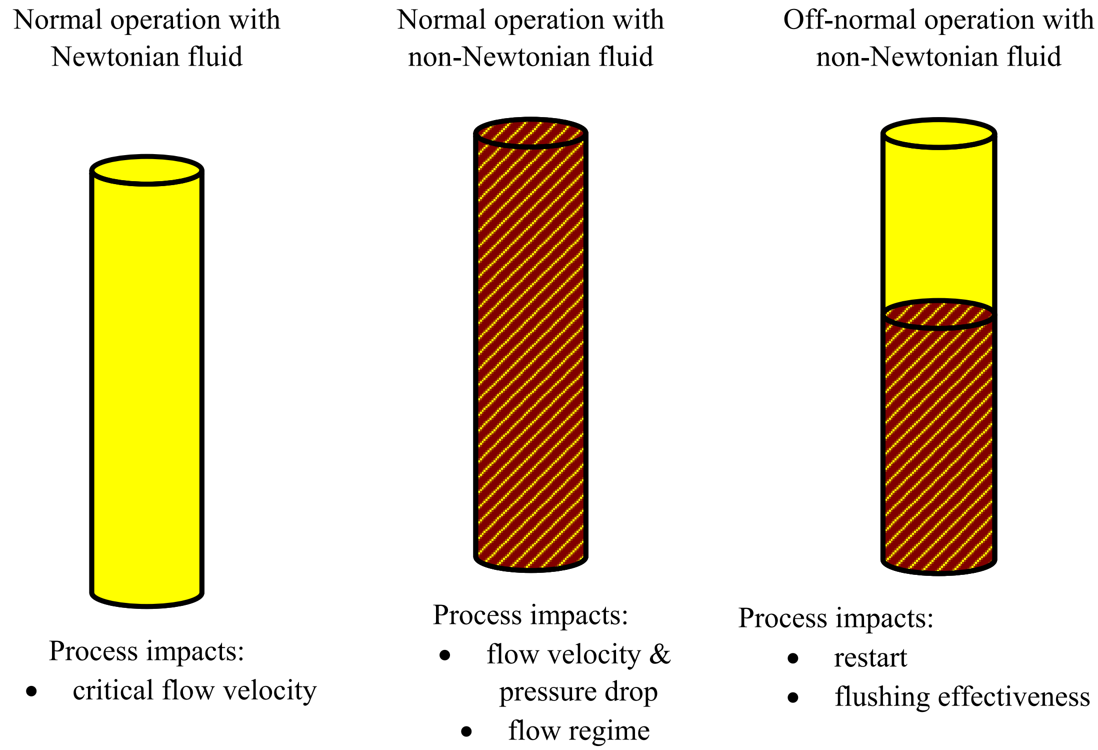
Off-Normal operation with non-Newtonian fluid

Process impacts:

- restart of mechanical agitators/PJMs
- off-bottom resuspension of solids
- blend time liquid/solids layer
- gas retention & release

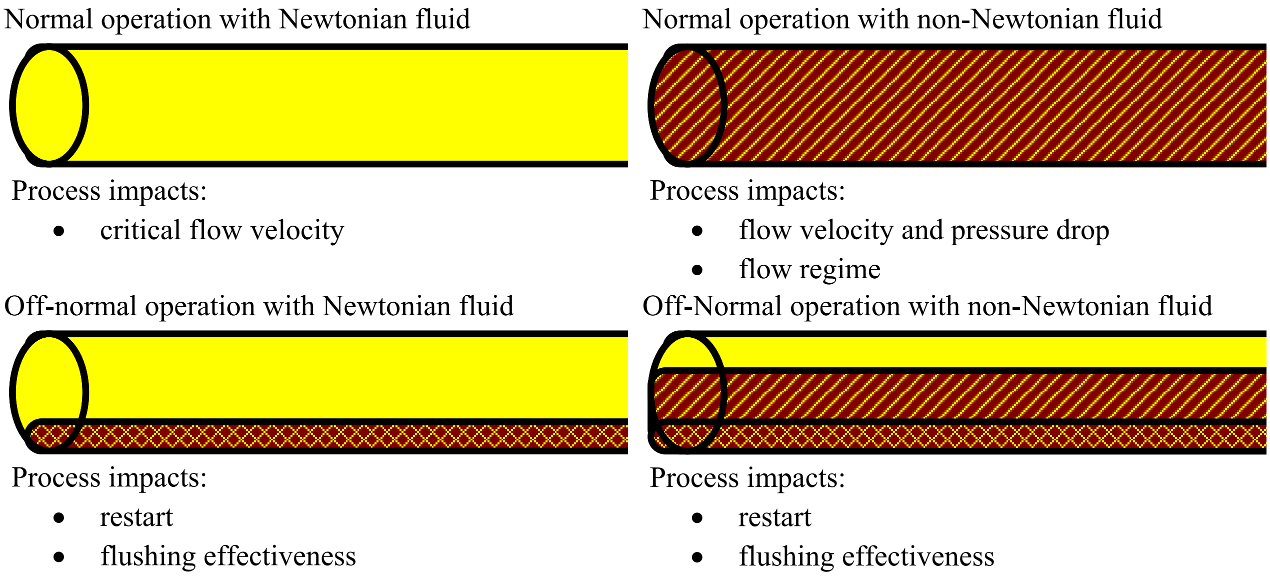
Solid – supernatant; diagonal – slurry; crosshatch – heel with coarse solids (>74 μm & >2.7 g/cc)

Figure S.1. Example Operational Scenarios for Process Vessels



Solid – supernatant; diagonal – slurry; crosshatch – heel with coarse solids (>74 µm & >2.7 g/cc)

Figure S.2. Example Operational Scenarios for Vertical Process Piping



Solid – supernatant; diagonal – slurry; crosshatch – heel with coarse solids (>74 µm & >2.7 g/cc)

Figure S.3. Example Operational Scenarios for Horizontal Process Piping

Table S.1. Range of Rheological Parameters and Regrowth Times at Typical Process Scales

Category	Heel Shear strength	Slurry/Heel Bingham Yield Stress	Slurry/Heel Bingham Consistency	Supernatant Viscosity
Min(a)	40 Pa	0 Pa	1 cP	1 cP
Median(a)	700 Pa	1.5 Pa	8 cP	8 cP
Max(a)	25,000 Pa	40 Pa	110 cP	30 cP
Tank heel property after 10 hours of sedimentation in process piping (0.1 m sludge height)	25,000 Pa	40 Pa	110 cP	n/a
Tank heel property after 100 hours of sedimentation in a medium-scale vessel (1 m sludge height)	25,000 Pa	40 Pa	110 cP	n/a
Tank heel property after 1000 hours of sedimentation in a large-scale vessel (10 m sludge height)	25,000 Pa	40 Pa	110 cP	n/a

(a) Statistics performed on all compiled data discussed in this report.

n/a – not applicable.

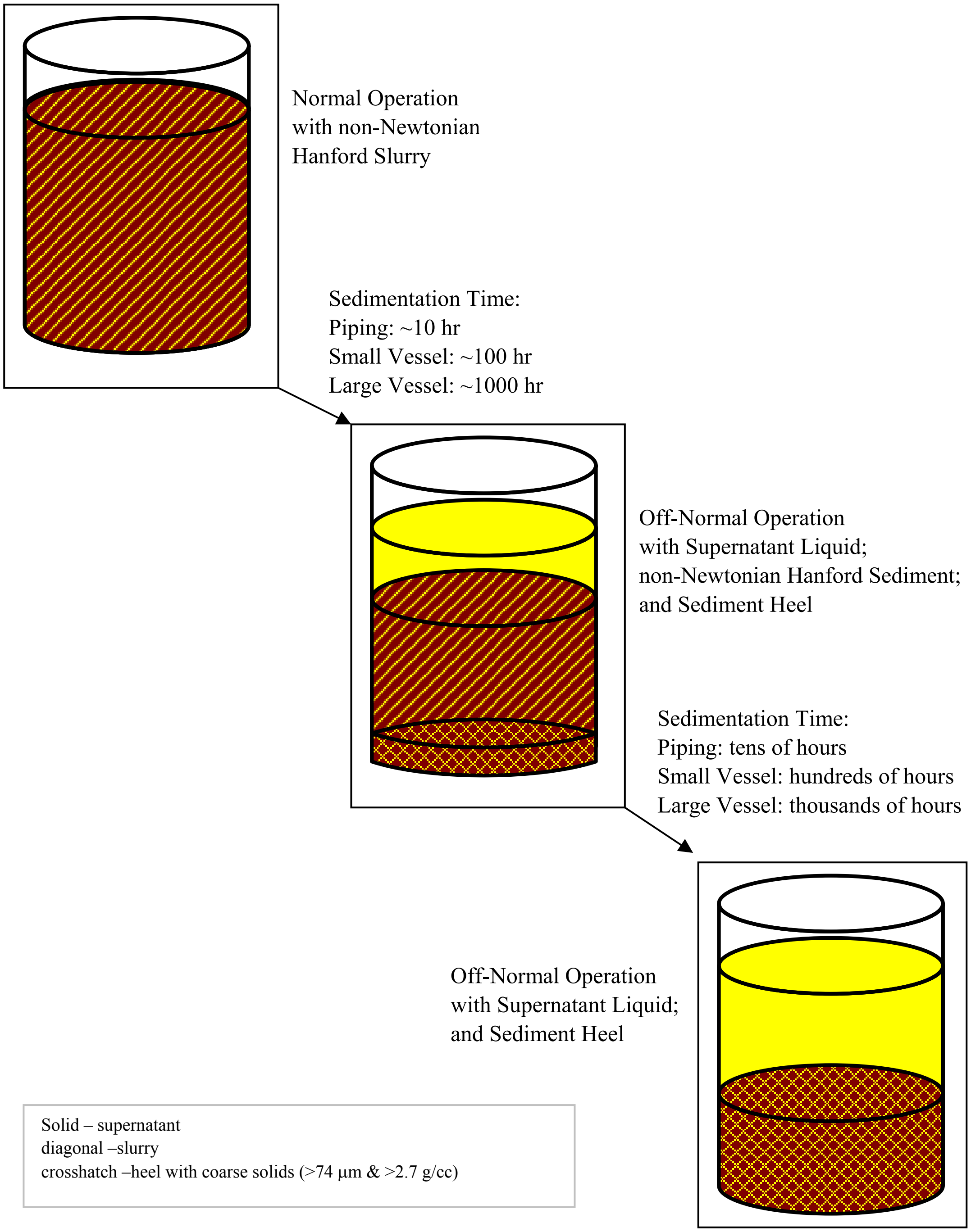


Figure S.4. Illustration of Development of Sludge Process Heel and Fully Settled Configuration at Various Process Scales

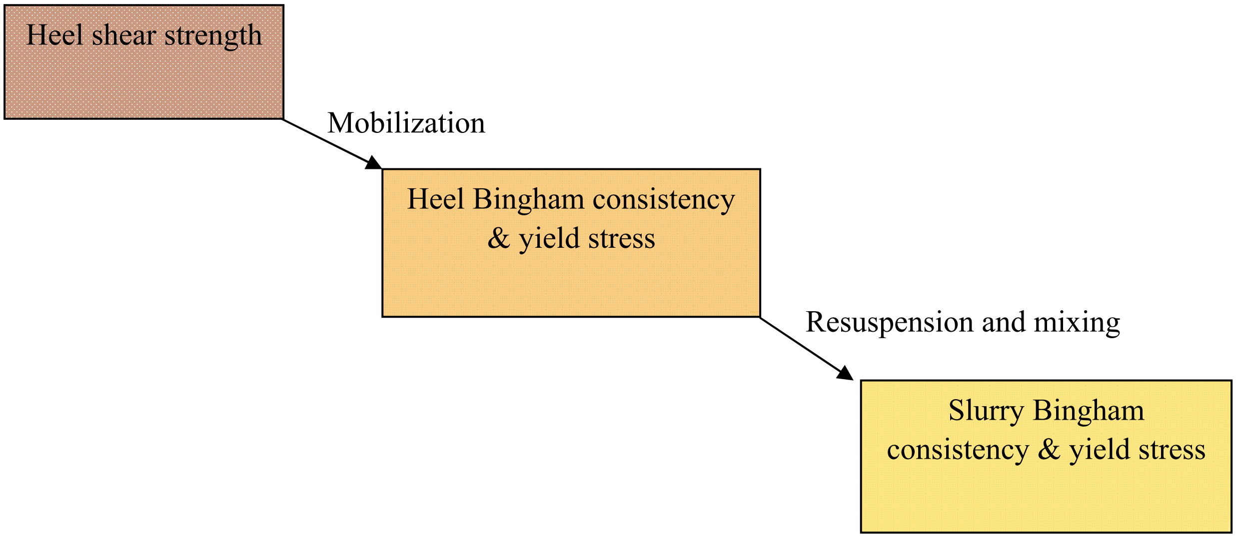
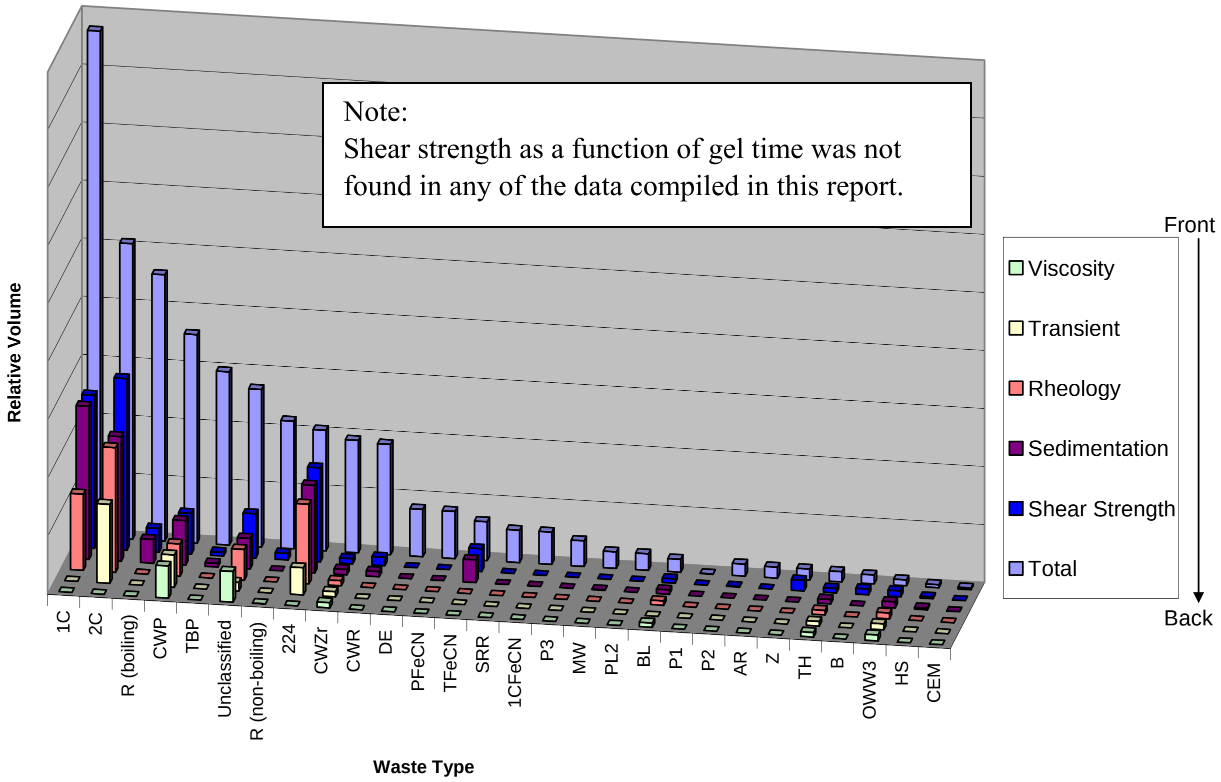


Figure S.5. Rheological Properties Encountered During Recovery from Process Upset Conditions

Discrepancies and Follow-on Tests

Rheology data and associated physical properties for Hanford tank wastes were compiled from all the readily available reports, but many gaps were observed when analyzing the data. These data include in situ as well as laboratory analysis of samples removed from the tanks. The gaps in the waste types analyzed are reported in each section of the report. Figure S.6 provides a summary of these gaps. The relative volume of wastes modeled for liquid viscosity, sedimentation, shear strength, rheological parameters (Bingham plastic model), and rheological parameters as a function of settling are plotted as a function of waste type. Additional testing of archive samples or samples being gathered on wastes that were collected as part of the analysis of the M-12 samples would fill in many of the gaps from current rheological and physical properties data.



Note:
Shear strength as a function of gel time was not found in any of the data compiled in this report.

Figure S.6. Relative Volume of Waste Types Modeled Based on Waste Tank Data Available for Liquid Viscosity, Sedimentation, Shear Strength, Rheology, and Transient Modeling Compared with the Total Volume of Each Sludge Waste Type

References

Bechtel National, Inc. 2006. *Issue Response Plan for Implementation of External Flowsheet Review Team (EFRT) Recommendations - M3, Inadequate Mixing System Design*. 24590-WTP-PL-ENG-06-0013 Rev 000, Bechtel National, Inc., Richland, Washington.

Bechtel National, Inc. 2006. *Scaled Testing to Determine the Adequacy of the WTP Pulse Jet Mixer Designs*. 24590-PTF-TSP-RT-06-007 Rev 0, Bechtel National, Inc., Richland, Washington.

WTP/RPP-MOA-BNI-00007, Subcontractor Change Notice No. 007.

Acronyms and Abbreviations

BBI	Best Basis Inventory
BNI	Bechtel National, Inc.
DOE	U.S. Department of Energy
ESP	Environmental Simulation Program
HLW	High Level Waste
PJM	Pulse Jet Mixer
PNNL	Pacific Northwest National Laboratory
QA	Quality Assurance
RPP	River Protection Project
TWINS	Tank Waste Information System
WTP	Waste Treatment Plant

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1.0 Introduction

The U.S. Department of Energy (DOE) Office of River Protection Waste Treatment and Immobilization Plant (WTP) is being designed and built to pretreat and then vitrify a large portion of the wastes in Hanford's 177 underground waste storage tanks. Once the material is transferred from the underground waste storage tanks to the WTP, the mixing systems at WTP must be capable of blending liquids, maintaining solids suspended, and resuspending settled solids.

In vessels where process streams are mixed, the liquids are blended to the degree required for processing and sampling. The pulse jet mixer (PJM) mixing test performance criteria require that that all points in the vessel must be reached during blending to ensure that there will be no zones where the material is not blended, and the slurry being blended into the vessel must achieve a sufficiently uniform vessel concentration.

The WTP PJM-mixed vessels do not have restrictive criteria on the degree of uniformity of solids concentration within the vessel liquid. However, the mixing must be sufficient to maintain the solids in suspension so that they do not accumulate on the bottom and can be transferred through the pump suction line. Solids suspended from the bottom of the vessel must be sufficiently lifted in a repeatable pattern so that they can be carried with the flowing fluid into the vessel suction line.

Mixing of tank waste slurries is also required for hydrogen control. During normal operations the vessels may be mixed intermittently, but must be mixed with a frequency to ensure that the hydrogen inventory is controlled. After a design basis event the important-to-safety air supply is limited and the PJMs will be operated intermittently. Between operating periods, solids will form a settled layer, which may have cohesive properties. The PJMs must be able to cause motion of the accumulated solids layer adequate to release hydrogen. Rheological properties of the suspending medium, solids suspensions, and settled solids are included in the parameters that define the ability of the PJM to blend, maintain solids suspensions, and resuspend settled solids.

Accurate rheological data of Hanford tank wastes at varying conditions including as a function of sedimentation are critical in validating the performance of the WTP-PJM mixing systems. This report provides a compilation of the available rheological data for Hanford tank wastes and empirical models describing this data. Rheological properties were modeled as a function of physical properties (volume percent settled solids, sedimentation rate, etc.) to provide a predictive tool for rheological behavior for different waste types under differing conditions.

This report presents the data sources considered and the development of the best-estimate data sets for rheological properties. The relation of the available data sets with regard to the insoluble solid inventory at Hanford is discussed. Quantifiable uncertainties in the data are elucidated. Liquid viscosity, sedimentation, and rheological models are also presented. Conclusions and recommendations are presented based on the models and data available.

2.0 Quality Requirements

Since December 2001, Battelle – Pacific Northwest Division, utilizing its use agreement with the Department of Energy (DE-AC05-76RL01831), has been providing support to Bechtel National, Inc. (BNI) in accordance with the Quality Assurance (QA) program approved under Subcontract No. 24590-101-TSA-W000-00004. This support has been provided under the WTP Support Project (WTPSP) QA Program and later the BNI Support Program (BNI-SP) for the technical support of the waste treatment plant being built in the 200 East area of the Hanford Site. In February 2007, the contract mechanism was switched to Pacific Northwest National Laboratory (PNNL) Operating Contract, DE-AC05-76RL01830, and the program was renamed the RPP-WTP Support Program.

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This report is based on data from testing as referenced. The PNNL assumes that the data from these references has been fully reviewed and documented in accordance with the analysts' QA Programs. PNNL only analyzed data from the referenced documentation. At PNNL, the performed calculations, the documentation and reporting of results and conclusions were performed in accordance with the *RPP-WTP Quality Assurance Manual* (RPP-WTP-QA-003, QAM). Internal verification and validation activities were addressed by conducting an independent technical review of the final data report in accordance with PNNL procedure QA-RPP-WTP-604. This review verifies that the reported results are traceable, that inferences and conclusions are soundly based, and that the reported work satisfies the Test Specification Success Criteria. This review procedure is part of PNNL's *RPP-WTP Quality Assurance Manual*).

3.0 Hanford Tank Waste

Radioactive waste from the reprocessing of spent nuclear fuel on the Hanford Site was transferred to underground storage tanks. Four different chemical processes were used for reprocessing this spent nuclear fuel, and waste from each of these processes exists in these 177 underground storage tanks. The four processes used were the bismuth phosphate ($BiPO_4$) process, the tributyl phosphate (TBP) process, the reduction-oxidation (REDOX) process, and the plutonium-uranium extraction (PUREX) process. Wastes with different chemical composition and properties were generated in multiple steps of these processes, and modifications to the processes have resulted in multiple waste types. Some of this waste was treated in the underground storage tanks, resulting in additional waste types. Each waste type was made alkaline for storage in the steel tanks. Table 3.1 lists the waste type, acronym, and a brief description of each waste type. The definitions were adapted from Meacham (2003).

Table 3.1. List of Waste Type Definitions

Waste Type	Definition
1C	$BiPO_4$ first cycle decontamination waste (1944-1956)
1CFeCN	Ferrocyanide sludge from in-farm scavenging of 1C supernatants in TY-Farm (1955-1958)
224	lanthanum fluoride process “224 Building” waste (1952-1956)
2C	$BiPO_4$ second cycle decontamination waste (1944-1956)
A1-SltCk	Saltcake from the first 242-A Evaporator campaign (1977-1980)
A2-SltSlr	saltcake from the second 242-A Evaporator campaign (1981-1994).
AR	Washed Plutonium-Uranium Extraction (PUREX) sludge (1967-1976)
B	high-level acid waste from PUREX processed at B Plant for Sr recovery (1967-1972)
BL	low-level waste from B Plant Sr and Cs recovery operations (1967-1976)
CEM	Portland Cement
CSR	Cesium recovery, supernatant from which Cs has been removed
CWP	PUREX cladding waste (1956-1960 and 1961-1972)
CWR	REDOX cladding waste, aluminum clad fuel (1952-1960 and 1961-1972)
CWZr	zirconium cladding waste (PUREX and REDOX)
DE	diatomaceous earth
HS	hot semi-works ^{90}Sr recovery waste (1962-1967)
MW	$BiPO_4$ process metal waste (1944-1956)
OWW3	PUREX organic wash waste (1968-1972)
P1	PUREX HLW (1956-1962)
P2	PUREX HLW (1963-1967)
P3	PUREX HLW (1983-1988)
PFeCN	Ferrocyanide sludge from in-plant scavenged supernatant (1954-1958)
PL2	PUREX low-level waste (1983-1988)
R (boiling)	boiling REDOX HLW (1952-1966)
R (non-boiling)	non-boiling REDOX HLW (1952-1966)
R-SltCk	Saltcake from self-concentration in S- and SX-Farms (1952-1966)
S1-SltCk	Saltcake from the first 242-S Evaporator campaign using 241-S-102 feed tank (1973-1976)
S2-SltSlr	Saltcake from the second 242-S Evaporator campaign using 241-S-102 feed tank (1976-1980)
SRR	HLW transfers (late B Plant operations)
T2-SltCk	Saltcake from the second 242-T Evaporator campaign using 241-TX-118 feed tank (1965-1976)
TBP	tributyl phosphate waste (from solvent based uranium recovery operations)
TFeCN	ferrocyanide sludge produced by in-tank or in-farm scavenging
TH	PUREX waste from processing of thoria targets
Z	Z Plant waste

Rheological data is available on 40 tanks that contain several different waste types. The primary and secondary waste types for the solids in these 40 tanks, as described in the Tank Waste Information System (TWINS) database, are listed in Table 3.2. The waste types for the liquids in these tanks are listed in Table 3.3. Rheological measurements have been made on samples from the tanks that are listed in these tables, but the data have not been published or the published documents are not currently accessible. Additional effort will be needed to obtain and analyze the rheological data from these tanks.

Table 3.2. Primary and Secondary Waste Types for the Solids in Tanks with Rheological Data Available

Tank	Primary Waste Type	Secondary Waste Type
A-101	A1-SltCk	P2
AN-102	A2-SltSlr	--
AN-103	A2-SltSlr	--
AN-104	A2-SltSlr	--
AN-105	A2-SltSlr	--
AN-107	A2-SltSlr	--
AP-104	No Insoluble Solids	
AW-101	A2-SltSlr	--
AW-103	CWZr	--
AY-101	NA(a)	--
AY-102	NA(a)	BL
AZ-101	P3	NA(a)
AZ-102	P3	PL2, SRR
B-111	2C	P2, B
B-201	224	--
B-202	224	--
B-203	224	--
BX-107	1C	--
C-103	CWP	--
C-104	CWP	CWZr, OWW3, TH
C-106	NA(a)	--
C-107	1C	CWP, SRR
C-109	TFeCN	CWP, 1C, HS
C-110	1C	--
C-112	TFeCN	1C, CWP, HS
S-102	NA SltCk(b)	R (non-boiling)
S-104	R (boiling)	CWR
S-112	S1-SltCk	R (non-boiling)
SY-101	S2-SltSlr	--
SY-102	NA(a)	Z
SY-103	S2-SltSlr	--
T-102	CWP	MW
T-104	1C	--
T-107	1C	CWP, TBP
T-110	2C	224
T-111	224	2C
T-203	224	--
T-204	224	--
U-103	S1-SltCk	S2-SltSlr, R (non-boiling)
U-107	S2-SltSlr	CWR, T2-SltCk

(a) Waste volume information indicates that this waste type is unclassified solid sludge.
(b) Waste volume information indicates that this waste type is unclassified saltcake.

Table 3.3. Primary and Secondary Waste Types for Liquids in Tanks with Rheological Data Available

Tank	Primary Waste Type	Secondary Waste Type
A-101 (interstitial only)	A1-SltCk	--
AN-102	NA[(a)]	--
AN-103	A2-SltSlr	--
AN-104	A2-SltSlr	--
AN-105	A2-SltSlr	--
AN-107	A2-SltSlr	--
AP-104	NA[(a)]	--
AW-101	A2-SltSlr	--
AW-103	NA[(a)]	A1-SltCk (interstitial)
AY-101	NA[(a)]	--
AY-102	NA[(a)]	BL (interstitial)
AZ-101	P3	--
AZ-102	P3	--
B-111	CSR	--
B-201	No Free Liquid	
B-202	No Free Liquid	
B-203	NA[(a)]	--
BX-107	No Free Liquid	
C-103	NA[(a)]	--
C-104	No Free Liquid	
C-106	NA[(a)]	--
C-107	No Free Liquid	
C-109	No Free Liquid	
C-110	1C	--
C-112	No Free Liquid	
S-102	No Free Liquid	
S-104 (interstitial only)	R-SltCk	--
S-112	No Free Liquid	
SY-101	S2-SltSlr	--
SY-102	NA[(a)]	Z (interstitial only)
SY-103	S2-SltSlr	--
T-102	CSR	--
T-104	No Free Liquid	
T-107	No Free Liquid	
T-110	2C	--
T-111	No Free Liquid	
T-203	No Free Liquid	
T-204	No Free Liquid	
U-103	S1-SltCk	--
U-107 (interstitial only)	S2-SltSlr	T2-SltCk
(a) Waste volume information indicates that this waste type is unclassified liquid.		

Waste type definitions have evolved over time as additional information on the composition of wastes transferred to the Hanford tanks has been identified. The latest modifications were included in Revision 5 of the Hanford Defined Waste (HDW) Model, which was published in February 2004 (Higley 2004). Most of these changes are included in the 2006 Best Basis Inventory (BBI), which is the database provided in TWINS and used in this report for determining the sludge volumes associated with each waste type. In the 2006 BBI, waste types 1C1 and 1C2 are combined as 1C, and waste types 2C1 and 2C2 are combined as 2C.

The 2002 BBI is used in the current Environmental Simulation Program (ESP)(a) model; therefore, some of the wastes types in the 2006 BBI were combined to be consistent with the ESP model and previous reports. Waste types identified in the 2006 BBI are compared with the waste types used in this report in Table 3.4. A few sludge, saltcake, and liquid layers in Hanford tanks have not been identified as a particular waste type and are listed as unclassified. The acronym NA is used for these unclassified wastes in the BBI presented in TWINS.

Twenty-nine of the 41 waste types described in Meacham (2003) are included in the tanks identified as having rheological data. Diatomaceous earth is included as a waste type in BBI but is not included in Meacham (2003); therefore, the total number of waste types is 42. Also included in TWINS are waste transfers and unclassified waste types. Only 26 of the 42 waste types are listed as sludge in TWINS, and these waste types are the focus of this study. Other waste types with rheological data are included in the data set to provide additional supporting data. Seven of the 26 sludge waste types are not represented in the rheology data set. These include 1CFeCN, AR, DE, P1, PFeCN, CEM, and Z. Waste transfers are also not represented in the rheological data. The definitions of these waste types are included in Table 3.1 and listed in Table 3.4.

REDOX high-level wastes (HLW) are classified as R1 and R2 in the 2006 BBI based on the date of waste generation, but these classifications do not indicate the thermal history of the REDOX waste, which is essential in determining whether gibbsite or boehmite is the predominant aluminum species in the waste. Therefore, REDOX HLW were reclassified as REDOX boiling and REDOX non-boiling waste types to provide waste type definitions that segregated the aluminum-containing sludges based on the predominant aluminum phase (gibbsite or boehmite). This reclassification was based on thermal history and aluminum leaching factors in these wastes, as described in Meacham (2003).

The 224 waste is currently in the Hanford baseline to be dried and transported to the Waste Isolation Pilot Plant (WIPP) as transuranic (TRU) waste. The inclusion of the 224 waste in this report raises the overall significance of the rheology characterization of the Hanford sludge. While this waste might not be a direct feed to WTP, it may be representative of sludge in other tanks that may be a feed to WTP. For example, Tanks T-110, T-111, and T-112 contain a blend of 224 and 2C waste that may not meet TRU waste specifications.

Rheology data available from tank waste core samples and falling ball rheometry are plotted as a function of waste type in Figure 3.1. The volume of waste in each tank for each waste type was determined using the TWINS database. Additional rheology data are being gathered on wastes that were collected as part of the analysis of the M-12 samples. The increase in the amount of rheology data that will be available based on these analyses is also shown in Figure 3.1.

(a) ESP was supplied and developed by OLI Systems, Inc., Morris Plains, New Jersey.

Table 3.4. Comparison of Waste Type Groups

2006 BBI	This Report
Bismuth Phosphate Process Waste Types	
MW1	MW
MW2	
1C	1C
2C	2C
224-1	224
224-2	
Uranium Recovery and Scavenging Waste Types	
1CFeCN	1CFeCN
PFeCN	PFeCN
TBP	TBP
TFeCN	TFeCN
REDOX Process Waste Types	
R1	R (boiling) or R (non-boiling)
R2	
CWR1	CWR
CWR2	
PUREX Process Waste Types	
P1	P1
P2	P2
P3AZ1	P3
P3AZ2	
CWP1	CWP
CWP2	
CWZr1	CWZr
CWZr2	
OWW3	OWW3
PL2	PL2
TH1	TH
TH2	
Cesium and Strontium Recovery Waste Types	
HS	HS
AR	AR
B	B
BL	BL
CSR	CSR
SRR	SRR
Saltcake and Salt Slurries Waste Types	
A1-SltCk	A1-SltCk
A2-SltSlr	A2-SltSlr
R-SltCk	R-SltCk
S1-SltCk	S1-SltCk
S2-SltSlr	S2-SltSlr
T2-SltCk	T2-SltCk
Other Process Facility Wastes	
Z	Z
Miscellaneous Wastes	
CEM	Portland Cement
DE	DE

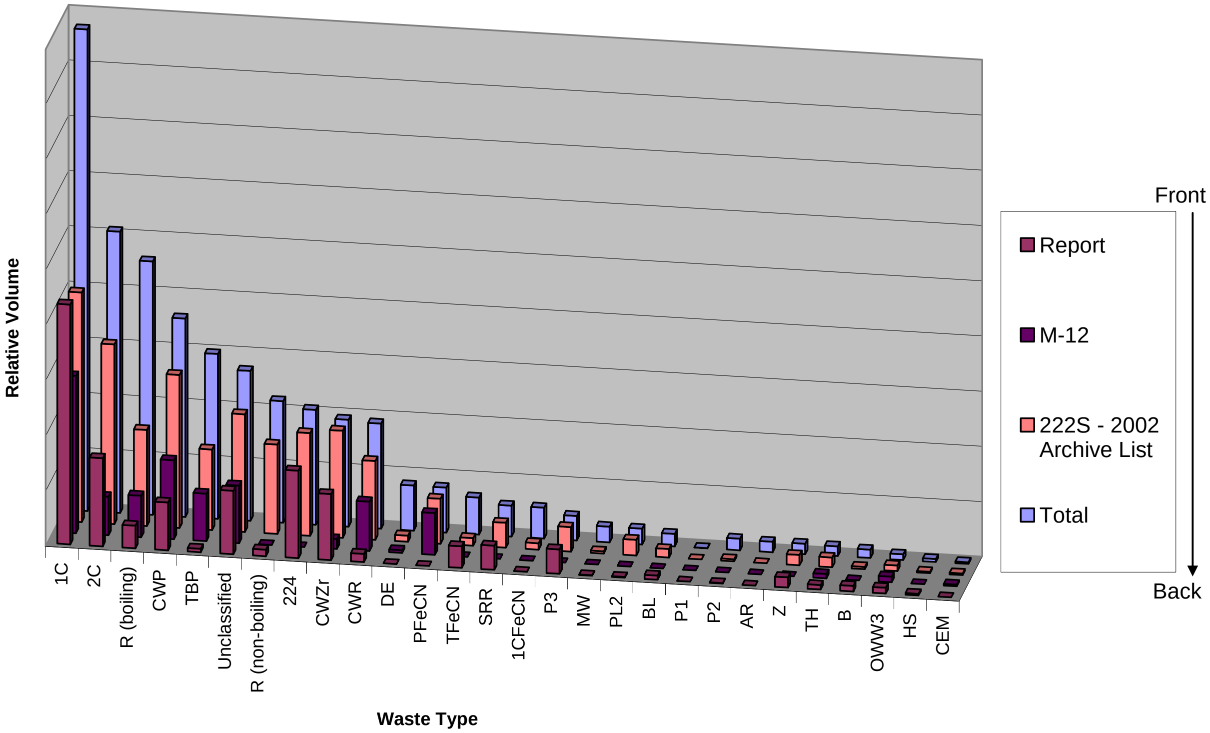


Figure 3.1. Gaps in Rheology Data Available for Sludges in the Entire Hanford Tank Waste Inventory as a Function of Waste Type

4.0 Rheology Theory

Rheology is the study of the flow and deformation of materials. When a force (i.e., stress) is placed on an object, the object deforms or strains. Many relationships have been found relating stress to strain for various fluids. Flow behavior of a fluid can generally be explained by considering a fluid placed between two plates of thickness x (Figure 4.1). The lower plate is held stationary while a force, F, is applied to the upper plate of area, A, that results in the plating moving at velocity, v. If the plate moves a length, ΔL, the strain, γ, on the fluid can be defined by Eq. (4.1).

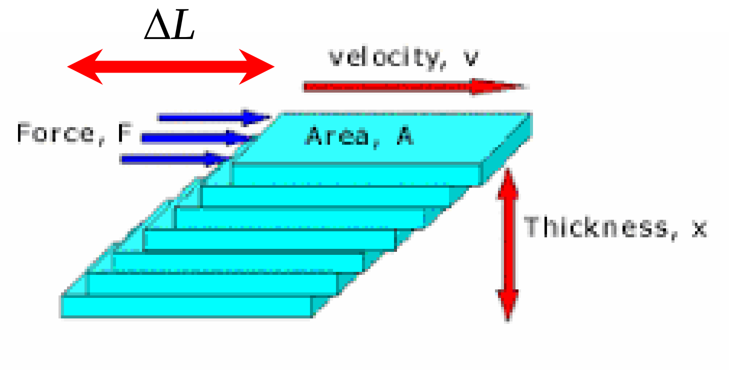


Figure 4.1. Diagram of Fluid Flow Between Stationary and Moving Plates

$$\gamma = \frac{\Delta L}{\mathrm{x}} \tag{4.1}$$

The rate of change of strain (also called shear rate), $\dot{\gamma}$, can be defined by Eq. (4.2). Because the shear rate is defined as the ratio of a velocity to a length, the units of the variable are the inverse of time, typically s^{-1}.

$$\dot{\gamma} = \frac{d\gamma}{dt} = \frac{d}{dt}\left(\frac{\Delta L}{\mathrm{x}}\right) = \frac{\mathrm{v}}{\mathrm{x}} \tag{4.2}$$

Typical shear rates of food-processing applications can be seen in Table 4.1. Depending on the application, shear rates in the range of 10^{-6} to 10^{7} s^{-1} are possible. Human perception of a fluid is typically based on a shear rate of approximately 60 s^{-1}.

The shear stress applied to the fluid can be found by Eq. (4.3). Because the shear stress is defined as the ratio of a force to an area, the units of the variable are pressures, typically expressed in Pa (N/m^2).

$$\tau = \frac{\mathrm{F}}{\mathrm{A}} \tag{4.3}$$

Table 4.1. Typical Shear Rates in Food-Processing Applications

Situation	Shear Rate Range (1/s)	Typical Applications
Sedimentation of particles in a suspending liquid	$10^{-6} – 10^{-3}$	Medicines, paints, spices in salad dressing
Leveling due to surface tension	$10^{-2} – 10^{-1}$	Frosting, Paints, printing inks
Draining under gravity	$10^{-1} – 10^{1}$	Vats, small food containers
Extrusion	$10^{0} – 10^{3}$	Snack and pet foods, toothpaste, cereals, pasta, polymers
Calendering	$10^{1} – 10^{2}$	Dough sheeting
Pouring from a bottle	$10^{1} – 10^{2}$	Foods, cosmetics, toiletries
Chewing and swallowing	$10^{1} – 10^{2}$	Foods
Dip coating	$10^{1} – 10^{2}$	Paints, confectionery
Mixing and stirring	$10^{1} – 10^{3}$	Food processing
Pipe flow	$10^{0} – 10^{3}$	Food processing, blood flow
Rubbing	$10^{2} – 10^{4}$	Topical application of creams and lotions
Brushing	$10^{3} – 10^{4}$	Brush painting, lipstick, nail polish
Spraying	$10^{3} – 10^{5}$	Spray drying, spray painting, fuel atomization
High-speed coating	$10^{4} – 10^{6}$	Paper
Lubrication	$10^{3} – 10^{7}$	Bearings, gasoline engines

The apparent viscosity of the fluid is defined as the ratio of the shear stress to shear rate (see Eq. 4.4). Often the shear stress and viscosity vary as a function of shear rate. Since the viscosity is defined as the ratio of shear stress to shear rate, the units of the variable are Pa•s. Typically, viscosity is reported in units of centipoise (cP; where 1 cP = 1 mPa•s).

$$\eta(\dot{\gamma}) = \frac{\tau(\dot{\gamma})}{\dot{\gamma}} \qquad (4.4)$$

For Newtonian fluids, the apparent viscosity is independent of shear rate (Eq. 4.5). Examples of the viscosity of common Newtonian materials can be seen in Table 4.2.

$$\tau = \eta\dot{\gamma} \qquad (4.5)$$

where τ is the shear stress, η is the Newtonian viscosity, and $\dot{\gamma}$ is the shear rate.

Fluids that do not behave as Newtonian fluids are referred to as non-Newtonian fluids. Rheograms or plots of shear stress versus shear rate are typically used to characterize non-Newtonian fluids. Examples of typical rheograms can be seen in Figure 4.2.

Table 4.2. Viscosities of Several Common Newtonian Fluids

Material	**Viscosity at 20°C (cP)**
Acetone	0.32
Water	1.0
Ethanol	1.2
Mercury	1.6
Ethylene Glycol	20
Corn Oil	71
Glycerin	1,500

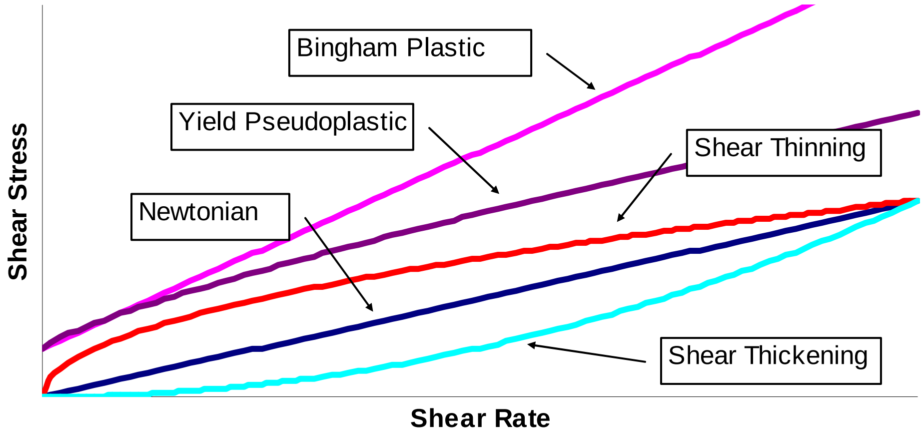


Figure 4.2. Rheograms of Various Fluid Types

Shear-thinning and shear-thickening fluids can be modeled by the Ostwald equation (Eq. 4.6). If n<1, then the material is referred to as pseudoplastic (shear thinning). If n>1, then that material is referred to as dilatant (shear thickening). These fluids exhibit decreasing or increasing apparent viscosities as shear rate increases, depending on whether the fluid is shear thinning or shear thickening, respectively. Since shear-thickening flow behavior is rare, shear-thickening behavior is often an indication of possible secondary flow patterns or other measurement errors.

$$\tau = m\dot{\gamma}^n \tag{4.6}$$

where

m = the power law consistency coefficient
n = the power law exponent
$\dot{\gamma}$ = is the shear rate.

A rheogram for a Bingham plastic does not pass through the origin. When a rheogram possesses a non-zero y-intercept, the fluid is said to posses a yield stress. A yield stress is a shear-stress threshold that defines the boundary between solid-like behavior and fluid-like behavior. The fluid will not begin to flow until the yield stress threshold is exceeded. For Bingham plastic materials, once enough force has been applied to exceed the yield stress, the material approaches Newtonian behavior at high shear rates (Eq. 4.7).

$$\tau = \tau_B + \eta_P \dot{\gamma} \tag{4.7}$$

where τ_B is the Bingham yield stress, η_p is the plastic viscosity, and $\dot{\gamma}$ is the shear rate.

Fluids that exhibit a non-linear rheogram with a yield stress are typically modeled by the three-parameter Herschel-Bulkley equation (Eq. 4.8). Again, shear-thickening behavior is uncommon, and typically the Hershel-Bulkley power-law exponent is less than unity.

$$\tau = \tau_H + k\dot{\gamma}^b \tag{4.8}$$

where

τ_H = yield stress
k = Herschel-Bulkley consistency coefficient
b = Hershel-Bulkley power law exponent
$\dot{\gamma}$ = shear rate.

An example of these rheological properties can be considered through a pipeline flow scenario through a 3-inch ID smooth pipe transporting 90 gallons per minute of fluid. This equates to an average pipeline velocity of 4.1 ft/sec. The fluid is a Bingham plastic with a Bingham yield stress, τ_B, of 30 Pa, a Bingham consistency or plastic viscosity, η_p, of 30 cP, and a slurry density of 1.2 kg/L. In this case, the fluid flow will be in the laminar regime with the velocity and apparent viscosity profiles shown in Figure 4.3. The flow profile reflects a “plug flow” regime where the center core of the fluid moves at constant velocity. This because the shear stress in this region does not exceed the yield stress of the fluid and acts as a solid material with an infinite apparent viscosity. At a radius of approximately 1.1 inches, the shear stress in the pipe exceeds the yield stress of the fluid and the fluid transitions from behaving as a solid to behaving as a “shear thinning” liquid. The apparent viscosity in the sheared region near the pipe wall (1.1–1.5 inch radius) drops from an infinite vale to approximately 100 cP at the pipe wall. Pressure drop for flow under these conditions is calculated at 9 psig/100 ft of straight horizontal pipe.

The case of a Newtonian fluid with the same pressure drop is then considered. At 90 gpm, a Newtonian viscosity of 300 cP is required for a 9 psi/100 ft pressure drop. The flow profiles for this system are shown in Figure 4.4. The flow profile shows a parabolic velocity profile that is characteristic of Newtonian, laminar pipe flows. The apparent viscosity in this case is constant at 300 cP throughout the pipe radius.

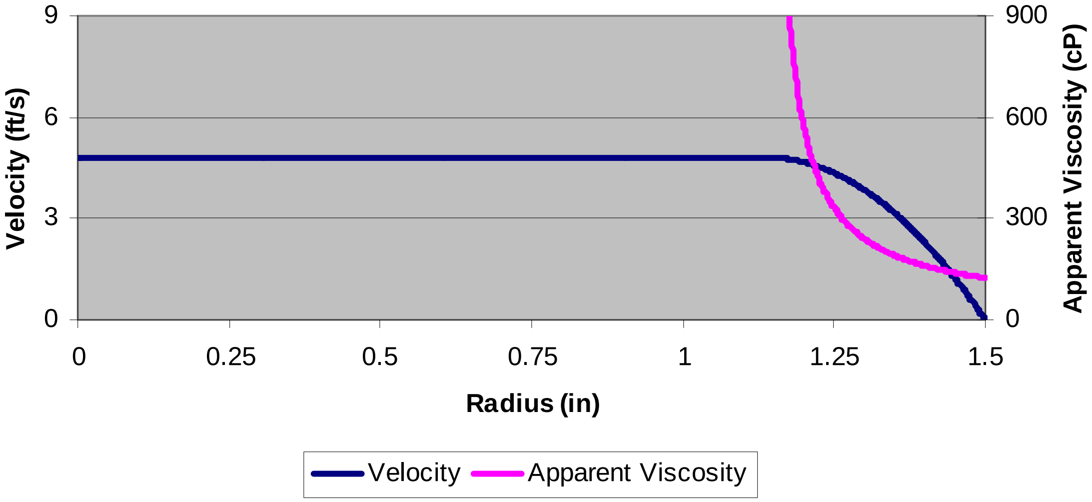


Figure 4.3. Example Flow Profiles for a Bingham Plastic Fluid (30 cP consistency, 30 Pa yield stress) in a 3-inch-ID Smooth Pipe at 90 gpm

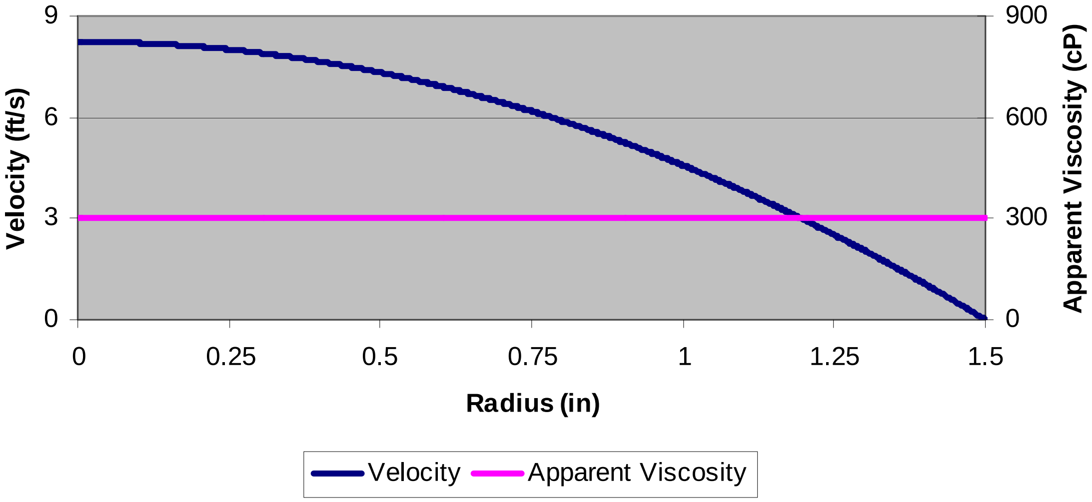


Figure 4.4. Example Flow Profiles for a Newtonian Fluid (30 cP viscosity) in a 3-inch-ID Smooth Pipe at 90 gpm

5.0 Rheology Measurements

Colloidal suspensions such as tank wastes exhibit a wide range of rheological behavior; therefore, rheological measurement of tank wastes requires a wide range of capabilities. Measurements of rheological properties of actual Hanford tank wastes have been performed in-situ using a falling ball rheometer and on core samples removed from the tanks using viscometers or rheometers. Rheological properties have also been calculated from extrusion data of tank waste core samples (slump tests).

5.1 Falling Ball Rheometer (In Situ Rheology)

The falling ball rheometer measures the drag force on a ball of known mass as it moves through the waste at various speeds from which rheology and density of the waste can be estimated. Physical models that form relationships are used to transform the drag force and velocity of the ball into fluid properties (density, viscosity, and yield strength). Different fluid types (Newtonian, Bingham plastic, or power law fluids) require different relationships. Details of the data reduction methodology are reported by Shephard et al. (1994).

The falling ball rheometer consists of a 71-N (16-lb), 9.12-cm diameter tungsten alloy ball tethered to a steel cable that is let out and retrieved from a spool at precise speeds using a computer-controlled drive system. A load cell measures the tension on the cable. A schematic of the system is shown in Figure 5.1.

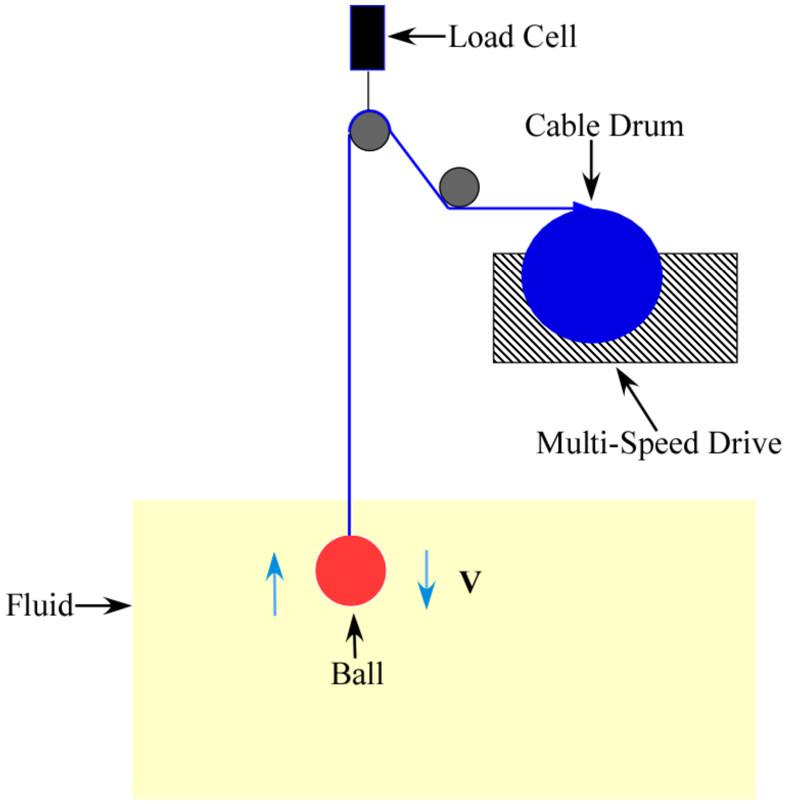


Figure 5.1. Schematic of the Falling Ball Rheometer

5.2 Laboratory Rheology Measurements

The majority of the rheology data are obtained from measurements of samples removed from the Hanford tanks. These samples included push- and rotary-mode core samples, auger samples, and grab samples. Rheological properties of these samples were obtained using rheometers under varying conditions depending upon the viscosity of the sample. The measuring system of a rheometer consists of a fixed part and a rotating part. Rheological properties obtained by laboratory measurements include viscosity, yield stress, and shear strength. Viscosity and yield stress are determined from a plot of shear stress as a function of shear rate. Shear strength is obtained from measuring shear stress as a function of time at a low shear rate that is held constant.

5.2.1 Viscosity and Yield Stress

Viscosity and yield stress (also call yield strength) are measured by plotting shear stress as a function of shear rate (rheogram). An example of a typical rheogram is provided in Figure 5.2. Most of the rheograms for Hanford tank waste samples include a curve with increasing shear rate and a second curve with decreasing shear rate. Generally, some thixotropic behavior (i.e., time dependency and hysteresis) is observed in these two curves.

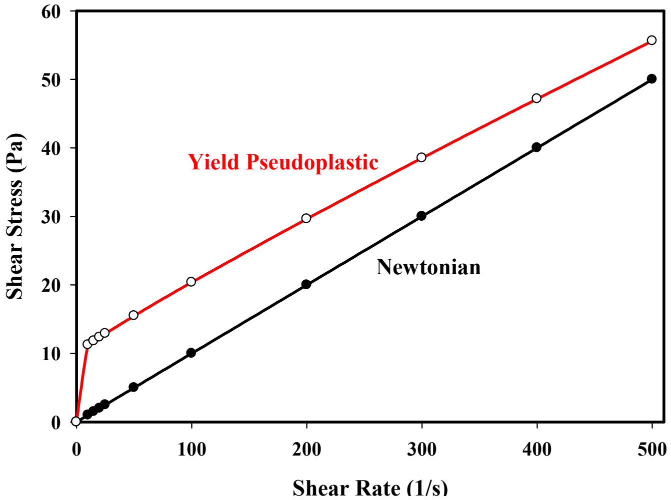


Figure 5.2. Rheogram of a Newtonian and Yield Pseudoplastic Fluid

Some rheometers measure shear stress as a function of shear rate (controlled-rate rheometers), while others measure shear rate as a function of shear stress (controlled-stress rheometers). Both types of systems were used to generate the data used in this report. Fixed and rotating parts of the rheometer varying according to the rheometer design and the viscosity of the sample. Both cone and plate and concentric cylinder geometries were used to measure tank waste samples. Rheograms were obtained at multiple temperatures and dilution levels (solids content) for many of the tank waste samples. Calibration of the systems was checked with Newtonian fluid standards of known viscosity.

Empirical curve fits of the data in the rheograms were performed using well-accepted models. Four different models were used in these analyses. These models included Newtonian, Bingham Plastic, Power Law, and Herschel-Bulkley fits described in Section 4. Additional parameters are included in each of these successive curve fits to provide a better fit of the data. The mathematical equations for these curve fits are provided in Eq. (4.5) through (4.8).

Equation (4.5) is the Newtonian model. No yield stress is observed in Newtonian fluids, and viscosity is constant over the entire shear rate range. In this equation the slope of the line is the Newtonian viscosity.

Equation (4.7) is the Bingham plastic model where the fluid has a positive yield stress as indicated by a non-zero intercept with the ordinate (y-axis) followed by a linear increase in the shear stress as function of shear rate. The slope of this line is the Bingham viscosity. The difference between a Bingham plastic and a Newtonian fluid is the presence of a non-zero yield stress.

Equation (4.6) is the power law model (sometimes called the Ostwald equation). For Hanford tank wastes we limit the model fit to pseudoplastic or Newtonian materials (exponent less than or equal to one). When the exponent in the power law model is equal to one, the fluid is a Newtonian fluid and consistency coefficient is the Newtonian viscosity. A fluid with power law behavior does not have a yield stress.

Equation (4.8) is the Herschel-Bulkley model or yield power law curve fit. This model has the greatest number of parameters in the curve, but it is often more detailed than is needed to fit the data. In this model, a yield stress (non-zero intercept with the ordinate) is followed by pseudoplastic behavior (exponent is less than 1). If the yield stress is zero, this model becomes the power law model. If the exponent is one, this model becomes the Bingham plastic model.

5.2.2 Shear Strength

Shear strength was measured on core samples taken from the tanks using a shear vane of known dimension as the rotating part of the rheometer. Shear strength is a semi-quantitative measure of the force required to move the sample and is dependent on sample history. Shear strength can be measured directly by slowly rotating a vane immersed in the sample material and recording the resulting torque as a function of time. The measured torque is converted to a shear stress by Eq. 5.1 and 5.2.

$$\tau = T / K \tag{5.1}$$

where

$$K = \frac{\pi D^3}{2}\left(\frac{H}{D} + \frac{1}{3}\right) \tag{5.2}$$

where

τ = the calculated shear stress in Pascals

T = the measured torque in Newton-meters

K = the shear vane constant in cubic meters
D = the shear vane diameter in meters
H = the shear vane height in meters.

A typical stress/time profile is shown in Figure 5.3. The profile shows an initial linear region (τ_y) followed by a nonlinear region, a stress maximum (τ_s), and a stress decay region. The stress maximum is the transition between the visco-elastic and fully viscous flow. Shear strength is defined as the transition between these two flows and is measured at the stress maximum.

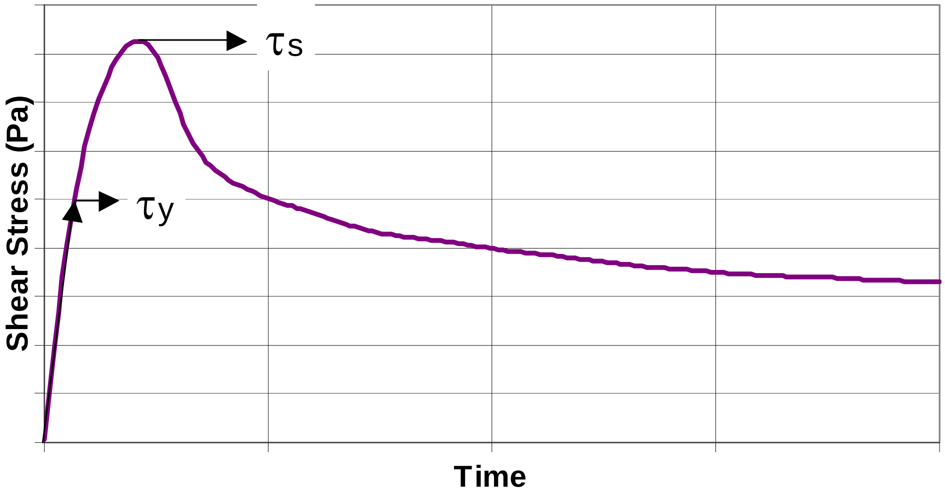


Figure 5.3. Typical Stress-Versus-Time Profile for a Shear Vane at Constant Shear Rate

Shear strength was measured on core samples, tank composites, and dilutions that had measurable shear strengths. The diameter and height of the shear vane are typically 1.6 and 3.2 cm, respectively, but other sizes have been used. Details of the vanes are available in the characterization reports. The rotation speed of the shear vane was constant (generally at 0.3 rpm).

To minimize history effects, the shear strength samples were often placed in the sample cup a minimum of 48 hours before the measurement. Sometimes the shear strength measurement was repeated one hour after the initial measurement to provide information about the effect of previous shear on the shear strength of these materials.

5.3 Shear Strength Calculation from Extrusion Data

Gauglitz and Aikin (1997) developed a methodology to estimate the shear strength of tank waste materials based on visual observations of horizontal extrusion behavior. A related core extrusion shear strength estimation technique was developed by Rassat et al. (2003). This technique is based strictly on extrusion length and was developed from the simulant extrusion results presented by Gauglitz and Aikin (1997).

An extrusion system has also been developed to make these observations on smaller quantities of waste. In these measurements an infusion syringe pump was modified to mimic the extrusions performed on the core samples from the Hanford tanks (Figure 5.4).

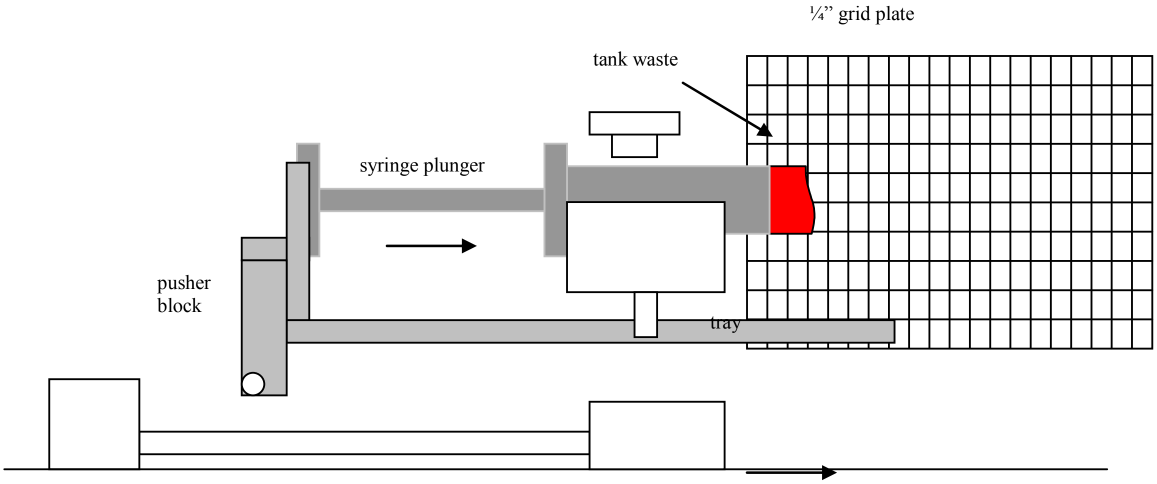


Figure 5.4. Mini-Extrusion Design

The pump was controlled by a microstepping motor drive. The motor drive pushed the pusher block against the syringe plunger, displacing the sample. The syringe pump was modified by the addition of a tray mounted directly to the pusher block. As the core was being extruded, the tray moved at the same speed the core was being pushed out.

For the extrusions, 10-mL Becton Dickinson syringes were used. The tips of the syringes were cut off so that the extrusion core would be the inner diameter of the syringe barrel. The cores were approximately 7 cm in length and 1.45 cm in diameter. The height from the bottom of the core to the tray was approximately 1.5 cm. The rate at which the core was extruded was 0.5 in./min. The syringe was filled with the sample in 0.5-mL increments. A microspatula was used to fill the syringe and remove voids in the sample. The syringes were filled a minimum of 72 hours prior to the extrusion. Parafilm was used to minimize drying of the sample. The samples were also placed in a closed plastic bag.

During the extrusions, video images were recorded and then analyzed to estimate the shear strength. To estimate the lengths of the extruded cores, a 6×3-inch grid plate was fabricated and attached to the syringe pump. The camera was placed directly in front of the syringe at a location to capture the entire extrusion. During the extrusions, the camera was not moved.

6.0 Physical Properties

Often, physical properties were measured on the same samples used to make rheological measurements. These properties are crucial in correlating the rheological properties of the suspensions in the WTP mixing systems. The physical properties of particular importance in this study include density of the suspension, centrifuged supernatant, centrifuged and settled solids; total solids content in the suspension as well as in the centrifuged and settled solids (both volume and wt% solids); dissolved and undissolved components of the total solids; and zeta potential. Very few data are available on zeta potential of Hanford tank wastes because of the high salt content in the supernatants, which make this measurement difficult on the standard zeta potential instruments available during characterization of these samples. Some of the other physical properties were not measured routinely on all samples; therefore, physical properties for many samples are incomplete.

6.1 Density

Density of the bulk sample, supernatant, centrifuged solids, and settled solids generally was calculated from volume and mass measurements. Details of these measurements are provided in the individual reports referenced for each sample. Generally, aliquots of the samples were placed in graduated centrifuge cones or in graduated cylinders and the sample was weighed. After allowing the samples to settle, the volume of the supernatant and solids was determined using the graduations on the centrifuge cones or graduated cylinders. When settled solids density was measured, the supernatant was decanted and placed in a graduated cylinder and weighed to determine the mass of the supernatant. The volume of the supernatant was also measured in the graduated cylinder. The settled solids were also weighed after decanting the supernatant. Settled solids and supernatant density were calculated by dividing the mass by the volume. Settled solids density was sometimes calculated without weighing the settled solids according to Eq. (6.1). In this calculation the density of the centrifuged supernatant was often used as the density of supernatant density used in Eq. (6.1).

$$\rho_{settled\ solids} = \frac{m_{sample} - (\rho_{\mathrm{sup}} \times V_{\mathrm{sup}})}{V_{settled\ solids}} \tag{6.1}$$

where

$\rho_{\text{settled solids}}$ = the density of the settled solids
m_{sample} = the mass of the sample used in the measurement
ρ_{sup} = the density of the settled supernatant
V_{sup} = the volume of settled supernatant
$V_{\text{settled solids}}$ = the volume of settled solids.

The supernatant was returned to the centrifuge cone, or a new aliquot of the sample was placed in a graduated centrifuge cone, and the sample was centrifuged to separate the liquid (supernatant) in the suspension from the solids. The sediment volume was measured on each sample at the completion of the centrifugation. The supernatant was decanted from the centrifuge cones and transferred to a graduated cylinder. The volume and mass of the decanted supernatant were measured to determine the supernatant density. The mass of the sediment remaining in the centrifuge cone was also measured. The densities of the supernatant, centrifuged solids, and bulk sample were often calculated from centrifugation data.

In situ liquid density data were obtained by the falling ball rheometer. A reference measurement of the ball in air is subtracted from the density measurements to adjust for the baseline forces associated with measurement. Both ball volume and buoyancy forces are used to calculate the density of waste, as shown in Eq. (6.2). This method is not applicable for materials with yield strengths because the strength of the material supports the ball resulting in an inaccurate buoyancy term (Stewart et al. 1996).

$$\rho = \frac{B_b}{V_b \times g} \tag{6.2}$$

where

ρ = the density of the liquid
B_b = the buoyancy force on the ball
V_b = the volume of the ball
g = the gravitational constant.

6.2 Solids Content

Weight percent total solids in the core samples was determined by either thermogravimetric analysis or simple gravimetric analysis methods. Both methods measure the change in the mass as the sample is heated. The mass loss is equated to the mass of water in the sample; therefore, the solids content is equal to the mass remaining in the sample after heating divided by the initial mass of the sample. Solids content is often reported as a percentage of the mass change instead of the fraction of the mass change. Solids content can also be reported in volume percent (volume of the dried solids divided by the volume of the initial sample reported as a percentage). Volume percent solids is often converted from the mass percent solids using the measured densities of the solids and supernatant.

In thermogravimetric analysis, approximately 25 mg of each sample was placed in a platinum, aluminum, or stainless steel pan, and the temperature of the sample was increased from ambient to approximately 550°C at a constant rate (generally 5°C/minute). The mass of the sample (by thermogravimetric analysis) and the change in the temperature of the sample (by differential thermal analysis) in relation to a reference sample (an empty pan of the same metal) were monitored as a function of temperature. These analyses were performed in a flowing air or helium atmosphere. The calibration of the thermal analysis system was checked with a lead or indium standard and calibrated weights. The thermogravimetric approach is typically used to distinguish free water from waters of hydration and, possibly, decomposition of solids at the higher temperatures.

A simpler gravimetric weight percent solids measurement is made by drying samples of known mass in a drying oven at 105°C. Greater than 2 g of material were weighed and then dried to obtain the total solids concentration. The mass of the sample before and after drying was measured.

Dissolved solids and undissolved solids content was calculated from the solids content measured in the supernatant (dissolved solids), total solids content (solids content of the bulk sample), and the fraction of supernatant in the sample measured after centrifugation or filtration. The equations used for calculating weight percent dissolved solids and undissolved solids are shown in Eq. (6.3) and (6.4), respectively. Weight percent undissolved solids is converted to volume percent using the densities of the undissolved solids and bulk sample.

$$\text{DS (wt\%)} = \left(\frac{\text{Supernatant mass}}{\text{Sample mass}} \right) \times \text{Supernatant Solids Content} \tag{6.3}$$

$$UDS\ (wt\%) = TS\ (wt\%) - DS\ (wt\%) \tag{6.4}$$

where

DS = the percent dissolved solids
UDS = the percent undissolved solids
TS = the percent total solids.

6.3 Zeta Potential

Zeta potential is the electrostatic potential at the surface of shear and is calculated from the electrophoretic mobility (velocity per unit of electric field strength). The surface of shear is not the surface of the particle, but extends from the particle out into solution to include the solution that moves with the particle (hydrodynamic size). A positive mobility (zeta-potential) means the surface of the particle is positively charged, a negative mobility means the surface is negatively charged, and a mobility value of zero means that the velocity is zero, which implies that electrostatic repulsion is small.

A charged solid-liquid interface (electrical double layer) is created between the charged particle and the liquid. In this electrical double layer, the concentration of the counter ions (ions in solution with the opposite charge as the particle surface) is higher near the particle and decrease steadily to the concentration in the bulk liquid. The thickness of this double layer is dependent upon the temperature, the dielectric constant of the liquid, and the ionic strength of the bulk liquid. For 1:1 electrolytes such as KCl at a bulk concentration of 1 mM, the double-layer thickness is approximately 10 nm. As the concentration of the electrolyte increases, the double layer thickness and the range of the repulsive forces between the molecules decreases.

Zeta potential is calculated from electrophoretic mobility using a theoretical model. Two classic models (Hückel and Smoluchowski equations) are used for these calculations. The Hückel equation is used for simple ions where the hydrodynamic radius is very small, and the Smoluchowski equation is used for very large particles. For most colloidal particles of interest dispersed in water, it is not easy to satisfy either model; therefore, mobility is related to zeta potential by a model-dependent function. Generally, these functions are more accurate for 1:1 electrolytes at 10^{-3} to 10^{-2} M salt.

The zeta potential of tank waste was measured by the Brookhaven Instrument Corporation's ZetaPlus zeta potential analyzer. In this system, a laser beam passes through the dilute sample between two electrodes that create an electric field. The particles in solution scatter the laser light as they move in this electric field.

The light that is scattered by the particles is Doppler-shifted because the scattering particles are moving in the electric field due to the charge on their surface. The Doppler shift is proportional to the velocity (both rate and direction) of the particles in this electric field, which is proportional to the electrophoretic mobility of the particles (Eq. 6.5).

$$\mathbf{V_s} = \mu_e \mathbf{E} \tag{6.5}$$

where

$\mathbf{V_s}$ = the average velocity of the TiO_2 particles
μ_e = the electrophoretic mobility
$\mathbf{E}$ = the electric field.

Because the ionic strength in most tank waste samples is extremely high (salt contents > 1 M), zeta potential was difficult to measure in the standard instruments available when most samples were characterized.

7.0 Sedimentation Measurements

Settling behavior of tank waste samples including dilutions of tank waste samples was determined by both gravity settling and centrifugation. Aliquots of the samples were allowed to settle in graduated cylinders or graduated centrifuge cones. The sediment volume and total volume of the sample aliquots were recorded as a function of time. In a few reports the height of the sediment bed and total sample were also recorded as a function of time. The samples were then centrifuged and the volume of the centrifuged supernatant and centrifuged solids were recorded. Details of the time and force used in centrifugation are reported in the individual characterization reports. The mass and volume of clear supernatant, centrifuged and settled solids, and total sample were generally determined for each aliquot at the completion of settling and centrifugation.

As the samples settled, an interface developed between the turbid suspension and clear supernatant. The sediment volume is the volume from the bottom of the suspension column to the interface between the clear supernatant and the cloudy suspension. Under the force of gravity, the solids in the suspension sank to the bottom of the cylinder, forming a sludge layer and a clear supernatant layer. The final sediment bed volume was measured after no significant change was observed in the height of this sludge layer over the prescribed time described in the individual characterization reports. The volume percent settled solids were then determined by dividing the final sediment bed volume by the total volume of the slurry.

The settling rate measured by this method is controlled by the settling rate of the smallest particles in the suspension. In a suspension with particles of uniform size, all of the particles will settle at the same rate, and a sharp boundary will exist between the clarified portion of the settling system and the fraction of the system where the particles are still settling. Hanford tank wastes are polydisperse systems, where each size fraction or material type (different particle densities) settles at its own characteristic velocity. The boundary between the clarified supernatant and the settling fraction of the system may be a diffuse region. The rate at which a particle settles in a suspending liquid depends on the size, shape, solvation, and density of the particle as well as the density and viscosity of the suspending medium. Stokes law provides a mathematical expression of the terminal settling velocity for spherical particles (Eq. 7.1). Asymmetry in the particle shape and solvation of the particle increase the friction factor of the settling particle, decreasing the settling rate of a particle of given mass compared to a spherical, unsolvated particle.

$$v = \frac{2r^2\left(\rho_p - \rho\right)g}{9\eta} \tag{7.1}$$

where

v = the terminal velocity of the particle
r = the radius of the particle
ρ_p = the density of the particle
ρ = the density of the suspending medium
g = the gravitation force
η = the viscosity of the suspending medium.

Interstitial liquid associated with the settled solids was further separated from the solids by centrifugation. The sediment volume was measured on each aliquot as function of time at a given force. Data for many samples were only recorded at a single duration. The volume percent centrifuged solids was then determined by dividing the sediment volume by the total volume of the slurry. The supernatant was decanted from the centrifuge cones, and the decanted supernatant and sediment were weighed. The weight percent supernatant and centrifuged solids were calculated by dividing their mass by the mass of the aliquot.

8.0 Rheology and Physical Properties Data

Appendix A is a compilation of the available rheology data for Hanford tank wastes. These data include in situ as well as laboratory analysis of samples removed from the tanks. If rheology data were available for samples, the physical properties of these samples were included with the rheology data. Settling rate as a function of time was included when available. Composition of the solids phases as determined by ESP was also included for each rheology sample.

The tables in Appendix A are organized by tank with a column for each sample for which rheology was obtained. There is a brief description of each sample along with a reference for the source of the rheology data. The model or basis used for interpreting the solid composition data is based on the ionic strength of the supernatant. The choices for this basis included salty, salt free, washed, leached, liquid, and supernatant. No distinction is made between salt-free and washed or liquid and supernatant.

8.1 Model Basis

Salty is used to describe samples that were untreated; therefore, it is assumed that the supernatant and solids composition is not changed from what is observed in tank. Rheology measurements on many samples were performed at multiple temperatures, and measurements made near tank temperature will be closest to this approximation. As temperatures decrease, dissolved solids may precipitate, and the solid content may increase. At elevated temperatures, solids may dissolve in the suspending medium, and the concentration of undissolved solids may decrease.

Salt free and washed models describe samples that were washed or diluted with water or supernatant. Washing or water dilutions decrease the salts in solution and may result in decreased undissolved solids contents. Total solids content will also decrease upon washing or diluting the sample. Washing the waste may also selectively remove specific solids from the settled solids. Because of changes in the composition of the solids and supernatant, washing and diluting tank wastes may significantly affect the rheological properties of the samples.

Leached model describes those tank samples that were washed in dilute $NaOH/NaNO_2$, followed by washing in concentrated NaOH to remove Cr, Al, and P from the sample, and then washing with dilute $NaOH/NaNO_2$ to remove any leached Cr, Al, or P remaining in the sample. The removal of Al and P from the sample may significantly affect the rheology of the suspension.

Liquid and supernatant models were used to describe the supernatant obtained from centrifugation or settling of slurries. They also describe core and dip samples that consisted of liquid or supernatant. These samples provide additional information on the rheological properties of the suspending medium.

8.2 Solid Phases

The average compositions of the solid and liquid phase in each tank were included in the tables in Appendix A. These compositions were derived from modeling carried out using the ESP[a] chemical thermodynamic model as described in WTP-RPT-153 (Wells et al 2007). The ESP predictions constitute the only phase composition information that 1) is available for all 177 tanks and 2) was prepared using a consistent method for all 177 tanks. It was therefore appropriate and advantageous to draw on this database in devising a sludge phase composition for transfer system design. However, this application of ESP had certain characteristics that should be noted:

- Compositions were calculated on a whole-tank basis, as if all the different layers of waste had been mixed and allowed to come to equilibrium.
- ESP is an equilibrium model and is not expected to predict the correct concentration of any compounds that have not yet come to equilibrium with an in-tank chemical environment different from those in which they formed (e.g., different temperature, pH, etc.).
- In the 2002 study, certain compounds were excluded from precipitating to reflect kinetic limitations or sometimes to reduce computational time or avoid nonconvergence of the solution algorithm. A significant example is boehmite, which was excluded because, had it been included, it would have been thermodynamically preferred to gibbsite in all wastes. Because gibbsite is actually dominant due to kinetic constraints that prevent boehmite from forming at lower temperatures, the databank excluded boehmite from forming at a temperature less than 100°C.
- Because of computational time constraints, Redox equilibrium was not calculated on a tank-by-tank basis in the 2002 study; rather, expert judgment and generic-composition runs of ESP were used to fix the metal oxidation states in all tanks. Iron was fixed as Fe^{+3}, manganese as Mn^{+2}, chromium as Cr^{+3} or Cr^{+6}, and so forth. Thus, the ESP predictions could not include compounds formed by metals in any other oxidation states.
- The study assigned compounds to the "trace analytes" (including thorium, cadmium, copper, tin, and many others) without employing the ESP model; thus, these metals are not present in the compounds in the ESP-predictions database.
- Thermodynamic data were not available for all the compounds that could potentially form in the tank waste, which led to the omission of some compounds.

The solids predicted by the ESP chemical thermodynamic model for the tank-average solid phase were taken as a best approximation, although [as noted in Wells et al. (2007)] there were cases in which the ESP model predicted solids that were not observed, and others in which observed solids were not predicted. Only one compound modification was made to the ESP output: all aluminum hydroxide predicted by ESP in tanks containing Redox boiling waste was substituted with boehmite on an equivalent-Al basis, as in Wells et al. (2007). Aluminum hydroxide/oxide predicted in other tanks was considered to be gibbsite.

(a) ESP was supplied and developed by OLI Systems, Inc., Morris Plains, New Jersey.

The ESP model, as used, predicted the concentration of each solid in the waste on a normalized basis. In other words, the model predicted the relative masses of different solids, and the relative volumes and masses of total liquid and total solid, but not the absolute masses or volumes in a tank. The absolute mass of each solid–phase compound in a tank was calculated for the present study by combining the modified ESP results with BBI volumes, using Eq. (8.1):

$$M_S = c_S V \phi_{ESP} \tag{8.1}$$

where

c_S = mass of compound per volume of solid phase
V_S = solid phase volume in the tank
ϕ_{ESP} = ESP-predicted fraction of solid phase, average of all the waste in the tank
V = total waste volume in the tank as defined by the 2002 BBI.

The solid volume calculated by the above equation contains some uncertainty because of uncertainty in the parameters and because potential retained gas volume is not accounted for. The portion of the volume *V* that is not solid phase is liquid volume, which includes both the interstitial liquid in the bulk solids layers and any supernatant that may be present. The volume of each compound in the solid phase was calculated by dividing the mass of each compound by the density. All the densities discussed were taken from the *Handbook of Chemistry and Physics* (CRC 1975), as in Wells et al. (2007), except where otherwise noted.

The ESP-predicted solid-phase compositions were on a "salty" basis; that is, the water-soluble sodium salt solids were included. These compositions were used to calculate a second composition that was on a "salt-free" basis, where only the insoluble metal compounds were retained in the solid phase.

Physical property measurements from tank characterization reports were used to provide the mass fraction of undissolved solids for a particular slurry sample. This was multiplied by the ESP solid phase speciation to produce the mass fraction of an ESP species in the slurry sample. Slurry densities from physical property measurements along with literature values for crystal density of the ESP phases were then used to convert the mass fraction to volume percent undissolved solids in the slurry sample.

8.3 Rheological Data

Rheological data included the temperature, instrument, source of the data, and all applicable model fits for the rheological data. Details about the rheological measurements can be obtained from the individual references. Correlation coefficients for each curve fit are also included with each model used for the available data. A description of the curve fits is provided in Section 4, Rheology Theory.

8.4 Physical Property Data

Physical property data may be obtained from a separate reference than was used to report the rheology data, but physical properties data do represent the properties of the sample used to perform the rheology. The physical properties reported included bulk, supernatant, centrifuged solids, settled solids, and particle (listed as solids) densities; volume and weight percent settled solids (also listed as settled supernatant which is just 100% minus the percent settled solids) and centrifuged solids; and solids content of the supernatant (dissolved solids), centrifuged sludge, and bulk sample (total solids); and the percent undissolved solids. Zeta potential is also listed in the table, but only minimal data were obtained on zeta potential of tank waste samples. A detailed description of these measurements is provided in Section 6. If available, the temperature at which these physical properties were measured was also reported. Details of these data are provided in the reference associated with each sample.

8.5 Settling Data

Gravity settling data is reported as the volume of the sediment bed as a function of time (up to 72 hours) for each sample. The total volume of the aliquot in the settling column (initial volume) is also recorded for each sample. Settling data is also reported for multiple temperatures if it is available. A more detailed description of the method used for gravity settling is described in Section 7.

8.6 Particle Size Data

Particle size data used in this report are obtained from a report prepared earlier this year, *Estimate of Hanford Waste Insoluble Solid Particle Size and Density Distribution* (Wells et al. 2007). No modifications were made to the data reported in that document. The data reported in the tables are the particle diameter for cumulative volume percents ranging from 1 to 99%.

8.7 Shear Strength Data

Shear strength data are reported as a function of gelation time. Only limited data were obtained at discrete gelation times. Most of the shear strength data were obtained for samples that had remained undisturbed for a minimum of three days. Inserting the shear vane did not constitute disturbing the sample for this report. A more detailed description of the methods used to obtain shear strength is provided in Section 5. The data reported include measurements from the ball rheometer and laboratory measurements using a vane geometry. Calculation of shear strength from core extrusions is not included in this report.

9.0 Viscosity Model

Hanford liquid supernatant can be characterized rheologically as a Newtonian fluid. While the chemical composition of the aqueous waste has a significant effect on the viscosity of the supernatant liquid, the model described in this section attempts to model the Hanford supernatant viscosity as a function of only liquid density and temperature. Liquid density was selected as an independent variable in this model because it is relatively easy to measure and directly scales with dissolved species concentration.

Temperature is known to have a large effect on liquid viscosity. The Andrade correlation is a mathematical relationship often used when evaluating the relationship between increasing temperature and decreasing viscosity of liquids. It is not accurate for high-temperature fluids or highly polar mixtures. This equation is shown as Eq. (9.1):

$$\eta = Ae^{\frac{B}{T}} \tag{9.1}$$

where

η = the Newtonian viscosity in cP

T = temperature in Kelvin (K)

A (in cP) and B (in K) = fitting parameters associated with molecular structure.

A plot of the viscosity of water as a function of temperature is shown in Figure 9.1. For water the Andrade equation parameters are 0.0019 cP and 1800K for A and B, respectively.

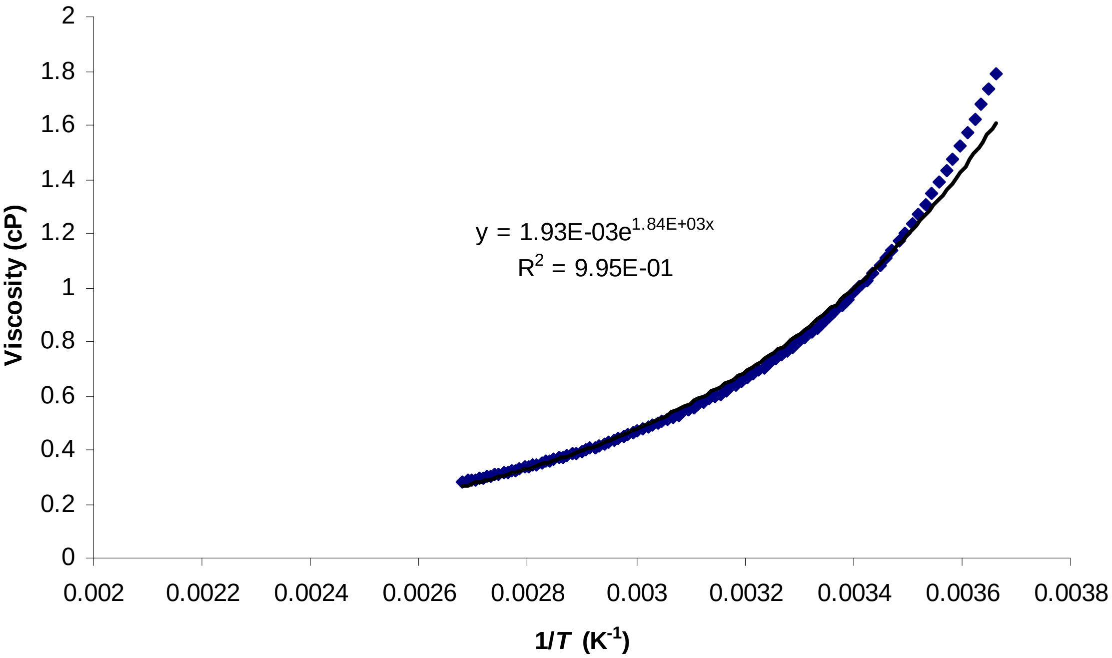


Figure 9.1. Viscosity of Water at Various Temperatures

Liquid viscosity data from 8 different Hanford tanks was analyzed as a function of liquid density, temperature, and dilution with water (salt content). The tanks for which this data was available are listed in Table 9.1. Relative volumes of the waste types comprised by these tanks are shown in Figure 9.2. Several sludge waste types are not represented in this analysis due to a lack of appropriate data.

Table 9.1. Liquid Viscosity Data for Hanford Tank Wastes

Tank	**Density** (g/mL)	**Dilution**	**Temperature** (°C)	**Viscosity** (cP)
241-AN-103	1.42	Supernatant from 80% Dilution of Settled Solids	29	11.6
	1.42		45	6.7
	1.42		65	4.6
	1.46	26% Dilution of Supernatant	29	7.8
	1.46		45	5.4
	1.46		65	3.7
	1.52	10% Dilution of Supernatant	29	8.8
	1.52		45	5.9
	1.52		65	4
	1.58	Undiluted Supernatant	29	27.4
	1.58		45	13
	1.58		65	7.6
241-AN-104	1.26	Undiluted Permeate	25	3.5
	1.31	Supernatant from 80% Dilution of Settled Solids	25	17.5
	1.31		45	8.1
	1.31		65	5.4
	1.42	Undiluted Supernatant	25	16.9
	1.42		45	8.1
	1.42		65	4.6
241-AN-105	1.35	20% Dilution of Supernatant	25	9.4
	1.35		45	4.2
	1.35		65	2.4
	1.42	Undiluted Supernatant	25	12.3
	1.42		45	6.3
	1.42		65	3.5
241-AP-104	1.26	Undiluted Supernatant	25	3.7
	1.26		40	2.4
241-AW-101	1.38	Supernatant from 50% Dilution of Tank Composite	25	11.5
	1.38		45	5.4
	1.38		65	3.6
	1.42	Supernatant from 80% Dilution of Settled Solids	25	6.0
	1.42		45	3.0
	1.42		65	1.8
	1.52	Undiluted Supernatant	25	22.0
	1.52		45	8.0
	1.52		65	5.4
241-AY-102	1.13	Centrifuged Liquid Composite	27	1.8
	1.13		45	1.1
	1.13		65	0.3
241-C-104	1.24	Undiluted Supernatant	25	1.3
	1.24		45	1.3
	1.24		65	1.4
241-S-112	1.16	20% Dilution of 2nd Dissolution Contact[a]	20	2.0
	1.16		35	1.8
	1.16		50	1.4
	1.36	20% Dilution of 1st Dissolution Contact[b]	20	5.7
	1.36		35	4.0
	1.36		50	2.9

(a) The second contact was accomplished by mixing 30 g of residue from the first contact in 70.5 g of water at 50°C.
(b) The first contact was accomplished by mixing 82 g of waste with 50 g of water at 50°C.

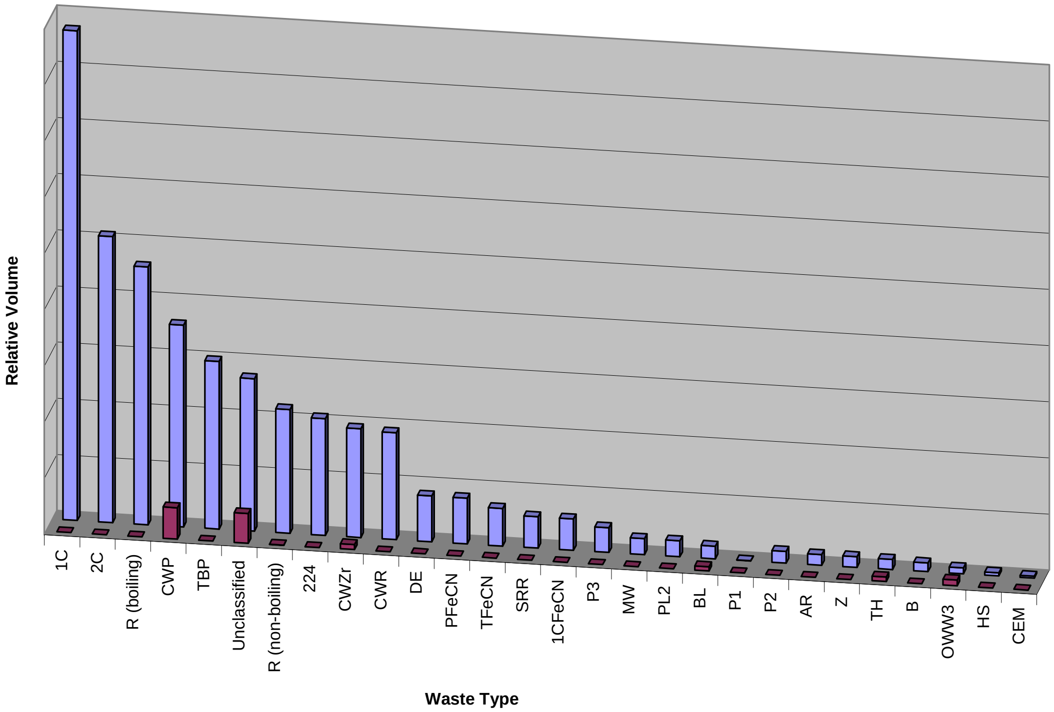


Figure 9.2. Relative Waste Volumes Used in the Analysis of Liquid Viscosity as a Function of Sludge Waste Types

Figure 9.3 is a plot of the Hanford liquid viscosity as a function of density. During the multidecade Hanford tank waste characterization effort, measurements were not performed at consistent temperatures. Therefore, data are grouped in 15ºC temperature increments starting at 20º to 35ºC and ending at 80º to 95ºC. In addition, the data are grouped according to whether the sample was from a tank waste composite [as-received (AR)] or diluted with water (Dil)**.** Exponential fits to these data for each temperature group were also obtained and are shown in a log plot of viscosity as a function of liquid density minus one (second plot in Figure 9.3). These data indicate that liquid density should be maintained below 1.4 to 1.5 g/mL to avoid exceeding the 15 cP liquid viscosity bound found in Poloski et al. (2003a). The coefficients for these exponential fits were constrained to produce the viscosity of water according to the Andrade correlation when sample density is unity.

At constant density, the parameters of the exponential fits vary with temperature. Assuming that the model takes the form of the Andrade correlation at each liquid density, the viscosity of the supernatant in the Hanford tanks can be correlated to density according to:

$$\eta = \left(m_1 e^{b_1(\rho-1)}\right) e^{(m_2(\rho-1)+b_2)/T} \tag{9.2}$$

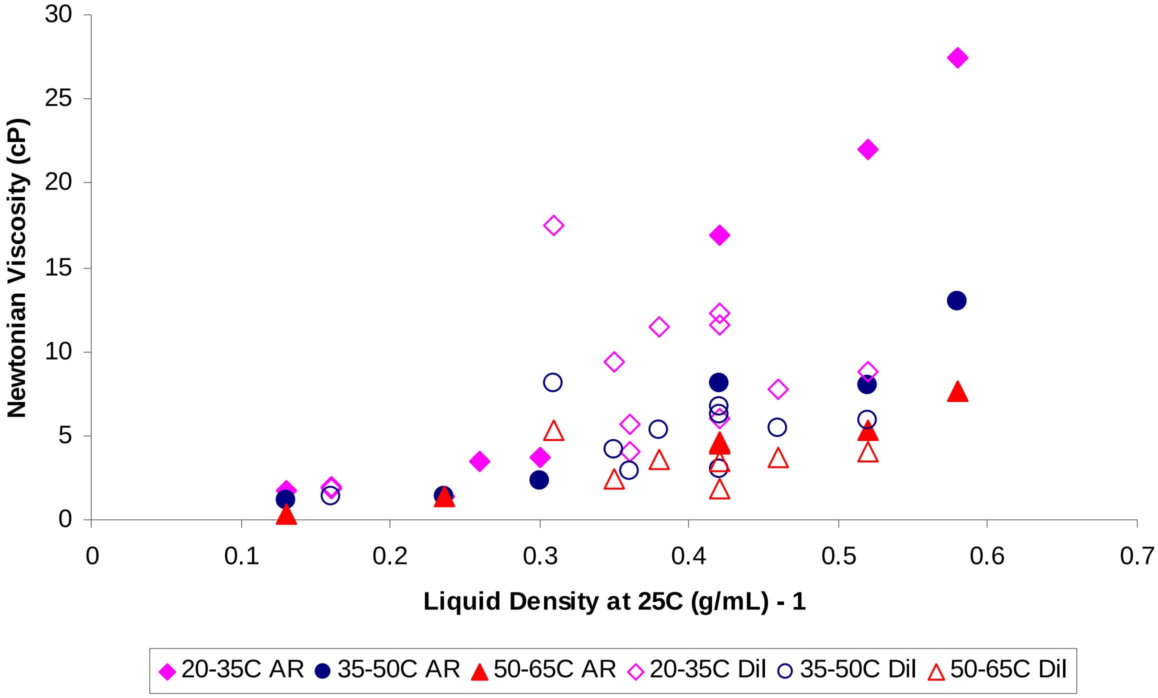
where

η = the Newtonian viscosity in cP

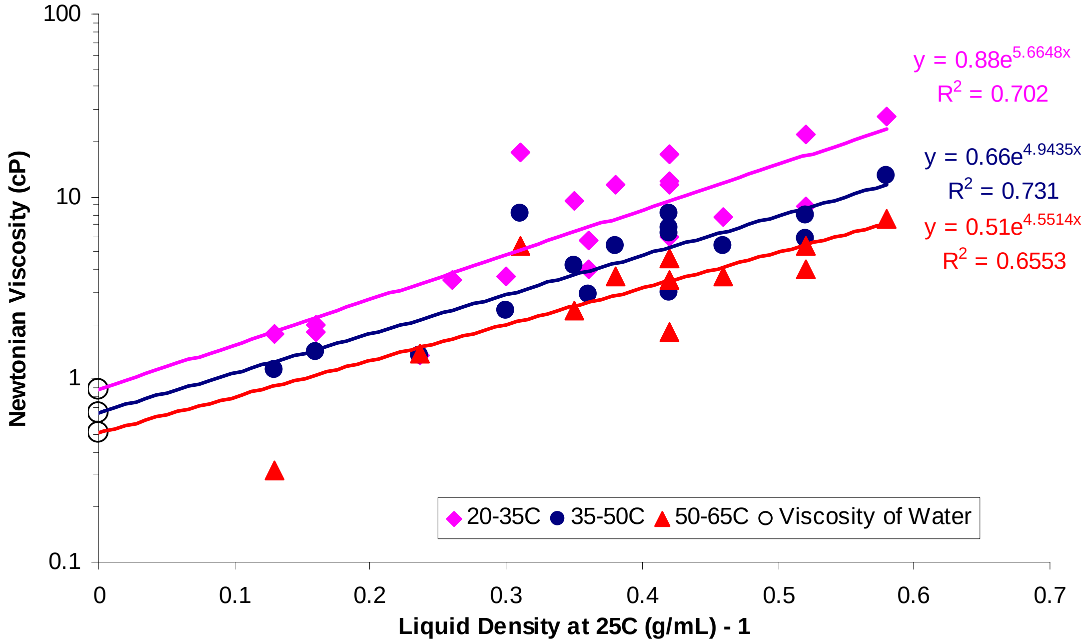
T = temperature in Kelvin

ρ = the liquid density in g/mL

m_1 = 0.00216 cP



(a) Data grouped according to dilution and temperature.



(b) Exponential fits at various temperatures

Figure 9.3. Viscosity of Hanford Supernatant at Various Densities and Temperatures

b_1 = -6.69 $(\text{g/mL})^{-1}$
m_2 = 3700K·$(\text{g/mL})^{-1}$
b_2 = 1810K.

When the liquid density is unity, this equation reduces to the Andrade correlation for water.

Figure 9.4 is a parity plot of the measured and predicted viscosities. Based on this correlation, on average, measured viscosity is biased by 9%.

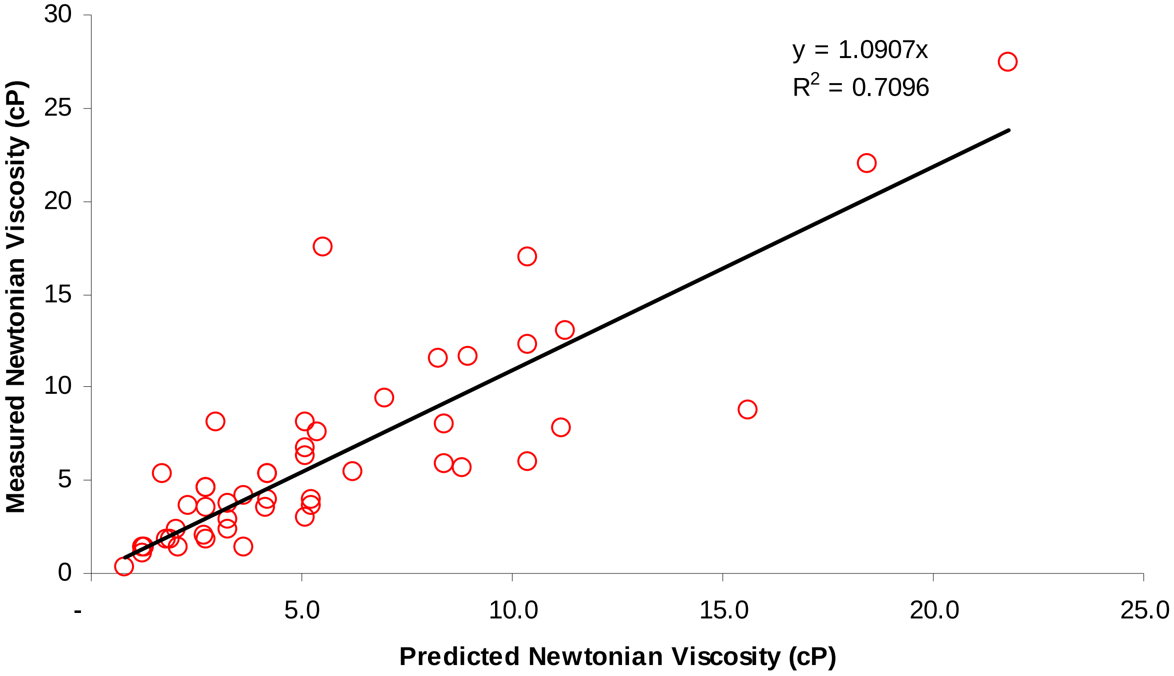


Figure 9.4. Parity Plot of Measured and Predicted Hanford Supernatant Liquid

10.0 Sedimentation Model

Hanford tank waste was observed to settle in the "zone" or "hindered" settling regime. This regime occurs when interacting particles settle as a mass and is common in the wastewater industry. Hindered settling is characterized by the settled-solids layer height decreasing from the fully suspended volume to a final settled-solids volume. Several models have been developed to predict the performance of sludge in a settling system based on laboratory-scale sedimentation column data. One of the more recent models is described by Renko (1996, 1998) and is shown in Eq. (10.1).

$$\frac{z}{z_0} = \frac{C\phi_0}{\alpha} + \left(1 - \frac{C\phi_0}{\alpha}\right) e^{\frac{-\alpha}{\phi_0 z_0} t} \tag{10.1}$$

where

z = the interface height (m) at time t in hours

z_0 = the initial interface height (m)

ϕ_0 = the initial solids concentration of the suspended sample (volume fraction)

α and C = fitting parameters in m/hr^{-1}.

When sedimentation begins, the interface height (z) is equal to the initial interface height (z_0). As time goes to infinity, the interface height approaches $\frac{C\phi_0 z_0}{\alpha}$. Because the average solids concentration varies with interface height, as shown in Eq. (10.2), the maximum solids concentration $(\phi_{\max})$ achieved through sedimentation is $\frac{\alpha}{C}$.

$$\phi = \frac{\phi_0 z_0}{z} \tag{10.2}$$

Based on these relationships, Eq. (10.1) can be rewritten in terms of average solids concentration as shown in Eq. (10.3).

$$\phi = \left[\frac{C}{\alpha} + \left(\frac{1}{\phi_0} - \frac{C}{\alpha}\right) e^{\frac{-\alpha}{\phi_0 z_0} t}\right]^{-1} \tag{10.3}$$

The data collected in this report contains 58 sedimentation curves over 17 waste tanks and eight waste types. Each sedimentation curve was fit to Eq. (10.1), and the fitting parameters α and C are reported in Table 10.1. Values for the initial solids concentration (ϕ_0) were estimated from physical property data. Values for the initial sediment height (z_0) were unknown for many of the data because they only reported volume (or vol%) rather than height. However, most measurements were performed in small graduated cylinders or graduated centrifuge cones with a total volume of 20–50 mL; therefore, an initial height of 10 cm was assumed in all calculations. This is similar to the data where sediment height as well as sediment volume was provided (Morrey and Tingey 1996).

Table 10.1. Sedimentation Model Input and Fitting Parameters for Hanford Tank Waste

Tank	**Waste Type**	ϕ_0 **vol%**	z_0 **mm**	C **mm/hr**	α **mm/hr**	ϕ_{max} **vol%**
B-202	224	0.8%	100	21.7	0.43	2.0%
B-202	224	0.8%	100	17.0	0.34	2.0%
B-202	224	0.8%	100	36.1	0.68	1.9%
B-202	224	0.9%	100	17.2	0.32	1.9%
B-202	224	0.9%	100	19.8	0.38	1.9%
B-202	224	1.0%	100	25.3	0.64	2.6%
B-202	224	2.0%	100	12.2	0.32	2.6%
B-202	224	2.1%	100	11.8	0.31	2.6%
B-202	224	2.0%	100	13.3	0.31	2.3%
B-202	224	2.0%	100	9.6	0.25	2.6%
B-202	224	2.3%	100	9.4	0.25	2.6%
B-202	224	2.3%	100	9.6	0.28	2.9%
B-202 Average values →				***16.9***	***0.38***	***2.3%***
B-203	224	0.4%	100	53.4	0.55	1.0%
B-203	224	1.8%	100	6.1	0.13	2.1%
B-203	224	1.8%	100	6.1	0.13	2.1%
B-203 Average values →				***21.8***	***0.27***	***1.7%***
T-111	224	0.1%	100	9.4	0.01	0.1%
T-111	224	0.2%	100	7.0	0.02	0.3%
T-111	224	1.9%	100	1.9	0.05	2.6%
T-111 Average values →				***6.10***	***0.027***	***1.0%***
T-203	224	0.4%	100	28.9	0.27	0.9%
T-203	224	1.3%	100	4.7	0.07	1.4%
T-203 Average values →				***16.8***	***0.17***	***1.2%***
T-204	224	0.4%	100	91.7	0.75	0.8%
T-204	224	1.5%	100	4.4	0.07	1.7%
T-204 Average values →				***48.1***	***0.41***	***1.3%***
BX-107	1C	0.4%	100	13.4	0.17	1.3%
BX-107	1C	0.5%	100	26.0	0.29	1.1%
BX-107	1C	0.5%	100	20.9	0.27	1.3%
BX-107	1C	2.2%	100	12.4	0.50	4.1%
BX-107	1C	2.6%	100	18.4	0.73	4.0%
BX-107	1C	2.7%	100	13.9	0.56	4.0%
BX-107 Average values →				***17.5***	***0.42***	***2.6%***
C-110	1C	0.3%	100	9.7	0.08	0.8%
C-110	1C	0.5%	100	9.2	0.13	1.4%
C-110	1C	1.5%	100	7.8	0.17	2.2%
C-110	1C	2.5%	100	11.0	0.46	4.2%
C-110 Average values →				***9.4***	***0.21***	***2.2%***
T-107	1C	3.4%	100	10.7	1.02	9.6%
T-107	1C	7.5%	100	5.3	0.59	11.1%
T-107 Average values →				***8.0***	***0.81***	***10.4%***
T-110	2C	0.3%	100	20.1	0.25	1.2%
T-110	2C	1.4%	100	12.7	0.39	3.1%
T-110	2C	3.5%	100	1.1	0.05	4.5%
T-110 Average values →				***11.3***	***0.23***	***2.9%***

Table 10.1 (contd)

Tank	**Waste Type**	ϕ_0 **vol%**	z_0 **mm**	C **mm/hr**	α **mm/hr**	ϕ_{max} **vol%**
AN-104	A2SltSlr	0.4%	100	6.1	0.14	2.3%
AN-104	A2SltSlr	0.9%	100	7.4	0.68	9.2%
AN-104	A2SltSlr	3.2%	100	20.7	1.17	5.6%
AN-104	A2SltSlr	4.5%	100	19.8	1.05	5.3%
AN-104 Average values →				***13.5***	***0.76***	***5.6%***
AN-105	A2SltSlr	0.7%	100	8.0	0.48	6.0%
AN-105	A2SltSlr	4.2%	100	1.8	0.54	30.1%
AN-105	A2SltSlr	8.2%	100	5.0	0.80	16.0%
AN-105	A2SltSlr	10.5%	100	3.9	0.99	25.1%
AN-105 Average values →				***4.7***	***0.70***	***19.3%***
C-104	CWP	2.1%	100	4.6	0.44	9.7%
C-104	CWP	3.0%	100	4.3	0.34	7.8%
C-104	CWP	5.1%	100	3.8	0.41	10.7%
C-104 Average values →				***4.2***	***0.40***	***9.4%***
T-102	CWP	2.1%	100	22.5	4.66	20.7%
T-102	CWP	4.7%	100	37.6	10.33	27.5%
T-102 Average values →				***30.1***	***7.5***	***24.1%***
S-104	R (boiling)	2.3%	100	9.0	0.25	2.7%
S-104	R (boiling)	2.8%	100	8.6	0.37	4.3%
S-104	R (boiling)	8.7%	100	5.1	0.50	9.8%
S-104 Average values →				***7.6***	***0.37***	***5.6%***
C-109	TFeCN	2.2%	100	16.1	0.82	5.1%
C-109	TFeCN	3.5%	100	14.3	0.58	4.1%
C-109 Average values →				***15.2***	***0.70***	***4.6%***
C-112	TFeCN	2.2%	100	8.6	0.42	4.9%
C-112	TFeCN	5.9%	100	1.9	0.17	8.8%
C-112 Average values →				***5.3***	***0.30***	***6.9%***
AY-102	Unclassified	7.8%	100	6.0	0.80	13.3%

The data presented in Table 10.1 can be grouped according to waste type. A summary table of the fitting parameters for each waste type is shown in Table 10.2.

Table 10.2. Sedimentation Parameters for Each Waste Type

Waste Type	**Avg C (mm/hr)**	**Avg α (mm/hr)**
224	18.9 ± 20.2	0.3 ± 0.2
1C	13.2 ± 5.9	0.4 ± 0.3
2C	11.3 ± 9.6	0.2 ± 0.2
A2SltSlr	9.1 ± 7.2	0.7 ± 0.3
CWP	14.6 ± 15.1	3.2 ± 4.4
R (boiling)	7.6 ± 2.2	0.4 ± 0.1
TFeCN	10.2 ± 6.4	0.5 ± 0.3
Unclassified	6.0 ± not measured	0.8 ± not measured

Several of the waste types are not represented in this modeling activity because appropriate data was not available. The gaps in the waste types modeled are shown in Figure 10.1. The relative volume of each waste type in the17 waste tanks modeled (red bar in the front of the graph) is compared to the total volume of waste associated with those waste types (blue bar in the back of the graph). The volume of waste in each tank for each waste type was determined using the TWINS database.

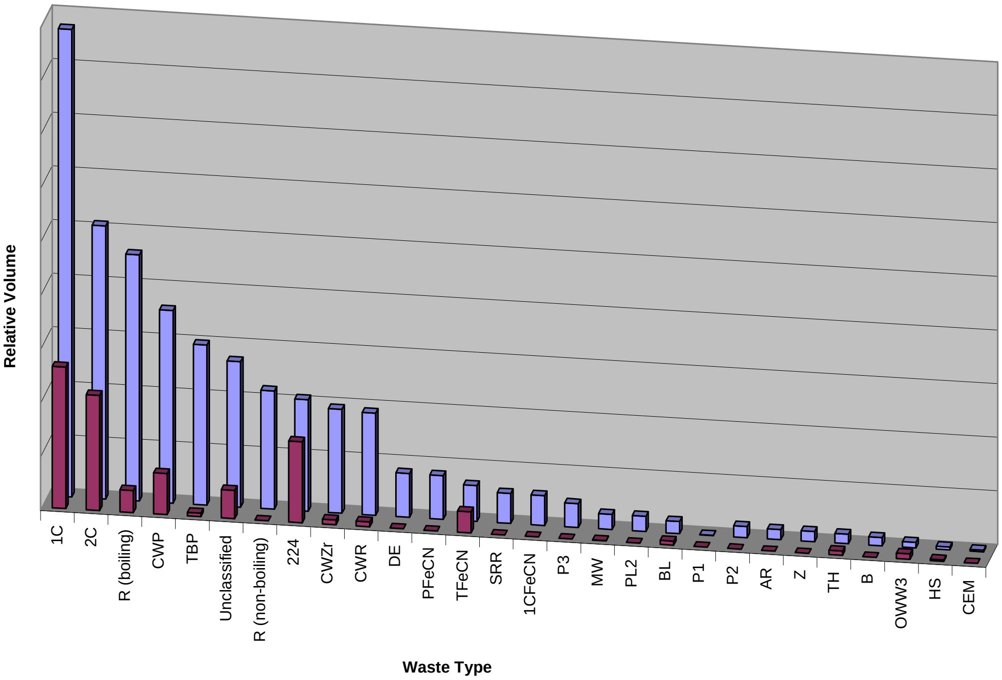
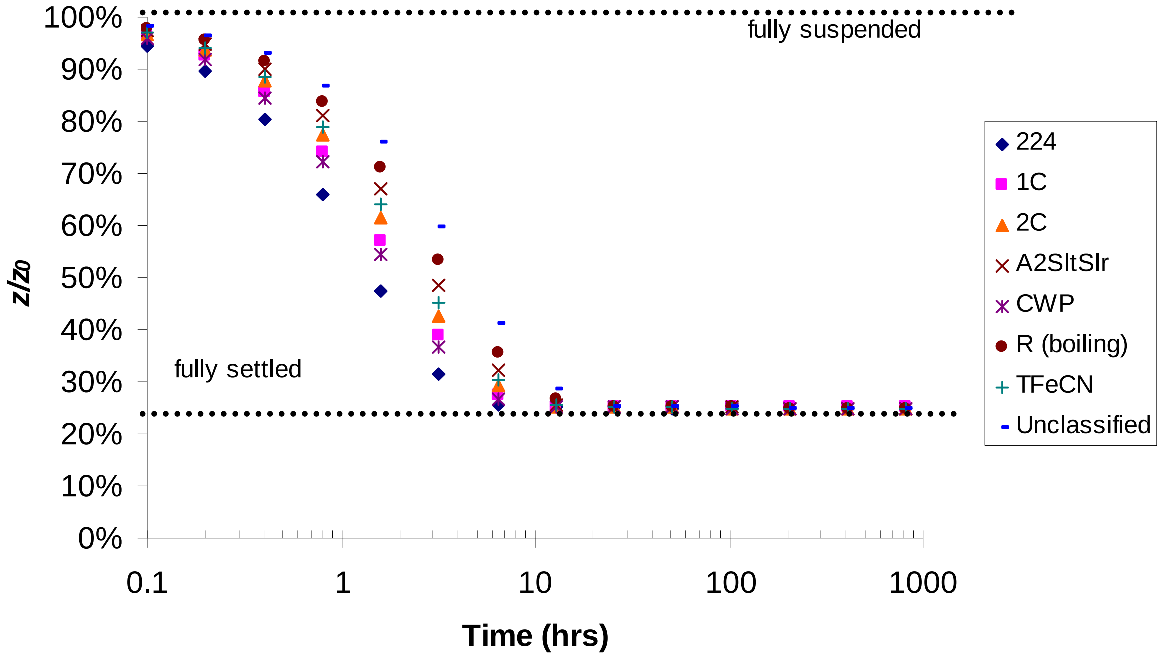
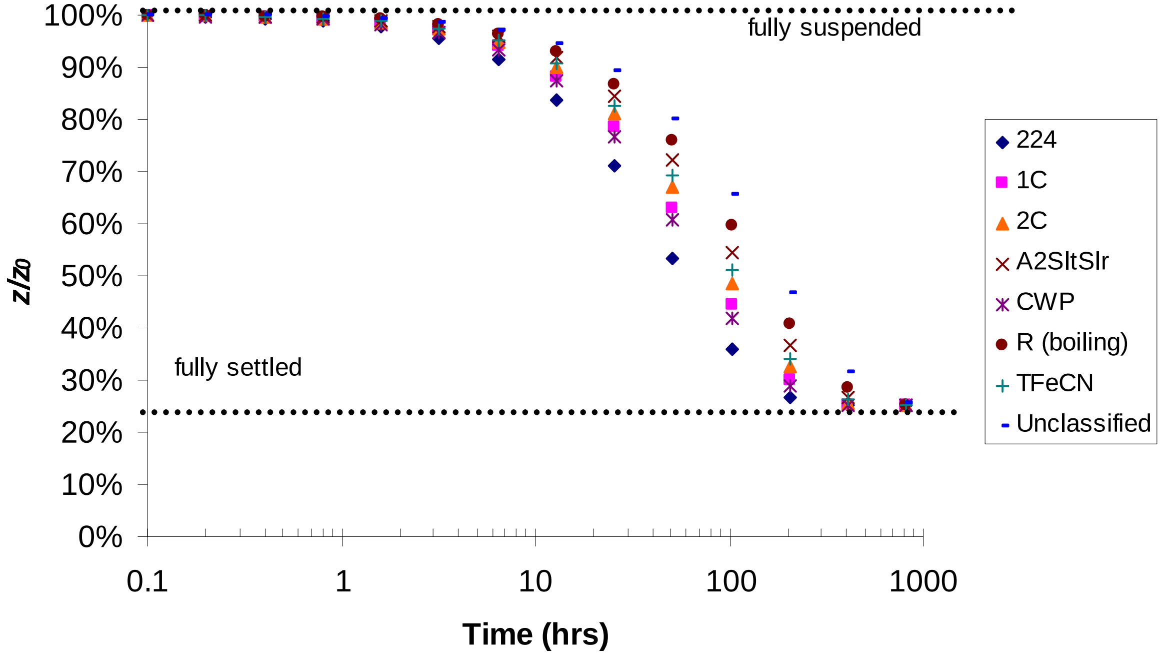


Figure 10.1. Gaps in Data Available for Sedimentation Modeling as a Function of Waste Type

From Eq. (10.1) and (10.3), initial interface height, z_0, and initial solids concentration, ϕ_0, are input parameters to determine the interface level and solids concentration as a function of time. The average values from Table 10.1 were used to calculate interface height as a function of time at an initial solids concentration equivalent to a 3:1 dilution of the sediment volume at initial heights of 10 cm and 4 m. The resulting plots shown in Figure 10.2 illustrate that small-scale laboratory experiments reach the fully settled configuration faster than plant-scale vessels. This can be explained by considering that the total distance the particles must travel to reach the full sediment configuration at plant scale is larger than the lab-scale experiments.



a) initial interface height is z_0 = 10 cm; initial solids concentration of the suspended sample is $\phi = \dfrac{\phi_{\max}}{4}$



b) initial interface height is z_0 = 4 m; initial solids concentration of the suspended sample is $\phi = \dfrac{\phi_{\max}}{4}$

Figure 10.2. Predicted Sedimentation Curves for Various Waste Types at Different Scales

11.0 Shear Strength Model

Shear strength is a transient property that grows during the time a sample remains quiescent. A model describing the growth of shear strength with respect to time is presented by Speers et al. (1987), who describe the shear strength rebuild behavior for several drilling mud slurries with a first-order rate model:

$$\frac{G_t - G_\infty}{G_0 - G_\infty} = e^{-kt} \tag{11.1}$$

where

G_t = shear strength

t = gel time

G_0 = initial shear strength

G_∞ = equilibrium shear strength

k = gel time constant.

Only limited data were available for shear strength as a function of gelation time, but this model appears to be a good fit to the AZ-101 pretreated sludge shear-strength data (Poloski et al. 2003b) shown in Figure 11.1. The model-fit parameters observed for the AZ-101 pretreated sludge are reported in Table 11.1. Using this model, the initial shear-strength parameter (14.2 Pa) should roughly agree with the measured rheological Bingham-yield-stress measurement (14.7 to 18.1 Pa) (Poloski et al. 2003b). This model indicates that the shear strength rebuilds immediately from the time that it remains unshared. The material is expected to reach 95% of its steady-state shear strength (31 Pa) 9 hours from this time.

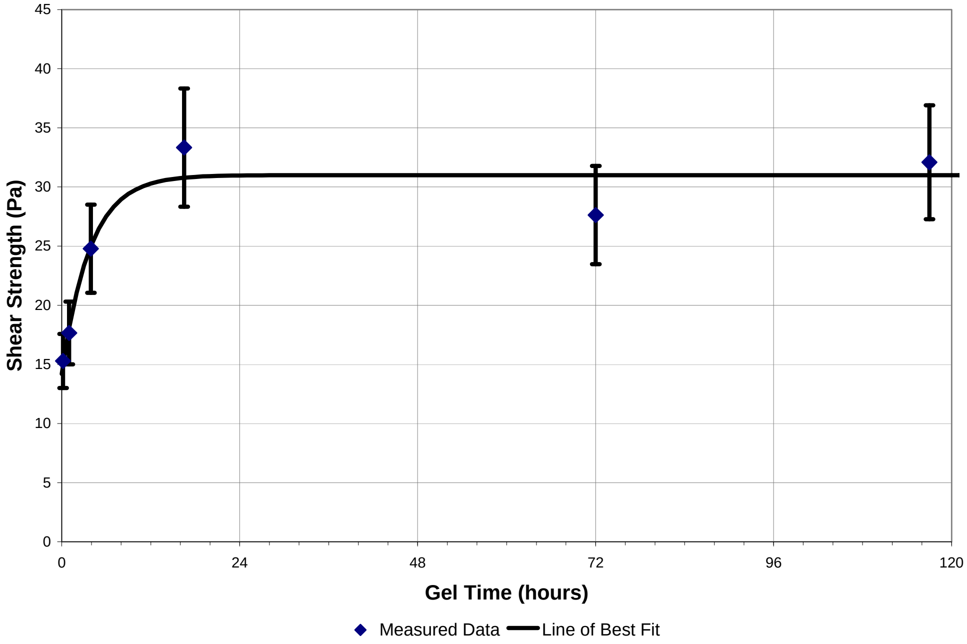


Figure 11.1. Shear Strength as a Function of Gel Time for HLW Pretreated Sludge

Table 11.1. Shear Strength Model Fit Parameters for Pretreated AZ-101 Sludge

Variable	Model Fit
G_t	See Figure 11.1 (r^2=0.929)
t	0 to 120 hours
G_0	14.2 Pa.
G_∞	31 Pa
k	0.262 hr^{-1}

These AZ-101 pretreated sludge shear strength data represent the only transient shear strength data found for Hanford waste suspensions. While other data exists to estimate the initial and steady-state shear strength values for several tank wastes, the only source for the gel time constant describing how quickly the shear strength rises to its steady state value is from AZ-101 pretreated sludge. A comparison of the AZ-101 pretreated sludge gel time constant against other suspensions either used in industry or for Hanford simulants is shown in Table 11.2. These data illustrate that the measured time constant of 0.262 hr^{-1}, while high, is comparable with other fine particulate slurry systems. A graphical view of the time it takes to reach 95% of the growth in shear strength for these systems is shown in Figure 11.2. The numbers closes to the x-axis are the temperature in °C at which these shear strengths were measured. This figure portrays that the AZ-101 pretreated sludge material nearly reaches the equilibrium shear strength in approximately 10 hrs.

In the absence of actual shear strength as a function of time data, the transient shear strength model can be approximated through the following equation:

$$\frac{G_t - \tau_\infty}{\tau_O^B - \tau_\infty} \cong e^{-kt} \tag{11.2}$$

where

G_t = shear strength
t = the gel time
τ_O^B = the Bingham yield stress
τ_∞ = the single point equilibrium shear strength measurement
k = the gel time constant.

In this model, the initial shear strength is replaced by the Bingham Plastic yield stress, τ_O^B, while the equilibrium shear strength is approximated by a single point shear strength measurement, , τ_∞, because most shear strength measurements were taken after the sample sat undisturbed for several days. Currently, a gel time constant of 0.262 hr^{-1} is used based on the fit for the pretreated AZ-101 sludge. Until additional transient shear strength data are obtained, this gel time constant is recommended for Hanford tank waste.

Table 11.2. Shear Strength Rebuild Parameters for Various Materials

Material	**Temperature (°C)**	**Initial Shear Strength, G_o (Pa)**	**Gel Time Constant, *k* (hr^{-1})**	**Steady-State Gel Strength, G_∞ (Pa)**	**Correlation Coefficient (r^2)**
Dispersed gel-chemical[(a)]	20	2.4	0.00637	14.0	0.96
	40	2.2	0.0253	4.7	0.986
	60	1.8	0.028	4.2	0.985
	80	1.8	0.0342	4.3	0.993
Beaufort lignosulfonate[(a)]	20	5.0	0.00609	16.5	0.908
	40	1.6	0.0535	3.1	0.924
	60	1.6	0.0165	4.8	0.933
	80	1.4	0.0607	3.8	0.964
E. Coast biovert[(a)]	20	2.7	0.00595	14.1	0.95
	40	1.5	0.0467	7.8	0.991
	60	1.7	0.0681	9.7	0.986
	80	2.0	0.1	11.8	0.996
Extended gel[(a)]	20	5.8	0.0522	10.9	0.932
	40	5.2	0.172	8.0	0.977
	60	3.9	1.42	4.9	0.923
	80	2.7	0.146	3.9	0.956
Gel[(a)] no #1	20	2.5	0.00237	16.6	0.962
#2	20	8.1	0.000378	16.6	0.956
#3	20	1.8	0.0154	15.0	0.986
#4	20	13.7	0.0215	24.5	0.981
#5	20	1.1	0.0166	13.6	0.99
#6	20	13.5	0.0137	34.0	0.958
#7	20	1.2	0.00264	14.3	0.958
#8	20	4.5	0.00767	16.0	0.93
#9	20	5.2	0.576	10.6	0.954
#10	20	3.1	0.0132	14.2	0.913
Laponite PJM Simulant[(b)]	15	79.5	0.123	141.4	0.866
	25	63.6	0.254	139.8	0.922
	35	71.1	0.0761	149.7	0.995
Kaolin-Bentonite PJM Simulant[(b)]	15	36.4	0.0193	70.0	0.916
	25	41.4	0.0506	74.7	0.964
	35	48.4	0.0168	97.2	0.905
AZ-101 Pretreated (PT) Sludge[(c)]	30	14.2	0.262	31	0.929

(a) Speers at al. (1987).
(b) Poloski et al. (2004).
(c) Poloski et al. (2003b).

Values for the single point equilibrium shear strength, τ_∞, are provided in Figure 11.3. Falling ball rheometer and shear vane measurements were compiled, and the maximum measured value for each tank is shown in Figure 11.3. A breakdown of the primary sludge waste type is also provided. Saltcake waste types are stated in the absence of a sludge waste type. The gaps in the waste types represented in this shear strength data are shown in Figure 11.4. The relative volume of each waste type in the tanks where shear strength data was analyzed (red bar in the front of the graph) is compared to the total volume of waste associated with those waste types (blue bar in the back of the graph). Saltcake waste types are stated in the absence of a sludge waste type.

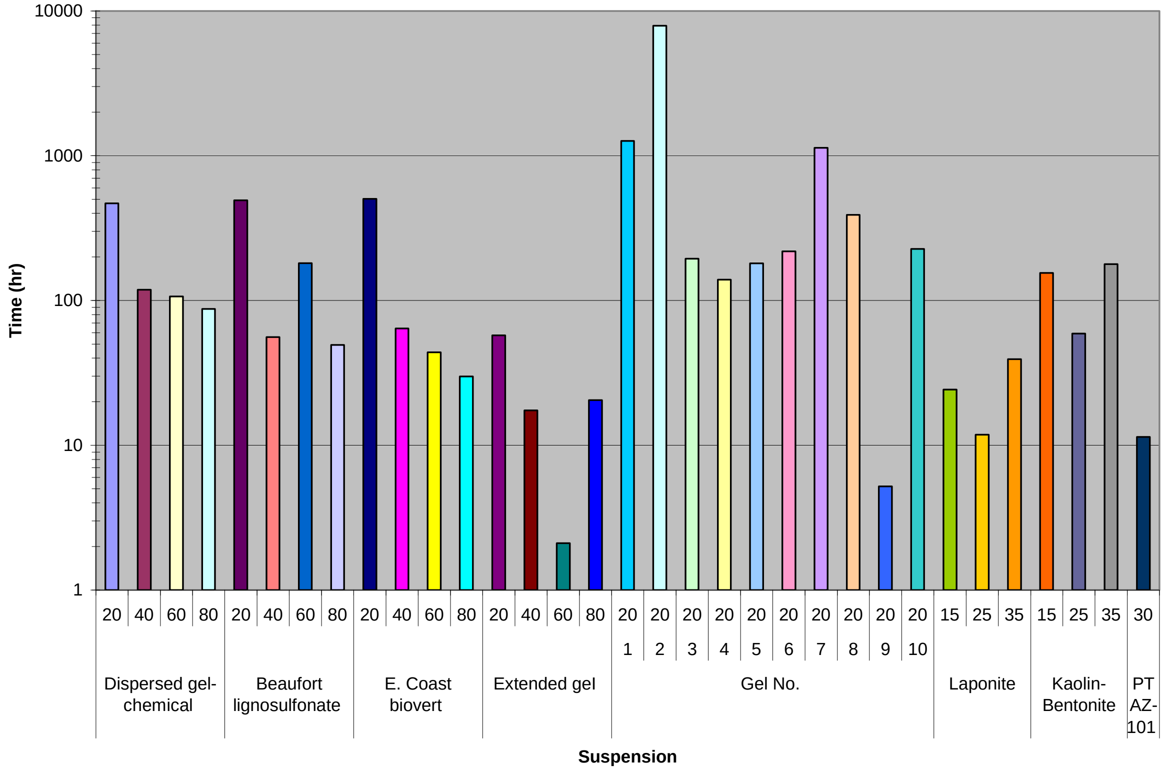
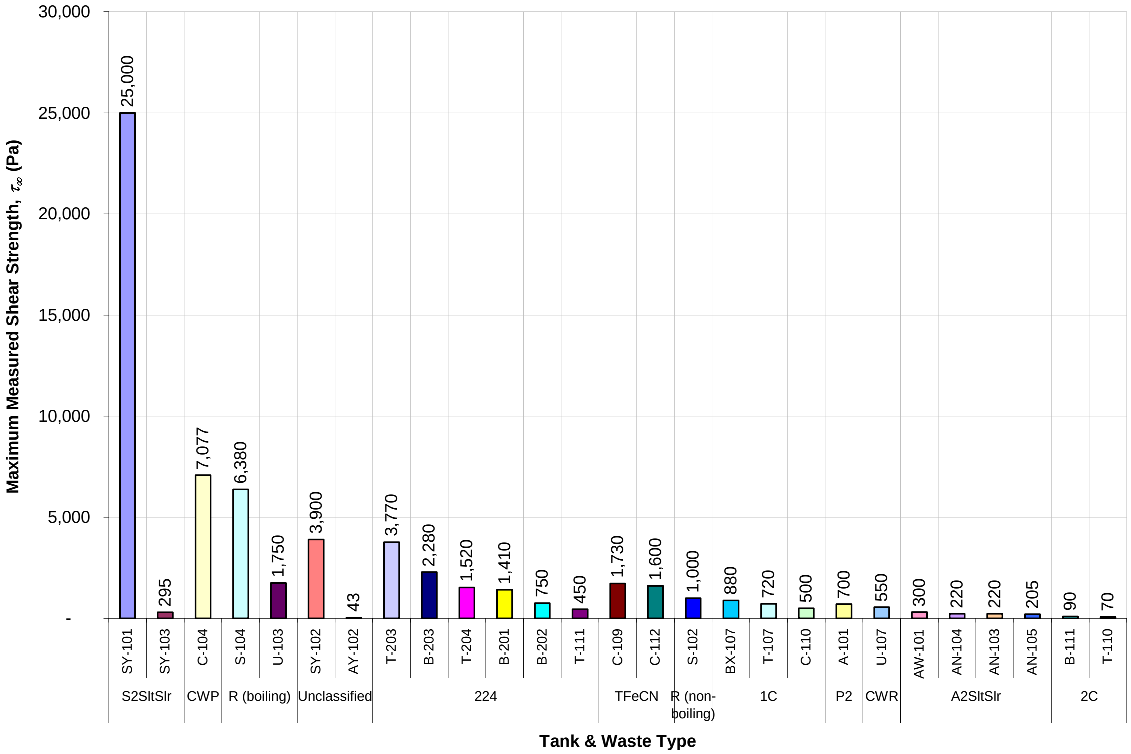
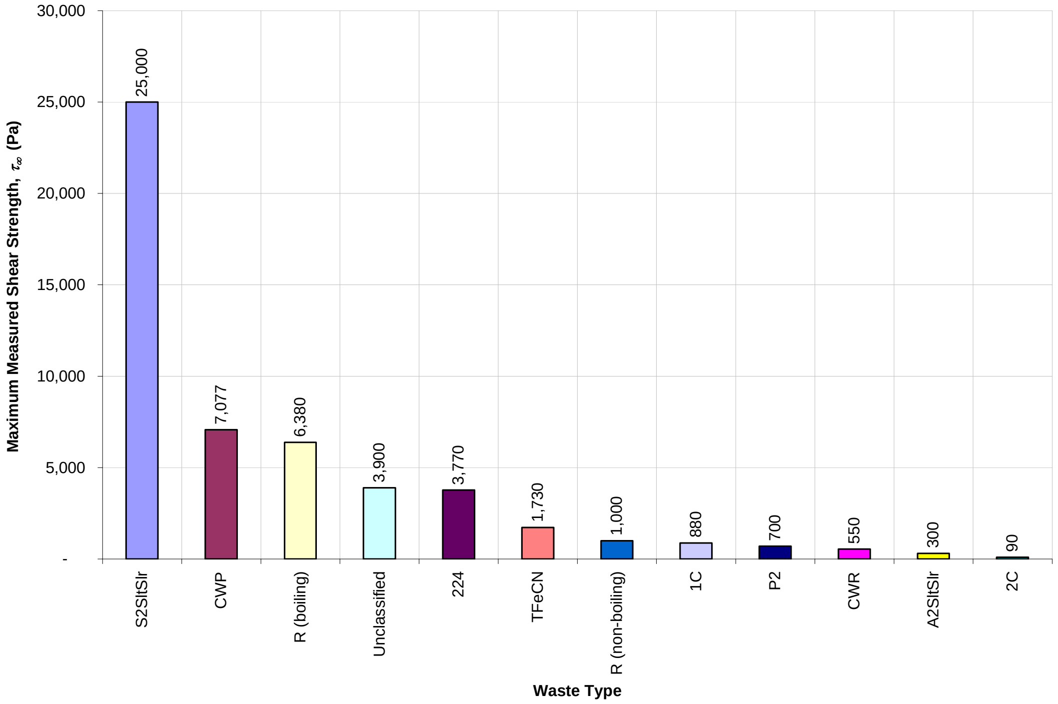


Figure 11.2. Gel Time Constant Comparison of Various Particulate Suspensions and Temperatures (ºC)

An analysis of the slurry composition for the tanks identified with maximum shear strength for each waste type was performed. The analysis reveals that, with the exception of the saltcake wastes, shear strength increases with increasing concentration of the following species (in order of significance) zirconium compounds > boehmite > bismuth compounds > gibbsite > iron hydroxide. Silica and aluminosilicate content did not show a strong effect on shear strength.



a) Maximum measured shear strength for each Hanford waste tank



b) Maximum measured shear strength for each Hanford waste type

Figure 11.3. Shear Strength Summary for Various Hanford Waste Tanks and Types

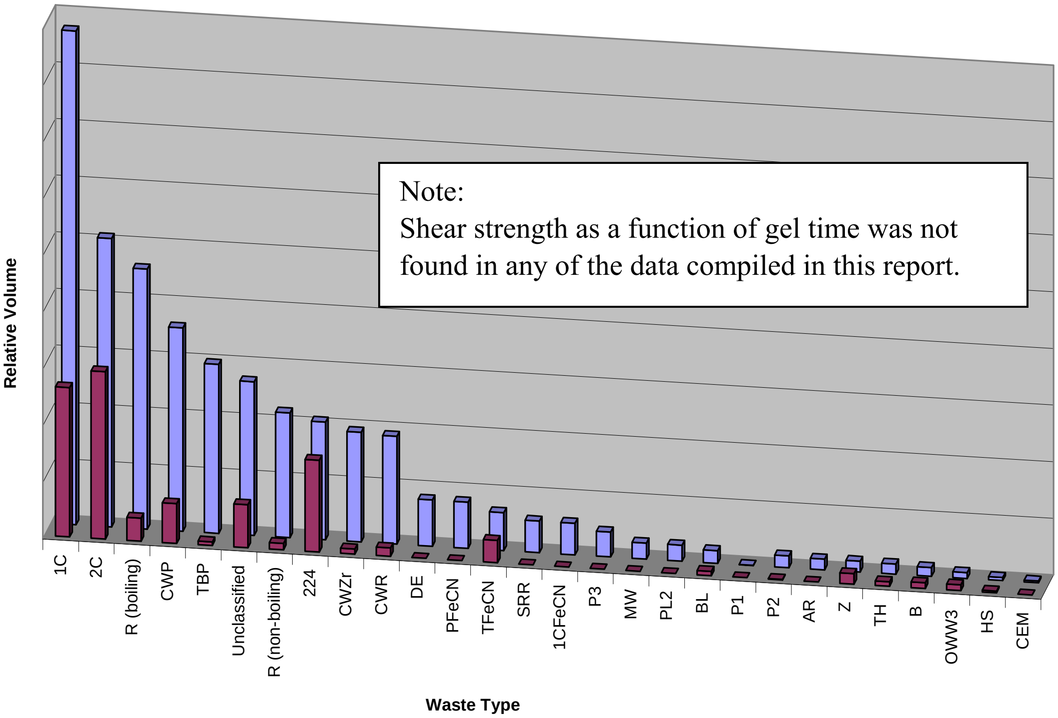


Figure 11.4. Gaps in Data Available for Shear Strength Modeling as a Function of Waste Type

This observation can be explained by a particle size argument. The zirconium compounds, boehmite, bismuth compounds, gibbsite, and iron hydroxide particles are generally submicron, colloidal particles with a large surface-to-mass ratio (Wells et al. 2007). The silica present in the tank waste is generally thought to come from Hanford sand with a much larger particle size (Wells et al. 2007). Zhou and coworkers (2001) present an equation that states at a given surface chemistry condition the shear strength of a non-Newtonian fluid varies according to:

$$\tau_{\infty} = \frac{K}{d^2}\phi^c \tag{11.3}$$

where

K = a constant which relates bond strength to material properties and surface chemistry condition
d = the particle diameter
c = a fitting parameter.

In this situation, increases in the relative amounts of ZrO_2, boehmite, gibbsite, and iron hydroxide would reduce the overall particle diameter and increase shear strength. Adding silica would raise the particle diameter and reduce shear strength of the mixture. Bingham yield stress, τ_O^B, can also be modeled with an equation of the same form as Eq. (11.3).

Saltcake waste had the largest measured shear strength, which is attributed to precipitated salt bridges between particles. It is unclear whether saltcake shear strength is reversible (will rebuild to these high levels). These bridges will likely require excessive time or a change in chemical composition to reform.

12.0 Bingham Plastic Modeling

Hanford slurries can be characterized rheologically as non-Newtonian, Bingham plastic fluids. Bingham plastic model fits for 28 waste tanks from 12 sludge types covering a range of temperatures from 20º to 95ºC were obtained from the available literature. Figure 12.1 shows the range of Bingham parameters (Bingham consistency and yield stress) from approximately 300 flow curves. For reference, the HLW pretreated sludge boundaries discussed by Poloski and coworkers (2006a) are also placed on the figure. These data indicate that the Hanford tank feed has a greater tendency for exceeding the 30 cP Bingham consistency parameter (15 measurements) than the Bingham yield stress (3 measurements). Only two measurements exceeded both the yield stress and consistency boundaries.

The Bingham plastic rheological parameters are a strong function of the undissolved solids loading. Figure 12.2 shows how the Bingham plastic parameters vary with undissolved solids concentration. Again, the HLW pretreated sludge rheological bounds discussed by Poloski et al. (2006a; WTP-RPT-112 Rev 0) are shown in the figure. In addition, the WTP contract solids processing specification of 16.7 wt% solids has been converted to an estimate of volume percent undissolved solids to provide a process throughput reference point. Data points in the lower right quadrant should have moderate rheology while meeting or exceeding contract throughput specifications. The lower left quadrant identifies slurries with moderate rheology that are within contract throughput specifications. The upper right quadrant identifies slurries with high rheology where further dilution is likely needed to lower slurry rheological properties and meet contract throughput specifications. The upper left quadrant identifies slurries with high rheology, where further dilution may lead to moderate rheology while meeting throughput specifications.

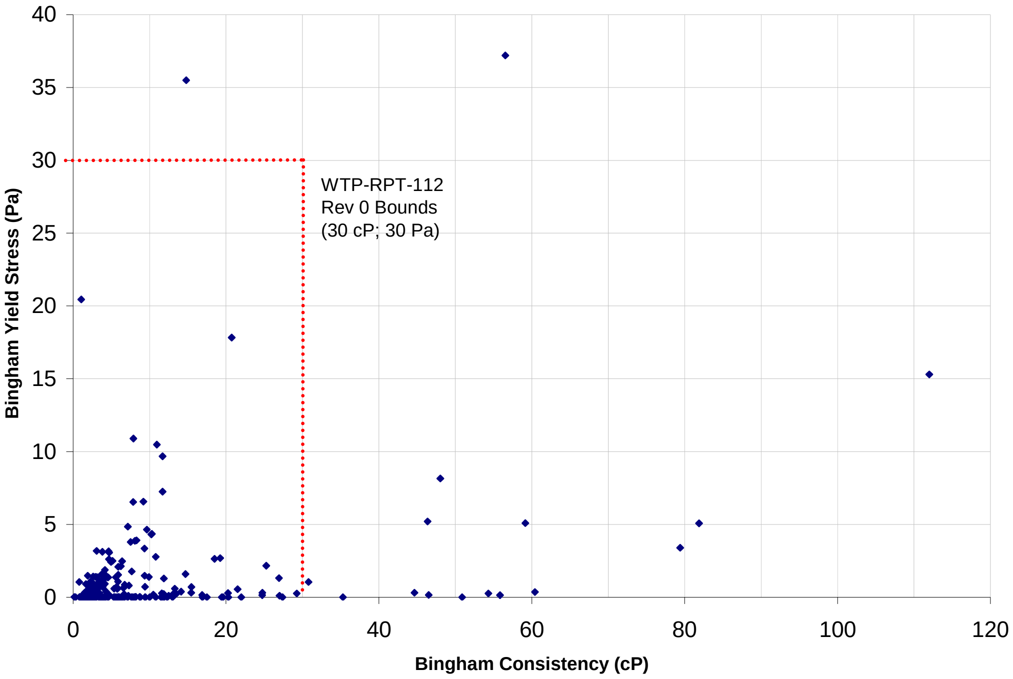


Figure 12.1. Scatter Plot Showing the Range of Measured Bingham Parameters

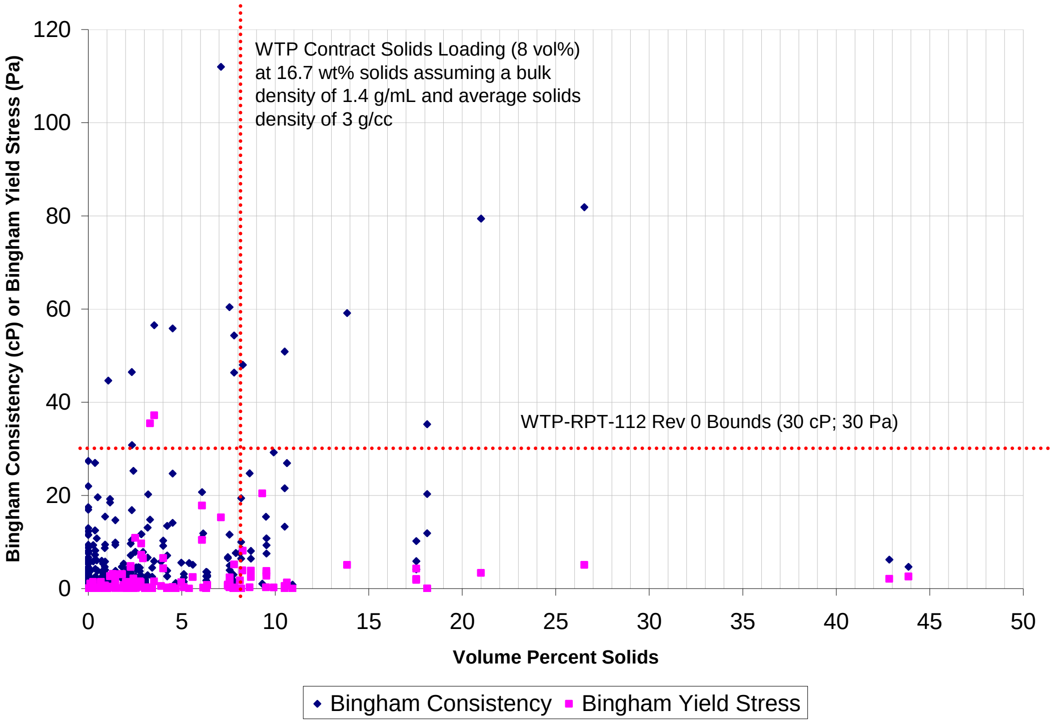


Figure 12.2. Scatter Plot of Obtained Bingham Parameters at Various Solids Loadings

While single points are shown on the scatter plot, each point actually lies on a series of dilution curves. Because of the exponential nature of rheological properties with respect to solids concentration, a small dilution can drastically lower the rheological properties of a fluid. Therefore, the high rheological point at 80 cP consistency and 27 Pa yield stress should not be considered an anomaly. This data point demonstrates the extreme rheology for this class of material achievable from concentrating solids from a slurry.

Several of the data points in Figure 12.2 are for the same tank sample diluted with water to various solid contents. To gain an understanding of how the rheological parameters in the database vary by Hanford waste tank and waste type, Figures 12.3 and 12.4 were created based on the maximum measured Bingham parameters for each waste tank. Figure 12.3 illustrates that R-(boiling), TFeCN, saltcake, and 224 wastes tend to exhibit high Bingham consistency values; Figure 12.4 shows that TFeCN, R-(boiling), 224, and CWP wastes exhibit relatively high Bingham yield stress values.

Interestingly, TFeCN, R-(boiling), 224, and CWP wastes also appear to be among the wastes with the large measured shear strength values. Consequently, these waste types appear to have the largest degree of non-Newtonian behavior. Because these wastes tend to be relatively high in iron hydroxide, boehmite, aluminosilicate, zirconium compounds, and bismuth compounds, the trend observed between solids composition and shear strength appears to be applicable to flow curve behavior also.

While saltcake wastes have among the highest Bingham consistency values, they have moderate Bingham yield stress values. Again, this supports the hypothesis that the high shear strength for the saltcake wastes is a nonreversible artifact of salt bridging between particles. Once these salt bridges are broken the yield stress reduces to moderate levels.

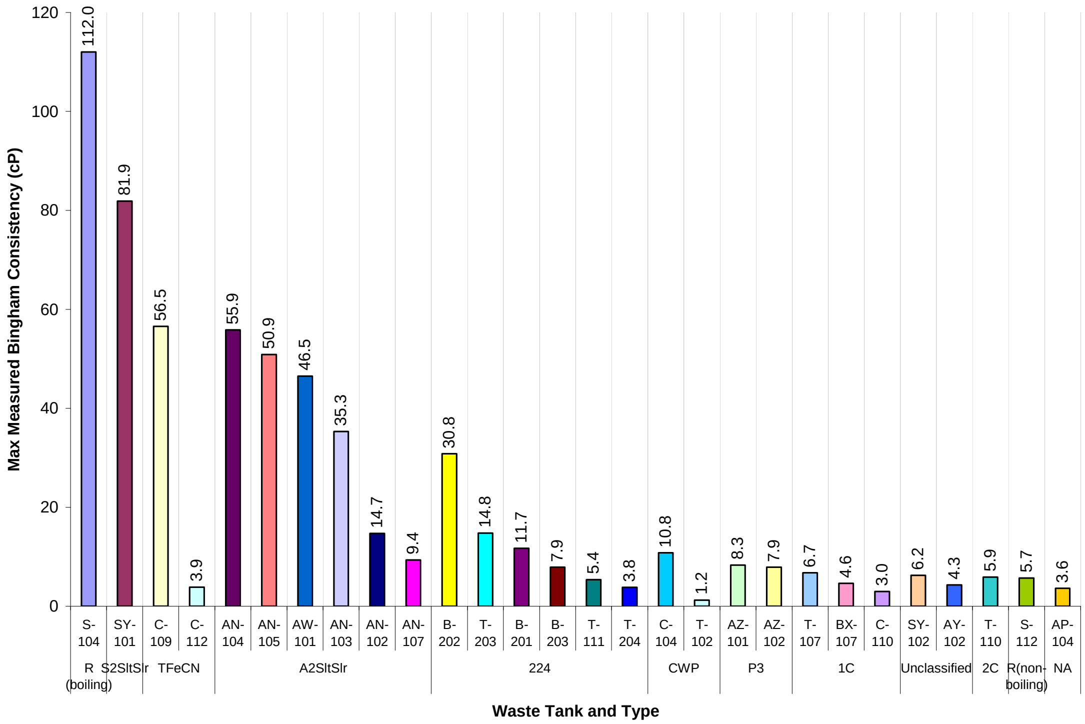


Figure 12.3. Maximum Measured Bingham Consistency for Various Hanford Tanks and Waste Types

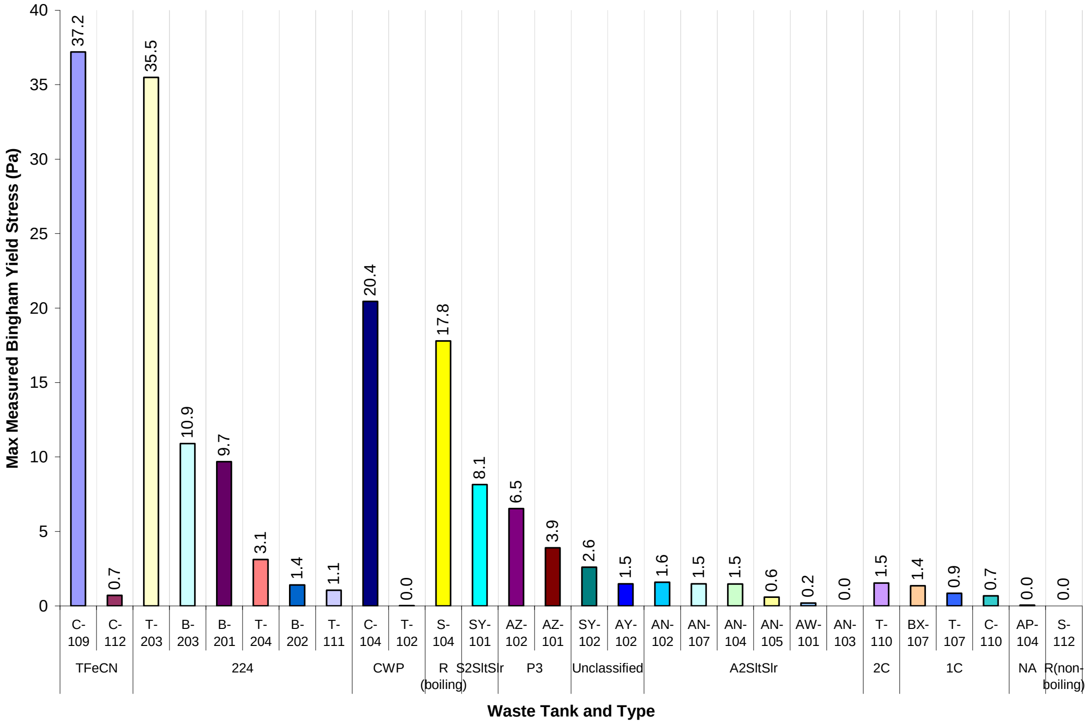


Figure 12.4. Maximum Measured Bingham Yield Stress for Various Hanford Tanks and Waste Types

Ferraris and co-workers (2001) provide an equation that describes how the Bingham plastic consistency parameter varies with solids concentration:

$$\eta_P = ae^{b\phi} \tag{12.1}$$

where

η_P = the Bingham consistency in cP

ϕ = the solids volume fraction

a and b = fitting parameters.

Zhou and coworkers (2001) provide an equation that describes how the Bingham yield stress varies with solids concentration (Eq. 12.2). This equation is of similar form to the shear strength equation.

$$\tau_O^B = c\phi^d \tag{12.2}$$

where

τ_O^B = the Bingham yield stress

ϕ = the solids volume fraction

c and d = fitting parameters.

These equations are typically valid only when the chemistry of the slurry is held constant while varying the solids loading. This can be achieved by diluting the slurry with decanted or separated interstitial liquid which is at equilibrium with the slurry solids. Unfortunately, this protocol was not observed and water was used as a diluent in all of the dilution studies cited in this report. Nonetheless, the data compiled in this report was modeled using Eq. (12.2) and (12.3) to find a correlation between rheological parameters and solids concentration.

Several correlations were found that had correlation coefficients (r^2) above 0.7, 17 correlations were found for Bingham consistency and 10 correlations for Bingham yield stress. These data cover eight Hanford waste tanks, with five waste types represented including 224, 1C, 2C, A2SltSlr, and CWP. The parameters for these correlations are shown in Table 12.1. Gaps in waste types used in these rheological correlations are shown in Figure 12.5. Several of these correlations indicate that relatively high rheological parameters (>30 cp or 30 Pa) exist at low solids concentrations (>8 vol% undissolved solids). These fluids may pose throughput challenges to the WTP as additional dilution may be required to achieve moderate rheological parameters.

Plots presenting the raw data used to evaluate these correlations are shown in Appendix B, while plots of the data and correlations can be found in Appendix C. Example plots showing a good correlation with Eq. (12.2) and (12.3) are shown in Figures 12.6 and 12.7. Figure 12.6 shows the relationship between C-104 as-received tank core samples and solids concentration, while Figure 12.7 shows the same relationship for the water-diluted C-104 core samples. These data are a combination of tank core sample characterization reports and cross-flow filtration studies. A peak in the yield stress trend and minimum in the consistency trend are observed in this figure.

Table 12.1. Bingham Model Parameters for Various Hanford Tanks

Waste Type	Waste Tank	Waste Status	Temperature Category (°C)	Consistency Parameter, *a* (cP)	Consistency Parameter, *b* (-)	Consistency Model Correlation Coefficient, r^2	Predicted Solids Loading at 30 cP Consistency (vol%)	Yield Stress Parameter, *c* (Pa)	Yield Stress Parameter, *d* (-)	Yield Stress Model Correlation Coefficient r^2	Predicted Solids Loading at 30 Pa Yield Stress (vol%)
224	B-202	Washed	20-35	1.51	36	0.91	8.3	7.21E+04	2.94	0.95	7.1
224	B-203	Washed	20-35	1.30	72	1.00	4.4	1.31E+07	3.80	1.00	3.3
224	T-111	Washed	20-35	2.64	37	0.82	6.5	n/r	n/r	n/r	n/r
224	T-203	Washed	20-35	1.08	79	1.00	4.2	2.50E+05	2.60	1.00	3.1
224	B-202	Washed	80-95	1.01	40	0.71	8.5	2.34E+04	2.62	0.92	7.9
224	T-111	Washed	80-95	1.16	43	0.90	7.6	n/r	n/r	n/r	n/r
1C	BX-107	Washed	20-35	1.64	37	0.98	7.9	n/r	n/r	n/r	n/r
1C	*BX-107*	*Washed*	*80-95*	*0.97*	*54*	*0.92*	*6.3*	*1.28E+15*	*9.53*	*1.00*	*3.7*
2C	*T-110*	*Washed*	*20-35*	*1.16*	*46*	*1.00*	*7.0*	*1.21E+04*	*2.68*	*1.00*	*10.7*
A2SltSlr	AN-105	Salt Cake	20-35	1.38	34	0.95	9.0	n/r	n/r	n/r	n/r
A2SltSlr	AN-105	Salt Cake	35-50	3.37	17	0.93	13.0	n/r	n/r	n/r	n/r
A2SltSlr	AN-105	Salt Cake	50-65	1.83	18	0.95	15.3	n/r	n/r	n/r	n/r
A2SltSlr	AN-104	Washed	20-35	11.35	35	0.87	2.8	n/r	n/r	n/r	n/r
A2SltSlr	AN-104	Washed	35-50	7.53	26	0.91	5.3	n/r	n/r	n/r	n/r
A2SltSlr	AN-104	Washed	50-65	4.83	24	0.92	7.7	n/r	n/r	n/r	n/r
CWP	C-104	Salt Cake	20-35	1.25	12	1.00	26.5	2.79E+02	2.40	1.00	39.4
CWP	C-104	Washed	20-35	0.78	28	1.00	13.2	4.13E+03	3.11	1.00	20.5
CWP	C-104	Washed	35-50	0.45	32	0.99	13.3	1.59E+04	3.60	1.00	17.5
CWP	C-104	Washed	50-65	0.36	32	0.99	13.9	4.90E+04	4.03	1.00	15.9
S2SltSlr	*SY-101*	*Salt Cake*	*20-35*	*43.05*	*3.7*	*0.91*	*0*	*n/r*	*n/r*	*n/r*	*n/r*
S2SltSlr	SY-101	Salt Cake	35-50	16.47	6.4	0.95	9.4	7.14E+01	1.98	0.99	64.6
S2SltSlr	SY-101	Salt Cake	65-80	8.32	14	0.76	9.0	1.19E+02	1.58	0.65	41.9
S2SltSlr	*SY-101*	*Salt Cake*	*80-95*	*16.18*	*13*	*1.00*	*4.7*	*n/r*	*n/r*	*n/r*	*n/r*
Unclassified	AY-102	Salt Cake	50-65	0.80	6.8	0.46	52.9	n/r	n/r	n/r	n/r

n/r – not reported due to poor correlation results

italics – predicted to achieve relatively large rheological parameters at low solids concentrations.

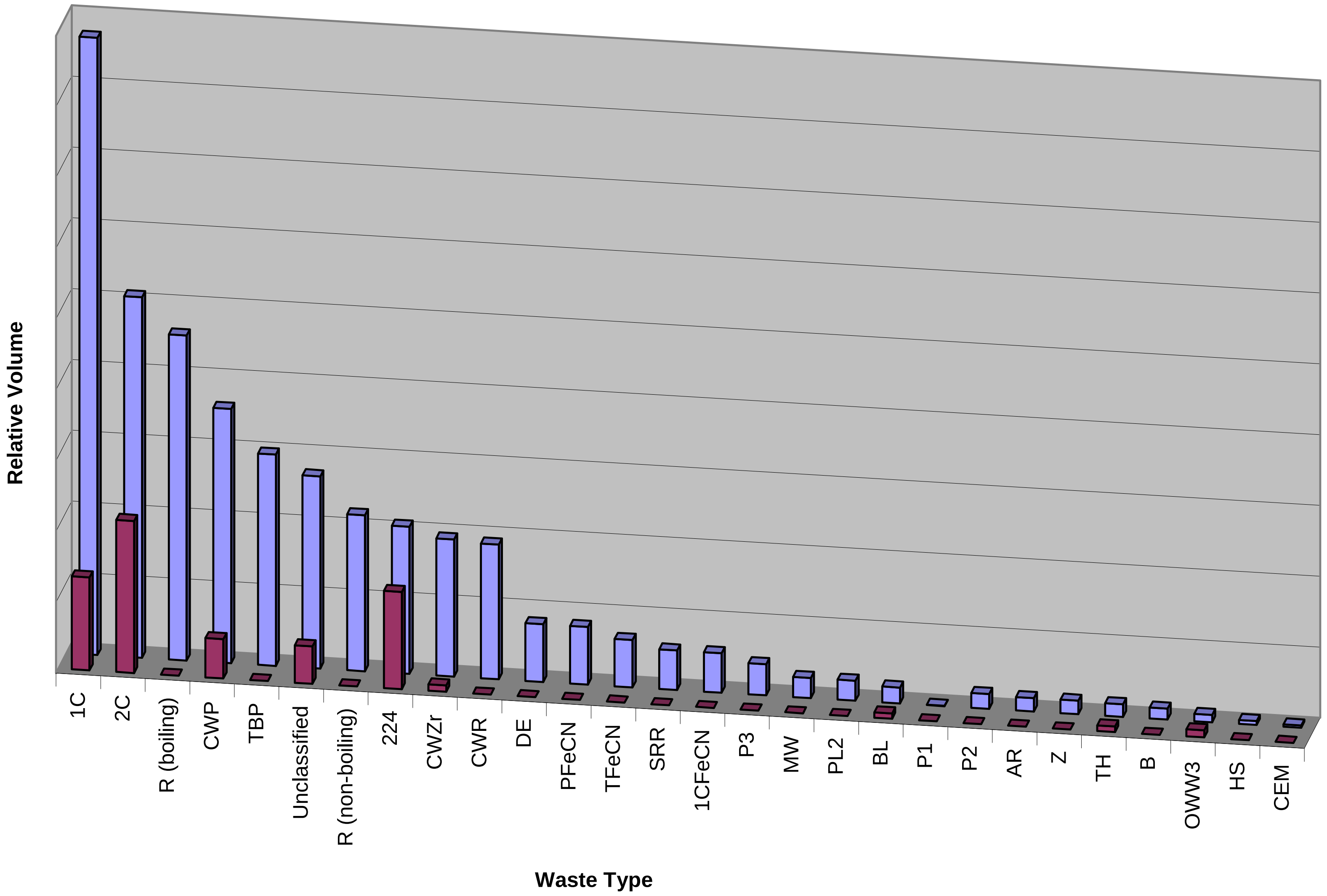
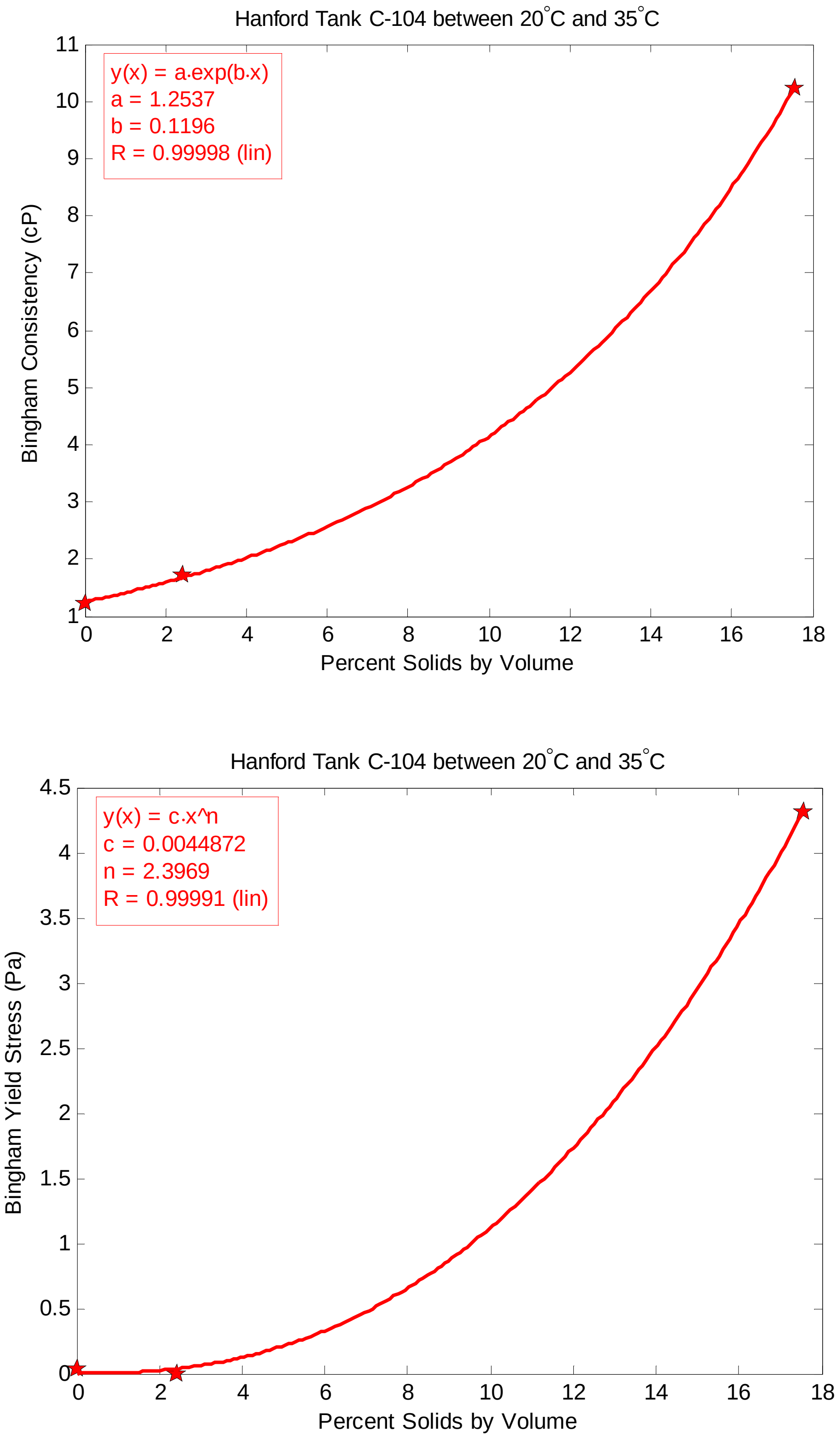
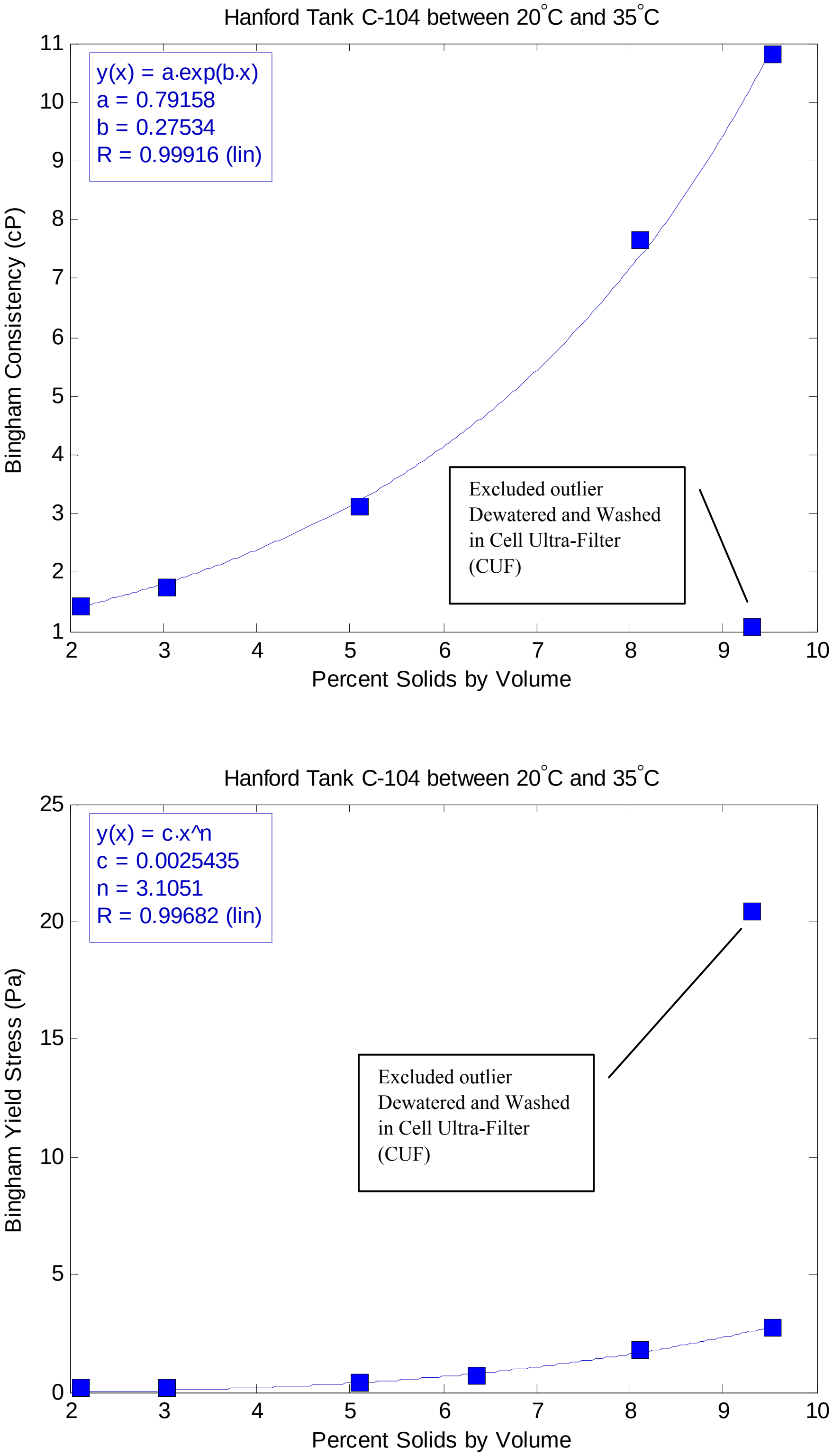


Figure 12.5. Gaps in Data Available for Rheological Correlations as a Function of Waste Type



Stars = as-received tank waste

Figure 12.6. Bingham Plastic Rheological Parameters as a Function of Solids Loading for Tank C-104 as an Example of an as-Received Hanford Core Sample



Squares represent water added as diluent

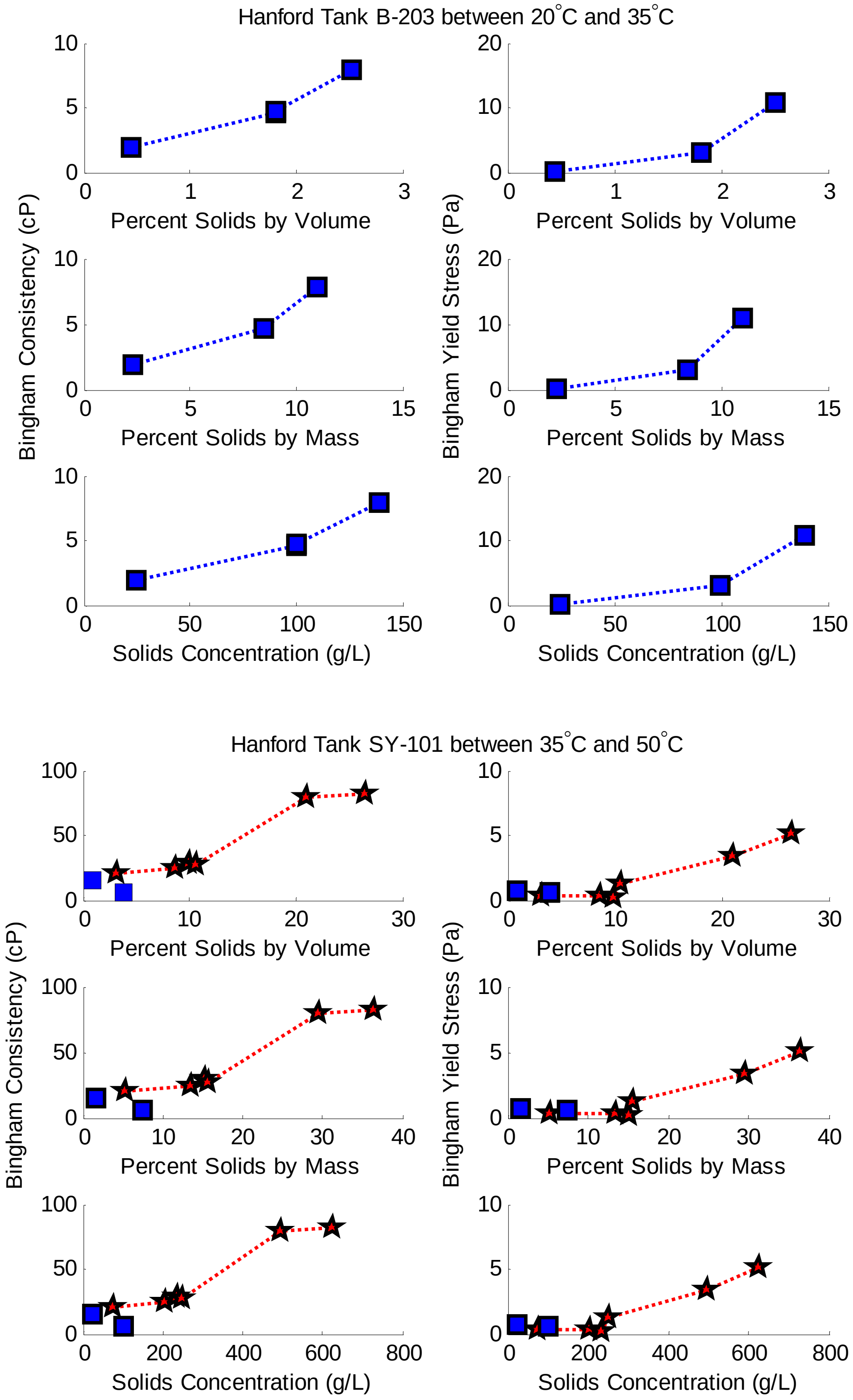
Figure 12.7. Bingham Plastic Rheological Parameters as a Function of Solids Loading for Tank C-104 as an Example of a Hanford Core Sample Diluted with Water

This peak shows the import of sample process history as it corresponds to a sample that was processed in the cell ultra-filter. The sample underwent similar chemical changes as it was dewatered and water washed to a certain solids loading. However, the use of the filtration equipment may have altered the slurry physical properties through dissolution of salt cake particles, a lowered ionic strength (zeta potential), and potential particle attrition from the pump/filter loop. For this reason, the point was discarded from the correlation analysis but kept in the above analysis on maximum rheological values as sample process history will vary widely from tank retrieval through vitrification. A more detailed look at the affect of WTP pretreatment process operations on rheological properties is needed to gain confidence in the current process design.

Example plots from Appendix B have been selected to illustrate two important observations made while preparing this report. These plots are shown in Figures 12.8 and 12.9. Figure 12.8 shows the expected "mechanically dominated" dilution behavior where rheological properties exponentially decrease with water dilution due to the simple reduction of particle/particle interactions.

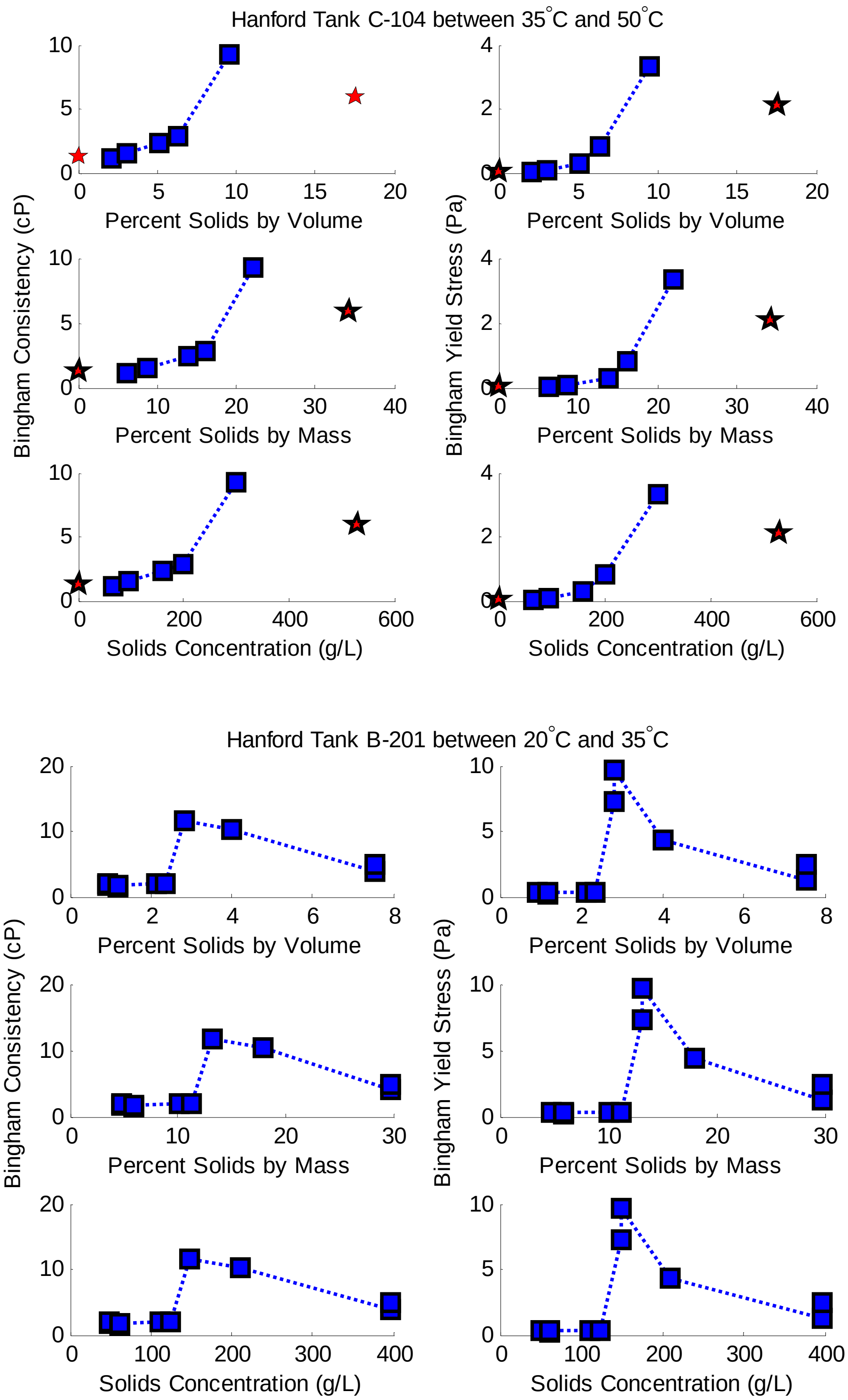
In reality, the parameters a, b, c, and d from Eq. (12.2) and (12.3) can vary significantly with slurry chemical and physical properties such as zeta potential, particle size, particle chemistry, and aqueous chemistry. As dilution with water occurs, all of these properties are likely to vary as salt particles dissolve changing average particle size and chemistry, aqueous species are diluted while salt species are added, and solution equilibrium is achieved. The fact that the expected "mechanical" trend is maintained during this process indicates that the effect of these changes is minimal and the slurry rheology is dominated by mechanical forces.

On the other hand, Figure 12.9 shows "chemically dominated" dilution behavior where rheological properties actually increase to a maximum value with water dilution. In this scenario, as the sample is diluted with water, chemical properties vary as salt particles dissolve. This changes average particle size, particle chemistry, aqueous speciation, and interaction potentials as a new solution equilibrium is achieved. Saltcake solids are typically on the order of several tens or hundreds of micrometers, while sludge particles are on the order of ten micrometers or smaller (Wells et al. 2007). The shift to smaller particle size, d, alone will result in a peak with regards to yield stress as the parameter, $c \propto d^{-2}$ (Zhou et al. 2001). Additionally, dilution will ultimately result in a reduction in solution ionic strength and zeta potential. The parameter c will reach a maximum value when the zeta potential is zero (Zhou et al. 2001). Consequently, in some cases, dilution with water will result in a rheological maximum due to these surface chemistry effects. Several additional examples of "mechanically dominated" and "chemically dominated" dilution phenomena can be seen in Appendix B.



Stars = as-received tank waste; squares = water added as diluent

Figure 12.8. Bingham Plastic Rheological Parameters as a Function of Solids Loading for a Water-Diluted Hanford Core Sample Showing Decreasing Rheology as Dilution Occurs



Stars = as-received tank waste; squares = water added as diluent

Figure 12.9. Bingham Plastic Rheological Parameters as a Function of Solids Loading for a Water-Diluted Hanford Core Sample Showing a Rheological Peak as Dilution Occurs

13.0 Transient Modeling

During off-normal events, the WTP processing system may lose power and become inoperable. In these situations, the slurries will remain quiescent for some time until backup/emergency systems are used or the primary system is restored. Understanding how rheological properties vary with time under quiescent conditions is an important design consideration. From the information presented above, an estimation of this transient rheological behavior can be obtained. The solids interface height of a sediment bed as a function of time (Renko 1996) in a sedimentation column was described in the sedimentation section of this report and shown as:

$$z(t, z_0) = \frac{C\phi_0 z_0}{\alpha} + \left(z_0 - \frac{C\phi_0 z_0}{\alpha} \right) e^{\frac{-\alpha}{\phi_0 z_0} t} \tag{13.1}$$

where

z = the interface height (m) at time t in hours

z_0 = the initial interface height (m)

ϕ_0 = the initial solids concentration of the suspended sample (volume fraction)

α and C = fitting parameters in m/hr^{-1}.

The solids concentration profile as a function of time was also presented by Renko (1998) and is shown as Eq. (13.2).

$$\phi(t, z) = \frac{\phi_0}{\frac{C\phi_0}{\alpha} + \left(1 - \frac{C\phi_0}{\alpha}\right)\left(1 - \frac{t\alpha}{\phi_0 z_0}\right) e^{\frac{-\alpha}{\phi_0 z_0} t}} \tag{13.2}$$

As sedimentation proceeds, the local Bingham consistency and yield parameter vary as a function of solids concentration. These equations were described in the Bingham plastic modeling section of this report and are shown as Eq. (13.3) and (13.4):

$$\eta_P = a e^{b\phi} \tag{13.3}$$

$$\tau_O^B = c\phi^d \tag{13.4}$$

where

η_P = Bingham consistency

τ_O^B = Bingham yield stress

b, c, and d = fitting parameters.

Shear strength as a function of time, for cohesive sludge layers that exclude frictional forces generated by coarse particles, was described in the shear strength modeling section of this report and is shown as

$$G_t = \left(\tau_O^B - \tau_\infty\right)e^{-kt_g} + \tau_\infty \tag{13.5}$$

where

G_t = shear strength at any gel time

τ_∞ = single point equilibrium shear strength measurement

τ_O^B = Bingham yield stress

t_g = gel time

k = gel time constant (hr^{-1}).

The equilibrium shear strength, τ_∞, (see Eq. 13.6) is assumed to have the same form and fitting parameter, d, as the correlation for Bingham yield stress (see Eq. 13.4). Consequently, if an equilibrium shear strength has been measured (due to the limited amount of Hanford waste data, a single point rather than an average is used for this calculation) at a given solids concentration, ϕ, the fitting parameter c_∞ can be solved.

$$\tau_\infty = c_\infty \phi^d \tag{13.6}$$

Combining Eq. (13.1) through (13.6) allows one to predict solids concentration, Bingham consistency, Bingham yield stress, and shear strength as a function of time. However, Eq. (13.5) is only valid for a slurry in which the solids concentration remains constant (i.e., a fully settled slurry). Eq. (13.5) cannot be applied directly to an actively sedimenting slurry because both the gel structure and solids concentration are changing simultaneously. Additionally, if coarse particles are present in the sludge, frictional forces will be generated in addition to cohesive, interparticle forces. The frictional force contribution would need to be accounted as an additional term in Eq. 13.5. A discussion on the affects of frictional forces on shear strength was discussed by Poloski et al. (2006b).

To use this Eq. 13.5 during sedimentation, the gel time for shear strength calculation must be adjusted to maintain a constant shear strength due to the sedimentation process while adjusting to the transient shear strength curve that matches the settled solids concentration. This is done through a numerical simulation constructed by considering two periods of time during the sedimentation process, t_0 and t_1, where $t_0 < t_1$. As sedimentation proceeds, solids concentration increases from an initial value at time t_0. The transient shear strength curve for the new solids concentration shifts due to the new solids concentration at time t_1. Therefore, a correction to the gel time is made to keep the shear strength constant due to sedimentation but reflects the new transient shear strength curve at the more fully settled solids concentrations. The correction for this shear strength gel time can be mathematically found as Eq. (13.7). The new gel time is calculated as Eq. (13.8).

$$\Delta t_g = \frac{1}{k}\ln\left[\frac{\left(\tau_{O,0}^B - \tau_{\infty,0}\right) + \left(\tau_{\infty,0} - \tau_{\infty,1}\right)e^{-k\left(t_0 - t_{g,0}\right)}}{\left(\tau_{O,1}^B - \tau_{\infty,1}\right)}\right] \tag{13.7}$$

$$t_{g,1} = t_{g,0} + \Delta t_g \tag{13.8}$$

From these equations, the rheological properties are observed to grow exponentially with solids concentration. Fully settled slurries typically exhibit large rheological properties, and a level of dilution is required for retrieval and processing. In this section, a 50% by volume dilution from the fully settled configuration is assumed as a realistic tank retrieval condition (the actual amount of diluant used will vary with retrieval technology and engineering parameters). When fully settled, the sludge interface level would then be at 75% of the total vessel height. Several process scales should be considered in this assessment. A summary of several significant height scales are shown in Table 13.1.

Table 13.1. Typical Process Heights

Process System	Length Scale SI	Imperial
Piping	0.1 m	3.9 in
Small Vessel	1 m	3.3 ft
Large Vessel	10 m	33 ft

Since the sedimentation experiments typically occurred under ambient temperature conditions, modeling was limited to rheological data in the 20º–35ºC temperature range. The average sedimentation parameters from Section 11, α and C, for each tank were used in the simulation. Bingham consistency and yield stress modeling parameters from Section 12 were also applied. Table 13.2 shows the values used for each of the variables in these equations. Only limited data were available for this analysis, and the relative volume of each waste type analyzed compared with the total volume of the sludge waste types is shown in Figure 13.1.

With these values, estimates on the transient growth of rheological parameters as a function of depth were performed. The results at the three length scales are shown in Appendix E. Figures 13.2–13.4 show typical examples of these results. The figures indicate that sedimentation will occur faster in the small-scale systems such as pipes than in the larger systems such as plant vessels, reaching fully settled configurations on the order of tens, hundreds, and thousands of hours for each of the process scales from smallest to largest, respectively.

However, as sedimentation proceeds, the solids concentration at the bottom of the layer is significantly higher than at the top. This result indicates that rheological properties significantly increase from the top of the sediment bed to the bottom. A thick sludge heel begins to forms at the bottom of the sediment bed. The sludge heel then reaches the maximum rheological properties due to gravitational forces that increase solids concentration at the bottom of the sediment bed and interparticle bonds that develop as the particles remain quiescent. The thickness of this heel then appears to expand, as these forces are maximized from the bottom of the bed to the top, until the entire sediment bed has the same rheological properties as the heel. Also note that the heel will also contain coarse and dense particles that will slowly settle to the bottom of the sediment layer if the required agitation is not sufficient to suspend the particles during normal operation or if the rheological properties of the sludge are not sufficient to suspend the particles during the sedimentation period. The thick sludge heel may be difficult to retrieve and reaches a substantial portion of the overall sediment bed on the order of 10, 100, and 1000 hours for each process scale considered from smallest to largest. This process is shown graphically in Figure 13.5.

Table 13.2. Variable Values used in Transient Modeling

Waste Type	Waste Tank	Waste Status	Temperature Category (°C)	Consistency Parameter, *a* (cP)	Consistency Parameter, *b* (-)	Yield Stress Parameter, *c* (Pa)	Yield Stress Parameter, *d* (-)	Maximum Measure Shear Strength (Pa)	Shear Strength Parameter, c_∞, (Pa)	*C* (mm/hr)	α (mm/hr)
Source →				**Table 12.1**				**Figure 11.3**	**Eq. (13.6)**	**Table 10.1**	
224	B-202	Washed	20-35	1.51	36	7.21E+04	2.94	750	5.25E+07	16.9	0.38
224	B-203	Washed	20-35	1.30	72	1.31E+07	3.80	2,280	4.03E+10	21.8	0.27
224	T-203	Washed	20-35	1.08	79	2.50E+05	2.60	3,770	5.79E+08	16.8	0.17
2C	T-110	Washed	20-35	1.16	46	1.21E+04	2.68	70	2.39E+06	11.3	0.23
CWP	C-104	Salt Cake	20-35	1.25	12	2.79E+02	2.40	7,077	2.12E+06	4.3	0.40
CWP	C-104	Washed	20-35	0.78	28	4.13E+03	3.11	7,077	1.14E+07	4.3	0.40

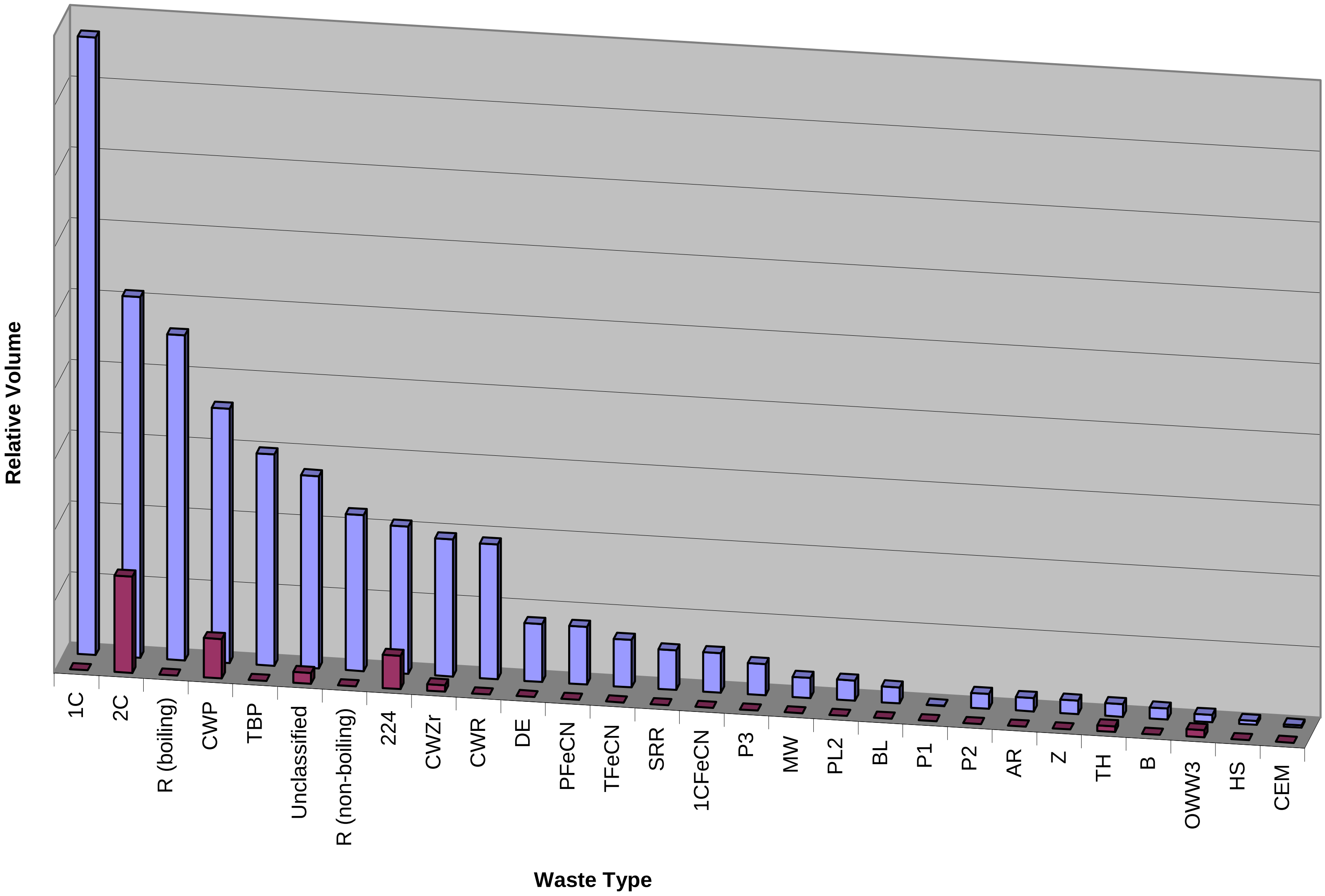


Figure 13.1. Relative Volume of Waste Types Analyzed based on Waste Tank Data Available for Transient Modeling

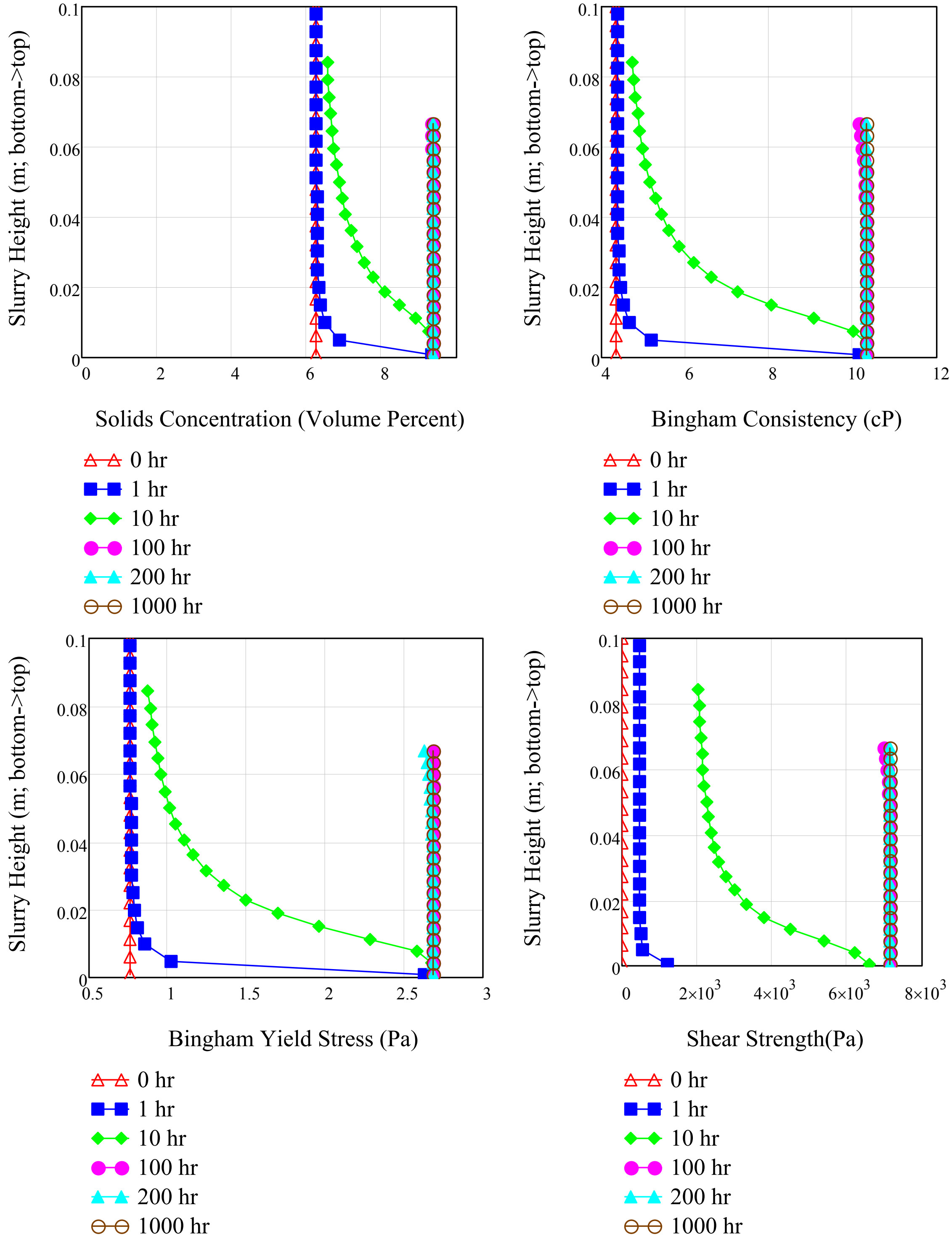


Figure 13.2. Predicted Sludge Properties from Hanford Tank C-104 with Water Dilution at a Starting Slurry Height of 0.1 m with 33% Volume Excess Supernatant from Fully Settled Configuration; Rheological Properties Taken at a Temperature Range of 20º-35ºC.

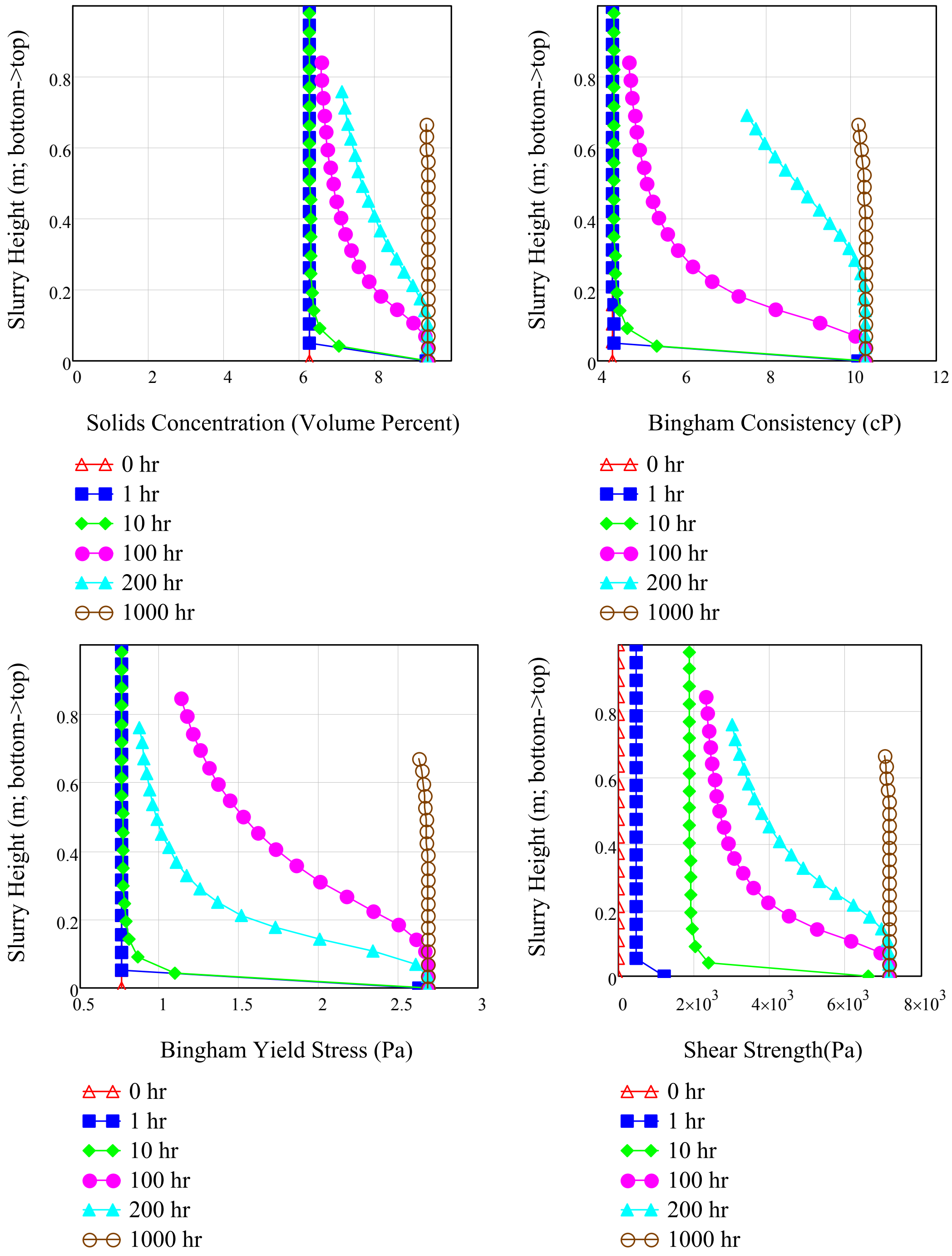


Figure 13.3. Predicted Sludge Properties from Hanford Tank C-104 with Water Dilution at Starting Slurry Height of 1 M with 33% Volume Excess Supernatant from Fully Settled Configuration; Rheological Properties Taken at a Temperature Range of 20º–35ºC

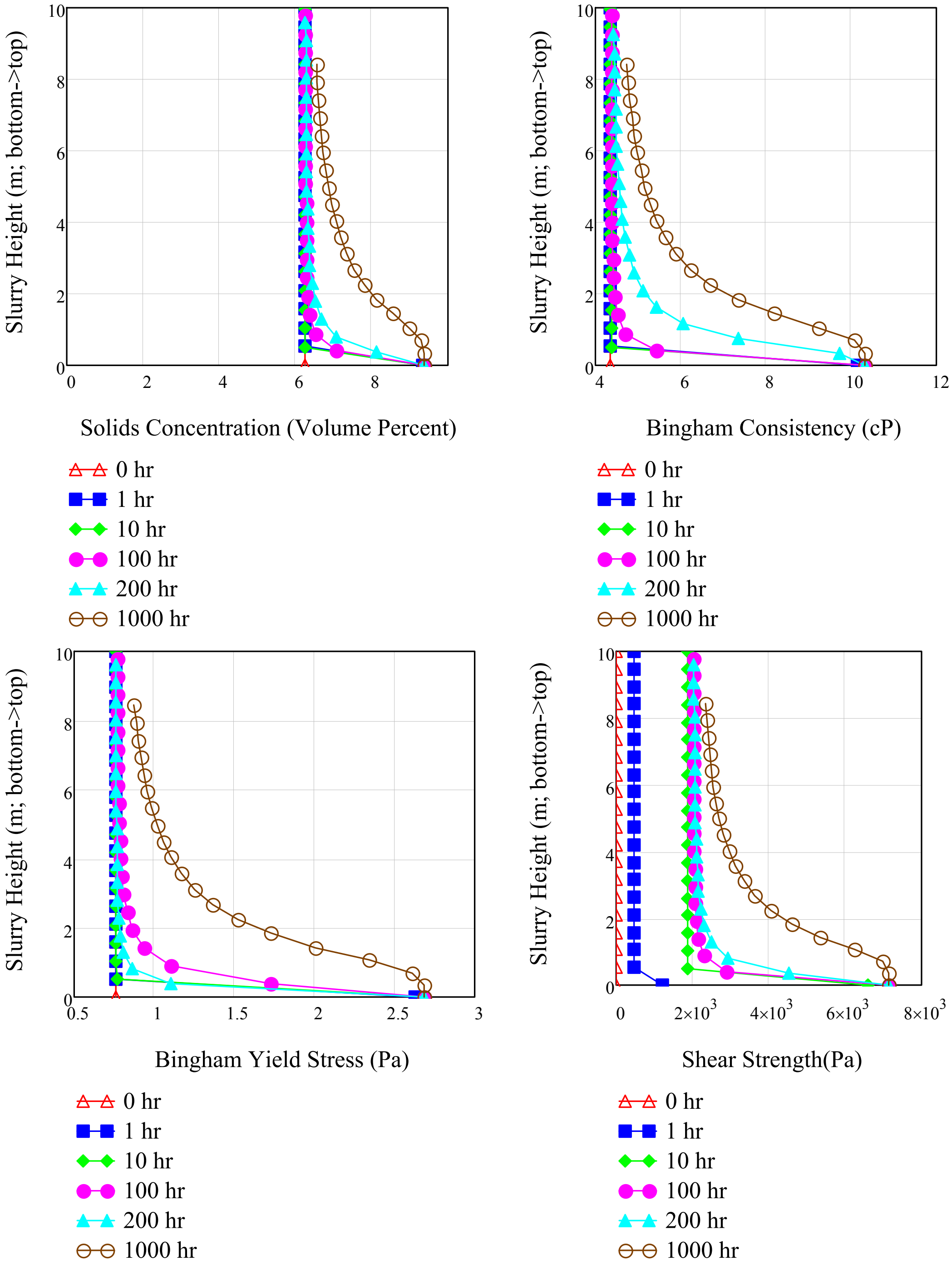


Figure 13.4. Predicted Sludge Properties from Hanford Tank C-104 with Water Dilution at Starting Slurry Height of 10 M with 33% Volume Excess Supernatant from Fully Settled Configuration; Rheological Properties Taken at a Temperature Range of 20º-35ºC

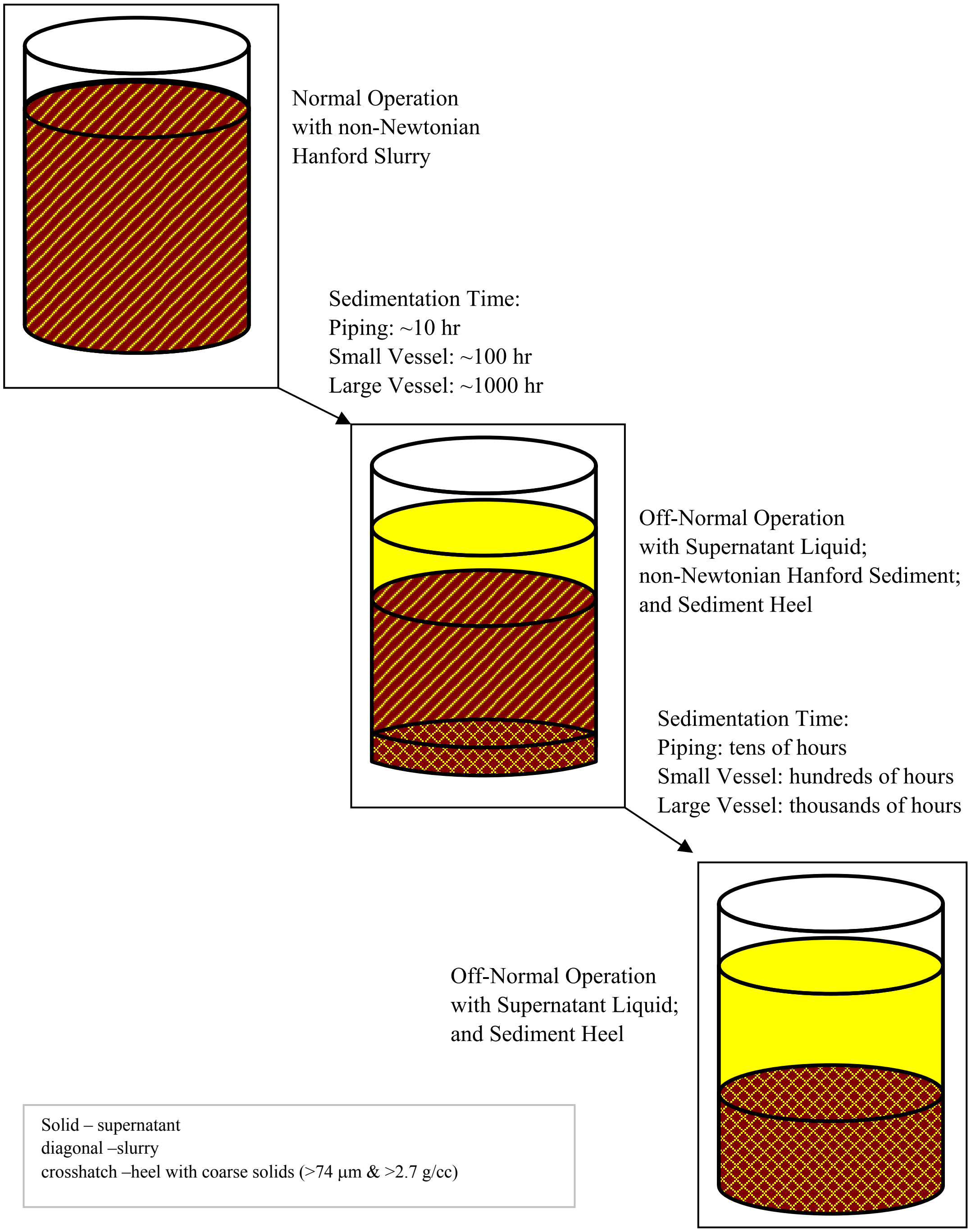


Figure 13.5. Illustration of Development of Sludge Process Heel and Fully Settled Configuration at Various Process Scales

Recovery from these slurry configurations will require the application of all of the parameters identified in this table. Initially the sediment will be gelled to some extent, due to the development of interparticle bonds as the particles remain quiescent and in close proximity, and will possess a shear strength threshold that must be overcome. After the sediment is mobilized, the Bingham consistency and yield stress parameters will be elevated due to the large concentration of undissolved solids in the sediment bed. As mixing proceeds and supernatant liquid is blended into the sediment, the rheological properties will drop to the normal operation range when the slurry is fully suspended. This is shown graphically in Figure 13.6.

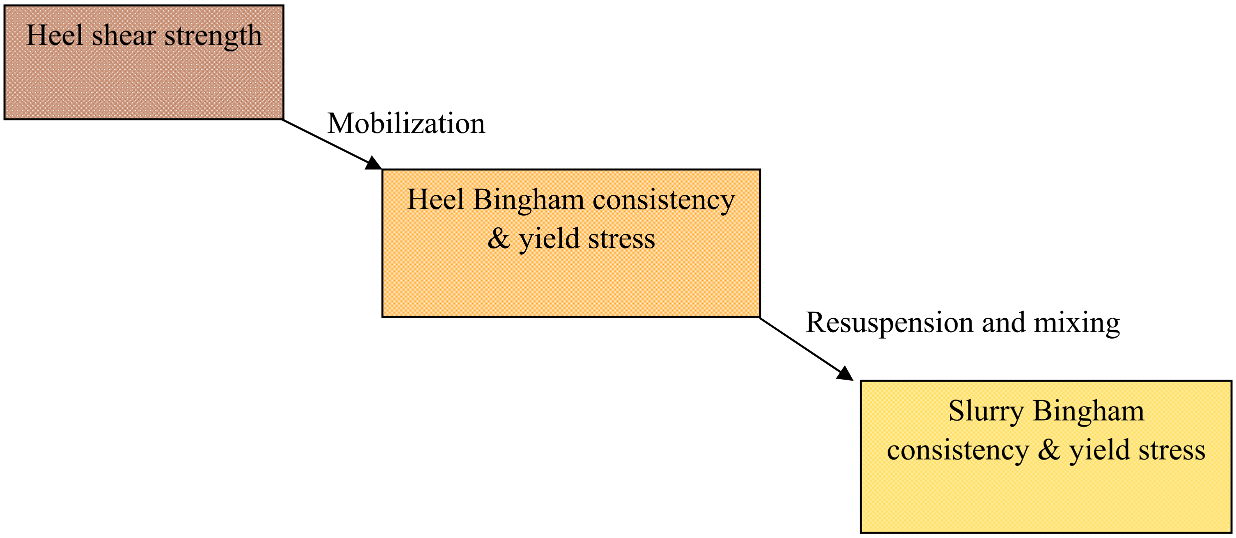


Figure 13.6. Rheological Properties Encountered During Recovery from Process Upset Conditions

14.0 Rheology Summary and Processing Scenarios

The data discussed in this report can be applied to a wide variety of process conditions. Three major process systems where these data apply are as flow in process vessels, vertical piping, and horizontal piping. In these process systems, several sludge configurations can be identified as potential operational scenarios. These scenarios and sludge configurations are shown in Figures 14.1 through 14.3 for process vessels (e.g. WTP EFRT issue M3), vertical piping, and horizontal piping (e.g. WTP EFRT issue M1), respectively.

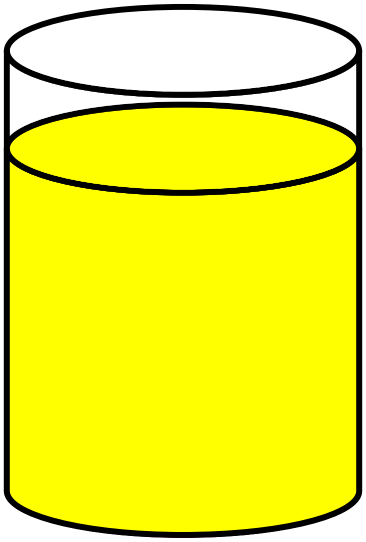
Table 14.1 provides a summary of the rheological parameters for each of the fluid layers shown in the associated process scenario figures. This table was compiled from the previous sections on sedimentation, shear strength, Bingham rheological parameters, and supernatant viscosity. In addition, the section discussing transient rheological modeling was summarized to provide an indication of the time scales for rheology regrowth at various process length scales. Recovery from these slurry configurations will require the application of all of the parameters identified in Table 14.1 through the process illustrated in Figure 13.6.

Table 14.1. Range of Rheological Parameters and Regrowth Times at Typical Process Scales

Category	Heel Shear strength	Slurry/Sediment Heel Bingham Yield Stress	Slurry/Sediment Heel Bingham Consistency	Supernatant Viscosity
Min[(a)]	40 Pa	0 Pa	1 cP	1 cP
Median[(a)]	700 Pa	1.5 Pa	8 cP	8 cP
Max[(a)]	25,000 Pa	40 Pa	110 cP	30 cP
Tank heel property after 10 hours of sedimentation in process piping (0.1 m sludge height)	25,000 Pa	40 Pa	110 cP	n/a
Tank heel property after 100 hours of sedimentation in a medium-scale vessel (1 m sludge height)	25,000 Pa	40 Pa	110 cP	n/a
Tank heel property after 1000 hours of sedimentation in a large-scale vessel (10 m sludge height)	25,000 Pa	40 Pa	110 cP	n/a

(a) Statistics performed on all compiled data discussed in this report.
n/a – not applicable.

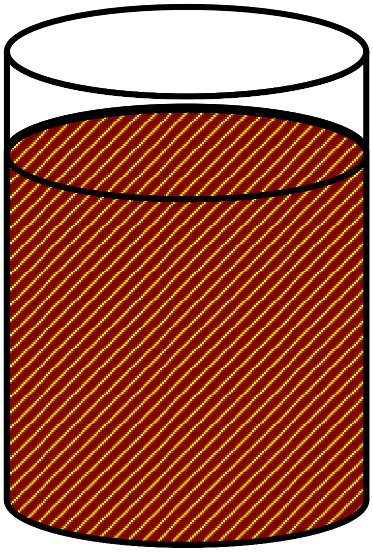
Normal operation with Newtonian fluid



Process impacts:

- cloud height
- blend times

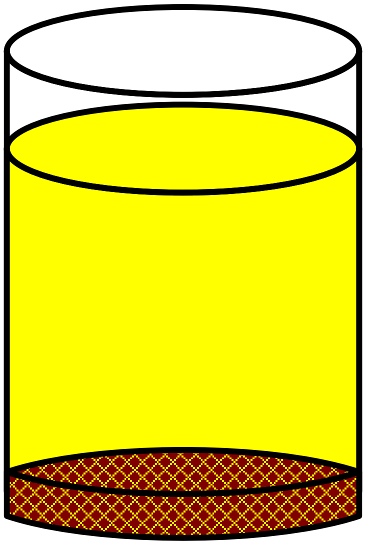
Normal operation with non-Newtonian fluid



Process impacts:

- mixing performance
- gas retention & release

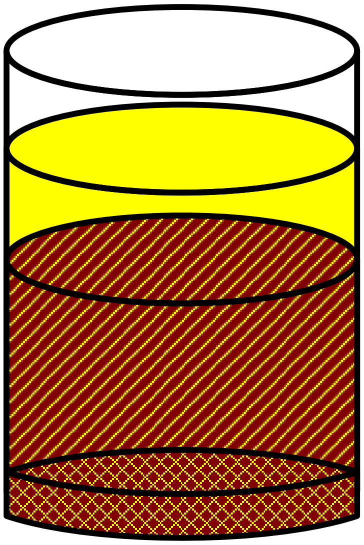
Off-normal operation with Newtonian fluid



Process impacts:

- off-bottom resuspension of solids
- blend time of solids layer

Off-Normal operation with non-Newtonian fluid

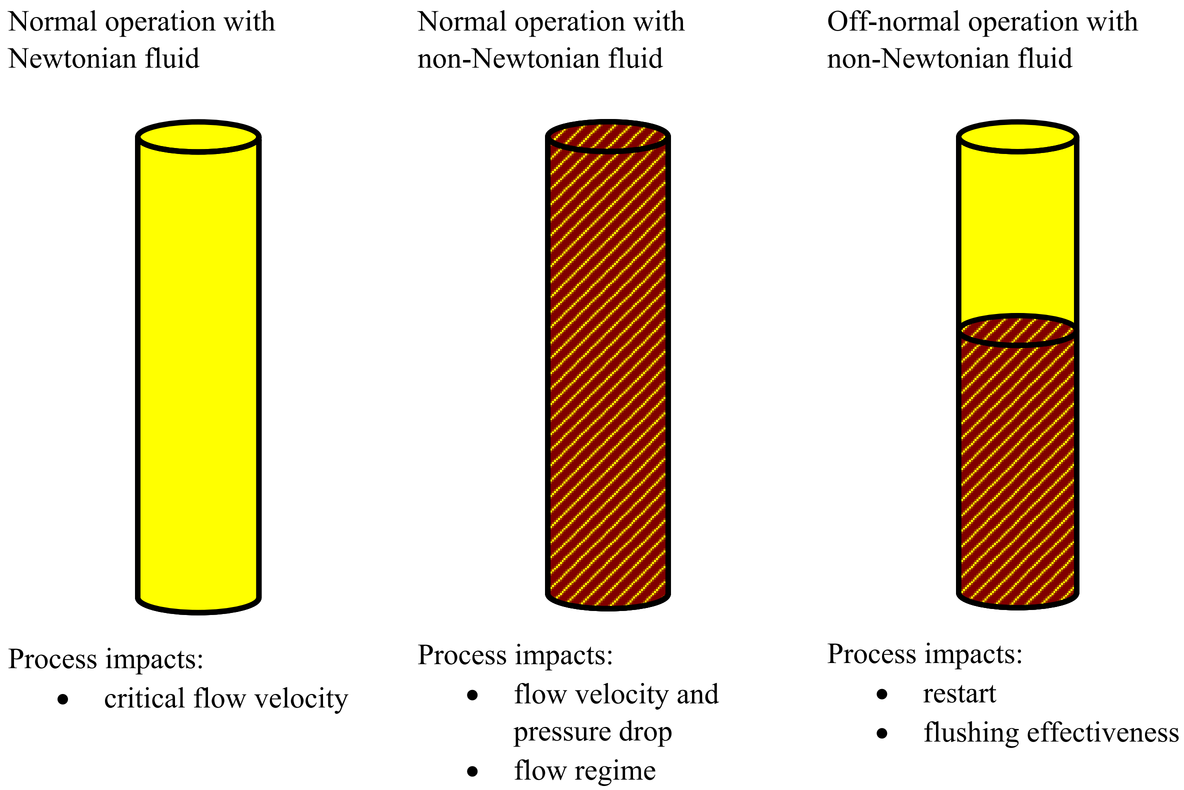


Process impacts:

- restart of mechanical agitators/PJMs
- off-bottom resuspension of solids
- blend time liquid/solids layer
- gas retention & release

Solid – supernatant; diagonal – slurry; crosshatch – heel with coarse solids (>74 µm & >2.7 g/cc)

Figure 14.1. Example Operational Scenarios for Process Vessels



Normal operation with Newtonian fluid

Process impacts:

- critical flow velocity

Normal operation with non-Newtonian fluid

Process impacts:

- flow velocity and pressure drop
- flow regime

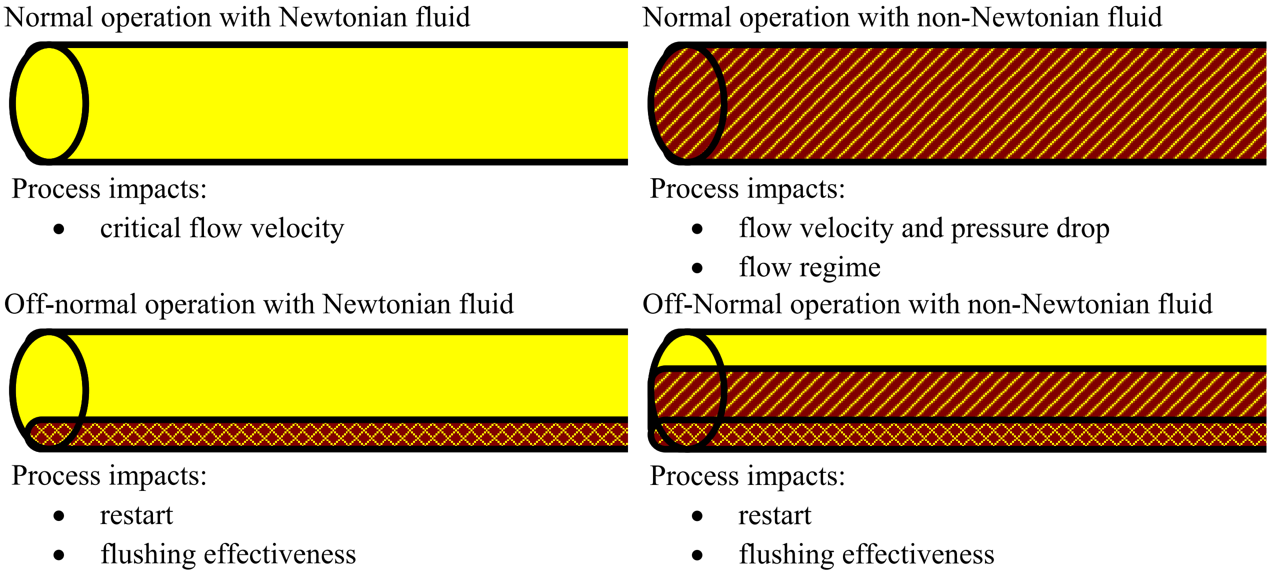
Off-normal operation with non-Newtonian fluid

Process impacts:

- restart
- flushing effectiveness

Solid – supernatant; diagonal – slurry; crosshatch – heel with coarse solids (>74 µm & >2.7 g/cc)

Figure 14.2. Example Operational Scenarios for Vertical Process Piping



Normal operation with Newtonian fluid

Process impacts:

- critical flow velocity

Normal operation with non-Newtonian fluid

Process impacts:

- flow velocity and pressure drop
- flow regime

Off-normal operation with Newtonian fluid

Process impacts:

- restart
- flushing effectiveness

Off-Normal operation with non-Newtonian fluid

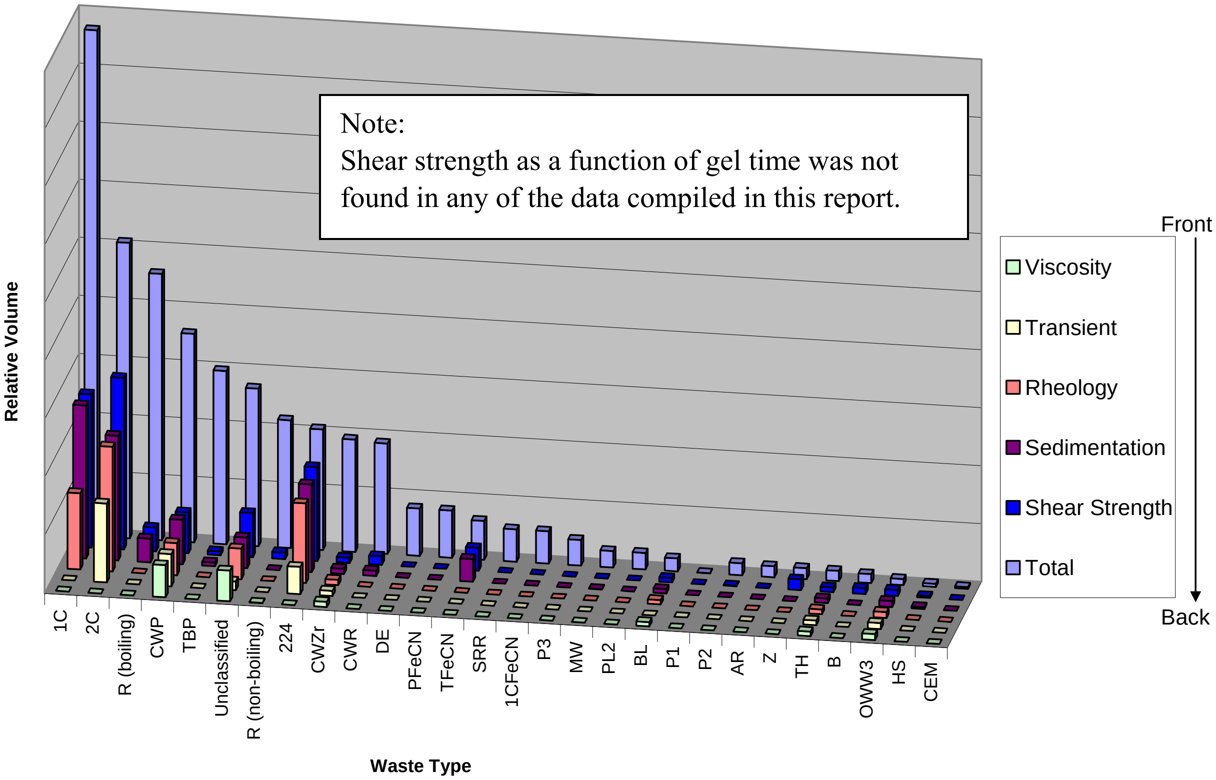
Process impacts:

- restart
- flushing effectiveness

Solid – supernatant; diagonal – slurry; crosshatch – heel with coarse solids (>74 µm & >2.7 g/cc)

Figure 14.3. Example Operational Scenarios for Horizontal Process Piping

Rheology data and associated physical properties for Hanford tank wastes were compiled from all the readily available reports, but many gaps were observed when analyzing the data. These data include in situ as well as laboratory analysis of samples removed from the tanks. The gaps in the waste types analyzed are reported in each section of the report. Figure 14.4 provides a summary of these gaps. The relative volume of wastes modeled for liquid viscosity, sedimentation, shear strength, rheological parameters (Bingham plastic model), and rheological parameters as a function of settling are plotted as a function of waste type.



Note:
Shear strength as a function of gel time was not found in any of the data compiled in this report.

Figure 14.4. Relative Volume of Waste Types Modeled Based on Waste Tank Data Available for Liquid Viscosity, Sedimentation, Shear Strength, Rheology, and Transient Modeling Compared to the Total Volume of Each Sludge Waste Type

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Appendix A

Tabulation of Available Rheology Data and Associated Physical and Chemical Data for Hanford Tank Wastes

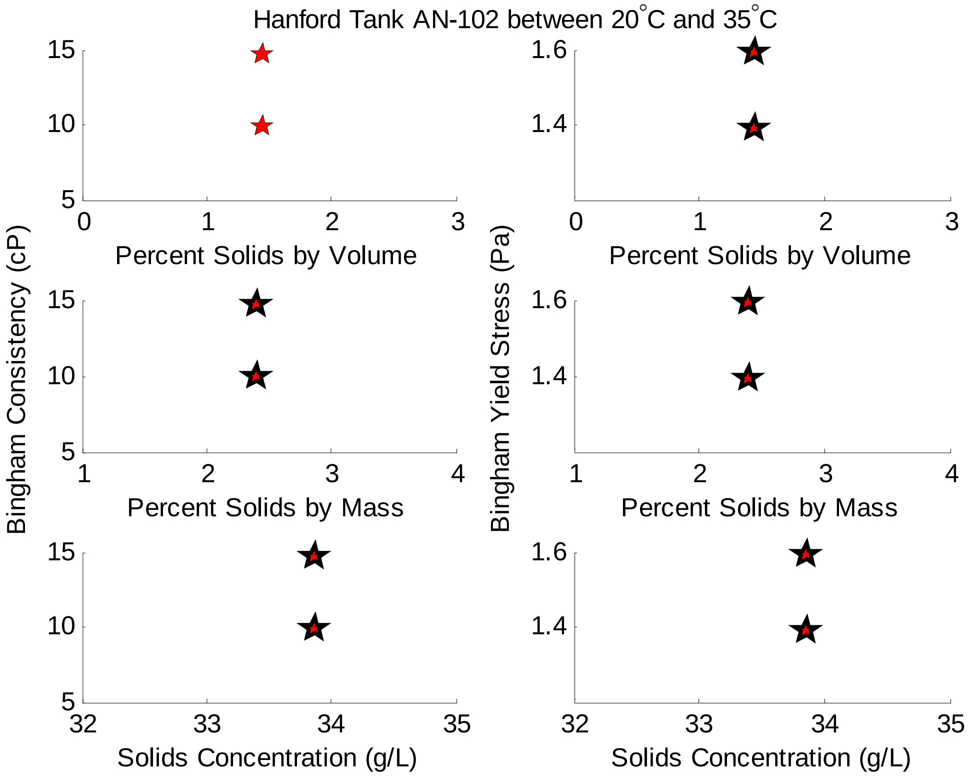
Appendix A – Tabulation of Available Rheology Data and Associated Physical and Chemical Data for Hanford Tank Wastes

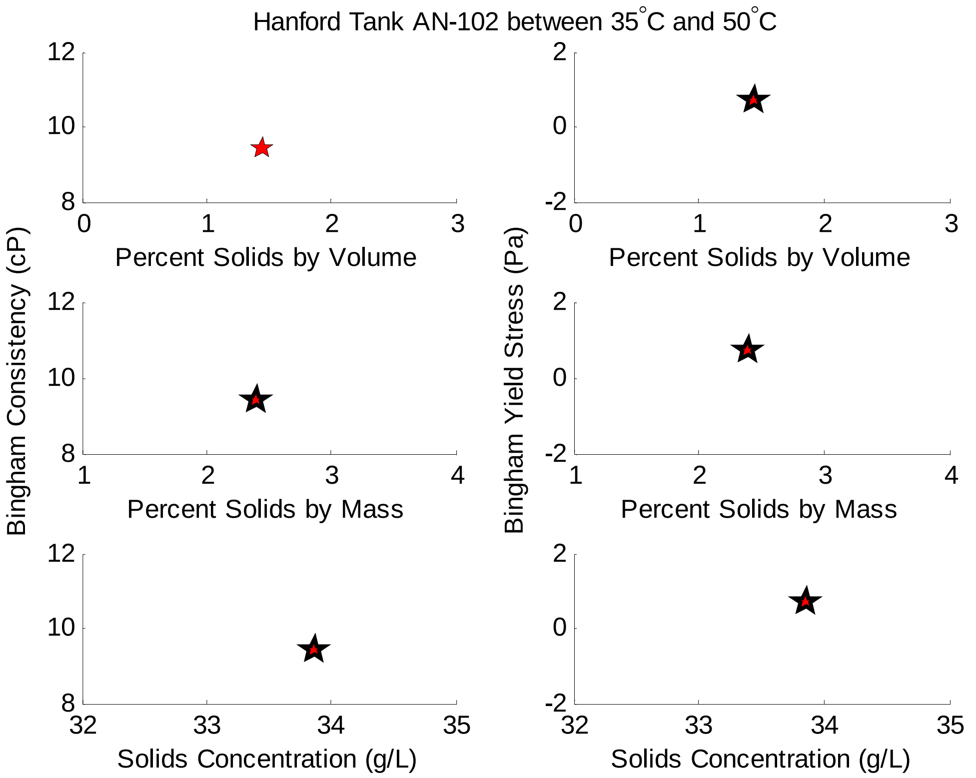
Appendix B

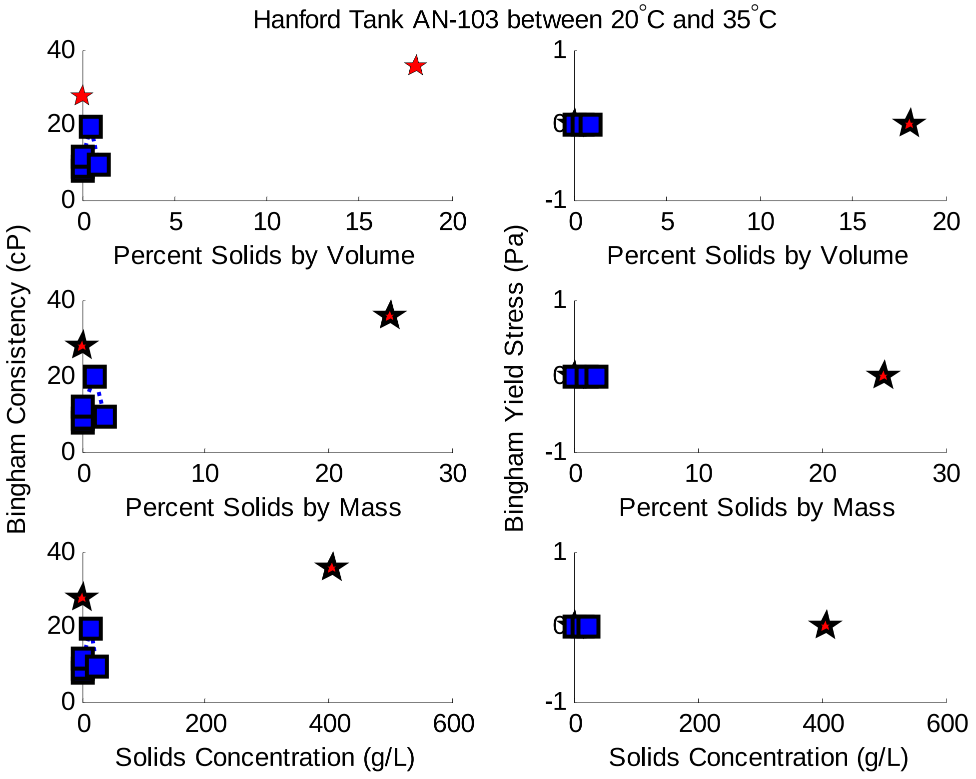
Raw Data Used in Evaluating Correlations of the Bingham Plastic Model Parameters with Solids Content

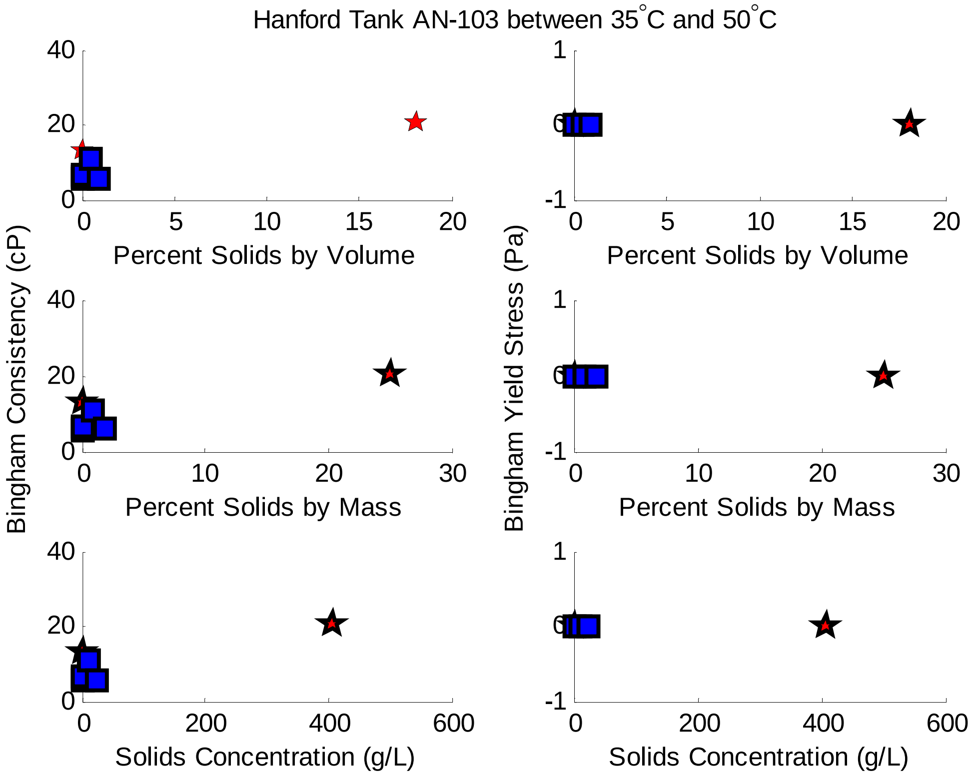
Appendix B – Raw Data Used in Evaluating Correlations of the Bingham Plastic Model Parameters with Solids Content

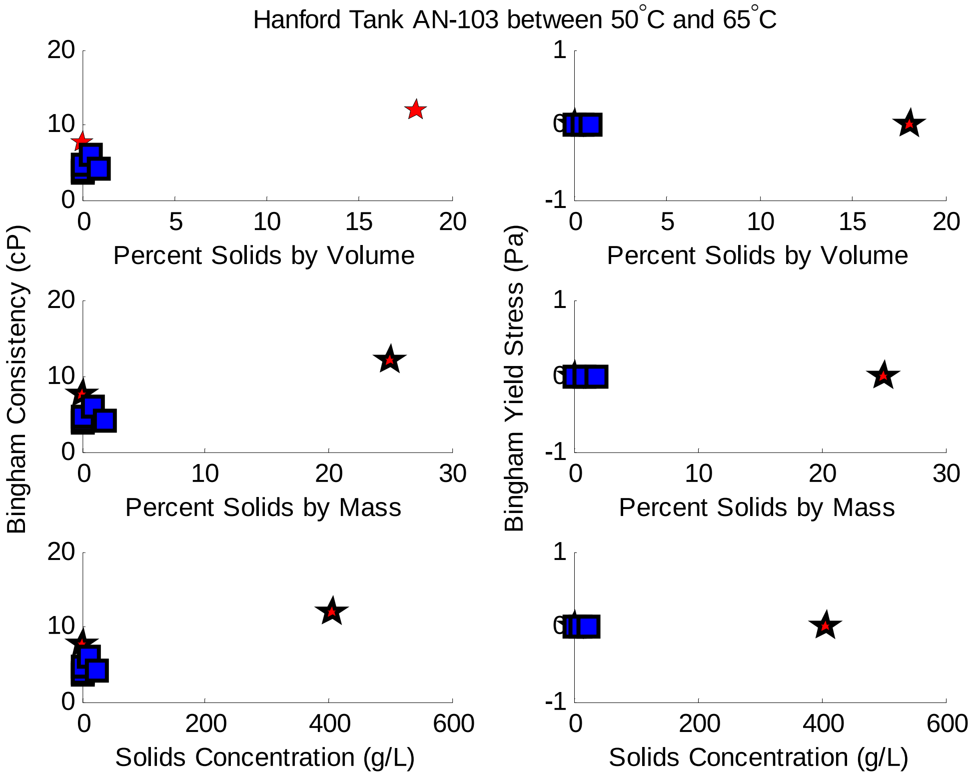
In the figures in this appendix, the stars = as-received tank waste; squares = water added as diluent; and circles = post washing and caustic leaching.

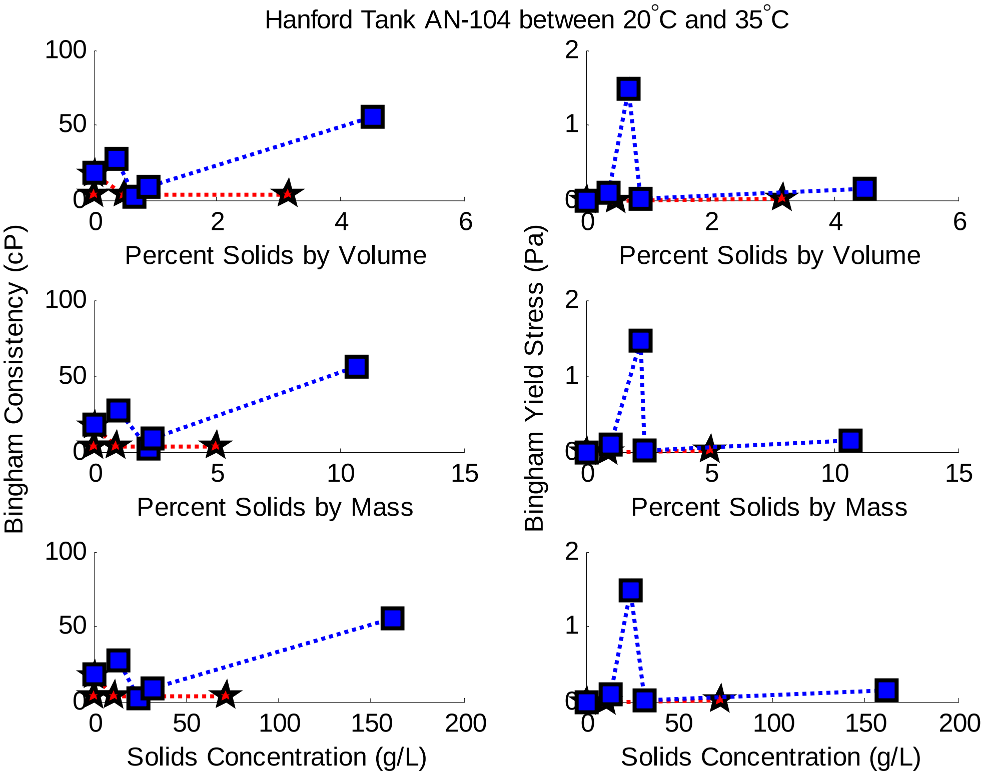


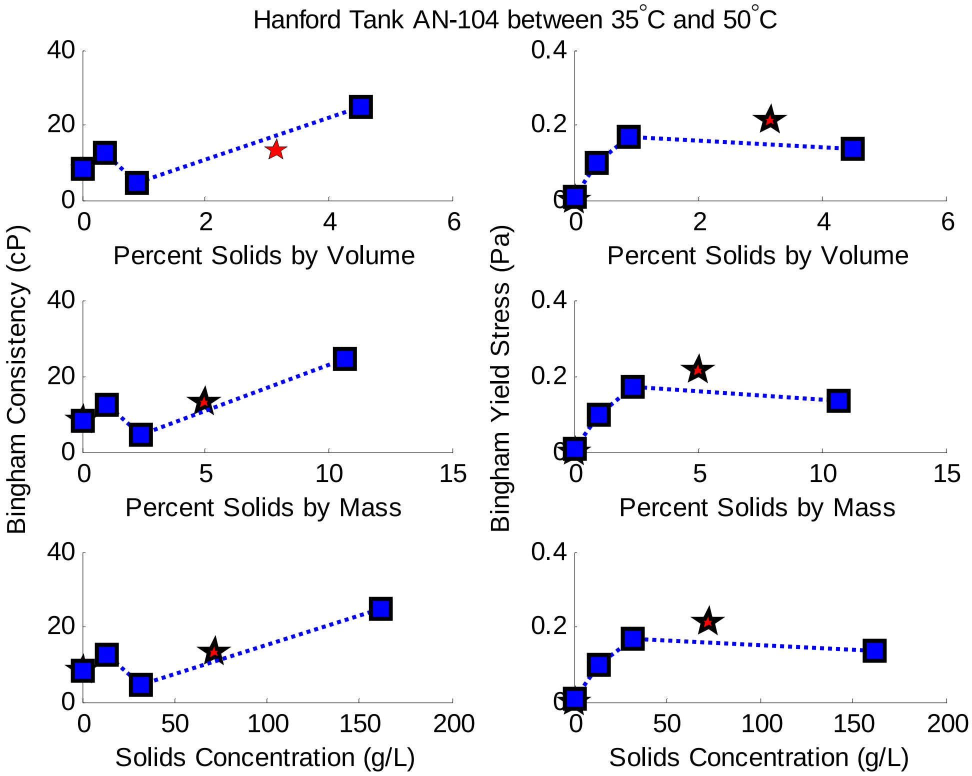

Hanford Tank AN-102 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
12
10
8
0
1
2
3
Percent Solids by Volume
2
0
-2
0
1
2
3
Percent Solids by Volume
12
10
8
1
2
3
4
Percent Solids by Mass
2
0
-2
1
2
3
4
Percent Solids by Mass
12
10
8
32
33
34
35
Solids Concentration (g/L)
2
0
-2
32
33
34
35
Solids Concentration (g/L)

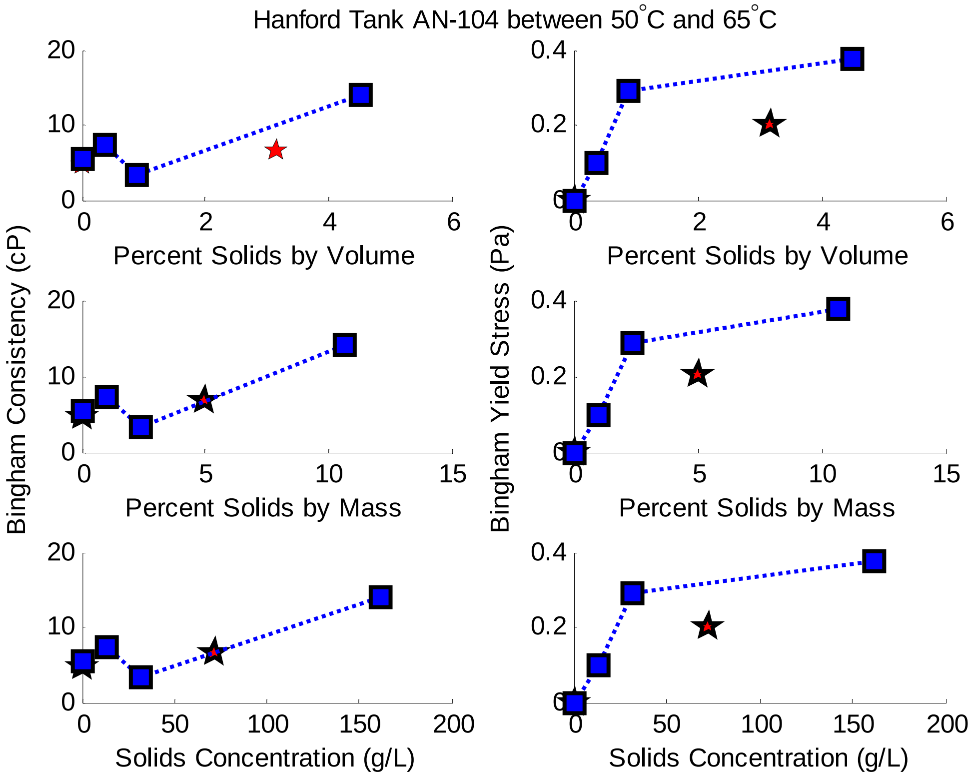

Hanford Tank AN-103 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
40
20
0
0
5
10
15
20
Percent Solids by Volume
1
0
-1
0
5
10
15
20
Percent Solids by Volume
40
20
0
0
10
20
30
Percent Solids by Mass
1
0
-1
0
10
20
30
Percent Solids by Mass
40
20
0
0
200
400
600
Solids Concentration (g/L)
1
0
-1
0
200
400
600
Solids Concentration (g/L)

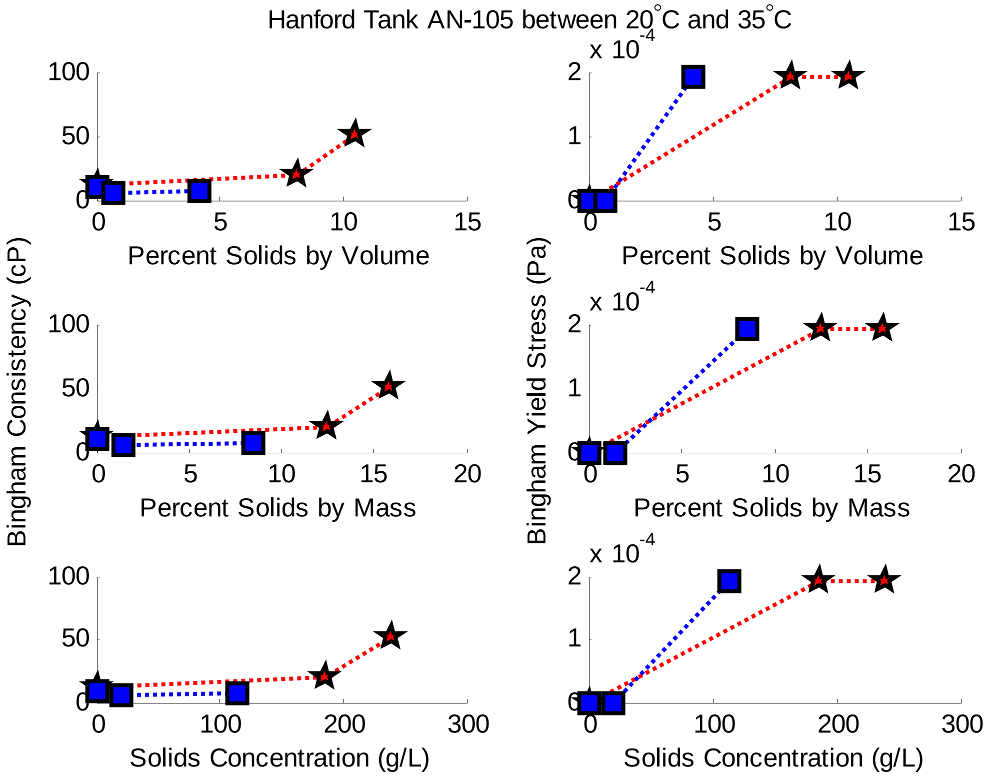

Hanford Tank AN-103 between 35°C and 50°C

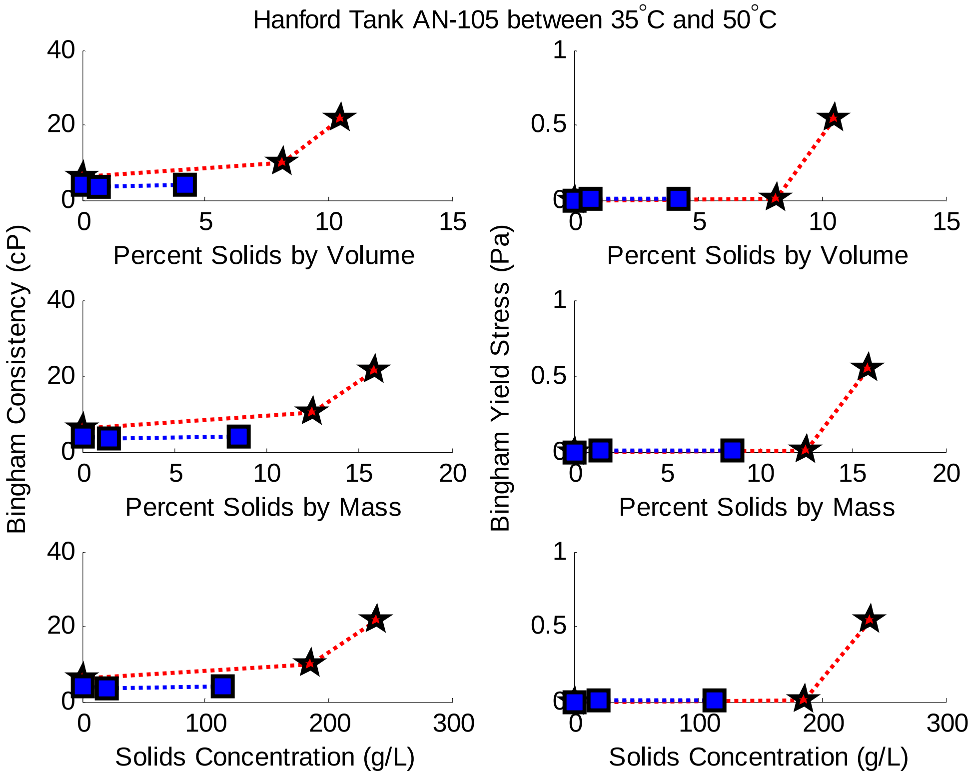

Hanford Tank AN-103 between 50°C and 65°C

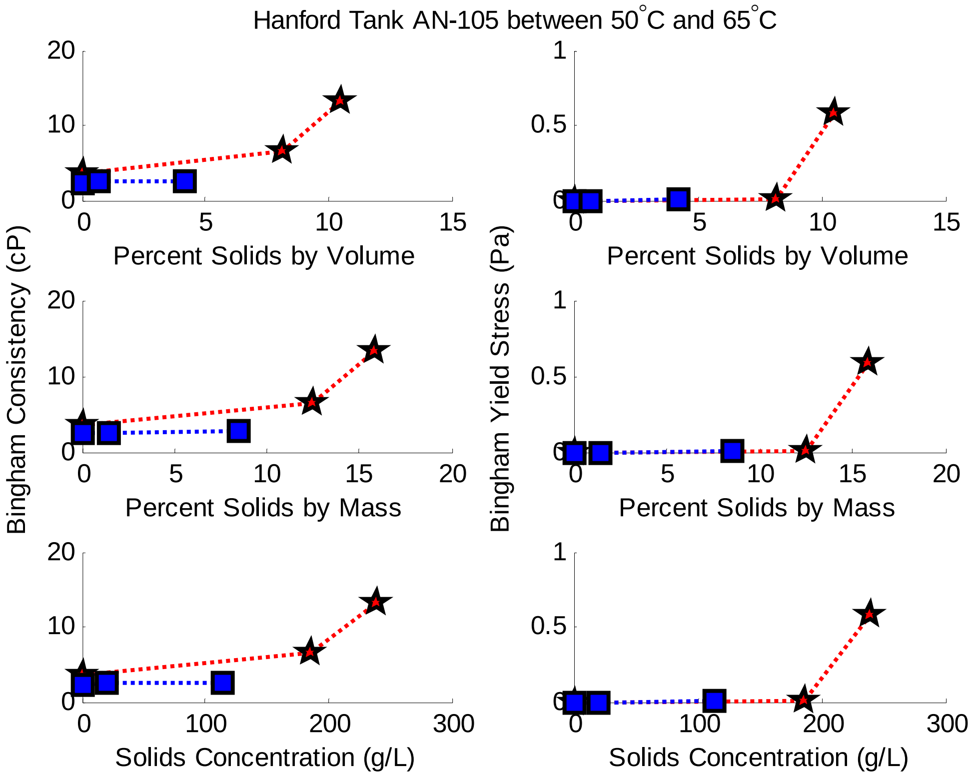

Hanford Tank AN-104 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
100
50
0
2
1
0
0
2
4
6
Percent Solids by Volume
0
5
10
15
Percent Solids by Mass
0
50
100
150
200
Solids Concentration (g/L)

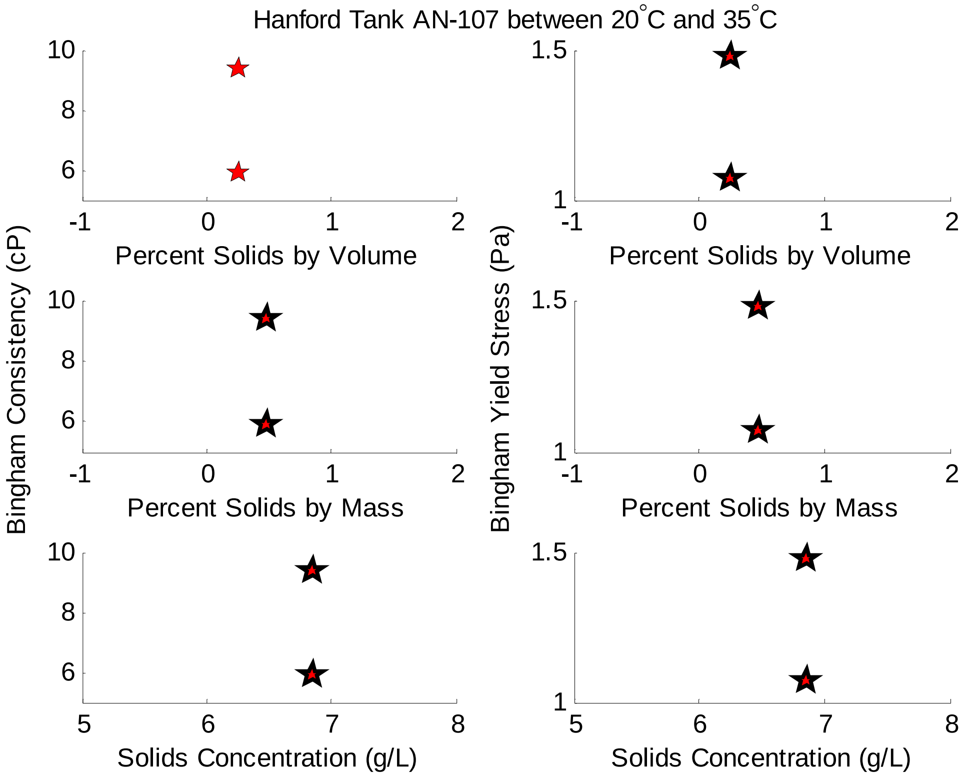

Hanford Tank AN-104 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
40
20
0
0.4
0.2
0
0
2
4
6
Percent Solids by Volume
0
5
10
15
Percent Solids by Mass
0
50
100
150
200
Solids Concentration (g/L)

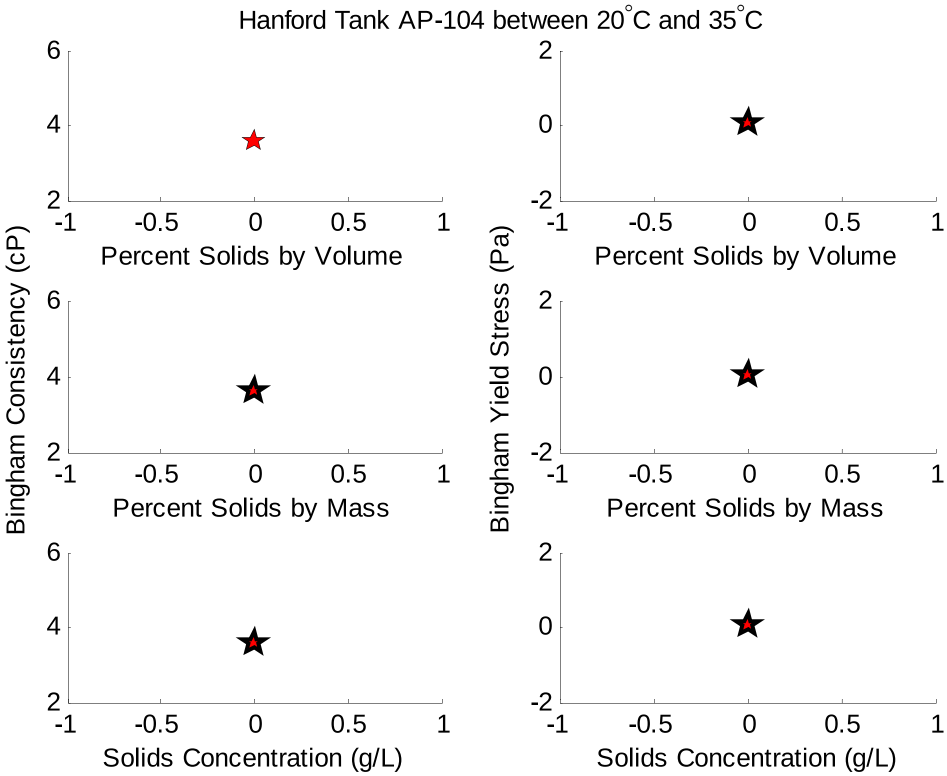

Hanford Tank AN-104 between 50°C and 65°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)
0
10
20
0.2
0.4
2
4
6
5
15
50
100
150
200

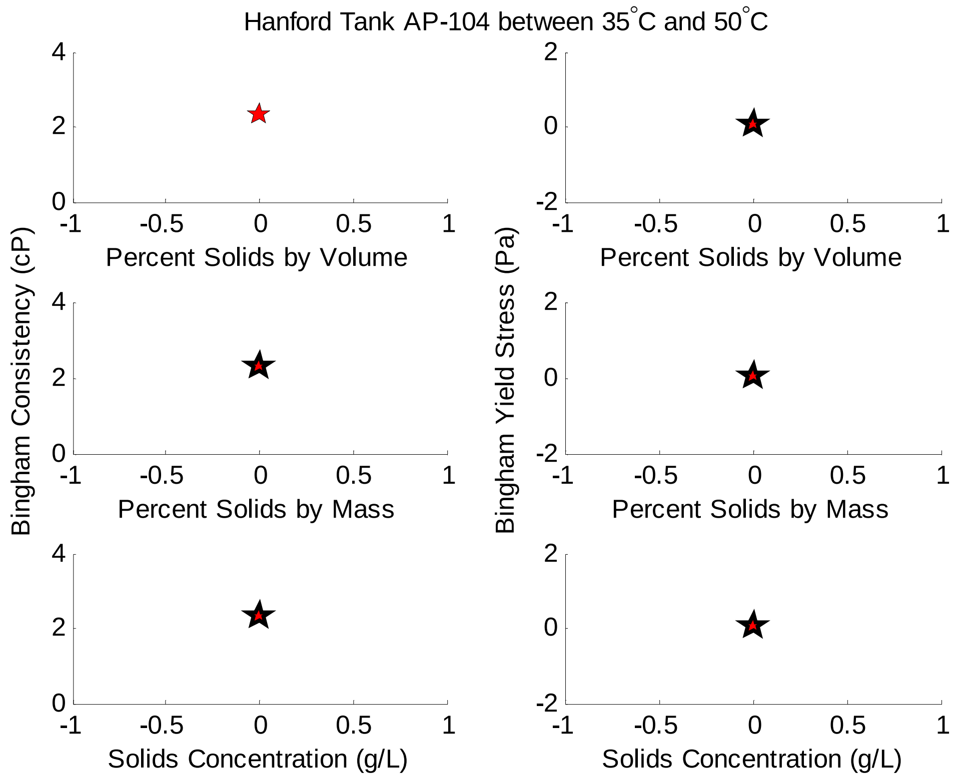

Hanford Tank AN-105 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
x 10^-4
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)
0
50
100
1
2
5
10
15
20
200
300

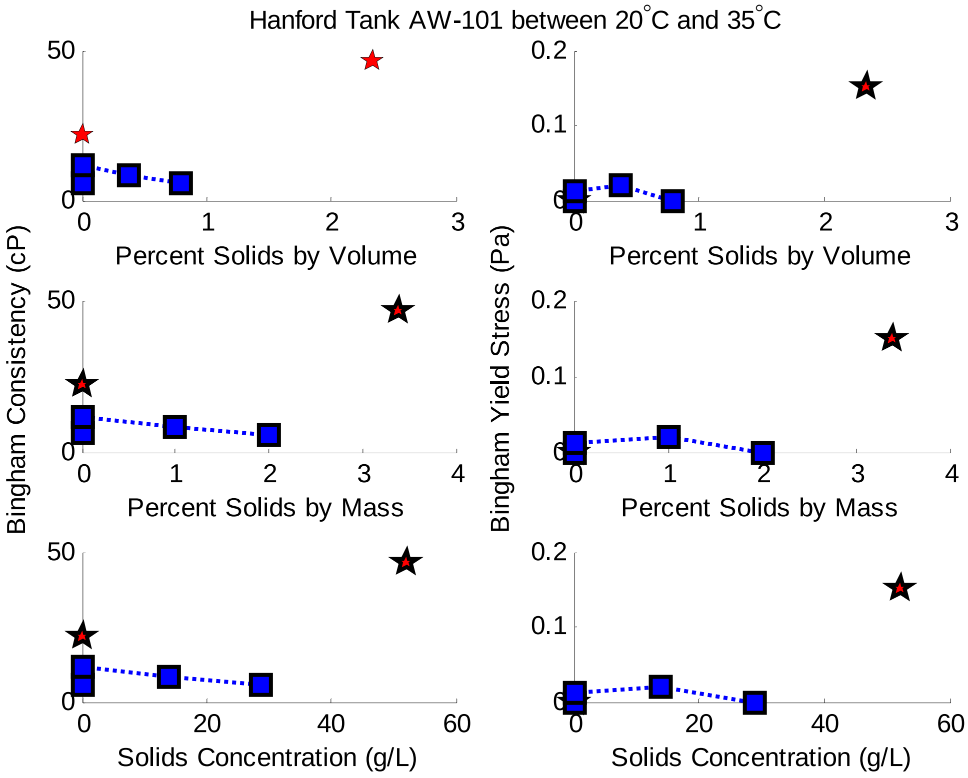

Hanford Tank AN-105 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
40
20
0
1
0.5
0
0
5
10
15
20
100
200
300
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)

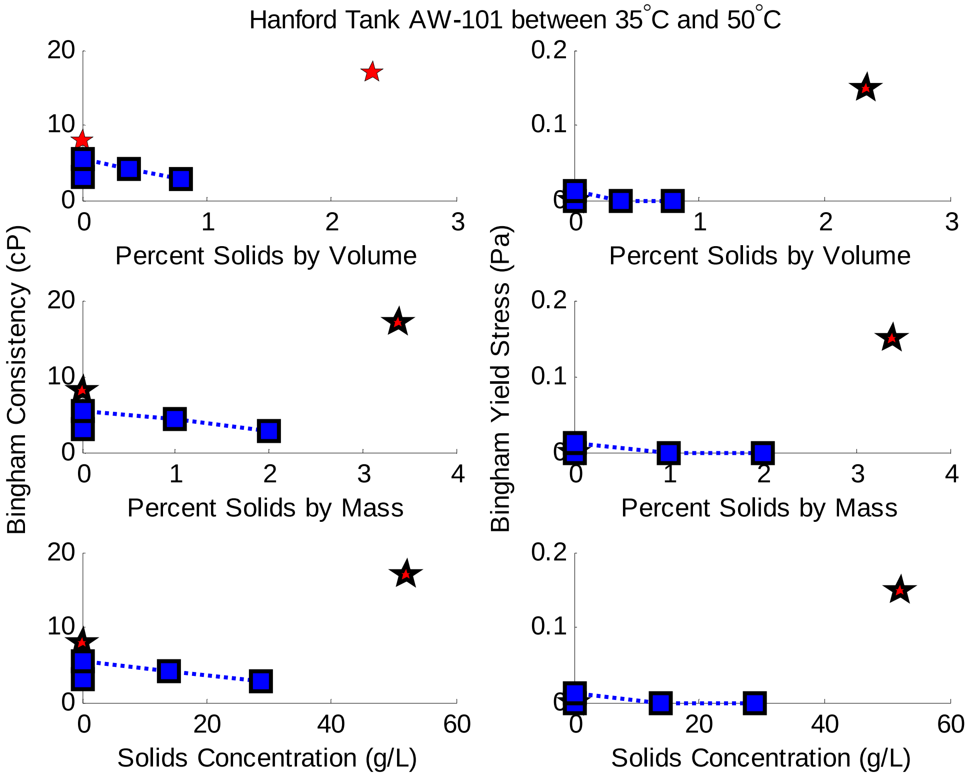

Hanford Tank AN-105 between 50°C and 65°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
20
10
0
1
0.5
0
0
5
10
15
20
100
200
300
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)

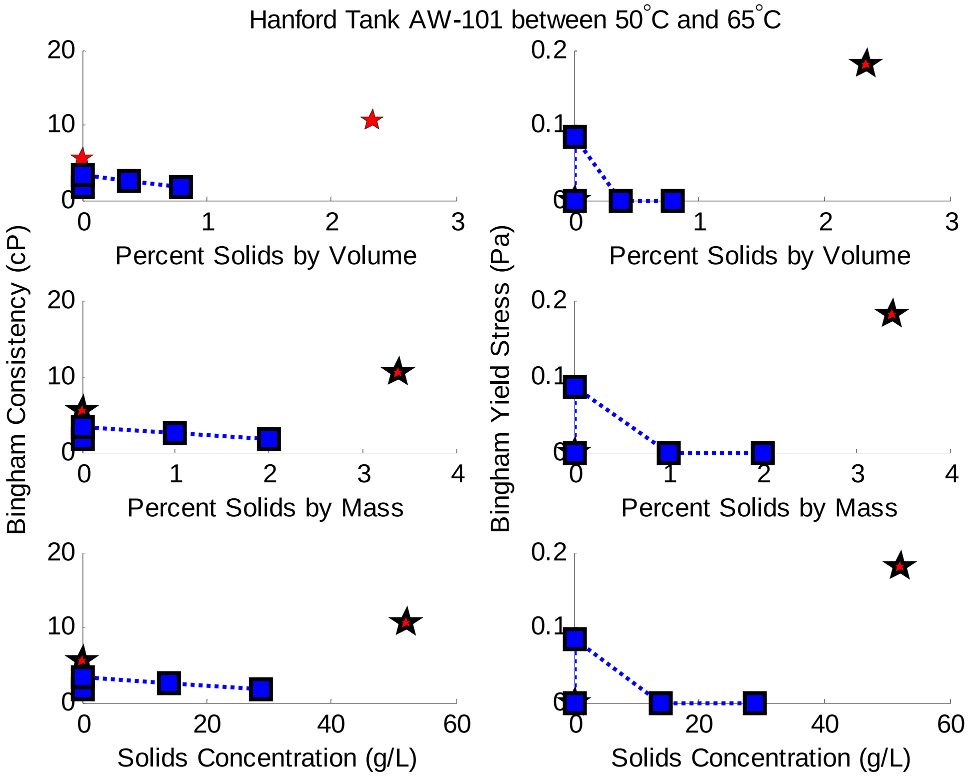

Hanford Tank AN-107 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
10
8
6
1.5
1
-1
0
1
2
Percent Solids by Volume
Percent Solids by Mass
5
6
7
8
Solids Concentration (g/L)

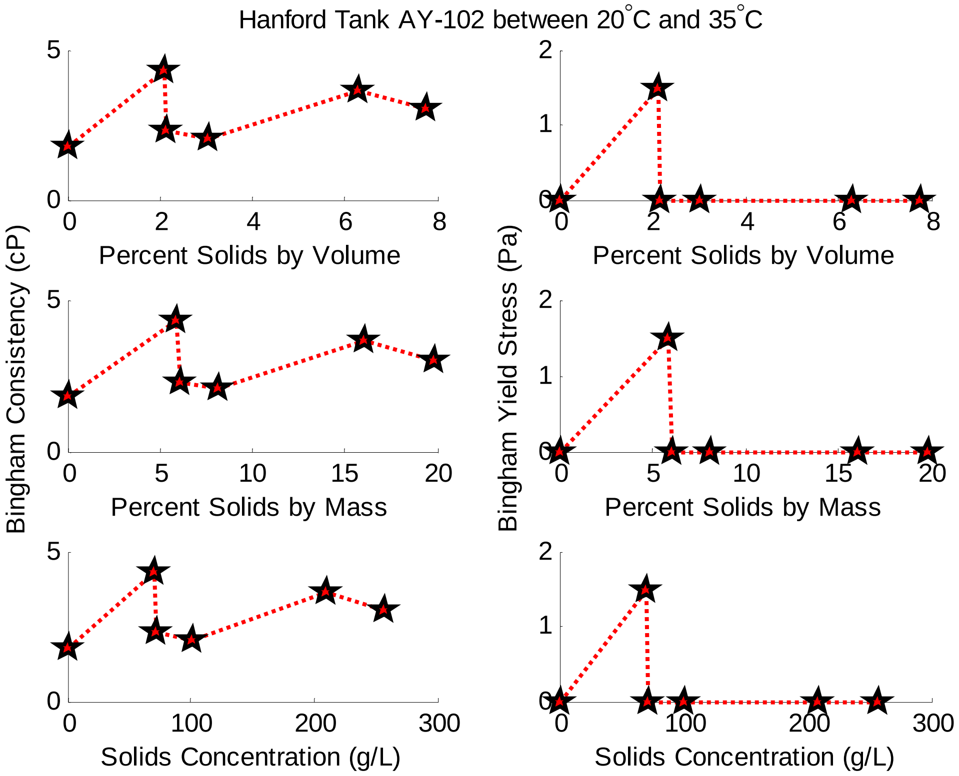

Hanford Tank AP-104 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
6
4
2
0
-2
-1
-0.5
0
0.5
1
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)


Hanford Tank AP-104 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
4
2
0
-2
-1
-0.5
0
0.5
1
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)

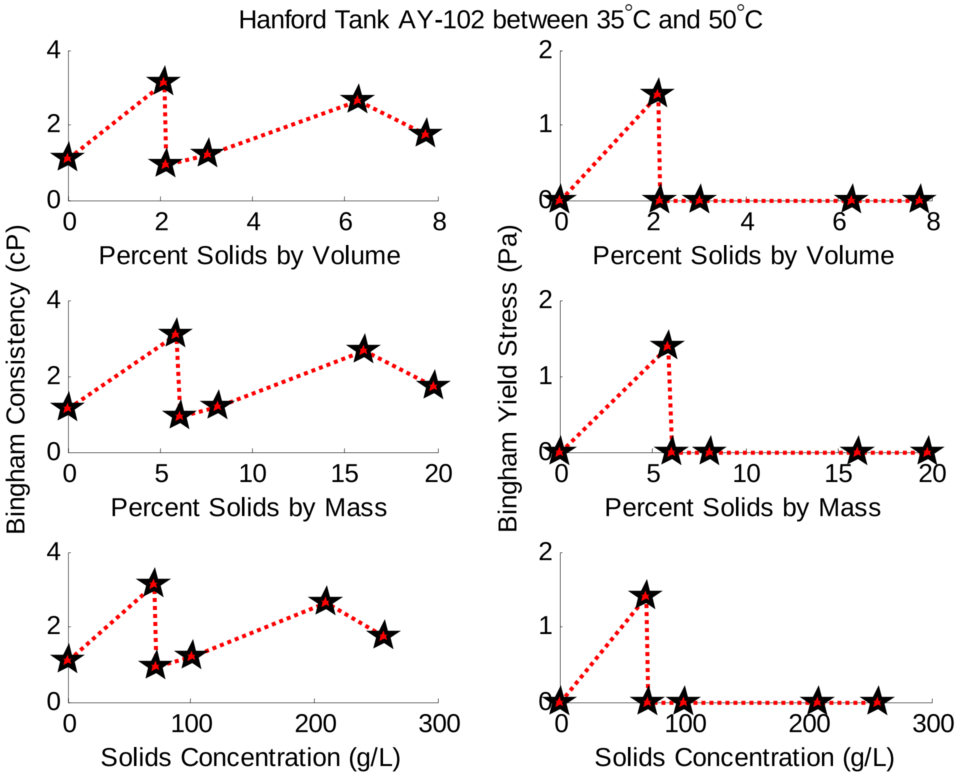

Hanford Tank AW-101 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
50
0.2
0.1
0
1
2
3
4
20
40
60
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)


Hanford Tank AW-101 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
20
10
0
0.2
0.1
0
0
1
2
3
4
Percent Solids by Volume
Percent Solids by Mass
20
40
60
Solids Concentration (g/L)

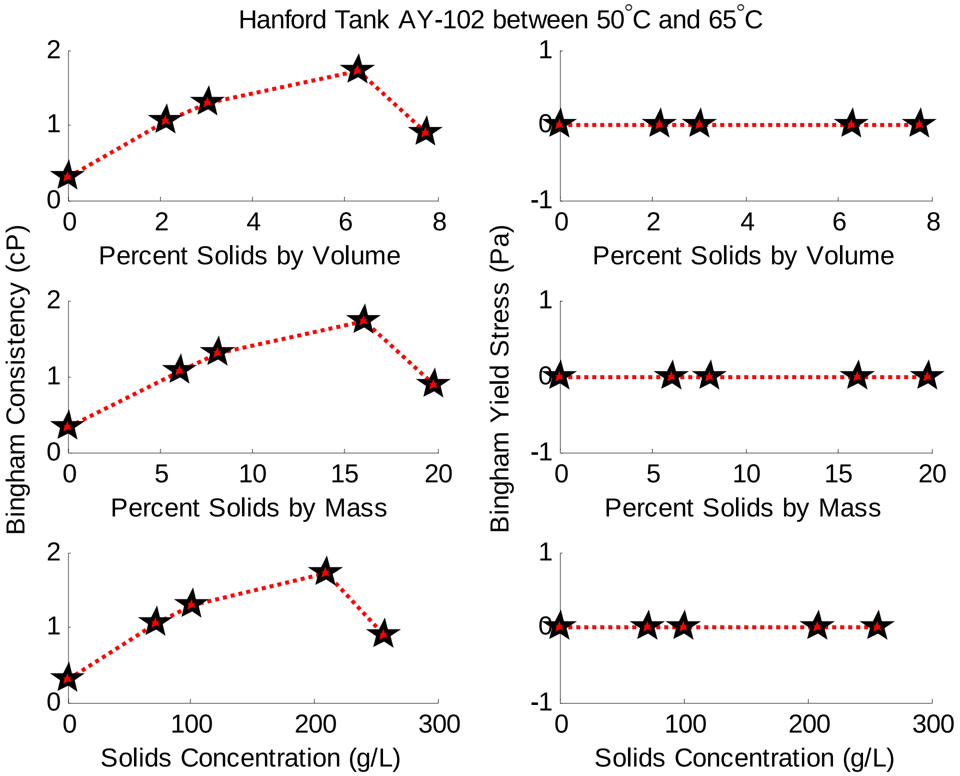

Hanford Tank AW-101 between 50°C and 65°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
20
10
0
0.2
0.1
0
0
1
2
3
4
Percent Solids by Volume
Percent Solids by Mass
20
40
60
Solids Concentration (g/L)

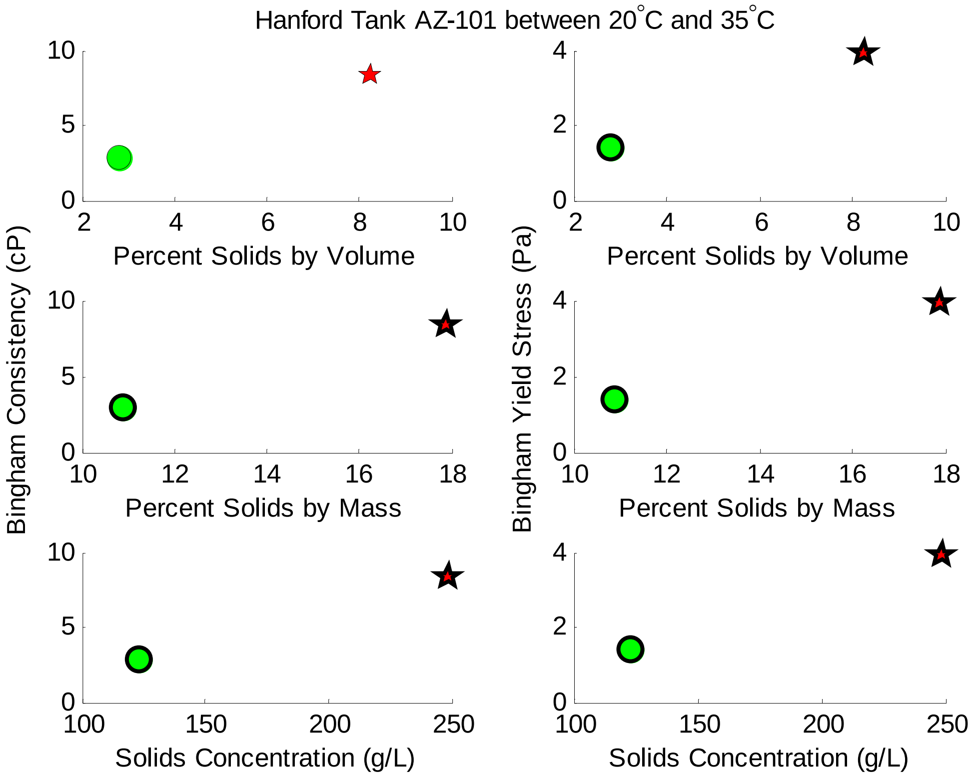


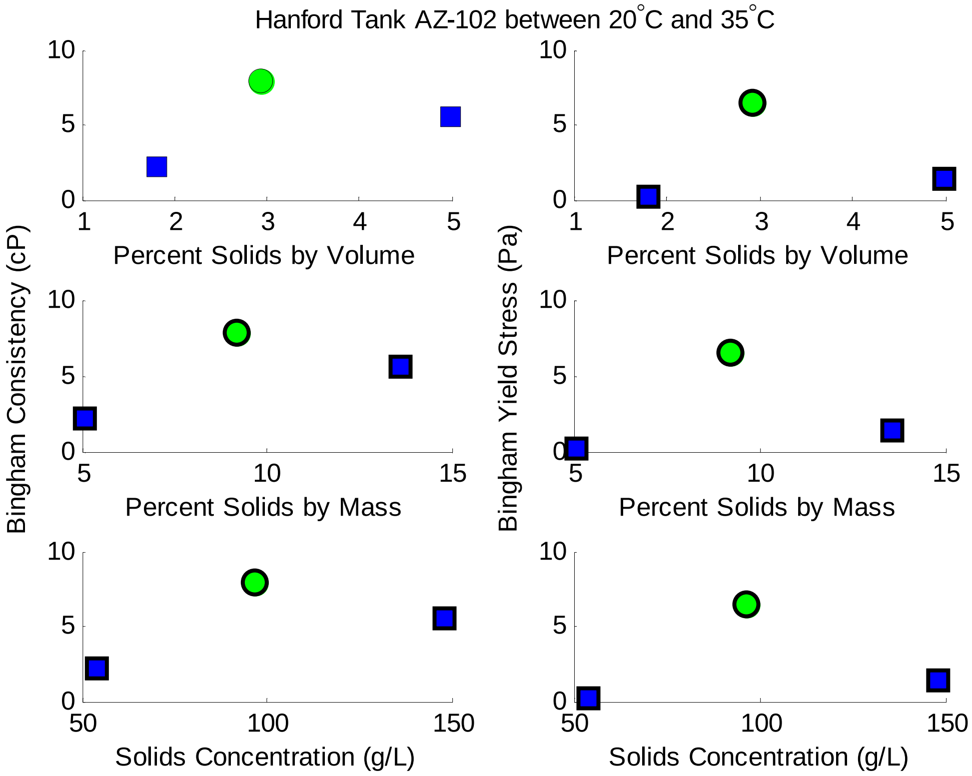
Hanford Tank AY-102 between 20°C and 35°C

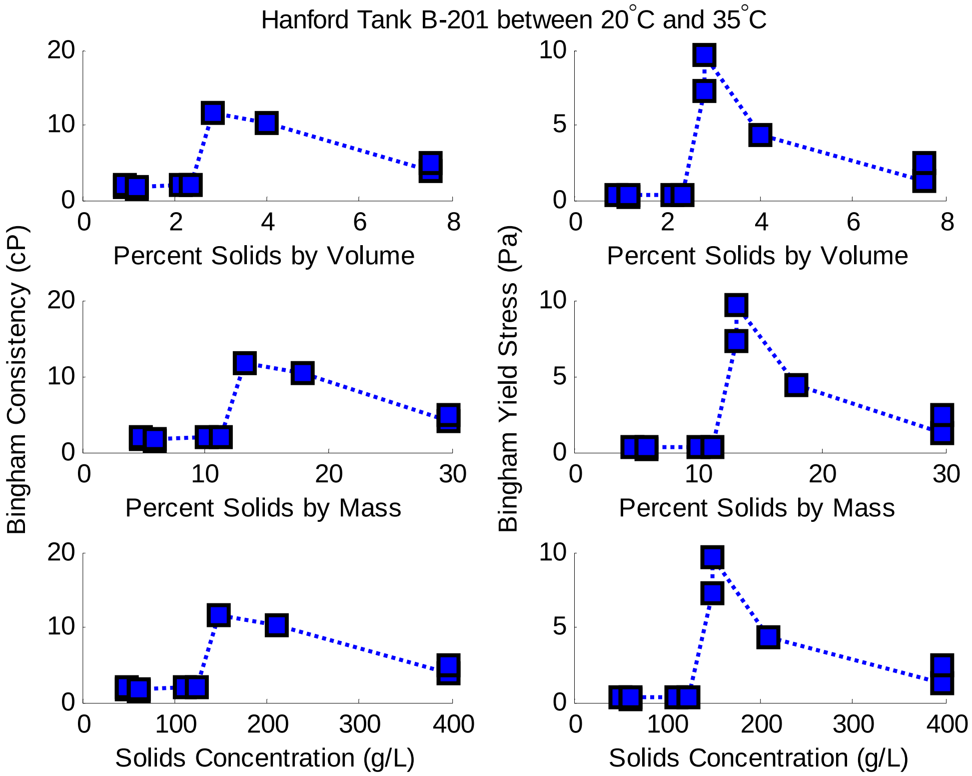


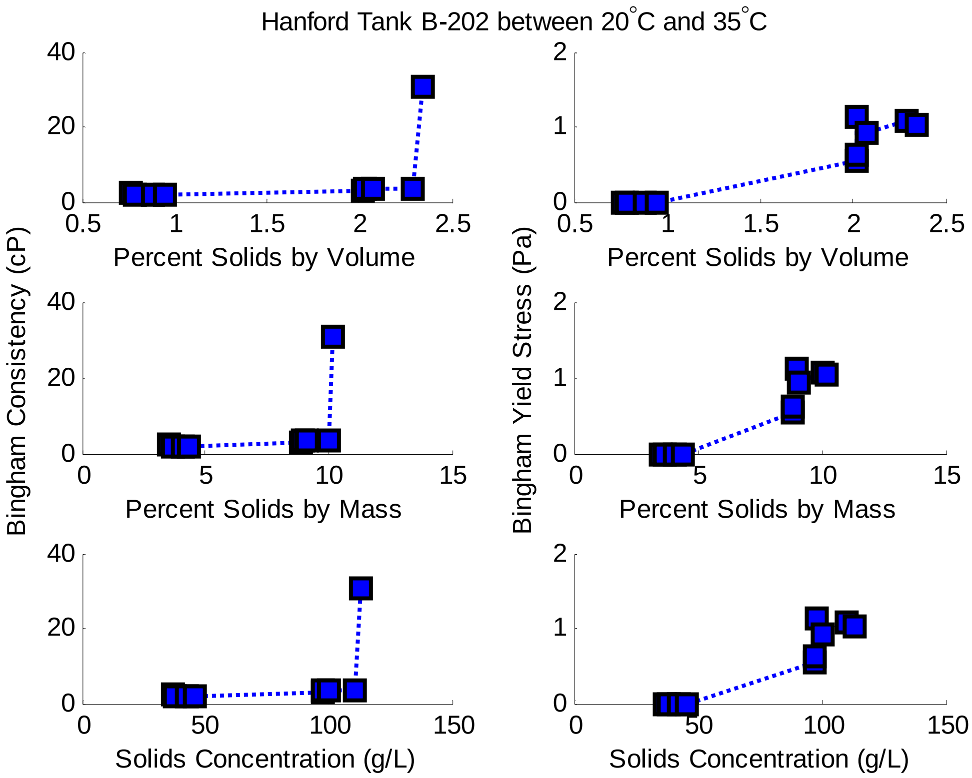
Hanford Tank AY-102 between 35°C and 50°C


Hanford Tank AY-102 between 50°C and 65°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
2
1
0
0
2
4
6
8
Percent Solids by Volume
1
0
-1
0
2
4
6
8
Percent Solids by Volume
2
1
0
0
5
10
15
20
Percent Solids by Mass
1
0
-1
0
5
10
15
20
Percent Solids by Mass
2
1
0
0
100
200
300
Solids Concentration (g/L)
1
0
-1
0
100
200
300
Solids Concentration (g/L)

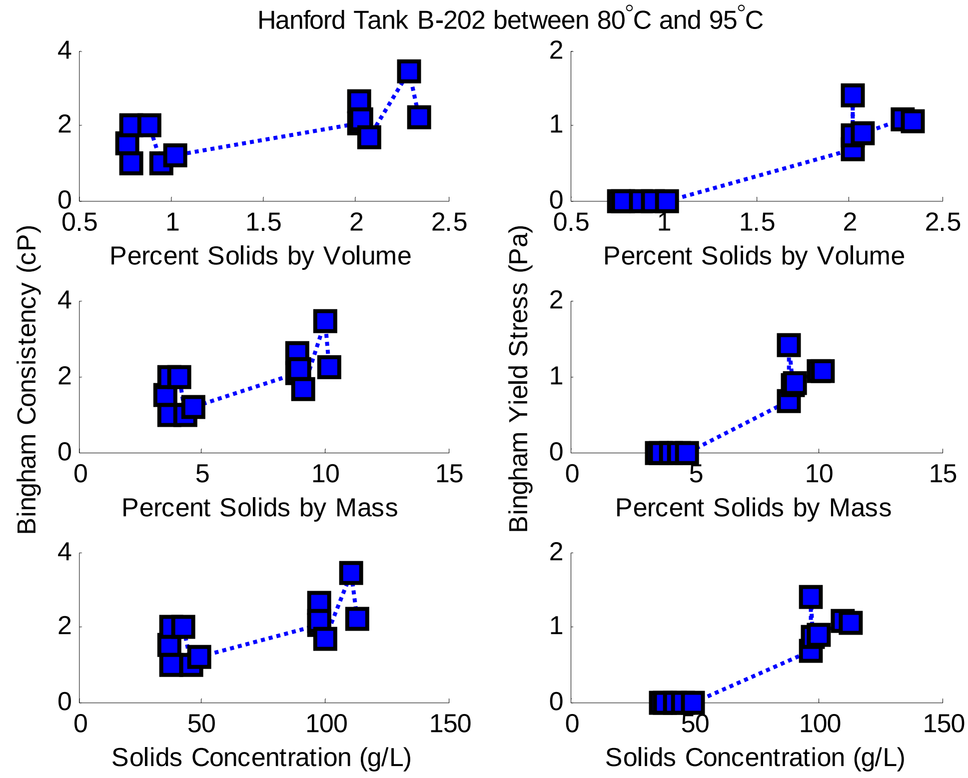

Hanford Tank AZ-101 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
10
5
0
2
4
6
8
10
Percent Solids by Volume
4
2
0
2
4
6
8
10
Percent Solids by Volume
10
5
0
10
12
14
16
18
Percent Solids by Mass
4
2
0
10
12
14
16
18
Percent Solids by Mass
10
5
0
100
150
200
250
Solids Concentration (g/L)
4
2
0
100
150
200
250
Solids Concentration (g/L)


Hanford Tank AZ-102 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
10
5
0
1
2
3
4
5
Percent Solids by Volume
5
10
15
Percent Solids by Mass
50
100
150
Solids Concentration (g/L)

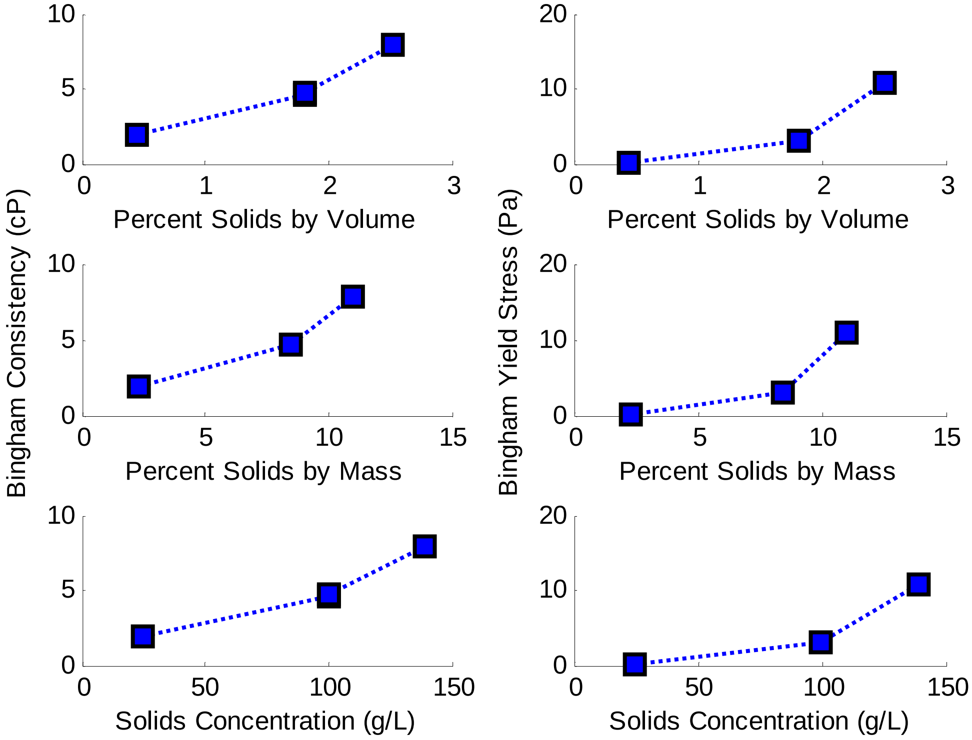

Hanford Tank B-201 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
20
10
5
0
2
4
6
8
Percent Solids by Volume
10
20
30
Percent Solids by Mass
100
200
300
400
Solids Concentration (g/L)

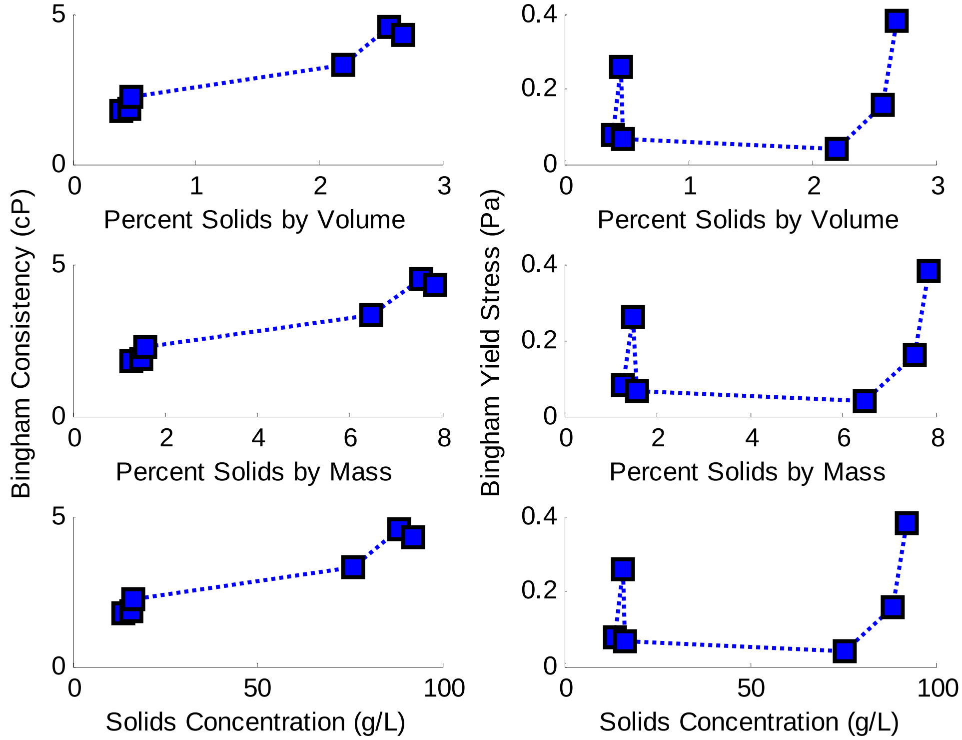


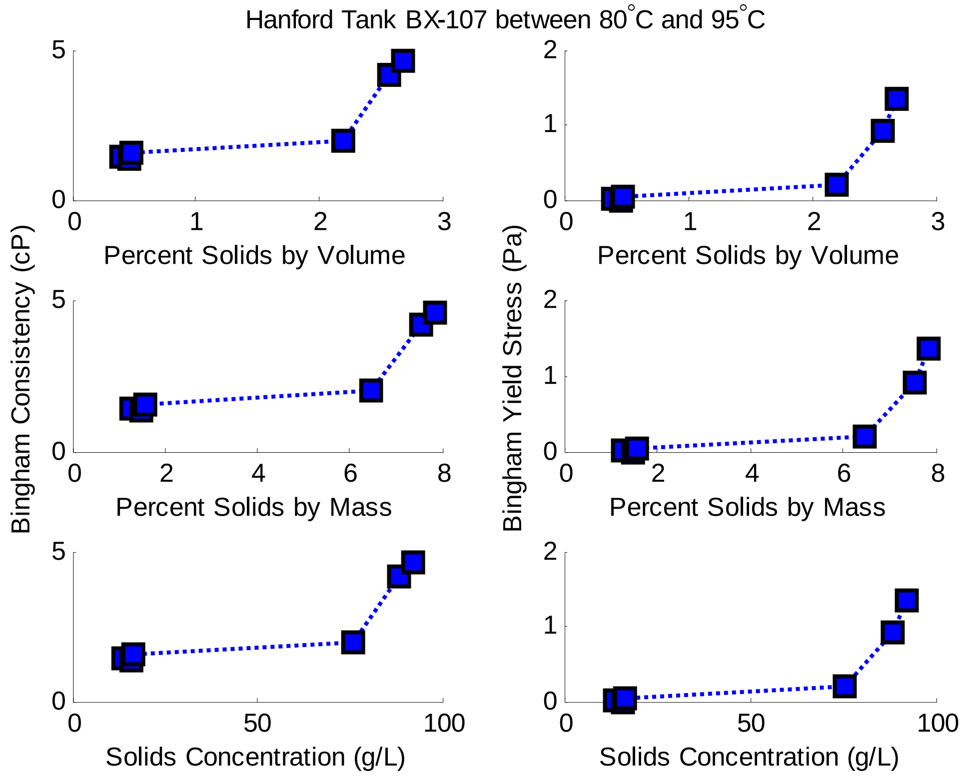
Hanford Tank B-202 between 20°C and 35°C

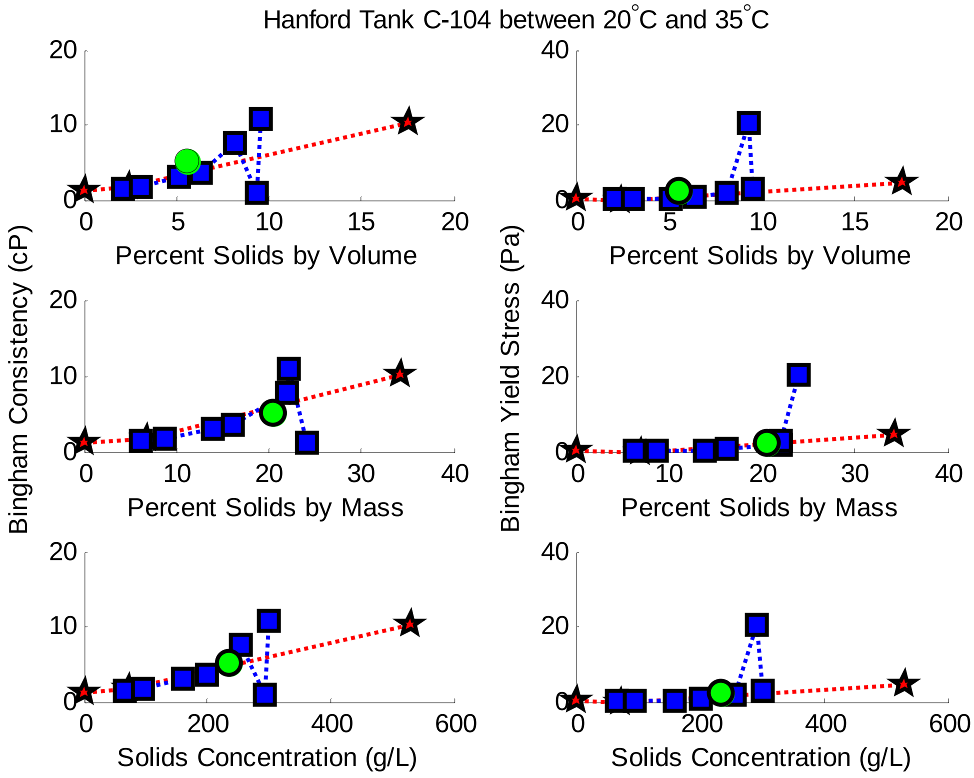


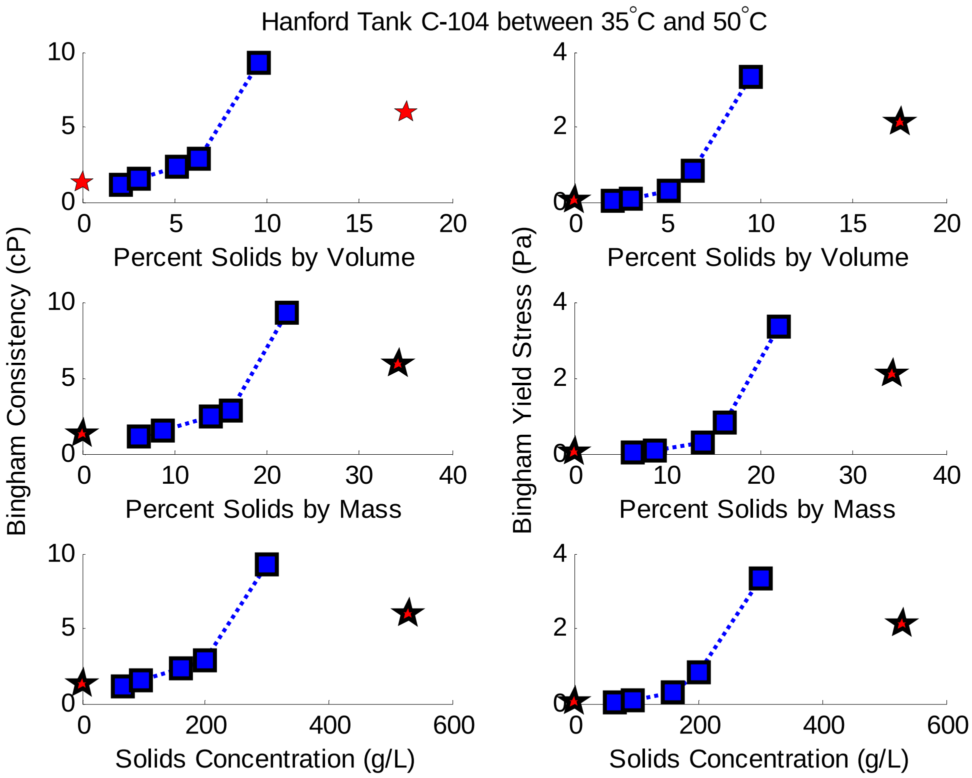
Hanford Tank B-202 between 80°C and 95°C

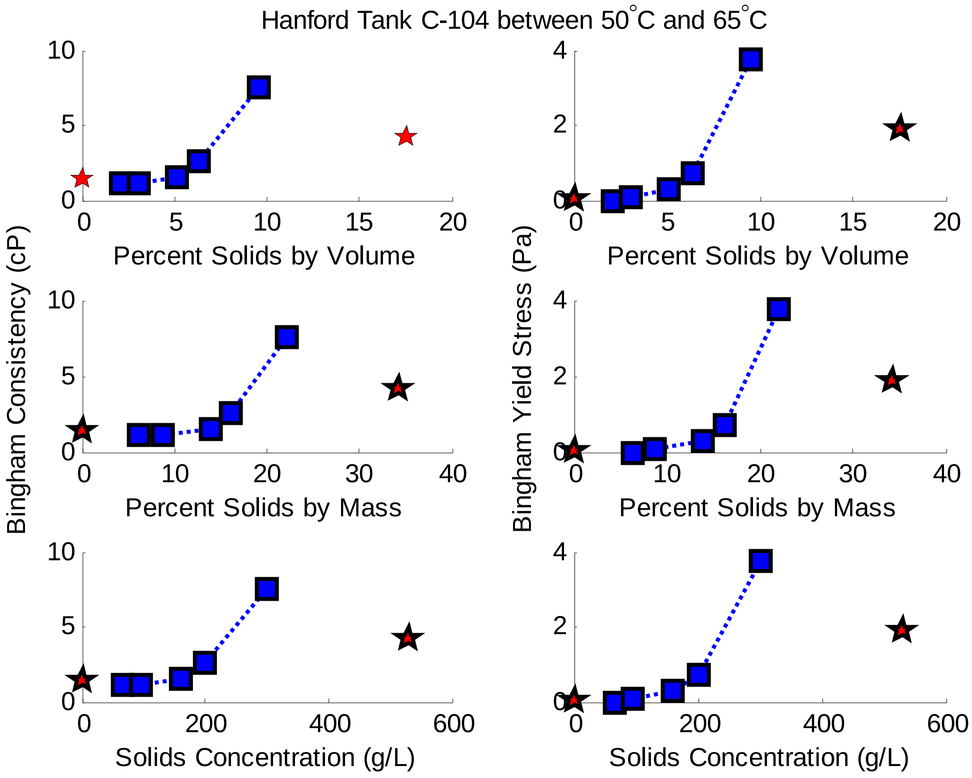

Hanford Tank B-203 between 20°C and 35°C

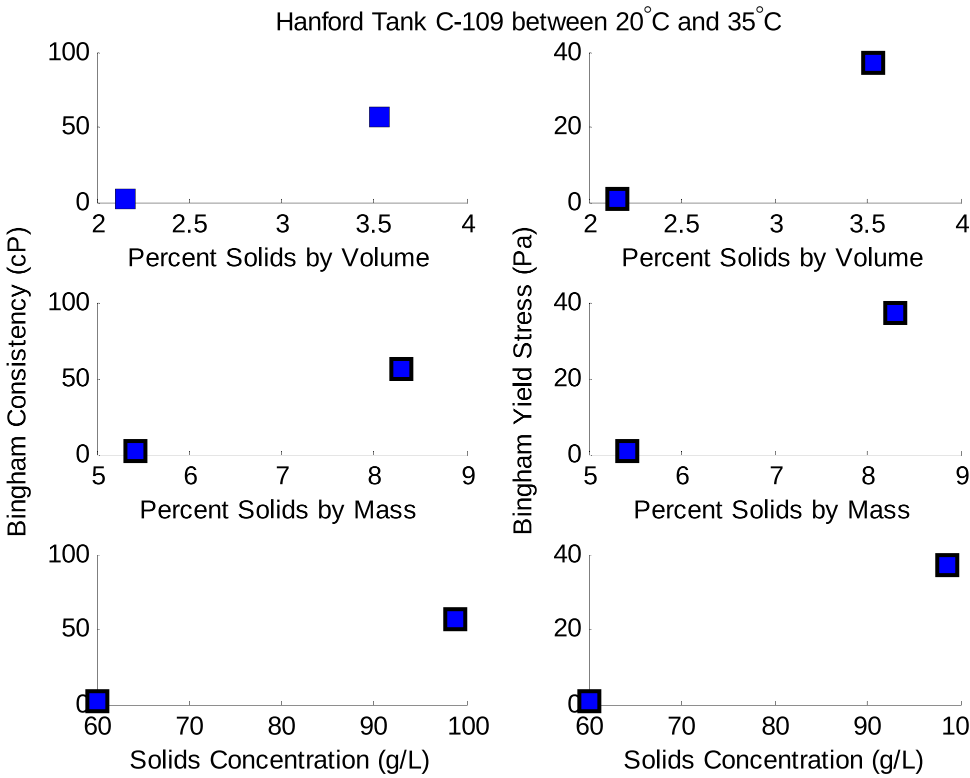

Hanford Tank BX-107 between 20°C and 35°C

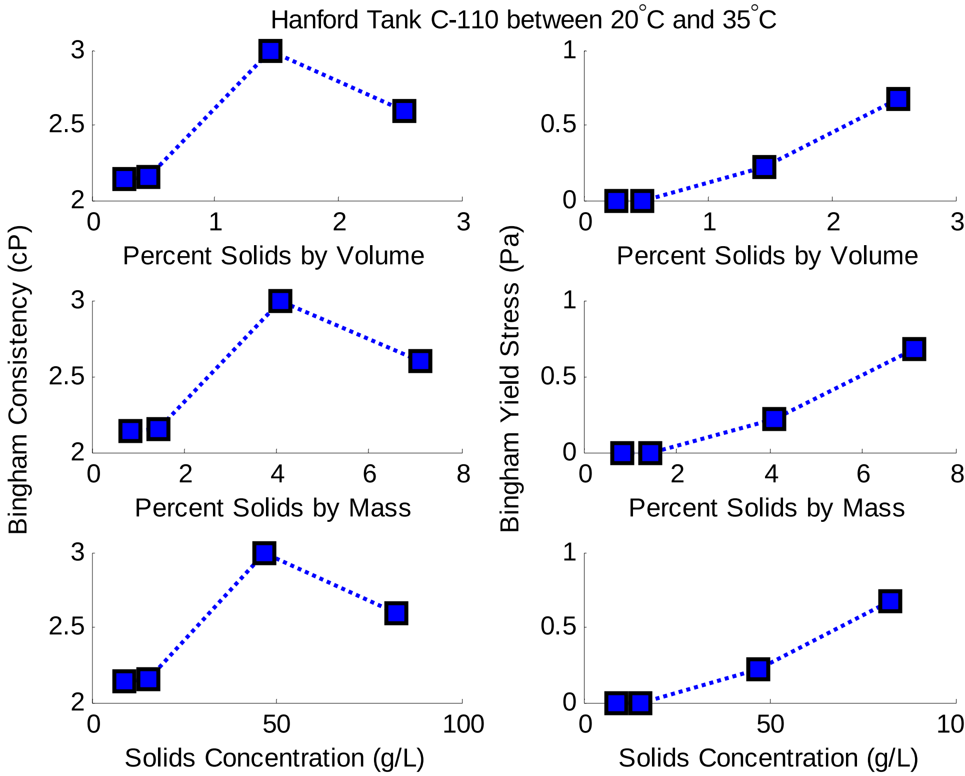

Hanford Tank BX-107 between 80°C and 95°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)
0
1
2
3
4
5
6
8
50
100

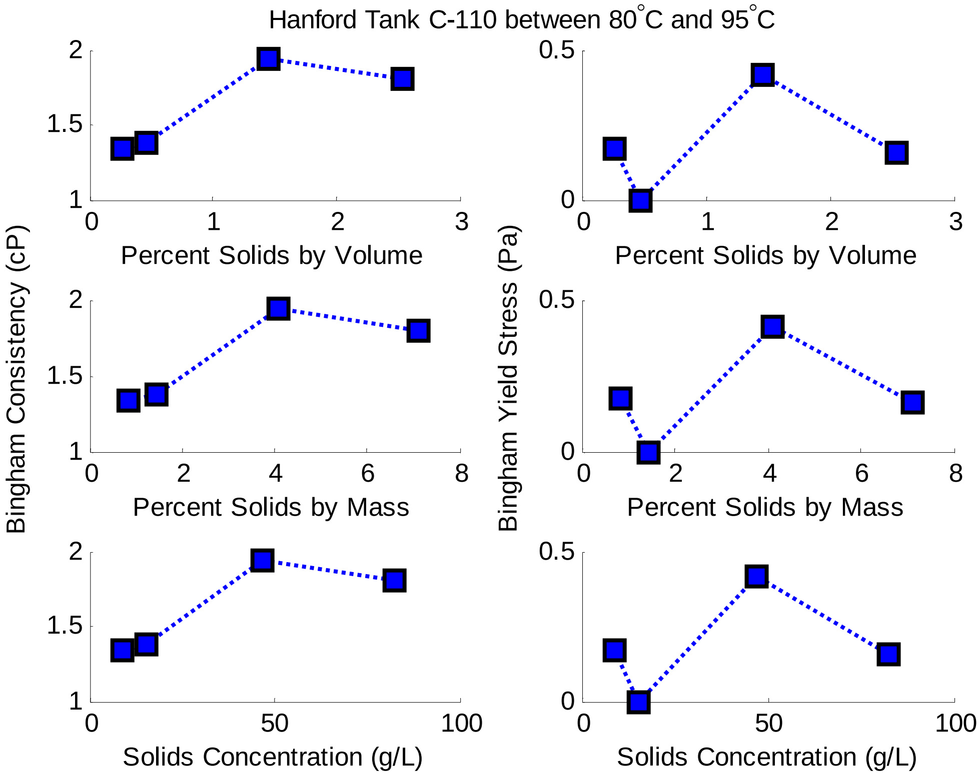

Hanford Tank C-104 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
Percent Solids by Volume
Percent Solids by Mass
Solids Concentration (g/L)
0
5
10
15
20
30
40
200
400
600

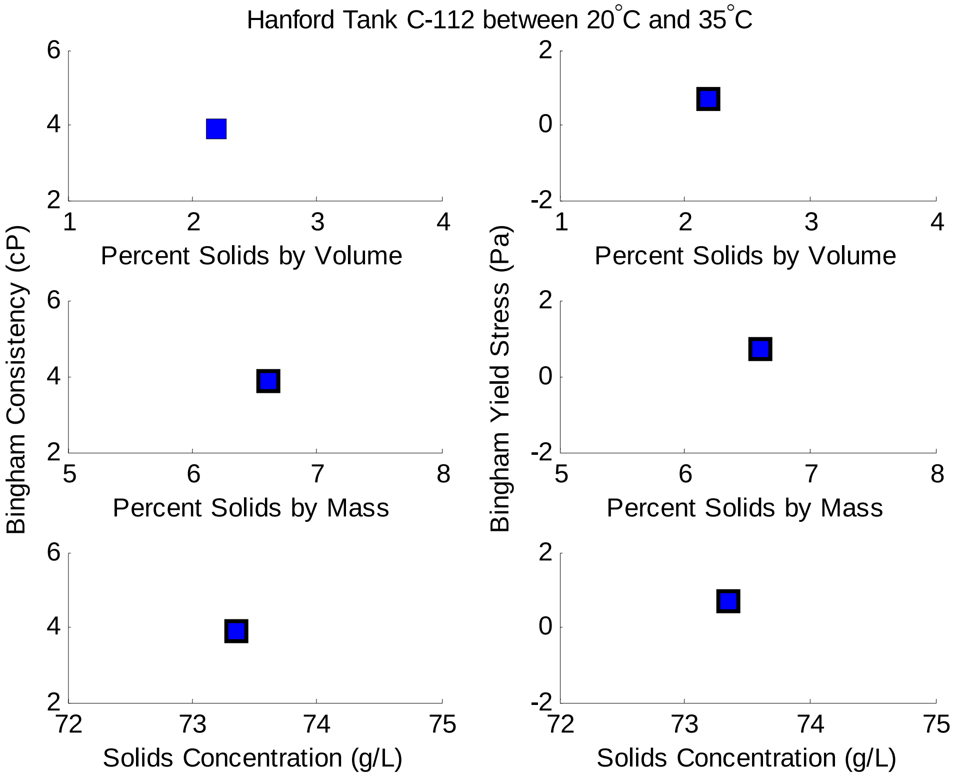

Hanford Tank C-104 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
0
5
10
0
2
4
0
5
10
15
20
Percent Solids by Volume
0
10
20
30
40
Percent Solids by Mass
0
200
400
600
Solids Concentration (g/L)

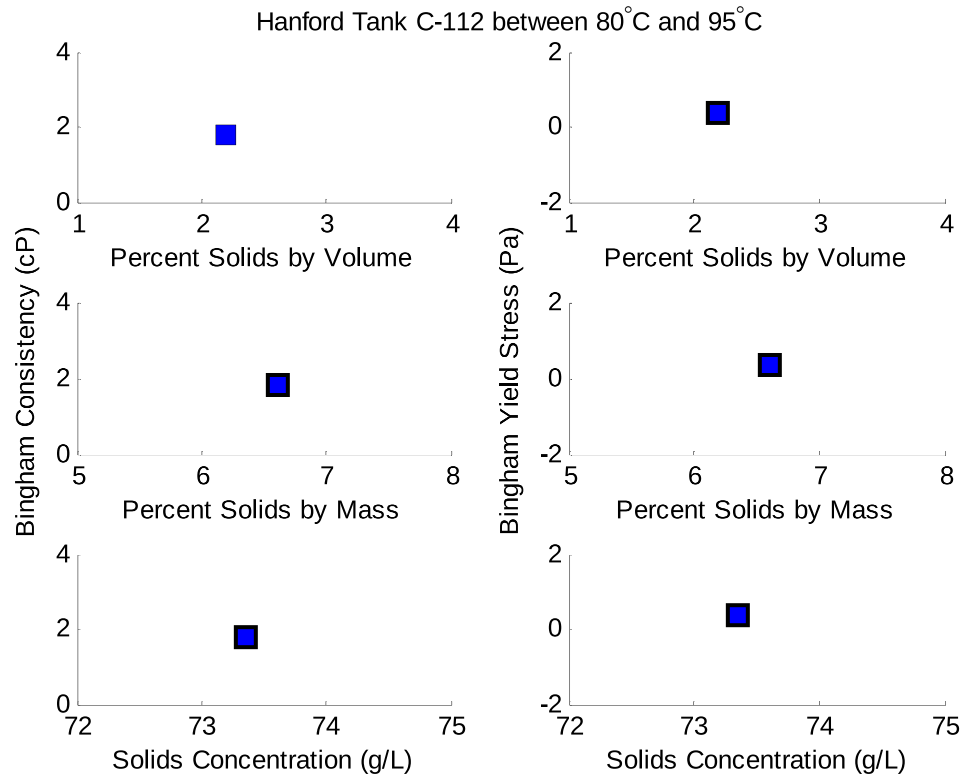

Hanford Tank C-104 between 50°C and 65°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
0
5
10
0
2
4
0
5
10
15
20
Percent Solids by Volume
0
10
20
30
40
Percent Solids by Mass
0
200
400
600
Solids Concentration (g/L)

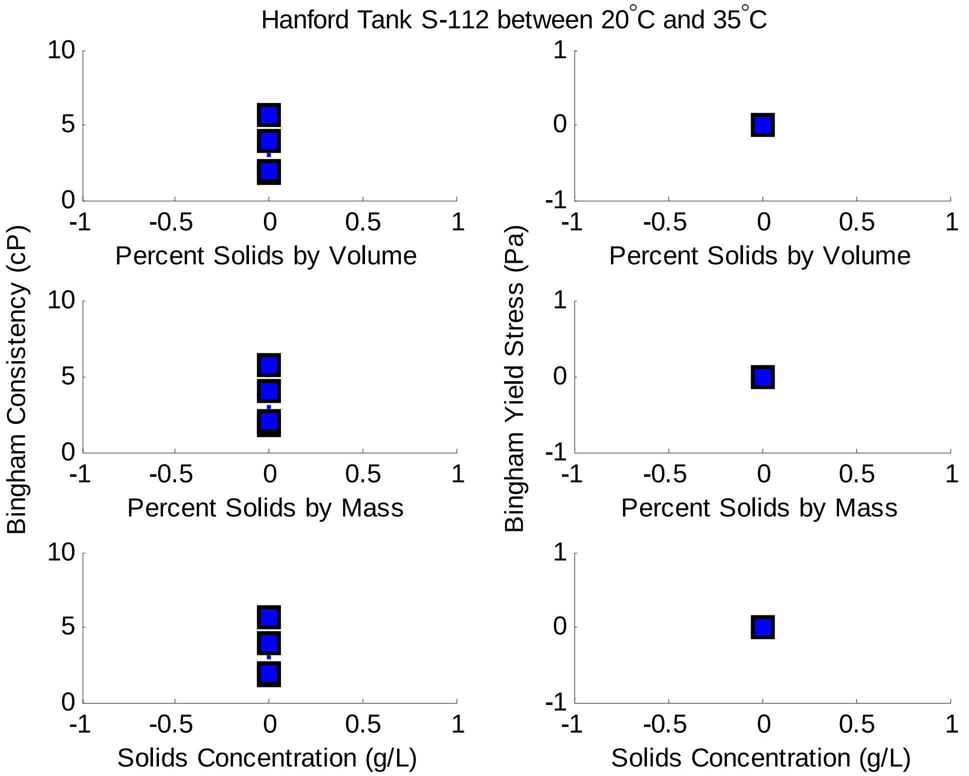

Hanford Tank C-109 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
100
50
0
40
20
0
2
2.5
3
3.5
4
Percent Solids by Volume
5
6
7
8
9
Percent Solids by Mass
60
70
80
90
100
Solids Concentration (g/L)

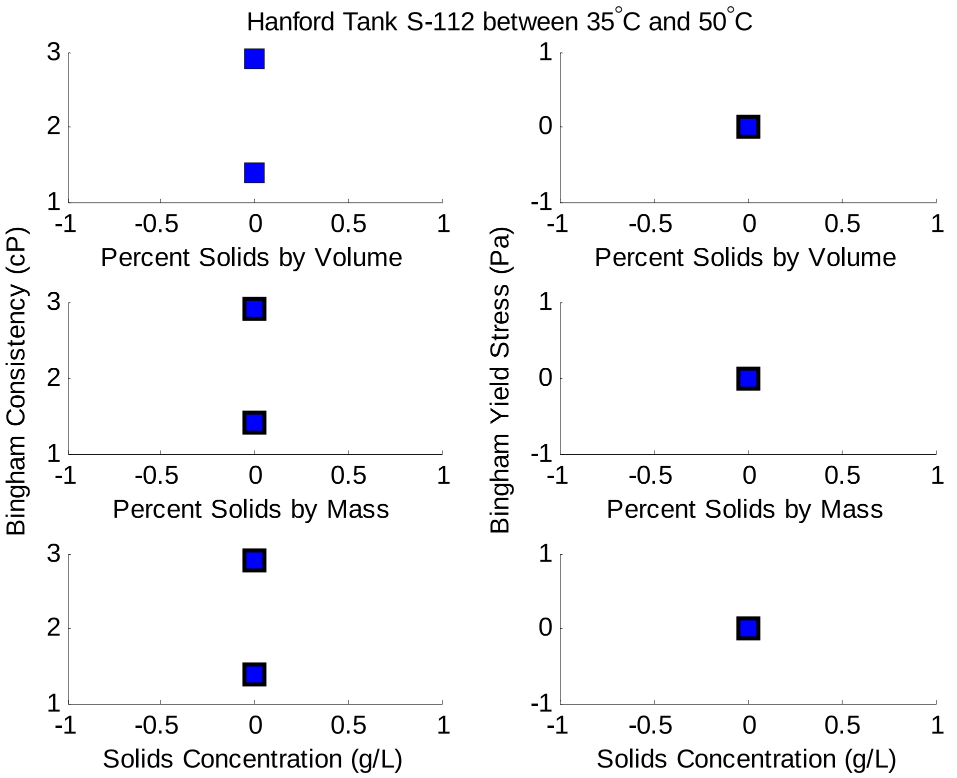

Hanford Tank C-110 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
3
2.5
2
1
0.5
0
0
1
2
3
Percent Solids by Volume
0
2
4
6
8
Percent Solids by Mass
0
50
100
Solids Concentration (g/L)


Hanford Tank C-110 between 80°C and 95°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
2
1.5
1
0.5
0
0
1
2
3
Percent Solids by Volume
0
2
4
6
8
Percent Solids by Mass
0
50
100
Solids Concentration (g/L)

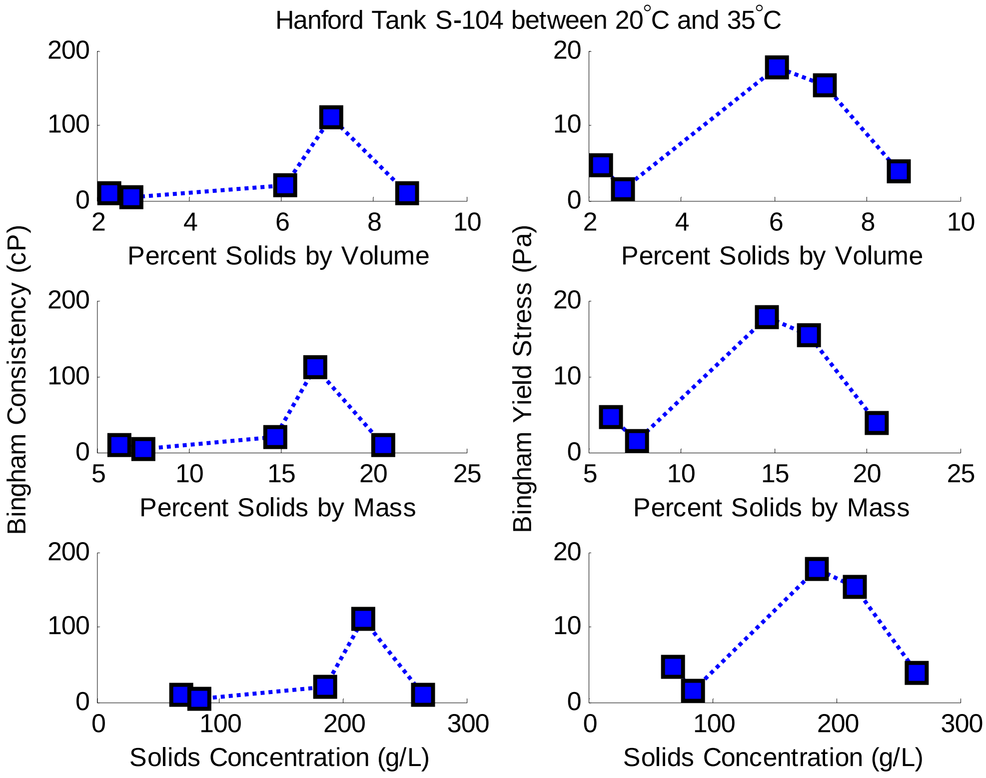

Hanford Tank C-112 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
6
4
2
0
-2
1
2
3
4
Percent Solids by Volume
5
6
7
8
Percent Solids by Mass
72
73
74
75
Solids Concentration (g/L)


Hanford Tank C-112 between 80°C and 95°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
4
2
0
1
2
3
4
Percent Solids by Volume
2
0
-2
1
2
3
4
Percent Solids by Volume
4
2
0
5
6
7
8
Percent Solids by Mass
2
0
-2
5
6
7
8
Percent Solids by Mass
4
2
0
72
73
74
75
Solids Concentration (g/L)
2
0
-2
72
73
74
75
Solids Concentration (g/L)

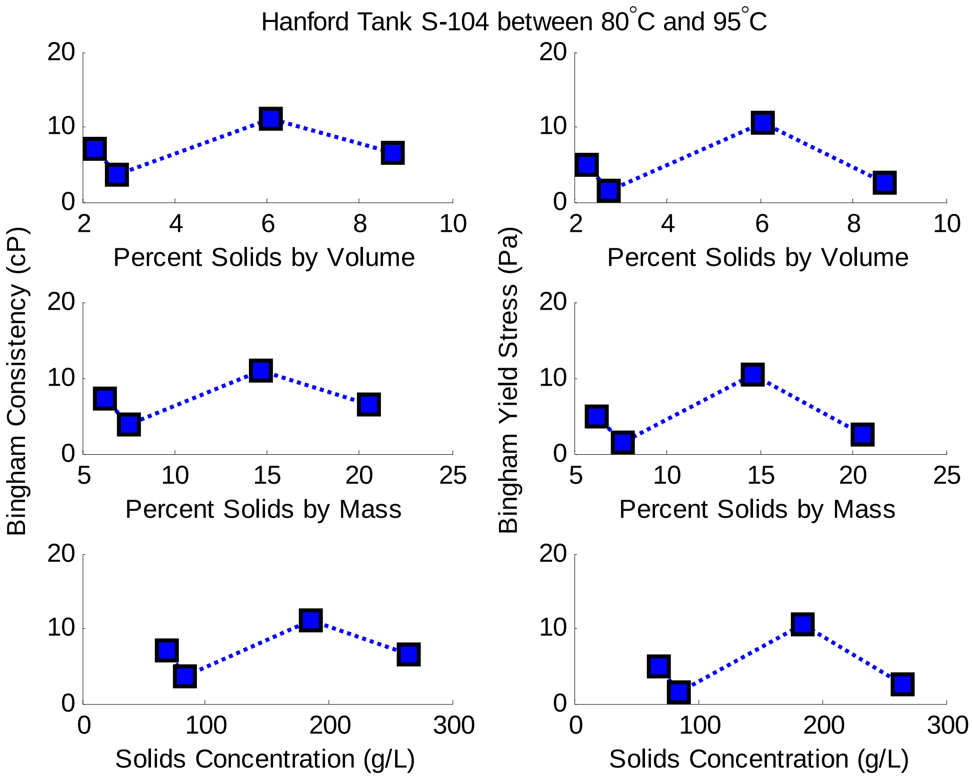

Hanford Tank S-112 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
10
5
0
-1
-0.5
0
0.5
1
Percent Solids by Volume
1
0
-1
-1
-0.5
0
0.5
1
Percent Solids by Volume
10
5
0
-1
-0.5
0
0.5
1
Percent Solids by Mass
1
0
-1
-1
-0.5
0
0.5
1
Percent Solids by Mass
10
5
0
-1
-0.5
0
0.5
1
Solids Concentration (g/L)
1
0
-1
-1
-0.5
0
0.5
1
Solids Concentration (g/L)

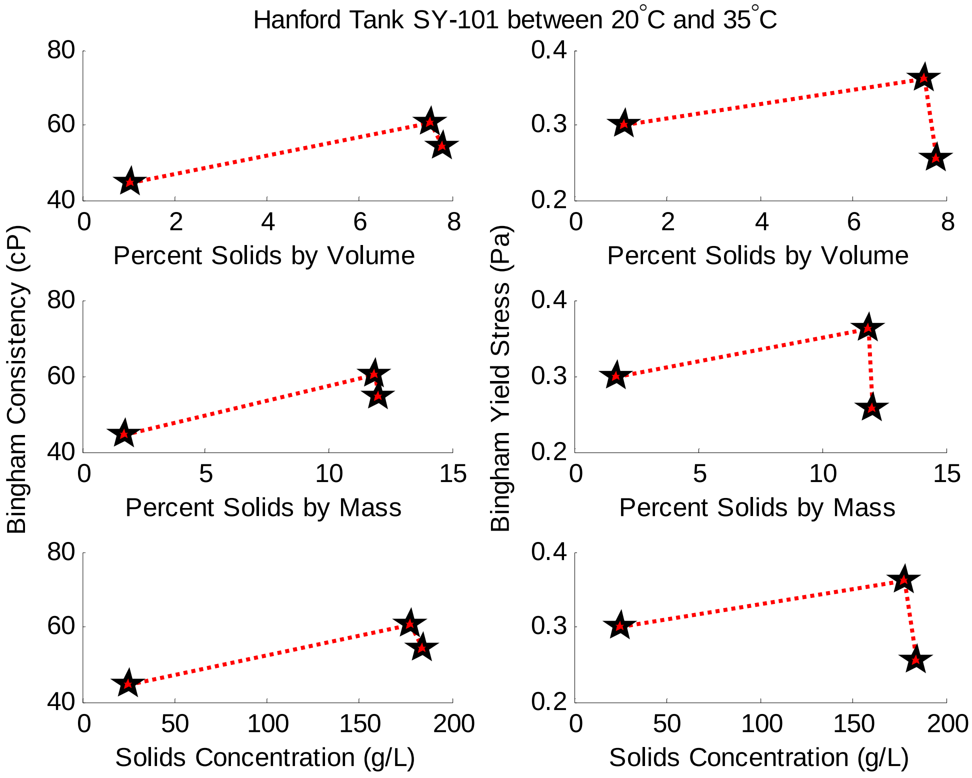


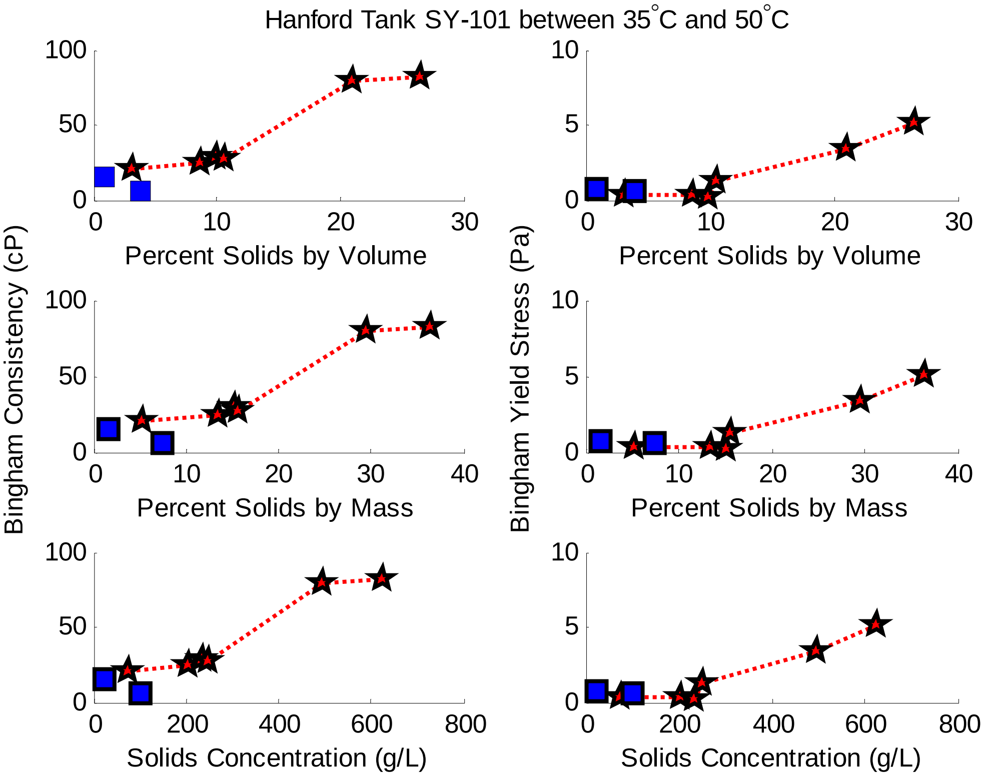
Hanford Tank S-112 between 35°C and 50°C

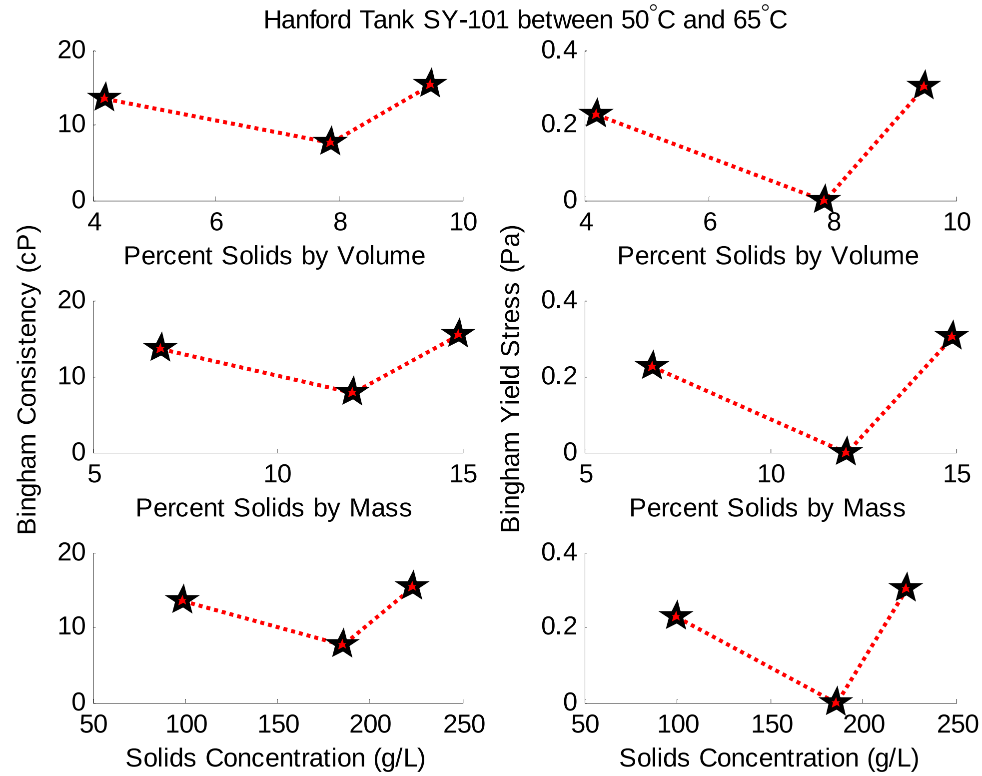


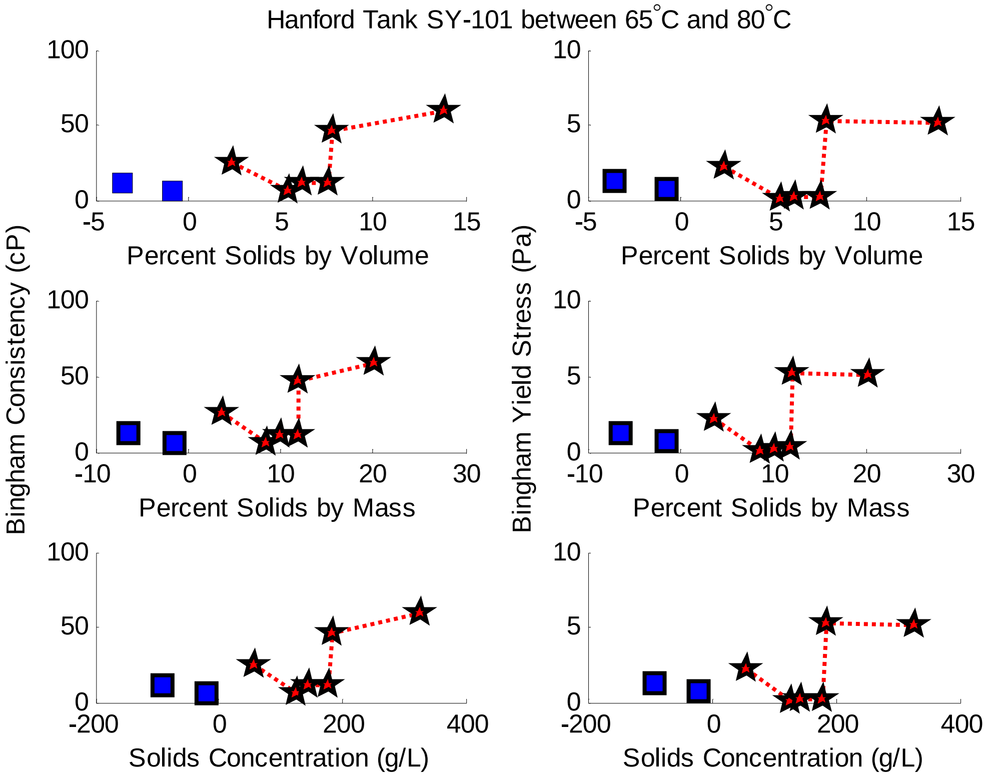
Hanford Tank S-104 between 20°C and 35°C

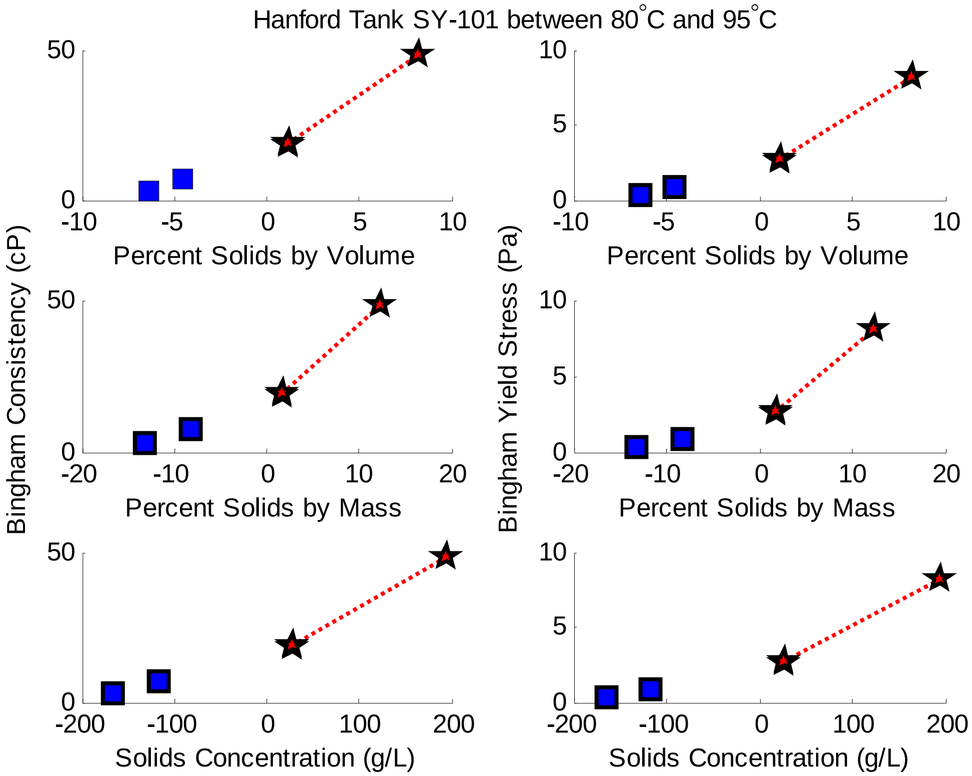

Hanford Tank S-104 between 80°C and 95°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
20
10
0
2
4
6
8
10
Percent Solids by Volume
5
10
15
20
25
Percent Solids by Mass
0
100
200
300
Solids Concentration (g/L)

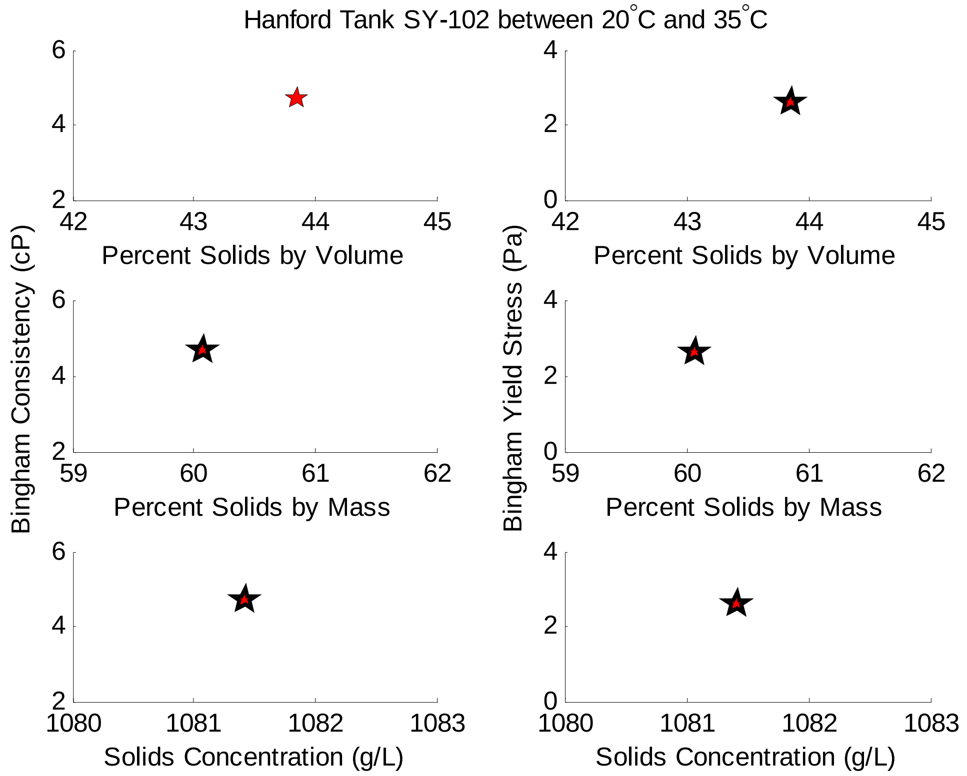

Hanford Tank SY-101 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
80
60
40
0.4
0.3
0.2
0
2
4
6
8
Percent Solids by Volume
0
5
10
15
Percent Solids by Mass
0
50
100
150
200
Solids Concentration (g/L)

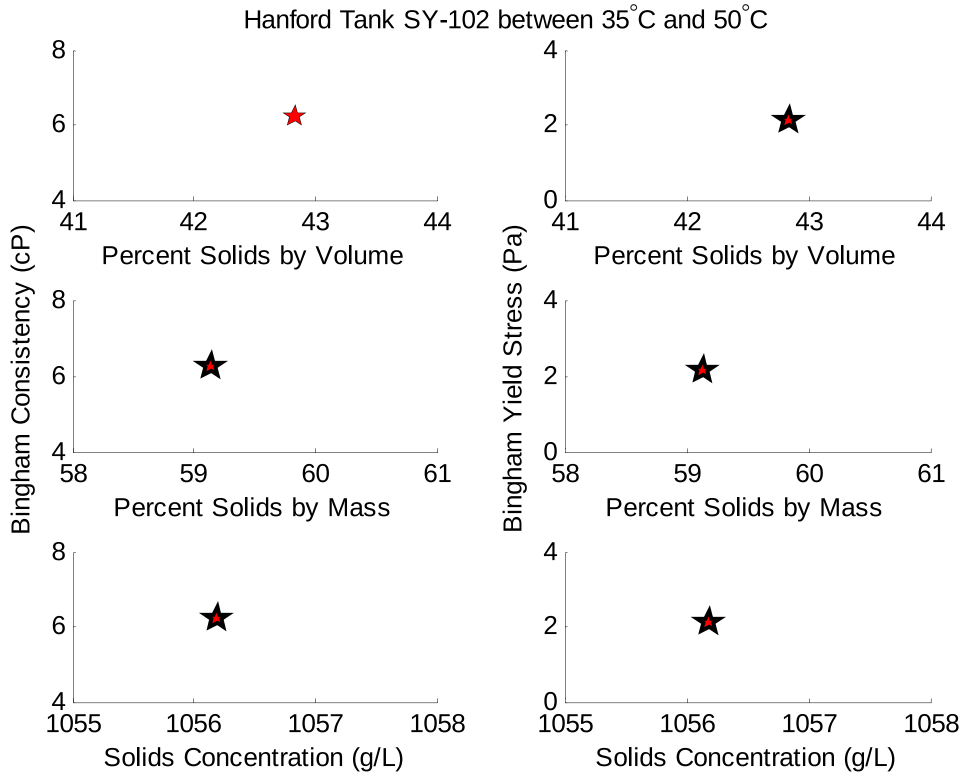

Hanford Tank SY-101 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
100
50
0
10
5
0
0
10
20
30
Percent Solids by Volume
0
10
20
30
40
Percent Solids by Mass
0
200
400
600
800
Solids Concentration (g/L)

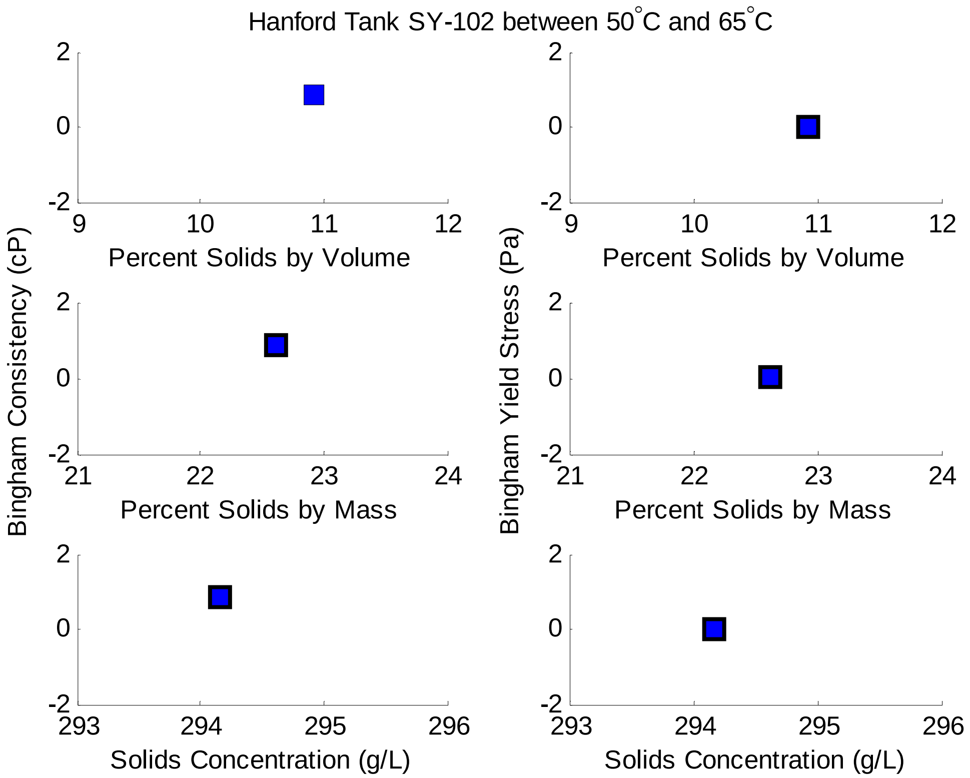

Hanford Tank SY-101 between 50°C and 65°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
20
10
0
0.4
0.2
0
4
6
8
10
Percent Solids by Volume
5
10
15
Percent Solids by Mass
50
100
150
200
250
Solids Concentration (g/L)

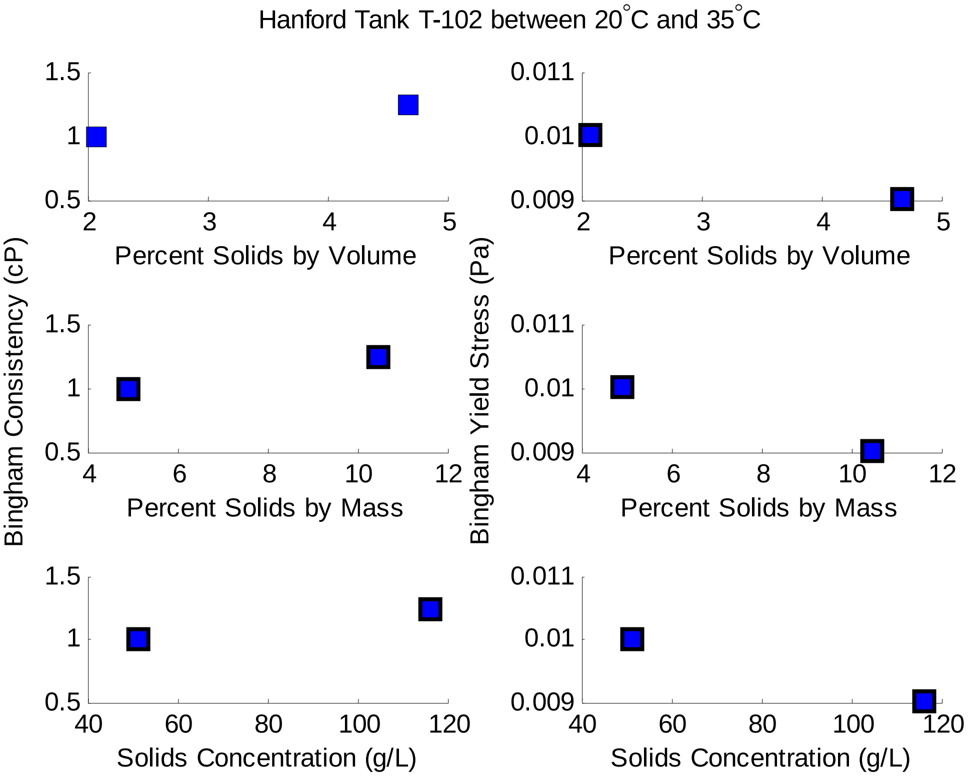

Hanford Tank SY-101 between 65°C and 80°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
100
50
0
10
5
0
-5
0
5
10
15
Percent Solids by Volume
-10
0
10
20
30
Percent Solids by Mass
-200
0
200
400
Solids Concentration (g/L)

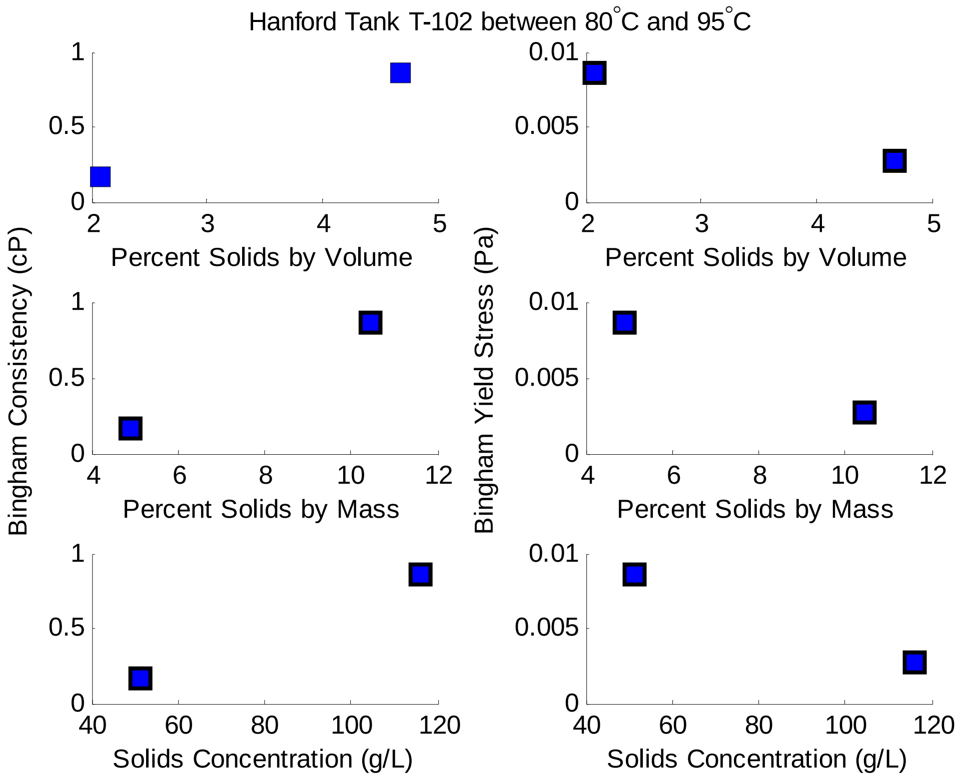

Hanford Tank SY-101 between 80°C and 95°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
50
0
10
5
0
-10
-5
0
5
10
Percent Solids by Volume
-20
-10
0
10
20
Percent Solids by Mass
-200
-100
0
100
200
Solids Concentration (g/L)

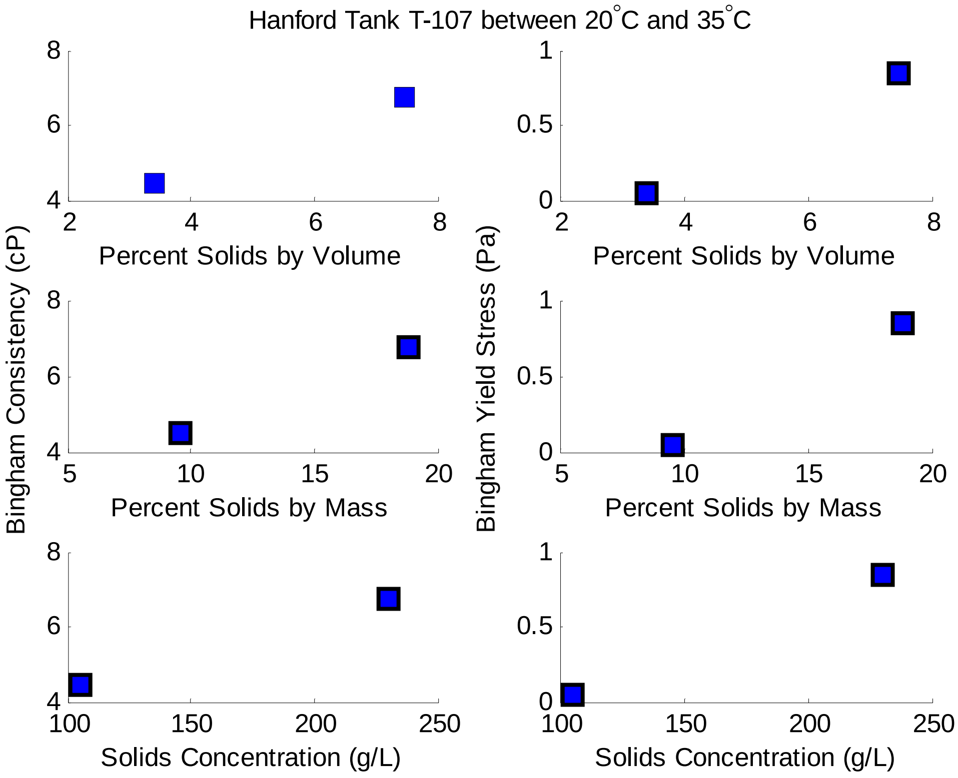

Hanford Tank SY-102 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
6
4
2
42
43
44
45
Percent Solids by Volume
4
2
0
42
43
44
45
Percent Solids by Volume
6
4
2
59
60
61
62
Percent Solids by Mass
4
2
0
59
60
61
62
Percent Solids by Mass
6
4
2
1080
1081
1082
1083
Solids Concentration (g/L)
4
2
0
1080
1081
1082
1083
Solids Concentration (g/L)

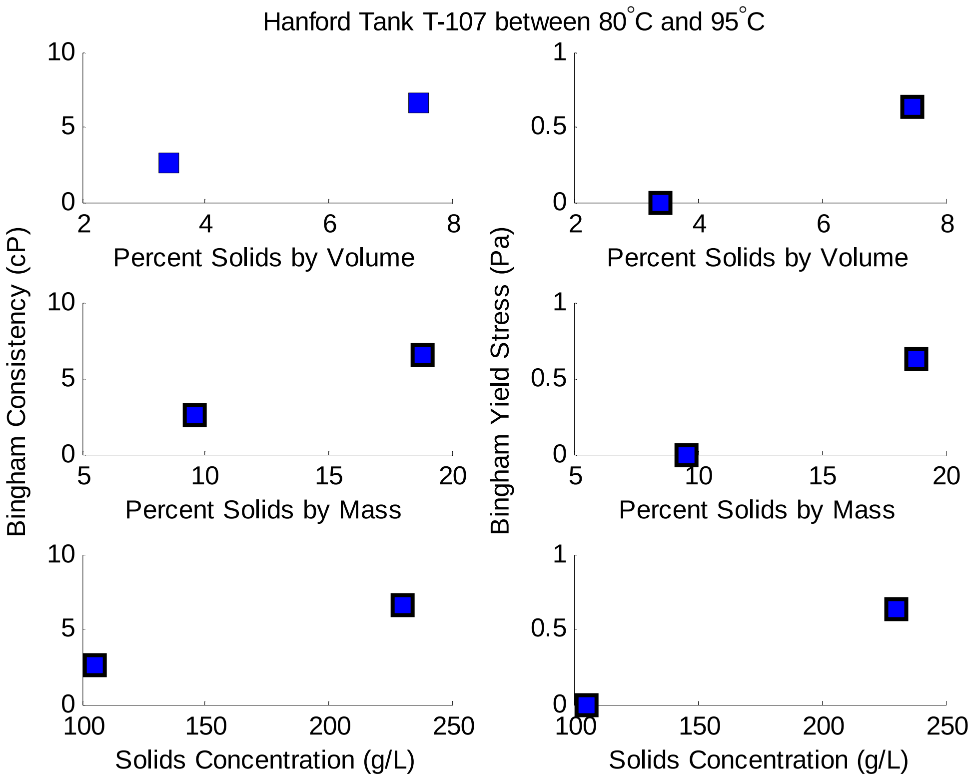

Hanford Tank SY-102 between 35°C and 50°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
8
6
4
41
42
43
44
Percent Solids by Volume
4
2
0
41
42
43
44
Percent Solids by Volume
8
6
4
58
59
60
61
Percent Solids by Mass
4
2
0
58
59
60
61
Percent Solids by Mass
8
6
4
1055
1056
1057
1058
Solids Concentration (g/L)
4
2
0
1055
1056
1057
1058
Solids Concentration (g/L)

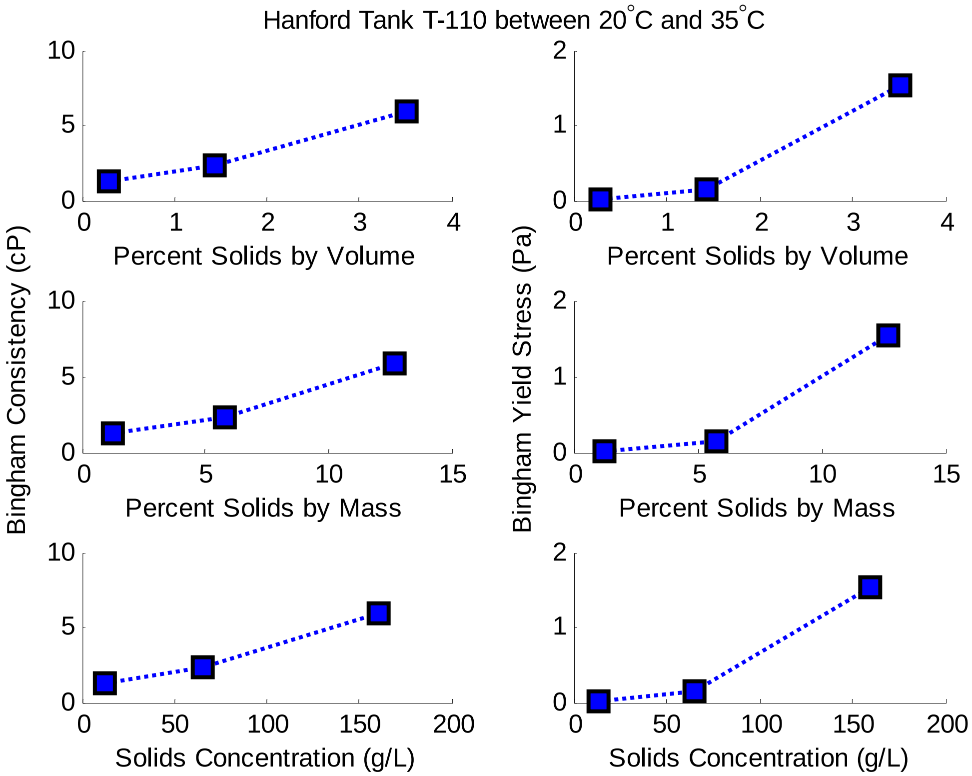

Hanford Tank SY-102 between 50°C and 65°C

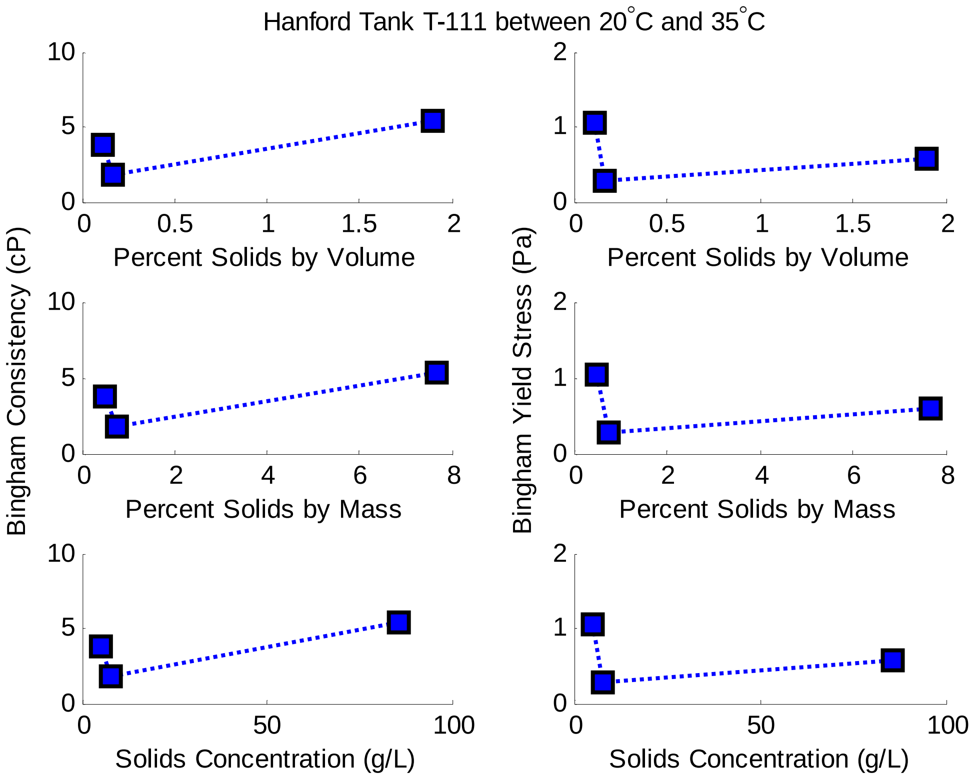

Hanford Tank T-102 between 20°C and 35°C

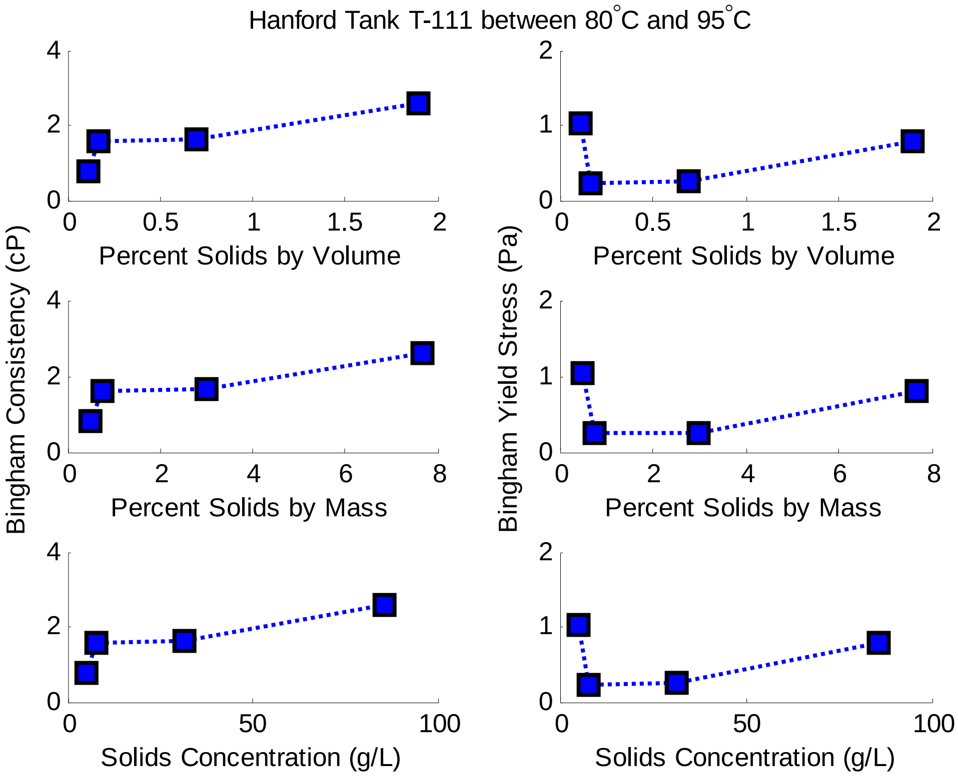

Hanford Tank T-102 between 80°C and 95°C

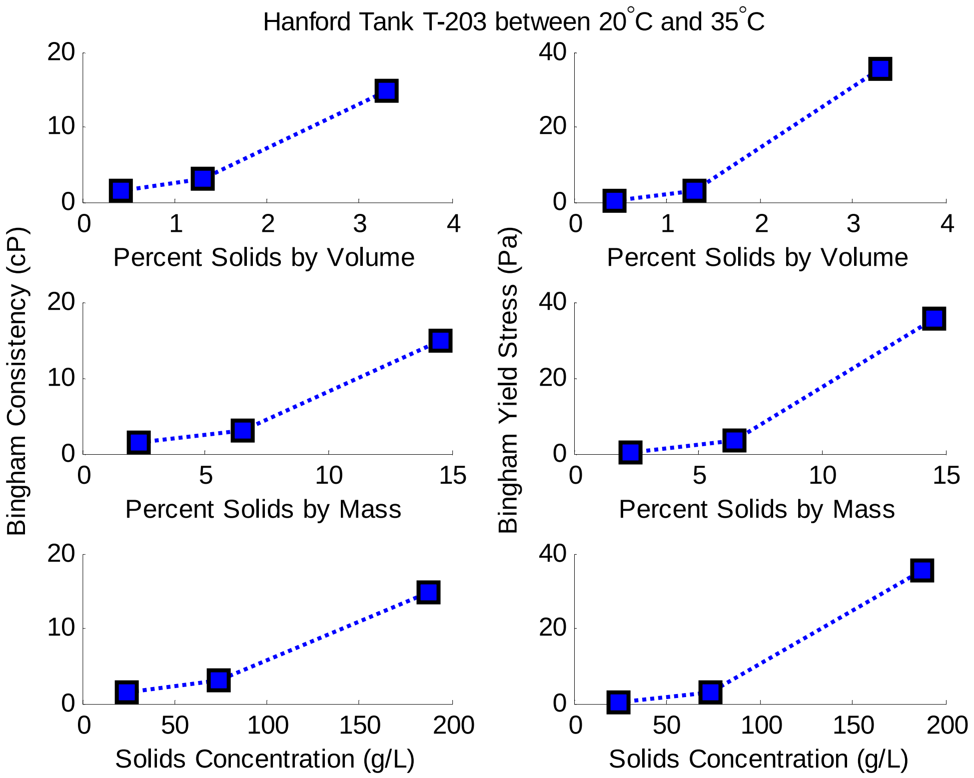

Hanford Tank T-107 between 20°C and 35°C

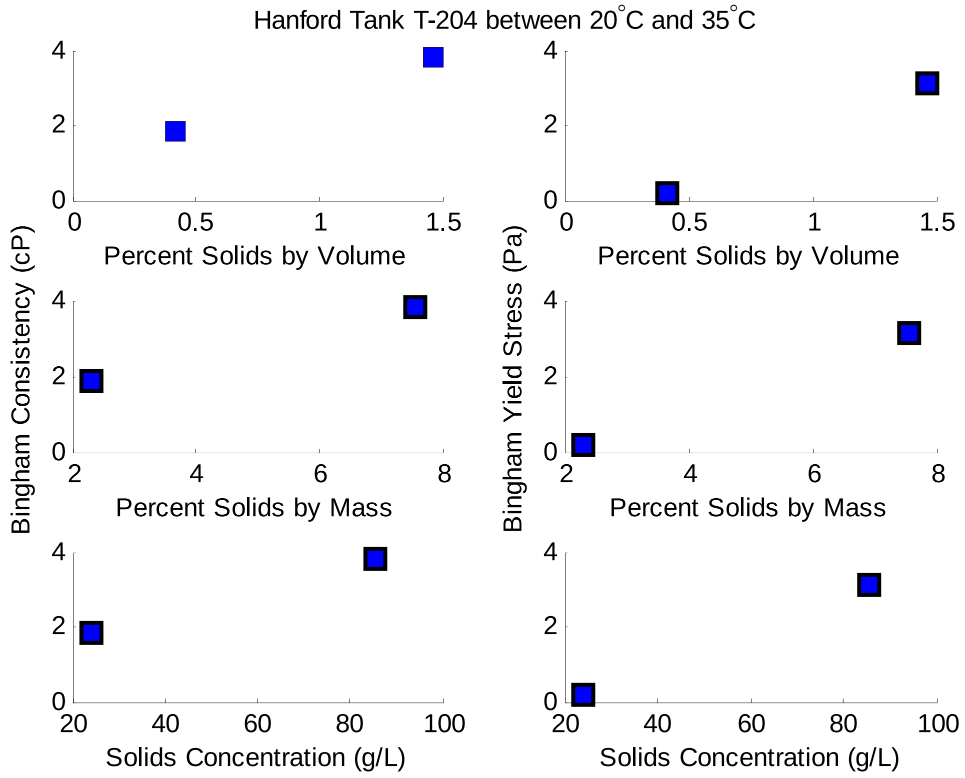

Hanford Tank T-107 between 80°C and 95°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
10
5
0
2
4
6
8
Percent Solids by Volume
1
0.5
0
2
4
6
8
Percent Solids by Volume
10
5
0
5
10
15
20
Percent Solids by Mass
1
0.5
0
5
10
15
20
Percent Solids by Mass
10
5
0
100
150
200
250
Solids Concentration (g/L)
1
0.5
0
100
150
200
250
Solids Concentration (g/L)


Hanford Tank T-110 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
10
5
0
0
1
2
3
4
Percent Solids by Volume
2
1
0
0
1
2
3
4
Percent Solids by Volume
10
5
0
0
5
10
15
Percent Solids by Mass
2
1
0
0
5
10
15
Percent Solids by Mass
10
5
0
0
50
100
150
200
Solids Concentration (g/L)
2
1
0
0
50
100
150
200
Solids Concentration (g/L)


Hanford Tank T-111 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
10
5
0
2
1
0
0
0.5
1
1.5
2
Percent Solids by Volume
0
2
4
6
8
Percent Solids by Mass
0
50
100
Solids Concentration (g/L)


Hanford Tank T-111 between 80°C and 95°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
4
2
0
2
1
0
0
0.5
1
1.5
2
Percent Solids by Volume
0
2
4
6
8
Percent Solids by Mass
0
50
100
Solids Concentration (g/L)


Hanford Tank T-203 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
0
10
20
0
20
40
0
1
2
3
4
Percent Solids by Volume
0
5
10
15
Percent Solids by Mass
0
50
100
150
200
Solids Concentration (g/L)

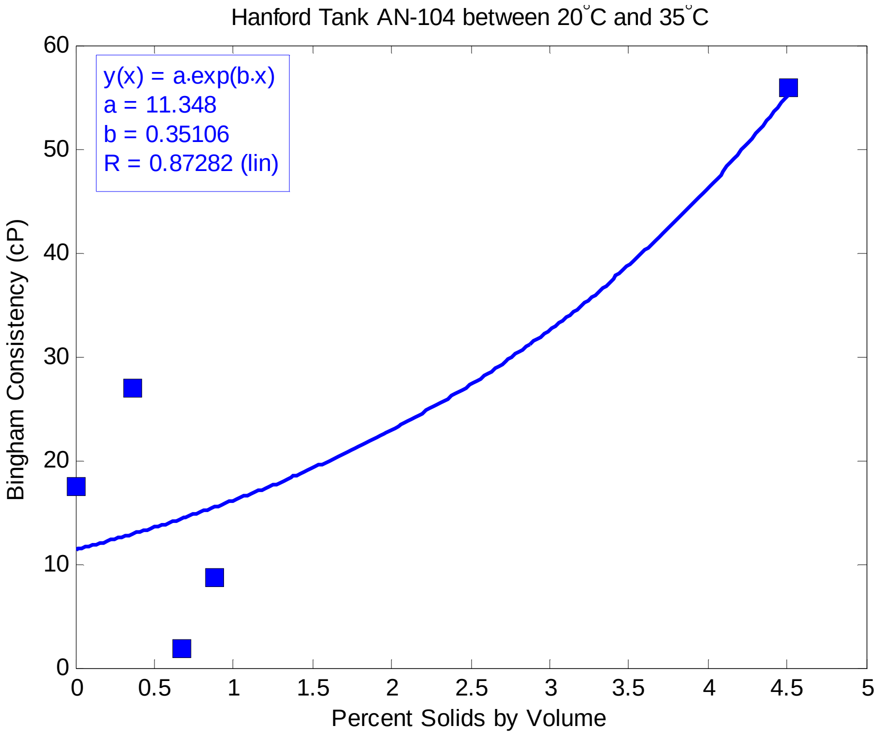

Hanford Tank T-204 between 20°C and 35°C
Bingham Consistency (cP)
Bingham Yield Stress (Pa)
0
2
4
0
0.5
1
1.5
Percent Solids by Volume
2
4
6
8
Percent Solids by Mass
20
40
60
80
100
Solids Concentration (g/L)

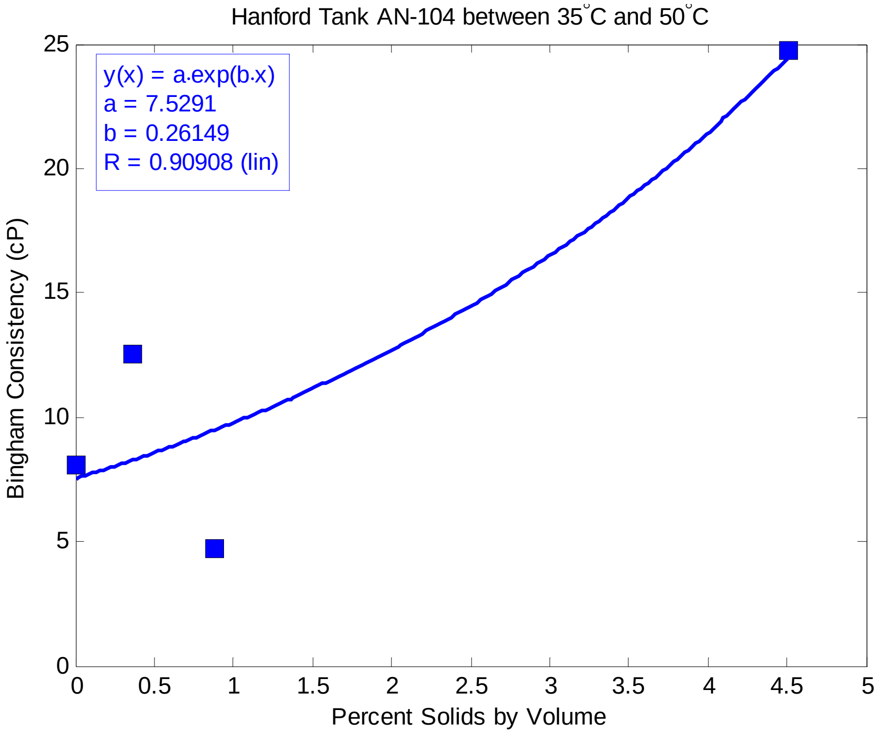
Appendix C

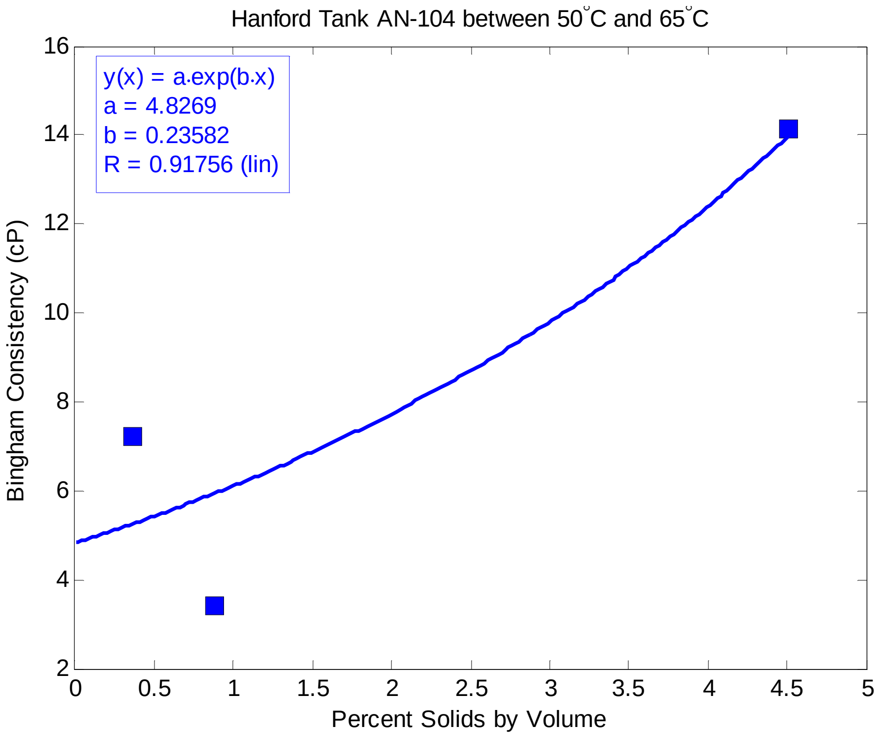
Correlations of the Bingham Plastic Model Parameters with Solids Content

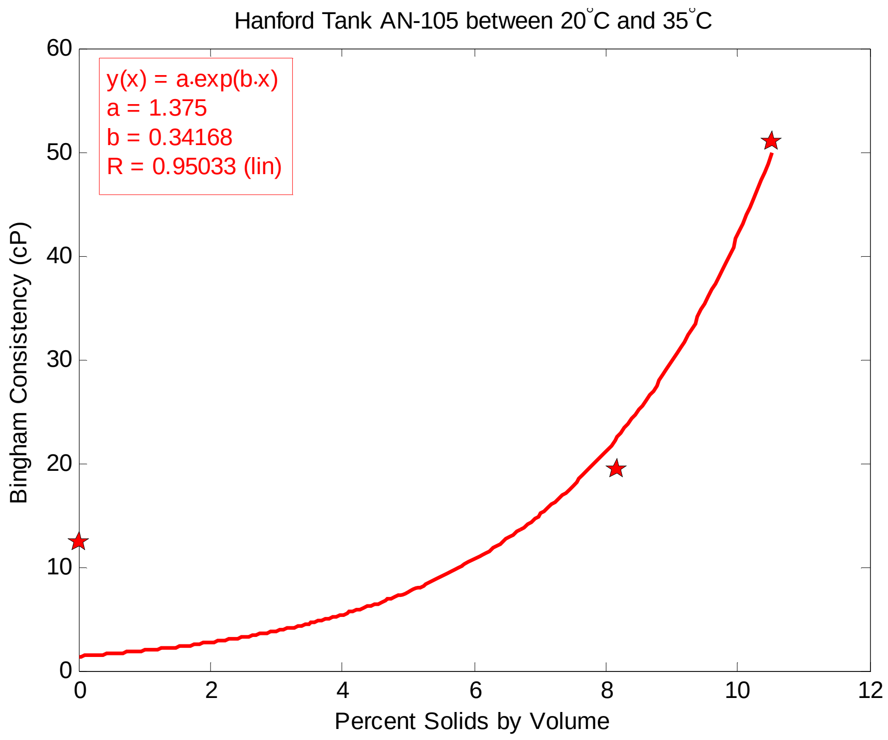
Appendix C – Correlations of the Bingham Plastic Model Parameters with Solids Content

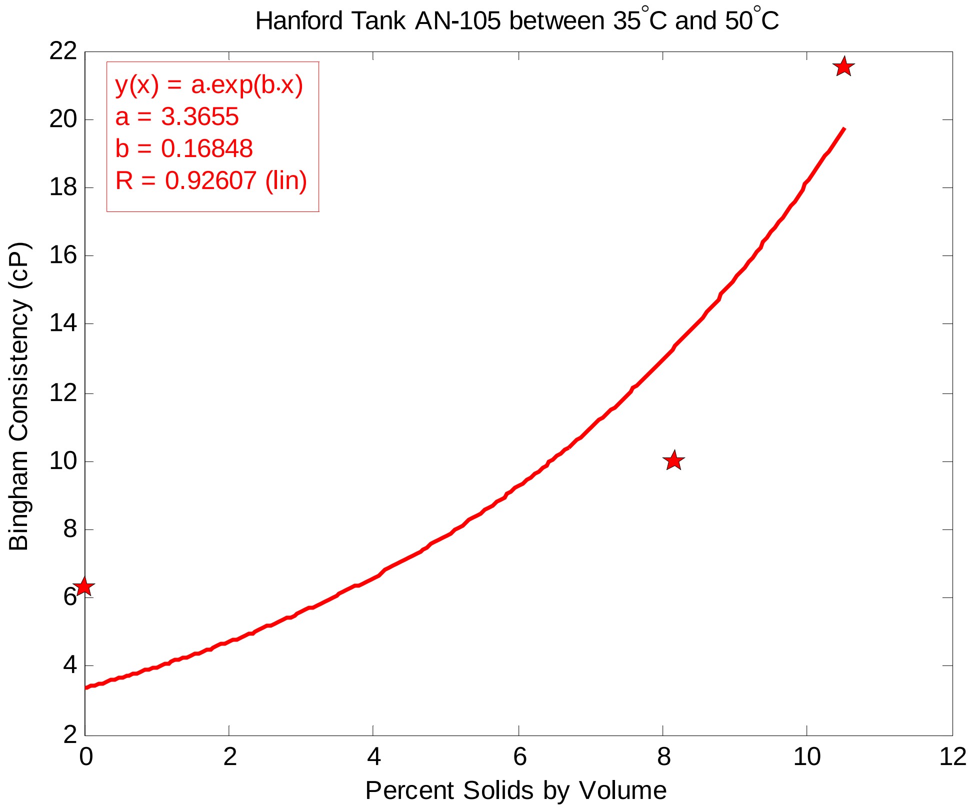
In the figures in this appendix, the stars = as-received tank waste; squares = water added as diluent; and circles = post washing and caustic.

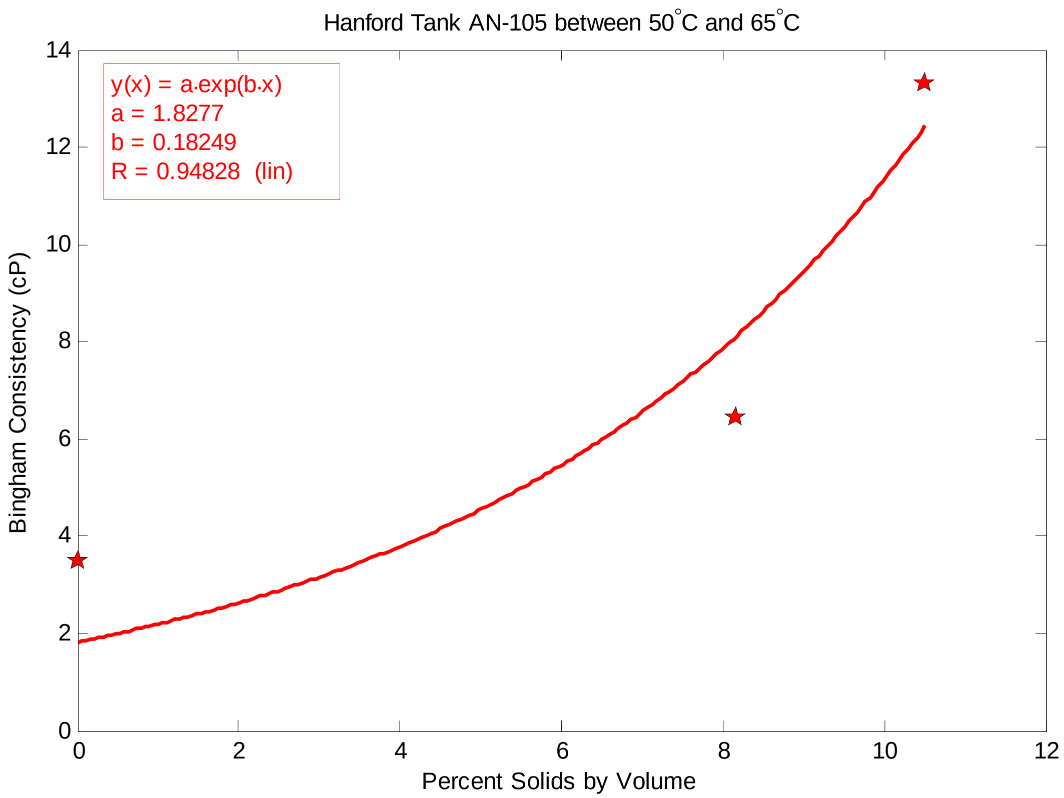


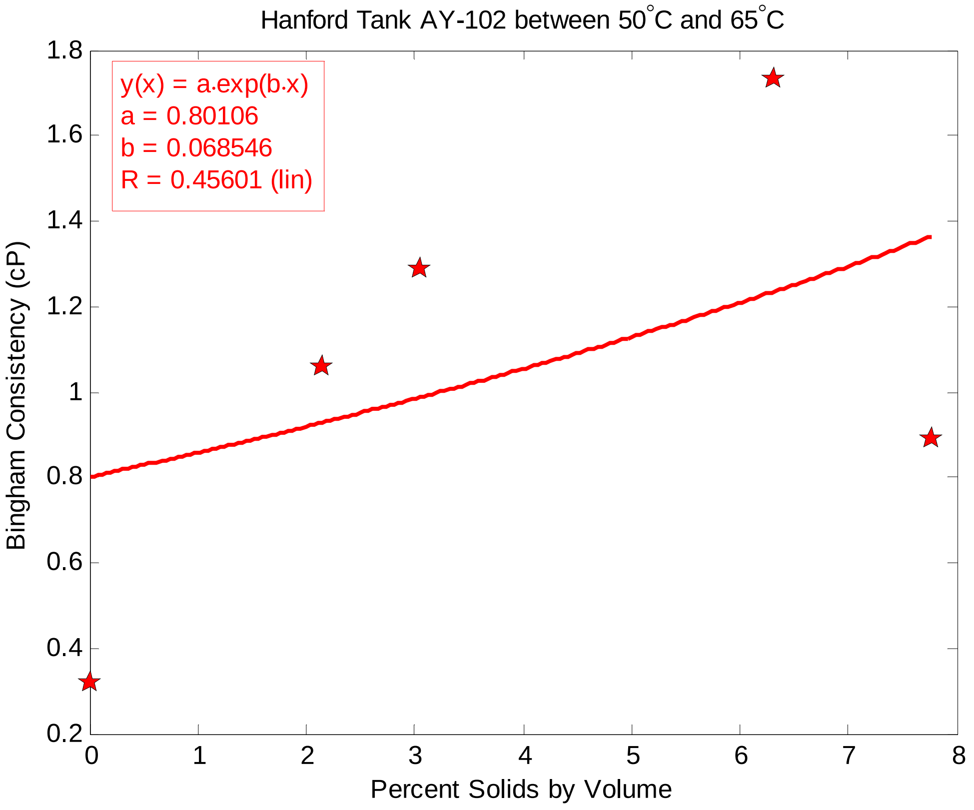


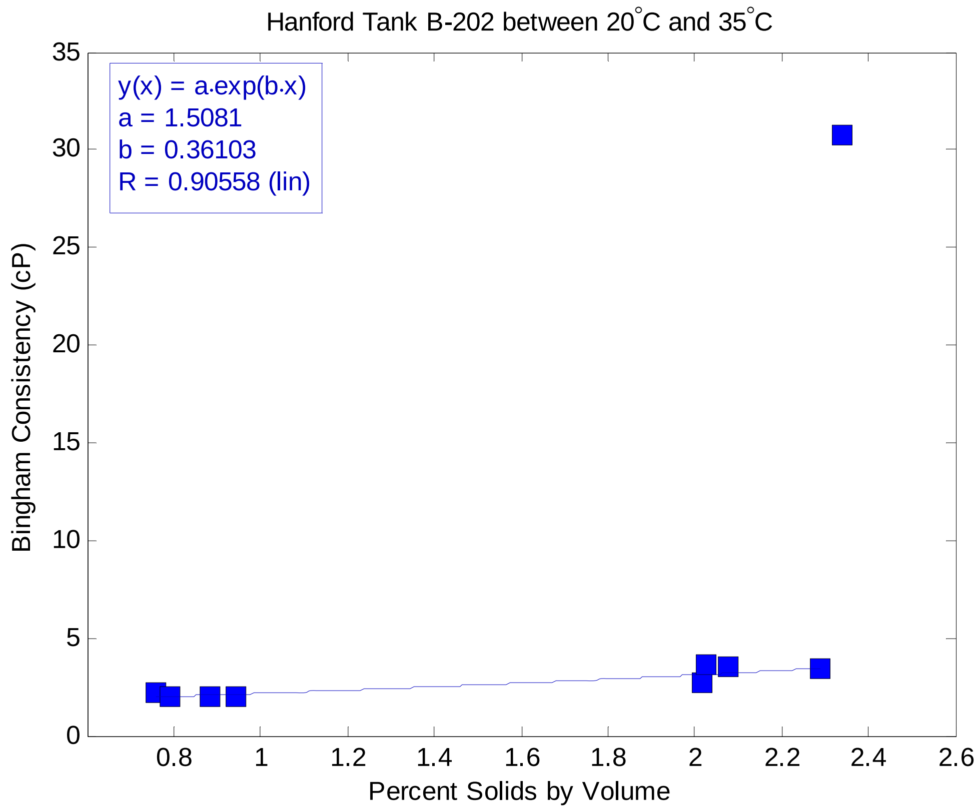

Hanford Tank AN-104 between 50°C and 65°C
y(x) = a·exp(b·x)
a = 4.8269
b = 0.23582
R = 0.91756 (lin)
Bingham Consistency (cP)
Percent Solids by Volume
16
14
12
10
8
6
4
2
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

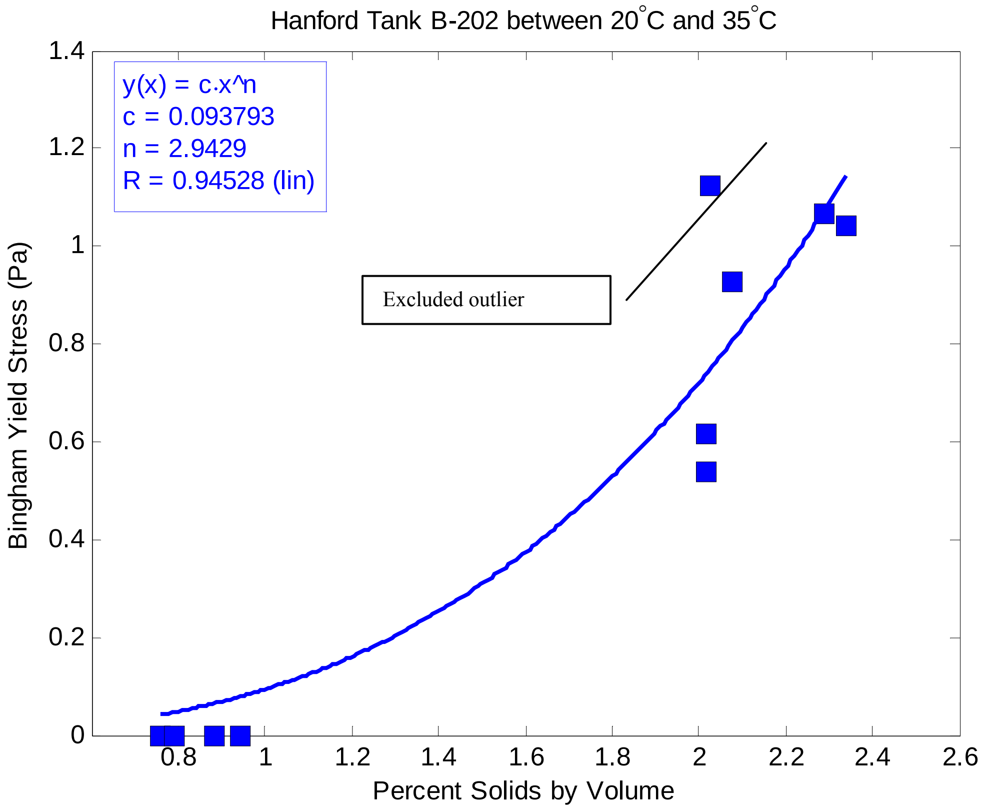

Hanford Tank AN-105 between 20°C and 35°C
y(x) = a.exp(b.x)
a = 1.375
b = 0.34168
R = 0.95033 (lin)
Bingham Consistency (cP)
Percent Solids by Volume
0
10
20
30
40
50
60
0
2
4
6
8
10
12

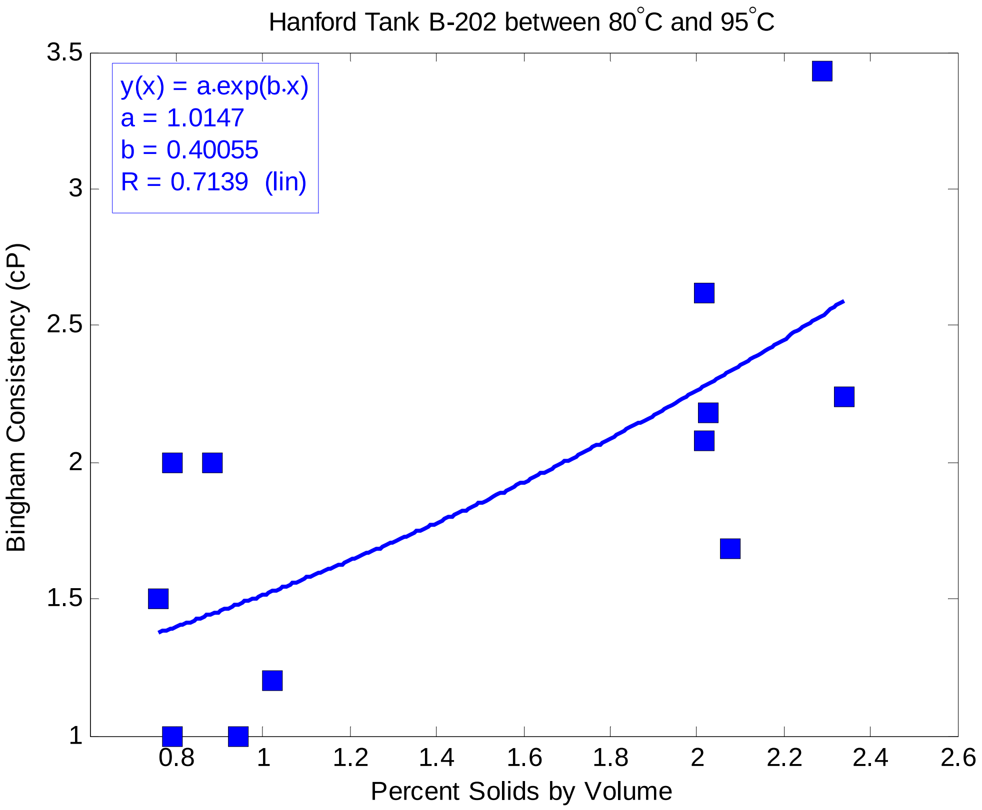

Hanford Tank AN-105 between 35°C and 50°C
y(x) = a.exp(b.x)
a = 3.3655
b = 0.16848
R = 0.92607 (lin)
Bingham Consistency (cP)
Percent Solids by Volume
2
4
6
8
10
12
14
16
18
20
22
0
2
4
6
8
10
12

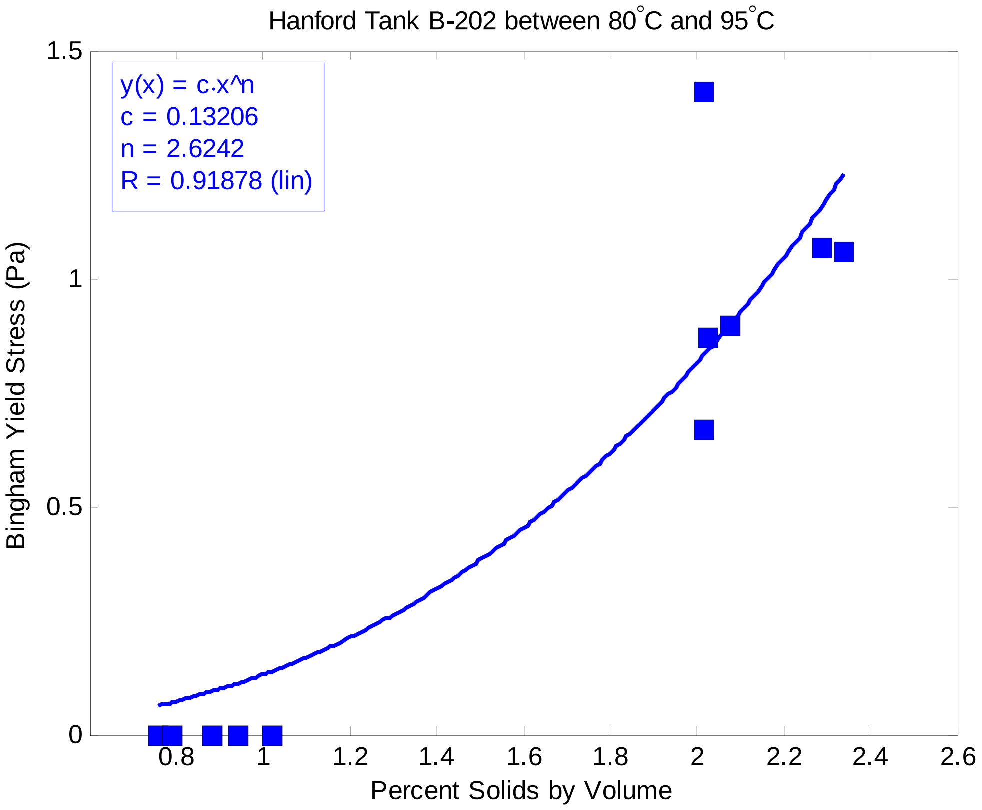

Hanford Tank AN-105 between 50°C and 65°C
y(x) = a·exp(b·x)
a = 1.8277
b = 0.18249
R = 0.94828 (lin)
Bingham Consistency (cP)
Percent Solids by Volume
0
2
4
6
8
10
12
14
0
2
4
6
8
10
12

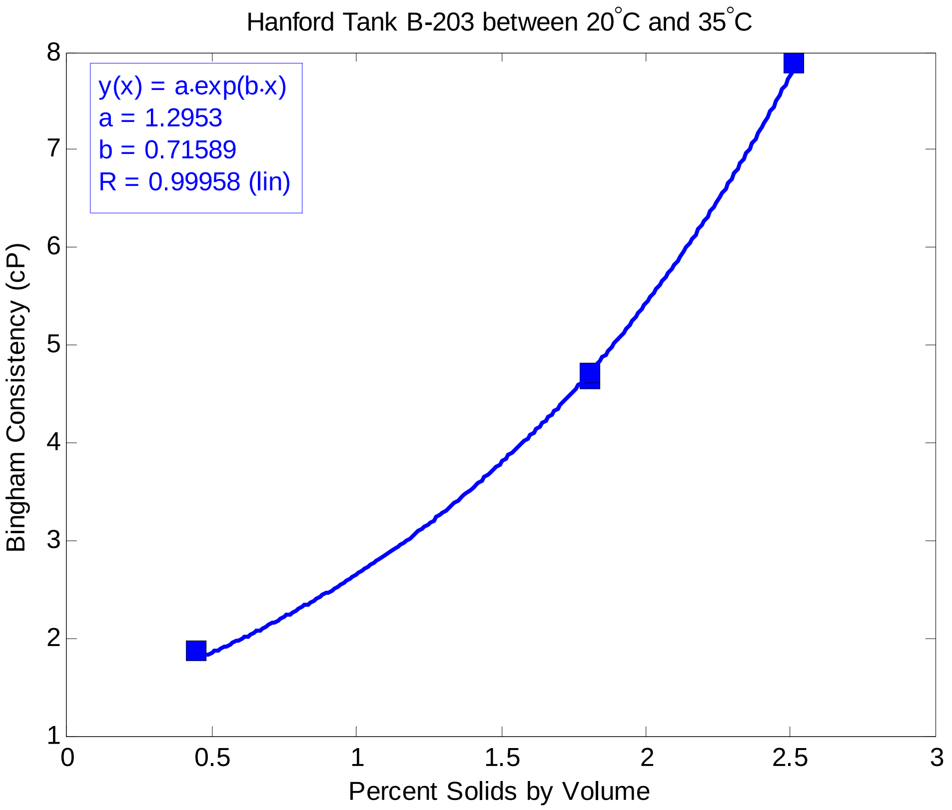

Hanford Tank AY-102 between 50°C and 65°C
y(x) = a.exp(b.x)
a = 0.80106
b = 0.068546
R = 0.45601 (lin)
Bingham Consistency (cP)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1
2
3
4
5
6
7
8
Percent Solids by Volume

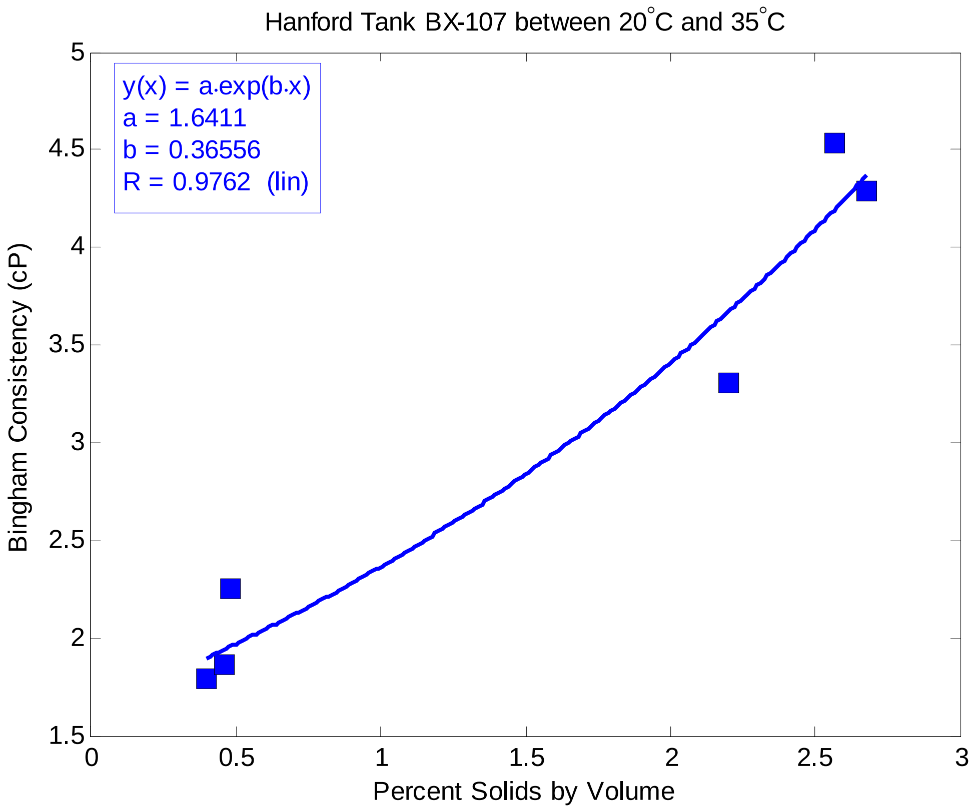

Hanford Tank B-202 between 20°C and 35°C


Hanford Tank B-202 between 20°C and 35°C

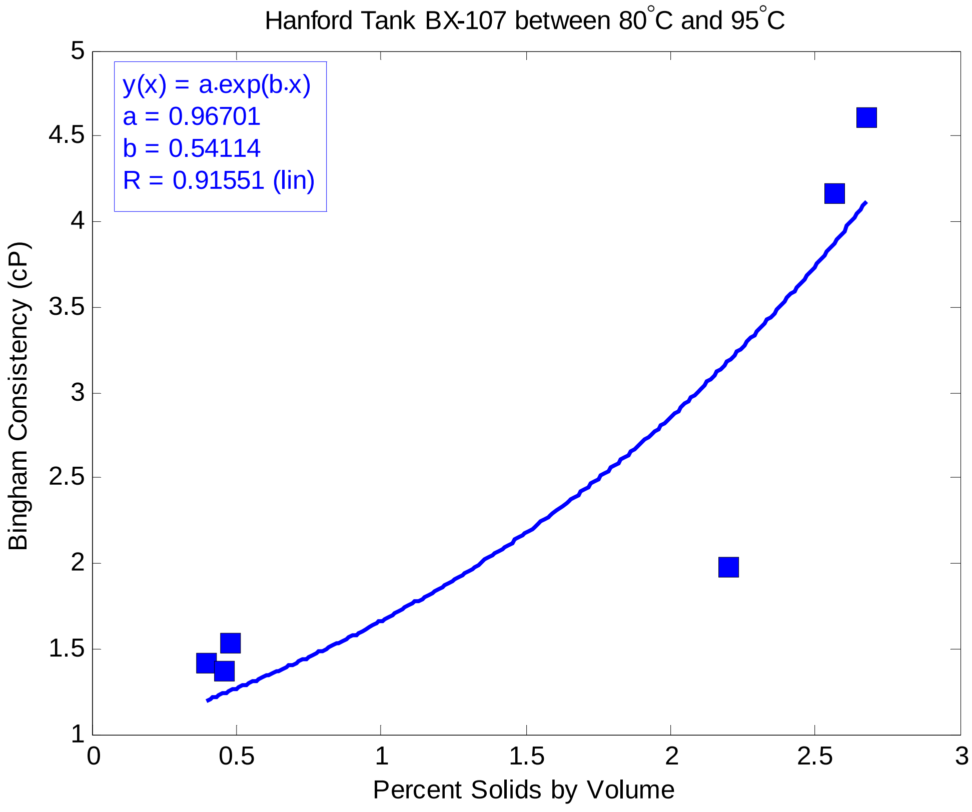

Hanford Tank B-202 between 80°C and 95°C
y(x) = a·exp(b·x)
a = 1.0147
b = 0.40055
R = 0.7139 (lin)
Bingham Consistency (cP)
3.5
3
2.5
2
1.5
1
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
Percent Solids by Volume


Hanford Tank B-202 between 80°C and 95°C
y(x) = c·x^n
c = 0.13206
n = 2.6242
R = 0.91878 (lin)
Bingham Yield Stress (Pa)
1.5
1
0.5
0
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
Percent Solids by Volume

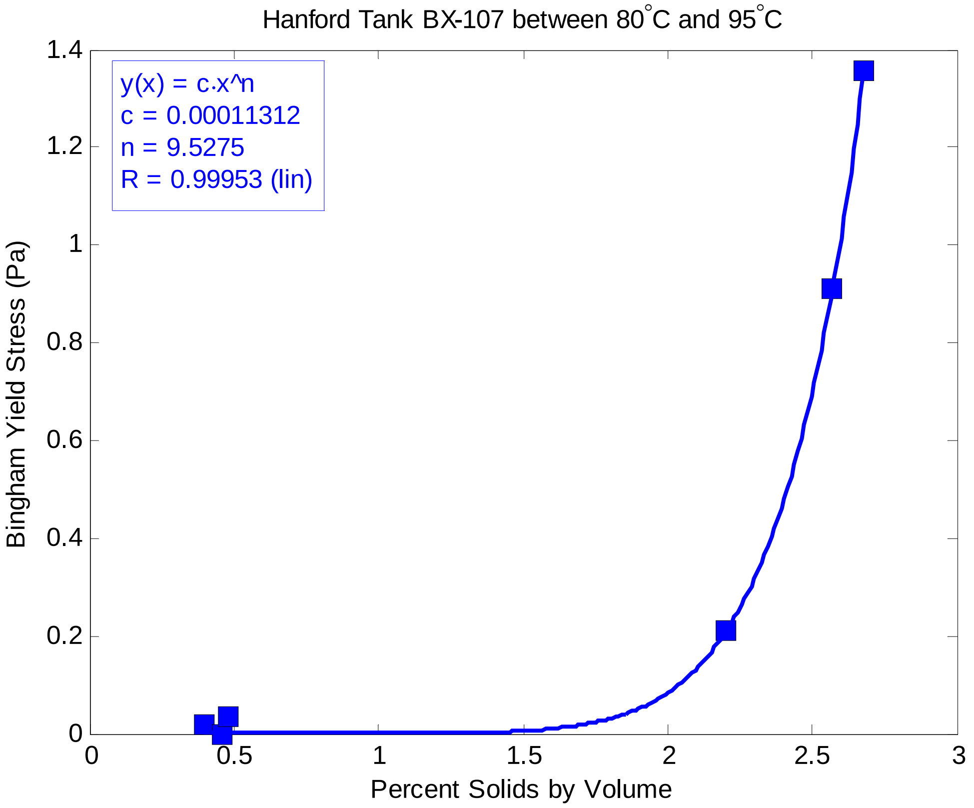

Hanford Tank B-203 between 20°C and 35°C
y(x) = a.exp(b.x)
a = 1.2953
b = 0.71589
R = 0.99958 (lin)
Bingham Consistency (cP)
Percent Solids by Volume
1
2
3
4
5
6
7
8
0
0.5
1
1.5
2
2.5
3

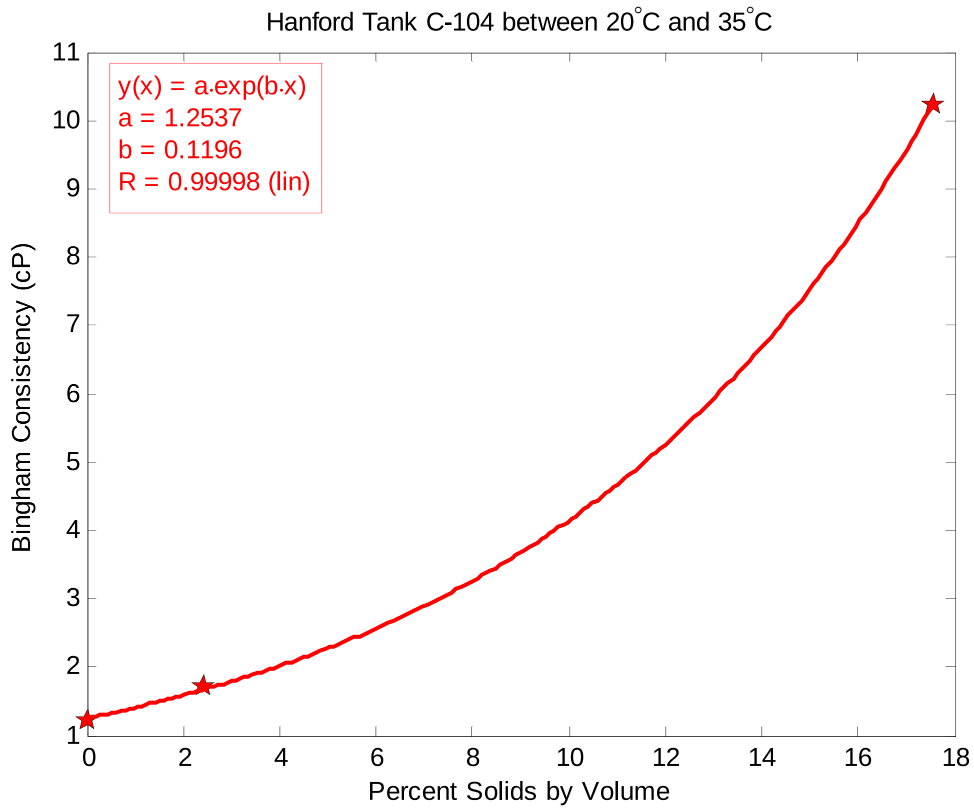


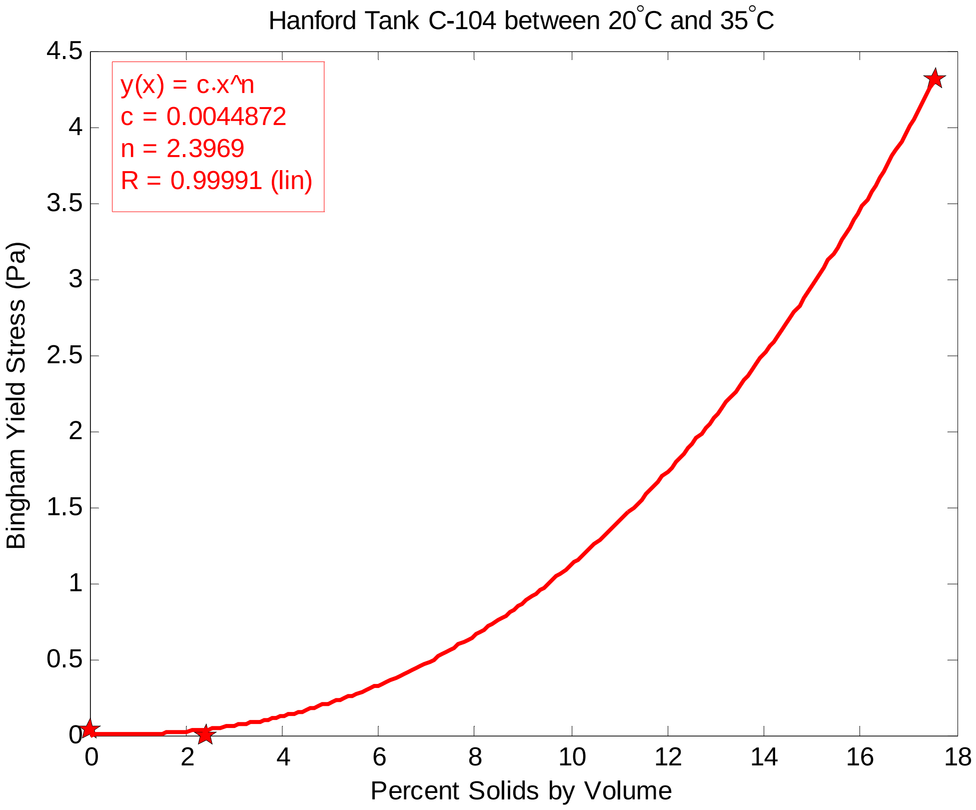
Hanford Tank BX-107 between 20°C and 35°C

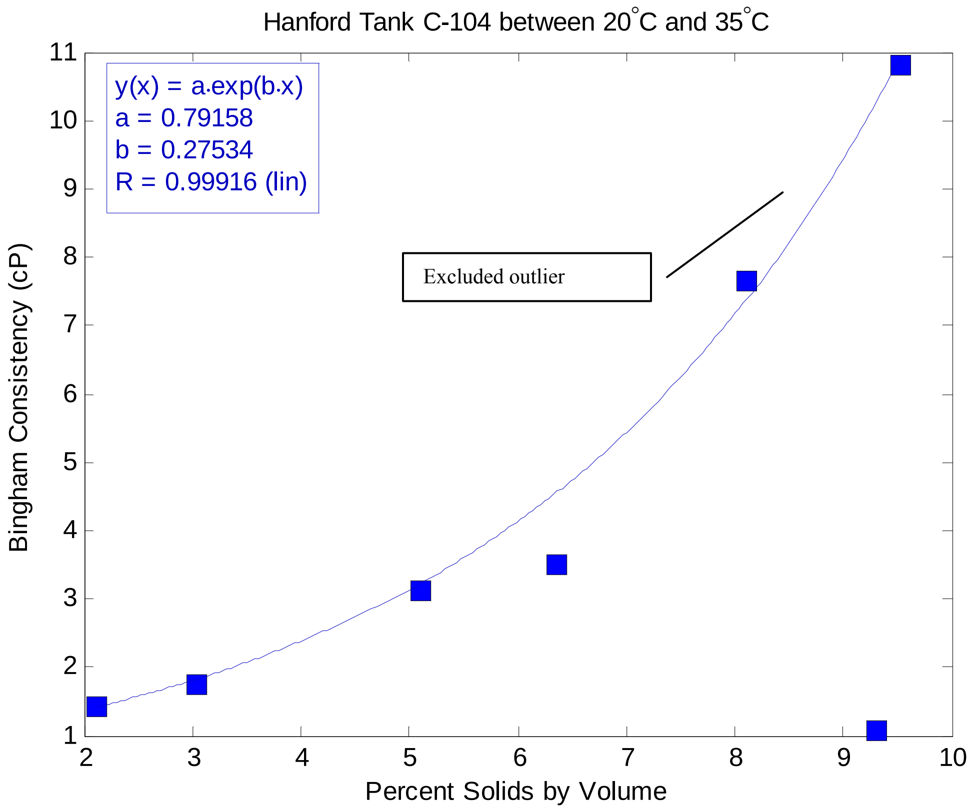


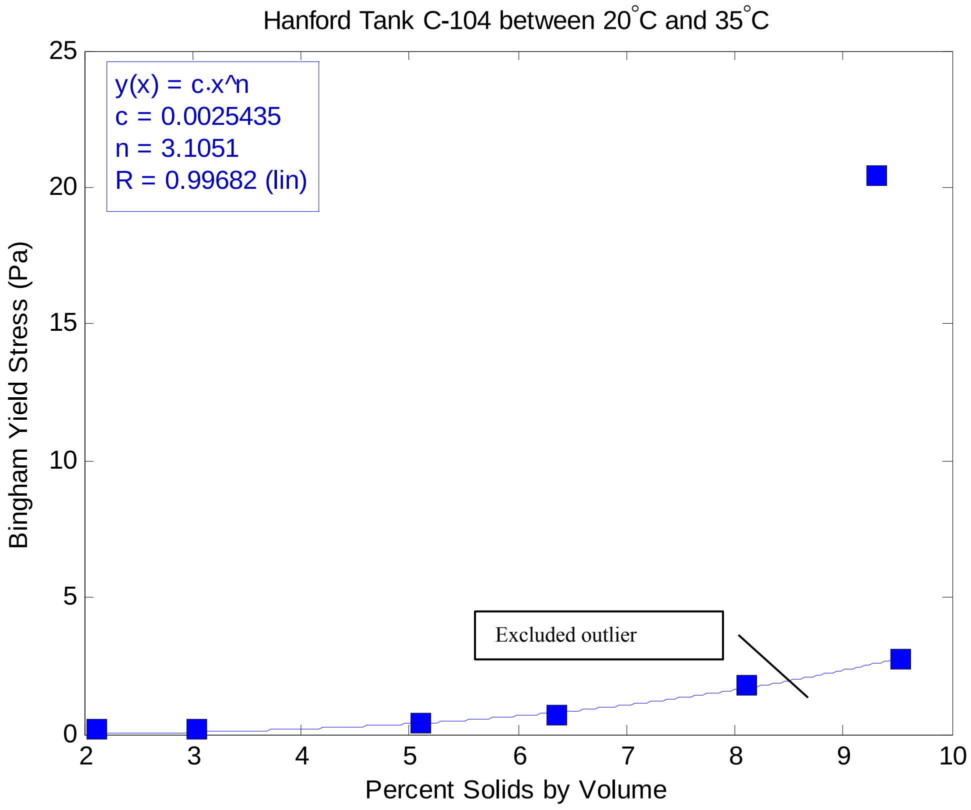
Hanford Tank BX-107 between 80°C and 95°C

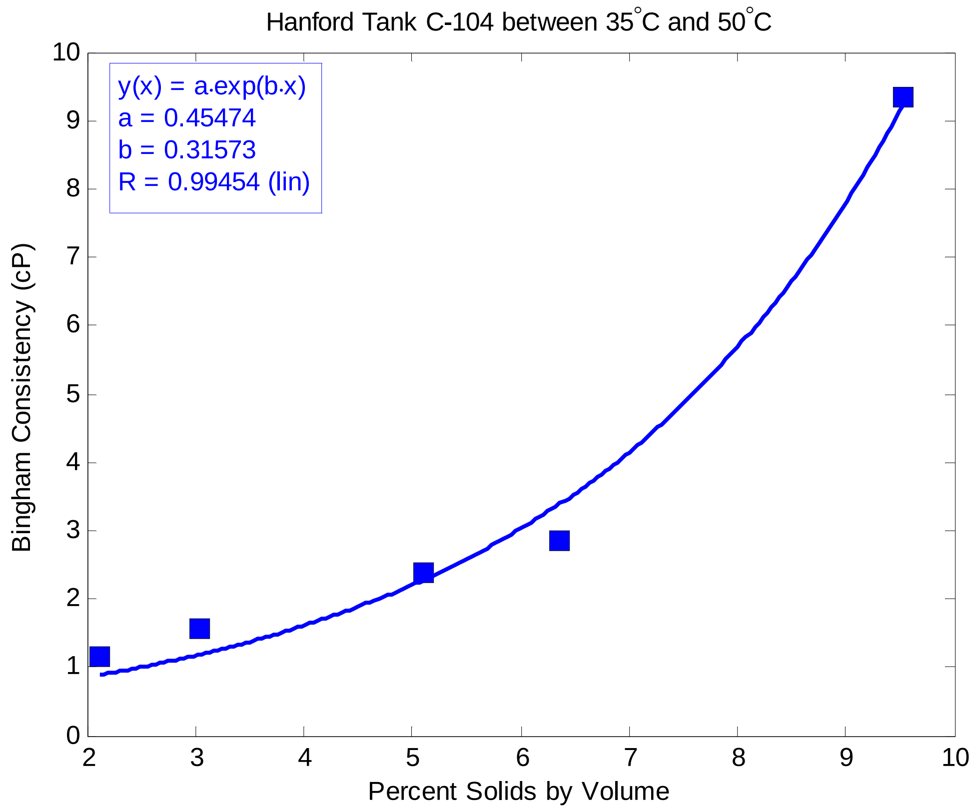

Hanford Tank BX-107 between 80°C and 95°C
y(x) = c·x^n
c = 0.00011312
n = 9.5275
R = 0.99953 (lin)
Bingham Yield Stress (Pa)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.5
1
1.5
2
2.5
3
Percent Solids by Volume

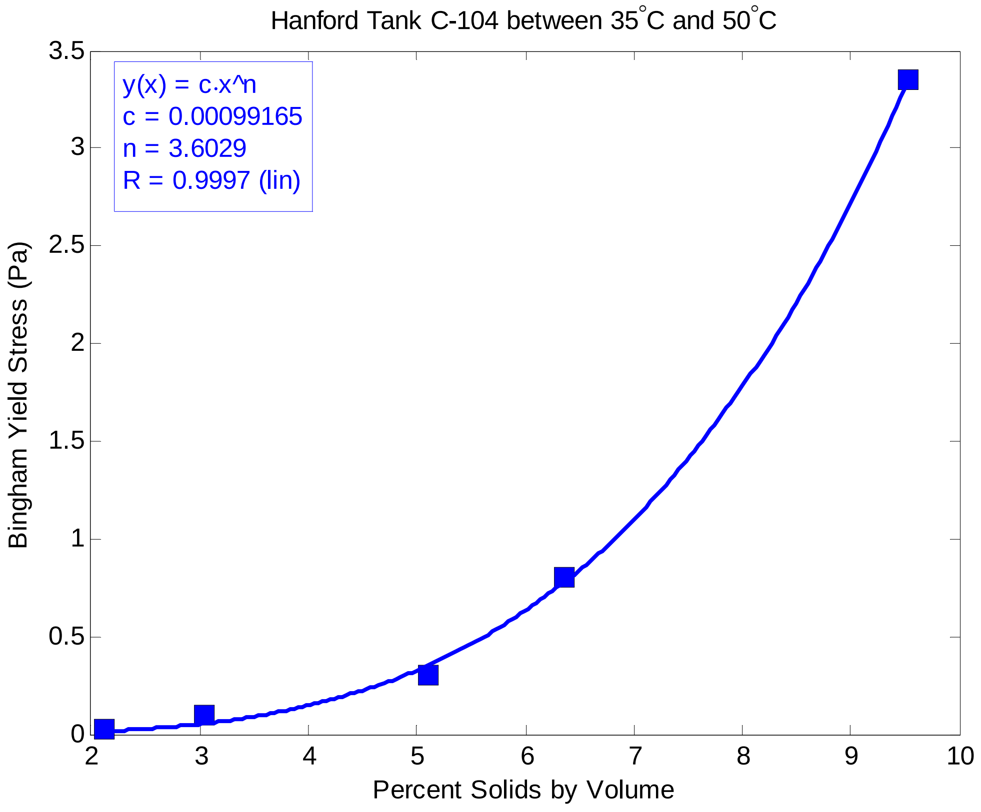

Hanford Tank C-104 between 20°C and 35°C

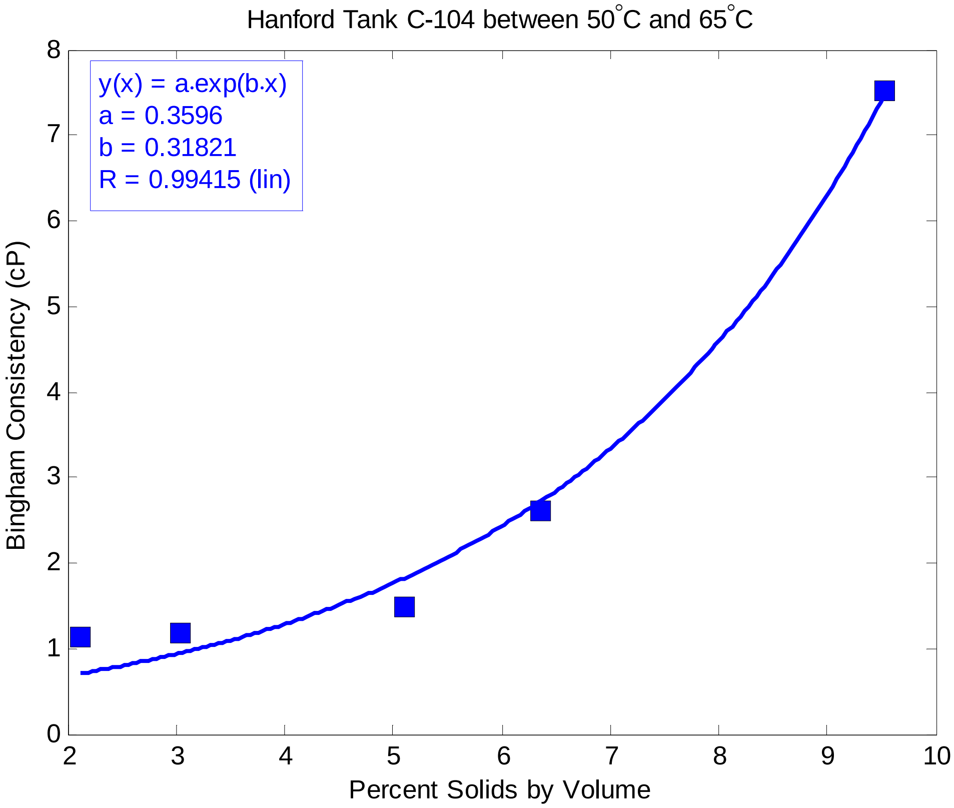

Hanford Tank C-104 between 20°C and 35°C

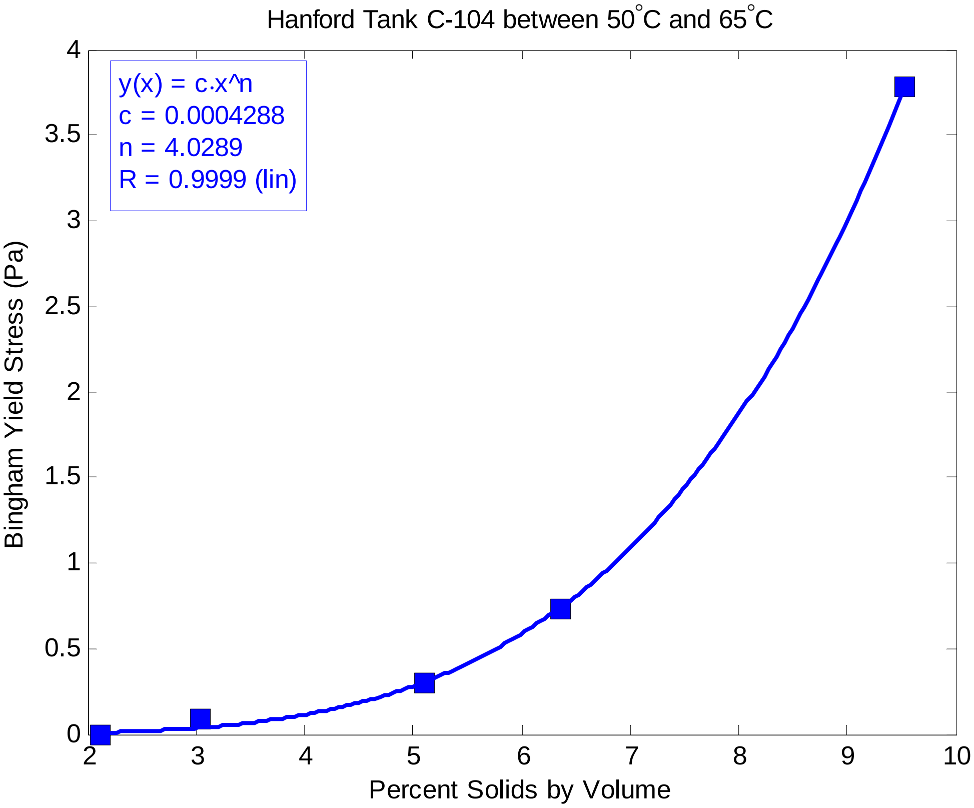

Hanford Tank C-104 between 20°C and 35°C
y(x) = a.exp(b.x)
a = 0.79158
b = 0.27534
R = 0.99916 (lin)
Excluded outlier
Bingham Consistency (cP)
Percent Solids by Volume
1
2
3
4
5
6
7
8
9
10
11
2
3
4
5
6
7
8
9
10

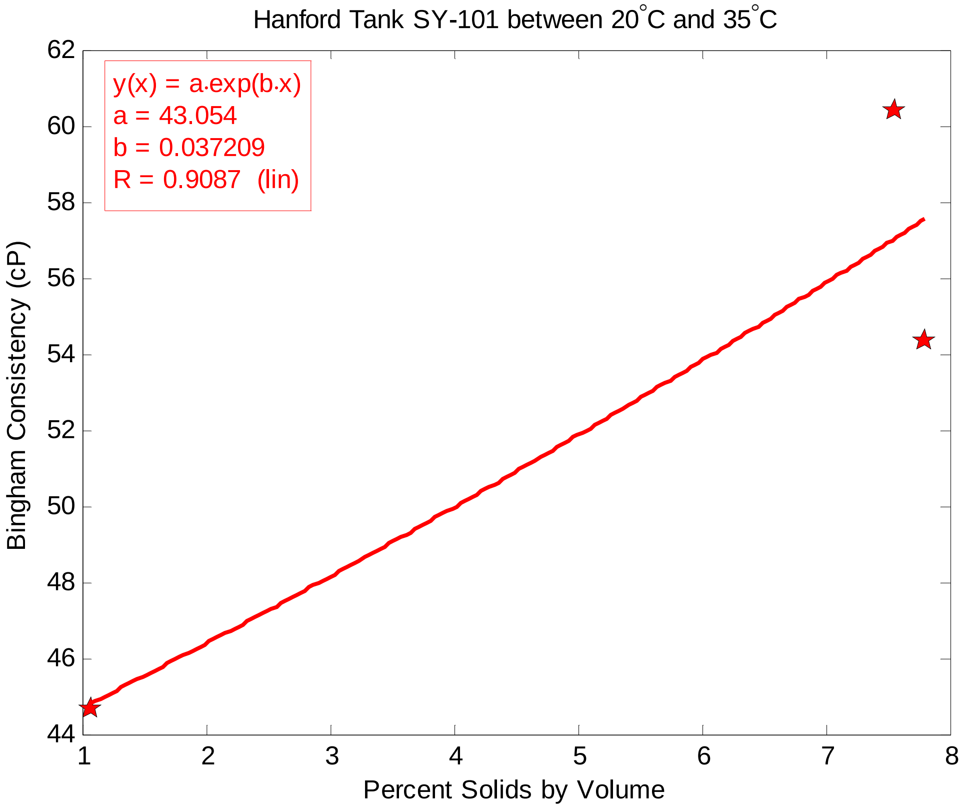

Hanford Tank C-104 between 20°C and 35°C
y(x) = c.x^n
c = 0.0025435
n = 3.1051
R = 0.99682 (lin)
Excluded outlier
Bingham Yield Stress (Pa)
Percent Solids by Volume
0
5
10
15
20
25
2
3
4
5
6
7
8
9
10

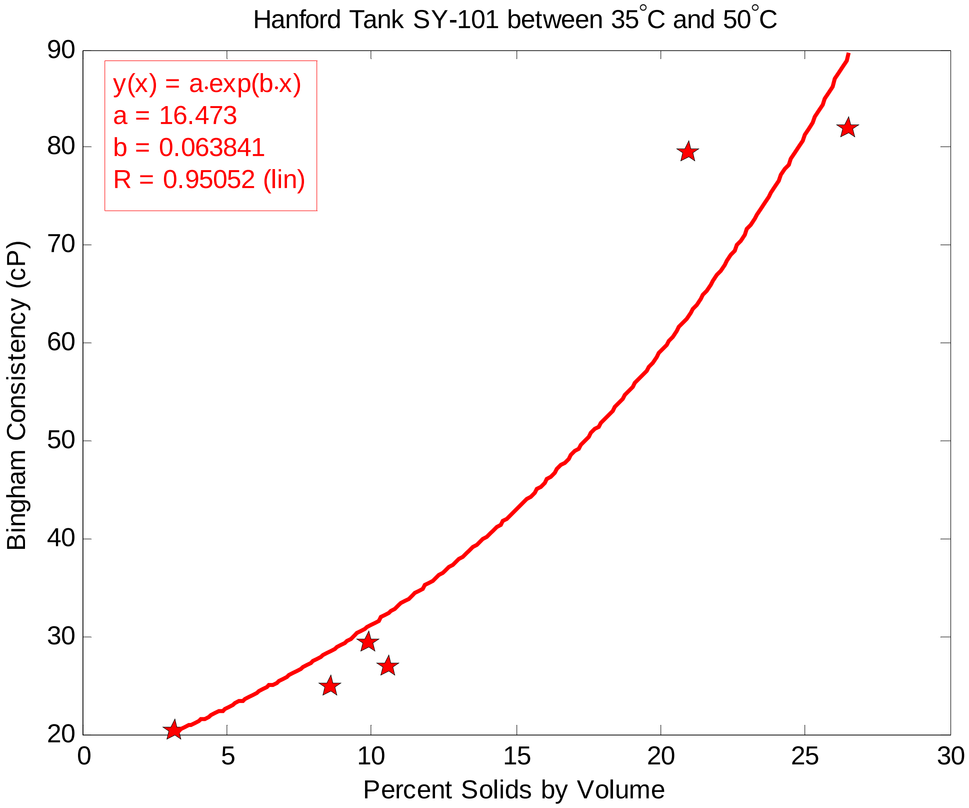

Hanford Tank C-104 between 35°C and 50°C
y(x) = a.exp(b.x)
a = 0.45474
b = 0.31573
R = 0.99454 (lin)
Bingham Consistency (cP)
0
1
2
3
4
5
6
7
8
9
10
2
3
4
5
6
7
8
9
10
Percent Solids by Volume

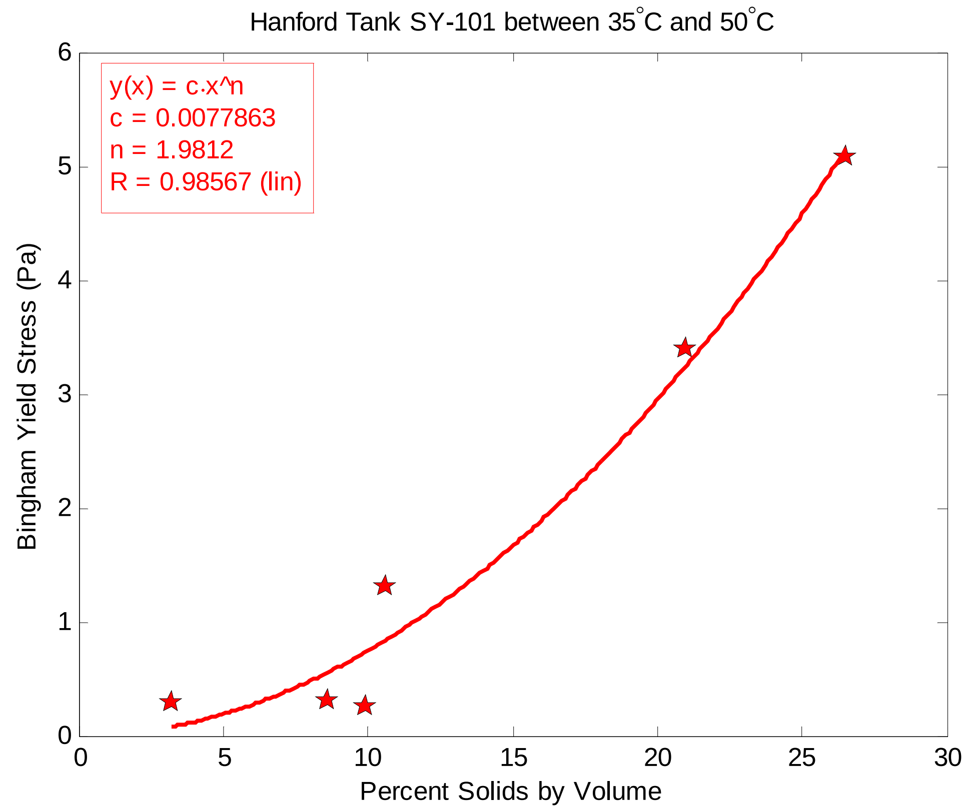

Hanford Tank C-104 between 35°C and 50°C
y(x) = c.x^n
c = 0.00099165
n = 3.6029
R = 0.9997 (lin)
Bingham Yield Stress (Pa)
0
0.5
1
1.5
2
2.5
3
3.5
2
3
4
5
6
7
8
9
10
Percent Solids by Volume

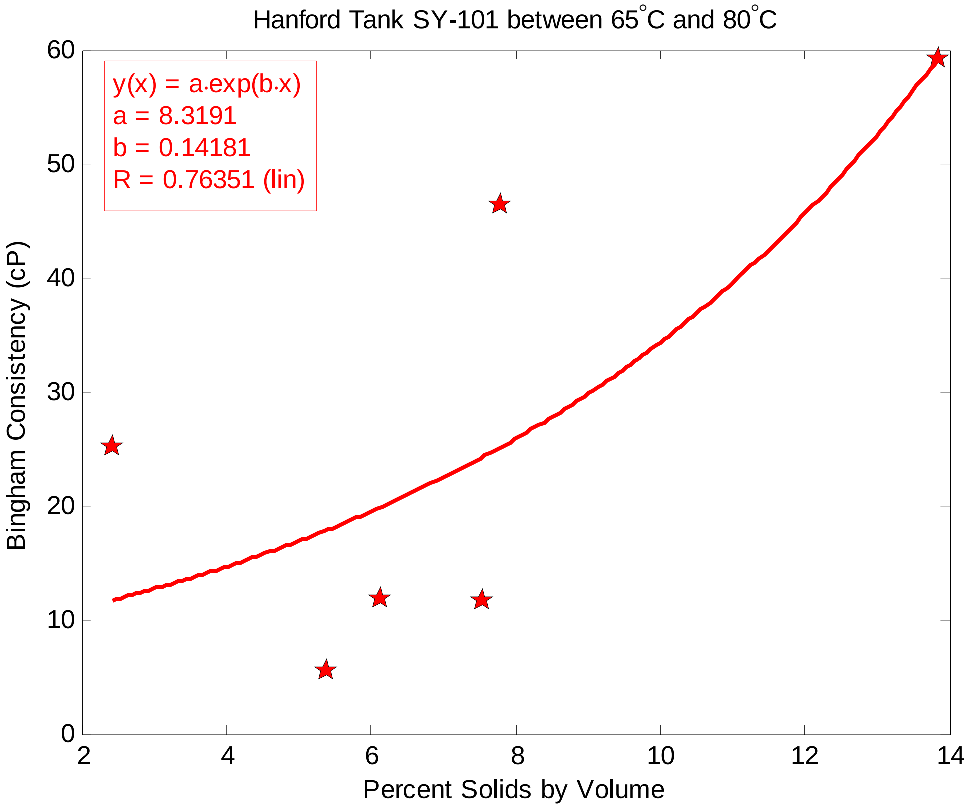

Hanford Tank C-104 between 50°C and 65°C
y(x) = a·exp(b·x)
a = 0.3596
b = 0.31821
R = 0.99415 (lin)
Bingham Consistency (cP)
0
1
2
3
4
5
6
7
8
2
3
4
5
6
7
8
9
10
Percent Solids by Volume

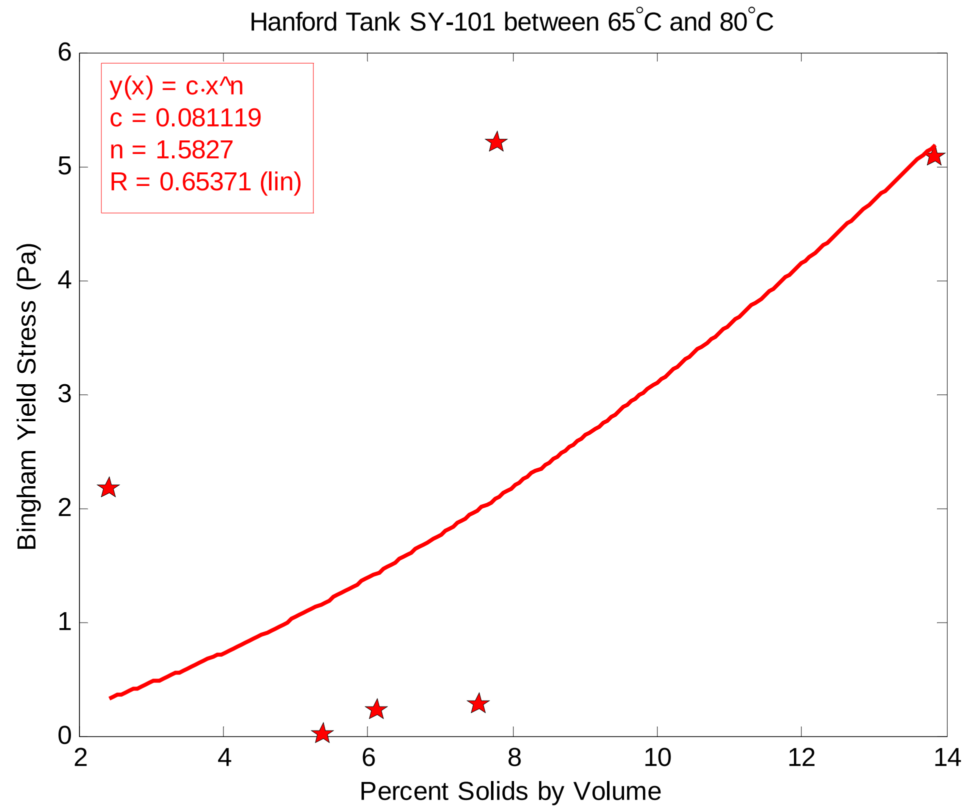

Hanford Tank C-104 between 50°C and 65°C
y(x) = c·x^n
c = 0.0004288
n = 4.0289
R = 0.9999 (lin)
Bingham Yield Stress (Pa)
0
0.5
1
1.5
2
2.5
3
3.5
4
2
3
4
5
6
7
8
9
10
Percent Solids by Volume

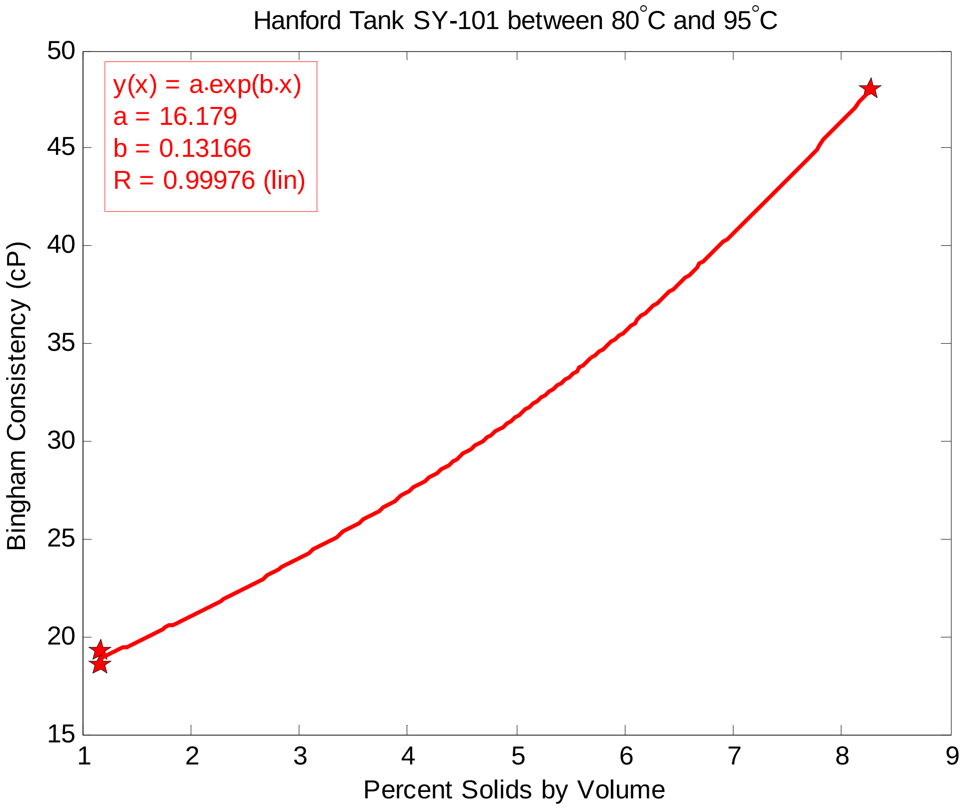

Hanford Tank SY-101 between 20°C and 35°C
y(x) = a.exp(b.x)
a = 43.054
b = 0.037209
R = 0.9087 (lin)
Bingham Consistency (cP)
Percent Solids by Volume
44
46
48
50
52
54
56
58
60
62
1
2
3
4
5
6
7
8

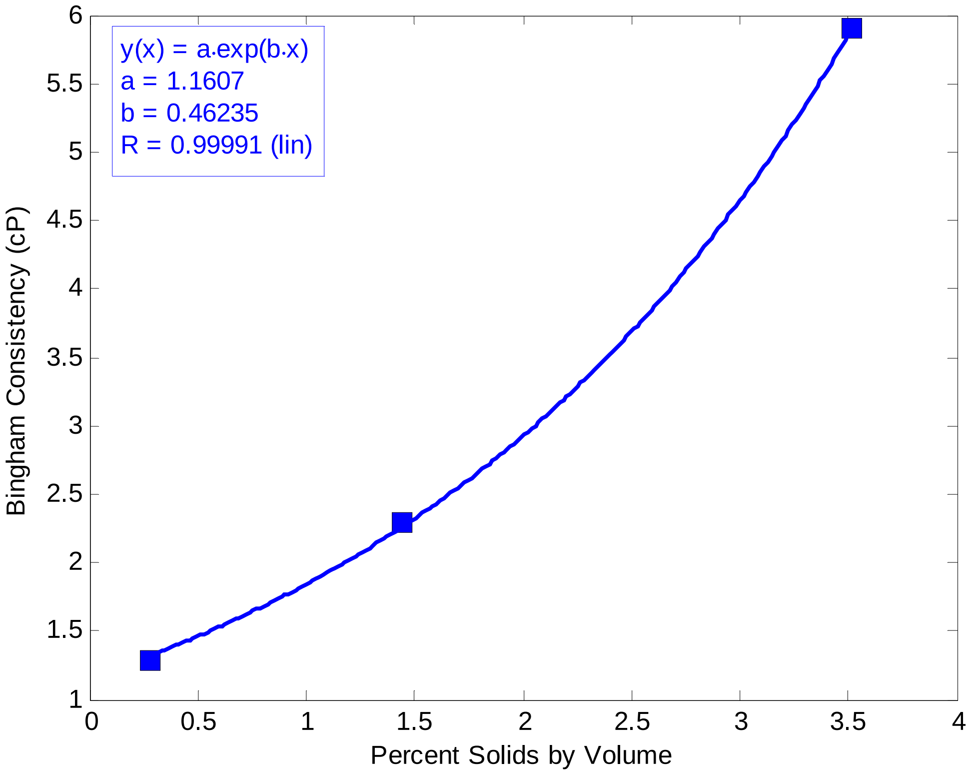

Hanford Tank SY-101 between 35°C and 50°C
y(x) = a.exp(b.x)
a = 16.473
b = 0.063841
R = 0.95052 (lin)
Bingham Consistency (cP)
Percent Solids by Volume
20
30
40
50
60
70
80
90
0
5
10
15
20
25
30

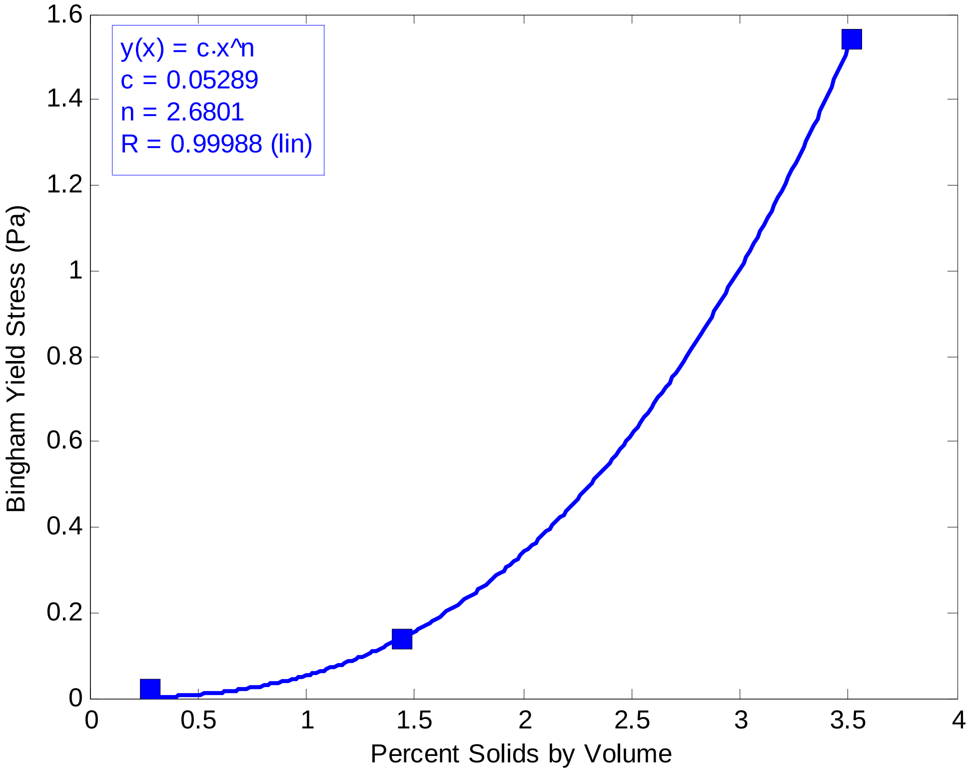

Hanford Tank SY-101 between 35°C and 50°C

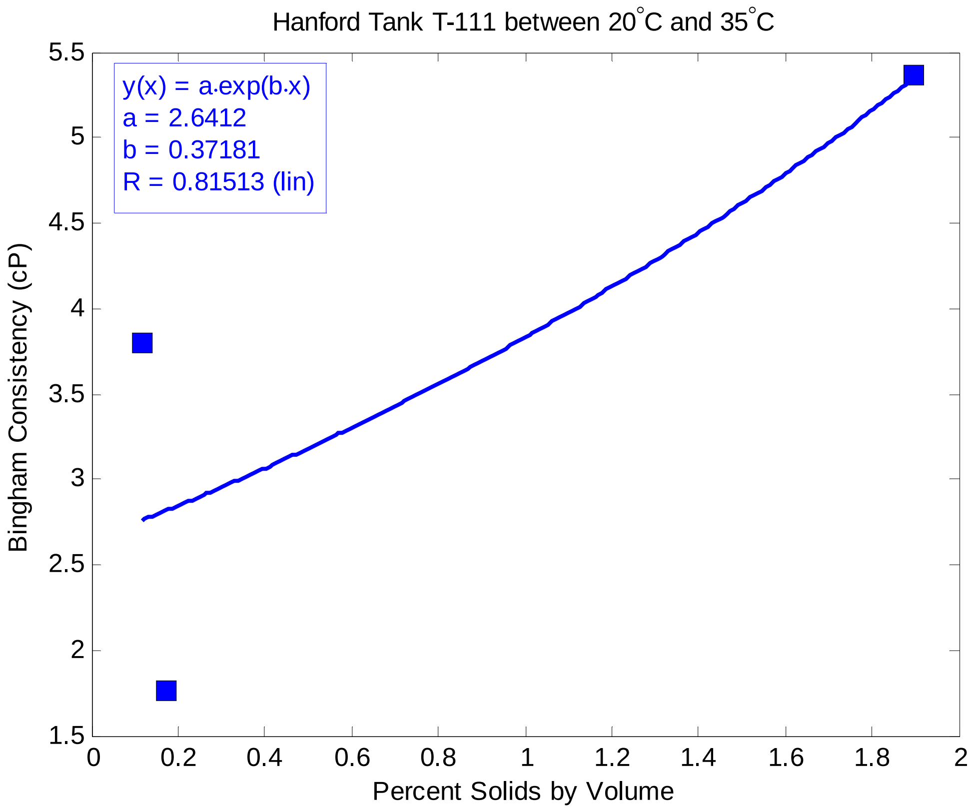

Hanford Tank SY-101 between 65°C and 80°C

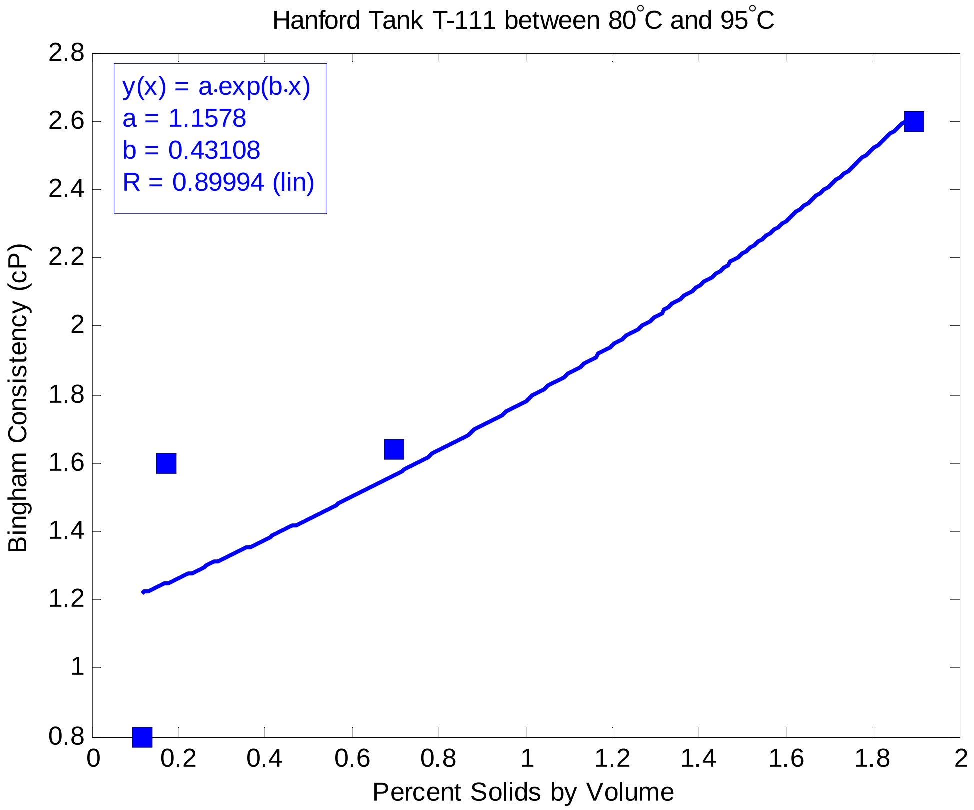

Hanford Tank SY-101 between 65°C and 80°C
y(x) = c.x^n
c = 0.081119
n = 1.5827
R = 0.65371 (lin)
Bingham Yield Stress (Pa)
0
1
2
3
4
5
6
2
4
6
8
10
12
14
Percent Solids by Volume

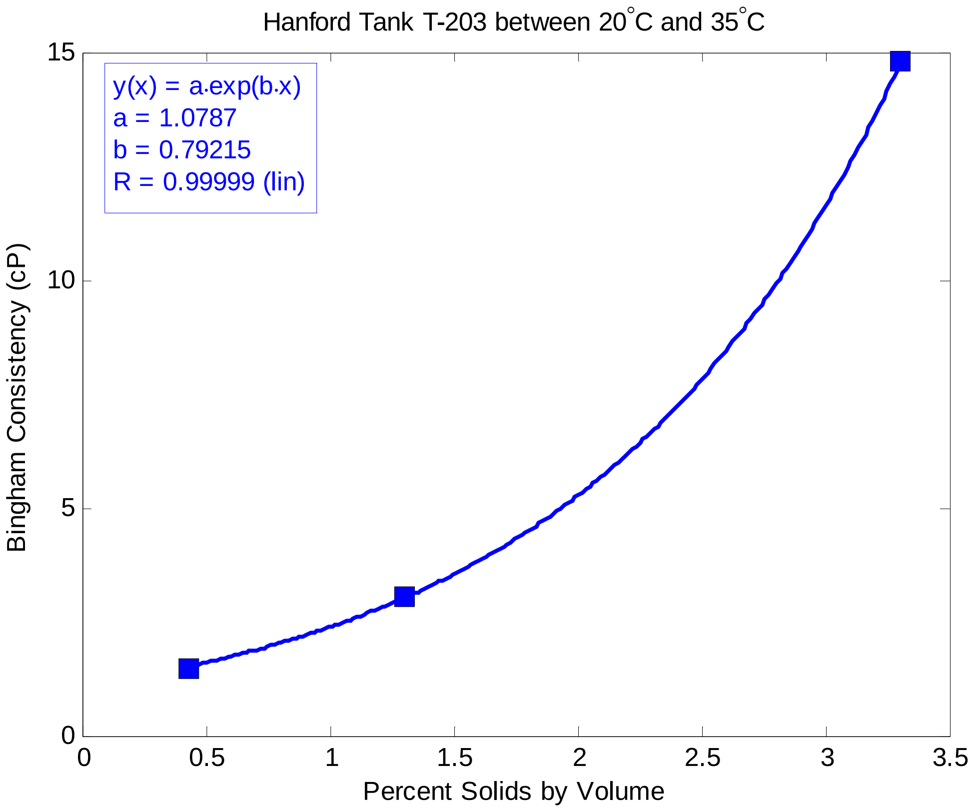

Hanford Tank SY-101 between 80°C and 95°C
y(x) = a.exp(b.x)
a = 16.179
b = 0.13166
R = 0.99976 (lin)
Bingham Consistency (cP)
15
20
25
30
35
40
45
50
1
2
3
4
5
6
7
8
9
Percent Solids by Volume

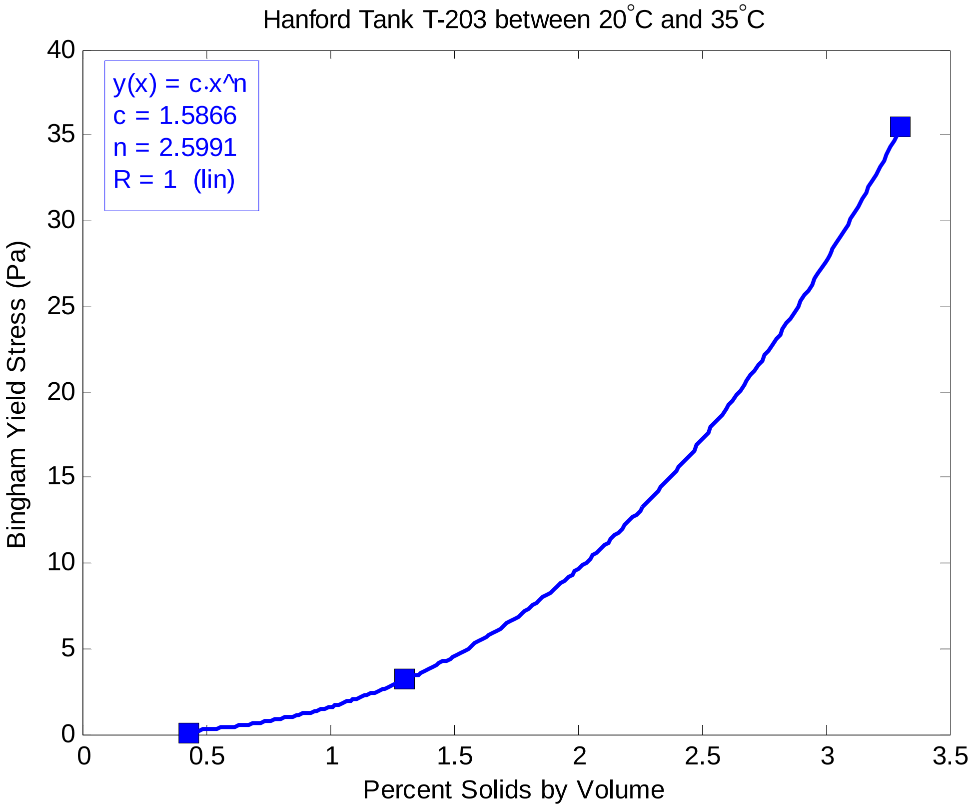

Hanford Tank T-110 between 20°C and 35°C


Hanford Tank T-110 between 20°C and 35°C


Hanford Tank T-111 between 20°C and 35°C
y(x) = a.exp(b.x)
a = 2.6412
b = 0.37181
R = 0.81513 (lin)
Bingham Consistency (cP)
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Percent Solids by Volume


Hanford Tank T-111 between 80°C and 95°C
y(x) = a.exp(b.x)
a = 1.1578
b = 0.43108
R = 0.89994 (lin)
Bingham Consistency (cP)
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Percent Solids by Volume


Hanford Tank T-203 between 20°C and 35°C
y(x) = a.exp(b.x)
a = 1.0787
b = 0.79215
R = 0.99999 (lin)
Bingham Consistency (cP)
15
10
5
0
0
0.5
1
1.5
2
2.5
3
3.5
Percent Solids by Volume

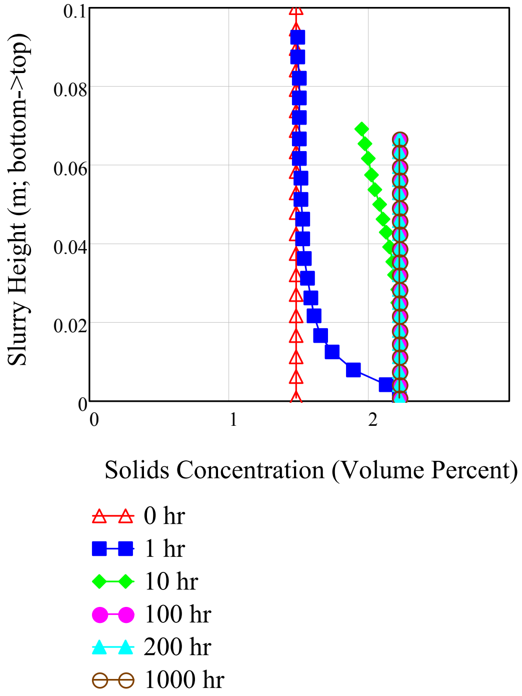

Hanford Tank T-203 between 20°C and 35°C
y(x) = c.x^n
c = 1.5866
n = 2.5991
R = 1 (lin)
Bingham Yield Stress (Pa)
40
35
30
25
20
15
10
5
0
0
0.5
1
1.5
2
2.5
3
3.5
Percent Solids by Volume

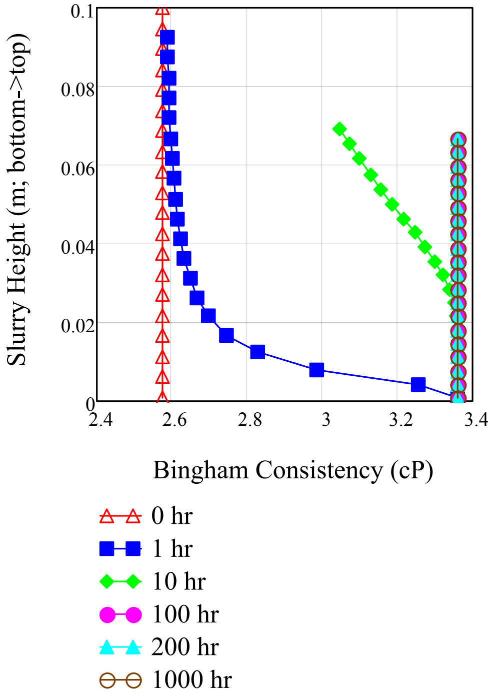
Appendix D

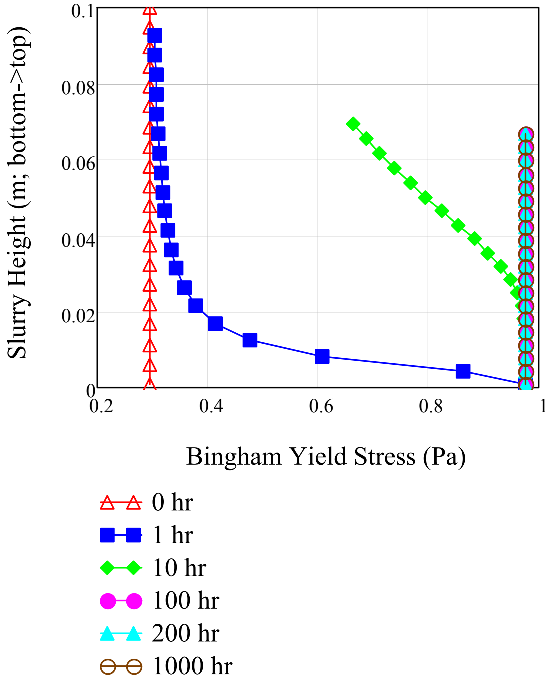
Sedimentation Layer Properties as Sludge Settles Under Different Starting Heights

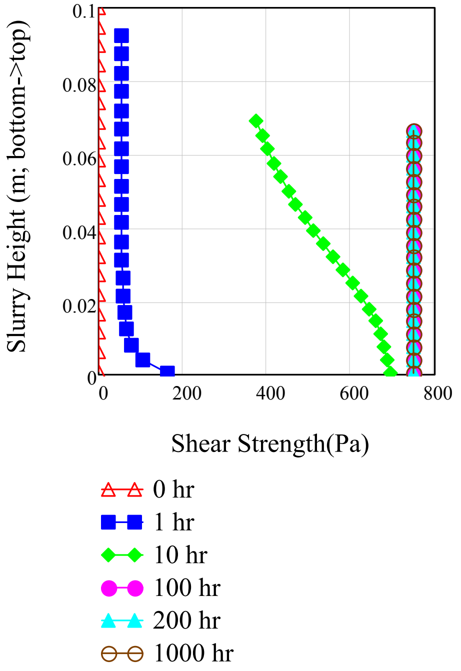
Appendix D – Sedimentation Layer Properties as Sludge Settles Under Different Starting Heights

Predicted sludge properties from Hanford Tank B-202 with water dilution at a starting slurry height of 0.1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.

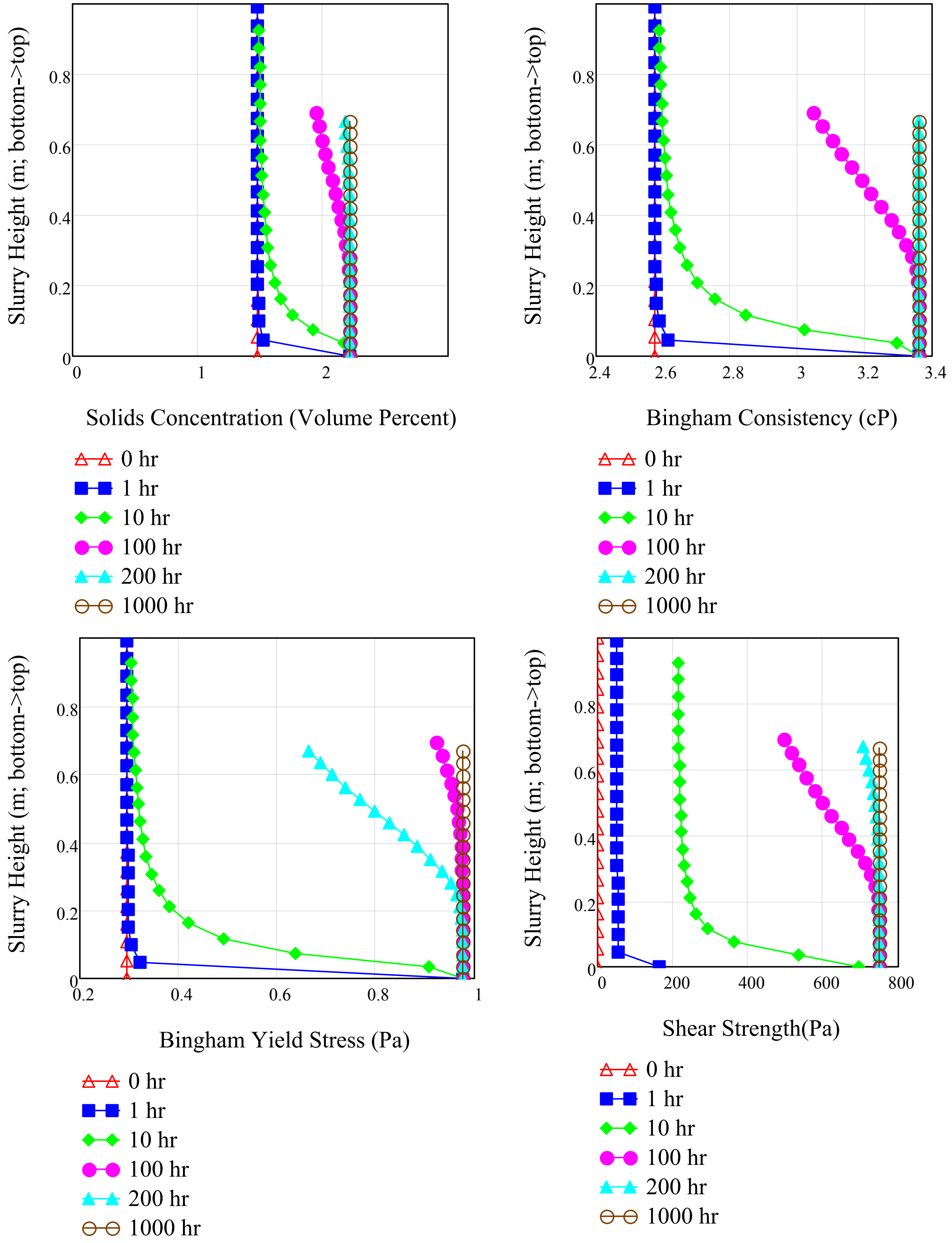




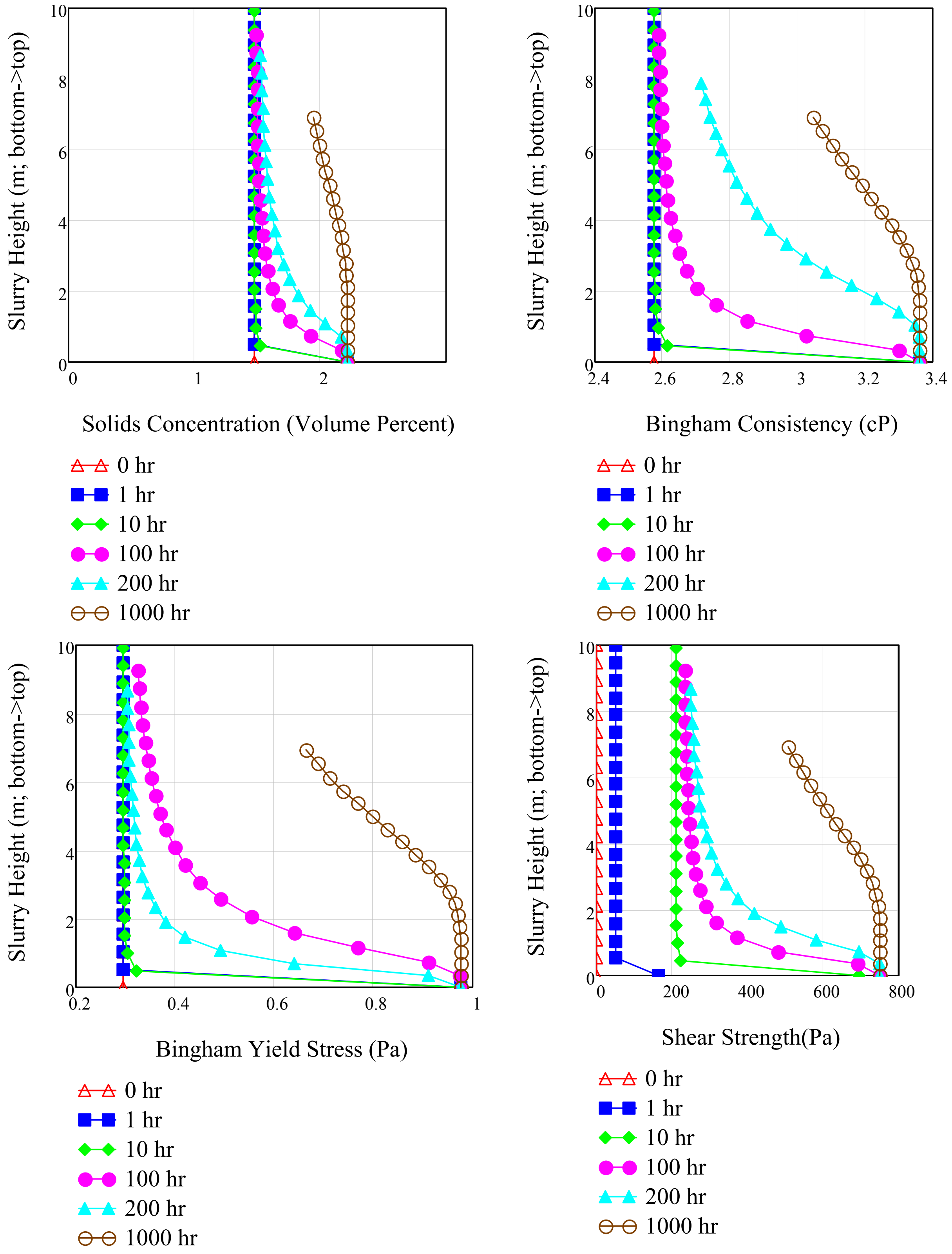




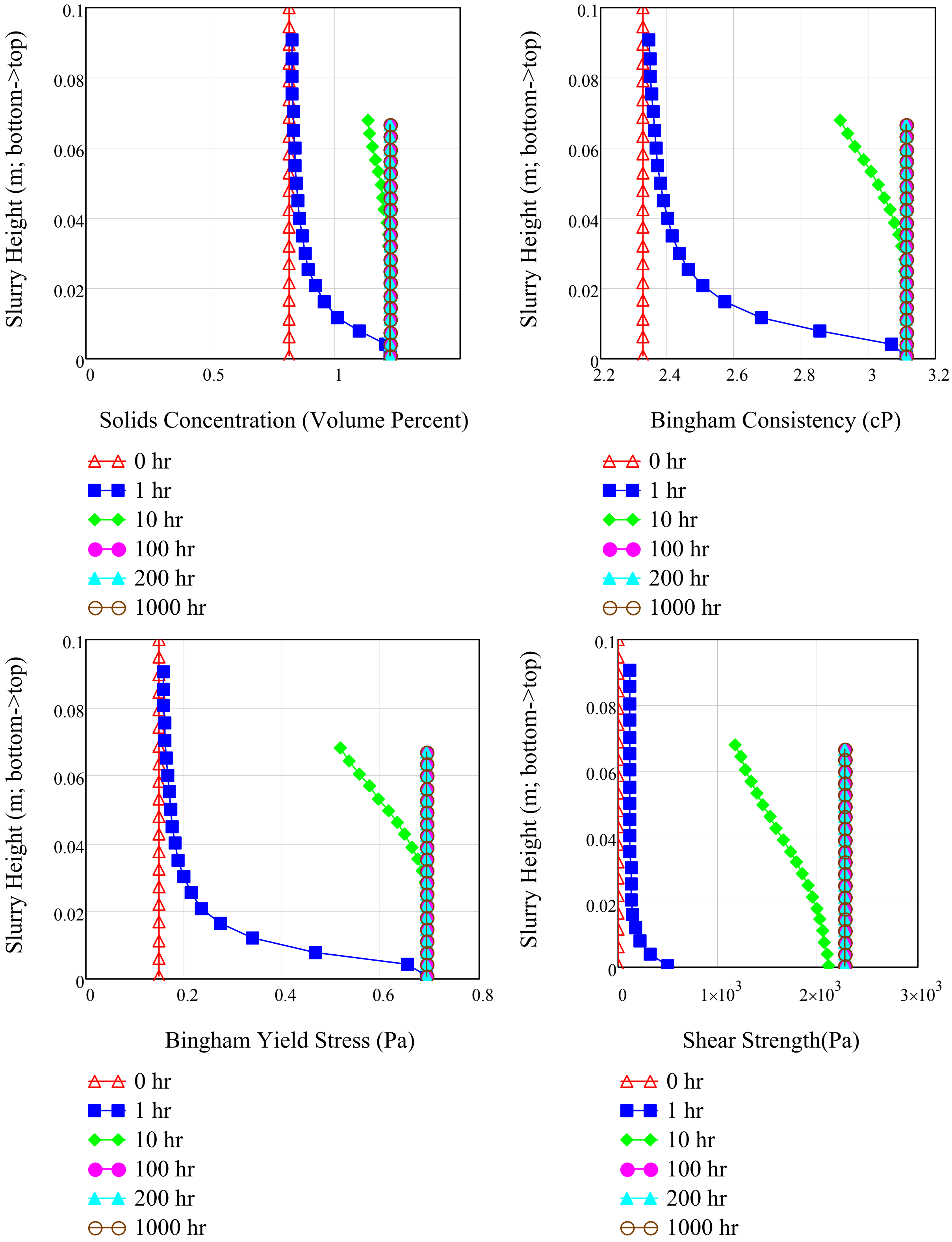
Predicted sludge properties from Hanford Tank B-202 with water dilution at a starting slurry height of 1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



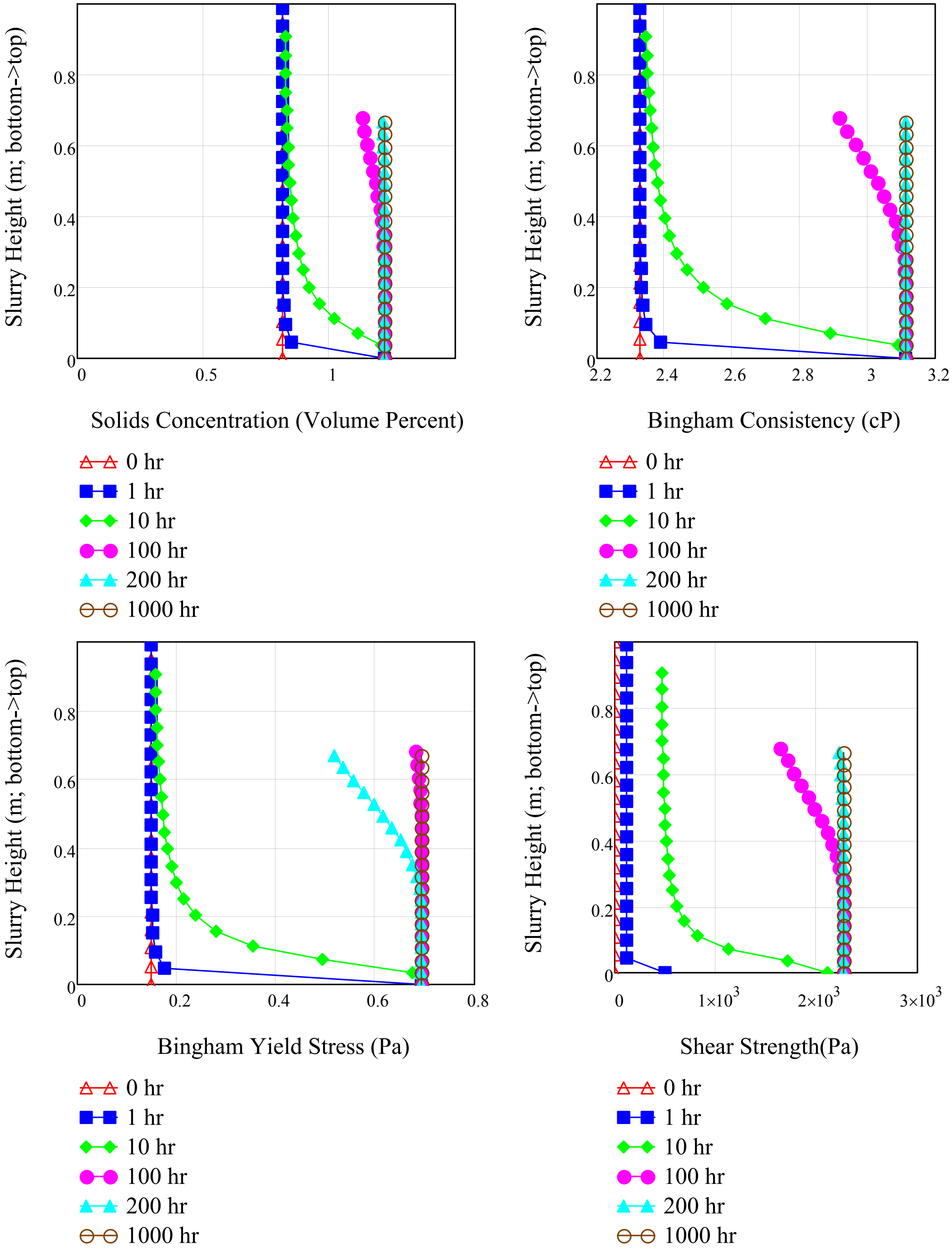
Predicted sludge properties from Hanford Tank B-202 with water dilution at a starting slurry height of 10 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



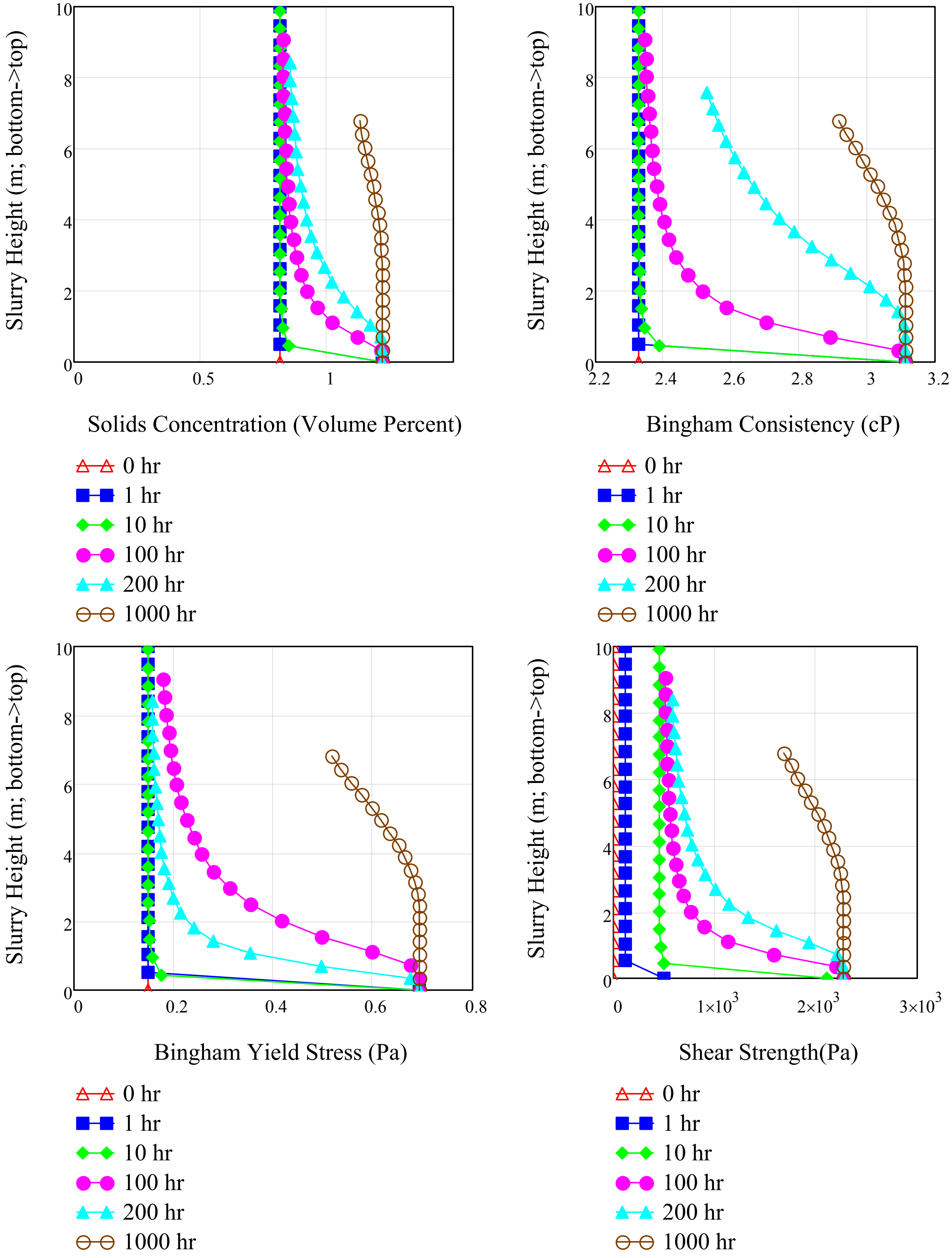
Predicted sludge properties from Hanford Tank B-203 with water dilution at a starting slurry height of 0.1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



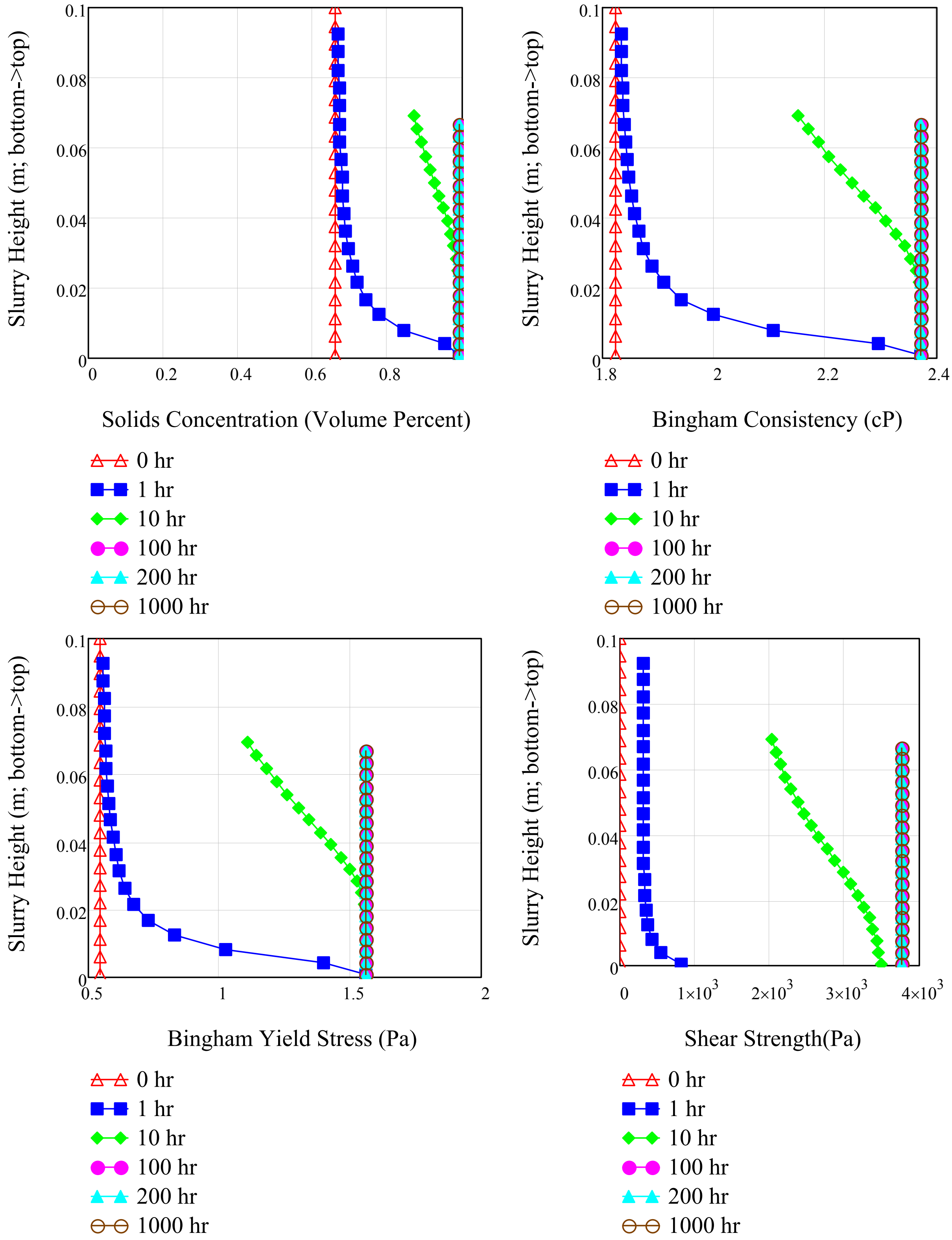
Predicted sludge properties from Hanford Tank B-203 with water dilution at a starting slurry height of 1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



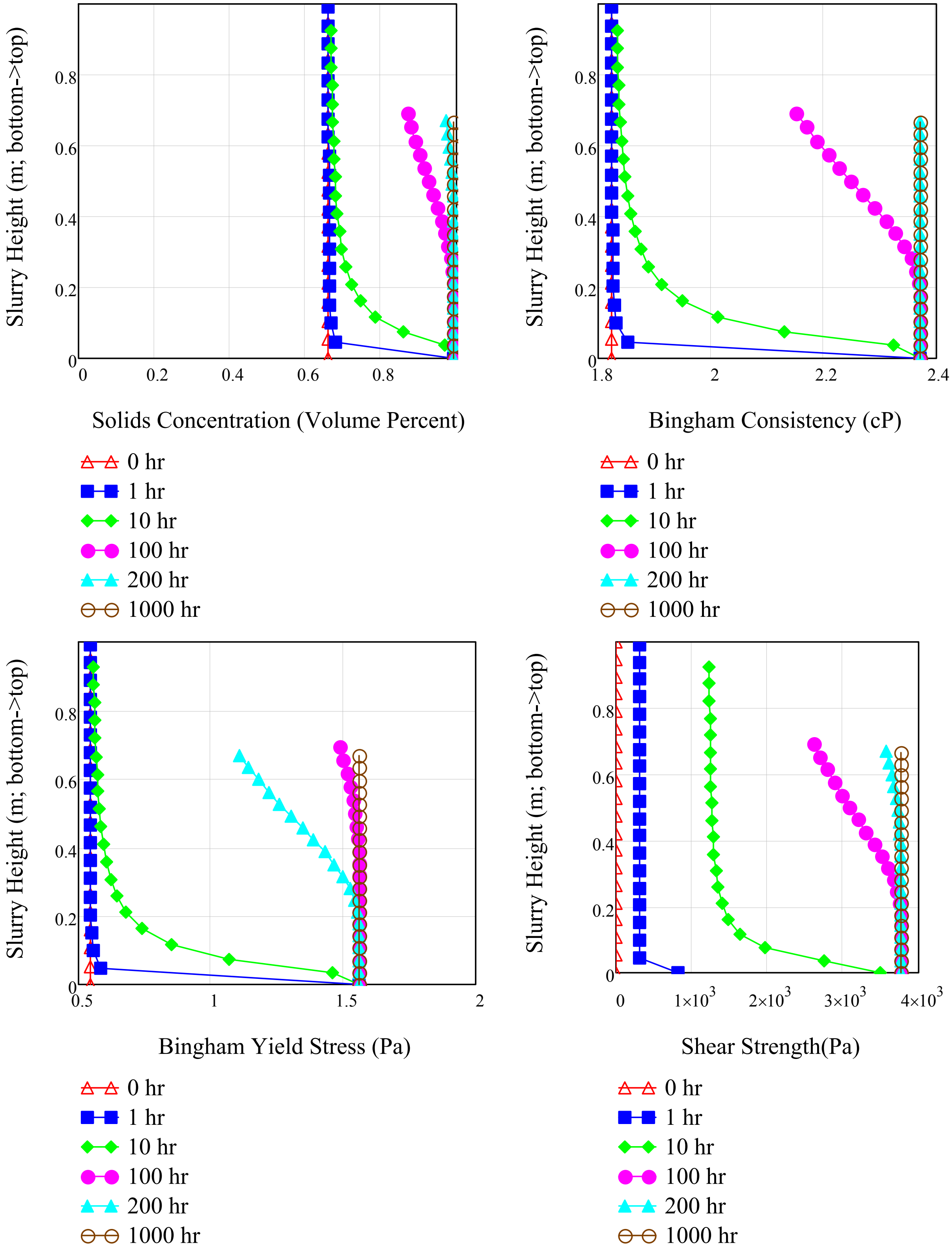
Predicted sludge properties from Hanford Tank B-203 with water dilution at a starting slurry height of 10 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



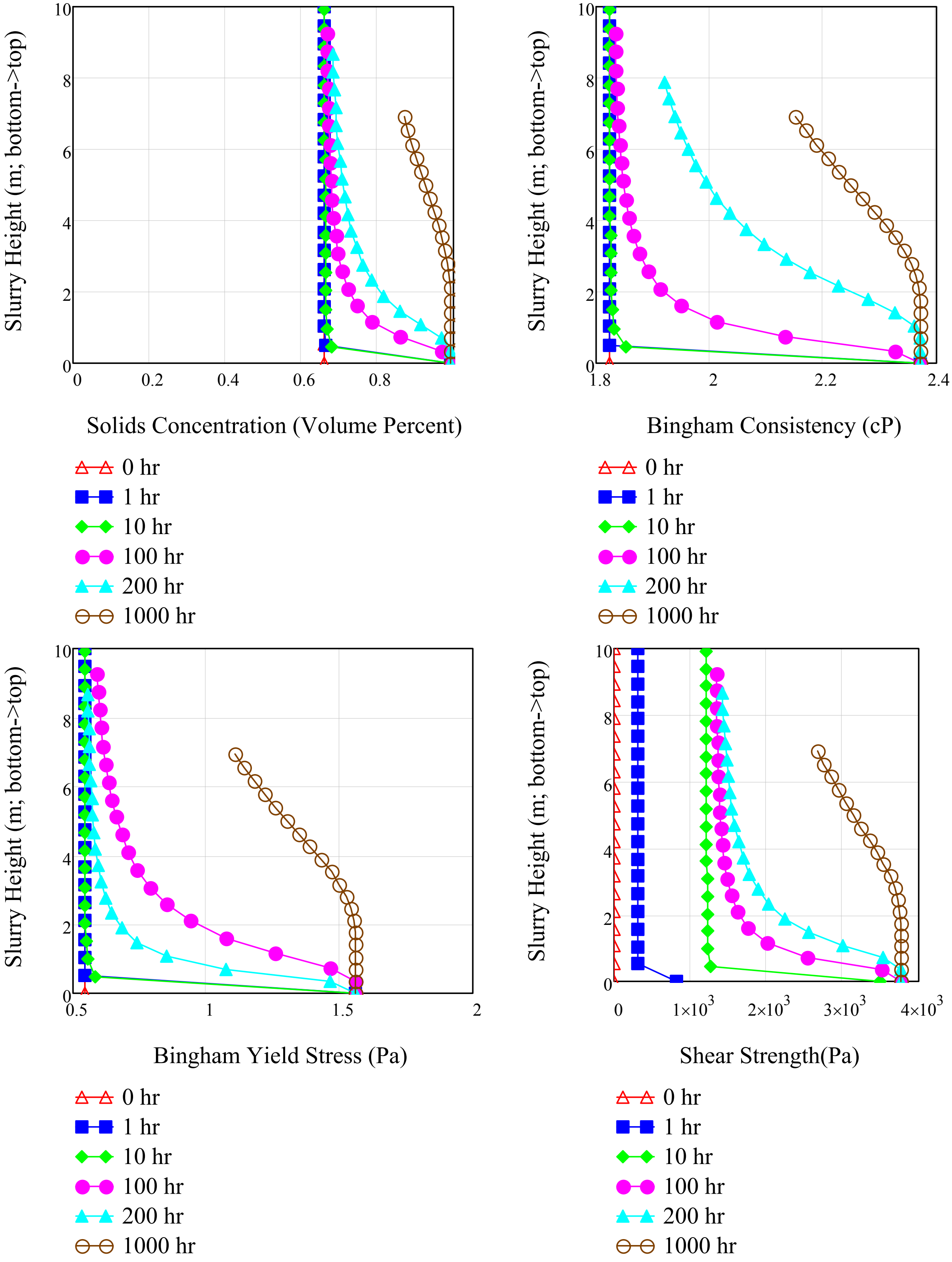
Predicted sludge properties from Hanford Tank T-203 with water dilution at a starting slurry height of 0.1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–5ºC.



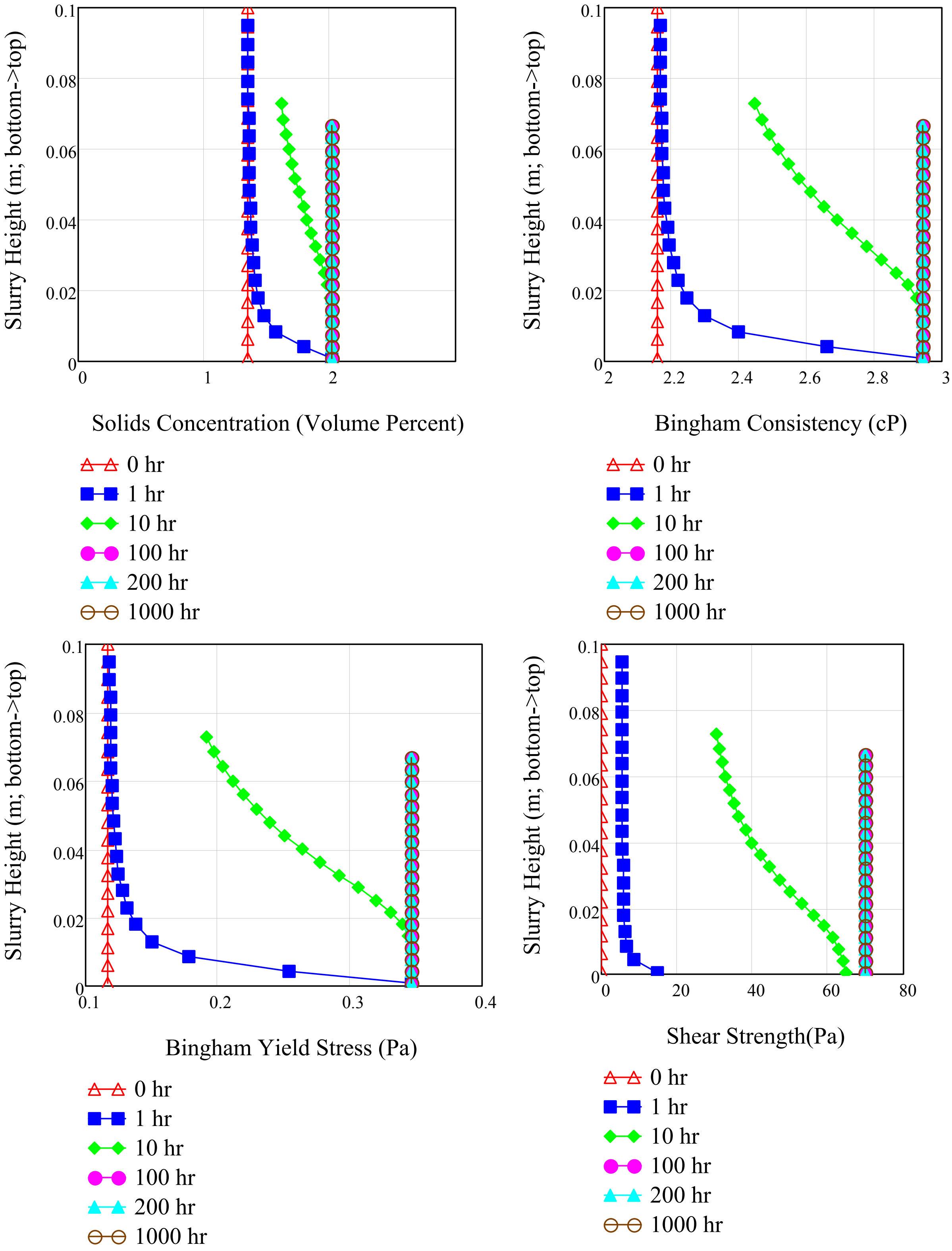
Predicted sludge properties from Hanford Tank T-203 with water dilution at a starting slurry height of 1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



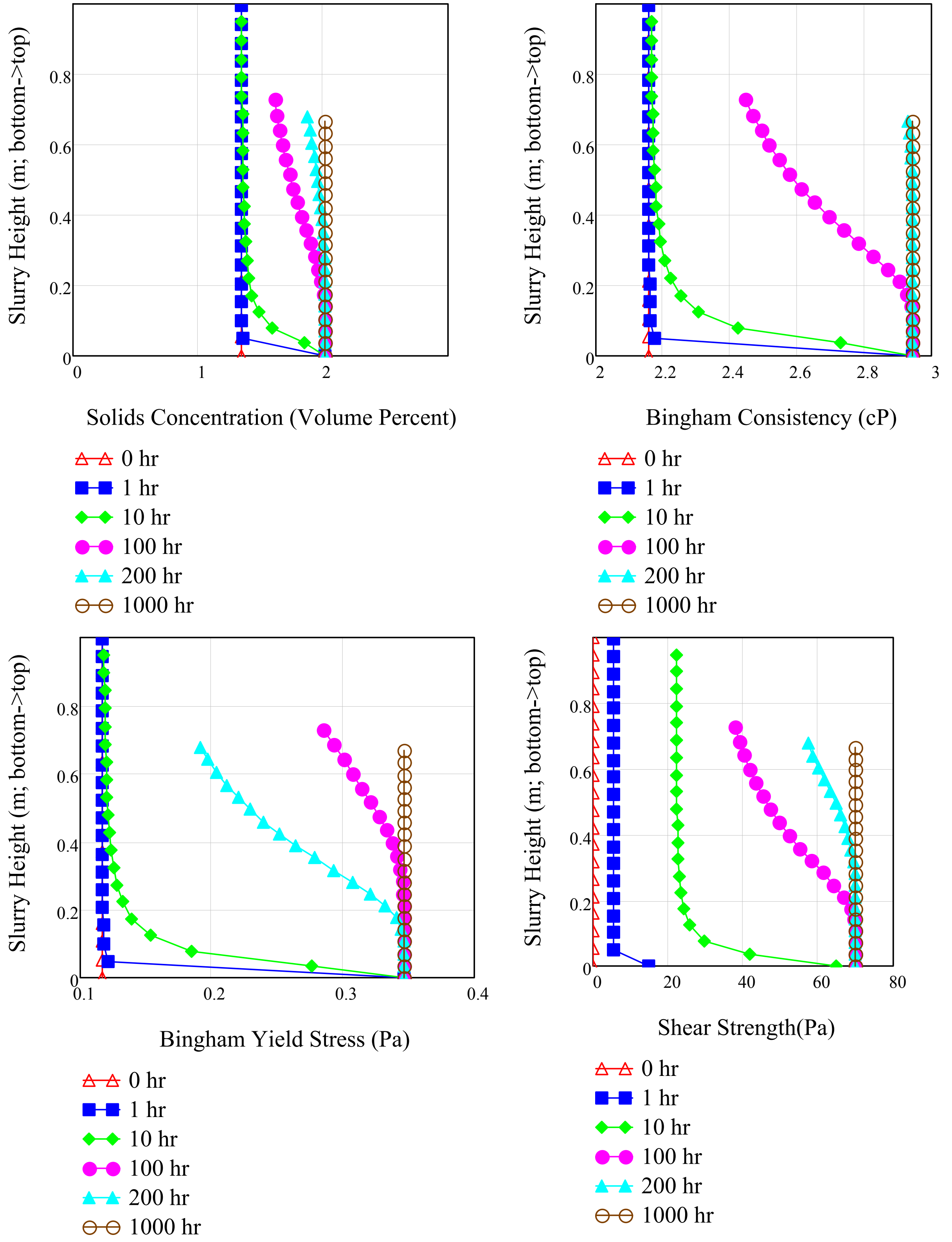
Predicted sludge properties from Hanford Tank T-203 with water dilution at a starting slurry height of 10 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



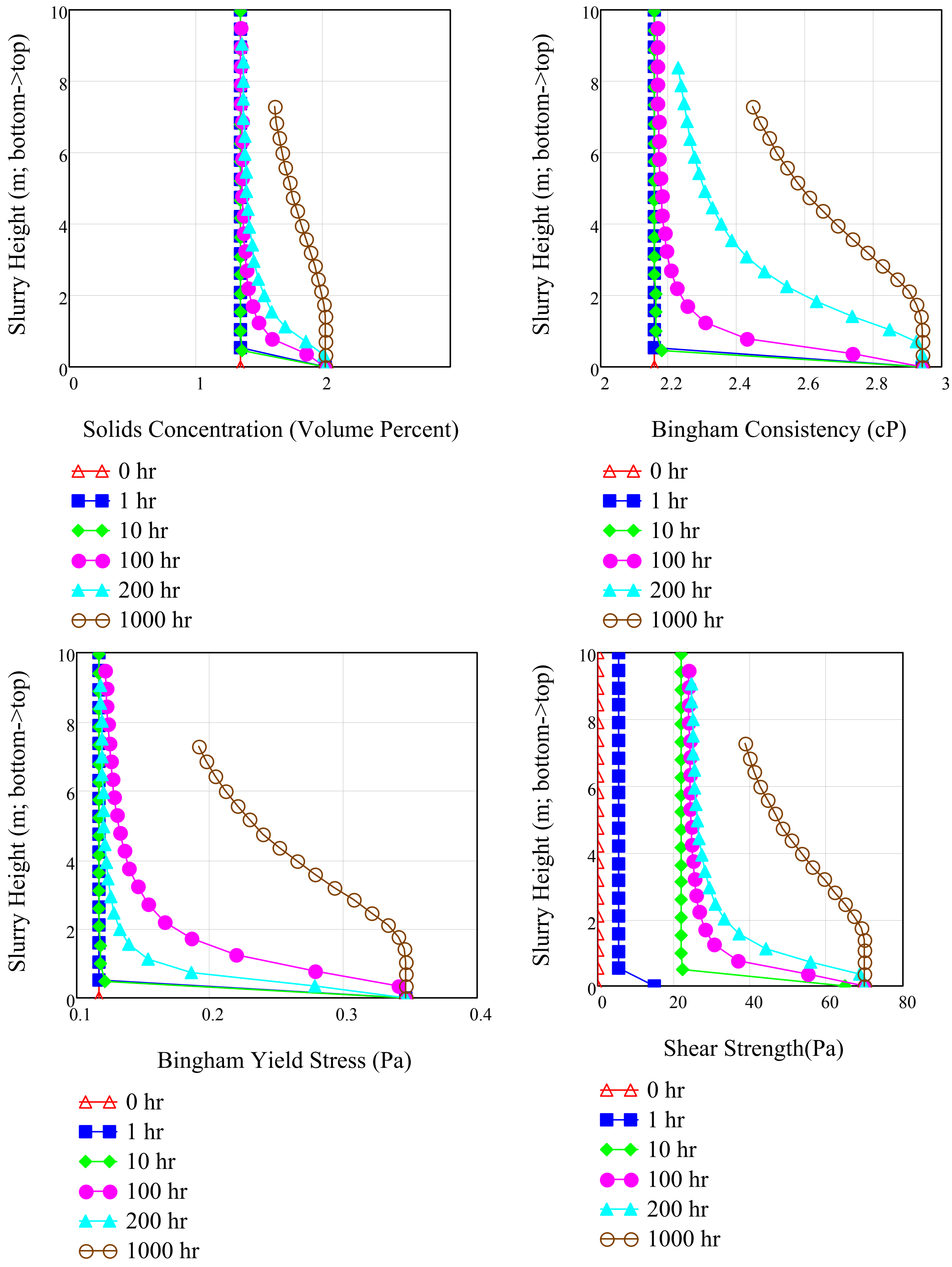
Predicted sludge properties from Hanford Tank T-110 with water dilution at a starting slurry height of 0.1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



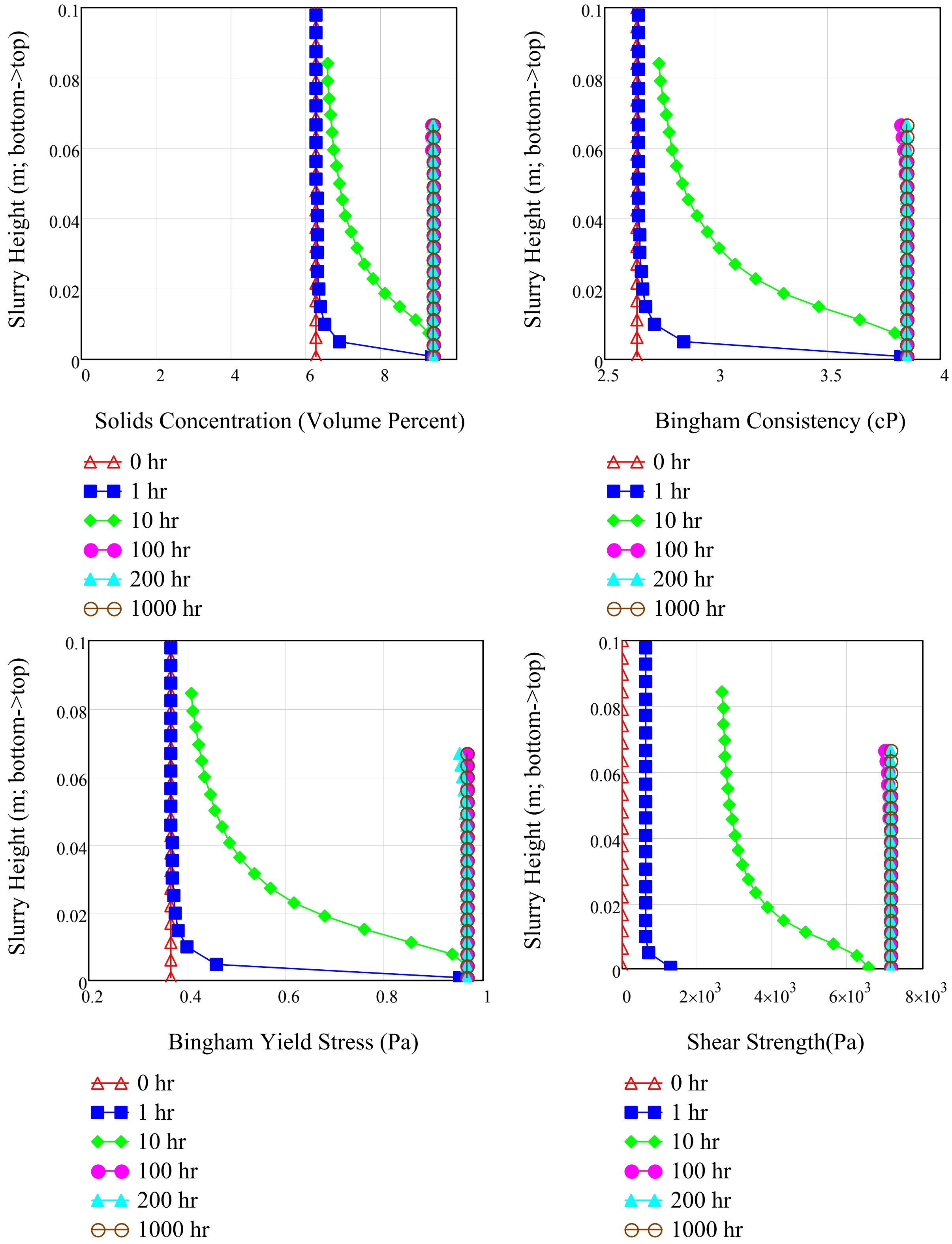
Predicted sludge properties from Hanford Tank T-110 with water dilution at a starting slurry height of 1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



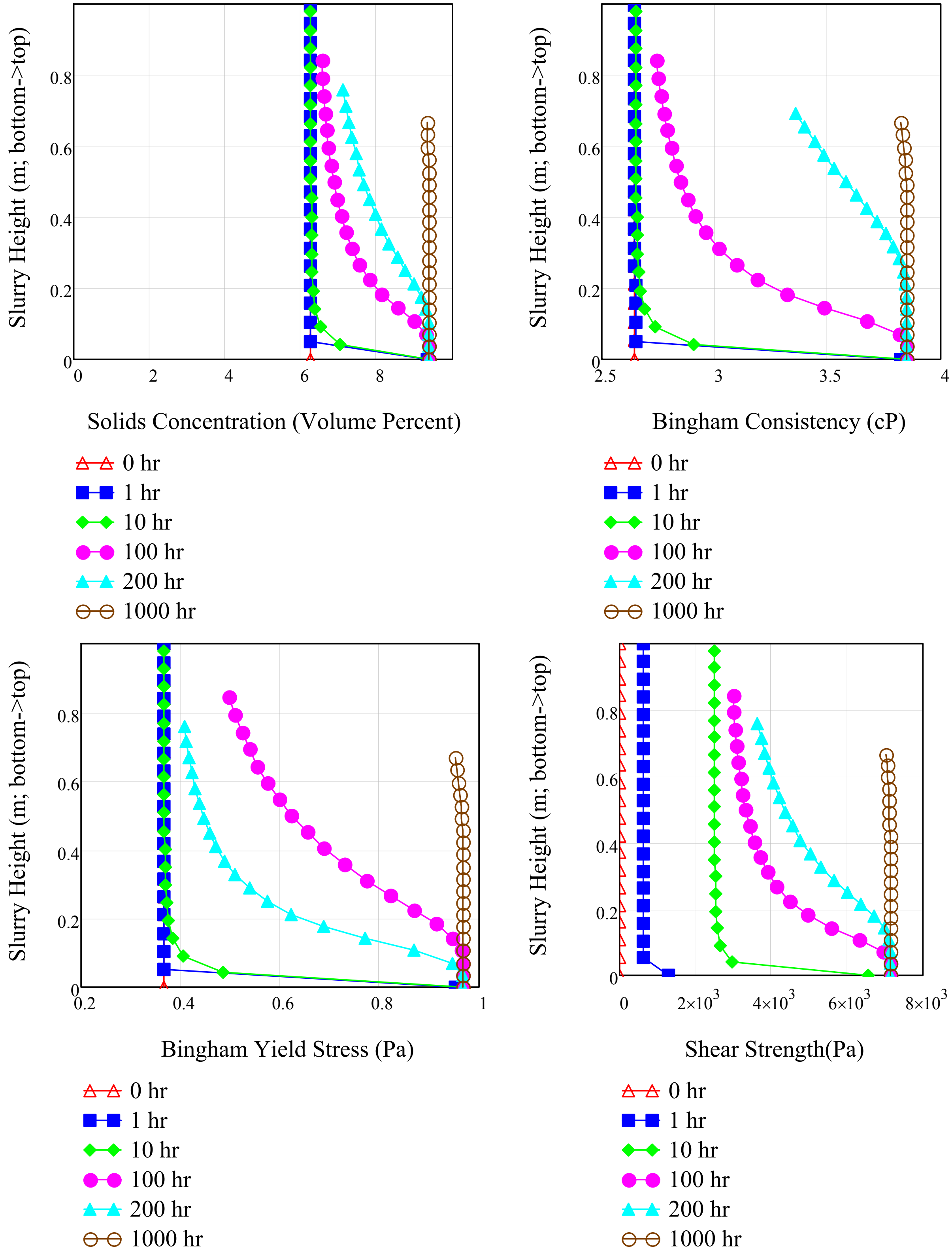
Predicted sludge properties from Hanford Tank T-110 with water dilution at a starting slurry height of 10 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



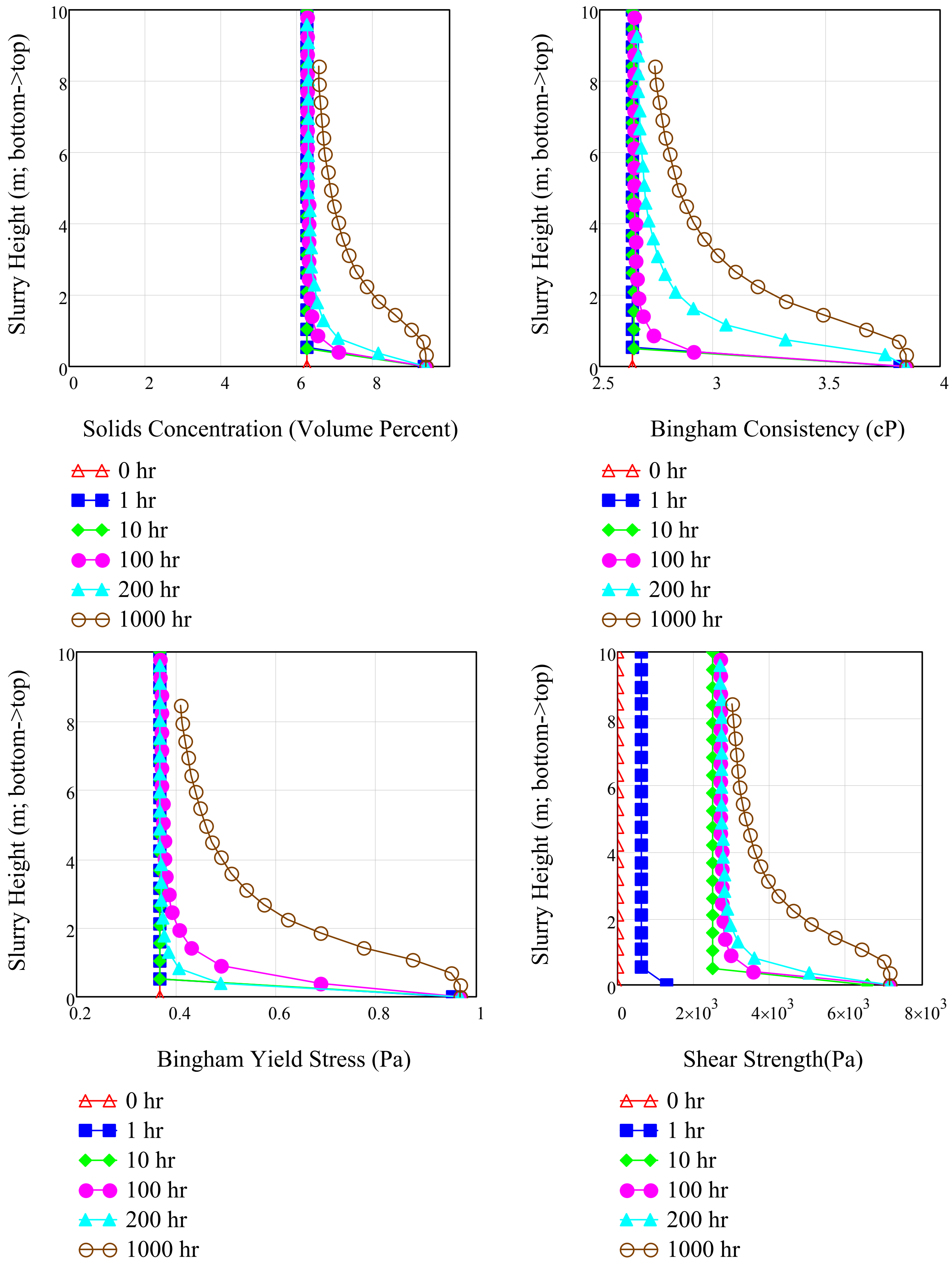
Predicted sludge properties from Hanford Tank C-104 without water dilution at a starting slurry height of 0.1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



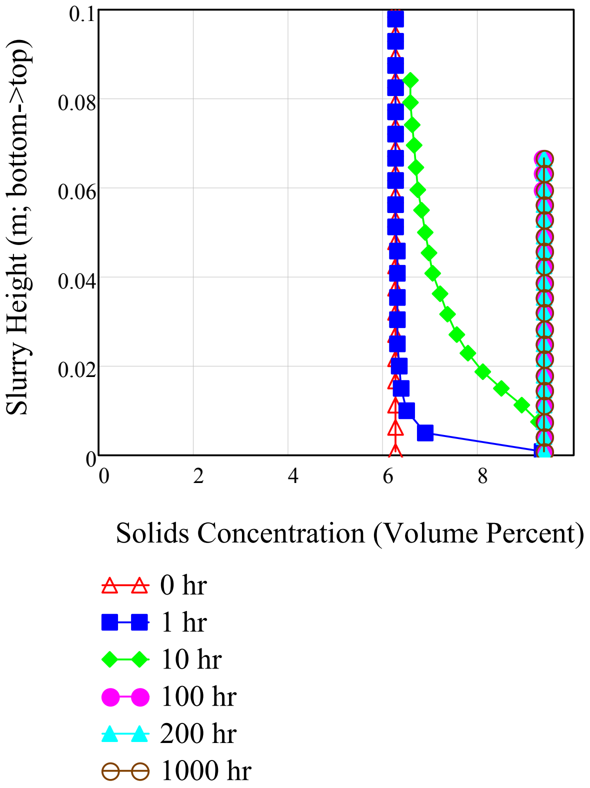
Predicted sludge properties from Hanford Tank C-104 without water dilution at a starting slurry height of 1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.

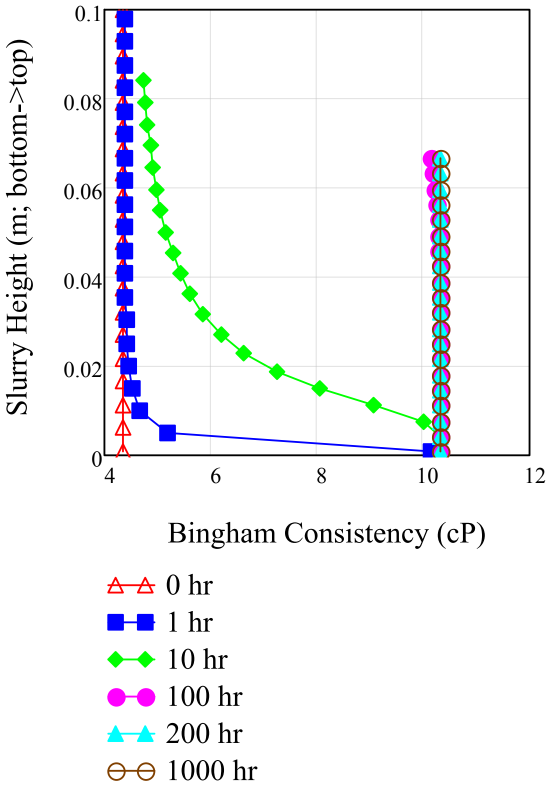


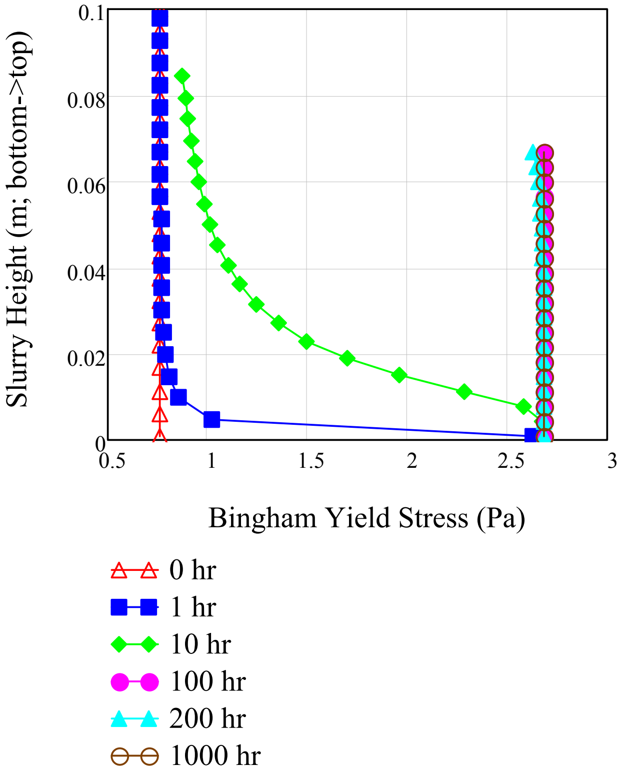
Predicted sludge properties from Hanford Tank C-104 without water dilution at a starting slurry height of 10 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.

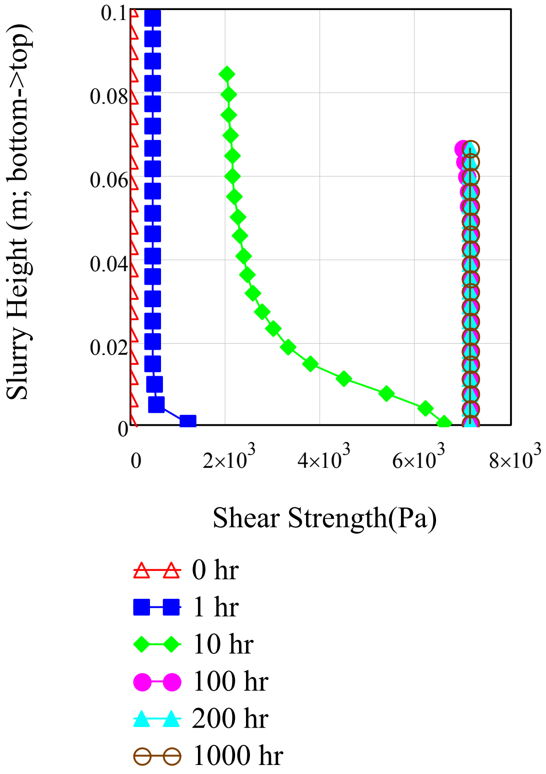


Predicted sludge properties from Hanford Tank C-104 with water dilution at a starting slurry height of 0.1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.

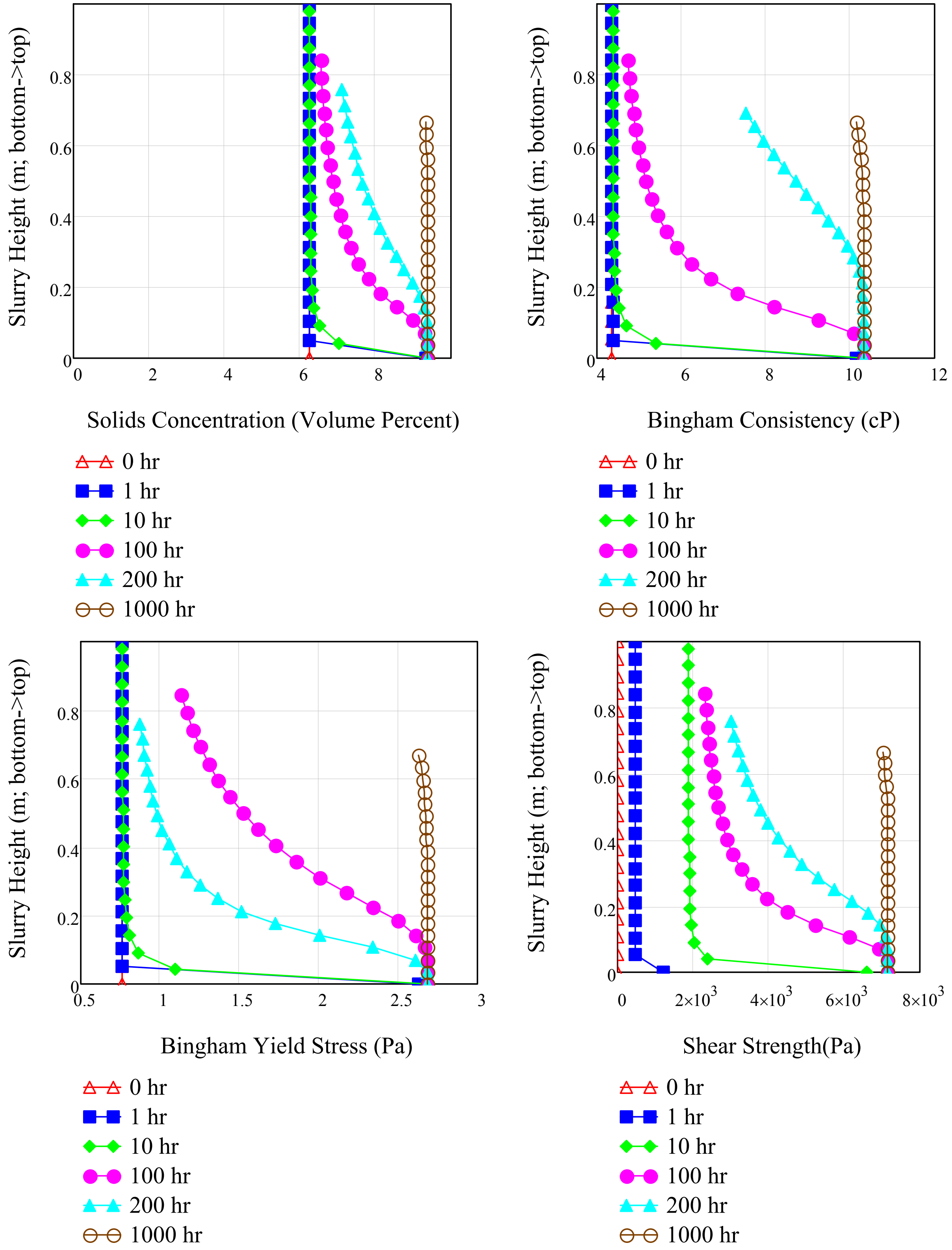




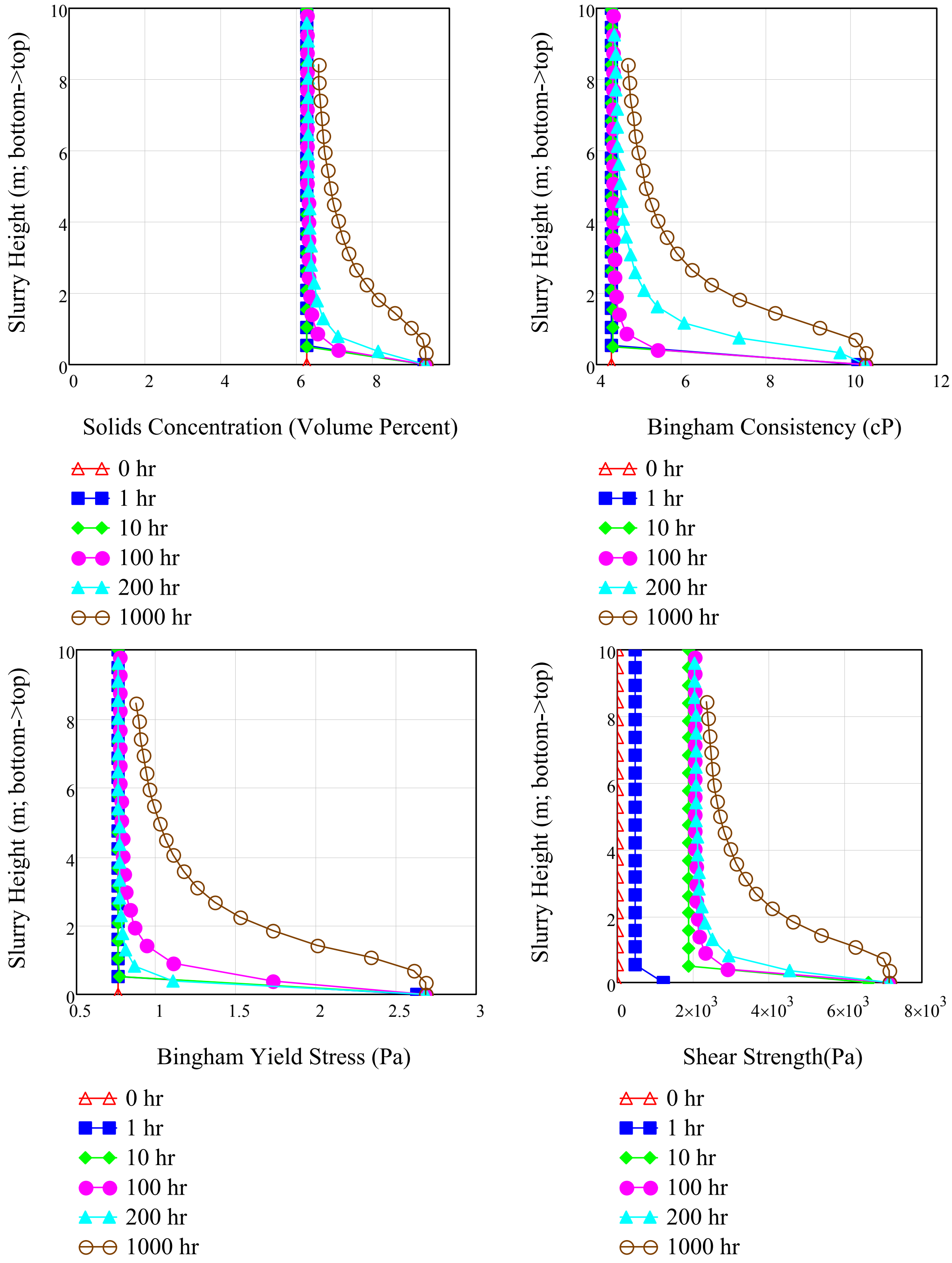




Predicted sludge properties from Hanford Tank C-104 with water dilution at a starting slurry height of 1 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



Predicted sludge properties from Hanford Tank C-104 with water dilution at a starting slurry height of 10 m with 33% volume excess supernatant from fully settled configuration; rheological properties taken at a temperature range of 20º–35ºC.



Model Chemical Data From ESP

Analyte\Sample	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**
Description	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Solid Phases (vol% of bulk)																	
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00102*	*0.00239*	*0.00239*	*0.00239*	*0.00239*	*0.00239*	*0.00239*	*0.00239*	*0.00161*	*0.00161*	*0.00239*	*0.00239*	*0.00239*	*0.00239*	*0.00239*	*0.00239*	*0.00239*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.02439*	*0.05692*	*0.05692*	*0.05692*	*0.05692*	*0.05692*	*0.05692*	*0.05692*	*0.03833*	*0.03833*	*0.05692*	*0.05692*	*0.05692*	*0.05692*	*0.05692*	*0.05692*	*0.05692*
$CaC_2O_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.07226*	*0.16861*	*0.16861*	*0.16861*	*0.16861*	*0.16861*	*0.16861*	*0.16861*	*0.11356*	*0.11356*	*0.16861*	*0.16861*	*0.16861*	*0.16861*	*0.16861*	*0.16861*	*0.16861*
FeOOH	*0.01650*	*0.03850*	*0.03850*	*0.03850*	*0.03850*	*0.03850*	*0.03850*	*0.03850*	*0.02593*	*0.02593*	*0.03850*	*0.03850*	*0.03850*	*0.03850*	*0.03850*	*0.03850*	*0.03850*
Gibbsite	*0.20629*	*0.48134*	*0.48134*	*0.48134*	*0.48134*	*0.48134*	*0.48134*	*0.48134*	*0.32417*	*0.32417*	*0.48134*	*0.48134*	*0.48134*	*0.48134*	*0.48134*	*0.48134*	*0.48134*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4$•$2H_2O$	*0.00121*	*0.00283*	*0.00283*	*0.00283*	*0.00283*	*0.00283*	*0.00283*	*0.00283*	*0.00191*	*0.00191*	*0.00283*	*0.00283*	*0.00283*	*0.00283*	*0.00283*	*0.00283*	*0.00283*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.01864*	*0.04348*	*0.04348*	*0.04348*	*0.04348*	*0.04348*	*0.04348*	*0.04348*	*0.02928*	*0.02928*	*0.04348*	*0.04348*	*0.04348*	*0.04348*	*0.04348*	*0.04348*	*0.04348*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.13427*	*0.31329*	*0.31329*	*0.31329*	*0.31329*	*0.31329*	*0.31329*	*0.31329*	*0.21099*	*0.21099*	*0.31329*	*0.31329*	*0.31329*	*0.31329*	*0.31329*	*0.31329*	*0.31329*
$Ni(OH)_2$	*0.00465*	*0.01085*	*0.01085*	*0.01085*	*0.01085*	*0.01085*	*0.01085*	*0.01085*	*0.00731*	*0.00731*	*0.01085*	*0.01085*	*0.01085*	*0.01085*	*0.01085*	*0.01085*	*0.01085*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00291*	*0.00680*	*0.00680*	*0.00680*	*0.00680*	*0.00680*	*0.00680*	*0.00680*	*0.00458*	*0.00458*	*0.00680*	*0.00680*	*0.00680*	*0.00680*	*0.00680*	*0.00680*	*0.00680*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00002*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00002*	*0.00002*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00004*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00082*	*0.00192*	*0.00192*	*0.00192*	*0.00192*	*0.00192*	*0.00192*	*0.00192*	*0.00130*	*0.00130*	*0.00192*	*0.00192*	*0.00192*	*0.00192*	*0.00192*	*0.00192*	*0.00192*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00116*	*0.00270*	*0.00270*	*0.00270*	*0.00270*	*0.00270*	*0.00270*	*0.00270*	*0.00182*	*0.00182*	*0.00270*	*0.00270*	*0.00270*	*0.00270*	*0.00270*	*0.00270*	*0.00270*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.74255*	*1.73262*	*1.73262*	*1.73262*	*1.73262*	*1.73262*	*1.73262*	*1.73262*	*1.16687*	*1.16687*	*1.73262*	*1.73262*	*1.73262*	*1.73262*	*1.73262*	*1.73262*	*1.73262*
$Na_2CO_3{\cdot}H_2O$	*4.54336*	*10.60117*	*10.60117*	*10.60117*	*10.60117*	*10.60117*	*10.60117*	*10.60117*	*7.13956*	*7.13956*	*10.60117*	*10.60117*	*10.60117*	*10.60117*	*10.60117*	*10.60117*	*10.60117*
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	*1.10472*	*2.57769*	*2.57769*	*2.57769*	*2.57769*	*2.57769*	*2.57769*	*2.57769*	*1.73600*	*1.73600*	*2.57769*	*2.57769*	*2.57769*	*2.57769*	*2.57769*	*2.57769*	*2.57769*
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*5.07169*	*11.83394*	*11.83394*	*11.83394*	*11.83394*	*11.83394*	*11.83394*	*11.83394*	*7.96980*	*7.96980*	*11.83394*	*11.83394*	*11.83394*	*11.83394*	*11.83394*	*11.83394*	*11.83394*
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*11.95*	*27.88*	*27.88*	*27.88*	*27.88*	*27.88*	*27.88*	*27.88*	*18.77*	*18.77*	*27.88*	*27.88*	*27.88*	*27.88*	*27.88*	*27.88*	*27.88*
Solids Concentration (g/L)	*278.8*	*650.6*	*650.6*	*650.6*	*650.6*	*650.6*	*650.6*	*650.6*	*438.1*	*438.1*	*650.6*	*650.6*	*650.6*	*650.6*	*650.6*	*650.6*	*650.6*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Physical Property Data

Physical Property	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***	***A-101***
Source of Data																	
Temperature (°C)	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**	**32 - 37**
Zeta Potential (mV)																	
Bulk Density (g/mL)	1.56	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.62	1.62	1.70	1.70	1.70	1.70	1.70	1.70	1.70
vol% Settled Solids																	
Density of Centrifuged Solids (g/mL)																	
vol% Centrifuged Solids																	
wt% Centrifuged Solids																	
Supernatant Density (g/mL)	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46
Density of Settled Solids (g/mL)																	
wt% Settled Supernatant																	
wt% dissolved solids in supernatant																	
wt% total solids in Centrifuged Sludge																	
wt% Total Solids																	
wt% UDS	***17.87***	***38.27***	***38.27***	***38.27***	***38.27***	***38.27***	***38.27***	***38.27***	***27.05***	***27.05***	***38.27***	***38.27***	***38.27***	***38.27***	***38.27***	***38.27***	***38.27***
Density of Solids (g/cc)	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***	***2.33***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**	**A-101**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Instrumentation	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)	***63***	***63***	***62***	***62***	***54***	***49***	***47***	***44***	***63***	***62***	***62***	***62***	***58***	***57***	***54***	***49***	***44***
Description	**Riser 15 Depth from bottom of tank is 175 inches Floating Solids**	**Riser 15 Depth from bottom of tank is 195 inches Floating Solids**	**Riser 15 Floating Solids Depth from bottom of tank is 232 inches**	**Riser 15 Floating Solids Depth from bottom of tank is 255 inches**	**Riser 15 Floating Solids Depth from bottom of tank is 295 inches**	**Riser 15 Floating Solids Depth from bottom of tank is 312 inches**	**Riser 15 Floating Solids Depth from bottom of tank is 325 inches**	**Riser 15 Floating Solids Depth from bottom of tank is 335 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 180 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 218 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 237 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 255 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 270 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 280 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 295 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 312 inches**	**Riser 24 Floating Solids Depth from bottom of tank is 345 inches**
Gelation Time/Shear Strength (Pa)																	
5 minutes																	
10 minutes																	
15 minutes																	
20 minutes																	
30 minutes																	
40 minutes																	
50 minutes																	
1 hour																	
2 hours																	
3 hours																	
4 hours																	
5 hours																	
6 hours																	
24 hours																	
32 hours																	
48 hours																	
56 hours																	
72 hours																	
Infinte time (GRE)	110	700	480	220	270	440	110	400	60	360	600	700	400	400	670	630	25

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**AN-102**	**AN-102**	**AN-102**
Description	**as received**	**as received**	**as received**
Model Basis	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**WTP-RPT-021 Rev. 1**	**WTP-RPT-021 Rev. 1**	**WTP-RPT-021 Rev. 1**
Solid Phases (vol% of bulk)			
$(NaAlO_2)_2 \bullet 2.5H_2O$	-	-	-
Ag_2CO_3	-	-	-
Bi_2O_3	***0.00010***	***0.00010***	***0.00010***
BiOCl	-	-	-
Boehmite	-	-	-
$Ca(OH)_2$	-	-	-
$Ca_5OH(PO_4)_3$	***0.00898***	***0.00898***	***0.00898***
$CaC_2O_4 \cdot H_2O$	-	-	-
$CaCO_3$	-	-	-
CaF_2	-	-	-
CrOOH	***0.00116***	***0.00116***	***0.00116***
FeOOH	***0.00187***	***0.00187***	***0.00187***
Gibbsite	***0.22125***	***0.22125***	***0.22125***
HgO	-	-	-
$KAlSiO_4$	-	-	-
$La(OH)_3$	-	-	-
$LaPO_4 \bullet 2H_2O$	***0.00003***	***0.00003***	***0.00003***
$Mn(OH)_2$	***0.00008***	***0.00008***	***0.00008***
$Mn_3(PO_4)_2$	-	-	-
$MnCO_3$	-	-	-
$Na_2U_2O_7$	***0.00085***	***0.00085***	***0.00085***
$NaAlCO_3(OH)_2$	-	-	-
$NaAlSiO_4$	-	-	-
$Ni(OH)_2$	***0.00267***	***0.00267***	***0.00267***
$Ni_3(PO_4)_2$	-	-	-
$NiC_2O_4 \bullet 2H_2O$	-	-	-
$Pb(OH)_2$	***0.00043***	***0.00043***	***0.00043***
$Pb_3(PO_4)_2$	-	-	-
$PbCO_3$	-	-	-
$Pu(OH)_4$	***0.00000***	***0.00000***	***0.00000***
SiO_2	-	-	-
$Sr_3(PO_4)_2$	-	-	-
$SrCO_3$	***0.00006***	***0.00006***	***0.00006***
TcO_2	***0.00000***	***0.00000***	***0.00000***
ZrO_2	***0.00026***	***0.00026***	***0.00026***
KNO_3	-	-	-
$Na_2C_2O_4$	***0.11439***	***0.11439***	***0.11439***
$Na_2CO_3 \cdot H_2O$	***0.30599***	***0.30599***	***0.30599***
Na_2SO_4	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-
Na_3FSO_4	***0.08019***	***0.08019***	***0.08019***
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-
$Na_6(SO_4)_2CO_3$	***0.04604***	***0.04604***	***0.04604***
NaF	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-
$NaHCO_3$	-	-	-
$NaNO_2$	-	-	-
$NaNO_3$	***0.66221***	***0.66221***	***0.66221***
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-
Total Volume % UDS	***1.4***	***1.4***	***1.4***
Solids Concentration (g/L)	***33.9***	***33.9***	***33.9***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

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Rheological Data

Model/model Parameter	***AN-102***	***AN-102***	***AN-102***
Temperature (°C)	**25**	**35**	**50**
Source of Data	***WTP-RPT-021 Rev. 1***	***WTP-RPT-021 Rev. 1***	***WTP-RPT-021 Rev. 1***
Notes			
Newtonian:			
η – Newtonian viscosity (cP)	n/m	n/m	n/m
r – correlation coefficient	n/m	n/m	n/m
Ostwald (or Power Law):			
m – the consistency coefficient (Pa·s^{-n})	0.05943	0.08108	0.05002
n – the power-law exponent	0.8135	0.7081	0.7581
r – correlation coefficient	1	0.97	0.98
Bingham Plastic:			
τ_B- the Bingham yield stress (Pa)	1.592	1.39	0.7177
η_p - the plastic viscosity (Pa·s)	0.0147	0.0099	0.0094
r – correlation coefficient	0.98	0.98	0.99
Herschel-Bulkley:			
τ_H- the yield stress (Pa)	0.84	0.2102	0.2362
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.04164	0.03547	0.0158
b - the Hershel-Bulkely power-law exponent	0.8666	0.8358	0.9362
r – correlation coefficient	1	0.91	1
n/a = not applicable			

Physical Property Data

Physical Property	***AN-102***	***AN-102***	***AN-102***
Notes	**WTP-RPT-021 Table 4.4**	**WTP-RPT-021 Table 4.4**	**WTP-RPT-021 Table 4.4**
Temperature (°C)			
Zeta Potential (mV)			
Bulk Density (g/mL)	1.411	1.411	1.411
vol% Settled Solids	22	22	22
Density of Centrifuged Solids (g/mL)	1.49	1.49	1.49
vol% Centrifuged Solids	13.4	13.4	13.4
wt% Centrifuged Solids	14.1	14.1	14.1
Supernatant Density (g/mL)	***1.40***	***1.40***	***1.40***
Density of Settled Solids (g/mL)	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m
wt% dissolved solids in supernatant	51.5	51.5	51.5
wt% total solids in Centrifuged Sludge	52.9	52.9	52.9
wt% Total Solids			
wt% UDS	2.4	2.4	2.4
Density of Solids (g/cc)	***2.34***	***2.34***	***2.34***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103	AN-103
Description	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	Supernatant (separated at 45 C)	Supernatant (separated at 45 C)	Supernatant (separated at 45 C)	10% Dilution (Water) Supernatant	10% Dilution (Water) Supernatant	10% Dilution (Water) Supernatant	26% Dilution (Water) Supernatant	26% Dilution (Water) Supernatant	26% Dilution (Water) Supernatant	Whole Tank Composite	Whole Tank Composite	Whole Tank Composite	50% Dilution of Whole Tank Composite	50% Dilution of Whole Tank Composite	50% Dilution of Whole Tank Composite	80% Dilution of Settled Solids	80% Dilution of Settled Solids	80% Dilution of Settled Solids	Supernatant from 80% Dilution of Settled Solids	Supernatant from 80% Dilution of Settled Solids	Supernatant from 80% Dilution of Settled Solids
Model Basis	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Supernatant	Supernatant	Supernatant	Supernatant	Supernatant	Supernatant	Salty	Salty	Salty	Washed	Washed	Washed	Washed	Washed	Washed	Washed	Washed	Washed
Source of Data	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153	HNF-7153
Solid Phases (vol% of bulk)																												
$(NaAlO_2)_2•2.5H_2O$	0.53757	0.53757	0.53757	0.53757	0.53757	0.53757	0.53757	-	-	-	-	-	-	-	-	-	0.29598	0.29598	0.29598	0.59406	0.59406	0.59406	0.33236	0.29912	0.29912	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	0.00114	0.00114	0.00114	0.00114	0.00114	0.00114	0.00114	-	-	-	-	-	-	-	-	-	0.00063	0.00063	0.00063	0.00126	0.00126	0.00126	0.00071	0.00064	0.00064	-	-	-
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	0.02311	0.02311	0.02311	0.02311	0.02311	0.02311	0.02311	-	-	-	-	-	-	-	-	-	0.01273	0.01273	0.01273	0.02554	0.02554	0.02554	0.01429	0.01286	0.01286	-	-	-
$CaC_2O_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	0.03301	0.03301	0.03301	0.03301	0.03301	0.03301	0.03301	-	-	-	-	-	-	-	-	-	0.01817	0.01817	0.01817	0.03648	0.03648	0.03648	0.02041	0.01837	0.01837	-	-	-
FeOOH	0.00440	0.00440	0.00440	0.00440	0.00440	0.00440	0.00440	-	-	-	-	-	-	-	-	-	0.00242	0.00242	0.00242	0.00486	0.00486	0.00486	0.00272	0.00245	0.00245	-	-	-
Gibbsite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	0.20404	0.20404	0.20404	0.20404	0.20404	0.20404	0.20404	-	-	-	-	-	-	-	-	-	0.11234	0.11234	0.11234	0.22548	0.22548	0.22548	0.12615	0.11353	0.11353	-	-	-
$La(OH)_3$	0.00285	0.00285	0.00285	0.00285	0.00285	0.00285	0.00285	-	-	-	-	-	-	-	-	-	0.00157	0.00157	0.00157	0.00315	0.00315	0.00315	0.00176	0.00159	0.00159	-	-	-
$LaPO_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	0.00182	0.00182	0.00182	0.00182	0.00182	0.00182	0.00182	-	-	-	-	-	-	-	-	-	0.00100	0.00100	0.00100	0.00202	0.00202	0.00202	0.00113	0.00102	0.00102	-	-	-
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	-	-	-	-	-	-	-	-	-	0.00027	0.00027	0.00027	0.00055	0.00055	0.00055	0.00031	0.00028	0.00028	-	-	-
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	0.00360	0.00360	0.00360	0.00360	0.00360	0.00360	0.00360	-	-	-	-	-	-	-	-	-	0.00198	0.00198	0.00198	0.00397	0.00397	0.00397	0.00222	0.00200	0.00200	-	-	-
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-	-	-	-	-	-	-	-	-	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-	-	-
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	0.00070	0.00070	0.00070	0.00070	0.00070	0.00070	0.00070	-	-	-	-	-	-	-	-	-	0.00038	0.00038	0.00038	0.00077	0.00077	0.00077	0.00043	0.00039	0.00039	-	-	-
TcO_2	0.00011	0.00011	0.00011	0.00011	0.00011	0.00011	0.00011	-	-	-	-	-	-	-	-	-	0.00006	0.00006	0.00006	0.00012	0.00012	0.00012	0.00007	0.00006	0.00006	-	-	-
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	0.54529	0.54529	0.54529	0.54529	0.54529	0.54529	0.54529	-	-	-	-	-	-	-	-	-	0.30023	0.30023	0.30023	-	-	-	-	-	-	-	-	-
$Na_2CO_3·H_2O$	3.03822	3.03822	3.03822	3.03822	3.03822	3.03822	3.03822	-	-	-	-	-	-	-	-	-	1.67281	1.67281	1.67281	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	0.32838	0.32838	0.32838	0.32838	0.32838	0.32838	0.32838	-	-	-	-	-	-	-	-	-	0.18080	0.18080	0.18080	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2·19H_2O$	0.19171	0.19171	0.19171	0.19171	0.19171	0.19171	0.19171	-	-	-	-	-	-	-	-	-	0.10555	0.10555	0.10555	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	9.82969	9.82969	9.82969	9.82969	9.82969	9.82969	9.82969	-	-	-	-	-	-	-	-	-	5.41210	5.41210	5.41210	-	-	-	-	-	-	-	-	-
$NaNO_3$	18.17279	18.17279	18.17279	18.17279	18.17279	18.17279	18.17279	-	-	-	-	-	-	-	-	-	10.00570	10.00570	10.00570	-	-	-	-	-	-	-	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	32.92	32.92	32.92	32.92	32.92	32.92	32.92	-	-	-	-	-	-	-	-	-	18.12	18.12	18.12	0.90	0.90	0.90	0.50	0.45	0.45	-	-	-
Solids Concentration (g/L)	740.1	740.1	740.1	740.1	740.1	740.1	740.1	-	-	-	-	-	-	-	-	-	407.5	407.5	407.5	25.6	25.6	25.6	14.3	12.9	12.9	-	-	-

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter								**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**
Temperature (°C)								**29**	**45**	**65**	**29**	**45**	**65**	**29**	**45**	**65**	**29**	**45**	**65**	**29**	**45**	**65**	**29**	**45**	**65**	**29**	**45**	**65**
Source of Data								**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**
Instrumentation								Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI	Haake CV20 MVI
Newtonian:																												
η – Newtonian viscosity (cP)								27.4	13	7.63	8.8	5.9	4	7.8	5.4	3.7	35.3	20.3	11.9	9.45	5.83	4.01	19.6	10.8	6.05	11.6	6.7	4.6
r – correlation coefficient																												
Ostwald (or Power Law):																												
m – the consistency coefficient (Pa·s^{-n})																												
n – the power-law exponent																												
r – correlation coefficient																												
Bingham Plastic:																												
τ_B- the Bingham yield stress (Pa)								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
η_p - the plastic viscosity (Pa·s)								***0.0274***	***0.013***	***0.00763***	***0.0088***	***0.0059***	***0.004***	***0.0078***	***0.0054***	***0.0037***	***0.0353***	***0.0203***	***0.0119***	***0.00945***	***0.00583***	***0.00401***	***0.0196***	***0.0108***	***0.00605***	***0.0116***	***0.0067***	***0.0046***
r – correlation coefficient																												
Herschel-Bulkley:																												
τ_H- the yield stress (Pa)																												
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})																												
b - the Hershel-Bulkely power-law exponent																												
r – correlation coefficient																												
n/a = not applicable																												

Physical Property Data

Physical Property	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**
Source of Data	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**	**HNF-7153**
Temperature (°C)								**29**	**45**	**95**	**29**	**45**	**95**	**29**	**45**	**95**	**29**	**45**	**95**	**29**	**45**	**95**	**29**	**45**	**95**	**29**	**45**	**95**
Zeta Potential (mV)																												
Bulk Density (g/mL)	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.58	1.58	1.58	1.52	1.52	1.52	1.46	1.46	1.46	1.63	1.63	1.63	1.42	1.42	1.42	1.43	1.43	1.43	1.42	1.42	1.42
vol% Settled Solids																	59	59	59	21	21	21	22	26	12			
Density of Centrifuged Solids (g/mL)																	1.95	1.95	1.95	1.61	1.61	1.61						
vol% Centrifuged Solids																	34	34	34	8	8	8	6	6	4			
wt% Centrifuged Solids																	41.5	41.5	41.5	8.8	8.8	8.8	7.2	8.7	4.1			
Supernatant Density (g/mL)	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.52	1.52	1.52	1.46	1.46	1.46	1.58	1.58	1.58	1.44	1.44	1.44	1.42	1.42	1.42	1.42	1.42	1.42
Density of Settled Solids (g/mL)																							1.75	1.64	1.64			
wt% Settled Supernatant																												
wt% dissolved solids in supernatant																	48.9	48.9	48.9	52.9	52.9	52.9						
wt% total solids in Centrifuged Sludge																	73.2	73.2	73.2	66	66	66						
wt% Total Solids																												
wt% UDS	***41.12***	***41.12***	***41.12***	***41.12***	***41.12***	***41.12***	***41.12***	0	0	0	0	0	0	0	0	0	25	25	25	1.8	1.8	1.8	1	0.9	0.9	***0***	***0***	***0***
Density of Solids (g/cc)	***2.25***	***2.25***	***2.25***	***2.25***	***2.25***	***2.25***	***2.25***	***2.25***	***2.25***	***2.25***	***2.85***	***2.85***	***2.85***	***2.85***	***2.85***	***2.85***	***2.25***	***2.25***	***2.25***	***2.85***	***2.85***	***2.85***	***2.85***	***2.85***	***2.85***	***2.85***	***2.85***	***2.85***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**	**AN-103**
Source of Data	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**
Instrumentation	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)	**43**	**43**	**43**	**43**	**43**	**43**	**42**
Description	**Riser 16B Depth from bottom of tank is 350 cm**	**Riser 16B Depth from bottom of tank is 300 cm**	**Riser 16B Depth from bottom of tank is 250 cm**	**Riser 1B Depth from bottom of tank is 350 cm**	**Riser 1B Depth from bottom of tank is 300 cm**	**Riser 1B Depth from bottom of tank is 250 cm Non-Convective layer**	**Riser 1B Depth from bottom of tank is 200 cm Non-convective layer**
Gelation Time/Shear Strength (Pa)							
5 minutes							
10 minutes							
15 minutes							
20 minutes							
30 minutes							
40 minutes							
50 minutes							
1 hour							
2 hours							
3 hours							
4 hours							
5 hours							
6 hours							
24 hours							
32 hours							
48 hours							
56 hours							
72 hours							
Infinte time (GRE)	60	150	220	50	125	167	188

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104
Description	**permeate**	**concentrated slurry**	**water washed slurry**	**Undiluted WTC**	**Undiluted WTC**	**Undiluted WTC**	**WTC 50% dilution**	**WTC 50% dilution**	**WTC 50% dilution**	**Settled Solids 80% Dilution**	**Settled Solids 80% Dilution**	**Settled Solids 80% Dilution**	**Undiluted Settled Solids**	**Undiluted Settled Solids**	**Undiluted Settled Solids**	**Undiluted Supernate Liquid**	**Undiluted Supernate Liquid**	**Undiluted Supernate Liquid**
Model Basis	**Salty**	**Salty**	**Salt Free**	**Salty**	**Salty**	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**WSRC-TR-2003-00295, REV. 0**	**WSRC-TR-2003-00295, REV. 0**	**WSRC-TR-2003-00295, REV. 0**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**	**HNF-3352**
Solid Phases (vol% of bulk)																		
$(NaAlO_2)_2\bullet 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	-	*0.00001*	*0.00159*	*0.00009*	*0.00009*	*0.00009*	*0.00207*	*0.00207*	*0.00207*	*0.00086*	*0.00086*	*0.00086*	*0.01059*	*0.01059*	*0.01059*	-	-	-
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	*0.00068*	*0.07822*	*0.00435*	*0.00435*	*0.00435*	*0.10136*	*0.10136*	*0.10136*	*0.04239*	*0.04239*	*0.04239*	*0.51972*	*0.51972*	*0.51972*	-	-	-
$CaC_2O_4\cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	-	*0.00168*	*0.19226*	*0.01068*	*0.01068*	*0.01068*	*0.24914*	*0.24914*	*0.24914*	*0.10421*	*0.10421*	*0.10421*	*1.27751*	*1.27751*	*1.27751*	-	-	-
FeOOH	-	*0.00017*	*0.01942*	*0.00108*	*0.00108*	*0.00108*	*0.02516*	*0.02516*	*0.02516*	*0.01053*	*0.01053*	*0.01053*	*0.12904*	*0.12904*	*0.12904*	-	-	-
Gibbsite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	*0.00008*	*0.00959*	*0.00053*	*0.00053*	*0.00053*	*0.01243*	*0.01243*	*0.01243*	*0.00520*	*0.00520*	*0.00520*	*0.06372*	*0.06372*	*0.06372*	-	-	-
$LaPO_4\bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	-	*0.00014*	*0.01624*	*0.00090*	*0.00090*	*0.00090*	*0.02104*	*0.02104*	*0.02104*	*0.00880*	*0.00880*	*0.00880*	*0.10790*	*0.10790*	*0.10790*	-	-	-
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	*0.00303*	*0.34688*	*0.01927*	*0.01927*	*0.01927*	*0.44950*	*0.44950*	*0.44950*	*0.18801*	*0.18801*	*0.18801*	*2.30487*	*2.30487*	*2.30487*	-	-	-
$Ni(OH)_2$	-	*0.00007*	*0.00842*	*0.00047*	*0.00047*	*0.00047*	*0.01091*	*0.01091*	*0.01091*	*0.00456*	*0.00456*	*0.00456*	*0.05594*	*0.05594*	*0.05594*	-	-	-
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4\bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	-	*0.00004*	*0.00448*	*0.00025*	*0.00025*	*0.00025*	*0.00580*	*0.00580*	*0.00580*	*0.00243*	*0.00243*	*0.00243*	*0.02974*	*0.02974*	*0.02974*	-	-	-
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	-	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00001*	*0.00001*	*0.00001*	*0.00000*	*0.00000*	*0.00000*	*0.00003*	*0.00003*	*0.00003*	-	-	-
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	-	*0.00001*	*0.00132*	*0.00007*	*0.00007*	*0.00007*	*0.00171*	*0.00171*	*0.00171*	*0.00072*	*0.00072*	*0.00072*	*0.00877*	*0.00877*	*0.00877*	-	-	-
TcO_2	-	*0.00000*	*0.00005*	*0.00000*	*0.00000*	*0.00000*	*0.00007*	*0.00007*	*0.00007*	*0.00003*	*0.00003*	*0.00003*	*0.00034*	*0.00034*	*0.00034*	-	-	-
ZrO_2	-	*0.00000*	*0.00015*	*0.00001*	*0.00001*	*0.00001*	*0.00020*	*0.00020*	*0.00020*	*0.00008*	*0.00008*	*0.00008*	*0.00102*	*0.00102*	*0.00102*	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	-	*0.01929*	-	*0.12258*	*0.12258*	*0.12258*	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2CO_3\cdot H_2O$	-	*0.14796*	-	*0.94043*	*0.94043*	*0.94043*	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4\cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	*0.00168*	-	*0.01068*	*0.01068*	*0.01068*	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4\cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4\cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7\cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	*0.02940*	-	*0.18686*	*0.18686*	*0.18686*	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2\cdot 19H_2O$	-	*0.01973*	-	*0.12543*	*0.12543*	*0.12543*	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	*0.00409*	-	*0.02597*	*0.02597*	*0.02597*	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	*0.27157*	-	*1.72611*	*1.72611*	*1.72611*	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4\cdot 0.25NaOH\cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	-	*0.50*	*0.68*	*3.18*	*3.18*	*3.18*	*0.88*	*0.88*	*0.88*	*0.37*	*0.37*	*0.37*	*4.51*	*4.51*	*4.51*	-	-	-
Solids Concentration (g/L)	-	*11.4*	*24.3*	*72.4*	*72.4*	*72.4*	*31.5*	*31.5*	*31.5*	*13.2*	*13.2*	*13.2*	*161.6*	*161.6*	*161.6*	-	-	-

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

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Rheological Data

Model/model Parameter	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***
Temperature (°C)	**25**	**25**	**25**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**
Source of Data	***WSRC-TR-2003-00295, REV. 0***	***WSRC-TR-2003-00295, REV. 0***	***WSRC-TR-2003-00295, REV. 0***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***	***HNF-3352***
Notes				**Page B7**	**Page B14**	**Page B21**	**Page B28**	**Page B35**	**Page B42**	**Page B49**	**Page B56**	**Page B63**	**Page B70**	**Page B78**	**Page B85**	**Page B92**	**Page B99**	**Page B106**
Newtonian:																		
η – Newtonian viscosity (cP)	3.5	3.85	n/m	2.879	14.000	7.591	8.786	5.428	4.650	27.426	12.890	7.684	56.435	25.350	15.860	16.929	8.071	4.571
r – correlation coefficient	n/m	n/m	n/m	1.000	0.999	0.997	0.999	0.997	0.997	0.999	0.999	0.992	0.999	0.996	0.979	1.000	0.995	0.997
Ostwald (or Power Law):																		
m – the consistency coefficient (Pas^{-n})	n/m	n/m	n/m	0.003	0.024	0.023	0.012	0.010	0.020	0.040	0.039	0.020	0.064	0.062	0.088	0.017	0.008	0.005
n – the power-law exponent	n/m	n/m	n/m	0.990	0.905	0.800	0.943	0.897	0.738	0.929	0.798	0.823	0.978	0.836	0.685	1.000	1.000	1.000
r – correlation coefficient	n/m	n/m	n/m	1.000	0.998	0.985	1.000	0.990	0.976	1.000	0.986	1.000	0.999	0.998	0.997	1.000	0.995	0.997
Bingham Plastic:																		
τ_B- the Bingham yield stress (Pa)	0	0	1.47	0.002	0.211	0.202	0.021	0.170	0.289	0.099	0.098	0.098	0.136	0.135	0.376	0.000	0.000	0.000
η_p - the plastic viscosity (Pas)	0.0035	0.00385	0.0019	0.003	0.013	0.007	0.009	0.005	0.003	0.027	0.013	0.007	0.056	0.025	0.014	0.017	0.008	0.005
r – correlation coefficient	n/m	n/m	n/m	1.000	0.999	0.997	0.999	0.997	0.997	0.999	0.999	0.992	0.999	0.996	0.979	1.000	0.995	0.997
Herschel-Bulkley:																		
τ_H- the yield stress (Pa)	n/m	n/m	n/m	0.000	0.198	0.194	0.010	0.169	0.291	0.000	0.000	0.003	0.001	0.001	0.001	0.001	0.000	0.000
k - the Herschel-Bulkely consistency coefficient (Pas^{-b})	n/m	n/m	n/m	0.003	0.015	0.014	0.011	0.005	0.004	0.040	0.039	0.020	0.064	0.062	0.088	0.017	0.008	0.005
b - the Hershel-Bulkely power-law exponent	n/m	n/m	n/m	0.980	0.980	0.867	0.966	1.000	0.986	0.930	0.799	0.822	0.978	0.836	0.685	1.000	1.000	1.000
r – correlation coefficient	n/m	n/m	n/m	1.000	0.999	0.991	1.000	0.997	0.996	1.000	0.986	1.000	0.999	0.998	0.997	1.000	0.995	0.997
n/a = not applicable																		

Physical Property Data

Physical Property	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***
Notes																		
Temperature (°C)	***25***	***25***	***25***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***
Zeta Potential (mV)																		
Bulk Density (g/mL)	1.26	*1.27*	***1.11***	***1.45***	***1.45***	***1.45***	1.33	1.33	1.33	***1.32***	***1.32***	***1.32***	***1.52***	***1.52***	***1.52***	***1.42***	***1.42***	***1.42***
vol% Settled Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL	***0***	***0***	***0***	***1.52***	***1.52***	***1.52***	***1.98***	***1.98***	***1.98***	***1.45***	***1.45***	***1.45***	***1.62***	***1.62***	***1.62***	***0***	***0***	***0***
vol% Centrifuged Solids	n/m	n/m	n/m	27	27	27	3	3	3	6	6	6	50	50	50	0	0	0
wt% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	***1.26***	1.26	***1.09***	1.42	1.42	1.42	1.31	1.31	1.31	1.31	1.31	1.31	1.42	1.42	1.42	1.42	1.42	1.42
Density of Settled Solids (g/mL	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m			n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	29.3	29.1	11.6	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	29.3	30	11.6	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	0	0.9	2.2	5	5	5	***2.37***	***2.37***	***2.37***	1	1	1	10.65	10.65	10.65	0	0	0
Density of Solids (g/cc)	***2.28***	***2.28***	***3.58***	***2.28***	***2.28***	***2.28***	***3.58***	***3.58***	***3.58***	***3.58***	***3.58***	***3.58***	***3.58***	***3.58***	***3.58***	***2.28***	***2.28***	***2.28***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule					*AN-104*			*AN-104*			*AN-104*			*AN-104*				
Notes:					**Table 3-2**			**Table 3-2**			**Table 3-4**			**Table 3-4**				
Temperature (°C)					**45**			**45**			**45**			**45**				
Total initial volume					30			46.5			31.2			20				
5 minutes																		
10 minutes																		
15 minutes																		
20 minutes																		
30 minutes																		
40 minutes																		
50 minutes																		
1 hour											21			18.5				
2 hours					25			12.5			14.5			18.5				
3 hours											13.2			18.5				
4 hours					18			8.2			12.5			18.5				
5 hours											12			18.5				
6 hours																		
24 hours					17			4.5			4.5			17				
32 hours					17													
48 hours					17			4						17				
56 hours					17			4										
72 hours final settled					17			4			3.5			17				

Shear Strength Data

Shear Strength Schedule																		
Source of Data																		
Notes:																		
Temperature (°C)																		
Description																		
Gelation Time/Shear Strength (Pa)																		
5 minutes																		
10 minutes																		
15 minutes																		
20 minutes																		
30 minutes																		
40 minutes																		
50 minutes																		
1 hour																		
2 hours																		
3 hours																		
4 hours																		
5 hours																		
6 hours																		
24 hours																		
32 hours																		
48 hours																		
56 hours																		
72 hours																		
Infinte time (GRE)																		

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fr

Analyte\Sample	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104	AN-104
Description	Settled Solids 80% Dilution Supernate	Settled Solids 80% Dilution Supernate	Settled Solids 80% Dilution Supernate	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ
Model Basis	Salt Free	Salt Free	Salt Free	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty
Report No/Source of Data	HNF-3352	HNF-3352	HNF-3352	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296
Solid Phases (vol% of bulk)															
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	-	-	-	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*	*0.00055*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*	*0.02709*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	-	-	-	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*	*0.06660*
FeOOH	-	-	-	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*	*0.00673*
Gibbsite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*	*0.00332*
$LaPO_4$•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	-	-	-	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*	*0.00562*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*	*0.12015*
$Ni(OH)_2$	-	-	-	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*	*0.00292*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	-	-	-	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*	*0.00155*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	-	-	-	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	-	-	-	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*	*0.00046*
TcO_2	-	-	-	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*
ZrO_2	-	-	-	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	-	-	-	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*	*0.76421*
$Na_2CO_3 \cdot H_2O$	-	-	-	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*	*5.86308*
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*	*0.06657*
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*	*1.16495*
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*	*0.78197*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*	*0.16189*
$NaNO_3$	-	-	-	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*	*10.76138*
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	-	-	-	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*	*19.80*
Solids Concentration (g/L)	-	-	-	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*	*451.1*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	***AN-104***	***AN-104***	***AN-104***												
Temperature (°C)	**25**	**45**	**65**												
Source of Data	***HNF-3352***	***HNF-3352***	***HNF-3352***												
Notes	**Page B113**	**Page B119**	**Page B127**												
Newtonian:															
η – Newtonian viscosity (cP)	17.500	8.143	5.357												
r – correlation coefficient	0.999	0.998	0.999												
Ostwald (or Power Law):															
m – the consistency coefficient (Pas^{-n})	0.019	0.010	0.005												
n – the power-law exponent	0.989	0.963	1.000												
r – correlation coefficient	0.999	0.998	0.999												
Bingham Plastic:															
τ_B- the Bingham yield stress (Pa)	0.000	0.010	0.000												
η_p - the plastic viscosity (Pas)	0.017	0.008	0.005												
r – correlation coefficient	0.999	0.998	0.999												
Herschel-Bulkley:															
τ_H- the yield stress (Pa)	0.000	0.000	0.000												
k - the Herschel-Bulkely consistency coefficient (Pas^{-b})	0.019	0.010	0.005												
b - the Hershel-Bulkely power-law exponent	0.989	0.963	1.000												
r – correlation coefficient	0.999	0.998	0.999												
n/a = not applicable															

Physical Property Data

Physical Property	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***	***AN-104***
Notes															
Temperature (°C)	***25***	***45***	***65***												
Zeta Potential (mV)															
Bulk Density (g/mL)	***1.31***	***1.31***	***1.31***	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
vol% Settled Solids	n/m	n/m	n/m												
Density of Centrifuged Solids (g/mL	***0***	***0***	***0***	0	0	0	0	0	0	0	0	0	0	0	0
vol% Centrifuged Solids	0	0	0												
wt% Centrifuged Solids	n/m	n/m	n/m												
Supernatant Density (g/mL)	1.31	1.31	1.31	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
Density of Settled Solids (g/mL	n/m	n/m	n/m												
wt% Settled Supernatant	n/m	n/m	n/m												
wt% dissolved solids in supernatant	n/m	n/m	n/m	50	50	50	50	50	50	50	50	50	50	50	50
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m												
wt% Total Solids	n/m	n/m	n/m	55	55	55	55	55	55	55	55	55	55	55	55
wt% UDS	0	0	0	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***	***28.37405002***
Density of Solids (g/cc)	***3.58***	***3.58***	***3.58***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule															
Notes:															
Temperature (°C)															
Total initial volume															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours final settled															

Shear Strength Data

Shear Strength Schedule				**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**	**AN-104**
Source of Data				**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**
Notes:				**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)				**44**	**46**	**47**	**46**	**45**	**44**	**44**	**46**	**47**	**46**	**45**	**44**
Description				**Riser 16B Depth from bottom of tank is 350 cm**	**Riser 16B Depth from bottom of tank is 300 cm**	**Riser 16B Depth from bottom of tank is 250 cm**	**Riser 16B Depth from bottom of tank is 200 cm**	**Riser 16B Depth from bottom of tank is 150 cm**	**Riser 16B Depth from bottom of tank is 100 cm**	**Riser 1B Depth from bottom of tank is 350 cm**	**Riser 1B Depth from bottom of tank is 300 cm**	**Riser 1B Depth from bottom of tank is 250 cm**	**Riser 1B Depth from bottom of tank is 200 cm**	**Riser 1B Depth from bottom of tank is 150 cm**	**Riser 1B Depth from bottom of tank is 100 cm**
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours															
Infinte time (GRE)				10	30	70	115	162	220	45	72	90	100	115	132

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**
Description	**Undiluted WTC**	**Undiluted WTC**	**Undiluted WTC**	**WTC 50% dilution**	**WTC 50% dilution**	**WTC 50% dilution**	**Dilution**	**Dilution**	**Dilution**	**Undiluted Settled Solids**	**Undiluted Settled Solids**	**Undiluted Settled Solids**	**Liquid**	**Liquid**	**Liquid**
Model Basis	**Salty**	**Salty**	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**
Solid Phases (vol% of bulk)															
$(NaAlO_2)_2•2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00032*	*0.00032*	*0.00032*	*0.00035*	*0.00035*	*0.00035*	*0.00202*	*0.00202*	*0.00202*	*0.00041*	*0.00041*	*0.00041*	-	-	-
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.03600*	*0.03600*	*0.03600*	*0.03950*	*0.03950*	*0.03950*	*0.23032*	*0.23032*	*0.23032*	*0.04629*	*0.04629*	*0.04629*	-	-	-
$CaC_2O_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.04971*	*0.04971*	*0.04971*	*0.05453*	*0.05453*	*0.05453*	*0.31801*	*0.31801*	*0.31801*	*0.06391*	*0.06391*	*0.06391*	-	-	-
FeOOH	*0.00349*	*0.00349*	*0.00349*	*0.00383*	*0.00383*	*0.00383*	*0.02233*	*0.02233*	*0.02233*	*0.00449*	*0.00449*	*0.00449*	-	-	-
Gibbsite	*0.56534*	*0.56534*	*0.56534*	*0.62023*	*0.62023*	*0.62023*	*3.61681*	*3.61681*	*3.61681*	*0.72687*	*0.72687*	*0.72687*	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4•2H_2O$	*0.00042*	*0.00042*	*0.00042*	*0.00046*	*0.00046*	*0.00046*	*0.00269*	*0.00269*	*0.00269*	*0.00054*	*0.00054*	*0.00054*	-	-	-
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.00143*	*0.00143*	*0.00143*	*0.00157*	*0.00157*	*0.00157*	*0.00917*	*0.00917*	*0.00917*	*0.00184*	*0.00184*	*0.00184*	-	-	-
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.00011*	*0.00011*	*0.00011*	*0.00013*	*0.00013*	*0.00013*	*0.00073*	*0.00073*	*0.00073*	*0.00015*	*0.00015*	*0.00015*	-	-	-
$Ni(OH)_2$	*0.00103*	*0.00103*	*0.00103*	*0.00113*	*0.00113*	*0.00113*	*0.00659*	*0.00659*	*0.00659*	*0.00132*	*0.00132*	*0.00132*	-	-	-
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00090*	*0.00090*	*0.00090*	*0.00098*	*0.00098*	*0.00098*	*0.00574*	*0.00574*	*0.00574*	*0.00115*	*0.00115*	*0.00115*	-	-	-
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00001*	*0.00001*	*0.00001*	*0.00000*	*0.00000*	*0.00000*	-	-	-
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00024*	*0.00024*	*0.00024*	*0.00026*	*0.00026*	*0.00026*	*0.00153*	*0.00153*	*0.00153*	*0.00031*	*0.00031*	*0.00031*	-	-	-
TcO_2	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00005*	*0.00005*	*0.00005*	*0.00001*	*0.00001*	*0.00001*	-	-	-
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.32204*	*0.32204*	*0.32204*	-	-	-	-	-	-	*0.41405*	*0.41405*	*0.41405*	-	-	-
$Na_2CO_3·H_2O$	*2.98997*	*2.98997*	*2.98997*	-	-	-	-	-	-	*3.84425*	*3.84425*	*3.84425*	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	*0.30222*	*0.30222*	*0.30222*	-	-	-	-	-	-	*0.38856*	*0.38856*	*0.38856*	-	-	-
$Na_3NO_3SO_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2·19H_2O$	*0.53076*	*0.53076*	*0.53076*	-	-	-	-	-	-	*0.68240*	*0.68240*	*0.68240*	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*3.36854*	*3.36854*	*3.36854*	-	-	-	-	-	-	*4.33098*	*4.33098*	*4.33098*	-	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*8.17*	*8.17*	*8.17*	*0.72*	*0.72*	*0.72*	*4.22*	*4.22*	*4.22*	*10.51*	*10.51*	*10.51*	-	-	-
Solids Concentration (g/L)	***186.0***	***186.0***	***186.0***	***19.5***	***19.5***	***19.5***	***114.0***	***114.0***	***114.0***	***239.2***	***239.2***	***239.2***	-	-	-

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***	***AN-105***
Temperature (°C)	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**
Source of Data	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**
Notes	**Page A29**	**Page A37**	**Page A43**	**Page A6**	**Page A15**	**Page A22**	**Page A50**	**Page A57**	**Page A64**	**Page A71**	**Page A78**	**Page A85**	**Table 2.3**	**Table 2.3**	**Table 2.3**
Newtonian:															
η – Newtonian viscosity (cP)	19.428	10.006	6.436	6.000	3.643	2.543	7.145	3.857	2.652	50.878	23.851	15.785	12.300	6.300	3.500
r – correlation coefficient	1.000	1.000	0.998	1.000	0.997	0.994	0.997	0.991	0.994	0.994	0.999	0.997			
Ostwald (or Power Law):															
m – the consistency coefficient (Pa·s^{-n})	0.020	0.017	0.011	0.006	0.006	0.003	0.009	0.004	0.003	0.068	0.057	0.065			
n – the power-law exponent	0.996	0.899	0.895	0.995	0.907	1.000	0.961	1.000	0.953	0.947	0.841	0.742			
r – correlation coefficient	1.000	0.998	0.992	1.000	0.996	0.994	0.998	0.991	0.994	0.996	0.996	0.994			
Bingham Plastic:															
τ_B- the Bingham yield stress (Pa)	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.543	0.581	0.000	0.000	0.000
η_p - the plastic viscosity (Pa·s)	0.019	0.010	0.006	0.006	0.004	0.003	0.007	0.004	0.003	0.051	0.022	0.013	***0.012***	***0.006***	***0.004***
r – correlation coefficient	1.000	1.000	0.998	1.000	0.997	0.994	0.997	0.991	0.994	0.994	0.999	0.997			
Herschel-Bulkley:															
τ_H- the yield stress (Pa)	0.028	0.028	0.041	0.000	0.000	0.000	0.035	0.028	0.017	0.025	0.512	0.496			
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.020	0.017	0.010	0.006	0.006	0.003	0.007	0.004	0.003	0.051	0.026	0.025			
b - the Hershel-Bulkely power-law exponent	0.997	0.905	0.912	1.000	0.913	1.000	0.990	1.000	0.993	0.998	0.966	0.888			
r – correlation coefficient	1.000	0.998	0.993	1.000	0.996	0.994	0.997	0.991	0.994	0.994	1.000	1.000			
n/a = not applicable															

Physical Property Data

Physical Property	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**
Notes															
Temperature (°C)	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***
Zeta Potential (mV)															
Bulk Density (g/mL)	1.49	1.49	1.49	1.33	1.33	1.33	1.34	1.34	1.34	1.51	1.51	1.51	***1.42***	***1.42***	***1.42***
vol% Settled Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	1.63	1.63	1.63	1.49	1.49	1.49	1.44	1.44	1.44	1.79	1.79	1.79	***0***	***0***	***0***
vol% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0	0	0
wt% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	1.42	1.42	1.42	1.32	1.32	1.32	1.28	1.28	1.28	1.42	1.42	1.42	1.42	1.42	1.42
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m			n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	***47.85***	***47.85***	***47.85***	***44.48***	***44.48***	***44.48***	***43.13***	***43.13***	***43.13***	***47.85***	***47.85***	***47.85***	***47.85***	***47.85***	***47.85***
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	***12.49***	***12.49***	***12.49***	***1.47***	***1.47***	***1.47***	***8.50***	***8.50***	***8.50***	***15.84***	***15.84***	***15.84***	0	0	0
Density of Solids (g/cc)	***2.28***	***2.28***	***2.28***	***2.70***	***2.70***	***2.70***	***2.70***	***2.70***	***2.70***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule		*AN-105*			*AN-105*		*AN-105*			*AN-105*					
Notes:		**from Table 3-1c; times are estimates**			**from Table 3-1c; times are estimates**		**actually 75% dilution from Table 3-3c; times are estimates**			**from Table 3-3c; times are estimates**					
Temperature (°C)		**45**			**45**		**25**			**25**					
Total initial volume		20			29.2		25			25					
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours		15			7										
4 hours															
5 hours															
6 hours		17.5													
24 hours		11			3.5		4.5			12					
32 hours															
48 hours															
56 hours															
72 hours final settled							3.5			10.5					

Shear Strength Data

Shear Strength Schedule															
Source of Data															
Notes:															
Temperature (°C)															
Description															
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours															
Infinte time (GRE)															

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**
Description	**dilution by volume**	**dilution by volume**	**dilution by volume**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**
Model Basis	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**
Solid Phases (vol% of bulk)																
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	-	-	-	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*	*0.00077*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*	*0.08743*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	-	-	-	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*	*0.12072*
FeOOH	-	-	-	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*	*0.00848*
Gibbsite	-	-	-	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*	*1.37297*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4$•$2H_2O$	-	-	-	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*	*0.00102*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	-	-	-	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*	*0.00348*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*	*0.00028*
$Ni(OH)_2$	-	-	-	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*	*0.00250*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	-	-	-	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*	*0.00218*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	-	-	-	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	-	-	-	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*	*0.00058*
TcO_2	-	-	-	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	-	-	-	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*	*0.78210*
$Na_2CO_3 \cdot H_2O$	-	-	-	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*	*7.26135*
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*	*0.73395*
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*	*1.28899*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*	*8.18075*
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	-	-	-	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*	*19.85*
Solids Concentration (g/L)	**-**	**-**	**-**	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***	***451.8***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	*AN-105*	*AN-105*	*AN-105*													
Temperature (°C)	**25**	**45**	**65**													
Source of Data	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**	**HNF-SD-WM-DTR-046 rev 0**													
Notes	**Table 2.3**	**Table 2.3**	**Table 2.3**													
Newtonian:																
η – Newtonian viscosity (cP)	9.400	4.200	2.400													
r – correlation coefficient																
Ostwald (or Power Law):																
m – the consistency coefficient (Pa·s^{-n})																
n – the power-law exponent																
r – correlation coefficient																
Bingham Plastic:																
τ_B- the Bingham yield stress (Pa)	0.000	0.000	0.000													
η_p - the plastic viscosity (Pa·s)	***0.009***	***0.004***	***0.002***													
r – correlation coefficient																
Herschel-Bulkley:																
τ_H- the yield stress (Pa)																
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})																
b - the Hershel-Bulkely power-law exponent																
r – correlation coefficient																
n/a = not applicable																

Physical Property Data

Physical Property	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**	**AN-105**
Notes																
Temperature (°C)	***25***	***45***	***65***													
Zeta Potential (mV)																
Bulk Density (g/mL)	***1.35***	***1.35***	***1.35***	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
vol% Settled Solids	n/m	n/m	n/m													
Density of Centrifuged Solids (g/mL)	***0***	***0***	***0***	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
vol% Centrifuged Solids	0	0	0													
wt% Centrifuged Solids	n/m	n/m	n/m													
Supernatant Density (g/mL)	***1.35***	***1.35***	***1.35***	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
Density of Settled Solids (g/mL)	n/m	n/m	n/m													
wt% Settled Supernatant	n/m	n/m	n/m													
wt% dissolved solids in supernatant	***45.49***	***45.49***	***45.49***	50	50	50	50	50	50	50	50	50	50	50	50	50
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	59	59	59	59	59	59	59	59	59	59	59	59	59
wt% Total Solids	n/m	n/m	n/m													
wt% UDS	0	0	0	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***	***28.42***
Density of Solids (g/cc)	***2.70***	***2.70***	***2.70***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule																
Notes:																
Temperature (°C)																
Total initial volume																
5 minutes																
10 minutes																
15 minutes																
20 minutes																
30 minutes																
40 minutes																
50 minutes																
1 hour																
2 hours																
3 hours																
4 hours																
5 hours																
6 hours																
24 hours																
32 hours																
48 hours																
56 hours																
72 hours final settled																

Shear Strength Data

Shear Strength Schedule				AN-105	AN-105	AN-105	AN-105	AN-105	AN-105	AN-105	AN-105	AN-105	AN-105	AN-105	AN-105	AN-105
Source of Data				RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296	RPP-6655 PNNL-11296
Notes:				Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer
Temperature (°C)				42	43	42	42	40	39	36	41	42	43	42	42	40
Description				Riser 16B Depth from bottom of tank is 350 cm	Riser 16B Depth from bottom of tank is 300 cm	Riser 16B Depth from bottom of tank is 250 cm	Riser 16B Depth from bottom of tank is 200 cm	Riser 16B Depth from bottom of tank is 150 cm	Riser 16B Depth from bottom of tank is 100 cm	Riser 16B Depth from bottom of tank is 50 cm	Riser 1B Depth from bottom of tank is 400 cm	Riser 1B Depth from bottom of tank is 350 cm	Riser 1B Depth from bottom of tank is 300 cm	Riser 1B Depth from bottom of tank is 250 cm	Riser 1B Depth from bottom of tank is 200 cm	Riser 1B Depth from bottom of tank is 150 cm
Gelation Time/Shear Strength (Pa)																
5 minutes																
10 minutes																
15 minutes																
20 minutes																
30 minutes																
40 minutes																
50 minutes																
1 hour																
2 hours																
3 hours																
4 hours																
5 hours																
6 hours																
24 hours																
32 hours																
48 hours																
56 hours																
72 hours																
Infinte time (GRE)				35	70	100	125	145	160	173	50	90	133	165	188	205

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AN-107

Model Chemical Data From ESP

Analyte\Sample	**AN-107**	**AN-107**
Description	**as received**	**as received**
Model Basis	**Salty**	**Salty**
Report No/Source of Data	**WSRC-TR-2003-00210, REV 0**	**WSRC-TR-2003-00210, REV 0**
Solid Phases (vol% of bulk)		
$(NaAlO_2)_2$•$2.5H_2O$	-	-
Ag_2CO_3	*0.00000*	*0.00000*
Bi_2O_3	*0.00001*	*0.00001*
BiOCl	-	-
Boehmite	-	-
$Ca(OH)_2$	-	-
$Ca_5OH(PO_4)_3$	-	-
$CaC_2O_4 \cdot H_2O$	-	-
$CaCO_3$	-	-
CaF_2	*0.00359*	*0.00359*
CrOOH	*0.00051*	*0.00051*
FeOOH	*0.01104*	*0.01104*
Gibbsite	-	-
HgO	-	-
$KAlSiO_4$	-	-
$La(OH)_3$	-	-
$LaPO_4$•$2H_2O$	*0.00011*	*0.00011*
$Mn(OH)_2$	-	-
$Mn_3(PO_4)_2$	-	-
$MnCO_3$	*0.00406*	*0.00406*
$Na_2U_2O_7$	-	-
$NaAlCO_3(OH)_2$	*0.16510*	*0.16510*
$NaAlSiO_4$	-	-
$Ni(OH)_2$	*0.00197*	*0.00197*
$Ni_3(PO_4)_2$	-	-
NiC_2O_4•$2H_2O$	-	-
$Pb(OH)_2$	*0.00062*	*0.00062*
$Pb_3(PO_4)_2$	-	-
$PbCO_3$	-	-
$Pu(OH)_4$	*0.00000*	*0.00000*
SiO_2	-	-
$Sr_3(PO_4)_2$	-	-
$SrCO_3$	*0.00002*	*0.00002*
TcO_2	*0.00000*	*0.00000*
ZrO_2	*0.00023*	*0.00023*
KNO_3	-	-
$Na_2C_2O_4$	-	-
$Na_2CO_3 \cdot H_2O$	-	-
Na_2SO_4	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-
Na_3FSO_4	*0.04934*	*0.04934*
$Na_3NO_3SO_4 \cdot H_2O$	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-
$Na_6(SO_4)_2CO_3$	-	-
NaF	*0.02402*	*0.02402*
$NaF(PO_4)_2 \cdot 19H_2O$	-	-
$NaHCO_3$	-	-
$NaNO_2$	-	-
$NaNO_3$	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-
Total Volume % UDS	*0.26*	*0.26*
Solids Concentration (g/L)	*6.9*	*6.9*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AN-107

Rheological Data

Model/model Parameter	**AN-107**	**AN-107**
Temperature (°C)	**25**	**40**
Source of Data	**WSRC-TR-2003-00210, REV 0**	**WSRC-TR-2003-00210, REV 0**
Notes		
Newtonian:		
η – Newtonian viscosity (cP)	n/m	n/m
r – correlation coefficient	n/m	n/m
Ostwald (or Power Law):		
m – the consistency coefficient (Pa·s^{-n})	n/m	n/m
n – the power-law exponent	n/m	n/m
r – correlation coefficient	n/m	n/m
Bingham Plastic:		
τ_B- the Bingham yield stress (Pa)	1.48	1.07
η_p - the plastic viscosity (Pa·s)	0.00936	0.00587
r – correlation coefficient	0.997	0.993
Herschel-Bulkley:		
τ_H- the yield stress (Pa)	n/m	n/m
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	n/m	n/m
b - the Hershel-Bulkely power-law exponent	n/m	n/m
r – correlation coefficient	n/m	n/m
n/a = not applicable		

Physical Property Data

Physical Property	**AN-107**	**AN-107**
Notes		
Temperature (°C)	***25***	***40***
Zeta Potential (mV)		
Bulk Density (g/mL)	1.42	***1.42***
vol% Settled Solids	n/m	n/m
Density of Centrifuged Solids (g/mL)	***1.48***	***1.46***
vol% Centrifuged Solids	8	8
wt% Centrifuged Solids	6.88	6.88
Supernatant Density (g/mL)	1.42	***1.42***
Density of Settled Solids (g/mL)	n/m	n/m
wt% Settled Supernatant	n/m	n/m
wt% dissolved solids in supernatant	49.25	49.25
wt% total solids in Centrifuged Sludge	n/m	n/m
wt% Total Solids	49.5	49.5
wt% UDS	0.483	0.483
Density of Solids (g/cc)	***2.63***	***2.63***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**AP-104**	**AP-104**
Description	**as received**	**as received**
Model Basis	**Salty**	**Salty**
Report No/Source of Data	**WTP-RPT-069, Rev. 0 (PNWD-3334)**	**WTP-RPT-069, Rev. 0 (PNWD-3334)**
Solid Phases (vol% of bulk)		
$(NaAlO_2)_2 \cdot 2.5H_2O$	-	-
Ag_2CO_3	-	-
Bi_2O_3	-	-
BiOCl	-	-
Boehmite	-	-
$Ca(OH)_2$	-	-
$Ca_5OH(PO_4)_3$	-	-
$CaC_2O_4 \cdot H_2O$	-	-
$CaCO_3$	-	-
CaF_2	-	-
CrOOH	-	-
FeOOH	-	-
Gibbsite	-	-
HgO	-	-
$KAlSiO_4$	-	-
$La(OH)_3$	-	-
$LaPO_4 \cdot 2H_2O$	-	-
$Mn(OH)_2$	-	-
$Mn_3(PO_4)_2$	-	-
$MnCO_3$	-	-
$Na_2U_2O_7$	-	-
$NaAlCO_3(OH)_2$	-	-
$NaAlSiO_4$	-	-
$Ni(OH)_2$	-	-
$Ni_3(PO_4)_2$	-	-
$NiC_2O_4 \cdot 2H_2O$	-	-
$Pb(OH)_2$	-	-
$Pb_3(PO_4)_2$	-	-
$PbCO_3$	-	-
$Pu(OH)_4$	-	-
SiO_2	-	-
$Sr_3(PO_4)_2$	-	-
$SrCO_3$	-	-
TcO_2	-	-
ZrO_2	-	-
KNO_3	-	-
$Na_2C_2O_4$	-	-
$Na_2CO_3 \cdot H_2O$	-	-
Na_2SO_4	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-
Na_3FSO_4	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-
$Na_6(SO_4)_2CO_3$	-	-
NaF	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-
$NaHCO_3$	-	-
$NaNO_2$	-	-
$NaNO_3$	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-
Total Volume % UDS	-	-
Solids Concentration (g/L)	**-**	**-**

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AP-104

Rheological Data

Model/model Parameter	***AP-104***	***AP-104***
Temperature (°C)	**25**	**40**
Source of Data	***WTP-RPT-069, Rev. 0 (PNWD-3334)***	***WTP-RPT-069, Rev. 0 (PNWD-3334)***
Notes		
Newtonian:		
η – Newtonian viscosity (cP)	3.68	2.37
r – correlation coefficient	0.9982	0.9976
Ostwald (or Power Law):		
m – the consistency coefficient ($Pa \cdot s^{-n}$)	0.0048	0.00324
n – the power-law exponent	0.959	0.9525
r – correlation coefficient	0.999	0.9988
Bingham Plastic:		
τ_B- the Bingham yield stress (Pa)	0.049	0.03798
η_p - the plastic viscosity (Pa·s)	0.0036	0.00231
r – correlation coefficient	0.9988	0.9984
Herschel-Bulkley:		
τ_H- the yield stress (Pa)	0	0
k - the Herschel-Bulkely consistency coefficient ($Pa \cdot s^{-b}$)	0.0048	0.00299
b - the Hershel-Bulkely power-law exponent	0.959	0.9635
r – correlation coefficient	0.999	0.9986
n/a = not applicable		

Physical Property Data

Physical Property	***AP-104***	***AP-104***
Notes		
Temperature (°C)	***25***	***40***
Zeta Potential (mV)		
Bulk Density (g/mL)	1.26	***1.26***
vol% Settled Solids	n/m	n/m
Density of Centrifuged Solids (g/mL)	n/m	n/m
vol% Centrifuged Solids	n/m	n/m
wt% Centrifuged Solids	n/m	n/m
Supernatant Density (g/mL)	1.30	1.30
Density of Settled Solids (g/mL)	n/m	n/m
wt% Settled Supernatant	n/m	n/m
wt% dissolved solids in supernatant	32	32
wt% total solids in Centrifuged Sludge	n/m	n/m
wt% Total Solids	31.2	31.2
wt% UDS	0.00	0.00
Density of Solids (g/cc)	***2.30***	***2.30***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101
Description	**Undiluted Supernate Liquid**	**Undiluted Supernate Liquid**	**Undiluted Supernate Liquid**	**Undiluted Settled Solids**	**Undiluted Settled Solids**	**Undiluted Settled Solids**	**Settled Solids 80% Dilution**	**Settled Solids 80% Dilution**	**Settled Solids 80% Dilution**	**Settled Solids 80% Dilution Supernate**	**Settled Solids 80% Dilution Supernate**	**Settled Solids 80% Dilution Supernate**	**Undiluted WTC**	**Undiluted WTC**	**Undiluted WTC**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**
Solid Phases (vol% of bulk)															
$(NaAlO_2)_2{\bullet}2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	*0.00784*	*0.00784*	*0.00784*	*0.12755*	*0.12755*	*0.12755*	-	-	-	*0.00328*	*0.00328*	*0.00328*
$CaC_2O_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	-	-	-	*0.00306*	*0.00306*	*0.00306*	*0.04987*	*0.04987*	*0.04987*	-	-	-	*0.00128*	*0.00128*	*0.00128*
FeOOH	-	-	-	*0.00384*	*0.00384*	*0.00384*	*0.06250*	*0.06250*	*0.06250*	-	-	-	*0.00161*	*0.00161*	*0.00161*
Gibbsite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	*0.02348*	*0.02348*	*0.02348*	*0.38204*	*0.38204*	*0.38204*	-	-	-	*0.00983*	*0.00983*	*0.00983*
$La(OH)_3$	-	-	-	*0.00018*	*0.00018*	*0.00018*	*0.00286*	*0.00286*	*0.00286*	-	-	-	*0.00007*	*0.00007*	*0.00007*
$LaPO_4{\bullet}2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	-	-	-	*0.00797*	*0.00797*	*0.00797*	*0.12961*	*0.12961*	*0.12961*	-	-	-	*0.00333*	*0.00333*	*0.00333*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	-	-	-	*0.00026*	*0.00026*	*0.00026*	*0.00425*	*0.00425*	*0.00425*	-	-	-	*0.00011*	*0.00011*	*0.00011*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4{\bullet}2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	-	-	-	*0.00134*	*0.00134*	*0.00134*	*0.02172*	*0.02172*	*0.02172*	-	-	-	*0.00056*	*0.00056*	*0.00056*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	-	-	-	*0.00000*	*0.00000*	*0.00000*	*0.00007*	*0.00007*	*0.00007*	-	-	-	*0.00000*	*0.00000*	*0.00000*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	-	-	-	*0.00003*	*0.00003*	*0.00003*	*0.00055*	*0.00055*	*0.00055*	-	-	-	*0.00001*	*0.00001*	*0.00001*
TcO_2	-	-	-	*0.00001*	*0.00001*	*0.00001*	*0.00023*	*0.00023*	*0.00023*	-	-	-	*0.00001*	*0.00001*	*0.00001*
ZrO_2	-	-	-	*0.00031*	*0.00031*	*0.00031*	*0.00512*	*0.00512*	*0.00512*	-	-	-	*0.00013*	*0.00013*	*0.00013*
KNO_3	-	-	-	*0.60022*	*0.60022*	*0.60022*	-	-	-	-	-	-	*0.25127*	*0.25127*	*0.25127*
$Na_2C_2O_4$	-	-	-	*0.30316*	*0.30316*	*0.30316*	-	-	-	-	-	-	*0.12691*	*0.12691*	*0.12691*
$Na_2CO_3{\cdot}H_2O$	-	-	-	*0.79453*	*0.79453*	*0.79453*	-	-	-	-	-	-	*0.33262*	*0.33262*	*0.33262*
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	*0.10121*	*0.10121*	*0.10121*	-	-	-	-	-	-	*0.04237*	*0.04237*	*0.04237*
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	-	-	-	*0.19217*	*0.19217*	*0.19217*	-	-	-	-	-	-	*0.08045*	*0.08045*	*0.08045*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	*0.36468*	*0.36468*	*0.36468*	-	-	-	-	-	-	*0.15267*	*0.15267*	*0.15267*
$NaNO_3$	-	-	-	*3.16232*	*3.16232*	*3.16232*	-	-	-	-	-	-	*1.32385*	*1.32385*	*1.32385*
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	-	-	-	*5.57*	*5.57*	*5.57*	*0.79*	*0.79*	*0.79*	-	-	-	*2.33*	*2.33*	*2.33*
Solids Concentration (g/L)	-	-	-	*124.8*	*124.8*	*124.8*	*28.8*	*28.8*	*28.8*	-	-	-	*52.3*	*52.3*	*52.3*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*
Temperature (°C)	25	45	65	25	45	65	25	45	65	25	45	65	25	45	65
Source of Data	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*	*HNF-4964 Rev. 0*
Notes	**Page A-5**	**Page A-10**	**Page A-15**	**Not Measured Exceeded Haake CV20/ME45 Limits**	**Not Measured Exceeded Haake CV20/ME45 Limits**	**Not Measured Exceeded Haake CV20/ME45 Limits**	**Page A-20**	**Page A-25**	**Page A-30**	**Page A-35**	**Page A-41**	**Page B85**	**Page A-46**	**Page A-52**	**Page A-58**
Newtonian:															
η – Newtonian viscosity (cP)	22.000	7.992	5.357				5.357	2.822	1.750	6.000	3.010	1.800	47.142	17.478	11.210
r – correlation coefficient	1.000	1.000	0.999				0.999	0.998	0.996	1.000	1.000		0.999	0.998	0.995
Ostwald (or Power Law):															
m – the consistency coefficient (Pa·s^{-n})	0.022	0.021	0.005				0.005	0.003	0.002	0.006	0.006		0.065	0.063	0.036
n – the power-law exponent	1.000	0.824	1.000				1.000	1.000	1.000	1.000	0.884		0.942	0.768	0.787
r – correlation coefficient	1.000	0.993	0.999				0.999	0.998	0.996	1.000	1.000		1.000	0.995	0.996
Bingham Plastic:															
τ_B- the Bingham yield stress (Pa)	0.000	0.000	0.000				0.000	0.000	0.000	0.012	0.012	0.000	0.150	0.148	0.181
η_p - the plastic viscosity (Pa·s)	0.022	0.008	0.005				0.005	0.003	0.002	0.006	0.003	***0.002***	0.047	0.017	0.010
r – correlation coefficient	1.000	1.000	0.999				0.999	0.998	0.996	1.000	1.000		0.999	0.998	0.995
Herschel-Bulkley:															
τ_H- the yield stress (Pa)	0.000	0.000	0.000				0.000	0.000	0.000	0.012	0.011		0.006	0.006	0.006
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.022	0.021	0.005				0.005	0.003	0.002	0.006	0.006		0.065	0.062	0.036
b - the Hershel-Bulkely power-law exponent	1.000	0.824	1.000				1.000	1.000	1.000	1.000	0.885		0.942	0.769	0.789
r – correlation coefficient	1.000	0.993	0.999				0.999	0.998	0.996	1.000	1.000		1.000	0.995	0.996
n/a = not applicable															

Physical Property Data

Physical Property	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*	*AW-101*
Notes															
Temperature (°C)	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***
Zeta Potential (mV)															
Bulk Density (g/mL)	***1.52***	***1.52***	***1.52***	***1.56***	***1.56***	***1.56***	***1.44***	***1.44***	***1.44***	***1.42***	***1.42***	***1.42***	***1.54***	***1.54***	***1.54***
vol% Settled Solids	0	0	0	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	n/a	n/a	n/a	1.68	1.68	1.68	1.42	1.42	1.42	1.42	1.42	1.42	1.68	1.68	1.68
vol% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	1.52	1.52	1.52	1.52	1.52	1.52	1.42	1.42	1.42	1.42	1.42	1.42	1.52	1.52	1.52
Density of Settled Solids (g/mL)	n/a	n/a	n/a	n/m	n/m	n/m	n/m			n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/a	n/a	n/a	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/a	n/a	n/a	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	0.00	0.00	0.00	8.00	8.00	8.00	2.00	2.00	2.00	0.00	0.00	0.00	3.40	3.40	3.40
Density of Solids (g/cc)	***2.24***	***2.24***	***2.24***	***2.24***	***2.24***	***2.24***	***3.66***	***3.66***	***3.66***	***3.66***	***3.66***	***3.66***	***2.24***	***2.24***	***2.24***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule															
Source of Data															
Notes:															
Temperature (°C)															
Description															
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours															
Infinte time (GRE)															

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101	AW-101
Description	**Diluted WTC (50% by volume)**	**Diluted WTC (50% by volume)**	**Diluted WTC (50% by volume)**	**Diluted WTC (50% by volume) Supernate**	**Diluted WTC (50% by volume) Supernate**	**Diluted WTC (50% by volume) Supernate**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**
Model Basis	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**HNF-4964 Rev. 0**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**
Solid Phases (vol% of bulk)														
$(NaAlO_2)_2 \bullet 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.06160*	*0.06160*	*0.06160*	-	-	-	*0.00713*	*0.00713*	*0.00713*	*0.00713*	*0.00713*	*0.00713*	*0.00713*	*0.00713*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.02409*	*0.02409*	*0.02409*	-	-	-	*0.00279*	*0.00279*	*0.00279*	*0.00279*	*0.00279*	*0.00279*	*0.00279*	*0.00279*
FeOOH	*0.03019*	*0.03019*	*0.03019*	-	-	-	*0.00349*	*0.00349*	*0.00349*	*0.00349*	*0.00349*	*0.00349*	*0.00349*	*0.00349*
Gibbsite	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	*0.18451*	*0.18451*	*0.18451*	-	-	-	*0.02136*	*0.02136*	*0.02136*	*0.02136*	*0.02136*	*0.02136*	*0.02136*	*0.02136*
$La(OH)_3$	*0.00138*	*0.00138*	*0.00138*	-	-	-	*0.00016*	*0.00016*	*0.00016*	*0.00016*	*0.00016*	*0.00016*	*0.00016*	*0.00016*
$LaPO_4 \bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.06260*	*0.06260*	*0.06260*	-	-	-	*0.00725*	*0.00725*	*0.00725*	*0.00725*	*0.00725*	*0.00725*	*0.00725*	*0.00725*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	*0.00205*	*0.00205*	*0.00205*	-	-	-	*0.00024*	*0.00024*	*0.00024*	*0.00024*	*0.00024*	*0.00024*	*0.00024*	*0.00024*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.01049*	*0.01049*	*0.01049*	-	-	-	*0.00121*	*0.00121*	*0.00121*	*0.00121*	*0.00121*	*0.00121*	*0.00121*	*0.00121*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00004*	*0.00004*	*0.00004*	-	-	-	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00027*	*0.00027*	*0.00027*	-	-	-	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*
TcO_2	*0.00011*	*0.00011*	*0.00011*	-	-	-	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00001*
ZrO_2	*0.00247*	*0.00247*	*0.00247*	-	-	-	*0.00029*	*0.00029*	*0.00029*	*0.00029*	*0.00029*	*0.00029*	*0.00029*	*0.00029*
KNO_3	-	-	-	-	-	-	*0.54600*	*0.54600*	*0.54600*	*0.54600*	*0.54600*	*0.54600*	*0.54600*	*0.54600*
$Na_2C_2O_4$	-	-	-	-	-	-	*0.27577*	*0.27577*	*0.27577*	*0.27577*	*0.27577*	*0.27577*	*0.27577*	*0.27577*
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	*0.72276*	*0.72276*	*0.72276*	*0.72276*	*0.72276*	*0.72276*	*0.72276*	*0.72276*
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	*0.09207*	*0.09207*	*0.09207*	*0.09207*	*0.09207*	*0.09207*	*0.09207*	*0.09207*
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	-	-	-	*0.17481*	*0.17481*	*0.17481*	*0.17481*	*0.17481*	*0.17481*	*0.17481*	*0.17481*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	*0.33174*	*0.33174*	*0.33174*	*0.33174*	*0.33174*	*0.33174*	*0.33174*	*0.33174*
$NaNO_3$	-	-	-	-	-	-	*2.87665*	*2.87665*	*2.87665*	*2.87665*	*2.87665*	*2.87665*	*2.87665*	*2.87665*
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*0.38*	*0.38*	*0.38*	-	-	-	*5.06*	*5.06*	*5.06*	*5.06*	*5.06*	*5.06*	*5.06*	*5.06*
Solids Concentration (g/L)	*13.9*	*13.9*	*13.9*	-	-	-	*113.5*	*113.5*	*113.5*	*113.5*	*113.5*	*113.5*	*113.5*	*113.5*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	***AW-101***	***AW-101***	***AW-101***	***AW-101***	***AW-101***	***AW-101***								
Temperature (°C)	**25**	**45**	**65**	**25**	**45**	**65**								
Source of Data	***HNF-4964 Rev. 0***	***HNF-4964 Rev. 0***	***HNF-4964 Rev. 0***	***HNF-4964 Rev. 0***	***HNF-4964 Rev. 0***	***HNF-4964 Rev. 0***	***RPP-6655*** ***PNNL-11296***	***RPP-6655*** ***PNNL-11296***	***RPP-6655*** ***PNNL-11296***	***RPP-6655*** ***PNNL-11296***	***RPP-6655*** ***PNNL-11296***	***RPP-6655*** ***PNNL-11296***	***RPP-6655*** ***PNNL-11296***	***RPP-6655*** ***PNNL-11296***
Notes	**Page A-64**	**Page A-69**	**Page A-74**	**Page A-79**	**Page A-84**	**Page A-89**								
Newtonian:														
η – Newtonian viscosity (cP)	8.286	4.214	2.571	11.500	5.351	3.641								
r – correlation coefficient	0.998	0.997	1.000	0.998	0.999	0.995								
Ostwald (or Power Law):														
m – the consistency coefficient (Pa·s^{-n})	0.010	0.004	0.003	0.011	0.006	0.006								
n – the power-law exponent	0.970	1.000	1.000	1.000	0.989	0.923								
r – correlation coefficient	0.998	0.997	1.000	0.998	0.999	0.989								
Bingham Plastic:														
τ_B- the Bingham yield stress (Pa)	0.020	0.000	0.000	0.000	0.000	0.085								
η_p - the plastic viscosity (Pa·s)	0.008	0.004	0.003	0.011	0.005	0.003								
r – correlation coefficient	0.998	0.997	1.000	0.998	0.999	0.995								
Herschel-Bulkley:														
τ_H- the yield stress (Pa)	0.010	0.000	0.000	0.000	0.000	0.068								
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.009	0.004	0.003	0.012	0.005	0.005								
b - the Hershel-Bulkely power-law exponent	0.977	1.000	1.000	1.000	0.999	0.917								
r – correlation coefficient	0.998	0.997	1.000	0.998	0.999	0.989								
n/a = not applicable														

Physical Property Data

Physical Property	***AW-101***	***AW-101***	***AW-101***	***AW-101***	***AW-101***	***AW-101***								
Notes														
Temperature (°C)	***25***	***45***	***65***	***25***	***45***	***65***								
Zeta Potential (mV)														
Bulk Density (g/mL)	***1.39***	***1.39***	***1.39***	***1.38***	***1.38***	***1.38***	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
vol% Settled Solids	n/m	n/m	n/m	n/m	n/m	n/m	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2
Density of Centrifuged Solids (g/mL)	***1.006***	***1.006***	***1.006***	***1.006***	***1.006***	***1.006***	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
vol% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
wt% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
Supernatant Density (g/mL)	1.38	1.38	1.38	1.38	1.38	1.38	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m								
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m								
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	55	55	55	55	55	55	55	55
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	64	64	64	64	64	64	64	64
wt% Total Solids	n/m	n/m	n/m	n/m	n/m	n/m								
wt% UDS	1.00	1.00	1.00	0.00	0.00	0.00	***7.47***	***7.47***	***7.47***	***7.47***	***7.47***	***7.47***	***7.47***	***7.47***
Density of Solids (g/cc)	***3.66***	***3.66***	***3.66***	***3.66***	***3.66***	***3.66***	***2.24***	***2.24***	***2.24***	***2.24***	***2.24***	***2.24***	***2.24***	***2.24***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule							**AW-101**	**AW-101**	**AW-101**	**AW-101**	**AW-101**	**AW-101**	**AW-101**	**AW-101**
Source of Data							**RPP-6655**	**RPP-6655**	**RPP-6655**	**RPP-6655**	**RPP-6655**	**RPP-6655**	**RPP-6655**	**RPP-6655**
Notes:							**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)							**44**	**43**	**41**	**43**	**44**	**43**	**41**	**39**
Description							**Riser 1C** **Depth from bottom of tank is 200 cm**	**Riser 1C** **Depth from bottom of tank is 150 cm**	**Riser 1C** **Depth from bottom of tank is 100 cm**	**Riser 13A** **Depth from bottom of tank is 250 cm**	**Riser 13A** **Depth from bottom of tank is 200 cm**	**Riser 13A** **Depth from bottom of tank is 150 cm**	**Riser 13A** **Depth from bottom of tank is 100 cm**	**Riser 13A** **Depth from bottom of tank is 50 cm**
Gelation Time/Shear Strength (Pa)														
5 minutes														
10 minutes														
15 minutes														
20 minutes														
30 minutes														
40 minutes														
50 minutes														
1 hour														
2 hours														
3 hours														
4 hours														
5 hours														
6 hours														
24 hours														
32 hours														
48 hours														
56 hours														
72 hours														
Infinte time (GRE)							140	230	300	47	95	140	175	197

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102	AY-102
Description	as received	as received	Centrifuged Liquid Composite	Centrifuged Liquid Composite	Centrifuged Liquid Composite	Retrieval Composite	Retrieval Composite	Retrieval Composite	1:1 Dilution Retrival Composite: Centrifuged Liquid	1:1 Dilution Retrival Composite: Centrifuged Liquid	1:1 Dilution Retrival Composite: Centrifuged Liquid	101 g UDS/L	101 g UDS/L	101 g UDS/L	210 g UDS/L	210 g UDS/L	210 g UDS/L
Model Basis	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty
Report No/Source of Data	WSRC-TR-2003-00205, REVISION 0	WSRC-TR-2003-00205, REVISION 0	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909	RPP-8909
Solid Phases (vol% of bulk)																	
$(NaAlO_2)_2 \bullet 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	*0.00015*	*0.00015*	-	-	-	*0.00055*	*0.00055*	*0.00055*	*0.00015*	*0.00015*	*0.00015*	*0.00021*	*0.00021*	*0.00021*	*0.00044*	*0.00044*	*0.00044*
Bi_2O_3	*0.00042*	*0.00042*	-	-	-	*0.00155*	*0.00155*	*0.00155*	*0.00043*	*0.00043*	*0.00043*	*0.00061*	*0.00061*	*0.00061*	*0.00126*	*0.00126*	*0.00126*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.09201*	*0.09201*	-	-	-	*0.33793*	*0.33793*	*0.33793*	*0.09355*	*0.09355*	*0.09355*	*0.13246*	*0.13246*	*0.13246*	*0.27434*	*0.27434*	*0.27434*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.01154*	*0.01154*	-	-	-	*0.04237*	*0.04237*	*0.04237*	*0.01173*	*0.01173*	*0.01173*	*0.01661*	*0.01661*	*0.01661*	*0.03440*	*0.03440*	*0.03440*
FeOOH	*0.80797*	*0.80797*	-	-	-	*2.96734*	*2.96734*	*2.96734*	*0.82144*	*0.82144*	*0.82144*	*1.16315*	*1.16315*	*1.16315*	*2.40895*	*2.40895*	*2.40895*
Gibbsite	*0.91660*	*0.91660*	-	-	-	*3.36630*	*3.36630*	*3.36630*	*0.93188*	*0.93188*	*0.93188*	*1.31954*	*1.31954*	*1.31954*	*2.73283*	*2.73283*	*2.73283*
HgO	*0.00003*	*0.00003*	-	-	-	*0.00010*	*0.00010*	*0.00010*	*0.00003*	*0.00003*	*0.00003*	*0.00004*	*0.00004*	*0.00004*	*0.00008*	*0.00008*	*0.00008*
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4 \bullet 2H_2O$	*0.00832*	*0.00832*	-	-	-	*0.03057*	*0.03057*	*0.03057*	*0.00846*	*0.00846*	*0.00846*	*0.01198*	*0.01198*	*0.01198*	*0.02481*	*0.02481*	*0.02481*
$Mn(OH)_2$	*0.14201*	*0.14201*	-	-	-	*0.52153*	*0.52153*	*0.52153*	*0.14437*	*0.14437*	*0.14437*	*0.20443*	*0.20443*	*0.20443*	*0.42339*	*0.42339*	*0.42339*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.01765*	*0.01765*	-	-	-	*0.06482*	*0.06482*	*0.06482*	*0.01794*	*0.01794*	*0.01794*	*0.02541*	*0.02541*	*0.02541*	*0.05262*	*0.05262*	*0.05262*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	*0.02024*	*0.02024*	-	-	-	*0.07432*	*0.07432*	*0.07432*	*0.02057*	*0.02057*	*0.02057*	*0.02913*	*0.02913*	*0.02913*	*0.06033*	*0.06033*	*0.06033*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.01344*	*0.01344*	-	-	-	*0.04934*	*0.04934*	*0.04934*	*0.01366*	*0.01366*	*0.01366*	*0.01934*	*0.01934*	*0.01934*	*0.04006*	*0.04006*	*0.04006*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00015*	*0.00015*	-	-	-	*0.00055*	*0.00055*	*0.00055*	*0.00015*	*0.00015*	*0.00015*	*0.00021*	*0.00021*	*0.00021*	*0.00044*	*0.00044*	*0.00044*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00277*	*0.00277*	-	-	-	*0.01016*	*0.01016*	*0.01016*	*0.00281*	*0.00281*	*0.00281*	*0.00398*	*0.00398*	*0.00398*	*0.00825*	*0.00825*	*0.00825*
TcO_2	*0.00000*	*0.00000*	-	-	-	*0.00001*	*0.00001*	*0.00001*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00001*	*0.00001*	*0.00001*
ZrO_2	*0.00011*	*0.00011*	-	-	-	*0.00041*	*0.00041*	*0.00041*	*0.00011*	*0.00011*	*0.00011*	*0.00016*	*0.00016*	*0.00016*	*0.00034*	*0.00034*	*0.00034*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.08262*	*0.08262*	-	-	-	*0.30343*	*0.30343*	*0.30343*	*0.08400*	*0.08400*	*0.08400*	*0.11894*	*0.11894*	*0.11894*	*0.24633*	*0.24633*	*0.24633*
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*2.12*	*2.12*	-	-	-	*7.77*	*7.77*	*7.77*	*2.15*	*2.15*	*2.15*	*3.05*	*3.05*	*3.05*	*6.31*	*6.31*	*6.31*
Solids Concentration (g/L)	*70.2*	*70.2*	-	-	-	*257.8*	*257.8*	*257.8*	*71.4*	*71.4*	*71.4*	*101.1*	*101.1*	*101.1*	*209.3*	*209.3*	*209.3*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***	***AY-102***
Temperature (°C)	**25**	**40**	**27**	**45**	**65**	**27**	**45**	**65**	**27**	**45**	**65**	**27**	**45**	**65**	**27**	**45**	**65**
Source of Data	***WSRC-TR-2003-00205, REVISION 0***	***WSRC-TR-2003-00205, REVISION 0***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***	***RPP-8909***
Notes			**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**	**Haake RV30 M5 Head MV-1 Sensor**
Newtonian:																	
η – Newtonian viscosity (cP)	4.55	3.16	1.78	1.12	0.32	3.01	1.73	0.89	2.29	0.93	1.06	2.05	1.19	1.29	3.64	2.66	1.73
r – correlation coefficient	n/m	n/m															
Ostwald (or Power Law):																	
m – the consistency coefficient (Pa·s^{-n})	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n – the power-law exponent	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
r – correlation coefficient	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bingham Plastic:																	
τ_B- the Bingham yield stress (Pa)	1.48	1.39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
η_p - the plastic viscosity (Pa·s)	0.0043	0.0031	***0.00178***	***0.00112***	***0.00032***	***0.00301***	***0.00173***	***0.00089***	***0.00229***	***0.00093***	***0.00106***	***0.00205***	***0.00119***	***0.00129***	***0.00364***	***0.00266***	***0.00173***
r – correlation coefficient	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Herschel-Bulkley:																	
τ_H- the yield stress (Pa)	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
b - the Hershel-Bulkely power-law exponent	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
r – correlation coefficient	n/m	n/m	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a = not applicable																	

Physical Property Data

Physical Property	***AY-102***	***AY-102***	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**	**AY-102**
Notes			**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**	**RPP-8909**
Temperature (°C)	***25***	***40***	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**	**Ambient**
Zeta Potential (mV)																	
Bulk Density (g/mL)	1.2	***1.2***	***1.13***	***1.13***	***1.13***	1.3	1.3	1.3	1.17	1.17	1.17	1.24	1.24	1.24	1.3	1.3	1.3
vol% Settled Solids	n/m	n/m	0	0	0	52	52	52									
Density of Centrifuged Solids (g/mL)	1.37	1.37	n/m	n/m	n/m	n/m	n/m	n/m									
vol% Centrifuged Solids	18	18	0	0	0	40	40	40									
wt% Centrifuged Solids	20.4	20.4	0	0	0												
Supernatant Density (g/mL)	1.15	1.15	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	1.47	1.47	1.47									
wt% Settled Supernatant	n/m	n/m	100	100	100	41	41	41									
wt% dissolved solids in supernatant	16.3	16.3	15.5	15.5	15.5	16	16	16									
wt% total solids in Centrifuged Sludge	45.5	45.5	n/m	n/m	n/m	46	46	46									
wt% Total Solids	21.2	21.2	15.5	15.5	15.5												
wt% UDS	5.85	5.85	***0.00***	***0.00***	***0.00***	***19.83***	***19.83***	***19.83***	6.10	6.10	6.10	8.15	8.15	8.15	16.10	16.10	16.10
Density of Solids (g/cc)	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***	***3.32***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AY-102

Settling Data

Settling Schedule						**AY-102**	**AY-102**	**AY-102**									
Notes:						**RPP-8909** **No Temp. Mentioned**	**RPP-8909** **No Temp. Mentioned**	**RPP-8909** **No Temp. Mentioned**									
Temperature (°C)						**Ambient**	**Ambient**	**Ambient**									
Total initial volume						94	94	94									
5 minutes																	
10 minutes																	
15 minutes						93.5	93.5	93.5									
20 minutes																	
30 minutes						93	93	93									
40 minutes																	
50 minutes																	
1 hour						91	91	91									
2 hours						88	88	88									
3 hours						81.5	81.5	81.5									
4 hours						80	80	80									
5 hours						77	77	77									
6 hours						75.5	75.5	75.5									
24 hours						62.5	62.5	62.5									
32 hours																	
48 hours						55.5	55.5	55.5									
56 hours																	
72 hours final settled						52	52	52									

Shear Strength Data

Shear Strength Schedule	***AY-102***	***AY-102***															
Source of Data	***WSRC-TR-2003-00205, REVISION 0***	***WSRC-TR-2003-00205, REVISION 0***															
Notes:	**Haake RV30/M5**	**Haake RV30/M5**															
Temperature (°C)	***0***	***0***															
Description	**Sample Settled for 48 hrs prior to shear strength testing; no settled solids physical properties values are available**	**Sample Settled for 48 hrs prior to shear strength testing; no settled solids physical properties values are available**															
Gelation Time/Shear Strength (Pa)																	
5 minutes																	
10 minutes																	
15 minutes																	
20 minutes																	
30 minutes																	
40 minutes																	
50 minutes																	
1 hour																	
2 hours																	
3 hours																	
4 hours																	
5 hours																	
6 hours																	
24 hours																	
32 hours																	
48 hours	43	0															
56 hours																	
72 hours																	
Infinte time (GRE)																	

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AZ-101

Model Chemical Data From ESP

Analyte\Sample	**AZ-101**	**AZ-101**
Description	**as received**	**Caustic Washed and Leached**
Model Basis	**Salty**	**Leached**
Report No/Source of Data	**WTP-RPT-043, Rev 1**	**WTP-RPT-043, Rev 1**
Solid Phases (vol% of bulk)		
$(NaAlO_2)_2 \cdot 2.5H_2O$	-	-
Ag_2CO_3	*0.00293*	*0.00328*
Bi_2O_3	-	-
BiOCl	-	-
Boehmite	-	-
$Ca(OH)_2$	-	-
$Ca_5OH(PO_4)_3$	*0.10549*	*0.11795*
$CaC_2O_4 \cdot H_2O$	-	-
$CaCO_3$	-	-
CaF_2	-	-
CrOOH	*0.00304*	*0.00340*
FeOOH	*1.60010*	*1.78914*
Gibbsite	*5.72952*	-
HgO	-	-
$KAlSiO_4$	-	-
$La(OH)_3$	-	-
$LaPO_4 \cdot 2H_2O$	*0.05674*	*0.06344*
$Mn(OH)_2$	*0.02700*	*0.03019*
$Mn_3(PO_4)_2$	-	-
$MnCO_3$	-	-
$Na_2U_2O_7$	*0.07502*	*0.08388*
$NaAlCO_3(OH)_2$	-	-
$NaAlSiO_4$	*0.16550*	*0.18505*
$Ni(OH)_2$	*0.10189*	*0.11393*
$Ni_3(PO_4)_2$	-	-
$NiC_2O_4 \cdot 2H_2O$	-	-
$Pb(OH)_2$	*0.00253*	*0.00283*
$Pb_3(PO_4)_2$	-	-
$PbCO_3$	-	-
$Pu(OH)_4$	*0.00083*	*0.00093*
SiO_2	-	-
$Sr_3(PO_4)_2$	-	-
$SrCO_3$	*0.00964*	*0.01078*
TcO_2	*0.00001*	*0.00001*
ZrO_2	*0.36110*	*0.40376*
KNO_3	-	-
$Na_2C_2O_4$	-	-
$Na_2CO_3 \cdot H_2O$	-	-
Na_2SO_4	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-
Na_3FSO_4	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-
$Na_6(SO_4)_2CO_3$	-	-
NaF	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-
$NaHCO_3$	-	-
$NaNO_2$	-	-
$NaNO_3$	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-
Total Volume % UDS	*8.24*	*2.81*
Solids Concentration (g/L)	*248.8*	*123.2*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AZ-101

Rheological Data

Model/model Parameter	***AZ-101***	***AZ-101***
Temperature (°C)	**25**	**25**
Source of Data	***WTP-RPT-043, Rev 1***	***WTP-RPT-043, Rev 1***
Notes		
Newtonian:		
η – Newtonian viscosity (cP)	n/m	n/m
r – correlation coefficient	n/m	n/m
Ostwald (or Power Law):		
m – the consistency coefficient (Pa·s^{-n})	n/m	n/m
n – the power-law exponent	n/m	n/m
r – correlation coefficient	n/m	n/m
Bingham Plastic:		
τ_B- the Bingham yield stress (Pa)	3.9	1.4
η_p - the plastic viscosity (Pa·s)	0.0083	0.0029
r – correlation coefficient	0.99	0.98
Herschel-Bulkley:		
τ_H- the yield stress (Pa)	2.4	0.873
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.0592	0.0346
b - the Hershel-Bulkely power-law exponent	0.5	0.5
r – correlation coefficient	1	0.98
n/a = not applicable		

Physical Property Data

Physical Property	***AZ-101***	***AZ-101***
Notes		
Temperature (°C)	***25***	***25***
Zeta Potential (mV)		
Bulk Density (g/mL)	1.39	1.13
vol% Settled Solids	n/m	n/m
Density of Centrifuged Solids (g/mL)	1.61	1.48
vol% Centrifuged Solids	36.4	20.5
wt% Centrifuged Solids	43.9	27
Supernatant Density (g/mL)	1.19	1
Density of Settled Solids (g/mL)	n/m	n/m
wt% Settled Supernatant	n/m	n/m
wt% dissolved solids in supernatant	26.2	3.43
wt% total solids in Centrifuged Sludge	n/m	n/m
wt% Total Solids	38.8	13.7
wt% UDS	17.90	10.90
Density of Solids (g/cc)	***3.02***	***4.39***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AZ-102

Model Chemical Data From ESP

Analyte\Sample	**AZ-102**	**AZ-102**	**AZ-102**
Description	**as received with 6:1 wt 0.01 NaOH added**	**concentrated slurry as received with 6:1 wt 0.01 NaOH added**	**Caustic Washed and Leached**
Model Basis	**Salt Free**	**Salt Free**	**Leached**
Report No/Source of Data	**BNFL-RPT-038 Rev. 0**	**BNFL-RPT-038 Rev. 0**	**BNFL-RPT-038 Rev. 0**
Solid Phases (vol% of bulk)			
$(NaAlO_2)_2{\bullet}2.5H_2O$	-	-	-
Ag_2CO_3	*0.00207*	*0.00571*	*0.00532*
Bi_2O_3	*0.00013*	*0.00035*	*0.00033*
BiOCl	-	-	-
Boehmite	-	-	-
$Ca(OH)_2$	-	-	-
$Ca_5OH(PO_4)_3$	*0.02282*	*0.06286*	*0.05856*
$CaC_2O_4{\cdot}H_2O$	-	-	-
$CaCO_3$	-	-	-
CaF_2	-	-	-
CrOOH	*0.00304*	*0.00838*	*0.00781*
FeOOH	*0.36541*	*1.00640*	*0.93763*
Gibbsite	*0.66849*	*1.84113*	-
HgO	-	-	-
$KAlSiO_4$	-	-	-
$La(OH)_3$	-	-	-
$LaPO_4{\bullet}2H_2O$	*0.00933*	*0.02569*	*0.02394*
$Mn(OH)_2$	*0.01000*	*0.02753*	*0.02565*
$Mn_3(PO_4)_2$	-	-	-
$MnCO_3$	-	-	-
$Na_2U_2O_7$	*0.02076*	*0.05718*	*0.05328*
$NaAlCO_3(OH)_2$	*0.48125*	*1.32544*	*1.23487*
$NaAlSiO_4$	*0.16669*	*0.45908*	*0.42771*
$Ni(OH)_2$	*0.02233*	*0.06150*	*0.05730*
$Ni_3(PO_4)_2$	-	-	-
$NiC_2O_4{\bullet}2H_2O$	-	-	-
$Pb(OH)_2$	*0.00184*	*0.00508*	*0.00473*
$Pb_3(PO_4)_2$	-	-	-
$PbCO_3$	-	-	-
$Pu(OH)_4$	*0.00023*	*0.00063*	*0.00059*
SiO_2	-	-	-
$Sr_3(PO_4)_2$	-	-	-
$SrCO_3$	*0.00097*	*0.00267*	*0.00249*
TcO_2	*0.00001*	*0.00002*	*0.00002*
ZrO_2	*0.03346*	*0.09216*	*0.08586*
KNO_3	-	-	-
$Na_2C_2O_4$	-	-	-
$Na_2CO_3{\cdot}H_2O$	-	-	-
Na_2SO_4	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-
Na_3FSO_4	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-
NaF	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	-	-	-
$NaHCO_3$	-	-	-
$NaNO_2$	-	-	-
$NaNO_3$	-	-	-
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-
Total Volume % UDS	*1.81*	*4.98*	*2.93*
Solids Concentration (g/L)	*53.8*	*148.2*	*96.6*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-AZ-102

Rheological Data

Model/model Parameter	***AZ-102***	***AZ-102***	***AZ-102***
Temperature (°C)	**25**	**25**	**25**
Source of Data	***BNFL-RPT-038 Rev. 0***	***BNFL-RPT-038 Rev. 0***	***BNFL-RPT-038 Rev. 0***
Notes	**Appendix F; Figure 4**	**Appendix F; Figure 9**	**Appendix F; Figure 15**
Newtonian:			
η – Newtonian viscosity (cP)	2.589	9.908	17.74
r – correlation coefficient	0.993	0.962	0.84
Ostwald (or Power Law):			
m – the consistency coefficient ($Pa\cdot s^{-n}$)	0.022	0.177	2.45
n – the power-law exponent	0.631	0.504	0.25
r – correlation coefficient	0.986	0.982	0.99
Bingham Plastic:			
τ_B- the Bingham yield stress (Pa)	0.134	1.377	6.53
η_p - the plastic viscosity (Pa·s)	0.002	0.006	0.01
r – correlation coefficient	0.993	0.962	0.84
Herschel-Bulkley:			
τ_H- the yield stress (Pa)	0.000	0.939	4.55
k - the Herschel-Bulkely consistency coefficient ($Pa\cdot s^{-b}$)	0.027	0.047	0.26
b - the Hershel-Bulkely power-law exponent	0.593	0.671	0.52
r – correlation coefficient	0.983	0.983	0.95
n/a = not applicable			

Physical Property Data

Physical Property	***AZ-102***	***AZ-102***	***AZ-102***
Notes			
Temperature (°C)	***25***	***25***	***25***
Zeta Potential (mV)			
Bulk Density (g/mL)	***1.06***	1.09	1.05
vol% Settled Solids	n/m	96	93
Density of Centrifuged Solids (g/mL)	n/m	1.36	1.2
vol% Centrifuged Solids	n/m	26	26
wt% Centrifuged Solids	n/m	33	30
Supernatant Density (g/mL)	1.02	1.02	1.04
Density of Settled Solids (g/mL)	n/m	1.07	1.07
wt% Settled Supernatant	n/m	95	94
wt% dissolved solids in supernatant	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m
wt% UDS	5.10	13.60	9.20
Density of Solids (g/cc)	***2.98***	***2.98***	***3.30***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**B-111**	**B-111**
Description	**no dilution**	**no dilution**
Model Basis	**Salty**	**Salty**
Report No/Source of Data	**Segment 3; WHC-SD-WM-ER-382, rev 0**	**Segment 5; WHC-SD-WM-ER-382, rev 0**
Solid Phases (vol% of bulk)		
$(NaAlO_2)_2•2.5H_2O$	-	-
Ag_2CO_3	***0.00014***	***0.00021***
Bi_2O_3	***0.25830***	***0.40743***
BiOCl	***0.08115***	***0.12801***
Boehmite	-	-
$Ca(OH)_2$	-	-
$Ca_5OH(PO_4)_3$	-	-
$CaC_2O_4·H_2O$	-	-
$CaCO_3$	-	-
CaF_2	***0.05600***	***0.08834***
CrOOH	***0.03960***	***0.06247***
FeOOH	***0.81578***	***1.28677***
Gibbsite	-	-
HgO	-	-
$KAlSiO_4$	-	-
$La(OH)_3$	-	-
$LaPO_4•2H_2O$	***0.00027***	***0.00043***
$Mn(OH)_2$	-	-
$Mn_3(PO_4)_2$	-	-
$MnCO_3$	***0.00699***	***0.01102***
$Na_2U_2O_7$	-	-
$NaAlCO_3(OH)_2$	***0.26333***	***0.41536***
$NaAlSiO_4$	-	-
$Ni(OH)_2$	-	-
$Ni_3(PO_4)_2$	-	-
$NiC_2O_4•2H_2O$	***0.00284***	***0.00448***
$Pb(OH)_2$	-	-
$Pb_3(PO_4)_2$	-	-
$PbCO_3$	***0.04051***	***0.06390***
$Pu(OH)_4$	***0.00004***	***0.00006***
SiO_2	***1.02591***	***1.61821***
$Sr_3(PO_4)_2$	-	-
$SrCO_3$	***0.01394***	***0.02198***
TcO_2	***0.00010***	***0.00016***
ZrO_2	***0.00045***	***0.00071***
KNO_3	-	-
$Na_2C_2O_4$	***0.26828***	***0.42317***
$Na_2CO_3·H_2O$	-	-
Na_2SO_4	-	-
$Na_2SO_4·10H_2O$	-	-
Na_3FSO_4	-	-
$Na_3NO_3SO_4·H_2O$	-	-
$Na_3PO_4·8H_2O$	-	-
$Na_4P_2O_7·10H_2O$	***6.86039***	***10.82119***
$Na_6(SO_4)_2CO_3$	-	-
NaF	-	-
$NaF(PO_4)_2·19H_2O$	-	-
$NaHCO_3$	-	-
$NaNO_2$	-	-
$NaNO_3$	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	-	-
Total Volume % UDS	***9.73***	***15.35***
Solids Concentration (g/L)	***236.2***	***372.6***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Physical Property Data

Physical Property	***B-111***	***B-111***
Notes		
Temperature (°C)	**30**	**30**
Zeta Potential (mV)		
Bulk Density (g/mL)	1.27	1.35
vol% Settled Solids	100	100
Density of Centrifuged Solids (g/mL)	1.38	1.45
vol% Centrifuged Solids	57	63
wt% Centrifuged Solids	55	67
Supernatant Density (g/mL)	1.15	1.17
Density of Settled Solids (g/mL)	n/m	n/m
wt% Settled Supernatant	n/m	n/m
wt% dissolved solids in supernatant	11.60	9.60
wt% total solids in Centrifuged Sludge	n/m	n/m
wt% Total Solids	30.2	37.2
wt% UDS	18.60	27.60
Density of Solids (g/cc)	***2.43***	***2.43***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	***B-111***	***B-111***
Source of Data	***Segment 3; WHC-SD-WM-ER-382, rev 0***	***Segment 5; WHC-SD-WM-ER-382, rev 0***
Notes:	**Page 5-14**	**Page 5-14**
Temperature (°C)	**Unspecified**	**Unspecified**
Description	**Shear Vane at unspecified gel time or temperature**	**Shear Vane at unspecified gel time or temperature**
Gelation Time/Shear Strength (Pa)		
5 minutes		
10 minutes		
15 minutes		
20 minutes		
30 minutes		
40 minutes		
50 minutes		
1 hour		
2 hours		
3 hours		
4 hours		
5 hours		
6 hours		
24 hours		
32 hours		
48 hours		
56 hours		
72 hours		
Infinte time (GRE)	< 30	90

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201	B-201
Description	as-received Segment 2	1:1 dilution by volume Segment 2 Sample 1	1:1 dilution by volume Segment 2 Sample 2	3:1 dilution by volume Segment 2 Sample 1	3:1 dilution by volume Segment 2 Sample 2	as-received Segment 5	1:1 dilution by volume Segment 5 Sample 2	1:1 dilution by volume Segment 5 Sample 3	3:1 dilution by volume Segment 5 Sample 1	3:1 dilution by volume Segment 5 Sample 2	as-received Segment 8	1:1 dilution by volume Segment 8 Sample 1	1:1 dilution by volume Segment 8 Sample 2	3:1 dilution by volume Segment 8 Sample 1	3:1 dilution by volume Segment 8 Sample 2
Model Basis	Salty	Salt Free	Salt Free	Salt Free	Salt Free	Salty	Salt Free	Salt Free	Salt Free	Salt Free	Salty	Salt Free	Salt Free	Salt Free	Salt Free
Source of Data	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037	PNNL-14221 WHC-SD-WM-DP-037
Solid Phases (vol% of bulk)															
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	0.00049	0.00033	0.00033	0.00009	0.00010	0.00034	0.00017	0.00017	0.00005	0.00005	0.00030	0.00012	0.00012	0.00004	0.00004
Bi_2O_3	3.16783	2.12494	2.12494	0.59764	0.66248	2.20371	1.12621	1.12621	0.33124	0.33124	1.92925	0.79685	0.79685	0.26562	0.26562
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	0.12911	0.08661	0.08661	0.02436	0.02700	0.08982	0.04590	0.04590	0.01350	0.01350	0.07863	0.03248	0.03248	0.01083	0.01083
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	0.91939	0.61671	0.61671	0.17345	0.19227	0.63957	0.32686	0.32686	0.09613	0.09613	0.55992	0.23127	0.23127	0.07709	0.07709
CrOOH	0.23154	0.15531	0.15531	0.04368	0.04842	0.16107	0.08232	0.08232	0.02421	0.02421	0.14101	0.05824	0.05824	0.01941	0.01941
FeOOH	1.16999	0.78481	0.78481	0.22073	0.24468	0.81390	0.41595	0.41595	0.12234	0.12234	0.71254	0.29430	0.29430	0.09810	0.09810
Gibbsite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	0.66521	0.44621	0.44621	0.12550	0.13911	0.46275	0.23649	0.23649	0.06956	0.06956	0.40512	0.16733	0.16733	0.05578	0.05578
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4$•$2H_2O$	1.08160	0.72552	0.72552	0.20405	0.22619	0.75242	0.38453	0.38453	0.11310	0.11310	0.65871	0.27207	0.27207	0.09069	0.09069
$Mn(OH)_2$	1.59222	1.06804	1.06804	0.30039	0.33297	1.10763	0.56606	0.56606	0.16649	0.16649	0.96968	0.40051	0.40051	0.13350	0.13350
$Mn_3(PO_4)_2$	0.45470	0.30500	0.30500	0.08578	0.09509	0.31631	0.16165	0.16165	0.04754	0.04754	0.27692	0.11438	0.11438	0.03813	0.03813
$MnCO_3$	1.67269	1.12202	1.12202	0.31557	0.34980	1.16361	0.59467	0.59467	0.17490	0.17490	1.01869	0.42076	0.42076	0.14025	0.14025
$Na_2U_2O_7$	0.00946	0.00634	0.00634	0.00178	0.00198	0.00658	0.00336	0.00336	0.00099	0.00099	0.00576	0.00238	0.00238	0.00079	0.00079
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	0.04743	0.03181	0.03181	0.00895	0.00992	0.03299	0.01686	0.01686	0.00496	0.00496	0.02888	0.01193	0.01193	0.00398	0.00398
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	0.01233	0.00827	0.00827	0.00233	0.00258	0.00858	0.00438	0.00438	0.00129	0.00129	0.00751	0.00310	0.00310	0.00103	0.00103
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	0.00072	0.00048	0.00048	0.00014	0.00015	0.00050	0.00025	0.00025	0.00007	0.00007	0.00044	0.00018	0.00018	0.00006	0.00006
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	0.11901	0.07983	0.07983	0.02245	0.02489	0.08279	0.04231	0.04231	0.01244	0.01244	0.07248	0.02994	0.02994	0.00998	0.00998
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	0.00120	0.00080	0.00080	0.00023	0.00025	0.00083	0.00043	0.00043	0.00013	0.00013	0.00073	0.00030	0.00030	0.00010	0.00010
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	0.28196	-	-	-	-	0.19615	-	-	-	-	0.17172	-	-	-	-
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	11.56	7.56	7.56	2.13	2.36	8.04	4.01	4.01	1.18	1.18	7.04	2.84	2.84	0.95	0.95
Solids Concentration (g/L)	597.5	396.4	396.4	111.5	123.6	415.7	210.1	210.1	61.8	61.8	363.9	148.6	148.6	49.5	49.5

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-B-201

Rheological Data

Model/model Parameter	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***	***B-201***
Temperature (°C)		**30**	**30**	**30**	**30**		**30**	**30**	**30**	**30**		**30**	**30**	**30**	**30**
Source of Data	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***	***PNNL-14221 WHC-SD-WM-DP-037***
Instrumentation	**Haake RV100 M5 Head/Shear Vane**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100 M5 Head/Shear Vane**	**Haake RV100**		**Haake RV100**	**Haake RV100**	**Haake RV100 M5 Head/Shear Vane**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100**
Newtonian:															
η – Newtonian viscosity (cP)		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Ostwald (or Power Law):															
m – the consistency coefficient (Pa·s^{-n})		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a
n – the power-law exponent		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Bingham Plastic:															
τ_B- the Bingham yield stress (Pa)		1.21	2.41	0.37	0.34		4.35	6.56	0.20	0.39		9.68	7.25	0.34	0.37
η_p - the plastic viscosity (Pa·s)		0.0040	0.0050	0.0020	0.0019		0.010	0.009	0.0016	0.0017		0.012	0.012	0.0019	0.0017
r – correlation coefficient		0.98	0.98	0.99	1.00		0.91	1.00	0.97	0.99		0.99	0.99	1.00	0.98
Herschel-Bulkley:															
τ_H- the yield stress (Pa)		1.20	2.25	n/a	n/a		2.91	6.38	n/a	n/a		9.21	6.39	n/a	n/a
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		0.004	0.022	n/a	n/a		0.392	0.025	n/a	n/a		0.055	0.097	n/a	n/a
b - the Hershel-Bulkely power-law exponent		0.99	0.76	n/a	n/a		0.44	0.84	n/a	n/a		0.76	0.67	n/a	n/a
r – correlation coefficient		0.98	0.98	n/a	n/a		0.95	1.00	n/a	n/a		1.00	1.00	n/a	n/a
n/a = not applicable															

Physical Property Data

Physical Property	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**	**B-201**
Source of Data	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**	**PNNL-14221 WHC-SD-WM-DP-037**
Temperature (°C)	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Zeta Potential (mV)						n/m					n/m	n/m	n/m	n/m	n/m
Bulk Density (g/mL)	1.65	1.33	1.33	1.1	1.1	1.51	1.17	1.17	1.05	1.05	1.34	1.13	1.13	1.05	1.05
vol% Settled Solids	100	82.7	82.9	42.5	42.2	100	80	81.5	36.9	37.1	100	91.8	91.9	43.9	42.2
Density of Centrifuged Solids (g/mL	1.66	1.59	1.59	1.48	1.48	1.52	1.4	1.4	1.36	1.36	1.37	1.33	1.33	1.24	1.24
vol% Centrifuged Solids	98	57.4	58.8	24	23.4	98	43.8	43.1	16.2	16.2	88	41.3	42.5	23.5	19.4
wt% Centrifuged Solids	98	67.6	69.5	32.3	31.1	98	52.1	51.5	21.3	20.2	90	49.2	48.7	25	25.1
Supernatant Density (g/mL)	1.19	1.01	1.01	1.01	1	1.19	1.00	1.00	1.00	1.00	1.05	1.01	1.01	1.01	1.01
Density of Settled Solids (g/mL	1.65					1.51					1.34				
wt% Settled Supernatant	0					0					0				
wt% dissolved solids in supernatant	n/m					n/m					n/m				
wt% total solids in Centrifuged Sludge															
wt% Total Solids	53.6					31.6					28				
wt% UDS	***36.21***	***29.80***	***29.80***	***10.13***	***11.23***	***27.53***	***17.96***	***17.96***	***5.88***	***5.88***	***27.16***	***13.15***	***13.15***	***4.72***	***4.72***
Density of Solids (g/cc)	***5.17***	***5.24***	***5.24***	***5.24***	***5.24***	***5.17***	***5.24***	***5.24***	***5.24***	***5.24***	***5.17***	***5.24***	***5.24***	***5.24***	***5.24***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	**B-201**					**B-201**					**B-201**				
Source of Data	**PNNL-14221 WHC-SD-WM-DP-037**					**PNNL-14221 WHC-SD-WM-DP-037**					**PNNL-14221 WHC-SD-WM-DP-037**				
Instrumentation	**Haake RV100/M5 Shear Vane**					**Haake RV100/M5 Shear Vane**					**Haake RV100/M5 Shear Vane**				
Temperature (°C)	**30**					**30**					**30**				
Description	**As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.**					**As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.**					**As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.**				
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour	1410					1310					1220				
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours															
Infinte time (GRE)															

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**
Description	**as-received Segment 2**	**1:1 dilution by volume Segment 2 Sample 1**	**1:1 dilution by volume Segment 2 Sample 2**	**1:1 dilution by volume Segment 2 Sample 1**	**1:1 dilution by volume Segment 2 Sample 2**	**3:1 dilution by volume Segment 2 Sample 1**	**3:1 dilution by volume Segment 2 Sample 2**	**3:1 dilution by volume Segment 2 Sample 1**	**3:1 dilution by volume Segment 2 Sample 2**	**as-received Segment 3 Core 25**	**as-received Segment 4 Core 24**	**1:1 dilution by volume Segment 4 Sample 1**	**1:1 dilution by volume Segment 4 Sample 2**	**1:1 dilution by volume Segment 4 Sample 1**	**1:1 dilution by volume Segment 4 Sample 2**	**3:1 dilution by volume Segment 4 Sample 1**
Model Basis	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**
Source of Data	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**
Solid Phases (vol% of bulk)																
$(NaAlO_2)_2•2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	*0.00039*	*0.00010*	*0.00010*	*0.00010*	*0.00010*	*0.00004*	*0.00005*	*0.00004*	*0.00005*	*0.00021*	*0.00028*	*0.00011*	*0.00010*	*0.00011*	*0.00010*	*0.00004*
Bi_2O_3	*1.33956*	*0.33534*	*0.33534*	*0.33534*	*0.33534*	*0.12648*	*0.17006*	*0.12648*	*0.17006*	*0.73282*	*0.96318*	*0.38898*	*0.34528*	*0.38898*	*0.34528*	*0.13123*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.25056*	*0.06272*	*0.06272*	*0.06272*	*0.06272*	*0.02366*	*0.03181*	*0.02366*	*0.03181*	*0.13707*	*0.18016*	*0.07276*	*0.06458*	*0.07276*	*0.06458*	*0.02455*
$CaC_2O_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	*1.02712*	*0.25712*	*0.25712*	*0.25712*	*0.25712*	*0.09698*	*0.13040*	*0.09698*	*0.13040*	*0.56190*	*0.73853*	*0.29825*	*0.26475*	*0.29825*	*0.26475*	*0.10062*
CrOOH	*0.20299*	*0.05082*	*0.05082*	*0.05082*	*0.05082*	*0.01917*	*0.02577*	*0.01917*	*0.02577*	*0.11105*	*0.14595*	*0.05894*	*0.05232*	*0.05894*	*0.05232*	*0.01989*
FeOOH	*1.39181*	*0.34842*	*0.34842*	*0.34842*	*0.34842*	*0.13141*	*0.17669*	*0.13141*	*0.17669*	*0.76140*	*1.00075*	*0.40415*	*0.35875*	*0.40415*	*0.35875*	*0.13634*
Gibbsite	*0.40722*	*0.10194*	*0.10194*	*0.10194*	*0.10194*	*0.03845*	*0.05170*	*0.03845*	*0.05170*	*0.22277*	*0.29280*	*0.11825*	*0.10496*	*0.11825*	*0.10496*	*0.03989*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	*0.21924*	*0.05488*	*0.05488*	*0.05488*	*0.05488*	*0.02070*	*0.02783*	*0.02070*	*0.02783*	*0.11994*	*0.15764*	*0.06366*	*0.05651*	*0.06366*	*0.05651*	*0.02148*
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4•2H_2O$	*1.11929*	*0.28020*	*0.28020*	*0.28020*	*0.28020*	*0.10568*	*0.14210*	*0.10568*	*0.14210*	*0.61232*	*0.80480*	*0.32501*	*0.28850*	*0.32501*	*0.28850*	*0.10965*
$Mn(OH)_2$	*1.94287*	*0.48637*	*0.48637*	*0.48637*	*0.48637*	*0.18345*	*0.24665*	*0.18345*	*0.24665*	*1.06287*	*1.39698*	*0.56416*	*0.50079*	*0.56416*	*0.50079*	*0.19033*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.02398*	*0.00600*	*0.00600*	*0.00600*	*0.00600*	*0.00226*	*0.00304*	*0.00226*	*0.00304*	*0.01312*	*0.01725*	*0.00696*	*0.00618*	*0.00696*	*0.00618*	*0.00235*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	*0.02496*	*0.00625*	*0.00625*	*0.00625*	*0.00625*	*0.00236*	*0.00317*	*0.00236*	*0.00317*	*0.01366*	*0.01795*	*0.00725*	*0.00643*	*0.00725*	*0.00643*	*0.00245*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.03167*	*0.00793*	*0.00793*	*0.00793*	*0.00793*	*0.00299*	*0.00402*	*0.00299*	*0.00402*	*0.01732*	*0.02277*	*0.00920*	*0.00816*	*0.00920*	*0.00816*	*0.00310*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00014*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00001*	*0.00002*	*0.00001*	*0.00002*	*0.00008*	*0.00010*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00001*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.07431*	*0.01860*	*0.01860*	*0.01860*	*0.01860*	*0.00702*	*0.00943*	*0.00702*	*0.00943*	*0.04065*	*0.05343*	*0.02158*	*0.01916*	*0.02158*	*0.01916*	*0.00728*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.57198*	-	-	-	-	-	-	-	-	*0.31291*	*0.41127*	-	-	-	-	-
$Na_2CO_3·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2·19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*8.63*	*2.02*	*2.02*	*2.02*	*2.02*	*0.76*	*1.02*	*0.76*	*1.02*	*4.72*	*6.20*	*2.34*	*2.08*	*2.34*	*2.08*	*0.79*
Solids Concentration (g/L)	*402.2*	*97.3*	*97.3*	*97.3*	*97.3*	*36.7*	*49.4*	*36.7*	*49.4*	*220.0*	*289.2*	*112.9*	*100.2*	*112.9*	*100.2*	*38.1*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*	*B-202*
Temperature (°C)		30	30	95	95	30	30	95	95			30	30	95	95	30
Source of Data	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*	*PNNL-14221* *WHC-SD-WM-DP-034* *WHC-SD-WM-ER-371*
Instrumentation	Haake RV100 M5 Head/Shear Vane	Haake RV100	Haake RV100	Haake RV100	Haake RV100	Haake RV100	Haake RV100	Haake RV100	Haake RV100	Haake RV100 M5 Head/Shear Vane	Haake RV100 M5 Head/Shear Vane	Haake RV100	Haake RV100	Haake RV100	Haake RV100	Haake RV100
Newtonian:																
η – Newtonian viscosity (cP)		n/a	n/a	n/a	n/a	2.20		1.50	1.20			n/a	n/a	n/a	n/a	2
r – correlation coefficient		n/a	n/a	n/a	n/a	0.99		0.75				n/a	n/a	n/a	n/a	
Ostwald (or Power Law):																
m – the consistency coefficient (Pa·s^{-n})		n/a	n/a	n/a	n/a	n/a		n/a	n/a			n/a	n/a	n/a	n/a	n/a
n – the power-law exponent		n/a	n/a	n/a	n/a	n/a		n/a	n/a			n/a	n/a	n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a	n/a	n/a		n/a	n/a			n/a	n/a	n/a	n/a	n/a
Bingham Plastic:																
τ_B- the Bingham yield stress (Pa)		0.62	0.54	1.41	0.67	0.00		0.00	0.00			1.04	0.93	1.06	0.90	0.00
η_p - the plastic viscosity (Pa·s)		0.0027	0.0027	0.0026	0.0021	***0.0022***		***0.0015***	***0.0012***			0.031	0.004	0.0022	0.0017	***0.0020***
r – correlation coefficient		1.00	0.99	0.99	0.97	n/a		n/a	n/a			0.90	0.96	0.96	0.97	n/a
Herschel-Bulkley:																
τ_H- the yield stress (Pa)		1.08	0.68	2.10	1.40	n/a	n/a	n/a	n/a			1.00	1.00	1.60	1.00	n/a
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		0.002	0.003	0.001	0.002	n/a	n/a	n/a	n/a			0.006	0.003	0.008	0.001	n/a
b - the Hershel-Bulkely power-law exponent		1.00	0.97	1.00	1.00	n/a	n/a	n/a	n/a			0.88	1.00	1.00	1.00	n/a
r – correlation coefficient						n/a	n/a	n/a	n/a							n/a
n/a = not applicable																

Physical Property Data

Physical Property	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202	B-202
Source of Data	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371	PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371
Temperature (°C)	30	30	30	95	95	30	30				30	30	30	95	95	30
Zeta Potential (mV)	n/m										n/m					
Bulk Density (g/mL)	1.23	1.10	1.10	1.10	1.10	1.04	1.05	1.04	1.05	***1.23***	1.2	1.11	1.10	1.11	1.10	1.04
vol% Settled Solids	100	***77***	***76***			***38***	***38***				100	***80***	***80***			***39***
Density of Centrifuged Solids (g/mL)	1.32	n/m	n/m								1.29					
vol% Centrifuged Solids	67	n/m	n/m								60.8					
wt% Centrifuged Solids	71.5	n/m	n/m								65.4					
Supernatant Density (g/mL)	1.06	***1.02***	***1.02***	***1.02***	***1.02***	***1.01***	***1.01***	***1.01***	***1.01***	***1.06***	1.05	***1.02***	***1.02***	***1.02***	***1.02***	***1.01***
Density of Settled Solids (g/mL)	1.23	n/m	n/m													
wt% Settled Supernatant	0										0					
wt% dissolved solids in supernatant	n/m										n/m					
wt% total solids in Centrifuged Sludge																
wt% Total Solids	36.2										28.5					
wt% UDS	32.70	***8.85***	***8.85***	***8.85***	***8.85***	***3.53***	***4.70***	***3.53***	***4.70***	***17.89***	24.10	***10.17***	***9.11***	***10.17***	***9.11***	***3.66***
Density of Solids (g/cc)	***4.66***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.66***	***4.66***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-B-202

Settling Data

Settling Schedule		**B-202**	**B-202**			**B-202**	**B-202**					**B-202**	**B-202**			**B-202**
Source of Data		**WHC-SD-WM-DP-034**	**WHC-SD-WM-DP-034**			**WHC-SD-WM-DP-034**	**WHC-SD-WM-DP-034**					**WHC-SD-WM-DP-034**	**WHC-SD-WM-DP-034**			**WHC-SD-WM-DP-034**
Temperature (°C)		**30**	**30**			**30**	**30**					**30**	**30**			**30**
Total initial volume		11.8	12.7			11.2	11					11.3	11.9			12.2
5 minutes																
10 minutes		11.8	12.7			9.7	10.2									
15 minutes												11.3	11.9			11.4
20 minutes																
30 minutes		11.8	12.7			8.4	9.2					11.3	11.9			10.3
40 minutes																
50 minutes		11.8	12.7			7.7	8.3					11.3	11.9			9.5
1 hour		11.7	12.5			7.2	7.7					11.1	11.7			9
2 hours		11.4	12.2			6	6.3					10.9	11.4			7.3
3 hours		11.1	11.8			5.4	5.5					10.4	11			6.4
4 hours		10.6	11.4			5.1	5					10.4	10.8			5.8
5 hours		10.3	11.2			5	4.9					10.3	10.6			5.6
6 hours		10.2	11			4.9	4.8					10.1	10.4			5.4
24 hours		9.4	9.9			4.5	4.5					9.2	9.7			5
32 hours		9.2	9.8			4.3	4.4					9.1	9.6			4.8
48 hours		9.1	9.7			4.2	4.3					9	9.5			4.7
56 hours		9.1	9.7			4.2	4.2					9	9.5			
72 hours final settled		9.1	9.7			4.2	4.2					9	9.5			4.7

Shear Strength Data

Shear Strength Schedule	**B-202**									**B-202**	**B-202**					
Source of Data	**PNNL-14221 WHC-SD-WM-DP-034**									**PNNL-14221 WHC-SD-WM-DP-034**	**PNNL-14221 WHC-SD-WM-DP-034**					
Instrumentation	**Haake RV100/M5 Shear Vane**									**Haake RV100/M5 Shear Vane**	**Haake RV100/M5 Shear Vane**					
Temperature (°C)	**30**									**30**	**30**					
Description	**As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.**									**As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.**	**As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.**					
Gelation Time/Shear Strength (Pa)																
5 minutes																
10 minutes																
15 minutes																
20 minutes																
30 minutes																
40 minutes																
50 minutes																
1 hour																
2 hours																
3 hours																
4 hours																
5 hours																
6 hours																
24 hours																
32 hours																
48 hours																
56 hours																
72 hours																
Infinte time (GRE)	200									270	750					

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**
Description	**3:1 dilution by volume Segment 4 Sample 2**	**3:1 dilution by volume Segment 4 Sample 1**	**3:1 dilution by volume Segment 4 Sample 2**	**as-received Segment 5 Core 25**	**as-received Segment 6 Core 24**	**1:1 dilution by volume Segment 6 Sample 1**	**1:1 dilution by volume Segment 6 Sample 2**	**1:1 dilution by volume Segment 6 Sample 1**	**1:1 dilution by volume Segment 6 Sample 2**	**3:1 dilution by volume Segment 6 Sample 1**	**3:1 dilution by volume Segment 6 Sample 2**	**3:1 dilution by volume Segment 6 Sample 1**	**3:1 dilution by volume Segment 6 Sample 2**	**as-received Segment 7 Core 25**
Model Basis	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**
Source of Data	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**	**PNNL-14221 WHC-SD-WM-DP-034 WHC-SD-WM-ER-371**
Solid Phases (vol% of bulk)														
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	*0.00004*	*0.00004*	*0.00004*	*0.00040*	*0.00028*	*0.00010*	*0.00011*	*0.00010*	*0.00011*	*0.00005*	*0.00004*	*0.00005*	*0.00004*	*0.00042*
Bi_2O_3	*0.13123*	*0.13123*	*0.13123*	*1.37561*	*0.94703*	*0.33666*	*0.38026*	*0.33666*	*0.38026*	*0.15719*	*0.14684*	*0.15719*	*0.14684*	*1.45353*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.02455*	*0.02455*	*0.02455*	*0.25730*	*0.17714*	*0.06297*	*0.07113*	*0.06297*	*0.07113*	*0.02940*	*0.02747*	*0.02940*	*0.02747*	*0.27188*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	*0.10062*	*0.10062*	*0.10062*	*1.05476*	*0.72615*	*0.25814*	*0.29157*	*0.25814*	*0.29157*	*0.12053*	*0.11259*	*0.12053*	*0.11259*	*1.11451*
CrOOH	*0.01989*	*0.01989*	*0.01989*	*0.20845*	*0.14351*	*0.05102*	*0.05762*	*0.05102*	*0.05762*	*0.02382*	*0.02225*	*0.02382*	*0.02225*	*0.22026*
FeOOH	*0.13634*	*0.13634*	*0.13634*	*1.42926*	*0.98397*	*0.34979*	*0.39509*	*0.34979*	*0.39509*	*0.16332*	*0.15256*	*0.16332*	*0.15256*	*1.51023*
Gibbsite	*0.03989*	*0.03989*	*0.03989*	*0.41818*	*0.28789*	*0.10234*	*0.11560*	*0.10234*	*0.11560*	*0.04779*	*0.04464*	*0.04779*	*0.04464*	*0.44187*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	*0.02148*	*0.02148*	*0.02148*	*0.22514*	*0.15499*	*0.05510*	*0.06223*	*0.05510*	*0.06223*	*0.02573*	*0.02403*	*0.02573*	*0.02403*	*0.23789*
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4$•$2H_2O$	*0.10965*	*0.10965*	*0.10965*	*1.14940*	*0.79130*	*0.28130*	*0.31773*	*0.28130*	*0.31773*	*0.13134*	*0.12269*	*0.13134*	*0.12269*	*1.21452*
$Mn(OH)_2$	*0.19033*	*0.19033*	*0.19033*	*1.99515*	*1.37355*	*0.48828*	*0.55152*	*0.48828*	*0.55152*	*0.22799*	*0.21297*	*0.22799*	*0.21297*	*2.10817*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.00235*	*0.00235*	*0.00235*	*0.02463*	*0.01696*	*0.00603*	*0.00681*	*0.00603*	*0.00681*	*0.00281*	*0.00263*	*0.00281*	*0.00263*	*0.02603*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	*0.00245*	*0.00245*	*0.00245*	*0.02563*	*0.01765*	*0.00627*	*0.00709*	*0.00627*	*0.00709*	*0.00293*	*0.00274*	*0.00293*	*0.00274*	*0.02708*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00310*	*0.00310*	*0.00310*	*0.03252*	*0.02239*	*0.00796*	*0.00899*	*0.00796*	*0.00899*	*0.00372*	*0.00347*	*0.00372*	*0.00347*	*0.03436*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00001*	*0.00001*	*0.00001*	*0.00015*	*0.00010*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00016*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00728*	*0.00728*	*0.00728*	*0.07631*	*0.05254*	*0.01868*	*0.02110*	*0.01868*	*0.02110*	*0.00872*	*0.00815*	*0.00872*	*0.00815*	*0.08064*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	-	-	-	*0.58737*	*0.40437*	-	-	-	-	-	-	-	-	*0.62065*
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*0.79*	*0.79*	*0.79*	*8.86*	*6.10*	*2.02*	*2.29*	*2.02*	*2.29*	*0.95*	*0.88*	*0.95*	*0.88*	*9.36*
Solids Concentration (g/L)	***38.1***	***38.1***	***38.1***	***413.0***	***284.4***	***97.7***	***110.4***	***97.7***	***110.4***	***45.6***	***42.6***	***45.6***	***42.6***	***436.4***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***	***B-202***
Temperature (°C)	**30**	**95**	**95**			**29**	**29**	**95**	**95**	**29**	**29**	**95**	**95**	
Source of Data	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***	***PNNL-14221*** ***WHC-SD-WM-DP-034*** ***WHC-SD-WM-ER-371***
Instrumentation	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100 M5 Head/Shear Vane**	**Haake RV100 M5 Head/Shear Vane**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100**	**Haake RV100 M5 Head/Shear Vane**
Newtonian:														
η – Newtonian viscosity (cP)	2	1	2			n/a	n/a	n/a	n/a	2.00	2.00	1.00	2.00	
r – correlation coefficient						n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Ostwald (or Power Law):														
m – the consistency coefficient (Pa·s^{-n})	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
n – the power-law exponent	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
r – correlation coefficient	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Bingham Plastic:														
τ_B- the Bingham yield stress (Pa)	0.00	0.00	0.00			1.12	1.07	0.87	1.07	0.00	0.00	0.00	0.00	
η_p - the plastic viscosity (Pa·s)	***0.0020***	***0.0010***	***0.0020***			0.004	0.003	0.002	0.003	***0.0020***	***0.0020***	***0.0010***	***0.0020***	
r – correlation coefficient	n/a	n/a	n/a			0.99	1.00	0.99	1.00	n/a	n/a	n/a	n/a	
Herschel-Bulkley:														
τ_H- the yield stress (Pa)	n/a	n/a	n/a			1.16	1.11	1.65	1.30	n/a	n/a	n/a	n/a	
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	n/a	n/a	n/a			0.020	0.015	0.007	0.001	n/a	n/a	n/a	n/a	
b - the Hershel-Bulkely power-law exponent	n/a	n/a	n/a			0.74	0.78	1.00	1.00	n/a	n/a	n/a	n/a	
r – correlation coefficient	n/a	n/a	n/a							n/a	n/a	n/a	n/a	
n/a = not applicable														

Physical Property Data

Physical Property	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**	**B-202**
Source of Data	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**	**PNNL-14221** **WHC-SD-WM-DP-034** **WHC-SD-WM-ER-371**
Temperature (°C)	**30**				**30**	**29**	**29**	**95**	**95**	**29**	**29**	**95**	**95**	
Zeta Potential (mV)					n/m	n/m	n/m			n/m	n/m	n/m	n/m	
Bulk Density (g/mL)	1.04	1.04	1.04	1.37	1.21	1.09	1.10	1.09	1.10	***1.04***	***1.04***	***1.04***	***1.04***	1.37
vol% Settled Solids	***39***				100	***86***	***86***			***48***	***47***			
Density of Centrifuged Solids (g/mL)					1.29									
vol% Centrifuged Solids					68.8									
wt% Centrifuged Solids					73.3									
Supernatant Density (g/mL)	***1.01***	***1.01***	***1.01***	***1.05***	1.03	***1.01***	***1.01***	***1.01***	***1.01***	***1.01***	***1.01***	***1.01***	***1.01***	***1.03***
Density of Settled Solids (g/mL)					1.21									
wt% Settled Supernatant					0									
wt% dissolved solids in supernatant					n/m									
wt% total solids in Centrifuged Sludge														
wt% Total Solids					27									
wt% UDS	***3.66***	***3.66***	***3.66***	***30.15***	23.50	***8.97***	***10.03***	***8.97***	***10.03***	***4.38***	***4.10***	***4.38***	***4.10***	***31.86***
Density of Solids (g/cc)	***4.83***	***4.83***	***4.83***	***4.66***	***4.66***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.83***	***4.66***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule	B-202					B-202	B-202			B-202	B-202				
Source of Data	WHC-SD-WM-DP-034					WHC-SD-WM-DP-034	WHC-SD-WM-DP-034			WHC-SD-WM-DP-034	WHC-SD-WM-DP-034				
Temperature (°C)	30					29	29			29	29				
Total initial volume	12.2					12.4	12.2			12.2	12.1				
5 minutes															
10 minutes															
15 minutes	11.8					12.4	12.2			11.7	11.6				
20 minutes															
30 minutes	11.1					12.4	12.2			11.2	11.2				
40 minutes															
50 minutes	10.3					12.4	12.2			10.7	10.8				
1 hour	9.8					12.2	12.2			10.2	10.4				
2 hours	7.8					12	11.9			8.7	8.8				
3 hours	6.7					11.8	11.8			7.6	7.8				
4 hours	6					11.5	11.5			7	7				
5 hours	5.7					11.5	11.5			6.8	6.7				
6 hours	5.5					11.3	11.3			6.7	6.6				
24 hours	5					10.8	10.9			6.1	6				
32 hours	5					10.7	10.7			6	5.9				
48 hours	4.8					10.7	10.6			6	5.7				
56 hours						10.7	10.5			5.9	5.7				
72 hours final settled	4.8					10.7	10.5			5.9	5.7				

Shear Strength Data

Shear Strength Schedule				B-202	B-202										B-202
Source of Data				PNNL-14221 WHC-SD-WM-DP-034	PNNL-14221 WHC-SD-WM-DP-034										PNNL-14221 WHC-SD-WM-DP-034
Instrumentation				Haake RV100/M5 Shear Vane	Haake RV100/M5 Shear Vane										Haake RV100/M5 Shear Vane
Temperature (°C)				30	30										30
Description				As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.	As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.										As-Received Sample before it was disturbed. Placed in water bath at temperature for a minimum of 1 hr.
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours															
Infinte time (GRE)				470	750										270

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**B-203**	**B-203**	**B-203**	**B-203**	**B-203**
Description	**Homogenized Tank Composite**	**30 wt% dilution of a core composite**	**1:1 Dilution of a core composite**	**1:1 Dilution of a core composite**	**4:1 Dilution of a core composite**
Model Basis	**Salty**	**Washed**	**Washed**	**Washed**	**Washed**
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Solid Phases (vol% of bulk)					
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-
Ag_2CO_3	*0.00008*	*0.00012*	*0.00009*	*0.00009*	*0.00002*
Bi_2O_3	*0.45700*	*0.70830*	*0.50930*	*0.50930*	*0.12562*
BiOCl	-	-	-	-	-
Boehmite	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	-	-
$CaC_2O_4{\cdot}H_2O$	-	-	-	-	-
$CaCO_3$	-	-	-	-	-
CaF_2	*0.01200*	*0.01859*	*0.01337*	*0.01337*	*0.00330*
CrOOH	*0.08346*	*0.12935*	*0.09301*	*0.09301*	*0.02294*
FeOOH	*0.10857*	*0.16827*	*0.12100*	*0.12100*	*0.02984*
Gibbsite	-	-	-	-	-
HgO	-	-	-	-	-
$KAlSiO_4$	*0.01013*	*0.01571*	*0.01129*	*0.01129*	*0.00279*
$La(OH)_3$	*0.03248*	*0.05033*	*0.03619*	*0.03619*	*0.00893*
$LaPO_4$•$2H_2O$	*0.25651*	*0.39756*	*0.28587*	*0.28587*	*0.07051*
$Mn(OH)_2$	*0.58814*	*0.91154*	*0.65544*	*0.65544*	*0.16167*
$Mn_3(PO_4)_2$	-	-	-	-	-
$MnCO_3$	*0.04020*	*0.06230*	*0.04480*	*0.04480*	*0.01105*
$Na_2U_2O_7$	*0.00368*	*0.00570*	*0.00410*	*0.00410*	*0.00101*
$NaAlCO_3(OH)_2$	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-
$Ni(OH)_2$	*0.00620*	*0.00961*	*0.00691*	*0.00691*	*0.00170*
$Ni_3(PO_4)_2$	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-
$Pb(OH)_2$	*0.00331*	*0.00513*	*0.00369*	*0.00369*	*0.00091*
$Pb_3(PO_4)_2$	-	-	-	-	-
$PbCO_3$	-	-	-	-	-
$Pu(OH)_4$	*0.00006*	*0.00009*	*0.00007*	*0.00007*	*0.00002*
SiO_2	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-
$SrCO_3$	*0.02107*	*0.03266*	*0.02348*	*0.02348*	*0.00579*
TcO_2	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00000*
ZrO_2	*0.00006*	*0.00009*	*0.00006*	*0.00006*	*0.00002*
KNO_3	-	-	-	-	-
$Na_2C_2O_4$	-	-	-	-	-
$Na_2CO_3{\cdot}H_2O$	-	-	-	-	-
Na_2SO_4	-	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-
NaF	-	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-
$NaNO_2$	-	-	-	-	-
$NaNO_3$	-	-	-	-	-
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-	-	-
Total Volume % UDS	*1.62*	*2.52*	*1.81*	*1.81*	*0.45*
Solids Concentration (g/L)	*89.6*	*138.9*	*99.9*	*99.9*	*24.6*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-B-203

Rheological Data

Model/model Parameter		**B-203**	**B-203**	**B-203**	**B-203**
Temperature (°C)		**25**	**25**	**25**	**25**
Source of Data	***PNNL-14365***	***PNNL-14365***	***PNNL-14365***	***PNNL-14365***	***PNNL-14365***
Instrumentation		**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**
Newtonian:					
η – Newtonian viscosity (cP)		n/a	n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a	n/a
Ostwald (or Power Law):					
m – the consistency coefficient (Pa·s^{-n})		n/a	n/a	n/a	n/a
n – the power-law exponent		n/a	n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a	n/a
Bingham Plastic:					
τ_B- the Bingham yield stress (Pa)		10.90	3.07	3.15	0.13
η_p - the plastic viscosity (Pa·s)		0.0079	0.0047	0.0047	0.0019
r – correlation coefficient		1.00	0.99	0.99	0.97
Herschel-Bulkley:					
τ_H- the yield stress (Pa)		n/a	n/a	n/a	0.01
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		n/a	n/a	n/a	0.0049
b - the Hershel-Bulkely power-law exponent		n/a	n/a	n/a	0.84
r – correlation coefficient		n/a	n/a	n/a	0.98
n/a = not applicable					

Physical Property Data

Physical Property	**B-203**	**B-203**	**B-203**	**B-203**	**B-203**
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Temperature (°C)					
Zeta Potential (mV)					
Bulk Density (g/mL)	1.28	1.26	1.18	1.18	1.06
vol% Settled Solids	100	100	87.5	87.5	43.8
Density of Centrifuged Solids (g/mL)	1.53	1.41	1.38	1.38	1.52
vol% Centrifuged Solids	83.7	54.5	38.5	38.5	13.9
wt% Centrifuged Solids	***100***	***61***	***45***	***45***	***20***
Supernatant Density (g/mL)	1.21	1.15	1.10	1.10	1.04
Density of Settled Solids (g/mL)					
wt% Settled Supernatant					
wt% dissolved solids in supernatant					
wt% total solids in Centrifuged Sludge					
wt% Total Solids	40.5	28.6	19.7	19.7	8.5
wt% UDS	***7.00***	***11.03***	***8.47***	***8.47***	***2.32***
Density of Solids (g/cc)	***5.52***	***5.52***	***5.52***	***5.52***	***5.52***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-B-203

Settling Data

Settling Schedule					
Source of Data		**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Temperature (°C)					
Total initial volume			13.3	13.3	13
5 minutes			13.3	13.3	12.6
10 minutes			13.3	13.3	12.1
15 minutes			13.3	13.3	11.4
20 minutes			13.3	13.3	10.6
30 minutes			13.3	13.3	9.5
40 minutes					
50 minutes					
1 hour			13.3	13.3	7.3
2 hours			13.05	13.05	6.2
3 hours			13	13	6
4 hours			12.95	12.95	5.9
5 hours					
6 hours			12.7	12.7	5.7
24 hours			12	12	5.6
32 hours					5.6
48 hours			11.8	11.8	5.6
56 hours			11.7	11.7	5.6
72 hours final settled			11.7	11.7	5.6

Shear Strength Data

Shear Strength Schedule	**B-203**	**B-203**			
Source of Data	**PNNL-14365**	**PNNL-14365**			
Instrumentation	**Haake RS300 Shear Vane**	**Haake RS300 Shear Vane**			
Temperature (°C)	**25**	**25**			
Description	**Homogenized Tank Composite**	**30 wt% dilution of the tank composite**			
Gelation Time/Shear Strength (Pa)					
5 minutes					
10 minutes					
15 minutes					
20 minutes					
30 minutes					
40 minutes					
50 minutes					
1 hour					
2 hours					
3 hours					
4 hours					
5 hours					
6 hours					
24 hours					
32 hours					
48 hours					
56 hours					
72 hours	2280	60			
Infinte time (GRE)					

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107	BX-107
Description	Core Segment 2	Core Segment 2	Core Segment 2 1:1 dilution	Core Segment 2 1:1 dilution	Core Segment 2 3:1 dilution	Core Segment 2 3:1 dilution	Core Segment 4	Core Segment 4	Core Segment 4 1:1 dilution	Core Segment 4 1:1 dilution	Core Segment 4 3:1 dilution	Core Segment 4 3:1 dilution	Core Segment 6	Core Segment 6	Core Segment 6 1:1 dilution	Core Segment 6 1:1 dilution	Core Segment 6 3:1 dilution	Core Segment 6 3:1 dilution
Model Basis	Salty	Salty	Salt Free	Salt Free	Salt Free	Salt Free	Salty	Salty	Salt Free	Salt Free	Salt Free	Salt Free	Salty	Salty	Salt Free	Salt Free	Salt Free	Salt Free
Report No/Source of Data	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package	SST BX-107 Cores 40 and 41 data package
Solid Phases (vol% of bulk)																		
$(NaAlO_2)_2 \cdot 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.48646*	*0.48646*	*0.25140*	*0.25140*	*0.04514*	*0.04514*	*0.50005*	*0.50005*	*0.26211*	*0.26211*	*0.04701*	*0.04701*	*0.39746*	*0.39746*	*0.21529*	*0.21529*	*0.03878*	*0.03878*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	*0.10202*	*0.10202*	*0.05272*	*0.05272*	*0.00947*	*0.00947*	*0.10487*	*0.10487*	*0.05497*	*0.05497*	*0.00986*	*0.00986*	*0.08335*	*0.08335*	*0.04515*	*0.04515*	*0.00813*	*0.00813*
CrOOH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FeOOH	*0.66010*	*0.66010*	*0.34113*	*0.34113*	*0.06125*	*0.06125*	*0.67853*	*0.67853*	*0.35566*	*0.35566*	*0.06380*	*0.06380*	*0.53933*	*0.53933*	*0.29214*	*0.29214*	*0.05262*	*0.05262*
Gibbsite	*1.49903*	*1.49903*	*0.77468*	*0.77468*	*0.13909*	*0.13909*	*1.54090*	*1.54090*	*0.80768*	*0.80768*	*0.14488*	*0.14488*	*1.22477*	*1.22477*	*0.66342*	*0.66342*	*0.11951*	*0.11951*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4 \cdot 2H_2O$	*0.00007*	*0.00007*	*0.00004*	*0.00004*	*0.00001*	*0.00001*	*0.00007*	*0.00007*	*0.00004*	*0.00004*	*0.00001*	*0.00001*	*0.00006*	*0.00006*	*0.00003*	*0.00003*	*0.00001*	*0.00001*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	*0.00718*	*0.00718*	*0.00371*	*0.00371*	*0.00067*	*0.00067*	*0.00738*	*0.00738*	*0.00387*	*0.00387*	*0.00069*	*0.00069*	*0.00587*	*0.00587*	*0.00318*	*0.00318*	*0.00057*	*0.00057*
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.07952*	*0.07952*	*0.04110*	*0.04110*	*0.00738*	*0.00738*	*0.08175*	*0.08175*	*0.04285*	*0.04285*	*0.00769*	*0.00769*	*0.06497*	*0.06497*	*0.03519*	*0.03519*	*0.00634*	*0.00634*
$NaAlCO_3(OH)_2$	*0.07098*	*0.07098*	*0.03668*	*0.03668*	*0.00659*	*0.00659*	*0.07297*	*0.07297*	*0.03825*	*0.03825*	*0.00686*	*0.00686*	*0.05800*	*0.05800*	*0.03142*	*0.03142*	*0.00566*	*0.00566*
$NaAlSiO_4$	*2.04731*	*2.04731*	*1.05802*	*1.05802*	*0.18996*	*0.18996*	*2.10449*	*2.10449*	*1.10309*	*1.10309*	*0.19786*	*0.19786*	*1.67274*	*1.67274*	*0.90607*	*0.90607*	*0.16322*	*0.16322*
$Ni(OH)_2$	*0.00076*	*0.00076*	*0.00039*	*0.00039*	*0.00007*	*0.00007*	*0.00078*	*0.00078*	*0.00041*	*0.00041*	*0.00007*	*0.00007*	*0.00062*	*0.00062*	*0.00033*	*0.00033*	*0.00006*	*0.00006*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \cdot 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00155*	*0.00155*	*0.00080*	*0.00080*	*0.00014*	*0.00014*	*0.00159*	*0.00159*	*0.00084*	*0.00084*	*0.00015*	*0.00015*	*0.00127*	*0.00127*	*0.00069*	*0.00069*	*0.00012*	*0.00012*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00003*	*0.00003*	*0.00002*	*0.00002*	*0.00000*	*0.00000*	*0.00003*	*0.00003*	*0.00002*	*0.00002*	*0.00000*	*0.00000*	*0.00002*	*0.00002*	*0.00001*	*0.00001*	*0.00000*	*0.00000*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	*0.01309*	*0.01309*	*0.00676*	*0.00676*	*0.00121*	*0.00121*	*0.01345*	*0.01345*	*0.00705*	*0.00705*	*0.00126*	*0.00126*	*0.01069*	*0.01069*	*0.00579*	*0.00579*	*0.00104*	*0.00104*
$SrCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00517*	*0.00517*	*0.00267*	*0.00267*	*0.00048*	*0.00048*	*0.00532*	*0.00532*	*0.00279*	*0.00279*	*0.00050*	*0.00050*	*0.00423*	*0.00423*	*0.00229*	*0.00229*	*0.00041*	*0.00041*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.06548*	*0.06548*	-	-	-	-	*0.06730*	*0.06730*	-	-	-	-	*0.05350*	*0.05350*	-	-	-	-
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	*0.30322*	*0.30322*	-	-	-	-	*0.31169*	*0.31169*	-	-	-	-	*0.24774*	*0.24774*	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	*0.08470*	*0.08470*	-	-	-	-	*0.08707*	*0.08707*	-	-	-	-	*0.06921*	*0.06921*	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*21.59362*	*21.59362*	-	-	-	-	*22.19666*	*22.19666*	-	-	-	-	*17.64290*	*17.64290*	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*27.02*	*27.02*	*2.57*	*2.57*	*0.46*	*0.46*	*27.77*	*27.77*	*2.68*	*2.68*	*0.48*	*0.48*	*22.08*	*22.08*	*2.20*	*2.20*	*0.40*	*0.40*
Solids Concentration (g/L)	***558.6***	***558.6***	***88.5***	***88.5***	***15.9***	***15.9***	***574.2***	***574.2***	***92.3***	***92.3***	***16.6***	***16.6***	***456.4***	***456.4***	***75.8***	***75.8***	***13.7***	***13.7***

Rheological Data

Model/model Parameter	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*	*BX-107*
Temperature (°C)	25	95	25	95	25	95	25	95	25	95	25	95	25	95	25	95	25	95
Source of Data	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*	*SST BX-107 Cores 40 and 41 data package*
Notes			C04-092	C04-099	C04-104	C04-106			C04-110	C04-114	C04-120	C04-124			C04-126	C04-130	C04-136	C04-138
Newtonian:																		
η – Newtonian viscosity (cP)			5.024	6.722	2.598	1.368			5.337	8.445	2.427	1.639			3.416	2.592	2.021	1.494
r – correlation coefficient			0.990	0.999	0.993	0.997			0.985	1.000	1.000	0.964			0.994	0.987	0.998	0.987
Ostwald (or Power Law):																		
m – the consistency coefficient ($Pa{\cdot}s^{-n}$)			0.007	0.126	0.012	0.001			0.006	0.053	0.010	0.002			0.007	0.014	0.005	0.001
n – the power-law exponent			0.953	0.505	0.739	1.000			0.984	0.691	0.765	1.000			0.875	0.709	0.836	1.000
r – correlation coefficient			0.994	0.924	0.996	0.997			0.986	0.999	0.997	0.964			0.999	0.967	0.997	0.987
Bingham Plastic:																		
τ_B- the Bingham yield stress (Pa)			0.158	0.909	0.261	0.000			0.381	1.356	0.067	0.035			0.038	0.209	0.079	0.019
η_p - the plastic viscosity (Pa·s)			0.005	0.004	0.002	0.001			0.004	0.005	0.002	0.002			0.003	0.002	0.002	0.001
r – correlation coefficient			0.990	0.999	0.993	0.997			0.985	1.000	1.000	0.964			0.994	0.987	0.998	0.987
Herschel-Bulkley:																		
τ_H- the yield stress (Pa)			0.097	0.893	0.122	0.000			0.402	1.216	0.000	0.006			0.014	0.012	0.011	0.010
k - the Herschel-Bulkely consistency coefficient ($Pa{\cdot}s^{-b}$)			0.006	0.005	0.008	0.001			0.004	0.010	0.008	0.002			0.007	0.013	0.005	0.001
b - the Hershel-Bulkely power-law exponent			0.961	0.965	0.797	1.000			0.996	0.889	0.795	1.000			0.884	0.717	0.855	1.000
r – correlation coefficient			0.993	1.000	0.996	0.997			0.986	1.000	0.997	0.964			0.999	0.968	0.997	0.987
n/a = not applicable																		

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Physical Property Data

Physical Property	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***
Notes																		
Temperature (°C)	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**
Zeta Potential (mV)																		
Bulk Density (g/mL)	1.47	1.47	***1.17***	***1.17***	***1.06***	***1.06***	1.45	1.45	***1.17***	***1.17***	***1.06***	***1.06***	1.4	1.4	***1.17***	***1.17***	***1.06***	***1.06***
vol% Settled Solids	100	100	n/m	n/m	n/m	n/m	100	100	n/m	n/m	n/m	n/m	97.8	97.8	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	1.58	1.58	n/m	n/m	n/m	n/m	1.54	1.54	n/m	n/m	n/m	n/m	1.49	1.49	n/m	n/m	n/m	n/m
vol% Centrifuged Solids	71.7	71.7	n/m	n/m	n/m	n/m	76	76	n/m	n/m	n/m	n/m	66	66	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	77.2	77.2	n/m	n/m	n/m	n/m	80.6	80.6	n/m	n/m	n/m	n/m	70.4	70.4	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	1.18	1.18	***1.11***	***1.11***	***1.05***	***1.05***	1.17	1.17	***1.11***	***1.11***	***1.05***	***1.05***	1.21	1.21	***1.12***	***1.12***	***1.06***	***1.06***
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	44.8	44.8	n/m	n/m	n/m	n/m	45.6	45.6	n/m	n/m	n/m	n/m	42	42	n/m	n/m	n/m	n/m
wt% UDS	38.00	38.00	***7.54***	***7.54***	***1.50***	***1.50***	39.60	39.60	***7.85***	***7.85***	***1.56***	***1.56***	32.60	32.60	***6.47***	***6.47***	***1.28***	***1.28***
Density of Solids (g/cc)	***2.07***	***2.07***	***3.44***	***3.44***	***3.44***	***3.44***	***2.07***	***2.07***	***3.44***	***3.44***	***3.44***	***3.44***	***2.07***	***2.07***	***3.44***	***3.44***	***3.44***	***3.44***

Settling Data

Settling Schedule			***BX-107***		***BX-107***				***BX-107***		***BX-107***				***BX-107***		***BX-107***	
Notes:			**C04-001-7**		**C04-001-7**				**C04-001-8**		**C04-001-8**				**C04-001-9**		**C04-001-9**	
Temperature (°C)			**25**		**25**				**25**		**25**				**25**		**25**	
Total initial volume			100		100				100		100				100		100	
5 minutes																		
10 minutes																		
15 minutes																		
20 minutes																		
30 minutes																		
40 minutes																		
50 minutes																		
1 hour																		
2 hours			82		55				87		55				85		60	
3 hours																		
4 hours																		
5 hours			76		50				80		49				67		40	
6 hours																		
24 hours			67		42				70		39				57		32	
32 hours			65		40				67		38				55		31	
48 hours			64		39				66		35				53		31	
56 hours			63		38				66		35				52		31	
72 hours final settled																		

Shear Strength Data

Shear Strength Schedule	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***	***BX-107***
Source of Data	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***	***SST BX-107 Cores 40 and 41 data package***
Notes:	**Page C04-001-6**																	
Temperature (°C)	**Ambient**																	
Description																		
Gelation Time/Shear Strength (Pa)																		
5 minutes	300						880						480					
10 minutes																		
15 minutes																		
20 minutes																		
30 minutes																		
40 minutes																		
50 minutes																		
1 hour																		
2 hours																		
3 hours																		
4 hours																		
5 hours																		
6 hours																		
24 hours																		
32 hours																		
48 hours																		
56 hours																		
72 hours																		
Infinte time (GRE)																		

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104
Description	Initial Slurry	Washed Slurry	Reconstituted Washed Slurry	Caustic Washed and Leached	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	Initial Slurry	100 g/L Diluted Slurry
Model Basis	Salty	Salt Free	Washed	Leached	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salt Free
Report No/Source of Data	BNFL-RPT-030 Rev. 0	BNFL-RPT-030 Rev. 0	BNFL-RPT-030 Rev. 0	BNFL-RPT-030 Rev. 0	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798
Solid Phases (vol% of bulk)																		
$(NaAlO_2)_2 \bullet 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	*0.00285*	*0.01406*	*0.01225*	*0.02051*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.02066*	*0.00459*
Bi_2O_3	*0.00006*	*0.00029*	*0.00025*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00043*	*0.00010*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.02298*	*0.11353*	*0.09895*	*0.16558*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.16685*	*0.03707*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	*0.00867*	*0.04283*	*0.03733*	*0.06246*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.06294*	*0.01398*
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FeOOH	*0.13170*	*0.65063*	*0.56708*	*0.94894*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.95618*	*0.21245*
Gibbsite	*1.10881*	*5.47789*	*4.77444*	-	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*8.05042*	*1.78868*
HgO	*0.00004*	*0.00018*	*0.00015*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00026*	*0.00006*
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	*0.00037*	*0.00183*	*0.00159*	*0.00267*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00269*	*0.00060*
$LaPO_4 \bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	*0.04419*	*0.21831*	*0.19028*	*0.31840*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.32083*	*0.07128*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.10694*	*0.52832*	*0.46047*	*0.77054*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.77642*	*0.17251*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.24486*	*1.20970*	*1.05436*	*1.76433*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*1.77780*	*0.39500*
$Ni(OH)_2$	*0.01295*	*0.06395*	*0.05574*	*0.09327*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.09399*	*0.02088*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00164*	*0.00809*	*0.00705*	*0.01180*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.01189*	*0.00264*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00025*	*0.00125*	*0.00109*	*0.00182*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00184*	*0.00041*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00054*	*0.00265*	*0.00231*	*0.00387*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00390*	*0.00087*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.19716*	*0.97401*	*0.84893*	*1.42058*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*1.43143*	*0.31804*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.21215*	-	-	-	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	*1.54026*	-
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	*0.32044*	-	-	-	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	*2.32652*	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*2.42*	*9.31*	*8.11*	*5.59*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*17.55*	*3.04*
Solids Concentration (g/L)	*73.1*	*292.8*	*255.2*	*233.7*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*531.0*	*95.6*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***
Temperature (°C)	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**45**	**65**	**25**
Source of Data	***BNFL-RPT-030 Rev. 0***	***BNFL-RPT-030 Rev. 0***	***BNFL-RPT-030 Rev. 0***	***BNFL-RPT-030 Rev. 0***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***	***RPP-5798***
Notes	**Appendix F; Figure 5**	**Appendix F; Figure 7**	**Appendix F; Figure 13**	**Appendix F; Figure 16**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Table 3-2**	**Page A-3**	**Page A-8**	**Page A-13**	**Page A-18**
Newtonian:																		
η – Newtonian viscosity (cP)	1.704	103.647	15.54	8.51	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	30.160	15.541	12.819	2.538
r – correlation coefficient	0.992	0.939	0.94	1.00	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.965	0.980	0.972	0.917
Ostwald (or Power Law):																		
m – the consistency coefficient (Pa·s^{-n})	0.002	16.879	0.02	0.04	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	1.709	1.165	1.174	0.021
n – the power-law exponent	1.000	0.046	1.00	0.77	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.256	0.199	0.162	0.609
r – correlation coefficient	0.992	0.696	0.94	1.00	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.981	0.948	0.935	0.979
Bingham Plastic:																		
τ_B- the Bingham yield stress (Pa)	0.000	20.445	1.77	2.49	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	4.311	2.083	1.871	0.172
η_p - the plastic viscosity (Pa·s)	0.002	0.001	0.01	0.01	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.010	0.006	0.004	0.002
r – correlation coefficient	0.992	0.939	0.94	1.00	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.965	0.980	0.972	0.917
Herschel-Bulkley:																		
τ_H- the yield stress (Pa)	0.000	16.838	2.35	2.39	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	4.172	1.927	1.728	0.042
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.002	0.083	0.00	0.01	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.024	0.023	0.022	0.026
b - the Hershel-Bulkely power-law exponent	1.000	0.799	1.00	0.99	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.857	0.772	0.718	0.560
r – correlation coefficient	0.992	0.911	0.94	1.00	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	0.981	0.992	0.984	0.985
n/a = not applicable																		

Physical Property Data

Physical Property	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***	***C-104***
Notes																		
Temperature (°C)	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***45***	***65***	***25***
Zeta Potential (mV)																		
Bulk Density (g/mL)	1.06	1.22	1.16	1.14	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.104
vol% Settled Solids	29.1	93.8	95	95.2	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
vol% Centrifuged Solids	11	46.2	50.6	42.2	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	14.7	54.2	58.3	50.9	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	1.02	1.001	1.001	1.001	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	***1.24***	1.04
Density of Settled Solids (g/mL)	1.2	1.28	1.18	1.18	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	1.226
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	9.7	24.9	22.1	21.2	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	6.90	24.00	22.00	20.50	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***34.26***	***8.66***
Density of Solids (g/cc)	***3.03***	***3.15***	***3.15***	***4.18***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.03***	***3.15***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*
Notes:																		**volume in report 1 mL=1 cm; Table 3-7**
Temperature (°C)	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**
Total initial volume																		99
5 minutes																		
10 minutes																		
15 minutes																		
20 minutes																		98
30 minutes																		
40 minutes																		97
50 minutes																		
1 hour																		95
2 hours																		88
3 hours																		82
4 hours																		76
5 hours																		71
6 hours																		66
24 hours																		49
32 hours																		43
48 hours																		38
56 hours																		37
72 hours final settled																		34

Shear Strength Data

Shear Strength Schedule					*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*				
Source of Data					**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**	**RPP-5798, Rev 0B**				
Notes:					**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**	**HNF-1666 Rev. 0B**				
Temperature (°C)																		
Description					**Shear Vane, on core 247 segment 1 upper solids; 6 months undistiburbed**	**Shear Vane, on core 247 segment 1 lower solids; 6 months undistiburbed**	**Shear Vane, on core 247 segment 2 upper solids; 6 months undistiburbed**	**Shear Vane, on core 247 segment 2 lower solids; 6 months undistiburbed**	**Shear Vane, on core 247 segment 3 quarter A; 6 months undistiburbed**	**Shear Vane, on core 247 segment 3 quarter B; 6 months undistiburbed**	**Shear Vane, on core 247 segment 3 quarter C; 6 months undistiburbed**	**Shear Vane, on core 247 segment 3 quarter D; 6 months undistiburbed**	**Shear Vane, on core 247 segment 4 upper solids; 6 months undistiburbed**	**Shear Vane, on core 247 segment 4 lower solids; 6 months undistiburbed**				
Gelation Time/Shear Strength (Pa)																		
5 minutes																		
10 minutes																		
15 minutes																		
20 minutes																		
30 minutes																		
40 minutes																		
50 minutes																		
1 hour																		
2 hours																		
3 hours																		
4 hours																		
5 hours																		
6 hours																		
24 hours																		
32 hours																		
48 hours																		
56 hours																		
72 hours					345	289	521	2421	885	1304	791	2607	810	7077				
Infinte time (GRE)																		

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104	C-104
Description	100 g/L Diluted Slurry	100 g/L Diluted Slurry	Decanted Undiluted Supernate	Decanted Undiluted Supernate	Decanted Undiluted Supernate	60 g/L Diluted Slurry	60 g/L Diluted Slurry	60 g/L Diluted Slurry	140 g/L Diluted Slurry	140 g/L Diluted Slurry	140 g/L Diluted Slurry	200 g/L Diluted Slurry	200 g/L Diluted Slurry	200 g/L Diluted Slurry	300 g/L Diluted Slurry	300 g/L Diluted Slurry	300 g/L Diluted Slurry
Model Basis	Salt Free	Salt Free	Salty	Salty	Salty	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free
Report No/Source of Data	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798	RPP-5798
Solid Phases (vol% of bulk)																	
$(NaAlO_2)_2•2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	*0.00459*	*0.00459*	-	-	-	*0.00320*	*0.00320*	*0.00320*	*0.00772*	*0.00772*	*0.00772*	*0.00960*	*0.00960*	*0.00960*	*0.01441*	*0.01441*	*0.01441*
Bi_2O_3	*0.00010*	*0.00010*	-	-	-	*0.00007*	*0.00007*	*0.00007*	*0.00016*	*0.00016*	*0.00016*	*0.00020*	*0.00020*	*0.00020*	*0.00030*	*0.00030*	*0.00030*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.03707*	*0.03707*	-	-	-	*0.02586*	*0.02586*	*0.02586*	*0.06233*	*0.06233*	*0.06233*	*0.07755*	*0.07755*	*0.07755*	*0.11632*	*0.11632*	*0.11632*
$CaC_2O_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	*0.01398*	*0.01398*	-	-	-	*0.00975*	*0.00975*	*0.00975*	*0.02351*	*0.02351*	*0.02351*	*0.02925*	*0.02925*	*0.02925*	*0.04388*	*0.04388*	*0.04388*
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FeOOH	*0.21245*	*0.21245*	-	-	-	*0.14818*	*0.14818*	*0.14818*	*0.35722*	*0.35722*	*0.35722*	*0.44442*	*0.44442*	*0.44442*	*0.66663*	*0.66663*	*0.66663*
Gibbsite	*1.78868*	*1.78868*	-	-	-	*1.24760*	*1.24760*	*1.24760*	*3.00759*	*3.00759*	*3.00759*	*3.74173*	*3.74173*	*3.74173*	*5.61259*	*5.61259*	*5.61259*
HgO	*0.00006*	*0.00006*	-	-	-	*0.00004*	*0.00004*	*0.00004*	*0.00010*	*0.00010*	*0.00010*	*0.00012*	*0.00012*	*0.00012*	*0.00018*	*0.00018*	*0.00018*
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	*0.00060*	*0.00060*	-	-	-	*0.00042*	*0.00042*	*0.00042*	*0.00100*	*0.00100*	*0.00100*	*0.00125*	*0.00125*	*0.00125*	*0.00187*	*0.00187*	*0.00187*
$LaPO_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	*0.07128*	*0.07128*	-	-	-	*0.04972*	*0.04972*	*0.04972*	*0.11986*	*0.11986*	*0.11986*	*0.14912*	*0.14912*	*0.14912*	*0.22368*	*0.22368*	*0.22368*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.17251*	*0.17251*	-	-	-	*0.12032*	*0.12032*	*0.12032*	*0.29007*	*0.29007*	*0.29007*	*0.36087*	*0.36087*	*0.36087*	*0.54131*	*0.54131*	*0.54131*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.39500*	*0.39500*	-	-	-	*0.27551*	*0.27551*	*0.27551*	*0.66418*	*0.66418*	*0.66418*	*0.82630*	*0.82630*	*0.82630*	*1.23945*	*1.23945*	*1.23945*
$Ni(OH)_2$	*0.02088*	*0.02088*	-	-	-	*0.01457*	*0.01457*	*0.01457*	*0.03511*	*0.03511*	*0.03511*	*0.04368*	*0.04368*	*0.04368*	*0.06553*	*0.06553*	*0.06553*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00264*	*0.00264*	-	-	-	*0.00184*	*0.00184*	*0.00184*	*0.00444*	*0.00444*	*0.00444*	*0.00553*	*0.00553*	*0.00553*	*0.00829*	*0.00829*	*0.00829*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00041*	*0.00041*	-	-	-	*0.00028*	*0.00028*	*0.00028*	*0.00069*	*0.00069*	*0.00069*	*0.00085*	*0.00085*	*0.00085*	*0.00128*	*0.00128*	*0.00128*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00087*	*0.00087*	-	-	-	*0.00060*	*0.00060*	*0.00060*	*0.00146*	*0.00146*	*0.00146*	*0.00181*	*0.00181*	*0.00181*	*0.00272*	*0.00272*	*0.00272*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.31804*	*0.31804*	-	-	-	*0.22183*	*0.22183*	*0.22183*	*0.53477*	*0.53477*	*0.53477*	*0.66531*	*0.66531*	*0.66531*	*0.99796*	*0.99796*	*0.99796*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2CO_3·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2·19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*3.04*	*3.04*	-	-	-	*2.12*	*2.12*	*2.12*	*5.11*	*5.11*	*5.11*	*6.36*	*6.36*	*6.36*	*9.54*	*9.54*	*9.54*
Solids Concentration (g/L)	*95.6*	*95.6*	-	-	-	*66.7*	*66.7*	*66.7*	*160.8*	*160.8*	*160.8*	*200.0*	*200.0*	*200.0*	*300.0*	*300.0*	*300.0*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*
Temperature (°C)	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**	**25**	**45**	**65**
Source of Data	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*	*RPP-5798*
Notes	**Page A-23**	**Page A-28**	**Page A-33**	**Page A-38**	**Page A-28**	**Page A-48**	**Page A-53**	**Page A-28**	**Page A-63**	**Page A-68**	**Page A-73**	**Page A-78**	**Page A-83**	**Page A-88**	**Page A-93**	**Page A-83**	**Page A-88**
Newtonian:																	
η – Newtonian viscosity (cP)	1.987	1.561	1.339	1.339	1.373	2.115	1.269	1.134	4.892	3.808	2.898	6.758	6.571	6.013	23.632	24.832	25.055
r – correlation coefficient	0.996	0.991	0.983	0.983	0.982	0.990	0.961	0.971	0.944	0.984	0.993	0.917	0.924	0.960	0.977	0.955	0.989
Ostwald (or Power Law):																	
m – the consistency coefficient (Pa s^{-n})	0.006	0.008	0.003	0.003	0.001	0.024	0.001	0.001	0.106	0.086	0.122	0.274	0.387	0.372	1.292	1.853	2.509
n – the power-law exponent	0.812	0.711	0.852	0.852	1.000	0.554	0.996	1.000	0.433	0.425	0.307	0.317	0.246	0.235	0.260	0.201	0.144
r – correlation coefficient	0.998	0.965	0.972	0.972	0.982	0.953	0.960	0.971	0.994	0.974	0.938	0.993	0.996	0.905	0.971	0.982	0.903
Bingham Plastic:																	
τ_B- the Bingham yield stress (Pa)	0.093	0.082	0.027	0.027	0.007	0.150	0.024	0.000	0.381	0.304	0.302	0.707	0.804	0.736	2.776	3.348	3.786
η_p - the plastic viscosity (Pas)	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.002	0.001	0.003	0.003	0.003	0.011	0.009	0.008
r – correlation coefficient	0.996	0.991	0.983	0.983	0.982	0.990	0.961	0.971	0.944	0.984	0.993	0.917	0.924	0.960	0.977	0.955	0.989
Herschel-Bulkley:																	
τ_H- the yield stress (Pa)	0.066	0.078	0.026	0.026	0.007	0.067	0.017	0.000	0.381	0.286	0.279	0.653	0.588	0.653	2.497	2.904	3.591
k - the Herschel-Bulkely consistency coefficient (Pa s^{-b})	0.005	0.001	0.001	0.001	0.001	0.016	0.001	0.001	0.004	0.004	0.004	0.008	0.045	0.013	0.041	0.075	0.029
b - the Hershel-Bulkely power-law exponent	0.811	1.000	1.000	1.000	1.000	0.602	1.000	1.000	0.970	0.920	0.845	0.855	0.548	0.731	0.774	0.655	0.771
r – correlation coefficient	0.998	0.991	0.983	0.983	0.982	0.960	0.961	0.971	0.948	0.989	0.995	0.943	0.988	0.967	0.993	0.992	0.994
n/a = not applicable																	

Physical Property Data

Physical Property	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*
Notes																	
Temperature (°C)	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***	***25***	***45***	***65***
Zeta Potential (mV)																	
Bulk Density (g/mL)	1.104	1.104	***1.24***	***1.24***	***1.24***	1.068	1.068	1.068	1.159	1.159	1.159	1.24	1.24	1.24	1.36	1.36	1.36
vol% Settled Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
vol% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	1.04	1.04	***1.24***	***1.24***	***1.24***	1.02	1.02	1.02	1.05	1.05	1.05	***1.11***	***1.11***	***1.11***	***1.17***	***1.17***	***1.17***
Density of Settled Solids (g/mL)	1.226	1.226	n/m			1.243	1.243	1.243	1.308	1.308	1.308	n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	***8.66***	***8.66***	***0.00***	***0.00***	***0.00***	***6.24***	***6.24***	***6.24***	***13.87***	***13.87***	***13.87***	***16.13***	***16.13***	***16.13***	***22.06***	***22.06***	***22.06***
Density of Solids (g/cc)	***3.15***	***3.15***	***3.03***	***3.03***	***3.03***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***	***3.15***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*	*C-104*
Notes:						**volume in report 1 mL=1 cm; Table 3-7**			**volume in report 1 mL=1 cm; Table 3-7**								
Temperature (°C)	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**
Total initial volume						100			100								
5 minutes																	
10 minutes																	
15 minutes																	
20 minutes						94			98								
30 minutes																	
40 minutes						86			98								
50 minutes																	
1 hour						83			97								
2 hours						85			95								
3 hours						79			90								
4 hours						49			83								
5 hours						41			79								
6 hours						38			76								
24 hours						25			60								
32 hours						23			55								
48 hours						22			50								
56 hours						22			48								
72 hours final settled						21			42								

Shear Strength Data

Shear Strength Schedule																	
Source of Data																	
Notes:																	
Temperature (°C)																	
Description																	
Gelation Time/Shear Strength (Pa)																	
5 minutes																	
10 minutes																	
15 minutes																	
20 minutes																	
30 minutes																	
40 minutes																	
50 minutes																	
1 hour																	
2 hours																	
3 hours																	
4 hours																	
5 hours																	
6 hours																	
24 hours																	
32 hours																	
48 hours																	
56 hours																	
72 hours																	
Infinte time (GRE)																	

241-C-109

Model Chemical Data From ESP

Analyte\Sample	**C-109**	**C-109**	**C-109**
Description	**no dilution**	**1:1 dilution**	**3:1 dilution**
Model Basis	**Salty**	**Salt Free**	**Salt Free**
Report No/Source of Data	**WHC-SD-WM-ER-402, rev 0; Core 47**	**WHC-SD-WM-ER-402, rev 0; Core 47**	**WHC-SD-WM-ER-402, rev 0; Core 47**
Solid Phases (vol% of bulk)			
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-
Ag_2CO_3	-	-	-
Bi_2O_3	*0.01311*	*0.01166*	*0.00711*
BiOCl	-	-	-
Boehmite	-	-	-
$Ca(OH)_2$	-	-	-
$Ca_5OH(PO_4)_3$	*0.41412*	*0.36843*	*0.22460*
$CaC_2O_4 \cdot H_2O$	-	-	-
$CaCO_3$	-	-	-
CaF_2	-	-	-
CrOOH	*0.00285*	*0.00254*	*0.00155*
FeOOH	*0.22392*	*0.19921*	*0.12144*
Gibbsite	*1.96610*	*1.74915*	*1.06632*
HgO	-	-	-
$KAlSiO_4$	-	-	-
$La(OH)_3$	-	-	-
$LaPO_4$•$2H_2O$	*0.00007*	*0.00006*	*0.00004*
$Mn(OH)_2$	-	-	-
$Mn_3(PO_4)_2$	*0.00459*	*0.00409*	*0.00249*
$MnCO_3$	-	-	-
$Na_2U_2O_7$	*0.08836*	*0.07861*	*0.04792*
$NaAlCO_3(OH)_2$	*0.70261*	*0.62508*	*0.38106*
$NaAlSiO_4$	*0.37371*	*0.33247*	*0.20268*
$Ni(OH)_2$	*0.16172*	*0.14388*	*0.08771*
$Ni_3(PO_4)_2$	-	-	-
NiC_2O_4•$2H_2O$	-	-	-
$Pb(OH)_2$	*0.01165*	*0.01036*	*0.00632*
$Pb_3(PO_4)_2$	-	-	-
$PbCO_3$	-	-	-
$Pu(OH)_4$	*0.00002*	*0.00002*	*0.00001*
SiO_2	-	-	-
$Sr_3(PO_4)_2$	-	-	-
$SrCO_3$	*0.00548*	*0.00487*	*0.00297*
TcO_2	-	-	-
ZrO_2	*0.00022*	*0.00020*	*0.00012*
KNO_3	-	-	-
$Na_2C_2O_4$	*0.07715*	-	-
$Na_2CO_3 \cdot H_2O$	-	-	-
Na_2SO_4	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-
Na_3FSO_4	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-
NaF	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*1.26441*	-	-
$NaHCO_3$	-	-	-
$NaNO_2$	-	-	-
$NaNO_3$	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	*1.31565*	-	-
Total Volume % UDS	*6.63*	*3.53*	*2.15*
Solids Concentration (g/L)	***156.2***	***98.7***	***60.2***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-C-109

Rheological Data

Model/model Parameter		***C-109***	***C-109***
Temperature (°C)		**30**	**30**
Source of Data		***WHC-SD-WM-ER-402, rev 0; Core 47***	***WHC-SD-WM-ER-402, rev 0; Core 47***
Notes		**Entered from Joel Tingey's Paper File**	**Entered from Joel Tingey's Paper File**
Newtonian:			
η – Newtonian viscosity (cP)		164.527	5.490
r – correlation coefficient		0.558	0.896
Ostwald (or Power Law):			
m – the consistency coefficient (Pa·s^{-n})		20.278	0.512
n – the power-law exponent		0.186	0.215
r – correlation coefficient		0.805	0.911
Bingham Plastic:			
τ_B- the Bingham yield stress (Pa)		37.203	0.929
η_p - the plastic viscosity (Pa·s)		0.057	0.003
r – correlation coefficient		0.558	0.896
Herschel-Bulkley:			
τ_H- the yield stress (Pa)		16.131	0.906
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		7.214	0.004
b - the Hershel-Bulkely power-law exponent		0.311	0.943
r – correlation coefficient		0.761	0.902
n/a = not applicable			

Physical Property Data

Physical Property	***C-109***	***C-109***	***C-109***
Notes			
Temperature (°C)	**30**	**30**	**30**
Zeta Potential (mV)			
Bulk Density (g/mL)	1.23	***1.19***	1.11
vol% Settled Solids	100	88	41
Density of Centrifuged Solids (g/mL)	***1.23***	n/m	1.39
vol% Centrifuged Solids	100	n/m	21.1
wt% Centrifuged Solids	100	n/m	27
Supernatant Density (g/mL)	1.15	***1.13***	1.01
Density of Settled Solids (g/mL)	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m
wt% dissolved solids in supernatant	***29.61***	***29.12***	***26.01***
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m
wt% UDS	***12.70***	***8.30***	***5.42***
Density of Solids (g/cc)	***2.36***	***2.80***	***2.80***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule		***C-109***	***C-109***
Notes:		**Page B-19; appears to be fast settling**	**Page B-19; appears to be fast settling**
Temperature (°C)		**30**	**30**
Total initial volume		100	100
5 minutes			
10 minutes			
15 minutes			
20 minutes			
30 minutes			
40 minutes			
50 minutes			
1 hour			
2 hours		97	63
3 hours			
4 hours			
5 hours		92	59
6 hours			
24 hours		88	45
32 hours			
48 hours		87	40
56 hours		86	39
72 hours final settled			

Shear Strength Data

Shear Strength Schedule	***C-109***		
Source of Data	**SG McKinley et al Characterization Report March 30, 1993**		
Notes:			
Temperature (°C)	**Unspecified**		
Description	**Shear Vane at unspecified gel time or temperature**		
Gelation Time/Shear Strength (Pa)			
5 minutes			
10 minutes			
15 minutes			
20 minutes			
30 minutes			
40 minutes			
50 minutes			
1 hour			
2 hours			
3 hours			
4 hours			
5 hours			
6 hours			
24 hours			
32 hours			
48 hours			
56 hours			
72 hours	1730		
Infinte time (GRE)			

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**C-110**	**C-110**	**C-110**	**C-110**	**C-110**	**C-110**	**C-110**	**C-110**	**C-110**	**C-110**
Description	**Segment 2 no dilution**	**Segment 2 1:1 dilution**	**Segment 2 3:1 dilution**	**Segment 2 1:1 dilution**	**Segment 2 3:1 dilution**	**Segment 4 no dilution**	**Segment 4 1:1 dilution**	**Segment 4 3:1 dilution**	**Segment 4 1:1 dilution**	**Segment 4 3:1 dilution**
Model Basis	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**
Report No/Source of Data	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**	**C-110 Cores 37, 38 and 39 data package.pdf**
Solid Phases (vol% of bulk)										
$(NaAlO_2)_2{\bullet}2.5H_2O$	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	*0.00002*	*0.00001*	*0.00000*	*0.00001*	*0.00000*	*0.00001*	*0.00001*	*0.00000*	*0.00001*	*0.00000*
Bi_2O_3	*0.31812*	*0.16452*	*0.03037*	*0.16452*	*0.03037*	*0.19202*	*0.09388*	*0.01751*	*0.09388*	*0.01751*
BiOCl	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.01181*	*0.00611*	*0.00113*	*0.00611*	*0.00113*	*0.00713*	*0.00349*	*0.00065*	*0.00349*	*0.00065*
$CaC_2O_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-
CaF_2	*0.10128*	*0.05238*	*0.00967*	*0.05238*	*0.00967*	*0.06114*	*0.02989*	*0.00558*	*0.02989*	*0.00558*
CrOOH	*0.01912*	*0.00989*	*0.00183*	*0.00989*	*0.00183*	*0.01154*	*0.00564*	*0.00105*	*0.00564*	*0.00105*
FeOOH	*0.63062*	*0.32614*	*0.06021*	*0.32614*	*0.06021*	*0.38066*	*0.18610*	*0.03472*	*0.18610*	*0.03472*
Gibbsite	*1.24280*	*0.64273*	*0.11865*	*0.64273*	*0.11865*	*0.75018*	*0.36676*	*0.06842*	*0.36676*	*0.06842*
HgO	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-
$LaPO_4{\bullet}2H_2O$	*0.00007*	*0.00003*	*0.00001*	*0.00003*	*0.00001*	*0.00004*	*0.00002*	*0.00000*	*0.00002*	*0.00000*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	*0.00565*	*0.00292*	*0.00054*	*0.00292*	*0.00054*	*0.00341*	*0.00167*	*0.00031*	*0.00167*	*0.00031*
$MnCO_3$	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.07967*	*0.04120*	*0.00761*	*0.04120*	*0.00761*	*0.04809*	*0.02351*	*0.00439*	*0.02351*	*0.00439*
$NaAlCO_3(OH)_2$	*0.45968*	*0.23773*	*0.04389*	*0.23773*	*0.04389*	*0.27747*	*0.13566*	*0.02531*	*0.13566*	*0.02531*
$NaAlSiO_4$	*2.02887*	*1.04926*	*0.19370*	*1.04926*	*0.19370*	*1.22467*	*0.59875*	*0.11169*	*0.59875*	*0.11169*
$Ni(OH)_2$	*0.00143*	*0.00074*	*0.00014*	*0.00074*	*0.00014*	*0.00087*	*0.00042*	*0.00008*	*0.00042*	*0.00008*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4{\bullet}2H_2O$	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00579*	*0.00299*	*0.00055*	*0.00299*	*0.00055*	*0.00350*	*0.00171*	*0.00032*	*0.00171*	*0.00032*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00004*	*0.00002*	*0.00000*	*0.00002*	*0.00000*	*0.00002*	*0.00001*	*0.00000*	*0.00001*	*0.00000*
SiO_2	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00924*	*0.00478*	*0.00088*	*0.00478*	*0.00088*	*0.00558*	*0.00273*	*0.00051*	*0.00273*	*0.00051*
TcO_2	*0.00003*	*0.00001*	*0.00000*	*0.00001*	*0.00000*	*0.00002*	*0.00001*	*0.00000*	*0.00001*	*0.00000*
ZrO_2	*0.00612*	*0.00316*	*0.00058*	*0.00316*	*0.00058*	*0.00369*	*0.00181*	*0.00034*	*0.00181*	*0.00034*
KNO_3	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.01378*	-	-	-	-	*0.00832*	-	-	-	-
$Na_2CO_3{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	*19.31784*	-	-	-	-	*11.66065*	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*24.25*	*2.54*	*0.47*	*2.54*	*0.47*	*14.64*	*1.45*	*0.27*	*1.45*	*0.27*
Solids Concentration (g/L)	***497.7***	***82.4***	***15.2***	***82.4***	***15.2***	***300.4***	***47.0***	***8.8***	***47.0***	***8.8***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-C-110

Rheological Data

Model/model Parameter	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***
Temperature (°C)	**30**	**30**	**30**	**95**	**95**	**30**	**30**	**30**	**95**	**95**
Source of Data	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***	***C-110 Cores 37, 38 and 39 data package.pdf***
Notes		**C04-077**	**C04-114**	**C04-085**	**C04-118**		**C04-093**	**C04-126**	**C04-104**	**C04-138**
Newtonian:										
η – Newtonian viscosity (cP)		4.937	2.160	2.251	1.376		3.637	2.144	3.156	1.824
r – correlation coefficient		0.998	1.000	0.985	0.978		0.997	1.000	0.998	0.983
Ostwald (or Power Law):										
m – the consistency coefficient (Pa·s^{-n})		0.011	0.003	0.011	0.001		0.013	0.002	0.049	0.012
n – the power-law exponent		0.858	0.924	0.733	1.000		0.777	0.998	0.533	0.681
r – correlation coefficient		0.997	0.998	0.945	0.978		0.991	1.000	0.940	0.927
Bingham Plastic:										
τ_B- the Bingham yield stress (Pa)		0.676	0.000	0.159	0.000		0.218	0.000	0.414	0.173
η_p - the plastic viscosity (Pa·s)		0.003	0.002	0.002	0.001		0.003	0.002	0.002	0.001
r – correlation coefficient		0.998	1.000	0.985	0.978		0.997	1.000	0.998	0.983
Herschel-Bulkley:										
τ_H- the yield stress (Pa)		0.420	0.000	0.144	0.000		0.200	0.000	0.403	0.174
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		0.004	0.003	0.004	0.001		0.004	0.002	0.003	0.001
b - the Hershel-Bulkely power-law exponent		0.979	0.971	0.876	1.000		0.935	1.000	0.942	1.000
r – correlation coefficient		0.999	0.999	0.972	0.978		0.998	1.000	0.999	0.983
n/a = not applicable										

Physical Property Data

Physical Property	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***	***C-110***
Notes										
Temperature (°C)	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Zeta Potential (mV)										
Bulk Density (g/mL)	1.41	***1.16***	***1.06***	***1.16***	***1.06***	1.48	***1.15***	***1.06***	***1.15***	***1.06***
vol% Settled Solids	100	n/m	n/m	n/m	n/m	100	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	1.49	n/m	n/m	n/m	n/m	1.59	n/m	n/m	n/m	n/m
vol% Centrifuged Solids	75.7	n/m	n/m	n/m	n/m	76.2	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	80	n/m	n/m	n/m	n/m	81.6	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	1.15	***1.10***	***1.05***	***1.10***	***1.05***	1.13	***1.12***	***1.05***	***1.12***	***1.05***
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	***26.69***	***25.57***	***24.29***	***25.57***	***24.29***	***26.23***	***25.91***	***24.46***	***25.91***	***24.46***
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	40.3	n/m	n/m	n/m	n/m	28.4	n/m	n/m	n/m	n/m
wt% UDS	35.30	***7.13***	***1.44***	***7.13***	***1.44***	20.30	***4.10***	***0.83***	***4.10***	***0.83***
Density of Solids (g/cc)	***2.05***	***3.24***	***3.24***	***3.24***	***3.24***	***2.05***	***3.24***	***3.24***	***3.24***	***3.24***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule		*C-110*	*C-110*				*C-110*	*C-110*		
Notes:		**C04-31**	**C04-036**				**C04-59**	**C04-064**		
Temperature (°C)		**30**	**30**				**30**	**30**		
Total initial volume		100	100				100	100		
5 minutes										
10 minutes										
15 minutes										
20 minutes										
30 minutes										
40 minutes										
50 minutes										
1 hour										
2 hours		89	74				90	70		
3 hours										
4 hours										
5 hours		76	48				82	50		
6 hours										
24 hours		65	36				78	35		
32 hours		61	33				65	34		
48 hours		60	33				63	33		
56 hours		60	32				63	32		
72 hours final settled										

Shear Strength Data

Shear Strength Schedule	*C-110*	*C-110*	*C-110*	*C-110*	*C-110*	*C-110*	*C-110*	*C-110*	*C-110*	*C-110*
Source of Data	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*	*C-110 Cores 37, 38 and 39 data package.pdf*
Notes:	**Page C04-008**					**Page C04-008**				
Temperature (°C)	**Unspecified**					**Unspecified**				
Description	**Shear Vane at unspecified gel time or temperature**					**Shear Vane at unspecified gel time or temperature**				
Gelation Time/Shear Strength (Pa)										
5 minutes										
10 minutes										
15 minutes										
20 minutes										
30 minutes										
40 minutes										
50 minutes										
1 hour										
2 hours										
3 hours										
4 hours										
5 hours										
6 hours										
24 hours										
32 hours										
48 hours										
56 hours										
72 hours	500					500				
Infinte time (GRE)										

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-C-112

Model Chemical Data From ESP

Analyte\Sample	**C-112**	**C-112**	**C-112**	**C-112**
Description	**Core 36 composite**	**Core Composite 1:1 dilution**	**Core Composite 3:1 dilution**	**Core Composite 3:1 dilution**
Model Basis	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**
Report No/Source of Data	**SST C-112 Core 36 data package**	**SST C-112 Core 36 data package**	**SST C-112 Core 36 data package**	**SST C-112 Core 36 data package**
Solid Phases (vol% of bulk)				
$(NaAlO_2)_2{\bullet}2.5H_2O$	-	-	-	-
Ag_2CO_3	*0.00004*	*0.00001*	*0.00001*	*0.00001*
Bi_2O_3	*0.08264*	*0.03255*	*0.01208*	*0.01208*
BiOCl	-	-	-	-
Boehmite	-	-	-	-
$Ca(OH)_2$	-	-	-	-
$Ca_5OH(PO_4)_3$	*3.02056*	*1.18982*	*0.44146*	*0.44146*
$CaC_2O_4{\cdot}H_2O$	-	-	-	-
$CaCO_3$	-	-	-	-
CaF_2	-	-	-	-
CrOOH	*0.00997*	*0.00393*	*0.00146*	*0.00146*
FeOOH	*1.65469*	*0.65179*	*0.24184*	*0.24184*
Gibbsite	*1.77648*	*0.69977*	*0.25964*	*0.25964*
HgO	-	-	-	-
$KAlSiO_4$	-	-	-	-
$La(OH)_3$	-	-	-	-
$LaPO_4{\bullet}2H_2O$	*0.00435*	*0.00171*	*0.00064*	*0.00064*
$Mn(OH)_2$	-	-	-	-
$Mn_3(PO_4)_2$	*0.02757*	*0.01086*	*0.00403*	*0.00403*
$MnCO_3$	-	-	-	-
$Na_2U_2O_7$	*1.84757*	*0.72777*	*0.27003*	*0.27003*
$NaAlCO_3(OH)_2$	*4.59954*	*1.81179*	*0.67224*	*0.67224*
$NaAlSiO_4$	*0.88887*	*0.35013*	*0.12991*	*0.12991*
$Ni(OH)_2$	*0.96973*	*0.38198*	*0.14173*	*0.14173*
$Ni_3(PO_4)_2$	-	-	-	-
$NiC_2O_4{\bullet}2H_2O$	-	-	-	-
$Pb(OH)_2$	*0.07341*	*0.02892*	*0.01073*	*0.01073*
$Pb_3(PO_4)_2$	-	-	-	-
$PbCO_3$	-	-	-	-
$Pu(OH)_4$	*0.00009*	*0.00004*	*0.00001*	*0.00001*
SiO_2	-	-	-	-
$Sr_3(PO_4)_2$	*0.03066*	*0.01208*	*0.00448*	*0.00448*
$SrCO_3$	-	-	-	-
TcO_2	-	-	-	-
ZrO_2	*0.00074*	*0.00029*	*0.00011*	*0.00011*
KNO_3	-	-	-	-
$Na_2C_2O_4$	*0.84145*	-	-	-
$Na_2CO_3{\cdot}H_2O$	-	-	-	-
Na_2SO_4	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-
Na_3FSO_4	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	*7.23122*	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-
NaF	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	-	-	-	-
$NaHCO_3$	-	-	-	-
$NaNO_2$	-	-	-	-
$NaNO_3$	-	-	-	-
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-	-
Total Volume % UDS	*23.06*	*5.90*	*2.19*	*2.19*
Solids Concentration (g/L)	*653.9*	*197.7*	*73.4*	*73.4*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-C-112

Rheological Data

Model/model Parameter			***C-112***	***C-112***
Temperature (°C)			**25**	**95**
Source of Data			***SST C-112 Core 36 data package***	***SST C-112 Core 36 data package***
Notes			**Page C04-029**	**Page C04-031**
Newtonian:				
η – Newtonian viscosity (cP)			5.880	2.872
r – correlation coefficient			0.954	0.978
Ostwald (or Power Law):				
m – the consistency coefficient (Pa·s^{-n})			0.158	0.061
n – the power-law exponent			0.440	0.480
r – correlation coefficient			0.979	0.949
Bingham Plastic:				
τ_B- the Bingham yield stress (Pa)			0.697	0.368
η_p - the plastic viscosity (Pa·s)			0.004	0.002
r – correlation coefficient			0.954	0.978
Herschel-Bulkley:				
τ_H- the yield stress (Pa)			0.497	0.271
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})			0.044	0.016
b - the Hershel-Bulkely power-law exponent			0.612	0.650
r – correlation coefficient			0.997	0.982
n/a = not applicable				

Physical Property Data

Physical Property	***C-112***	***C-112***	***C-112***	***C-112***
Notes				
Temperature (°C)	**32**	**32**	**32**	**32**
Zeta Potential (mV)				
Bulk Density (g/mL)	1.70	1.24	1.11	1.11
vol% Settled Solids	100	74.4	42.4	42.4
Density of Centrifuged Solids (g/mL)	1.95	n/m	1.39	1.39
vol% Centrifuged Solids	83	n/m	21.4	21.4
wt% Centrifuged Solids	n/m	n/m	27	27
Supernatant Density (g/mL)	1.23	***1.09***	1.01	1.01
Density of Settled Solids (g/mL)		n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	***26.87***	***23.75***	***22.06***	***22.06***
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m
wt% Total Solids	55	n/m	n/m	n/m
wt% UDS	***38.47***	***15.94***	***6.61***	***6.61***
Density of Solids (g/cc)	***2.84***	***3.35***	***3.35***	***3.35***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-C-112

Settling Data

Settling Schedule		***C-112***	***C-112***	
Notes:		**C04-001-7**	**C04-001-7**	
Temperature (°C)		**25**	**25**	
Total initial volume		100	100	
5 minutes				
10 minutes				
15 minutes				
20 minutes				
30 minutes				
40 minutes				
50 minutes				
1 hour				
2 hours		96	87	
3 hours				
4 hours				
5 hours		94	62	
6 hours				
24 hours		88	50	
32 hours		76	47	
48 hours		75	42	
56 hours		74	42	
72 hours final settled				

Shear Strength Data

Shear Strength Schedule	***C-112***			
Source of Data	***SST C-112 Core 36 data package***			
Notes:	**Page 1-14**			
Temperature (°C)	**Unspecified**			
Description	**Page 1-13, 1-14: 10 weeks undisturbed (1680 hrs), 1 hour in water bath at unspecified temperature**			
Gelation Time/Shear Strength (Pa)				
5 minutes				
10 minutes				
15 minutes				
20 minutes				
30 minutes				
40 minutes				
50 minutes				
1 hour				
2 hours				
3 hours				
4 hours				
5 hours				
6 hours				
24 hours				
32 hours				
48 hours				
56 hours				
72 hours	1600			
Infinte time (GRE)				

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**	**S-102**
Description	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Solid Phases (vol% of bulk)																					
$(NaAlO_2)_2 \cdot 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00126*	*0.00126*	*0.00126*	*0.00126*	*0.00126*	*0.00055*	*(0.00017)*	*(0.00017)*	*(0.00017)*	*0.00171*	*0.00171*	*0.00171*	*0.00171*	*0.00171*	*0.00171*	*0.00171*	*0.00171*	*0.00171*	*0.00042*	*0.00042*	*0.00042*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.07608*	*0.07608*	*0.07608*	*0.07608*	*0.07608*	*0.03305*	*(0.00997)*	*(0.00997)*	*(0.00997)*	*0.10346*	*0.10346*	*0.10346*	*0.10346*	*0.10346*	*0.10346*	*0.10346*	*0.10346*	*0.10346*	*0.02523*	*0.02523*	*0.02523*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.13227*	*0.13227*	*0.13227*	*0.13227*	*0.13227*	*0.05747*	*(0.01734)*	*(0.01734)*	*(0.01734)*	*0.17988*	*0.17988*	*0.17988*	*0.17988*	*0.17988*	*0.17988*	*0.17988*	*0.17988*	*0.17988*	*0.04387*	*0.04387*	*0.04387*
FeOOH	*0.04814*	*0.04814*	*0.04814*	*0.04814*	*0.04814*	*0.02091*	*(0.00631)*	*(0.00631)*	*(0.00631)*	*0.06546*	*0.06546*	*0.06546*	*0.06546*	*0.06546*	*0.06546*	*0.06546*	*0.06546*	*0.06546*	*0.01596*	*0.01596*	*0.01596*
Gibbsite	*3.03073*	*3.03073*	*3.03073*	*3.03073*	*3.03073*	*1.31670*	*(0.39733)*	*(0.39733)*	*(0.39733)*	*4.12148*	*4.12148*	*4.12148*	*4.12148*	*4.12148*	*4.12148*	*4.12148*	*4.12148*	*4.12148*	*1.00506*	*1.00506*	*1.00506*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4 \cdot 2H_2O$	*0.00136*	*0.00136*	*0.00136*	*0.00136*	*0.00136*	*0.00059*	*(0.00018)*	*(0.00018)*	*(0.00018)*	*0.00185*	*0.00185*	*0.00185*	*0.00185*	*0.00185*	*0.00185*	*0.00185*	*0.00185*	*0.00185*	*0.00045*	*0.00045*	*0.00045*
$Mn(OH)_2$	*0.02574*	*0.02574*	*0.02574*	*0.02574*	*0.02574*	*0.01118*	*(0.00337)*	*(0.00337)*	*(0.00337)*	*0.03501*	*0.03501*	*0.03501*	*0.03501*	*0.03501*	*0.03501*	*0.03501*	*0.03501*	*0.03501*	*0.00854*	*0.00854*	*0.00854*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.10653*	*0.10653*	*0.10653*	*0.10653*	*0.10653*	*0.04628*	*(0.01397)*	*(0.01397)*	*(0.01397)*	*0.14488*	*0.14488*	*0.14488*	*0.14488*	*0.14488*	*0.14488*	*0.14488*	*0.14488*	*0.14488*	*0.03533*	*0.03533*	*0.03533*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.17564*	*0.17564*	*0.17564*	*0.17564*	*0.17564*	*0.07630*	*(0.02303)*	*(0.02303)*	*(0.02303)*	*0.23885*	*0.23885*	*0.23885*	*0.23885*	*0.23885*	*0.23885*	*0.23885*	*0.23885*	*0.23885*	*0.05824*	*0.05824*	*0.05824*
$Ni(OH)_2$	*0.00181*	*0.00181*	*0.00181*	*0.00181*	*0.00181*	*0.00079*	*(0.00024)*	*(0.00024)*	*(0.00024)*	*0.00246*	*0.00246*	*0.00246*	*0.00246*	*0.00246*	*0.00246*	*0.00246*	*0.00246*	*0.00246*	*0.00060*	*0.00060*	*0.00060*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \cdot 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00226*	*0.00226*	*0.00226*	*0.00226*	*0.00226*	*0.00098*	*(0.00030)*	*(0.00030)*	*(0.00030)*	*0.00307*	*0.00307*	*0.00307*	*0.00307*	*0.00307*	*0.00307*	*0.00307*	*0.00307*	*0.00307*	*0.00075*	*0.00075*	*0.00075*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00004*	*0.00002*	*(0.00000)*	*(0.00000)*	*(0.00000)*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*0.00001*	*0.00001*	*0.00001*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00061*	*0.00061*	*0.00061*	*0.00061*	*0.00061*	*0.00026*	*(0.00008)*	*(0.00008)*	*(0.00008)*	*0.00082*	*0.00082*	*0.00082*	*0.00082*	*0.00082*	*0.00082*	*0.00082*	*0.00082*	*0.00082*	*0.00020*	*0.00020*	*0.00020*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00072*	*0.00072*	*0.00072*	*0.00072*	*0.00072*	*0.00031*	*(0.00009)*	*(0.00009)*	*(0.00009)*	*0.00098*	*0.00098*	*0.00098*	*0.00098*	*0.00098*	*0.00098*	*0.00098*	*0.00098*	*0.00098*	*0.00024*	*0.00024*	*0.00024*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.87675*	*0.87675*	*0.87675*	*0.87675*	*0.87675*	*0.38090*	*(0.11494)*	*(0.11494)*	*(0.11494)*	*1.19229*	*1.19229*	*1.19229*	*1.19229*	*1.19229*	*1.19229*	*1.19229*	*1.19229*	*1.19229*	*0.29075*	*0.29075*	*0.29075*
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	*0.08415*	*0.08415*	*0.08415*	*0.08415*	*0.08415*	*0.03656*	*(0.01103)*	*(0.01103)*	*(0.01103)*	*0.11443*	*0.11443*	*0.11443*	*0.11443*	*0.11443*	*0.11443*	*0.11443*	*0.11443*	*0.11443*	*0.02790*	*0.02790*	*0.02790*
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*11.91588*	*11.91588*	*11.91588*	*11.91588*	*11.91588*	*5.17685*	*(1.56218)*	*(1.56218)*	*(1.56218)*	*16.20436*	*16.20436*	*16.20436*	*16.20436*	*16.20436*	*16.20436*	*16.20436*	*16.20436*	*16.20436*	*3.95157*	*3.95157*	*3.95157*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*14.39201*	*14.39201*	*14.39201*	*14.39201*	*14.39201*	*6.25260*	*(1.88680)*	*(1.88680)*	*(1.88680)*	*19.57163*	*19.57163*	*19.57163*	*19.57163*	*19.57163*	*19.57163*	*19.57163*	*19.57163*	*19.57163*	*4.77271*	*4.77271*	*4.77271*
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*30.87*	*30.87*	*30.87*	*30.87*	*30.87*	*13.41*	*(4.05)*	*(4.05)*	*(4.05)*	*41.98*	*41.98*	*41.98*	*41.98*	*41.98*	*41.98*	*41.98*	*41.98*	*41.98*	*10.24*	*10.24*	*10.24*
Solids Concentration (g/L)	***653.1***	***653.1***	***653.1***	***653.1***	***653.1***	***283.7***	***(85.6)***	***(85.6)***	***(85.6)***	***888.2***	***888.2***	***888.2***	***888.2***	***888.2***	***888.2***	***888.2***	***888.2***	***888.2***	***216.6***	***216.6***	***216.6***

Physical Property Data

Physical Property	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***	***S-102***
Source of Data																					
Temperature (°C)																					
Zeta Potential (mV)																					
Bulk Density (g/mL)	1.68	1.68	1.68	1.68	1.68	1.57	1.46	1.46	1.46	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.55	1.55	1.55
vol% Settled Solids																					
Density of Centrifuged Solids (g/mL)																					
vol% Centrifuged Solids																					
wt% Centrifuged Solids																					
Supernatant Density (g/mL)	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*	*1.49*
Density of Settled Solids (g/mL)																					
wt% Settled Supernatant																					
wt% dissolved solids in supernatant																					
wt% total solids in Centrifuged Sludge																					
wt% Total Solids																					
wt% UDS	*38.88*	*38.88*	*38.88*	*38.88*	*38.88*	*18.07*	*-5.86*	*-5.86*	*-5.86*	*50.75*	*50.75*	*50.75*	*50.75*	*50.75*	*50.75*	*50.75*	*50.75*	*50.75*	*13.97*	*13.97*	*13.97*
Density of Solids (g/cc)	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*	*2.12*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102	S-102
Source of Data	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249
Instrumentation	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer	Ball Rheometer
Temperature (°C)	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*25*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*
Description	Riser 11 Composition higher in metal oxides and low solubility ions Depth from bottom of tank is 22 inches	Riser 11 Composition higher in metal oxides and low solubility ions Depth from bottom of tank is 35 inches	Riser 11 Composition higher in metal oxides and low solubility ions Depth from bottom of tank is 55 inches	Riser 11 Composition higher in metal oxides and low solubility ions Depth from bottom of tank is 73 inches	Riser 11 Depth from bottom of tank is 113 inches	Riser 11 Depth from bottom of tank is 130 inches	Riser 11 Depth from bottom of tank is 150 inches	Riser 11 Depth from bottom of tank is 168 inches	Riser 11 Depth from bottom of tank is 190 inches	Riser 14 Composition higher in metal oxides and low solubility ions Depth from bottom of tank is 12 inches	Riser 14 Composition higher in metal oxides and low solubility ions Depth from bottom of tank is 38 inches	Riser 14 Composition higher in metal oxides and low solubility ions Depth from bottom of tank is 70 inches	Riser 14 Depth from bottom of tank is 80 inches	Riser 14 Depth from bottom of tank is 95 inches	Riser 14 Depth from bottom of tank is 108 inches	Riser 14 Depth from bottom of tank is 113 inches	Riser 14 Depth from bottom of tank is 120 inches	Riser 14 Depth from bottom of tank is 132 inches	Riser 14 Depth from bottom of tank is 152 inches	Riser 14 Depth from bottom of tank is 168 inches	Riser 14 Depth from bottom of tank is 190 inches
Gelation Time/Shear Strength (Pa)																					
5 minutes																					
10 minutes																					
15 minutes																					
20 minutes																					
30 minutes																					
40 minutes																					
50 minutes																					
1 hour																					
2 hours																					
3 hours																					
4 hours																					
5 hours																					
6 hours																					
24 hours																					
32 hours																					
48 hours																					
56 hours																					
72 hours																					
Infinte time (GRE)	800	1000	800	1000	800	500	190	170	500	600	800	800	450	70	300	50	50	500	130	130	100

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104
Description	Segment 2 no dilution	Segment 2 1:1 dilution	Segment 2 1.3:1 dilution	Segment 2 3:1 dilution	Segment 2 1:1 dilution	Segment 2 1.3:1 dilution	Segment 2 3:1 dilution	Segment 4 no dilution	Segment 4 1:1 dilution	Segment 4 1.3:1 dilution	Segment 4 3:1 dilution	Segment 4 1:1 dilution	Segment 4 1.3:1 dilution	Segment 4 3:1 dilution
Model Basis	Salty	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salty	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free	Salt Free
Report No/Source of Data	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031
Solid Phases (vol% of bulk)														
$(NaAlO_2)_2•2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00004*	*0.00002*	*0.00002*	*0.00001*	*0.00002*	*0.00002*	*0.00001*	*0.00003*	*0.00001*	*0.00001*	*0.00000*	*0.00001*	*0.00001*	*0.00000*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	*18.05730*	*8.21608*	*7.00884*	*2.60431*	*8.21608*	*7.00884*	*2.60431*	*14.87210*	*6.70448*	*5.74189*	*2.14376*	*6.70448*	*5.74189*	*2.14376*
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.00747*	*0.00340*	*0.00290*	*0.00108*	*0.00340*	*0.00290*	*0.00108*	*0.00615*	*0.00277*	*0.00237*	*0.00089*	*0.00277*	*0.00237*	*0.00089*
$CaC_2O_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	*0.03180*	*0.01447*	*0.01234*	*0.00459*	*0.01447*	*0.01234*	*0.00459*	*0.02619*	*0.01181*	*0.01011*	*0.00378*	*0.01181*	*0.01011*	*0.00378*
CaF_2	*0.00650*	*0.00296*	*0.00252*	*0.00094*	*0.00296*	*0.00252*	*0.00094*	*0.00535*	*0.00241*	*0.00207*	*0.00077*	*0.00241*	*0.00207*	*0.00077*
CrOOH	*0.03171*	*0.01443*	*0.01231*	*0.00457*	*0.01443*	*0.01231*	*0.00457*	*0.02611*	*0.01177*	*0.01008*	*0.00376*	*0.01177*	*0.01008*	*0.00376*
FeOOH	*0.09505*	*0.04325*	*0.03689*	*0.01371*	*0.04325*	*0.03689*	*0.01371*	*0.07829*	*0.03529*	*0.03023*	*0.01128*	*0.03529*	*0.03023*	*0.01128*
Gibbsite	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	*0.00015*	*0.00007*	*0.00006*	*0.00002*	*0.00007*	*0.00006*	*0.00002*	*0.00012*	*0.00006*	*0.00005*	*0.00002*	*0.00006*	*0.00005*	*0.00002*
$LaPO_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn(OH)_2$	*0.11385*	*0.05180*	*0.04419*	*0.01642*	*0.05180*	*0.04419*	*0.01642*	*0.09377*	*0.04227*	*0.03620*	*0.01352*	*0.04227*	*0.03620*	*0.01352*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.21776*	*0.09908*	*0.08452*	*0.03141*	*0.09908*	*0.08452*	*0.03141*	*0.17935*	*0.08085*	*0.06924*	*0.02585*	*0.08085*	*0.06924*	*0.02585*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.52822*	*0.24034*	*0.20503*	*0.07618*	*0.24034*	*0.20503*	*0.07618*	*0.43505*	*0.19612*	*0.16797*	*0.06271*	*0.19612*	*0.16797*	*0.06271*
$Ni(OH)_2$	*0.00462*	*0.00210*	*0.00179*	*0.00067*	*0.00210*	*0.00179*	*0.00067*	*0.00381*	*0.00172*	*0.00147*	*0.00055*	*0.00172*	*0.00147*	*0.00055*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00061*	*0.00028*	*0.00024*	*0.00009*	*0.00028*	*0.00024*	*0.00009*	*0.00050*	*0.00022*	*0.00019*	*0.00007*	*0.00022*	*0.00019*	*0.00007*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00017*	*0.00008*	*0.00007*	*0.00002*	*0.00008*	*0.00007*	*0.00002*	*0.00014*	*0.00006*	*0.00005*	*0.00002*	*0.00006*	*0.00005*	*0.00002*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.03093*	*0.01407*	*0.01201*	*0.00446*	*0.01407*	*0.01201*	*0.00446*	*0.02547*	*0.01148*	*0.00984*	*0.00367*	*0.01148*	*0.00984*	*0.00367*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00159*	*0.00072*	*0.00062*	*0.00023*	*0.00072*	*0.00062*	*0.00023*	*0.00131*	*0.00059*	*0.00051*	*0.00019*	*0.00059*	*0.00051*	*0.00019*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.43100*	-	-	-	-	-	-	*0.35497*	-	-	-	-	-	-
$Na_2CO_3·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2·19H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*14.02182*	-	-	-	-	-	-	*11.54846*	-	-	-	-	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*33.58*	*8.70*	*7.42*	*2.76*	*8.70*	*7.42*	*2.76*	*27.66*	*7.10*	*6.08*	*2.27*	*7.10*	*6.08*	*2.27*
Solids Concentration (g/L)	*908.6*	*264.6*	*225.7*	*83.9*	*264.6*	*225.7*	*83.9*	*748.3*	*215.9*	*184.9*	*69.0*	*215.9*	*184.9*	*69.0*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104
Temperature (°C)	30	30	30	30	95	95	95	30	30	28	30	95	95	95
Source of Data	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031	WHC-SD-WM-DP-031
Notes														
Newtonian:														
η – Newtonian viscosity (cP)		19.449		8.501	13.678		8.307		152.942	73.090	23.286		41.731	21.367
r – correlation coefficient		0.983		0.992	0.999		1.000		0.998	0.986	0.986		0.999	1.000
Ostwald (or Power Law):														
m – the consistency coefficient (Pa·s^{-n})		1.293		0.483	0.575		0.372		1.231	8.438	0.775		4.834	1.741
n – the power-law exponent		0.283		0.308	0.361		0.351		0.652	0.187	0.404		0.187	0.247
r – correlation coefficient		0.866		0.857	0.856		0.831		0.995	0.774	0.932		0.697	0.744
Bingham Plastic:														
τ_B- the Bingham yield stress (Pa)		3.869		1.363	2.472		1.558		15.346	17.828	4.639		10.481	4.841
η_p - the plastic viscosity (Pa·s)		0.008		0.004	0.006		0.004		0.112	0.021	0.010		0.011	0.007
r – correlation coefficient		0.983		0.992	0.999		1.000		0.998	0.986	0.986		0.999	1.000
Herschel-Bulkley:														
τ_H- the yield stress (Pa)		3.600		1.255	2.420		1.550		12.975	17.185	4.348		10.399	4.789
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		0.041		0.015	0.010		0.004		0.176	0.095	0.043		0.017	0.011
b - the Hershel-Bulkely power-law exponent		0.741		0.812	0.927		0.981		0.935	0.755	0.763		0.933	0.931
r – correlation coefficient		1.000		1.000	1.000		1.000		0.998	1.000	1.000		1.000	1.000
n/a = not applicable														

Physical Property Data

Physical Property	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104	S-104
Notes														
Temperature (°C)	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Zeta Potential (mV)														
Bulk Density (g/mL)	1.64	*1.29*	*1.27*	*1.11*	*1.29*	*1.27*	*1.11*	1.64	*1.28*	*1.26*	*1.11*	*1.28*	*1.26*	*1.11*
vol% Settled Solids	100	n/m	n/m	n/m	n/m	n/m	n/m	100	n/m	n/m	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	1.71	n/m	n/m	n/m	n/m	n/m	n/m	1.71	n/m	n/m	n/m	n/m	n/m	n/m
vol% Centrifuged Solids	82.5	n/m	n/m	n/m	n/m	n/m	n/m	100	n/m	n/m	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	86.1	n/m	n/m	n/m	n/m	n/m	n/m	100	n/m	n/m	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	1.28	*1.12*	*1.12*	*1.05*	*1.12*	*1.12*	*1.05*	1.28	*1.14*	*1.14*	*1.06*	*1.14*	*1.14*	*1.06*
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m		n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	*40.59*	*35.66*	*35.66*	*33.35*	*35.66*	*35.66*	*33.35*	*40.59*	*36.30*	*36.30*	*33.65*	*36.30*	*36.30*	*33.65*
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	62.3	n/m	n/m	n/m	n/m	n/m	n/m	67.7	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	55.40	*20.49*	*17.82*	*7.58*	*20.49*	*17.82*	*7.58*	*45.63*	*16.88*	*14.68*	*6.24*	*16.88*	*14.68*	*6.24*
Density of Solids (g/cc)	*2.71*	*3.04*	*3.04*	*3.04*	*3.04*	*3.04*	*3.04*	*2.71*	*3.04*	*3.04*	*3.04*	*3.04*	*3.04*	*3.04*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*
Notes:		**C04-012**		**C04-012**							**C04-013**			
Temperature (°C)	**30**	**30**	**30**	**30**	**95**	**95**	**95**	**30**	**30**	**30**	**30**	**95**	**95**	**95**
Total initial volume		100		100							100			
5 minutes														
10 minutes														
15 minutes														
20 minutes														
30 minutes														
40 minutes														
50 minutes														
1 hour														
2 hours		99		92							95			
3 hours														
4 hours														
5 hours		97		81							93			
6 hours														
24 hours		92		68							85			
32 hours		90		64							83			
48 hours		90		62							82			
56 hours		89												
72 hours final settled														

Shear Strength Data

Shear Strength Schedule	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*	*S-104*
Source of Data	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*	*WHC-SD-WM-DP-031*
Notes:	**Page C04-006**							**Page C04-006**						
Temperature (°C)	**Unspecified**							**Unspecified**						
Description	**Shear Vane at unspecified gel time or temperature**							**Shear Vane at unspecified gel time or temperature**						
Gelation Time/Shear Strength (Pa)														
5 minutes														
10 minutes														
15 minutes														
20 minutes														
30 minutes														
40 minutes														
50 minutes														
1 hour														
2 hours														
3 hours														
4 hours														
5 hours														
6 hours														
24 hours														
32 hours														
48 hours														
56 hours														
72 hours	1040							6380						
Infinte time (GRE)														

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-S-112

Analyte\Sample	**S-112**	**S-112**	**S-112**	**S-112**	**S-112**	**S-112**
Description	**V1L/V2L; decanted Saltcake supernate after 1st contact with water at 50C**	**V1L/V2L; decanted Saltcake supernate after 1st contact with water at 50C**	**V1L/V2L; decanted Saltcake supernate after 1st contact with water at 50C**	**V1SV2S; decanted Saltcake supernate after 2nd contact with water at 50C**	**V1SV2S; decanted Saltcake supernate after 2nd contact with water at 50C**	**V1SV2S; decanted Saltcake supernate after 2nd contact with water at 50C**
Model Basis	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**
Report No/Source of Data	**RPP-10984 Rev. 0**	**RPP-10984 Rev. 0**	**RPP-10984 Rev. 0**	**RPP-10984 Rev. 0**	**RPP-10984 Rev. 0**	**RPP-10984 Rev. 0**

Rheological Data

Model/model Parameter	***S-112***	***S-112***	***S-112***	***S-112***	***S-112***	***S-112***
Temperature (°C)	**20**	**35**	**50**	**20**	**35**	**50**
Source of Data	***RPP-10984 Rev. 0***	***RPP-10984 Rev. 0***	***RPP-10984 Rev. 0***	***RPP-10984 Rev. 0***	***RPP-10984 Rev. 0***	***RPP-10984 Rev. 0***
Notes	**Table 3-17**	**Table 3-17**	**Table 3-17**	**Table 3-17**	**Table 3-17**	**Table 3-17**
Newtonian:						
η – Newtonian viscosity (cP)	5.700	4.000	2.900	2.000	1.800	1.400
r – correlation coefficient						
Ostwald (or Power Law):						
m – the consistency coefficient (Pa·s^{-n})						
n – the power-law exponent						
r – correlation coefficient						
Bingham Plastic:						
τ_B- the Bingham yield stress (Pa)	0.000	0.000	0.000	0.000	0.000	0.000
η_p - the plastic viscosity (Pa·s)	***0.006***	***0.004***	***0.003***	***0.002***	***0.002***	***0.001***
r – correlation coefficient						
Herschel-Bulkley:						
τ_H- the yield stress (Pa)						
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})						
b - the Hershel-Bulkely power-law exponent						
r – correlation coefficient						
n/a = not applicable						

Physical Property Data

Physical Property	***S-112***	***S-112***	***S-112***	***S-112***	***S-112***	***S-112***
Notes						
Temperature (°C)	**50**	**50**	**50**	**50**	**50**	**50**
Zeta Potential (mV)	n/m	n/m	n/m	n/m	n/m	n/m
Bulk Density (g/mL)	1.36	1.36	1.36	1.15	1.15	1.15
vol% Settled Solids	n/m	n/m	n/m	n/m	n/m	n/m
Density of Centrifuged Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m
vol% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	n/m	n/m	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	***1.36***	***1.36***	***1.36***	1.16	1.16	1.16
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	0.00	0.00	0.00	0.00	0.00	0.00
Density of Solids (g/cc)	***3.02***	***3.02***	***3.02***	***3.02***	***3.02***	***3.02***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**
Description	**Initial Slurry**	**Window C Segment 4**	**Window C Segment 4**	**Window C Segment 4**	**Window C Segment 4**	**Window C Segment 8**	**Window C Segment 8**	**Window C Segment 8**	**Window C Segment 8**	**Window C Segment 13**	**Window C Segment 13**	**Window C Segment 13**	**Window C Segment 13**	**Window C Segment 15**	**Window C Segment 15**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**HNF-1666 Rev 0A, HNF-1666 Rev 0B**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**
Solid Phases (vol% of bulk)															
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	0.00035	0.00045	0.00052	0.00057	0.00045	0.00047	0.00059	0.00047	0.00032	0.00006	0.00019	0.00025	0.00037	0.00129	0.00092
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	0.01535	0.01976	0.02258	0.02486	0.01976	0.02042	0.02596	0.02065	0.01411	0.00282	0.00838	0.01105	0.01607	0.05668	0.04041
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	0.15259	0.19641	0.22447	0.24720	0.19641	0.20298	0.25810	0.20527	0.14030	0.02806	0.08328	0.10987	0.15974	0.56352	0.40171
FeOOH	0.01375	0.01770	0.02023	0.02228	0.01770	0.01829	0.02326	0.01850	0.01264	0.00253	0.00751	0.00990	0.01440	0.05078	0.03620
Gibbsite	2.98106	3.83716	4.38532	4.82930	3.83716	3.96549	5.04227	4.01019	2.74083	0.54817	1.62695	2.14636	3.12067	11.00893	7.84784
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4$•$2H_2O$	0.00034	0.00043	0.00049	0.00054	0.00043	0.00045	0.00057	0.00045	0.00031	0.00006	0.00018	0.00024	0.00035	0.00124	0.00088
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	0.00205	0.00264	0.00302	0.00333	0.00264	0.00273	0.00347	0.00276	0.00189	0.00038	0.00112	0.00148	0.00215	0.00758	0.00540
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	0.00580	0.00746	0.00853	0.00939	0.00746	0.00771	0.00981	0.00780	0.00533	0.00107	0.00316	0.00417	0.00607	0.02141	0.01526
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	0.00180	0.00232	0.00265	0.00292	0.00232	0.00240	0.00305	0.00243	0.00166	0.00033	0.00098	0.00130	0.00189	0.00666	0.00475
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	0.00000	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00002	0.00001
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	0.00030	0.00038	0.00044	0.00048	0.00038	0.00039	0.00050	0.00040	0.00027	0.00005	0.00016	0.00021	0.00031	0.00109	0.00078
TcO_2	0.00002	0.00002	0.00002	0.00003	0.00002	0.00002	0.00003	0.00002	0.00001	0.00000	0.00001	0.00001	0.00002	0.00006	0.00004
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	1.76726	2.27477	2.59974	2.86294	2.27477	2.35085	2.98920	2.37736	1.62484	0.32497	0.96450	1.27242	1.85002	6.52640	4.65242
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	0.14709	0.18933	0.21637	0.23828	0.18933	0.19566	0.24879	0.19786	0.13523	0.02705	0.08027	0.10590	0.15397	0.54318	0.38721
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	0.77865	1.00226	1.14544	1.26141	1.00226	1.03578	1.31704	1.04746	0.71590	0.14318	0.42496	0.56063	0.81512	2.87552	2.04985
Total Volume % UDS	5.87	7.55	8.63	9.50	7.55	7.80	9.92	7.89	5.39	1.08	3.20	4.22	6.14	21.66	15.44
Solids Concentration (g/L)	138.3	178.0	203.4	224.0	178.0	183.9	233.9	186.0	127.1	25.4	75.5	99.6	144.7	510.6	364.0

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*		
Temperature (°C)	**25**	**32**	**50**	**65**	**80**	**32**	**50**	**65**	**80**	**32**	**50**	**65**	**80**		
Source of Data	***HNF-1666 Rev 0A, HNF-1666 Rev 0B***	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**		
Notes	**Table 3-2**														
Newtonian:															
η – Newtonian viscosity (cP)	n/m	61.51	25.67	16.40	12.42	55.16	30.00	7.76	5.51	45.59	21.20	14.18	12.49		
r – correlation coefficient	n/m	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Ostwald (or Power Law):															
m – the consistency coefficient ($Pa\cdot s^{-n}$)	n/m	0.07	0.04	0.04	0.02	0.05	0.05	0.25	0.78	0.04	0.03	0.02	0.02		
n – the power-law exponent	n/m	0.97	0.92	0.85	0.89	1.03	0.93	0.01	0.11	1.02	0.92	0.93	0.89		
r – correlation coefficient	n/m	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.43	1.00	1.00	1.00	1.00		
Bingham Plastic:															
τ_B- the Bingham yield stress (Pa)	n/m	0.36	0.30	0.30	0.27	0.26	0.25	0.00	0.00	0.30	0.28	0.23	0.21		
η_p - the plastic viscosity ($Pa\cdot s$)	n/m	0.060	0.025	0.015	0.012	0.054	0.029	0.008	0.005	0.045	0.020	0.013	0.012		
r – correlation coefficient	n/m	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Herschel-Bulkley:															
τ_H- the yield stress (Pa)	n/m	0.00	0.06	0.06	0.06	0.06	0.06	0.05	0.08	0.06	0.06	0.05	0.05		
k - the Herschel-Bulkely consistency coefficient ($Pa\cdot s^{-b}$)	n/m	0.07	0.04	0.04	0.02	0.04	0.04	0.003	0.003	0.04	0.03	0.02	0.02		
b - the Hershel-Bulkely power-law exponent	n/m	0.98	0.93	0.86	0.91	1.04	0.94	1.13	1.08	1.04	0.93	0.95	0.90		
r – correlation coefficient	n/m	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
n/a = not applicable															

Physical Property Data

Physical Property	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*
Notes															
Temperature (°C)	***25***	***32***	***50***	***65***	***80***	***32***	***50***	***65***	***80***	***32***	***50***	***65***	***80***	**32**	**50**
Zeta Potential (mV)															
Bulk Density (g/mL)	***1.40***	1.50	1.51	1.50	1.50	1.53	1.54	1.54	1.48	1.44	1.45	1.45	1.44	1.67	1.70
vol% Settled Solids	n/m	60	60	58	51	44	48	54	56	39	37	39	40	100	100
Density of Centrifuged Solids (g/mL)	n/m	2.1	1.9	1.9	1.9	1.93	1.85	1.82	2.16	2.1	2.1	2	2.2	1.74	1.75
vol% Centrifuged Solids	n/m	5	7	7	7	22	23	20	8	7	7	7	6	84	80
wt% Centrifuged Solids	n/m	10	9	9	9	28	27	24	10	11	10	9	8	88	83
Supernatant Density (g/mL)	***1.34***	1.43	1.43	1.41	1.43	1.46	1.45	1.47	1.43	1.43	1.42	1.41	1.38	1.48	1.58
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	n/m	60.6	60.6	60.6	60.6	61.1	61.1	61.1	61.1	65	65	65	65	71.6	71.6
wt% UDS	***9.91***	***11.87***	***13.47***	***14.93***	***11.87***	***12.02***	***15.19***	***12.08***	***8.59***	***1.77***	***5.20***	***6.87***	***10.05***	***30.58***	***21.41***
Density of Solids (g/cc)	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*
Source of Data	***HNF-1666 Rev 0A, HNF-1666 Rev 0B***													**WHC-EP-0628**	**WHC-EP-0628**
Notes:	**HNF-1666 Rev. 0B**														
Temperature (°C)														**32**	**50**
Description	**Sample S99T000529; several months undisturbed**													**Sample 066 Stored at 222-S**	**Sample 066 Stored at 222-S**
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours	13036													4750	730
Infinte time (GRE)															

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101
Description	**Window C Segment 15**	**Window C Segment 15**	**Window C Segment 19**	**Window C Segment 19**	**Window C Segment 19**	**Window C Segment 19**	**Window C Segment 22**	**Window C Segment 22**	**Window C Segment 22**	**Window C Segment 22**	**Auger R-9221 Crust**	**Auger R-9221 Crust**	**Auger R-9221 Crust**	**Auger R-9221 Crust**	**Window E Segment 3**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-EP-0628 PNL-MIT52394**	**WHC-SD-WM-DTR-026**
Solid Phases (vol% of bulk)															
$(NaAlO_2)_2{\bullet}2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00139*	*0.00081*	*0.00125*	*0.00133*	*0.00143*	*0.00195*	*0.00166*	*0.00141*	*0.00136*	*0.00123*	*0.00254*	*0.00260*	*0.00254*	*0.00254*	*0.00076*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.06106*	*0.03566*	*0.05495*	*0.05833*	*0.06277*	*0.08559*	*0.07292*	*0.06178*	*0.05939*	*0.05378*	*0.11130*	*0.11386*	*0.11130*	*0.11130*	*0.03319*
$CaC_2O_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.60702*	*0.35455*	*0.54632*	*0.57995*	*0.62403*	*0.85096*	*0.72494*	*0.61419*	*0.59045*	*0.53468*	*1.10655*	*1.13201*	*1.10655*	*1.10655*	*0.33001*
FeOOH	*0.05470*	*0.03195*	*0.04923*	*0.05226*	*0.05624*	*0.07669*	*0.06533*	*0.05535*	*0.05321*	*0.04819*	*0.09972*	*0.10202*	*0.09972*	*0.09972*	*0.02974*
Gibbsite	*11.85878*	*6.92643*	*10.67290*	*11.32997*	*12.19115*	*16.62429*	*14.16246*	*11.99878*	*11.53503*	*10.44561*	*21.61758*	*22.11499*	*21.61758*	*21.61758*	*6.44710*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4{\bullet}2H_2O$	*0.00133*	*0.00078*	*0.00120*	*0.00128*	*0.00137*	*0.00187*	*0.00159*	*0.00135*	*0.00130*	*0.00118*	*0.00243*	*0.00249*	*0.00243*	*0.00243*	*0.00073*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.00817*	*0.00477*	*0.00735*	*0.00780*	*0.00839*	*0.01145*	*0.00975*	*0.00826*	*0.00794*	*0.00719*	*0.01488*	*0.01523*	*0.01488*	*0.01488*	*0.00444*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	*0.02306*	*0.01347*	*0.02076*	*0.02204*	*0.02371*	*0.03233*	*0.02754*	*0.02334*	*0.02243*	*0.02032*	*0.04204*	*0.04301*	*0.04204*	*0.04204*	*0.01254*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4{\bullet}2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00718*	*0.00419*	*0.00646*	*0.00686*	*0.00738*	*0.01006*	*0.00857*	*0.00726*	*0.00698*	*0.00632*	*0.01308*	*0.01338*	*0.01308*	*0.01308*	*0.00390*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00002*	*0.00001*	*0.00001*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00001*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00001*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00118*	*0.00069*	*0.00106*	*0.00113*	*0.00121*	*0.00165*	*0.00141*	*0.00119*	*0.00115*	*0.00104*	*0.00215*	*0.00220*	*0.00215*	*0.00215*	*0.00064*
TcO_2	*0.00006*	*0.00004*	*0.00006*	*0.00006*	*0.00007*	*0.00009*	*0.00008*	*0.00006*	*0.00006*	*0.00006*	*0.00012*	*0.00012*	*0.00012*	*0.00012*	*0.00003*
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*7.03021*	*4.10618*	*6.32719*	*6.71672*	*7.22725*	*9.85535*	*8.39590*	*7.11321*	*6.83829*	*6.19245*	*12.81551*	*13.11038*	*12.81551*	*12.81551*	*3.82202*
$Na_2CO_3{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	*0.58511*	*0.34175*	*0.52660*	*0.55902*	*0.60151*	*0.82024*	*0.69878*	*0.59202*	*0.56914*	*0.51539*	*1.06661*	*1.09116*	*1.06661*	*1.06661*	*0.31810*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	*3.09750*	*1.80917*	*2.78775*	*2.95937*	*3.18431*	*4.34224*	*3.69922*	*3.13407*	*3.01293*	*2.72838*	*5.64648*	*5.77641*	*5.64648*	*5.64648*	*1.68397*
Total Volume % UDS	*23.34*	*13.63*	*21.00*	*22.30*	*23.99*	*32.71*	*27.87*	*23.61*	*22.70*	*20.56*	*42.54*	*43.52*	*42.54*	*42.54*	*12.69*
Solids Concentration (g/L)	***550.1***	***321.3***	***495.0***	***525.5***	***565.5***	***771.1***	***656.9***	***556.5***	***535.0***	***484.5***	***1,002.7***	***1,025.8***	***1,002.7***	***1,002.7***	***299.0***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter															
Temperature (°C)															
Source of Data															
Notes															
Newtonian:															
η – Newtonian viscosity (cP)															
r – correlation coefficient															
Ostwald (or Power Law):															
m – the consistency coefficient (Pa·s^{n})															
n – the power-law exponent															
r – correlation coefficient															
Bingham Plastic:															
τ_B- the Bingham yield stress (Pa)															
η_p - the plastic viscosity (Pa·s)															
r – correlation coefficient															
Herschel-Bulkley:															
τ_H- the yield stress (Pa)															
k - the Herschel-Bulkely consistency coefficient (Pa·s^{b})															
b - the Hershel-Bulkely power-law exponent															
r – correlation coefficient															
n/a = not applicable															

Physical Property Data

Physical Property	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***
Notes															
Temperature (°C)	**65**	**80**	**32**	**50**	**65**	**80**	**32**	**50**	**65**	**80**	**28**	**50**	**65**	**80**	**32**
Zeta Potential (mV)															
Bulk Density (g/mL)	1.70	1.66	1.68	1.66	1.66	1.74	1.71	1.71	1.71	1.70	1.77	1.78	1.77	1.77	1.60
vol% Settled Solids	100	98	100	100	100	100	100	100	100	99	100	100	100	100	71
Density of Centrifuged Solids (g/mL)	1.76	1.79	1.75	1.75	1.73	1.9	1.78	1.82	1.79	1.79	1.82	1.82	1.81	1.82	1.8
vol% Centrifuged Solids	75	69	78	72	65	62	79	73	68	64	96	96	96	95	35
wt% Centrifuged Solids	78	74	79	76	67	68	83	78	72	68	99	99	99	99	40
Supernatant Density (g/mL)	1.50	1.55	1.50	1.46	1.44	1.44	1.46	1.51	1.52	1.53	***1.34***	***1.34***	***1.34***	***1.34***	1.49
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	71.6	71.6	68.6	68.6	68.6	68.6	71.5	71.5	71.5	71.5	85.7	85.7	85.7	85.7	n/m
wt% UDS	***32.36***	***19.35***	***29.47***	***31.66***	***34.06***	***44.32***	***38.42***	***32.55***	***31.29***	***28.50***	***56.65***	***57.63***	***56.65***	***56.65***	***18.69***
Density of Solids (g/cc)	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*
Source of Data	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-EP-0628**	**WHC-SD-WM-DRT-026**
Notes:															
Temperature (°C)	**65**	**80**	**32**	**50**	**65**	**80**	**32**	**50**	**65**	**80**	**28**	**50**	**65**	**80**	**32**
Description	**Sample 066 Stored at 222-S**	**Sample 066 Stored at 222-S**	**Sample 019 Stored at 222-S**	**Sample 019 Stored at 222-S**	**Sample 019 Stored at 222-S**	**Sample 019 Stored at 222-S**	**Sample 067 Stored at 222-S**	**Sample 067 Stored at 222-S**	**Sample 067 Stored at 222-S**	**Sample 067 Stored at 222-S**	**Sample 817 Stored at 222-S**	**Sample 817 Stored at 222-S**	**Sample 817 Stored at 222-S**	**Sample 817 Stored at 222-S**	**Sample 1229 Stored at 222-S**
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours	2100	530	1500	640	300	510	11600	2640	400	1400	25000	4200	210	270	500
Infinte time (GRE)															

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**
Description	**Window E Segment 15**	**Window E Segment 15**	**Window E Segment 15**	**Window E Segment 15**	**Window E Segment 19**	**Window E Segment 19**	**Window E Segment 19**	**Window E Segment 19**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**Window C Segment 16**	**Window C Segment 16R**	**Window E Segment 18**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Report No/Source of Data	**WHC-SD-WM-DTR-026**	**WHC-SD-WM-DTR-026**	**WHC-SD-WM-DTR-026**	**WHC-SD-WM-DTR-026**	**WHC-SD-WM-DTR-026**	**WHC-SD-WM-DTR-026**	**WHC-SD-WM-DTR-026**	**WHC-SD-WM-DTR-026**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**
Solid Phases (vol% of bulk)																
$(NaAlO_2)_2 \bullet 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00074*	*0.00092*	*0.00071*	*0.00076*	*0.00114*	*0.00169*	*0.00146*	*0.00143*	*0.00102*	*0.00204*	*0.00204*	*0.00204*	*0.00204*	*0.00131*	*0.00131*	*0.00131*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.03242*	*0.04016*	*0.03126*	*0.03319*	*0.04987*	*0.07413*	*0.06405*	*0.06252*	*0.04490*	*0.08961*	*0.08961*	*0.08961*	*0.08961*	*0.05733*	*0.05733*	*0.05733*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.32231*	*0.39922*	*0.31076*	*0.33001*	*0.49576*	*0.73702*	*0.63674*	*0.62153*	*0.44637*	*0.89095*	*0.89095*	*0.89095*	*0.89095*	*0.57002*	*0.57002*	*0.57002*
FeOOH	*0.02905*	*0.03598*	*0.02801*	*0.02974*	*0.04468*	*0.06642*	*0.05738*	*0.05601*	*0.04023*	*0.08029*	*0.08029*	*0.08029*	*0.08029*	*0.05137*	*0.05137*	*0.05137*
Gibbsite	*6.29675*	*7.79921*	*6.07107*	*6.44710*	*9.68515*	*14.39854*	*12.43937*	*12.14214*	*8.72035*	*17.40560*	*17.40560*	*17.40560*	*17.40560*	*11.13590*	*11.13590*	*11.13590*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4 \bullet 2H_2O$	*0.00071*	*0.00088*	*0.00068*	*0.00073*	*0.00109*	*0.00162*	*0.00140*	*0.00137*	*0.00098*	*0.00196*	*0.00196*	*0.00196*	*0.00196*	*0.00125*	*0.00125*	*0.00125*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.00434*	*0.00537*	*0.00418*	*0.00444*	*0.00667*	*0.00991*	*0.00856*	*0.00836*	*0.00600*	*0.01198*	*0.01198*	*0.01198*	*0.01198*	*0.00767*	*0.00767*	*0.00767*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	*0.01225*	*0.01517*	*0.01181*	*0.01254*	*0.01884*	*0.02800*	*0.02419*	*0.02362*	*0.01696*	*0.03385*	*0.03385*	*0.03385*	*0.03385*	*0.02166*	*0.02166*	*0.02166*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00381*	*0.00472*	*0.00367*	*0.00390*	*0.00586*	*0.00871*	*0.00753*	*0.00735*	*0.00528*	*0.01053*	*0.01053*	*0.01053*	*0.01053*	*0.00674*	*0.00674*	*0.00674*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00002*	*0.00002*	*0.00002*	*0.00001*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*	*0.00002*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00063*	*0.00078*	*0.00060*	*0.00064*	*0.00096*	*0.00143*	*0.00124*	*0.00121*	*0.00087*	*0.00173*	*0.00173*	*0.00173*	*0.00173*	*0.00111*	*0.00111*	*0.00111*
TcO_2	*0.00003*	*0.00004*	*0.00003*	*0.00003*	*0.00005*	*0.00008*	*0.00007*	*0.00006*	*0.00005*	*0.00009*	*0.00009*	*0.00009*	*0.00009*	*0.00006*	*0.00006*	*0.00006*
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*3.73289*	*4.62359*	*3.59910*	*3.82202*	*5.74163*	*8.53586*	*7.37440*	*7.19820*	*5.16967*	*10.31853*	*10.31853*	*10.31853*	*10.31853*	*6.60167*	*6.60167*	*6.60167*
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*0.31068*	*0.38481*	*0.29955*	*0.31810*	*0.47787*	*0.71043*	*0.61376*	*0.59909*	*0.43026*	*0.85879*	*0.85879*	*0.85879*	*0.85879*	*0.54945*	*0.54945*	*0.54945*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	*1.64470*	*2.03714*	*1.58575*	*1.68397*	*2.52975*	*3.76088*	*3.24915*	*3.17151*	*2.27774*	*4.54632*	*4.54632*	*4.54632*	*4.54632*	*2.90868*	*2.90868*	*2.90868*
Total Volume % UDS	*12.39*	*15.35*	*11.95*	*12.69*	*19.06*	*28.33*	*24.48*	*23.89*	*17.16*	*34.25*	*34.25*	*34.25*	*34.25*	*21.91*	*21.91*	*21.91*
Solids Concentration (g/L)	***292.1***	***361.8***	***281.6***	***299.0***	***449.2***	***667.9***	***577.0***	***563.2***	***404.5***	***807.3***	***807.3***	***807.3***	***807.3***	***516.5***	***516.5***	***516.5***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter																
Temperature (°C)																
Source of Data																
Notes																
Newtonian:																
η – Newtonian viscosity (cP)																
r – correlation coefficient																
Ostwald (or Power Law):																
m – the consistency coefficient (Pa·s^{n})																
n – the power-law exponent																
r – correlation coefficient																
Bingham Plastic:																
τ_B- the Bingham yield stress (Pa)																
η_p - the plastic viscosity (Pa·s)																
r – correlation coefficient																
Herschel-Bulkley:																
τ_H- the yield stress (Pa)																
k - the Herschel-Bulkely consistency coefficient (Pa·s^{b})																
b - the Hershel-Bulkely power-law exponent																
r – correlation coefficient																
n/a = not applicable																

Physical Property Data

Physical Property	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***
Notes																
Temperature (°C)	**32**	**50**	**65**	**80**	**32**	**50**	**65**	**80**						**50**	**50**	**50**
Zeta Potential (mV)																
Bulk Density (g/mL)	1.65	1.64	1.62	1.60	1.72	1.75	1.74	1.72	1.63	1.78	1.78	1.78	1.78	1.68	1.68	1.68
vol% Settled Solids	94	95	90	92	100	95	100	100	100	100	100	100	100	100	100	100
Density of Centrifuged Solids (g/mL)	1.72	1.78	1.74	1.82	1.76	1.82	1.84	1.85	***1.86***	***1.86***	***1.86***	***1.86***	***1.86***	1.75	1.75	1.75
vol% Centrifuged Solids	60	48	43	33	78	73	63	57	***73.7***	***73.7***	***73.7***	***73.7***	***73.7***	76	76	76
wt% Centrifuged Solids	63	51	46	37	80	77	67	62	***77.3***	***77.3***	***77.3***	***77.3***	***77.3***	80	80	80
Supernatant Density (g/mL)	1.55	1.51	1.52	1.49	1.57	1.51	1.54	1.52	***1.48***	***1.48***	***1.48***	***1.48***	***1.48***	1.49	1.49	1.49
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m						n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m						n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m						n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m						n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m						n/m	n/m	n/m
wt% UDS	***17.70***	***22.06***	***17.38***	***18.69***	***26.12***	***38.16***	***33.16***	***32.74***	***24.81***	***45.36***	***45.36***	***45.36***	***45.36***	***30.75***	***30.75***	***30.75***
Density of Solids (g/cc)	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	***SY-101***	***SY-101***	***SY-101***
Source of Data	**WHC-EP0628**	**WHC-EP0628**	**WHC-EP0628**	**WHC-EP0628**	**WHC-EP0628**	**WHC-EP0628**	**WHC-EP0628**	**WHC-EP0628**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**PNL-10198**	**PNL-10198**	**PNL-10198**
Notes:									**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**			
Temperature (°C)	**32**	**50**	**65**	**80**	**32**	**50**	**65**	**80**	**47**	**47**	**47**	**47**	**46**	**50**	**50**	**50**
Description	**Sample 818 Stored at 222-S**	**Sample 818 Stored at 222-S**	**Sample 818 Stored at 222-S**	**Sample 818 Stored at 222-S**	**Sample 1223 Stored at 222-S**	**Sample 1223 Stored at 222-S**	**Sample 1223 Stored at 222-S**	**Sample 1223 Stored at 222-S**	**Riser 4A Loosely Settled Solids Depth from bottom of tank is 75 cm**	**Riser 4A Loosely Settled Solids Depth from bottom of tank is 57 cm**	**Riser 4A Loosely Settled Solids Depth from bottom of tank is 45 cm**	**Riser 4A Loosely Settled Solids Depth from bottom of tank is 37 cm**	**Riser 4A Loosely Settled Solids Depth from bottom of tank is 16 cm**	**Window C Segment 16 Homogenized**	**Window C Segment 16R Homogenized**	**Window C Segment 18 Homogenized**
Gelation Time/Shear Strength (Pa)																
5 minutes																
10 minutes																
15 minutes																
20 minutes																
30 minutes																
40 minutes																
50 minutes																
1 hour																
2 hours																
3 hours																
4 hours																
5 hours																
6 hours																
24 hours																
32 hours																
48 hours																
56 hours																
72 hours	1720	450	790	230	1850	370	730	670	0.77	11	17	20	28	240	330	190
Infinte time (GRE)																

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101	SY-101
Description	Window C Segment 16, 16R, & 18 Composite	Window C Segment 16, 16R, & 18 Composite	Window C Segment 16, 16R, & 18 Composite	Window C Composite 10% Dilution	Window C Composite 10% Dilution	Window C Composite 10% Dilution	Window C Composite 20% Dilution	Window C Composite 20% Dilution	Window C Composite 20% Dilution	Window C Composite 35% Dilution	Window C Composite 35% Dilution	Window C Composite 35% Dilution	Window C Composite 50% Dilution	Window C Composite 50% Dilution	Window C Composite 50% Dilution
Model Basis	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Washed	Washed	Washed	Washed	Washed	Washed
Report No/Source of Data	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198	PNNL-10198
Solid Phases (vol% of bulk)															
$(NaAlO_2)_2•2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00158*	*0.00083*	*0.00049*	*0.00125*	*0.00047*	*0.00007*	*0.00063*	*0.00014*	*0.00007*	*0.00010*	*(0.00040)*	*(0.00050)*	*0.00043*	*(0.00009)*	*(0.00071)*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.06940*	*0.03621*	*0.02162*	*0.05495*	*0.02042*	*0.00305*	*0.02780*	*0.00633*	*0.00305*	*0.00438*	*(0.01734)*	*(0.02188)*	*0.01881*	*(0.00379)*	*(0.03107)*
$CaC_2O_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.69002*	*0.36001*	*0.21497*	*0.54632*	*0.20298*	*0.03035*	*0.27638*	*0.06290*	*0.03035*	*0.04350*	*(0.17243)*	*(0.21749)*	*0.18703*	*(0.03770)*	*(0.30886)*
FeOOH	*0.06218*	*0.03244*	*0.01937*	*0.04923*	*0.01829*	*0.00274*	*0.02491*	*0.00567*	*0.00274*	*0.00392*	*(0.01554)*	*(0.01960)*	*0.01686*	*(0.00340)*	*(0.02783)*
Gibbsite	*13.48030*	*7.03320*	*4.19957*	*10.67290*	*3.96549*	*0.59294*	*5.39945*	*1.22890*	*0.59294*	*0.84977*	*(3.36859)*	*(4.24883)*	*3.65388*	*(0.73650)*	*(6.03396)*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4•2H_2O$	*0.00152*	*0.00079*	*0.00047*	*0.00120*	*0.00045*	*0.00007*	*0.00061*	*0.00014*	*0.00007*	*0.00010*	*(0.00038)*	*(0.00048)*	*0.00041*	*(0.00008)*	*(0.00068)*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.00928*	*0.00484*	*0.00289*	*0.00735*	*0.00273*	*0.00041*	*0.00372*	*0.00085*	*0.00041*	*0.00059*	*(0.00232)*	*(0.00293)*	*0.00252*	*(0.00051)*	*(0.00415)*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	*0.02622*	*0.01368*	*0.00817*	*0.02076*	*0.00771*	*0.00115*	*0.01050*	*0.00239*	*0.00115*	*0.00165*	*(0.00655)*	*(0.00826)*	*0.00711*	*(0.00143)*	*(0.01174)*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4•2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00816*	*0.00426*	*0.00254*	*0.00646*	*0.00240*	*0.00036*	*0.00327*	*0.00074*	*0.00036*	*0.00051*	*(0.00204)*	*(0.00257)*	*0.00221*	*(0.00045)*	*(0.00365)*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00002*	*0.00001*	*0.00001*	*0.00001*	*0.00001*	*0.00000*	*0.00001*	*0.00000*	*0.00000*	*0.00000*	*(0.00000)*	*(0.00001)*	*0.00001*	*(0.00000)*	*(0.00001)*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00134*	*0.00070*	*0.00042*	*0.00106*	*0.00039*	*0.00006*	*0.00054*	*0.00012*	*0.00006*	*0.00008*	*(0.00033)*	*(0.00042)*	*0.00036*	*(0.00007)*	*(0.00060)*
TcO_2	*0.00007*	*0.00004*	*0.00002*	*0.00006*	*0.00002*	*0.00000*	*0.00003*	*0.00001*	*0.00000*	*0.00000*	*(0.00002)*	*(0.00002)*	*0.00002*	*(0.00000)*	*(0.00003)*
ZrO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*7.99150*	*4.16948*	*2.48963*	*6.32719*	*2.35085*	*0.35151*	*3.20095*	*0.72852*	*0.35151*	-	-	-	-	-	-
$Na_2CO_3·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4·H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7·10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2·19H_2O$	*0.66512*	*0.34702*	*0.20721*	*0.52660*	*0.19566*	*0.02926*	*0.26641*	*0.06063*	*0.02926*	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	*3.52104*	*1.83706*	*1.09692*	*2.78775*	*1.03578*	*0.15487*	*1.41033*	*0.32099*	*0.15487*	-	-	-	-	-	-
Total Volume % UDS	*26.53*	*13.84*	*8.26*	*21.00*	*7.80*	*1.17*	*10.63*	*2.42*	*1.17*	*0.90*	*(3.59)*	*(4.52)*	*3.89*	*(0.78)*	*(6.42)*
Solids Concentration (g/L)	*625.3*	*326.2*	*194.8*	*495.0*	*183.9*	*27.5*	*250.4*	*57.0*	*27.5*	*23.3*	*(92.4)*	*(116.5)*	*100.2*	*(20.2)*	*(165.4)*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Rheological Data

Model/model Parameter	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**	**SY-101**
Temperature (°C)	**50**	**70**	**90**	**50**	**70**	**90**	**50**	**70**	**90**	**50**	**70**	**90**	**50**	**70**	**90**
Source of Data	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**	**PNNL-10198**
Notes															
Newtonian:															
η – Newtonian viscosity (cP)	96.92	74.24	72.35	89.47	61.90	27.16	30.43	31.68	26.33	17.46	15.70	9.70	7.46	7.75	3.86
r – correlation coefficient	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Ostwald (or Power Law):															
m – the consistency coefficient (Pa·s^{-n})	0.64	0.76	2.12	0.36	0.92	0.63	0.32	0.34	0.52	0.08	0.22	0.15	0.09	0.14	0.04
n – the power-law exponent	0.68	0.60	0.42	0.76	0.54	0.46	0.60	0.60	0.49	0.75	0.55	0.53	0.57	0.51	0.59
r – correlation coefficient	0.99	0.99	0.98	1.00	0.99	0.97	0.99	0.99	0.98	0.99	0.97	0.98	0.98	0.97	0.98
Bingham Plastic:															
τ_B- the Bingham yield stress (Pa)	5.07	5.08	8.15	3.39	5.20	2.68	1.31	2.17	2.63	0.71	1.29	0.81	0.57	0.70	0.27
η_p - the plastic viscosity (Pa·s)	0.082	0.059	0.048	0.079	0.046	0.019	0.027	0.025	0.018	0.015	0.012	0.007	0.006	0.006	0.003
r – correlation coefficient	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Herschel-Bulkley:															
τ_H- the yield stress (Pa)	4.12	4.35	6.09	2.65	4.04	2.32	1.02	1.59	2.06	0.46	1.26	0.71	0.51	0.65	0.26
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.15	0.11	0.28	0.13	0.15	0.049	0.047	0.074	0.073	0.033	0.013	0.014	0.010	0.009	0.003
b - the Hershel-Bulkely power-law exponent	0.90	0.90	0.72	0.92	0.81	0.85	0.91	0.83	0.78	0.88	0.98	0.89	0.91	0.93	0.98
r – correlation coefficient	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00
n/a = not applicable															

Physical Property Data

Physical Property	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***	***SY-101***
Notes	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**	**Centrifuged Solids are Filtered Solids**
Temperature (°C)	**50**	**70**	**90**	**50**	**70**	**90**	**50**	**70**	**90**	**50**	**70**	**90**	**50**	**70**	**90**
Zeta Potential (mV)															
Bulk Density (g/mL)	1.72	1.61	1.58	1.68	1.53	1.51	1.60	1.55	1.51	1.48	1.42	1.42	1.34	1.29	1.25
vol% Settled Solids	100	100	100	100	98	96	96	99	98	89	n/m	76	34	34	33
Density of Centrifuged Solids (g/mL)	1.74	1.7	1.74	1.68	1.61	1.66	1.73	1.86	1.7	1.7	1.72	1.68	1.92	1.65	1.93
vol% Centrifuged Solids															
wt% Centrifuged Solids	83	71	66	60	61	49	68	67	59	40	38	42	25	24	24
Supernatant Density (g/mL)	1.49	1.49	1.51	1.50	1.46	1.50	1.51	1.53	1.50	1.47	1.46	1.47	1.29	1.30	1.33
Density of Settled Solids (g/mL)	1.72	1.63	1.58	1.68	1.51	1.51	1.59	1.57	1.51	1.51	n/m	1.42	1.42	1.38	1.25
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
wt% UDS	***36.35***	***20.26***	***12.33***	***29.47***	***12.02***	***1.82***	***15.65***	***3.68***	***1.82***	***1.57***	***-6.50***	***-8.20***	***7.48***	***-1.57***	***-13.23***
Density of Solids (g/cc)	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.36***	***2.58***	***2.58***	***2.58***	***2.58***	***2.58***	***2.58***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*	*SY-101*
Source of Data	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198	PNL-10198
Notes:															
Temperature (°C)	50			50			50	50	50	50	50	50	50	50	50
Description	Window C Segment 16, 16R, & 18 Composite			Window C Composite 10% Dilution											
Gelation Time/Shear Strength (Pa)															
5 minutes															
10 minutes															
15 minutes															
20 minutes															
30 minutes															
40 minutes															
50 minutes															
1 hour															
2 hours															
3 hours															
4 hours															
5 hours															
6 hours															
24 hours															
32 hours															
48 hours															
56 hours															
72 hours	60			110											
Infinte time (GRE)															

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-SY-102

Model Chemical Data From ESP

Analyte\Sample	**SY-102**	**SY-102**	**SY-102**
Description	**Undiluted**	**1% Dilution with NaNO3**	**48% Dilution with 1M NaNO3**
Model Basis	**Salty**	**Salty**	**Salt Free**
Report No/Source of Data	**PNNL-11352**	**PNNL-11352**	**PNNL-11352**
Solid Phases (vol% of bulk)			
$(NaAlO_2)_2 \cdot 2.5H_2O$	-	-	-
Ag_2CO_3	-	-	-
Bi_2O_3	***0.12803***	***0.12504***	***0.04863***
BiOCl	-	-	-
Boehmite	-	-	-
$Ca(OH)_2$	-	-	-
$Ca_5OH(PO_4)_3$	***0.37952***	***0.37067***	***0.14416***
$CaC_2O_4 \cdot H_2O$	-	-	-
$CaCO_3$	-	-	-
CaF_2	-	-	-
CrOOH	***1.49365***	***1.45881***	***0.56734***
FeOOH	***1.03054***	***1.00650***	***0.39144***
Gibbsite	***25.37101***	***24.77916***	***9.63684***
HgO	-	-	-
$KAlSiO_4$	-	-	-
$La(OH)_3$	-	-	-
$LaPO_4 \cdot 2H_2O$	***0.01280***	***0.01250***	***0.00486***
$Mn(OH)_2$	***0.17399***	***0.16994***	***0.06609***
$Mn_3(PO_4)_2$	-	-	-
$MnCO_3$	-	-	-
$Na_2U_2O_7$	***0.05988***	***0.05848***	***0.02274***
$NaAlCO_3(OH)_2$	-	-	-
$NaAlSiO_4$	-	-	-
$Ni(OH)_2$	***0.04675***	***0.04566***	***0.01776***
$Ni_3(PO_4)_2$	-	-	-
$NiC_2O_4 \cdot 2H_2O$	-	-	-
$Pb(OH)_2$	***0.03699***	***0.03613***	***0.01405***
$Pb_3(PO_4)_2$	-	-	-
$PbCO_3$	-	-	-
$Pu(OH)_4$	***0.00504***	***0.00492***	***0.00191***
SiO_2	-	-	-
$Sr_3(PO_4)_2$	-	-	-
$SrCO_3$	***0.00791***	***0.00773***	***0.00301***
TcO_2	***0.00018***	***0.00017***	***0.00007***
ZrO_2	***0.00173***	***0.00169***	***0.00066***
KNO_3	-	-	-
$Na_2C_2O_4$	***8.07249***	***7.88417***	-
$Na_2CO_3 \cdot H_2O$	-	-	-
Na_2SO_4	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-
Na_3FSO_4	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-
NaF	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	***3.09380***	***3.02163***	-
$NaHCO_3$	-	-	-
$NaNO_2$	-	-	-
$NaNO_3$	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	***3.94679***	***3.85472***	-
Total Volume % UDS	*43.86*	*42.84*	*10.92*
Solids Concentration (g/L)	***1,081.4***	***1,056.2***	***294.2***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-SY-102

Rheological Data

Model/model Parameter	***SY-102***	***SY-102***	***SY-102***
Temperature (°C)	**25**	**25**	**25**
Source of Data	***PNNL-11352***	***PNNL-11352***	***PNNL-11352***
Notes	**Page 2.8**	**Page 2.8**	**Page 2.8**
Newtonian:			
η – Newtonian viscosity (cP)	16.725	16.022	0.893
r – correlation coefficient	0.959	0.991	0.980
Ostwald (or Power Law):			
m – the consistency coefficient (Pa·s^{-n})	1.764	1.188	0.003
n – the power-law exponent	0.135	0.201	0.782
r – correlation coefficient	0.929	0.915	0.992
Bingham Plastic:			
τ_B- the Bingham yield stress (Pa)	2.602	2.120	0.010
η_p - the plastic viscosity (Pa·s)	0.005	0.006	0.001
r – correlation coefficient	0.959	0.991	0.980
Herschel-Bulkley:			
τ_H- the yield stress (Pa)	2.377	1.882	0.000
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})	0.039	0.038	0.003
b - the Hershel-Bulkely power-law exponent	0.647	0.699	0.785
r – correlation coefficient	0.975	0.989	0.992
n/a = not applicable			

Physical Property Data

Physical Property	***SY-102***	***SY-102***	***SY-102***
Notes	**Letter Report-1990 RD Scheele PNNL-11352**		
Temperature (°C)	***25***	**25**	**25**
Zeta Potential (mV)	-37		
Bulk Density (g/mL)	1.80	***1.79***	***1.30***
vol% Settled Solids	100	n/m	n/m
Density of Centrifuged Solids (g/mL)	1.83	n/m	n/m
vol% Centrifuged Solids	92	n/m	n/m
wt% Centrifuged Solids	93.93	n/m	n/m
Supernatant Density (g/mL)	1.28	***1.28***	***1.13***
Density of Settled Solids (g/mL)	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m
wt% dissolved solids in supernatant	n/m	n/m	n/m
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m
wt% Total Solids	67.3	n/m	n/m
wt% UDS	***60.08***	***59.14***	***22.61***
Density of Solids (g/cc)	***2.47***	***2.47***	***2.69***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	***SY-102***		
Source of Data	***PNNL-11352***		
Notes:	**reference of DiCenso et al. 1995**		
Temperature (°C)			
Description	**Page 2.11**		
Gelation Time/Shear Strength (Pa)			
5 minutes			
10 minutes			
15 minutes			
20 minutes			
30 minutes			
40 minutes			
50 minutes			
1 hour			
2 hours			
3 hours			
4 hours			
5 hours			
6 hours			
24 hours			
32 hours			
48 hours			
56 hours			
72 hours	3900		
Infinte time (GRE)			

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**
Description	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Source of Data	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**
Solid Phases (vol% of bulk)										
$(NaAlO_2)_2 \bullet 2.5H_2O$	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*
BiOCl	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.05816*	*0.05816*	*0.05816*	*0.05816*	*0.05816*	*0.05816*	*0.05816*	*0.05816*	*0.05816*	*0.05816*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.25879*	*0.25879*	*0.25879*	*0.25879*	*0.25879*	*0.25879*	*0.25879*	*0.25879*	*0.25879*	*0.25879*
FeOOH	*0.11237*	*0.11237*	*0.11237*	*0.11237*	*0.11237*	*0.11237*	*0.11237*	*0.11237*	*0.11237*	*0.11237*
Gibbsite	*5.49441*	*5.49441*	*5.49441*	*5.49441*	*5.49441*	*5.49441*	*5.49441*	*5.49441*	*5.49441*	*5.49441*
HgO	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-
$LaPO_4 \bullet 2H_2O$	*0.00158*	*0.00158*	*0.00158*	*0.00158*	*0.00158*	*0.00158*	*0.00158*	*0.00158*	*0.00158*	*0.00158*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.02192*	*0.02192*	*0.02192*	*0.02192*	*0.02192*	*0.02192*	*0.02192*	*0.02192*	*0.02192*	*0.02192*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.28376*	*0.28376*	*0.28376*	*0.28376*	*0.28376*	*0.28376*	*0.28376*	*0.28376*	*0.28376*	*0.28376*
$Ni(OH)_2$	*0.00641*	*0.00641*	*0.00641*	*0.00641*	*0.00641*	*0.00641*	*0.00641*	*0.00641*	*0.00641*	*0.00641*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \bullet 2H_2O$	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00514*	*0.00514*	*0.00514*	*0.00514*	*0.00514*	*0.00514*	*0.00514*	*0.00514*	*0.00514*	*0.00514*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*	*0.00003*
SiO_2	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00031*	*0.00031*	*0.00031*	*0.00031*	*0.00031*	*0.00031*	*0.00031*	*0.00031*	*0.00031*	*0.00031*
TcO_2	*0.00006*	*0.00006*	*0.00006*	*0.00006*	*0.00006*	*0.00006*	*0.00006*	*0.00006*	*0.00006*	*0.00006*
ZrO_2	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*	*0.00119*
KNO_3	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*1.78840*	*1.78840*	*1.78840*	*1.78840*	*1.78840*	*1.78840*	*1.78840*	*1.78840*	*1.78840*	*1.78840*
$Na_2CO_3 \cdot H_2O$	*0.68236*	*0.68236*	*0.68236*	*0.68236*	*0.68236*	*0.68236*	*0.68236*	*0.68236*	*0.68236*	*0.68236*
Na_2SO_4	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	*0.51162*	*0.51162*	*0.51162*	*0.51162*	*0.51162*	*0.51162*	*0.51162*	*0.51162*	*0.51162*	*0.51162*
NaF	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*2.96922*	*2.96922*	*2.96922*	*2.96922*	*2.96922*	*2.96922*	*2.96922*	*2.96922*	*2.96922*	*2.96922*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*6.45015*	*6.45015*	*6.45015*	*6.45015*	*6.45015*	*6.45015*	*6.45015*	*6.45015*	*6.45015*	*6.45015*
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*18.65*	*18.65*	*18.65*	*18.65*	*18.65*	*18.65*	*18.65*	*18.65*	*18.65*	*18.65*
Solids Concentration (g/L)	*431.1*	*431.1*	*431.1*	*431.1*	*431.1*	*431.1*	*431.1*	*431.1*	*431.1*	*431.1*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-SY-103

Physical Property Data

Physical Property	***SY-103***	***SY-103***	***SY-103***	***SY-103***	***SY-103***	***SY-103***	***SY-103***	***SY-103***	***SY-103***	***SY-103***
Source of Data										
Temperature (°C)										
Zeta Potential (mV)										
Bulk Density (g/mL)	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
vol% Settled Solids										
Density of Centrifuged Solids (g/mL)										
vol% Centrifuged Solids										
wt% Centrifuged Solids										
Supernatant Density (g/mL)	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
Density of Settled Solids (g/mL)										
wt% Settled Supernatant										
wt% dissolved solids in supernatant										
wt% total solids in Centrifuged Sludge										
wt% Total Solids										
wt% UDS	***27.46***	***27.46***	***27.46***	***27.46***	***27.46***	***27.46***	***27.46***	***27.46***	***27.46***	***27.46***
Density of Solids (g/cc)	***2.31***	***2.31***	***2.31***	***2.31***	***2.31***	***2.31***	***2.31***	***2.31***	***2.31***	***2.31***

Shear Strength Data

Shear Strength Schedule	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**	**SY-103**
Source of Data	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**	**RPP-6655 PNNL-11296**
Instrumentation	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)	**35**	**37**	**38**	**38**	**37**	**35**	**37**	**38**	**38**	**37**
Description	**Riser 17C Depth from bottom of tank is 300 cm**	**Riser 17C Depth from bottom of tank is 250 cm**	**Riser 17C Depth from bottom of tank is 200 cm**	**Riser 17C Depth from bottom of tank is 150 cm**	**Riser 17C Depth from bottom of tank is 100 cm**	**Riser 22A Depth from bottom of tank is 300 cm**	**Riser 22A Depth from bottom of tank is 250 cm**	**Riser 22A Depth from bottom of tank is 200 cm**	**Riser 22A Depth from bottom of tank is 150 cm**	**Riser 22A Depth from bottom of tank is 100 cm**
Gelation Time/Shear Strength (Pa)										
5 minutes										
10 minutes										
15 minutes										
20 minutes										
30 minutes										
40 minutes										
50 minutes										
1 hour										
2 hours										
3 hours										
4 hours										
5 hours										
6 hours										
24 hours										
32 hours										
48 hours										
56 hours										
72 hours										
Infinte time (GRE)	10	45	95	155	228	48	118	180	242	295

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**T-102**	**T-102**	**T-102**	**T-102**
Description	**Core 55 Segment 2 1:1 dilution**	**Core 55 Segment 2 3:1 dilution**	**Core 55 Segment 2 1:1 dilution**	**Core 55 Segment 2 3:1 dilution**
Model Basis	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**
Report No/Source of Data	**HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0**	**HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0**	**HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0**	**HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0**
Solid Phases (vol% of bulk)				
$(NaAlO_2)_2\bullet 2.5H_2O$	-	-	-	-
Ag_2CO_3	*0.00083*	*0.00037*	*0.00083*	*0.00037*
Bi_2O_3	*0.00292*	*0.00129*	*0.00292*	*0.00129*
BiOCl	-	-	-	-
Boehmite	-	-	-	-
$Ca(OH)_2$	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.00901*	*0.00399*	*0.00901*	*0.00399*
$CaC_2O_4\cdot H_2O$	-	-	-	-
$CaCO_3$	-	-	-	-
CaF_2	-	-	-	-
CrOOH	*0.00011*	*0.00005*	*0.00011*	*0.00005*
FeOOH	*0.07697*	*0.03408*	*0.07697*	*0.03408*
Gibbsite	*4.13662*	*1.83152*	*4.13662*	*1.83152*
HgO	-	-	-	-
$KAlSiO_4$	-	-	-	-
$La(OH)_3$	-	-	-	-
$LaPO_4\bullet 2H_2O$	*0.00042*	*0.00019*	*0.00042*	*0.00019*
$Mn(OH)_2$	-	-	-	-
$Mn_3(PO_4)_2$	*0.00897*	*0.00397*	*0.00897*	*0.00397*
$MnCO_3$	-	-	-	-
$Na_2U_2O_7$	*0.02984*	*0.01321*	*0.02984*	*0.01321*
$NaAlCO_3(OH)_2$	*0.33528*	*0.14845*	*0.33528*	*0.14845*
$NaAlSiO_4$	*0.07256*	*0.03213*	*0.07256*	*0.03213*
$Ni(OH)_2$	*0.00048*	*0.00021*	*0.00048*	*0.00021*
$Ni_3(PO_4)_2$	-	-	-	-
$NiC_2O_4\bullet 2H_2O$	-	-	-	-
$Pb(OH)_2$	*0.00122*	*0.00054*	*0.00122*	*0.00054*
$Pb_3(PO_4)_2$	-	-	-	-
$PbCO_3$	-	-	-	-
$Pu(OH)_4$	*0.00001*	*0.00000*	*0.00001*	*0.00000*
SiO_2	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-
$SrCO_3$	*0.00018*	*0.00008*	*0.00018*	*0.00008*
TcO_2	-	-	-	-
ZrO_2	*0.00015*	*0.00007*	*0.00015*	*0.00007*
KNO_3	-	-	-	-
$Na_2C_2O_4$	-	-	-	-
$Na_2CO_3\cdot H_2O$	-	-	-	-
Na_2SO_4	-	-	-	-
$Na_2SO_4\cdot 10H_2O$	-	-	-	-
Na_3FSO_4	-	-	-	-
$Na_3NO_3SO_4\cdot H_2O$	-	-	-	-
$Na_3PO_4\cdot 8H_2O$	-	-	-	-
$Na_4P_2O_7\cdot 10H_2O$	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-
NaF	-	-	-	-
$NaF(PO_4)_2\cdot 19H_2O$	-	-	-	-
$NaHCO_3$	-	-	-	-
$NaNO_2$	-	-	-	-
$NaNO_3$	-	-	-	-
$Na_3PO_4\cdot 0.25NaOH\cdot 12H_2O$	-	-	-	-
Total Volume % UDS	*4.68*	*2.07*	*4.68*	*2.07*
Solids Concentration (g/L)	*116.1*	*51.4*	*116.1*	*51.4*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-102

Rheological Data

Model/model Parameter	***T-102***	***T-102***	***T-102***	***T-102***
Temperature (°C)	**30**	**30**	**90**	**90**
Source of Data	***HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0***	***HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0***	***HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0***	***HNF-SD-WM-ER-700 Rev. 0 WHC-SD-WM-DP-052 Rev 0***
Notes	**Taylor Vorticies observed fit over 0-20 1/sec**	**Taylor Vorticies observed fit over 0-80 1/sec**	**Taylor Vorticies observed fit over 0-12 1/sec**	**Taylor Vorticies observed fit over 0-20 1/sec**
Newtonian:				
η – Newtonian viscosity (cP)	1.840	1.167	1.130	1.154
r – correlation coefficient	0.988	1.000	0.831	0.375
Ostwald (or Power Law):				
m – the consistency coefficient ($Pa \cdot s^{-n}$)	0.003	0.002	0.008	0.010
n – the power-law exponent	0.804	0.817	0.172	0.001
r – correlation coefficient	0.960	0.992	0.997	1.000
Bingham Plastic:				
τ_B- the Bingham yield stress (Pa)	0.009	0.010	0.003	0.009
η_p - the plastic viscosity ($Pa \cdot s$)	0.001	0.001	0.001	0.000
r – correlation coefficient	0.988	1.000	0.831	0.375
Herschel-Bulkley:				
τ_H- the yield stress (Pa)	0.009	0.007	0.001	0.007
k - the Herschel-Bulkely consistency coefficient ($Pa \cdot s^{-b}$)	0.001	0.002	0.005	0.003
b - the Hershel-Bulkely power-law exponent	0.994	0.908	0.313	0.008
r – correlation coefficient	0.987	0.998	0.993	1.000
n/a = not applicable				

Physical Property Data

Physical Property	***T-102***	***T-102***	***T-102***	***T-102***
Notes				
Temperature (°C)	**30**	**30**	**30**	**30**
Zeta Potential (mV)				
Bulk Density (g/mL)	1.11	1.05	1.11	1.05
vol% Settled Solids	15.7	8.3	15.7	8.3
Density of Centrifuged Solids (g/mL)	n/m	n/m	n/m	n/m
vol% Centrifuged Solids	n/m	n/m	n/m	n/m
wt% Centrifuged Solids	n/m	n/m	n/m	n/m
Supernatant Density (g/mL)	***1.04***	***1.02***	***1.04***	***1.02***
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	***21.72***	***21.25***	***21.72***	***21.25***
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m
wt% Total Solids	n/m	n/m	n/m	n/m
wt% UDS	***10.46***	***4.90***	***10.46***	***4.90***
Density of Solids (g/cc)	***2.48***	***2.48***	***2.48***	***2.48***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule	***T-102***	***T-102***		
Notes:	**WHC-SD-WM-DP-052 C08-19**	**WHC-SD-WM-DP-052 C08-24**		
Temperature (°C)	**25**	**25**		
Total initial volume	100	100		
5 minutes				
10 minutes				
15 minutes				
20 minutes				
30 minutes				
40 minutes				
50 minutes				
1 hour				
2 hours	18	11		
3 hours				
4 hours				
5 hours	17	10		
6 hours	17	10		
24 hours	17			
32 hours	17			
48 hours				
56 hours				
72 hours final settled				

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-107

Model Chemical Data From ESP

Analyte\Sample	T-107	T-107	T-107	T-107	T-107
Description	**no dilution**	**1:1 dilution**	**3:1 dilution**	**1:1 dilution**	**3:1 dilution**
Model Basis	**Salty**	**Salt Free**	**Salt Free**	**Salt Free**	**Salt Free**
Report No/Source of Data	**WHC-SD-WM-ER-382, rev 0**	**WHC-SD-WM-ER-382, rev 0**	**WHC-SD-WM-ER-382, rev 0**	**WHC-SD-WM-ER-382, rev 0**	**WHC-SD-WM-ER-382, rev 0**
Solid Phases (vol% of bulk)					
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-
Ag_2CO_3	*0.00008*	*0.00008*	*0.00004*	*0.00008*	*0.00004*
Bi_2O_3	*0.11961*	*0.12696*	*0.05809*	*0.12696*	*0.05809*
BiOCl	-	-	-	-	-
Boehmite	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	-	-
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-
$CaCO_3$	-	-	-	-	-
CaF_2	*0.11698*	*0.12417*	*0.05682*	*0.12417*	*0.05682*
CrOOH	*0.01187*	*0.01260*	*0.00576*	*0.01260*	*0.00576*
FeOOH	*1.04158*	*1.10564*	*0.50589*	*1.10564*	*0.50589*
Gibbsite	*3.22914*	*3.42773*	*1.56838*	*3.42773*	*1.56838*
HgO	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-
$LaPO_4$•$2H_2O$	*0.00010*	*0.00011*	*0.00005*	*0.00011*	*0.00005*
$Mn(OH)_2$	-	-	-	-	-
$Mn_3(PO_4)_2$	*0.02970*	*0.03153*	*0.01443*	*0.03153*	*0.01443*
$MnCO_3$	-	-	-	-	-
$Na_2U_2O_7$	*0.47700*	*0.50633*	*0.23168*	*0.50633*	*0.23168*
$NaAlCO_3(OH)_2$	*1.01941*	*1.08210*	*0.49512*	*1.08210*	*0.49512*
$NaAlSiO_4$	*0.92570*	*0.98263*	*0.44961*	*0.98263*	*0.44961*
$Ni(OH)_2$	*0.00496*	*0.00526*	*0.00241*	*0.00526*	*0.00241*
$Ni_3(PO_4)_2$	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-
$Pb(OH)_2$	*0.01135*	*0.01205*	*0.00551*	*0.01205*	*0.00551*
$Pb_3(PO_4)_2$	-	-	-	-	-
$PbCO_3$	-	-	-	-	-
$Pu(OH)_4$	*0.00004*	*0.00005*	*0.00002*	*0.00005*	*0.00002*
SiO_2	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-
$SrCO_3$	*0.04453*	*0.04727*	*0.02163*	*0.04727*	*0.02163*
TcO_2	-	-	-	-	-
ZrO_2	*0.00118*	*0.00125*	*0.00057*	*0.00125*	*0.00057*
KNO_3	-	-	-	-	-
$Na_2C_2O_4$	*0.04057*	-	-	-	-
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-
Na_2SO_4	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	*6.37408*	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-
NaF	*0.50793*	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*0.66969*	-	-	-	-
$NaHCO_3$	-	-	-	-	-
$NaNO_2$	-	-	-	-	-
$NaNO_3$	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-
Total Volume % UDS	*14.63*	*7.47*	*3.42*	*7.47*	*3.42*
Solids Concentration (g/L)	*360.0*	*229.9*	*105.2*	*229.9*	*105.2*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-107

Rheological Data

Model/model Parameter		***T-107***	***T-107***	***T-107***	***T-107***
Temperature (°C)		**25**	**25**	**90**	**90**
Source of Data					
Notes		**Fit from hardcopies in Tingey archive file**	**Fit from hardcopies in Tingey archive file**	**Fit from hardcopies in Tingey archive file**	**Fit from hardcopies in Tingey archive file**
Newtonian:					
η – Newtonian viscosity (cP)		9.302	4.612	8.466	2.559
r – correlation coefficient		0.949	0.980	0.940	0.987
Ostwald (or Power Law):					
m – the consistency coefficient ($\mathrm{Pa \cdot s^{-n}}$)		0.666	0.006	0.387	0.003
n – the power-law exponent		0.261	0.952	0.344	1.000
r – correlation coefficient		0.913	0.975	0.958	0.987
Bingham Plastic:					
τ_B- the Bingham yield stress (Pa)		0.852	0.049	0.630	0.000
η_p - the plastic viscosity (Pa·s)		0.007	0.004	0.007	0.003
r – correlation coefficient		0.949	0.980	0.940	0.987
Herschel-Bulkley:					
τ_H- the yield stress (Pa)		0.735	0.050	0.415	0.000
k - the Herschel-Bulkely consistency coefficient ($\mathrm{Pa \cdot s^{-b}}$)		0.039	0.004	0.088	0.003
b - the Hershel-Bulkely power-law exponent		0.710	1.000	0.574	1.000
r – correlation coefficient		0.965	0.980	0.971	0.987
n/a = not applicable					

Physical Property Data

Physical Property	***T-107***	***T-107***	***T-107***	***T-107***	***T-107***
Notes					
Temperature (°C)	**30**	**30**	**30**	**30**	**30**
Zeta Potential (mV)					
Bulk Density (g/mL)	1.44	1.22	1.10	1.22	1.10
vol% Settled Solids	74	68	32	68	32
Density of Centrifuged Solids (g/mL)	1.53	1.44	1.32	1.44	1.32
vol% Centrifuged Solids	74	36	16	36	16
wt% Centrifuged Solids	79	44	19	44	19
Supernatant Density (g/mL)	1.20	1.07	1.03	1.07	1.03
Density of Settled Solids (g/mL)	n/m	n/m	n/m	n/m	n/m
wt% Settled Supernatant	n/m	n/m	n/m	n/m	n/m
wt% dissolved solids in supernatant	***23.17***	***20.66***	***19.89***	***20.66***	***19.89***
wt% total solids in Centrifuged Sludge	n/m	n/m	n/m	n/m	n/m
wt% Total Solids	47	n/m	n/m	n/m	n/m
wt% UDS	25.00	***18.84***	***9.56***	***18.84***	***9.56***
Density of Solids (g/cc)	***2.46***	***3.08***	***3.08***	***3.08***	***3.08***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-107

Settling Data

Settling Schedule		***T-107***	***T-107***		
Notes:		**WHC-SD-WM-ER-382 5-35**	**WHC-SD-WM-ER-382 5-36**		
Temperature (°C)		**30**	**30**		
Total initial volume		100	100		
5 minutes					
10 minutes					
15 minutes					
20 minutes					
30 minutes					
40 minutes					
50 minutes					
1 hour					
2 hours		95	65		
3 hours					
4 hours					
5 hours		89	56		
6 hours					
24 hours		72	41		
32 hours		70	36		
48 hours		68	32		
56 hours		67	32		
72 hours final settled					

Shear Strength Data

Shear Strength Schedule	***T-107***				
Source of Data	***WHC-SD-WM-ER-382, rev 0***				
Notes:	**Page 6-7**				
Temperature (°C)	**Unspecified**				
Description	**Shear Vane at unspecified gel time or temperature**				
Gelation Time/Shear Strength (Pa)					
5 minutes					
10 minutes					
15 minutes					
20 minutes					
30 minutes					
40 minutes					
50 minutes					
1 hour					
2 hours					
3 hours					
4 hours					
5 hours					
6 hours					
24 hours					
32 hours					
48 hours					
56 hours					
72 hours	720				
Infinte time (GRE)					

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**T-110**	**T-110**	**T-110**	**T-110**
Description	**Tank Composite with water added to return to original solids content**	**30 wt% dilution of a core composite**	**1:1 Dilution of a core composite**	**4:1 Dilution of a core composite**
Model Basis	**Salty**	**Washed**	**Washed**	**Washed**
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Solid Phases (vol% of bulk)				
$(NaAlO_2)_2{\bullet}2.5H_2O$	-	-	-	-
Ag_2CO_3	-	-	-	-
Bi_2O_3	*1.15553*	*0.63157*	*0.25860*	*0.05099*
BiOCl	-	-	-	-
Boehmite	-	-	-	-
$Ca(OH)_2$	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.00703*	*0.00384*	*0.00157*	*0.00031*
$CaC_2O_4{\cdot}H_2O$	-	-	-	-
$CaCO_3$	-	-	-	-
CaF_2	*0.32908*	*0.17986*	*0.07365*	*0.01452*
CrOOH	*0.17966*	*0.09820*	*0.04021*	*0.00793*
FeOOH	*2.54317*	*1.39000*	*0.56916*	*0.11221*
Gibbsite	-	-	-	-
HgO	-	-	-	-
$KAlSiO_4$	-	-	-	-
$La(OH)_3$	-	-	-	-
$LaPO_4{\bullet}2H_2O$	*0.06452*	*0.03526*	*0.01444*	*0.00285*
$Mn(OH)_2$	-	-	-	-
$Mn_3(PO_4)_2$	*0.19524*	*0.10671*	*0.04369*	*0.00861*
$MnCO_3$	-	-	-	-
$Na_2U_2O_7$	-	-	-	-
$NaAlCO_3(OH)_2$	*1.77381*	*0.96950*	*0.39697*	*0.07827*
$NaAlSiO_4$	*0.06315*	*0.03451*	*0.01413*	*0.00279*
$Ni(OH)_2$	*0.01007*	*0.00551*	*0.00225*	*0.00044*
$Ni_3(PO_4)_2$	-	-	-	-
$NiC_2O_4{\bullet}2H_2O$	-	-	-	-
$Pb(OH)_2$	*0.05860*	*0.03203*	*0.01311*	*0.00259*
$Pb_3(PO_4)_2$	-	-	-	-
$PbCO_3$	-	-	-	-
$Pu(OH)_4$	*0.00012*	*0.00006*	*0.00003*	*0.00001*
SiO_2	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-
$SrCO_3$	*0.05596*	*0.03059*	*0.01252*	*0.00247*
TcO_2	*0.00000*	*0.00000*	*0.00000*	*0.00000*
ZrO_2	*0.00076*	*0.00042*	*0.00017*	*0.00003*
KNO_3	-	-	-	-
$Na_2C_2O_4$	*0.14186*	-	-	-
$Na_2CO_3{\cdot}H_2O$	-	-	-	-
Na_2SO_4	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-
Na_3FSO_4	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	*7.68168*	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-
NaF	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	-	-	-	-
$NaHCO_3$	-	-	-	-
$NaNO_2$	-	-	-	-
$NaNO_3$	-	-	-	-
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-	-
Total Volume % UDS	*14.26*	*3.52*	*1.44*	*0.28*
Solids Concentration (g/L)	***436.8***	***160.1***	***65.6***	***12.9***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-110

Rheological Data

Model/model Parameter		**T-110**	**T-110**	**T-110**
Temperature (°C)		**25**	**25**	**25**
Source of Data		***PNNL-14365***	***PNNL-14365***	***PNNL-14365***
Instrumentation		**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**
Newtonian:				
η – Newtonian viscosity (cP)		n/a	n/a	1.41
r – correlation coefficient		n/a	n/a	0.94
Ostwald (or Power Law):				
m – the consistency coefficient (Pa·s^{-n})		n/a	n/a	n/a
n – the power-law exponent		n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a
Bingham Plastic:				
τ_B- the Bingham yield stress (Pa)		1.54	0.14	0.02
η_p - the plastic viscosity (Pa·s)		0.0059	0.0023	0.0013
r – correlation coefficient		0.99	0.99	0.95
Herschel-Bulkley:				
τ_H- the yield stress (Pa)		1.11	0.07	n/a
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		0.02	0.01	n/a
b - the Hershel-Bulkely power-law exponent		0.82	0.83	n/a
r – correlation coefficient		0.99	0.99	n/a
n/a = not applicable				

Physical Property Data

Physical Property	***T-110***	***T-110***	***T-110***	***T-110***
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Temperature (°C)				
Zeta Potential (mV)				
Bulk Density (g/mL)	1.50	1.26	1.13	1.04
vol% Settled Solids	100	87.1	46.4	22.2
Density of Centrifuged Solids (g/mL)	1.58	1.51	1.61	1.47
vol% Centrifuged Solids	79.9	39.9	16.4	8.1
wt% Centrifuged Solids	***84***	***48***	***23***	***11***
Supernatant Density (g/mL)	1.24	1.14	1.08	1.03
Density of Settled Solids (g/mL)				
wt% Settled Supernatant				
wt% dissolved solids in supernatant				
wt% total solids in Centrifuged Sludge				
wt% Total Solids	48.4	29.3	15.3	6.4
wt% UDS	***29.12***	***12.71***	***5.80***	***1.24***
Density of Solids (g/cc)	***3.06***	***4.55***	***4.55***	***4.55***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-110

Settling Data

Settling Schedule				
Source of Data		**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Temperature (°C)				
Total initial volume		13.7	13.6	13.5
5 minutes		13.7	13.6	13.3
10 minutes		13.7	13.6	12.5
15 minutes		13.7	13.4	11.9
20 minutes		13.7		
30 minutes		13.7	13.3	10.9
40 minutes		13.7		
50 minutes		13.7		
1 hour		13.7	12.2	5.9
2 hours		13.7	10.1	4.9
3 hours		13.7	8.9	4.4
4 hours		13.7	8.9	4.1
5 hours				
6 hours		13.45	8.45	3.15
24 hours				
32 hours		12.6	6.4	3
48 hours				3
56 hours				3
72 hours final settled		11.9	6.2	3

Shear Strength Data

Shear Strength Schedule	**T-110**			
Source of Data	**PNNL-14365**			
Instrumentation	**Haake RS300 Shear Vane**			
Temperature (°C)	**25**			
Description	**Tank Composite with water added to return to original solids content (49%)**			
Gelation Time/Shear Strength (Pa)				
5 minutes				
10 minutes				
15 minutes				
20 minutes				
30 minutes				
40 minutes				
50 minutes				
1 hour				
2 hours				
3 hours				
4 hours				
5 hours				
6 hours				
24 hours				
32 hours				
48 hours				
56 hours				
72 hours	70			
Infinte time (GRE)				

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**
Description	**Segment 2 Core 31**	**Segment 2 Core 31 1:1 Dilution**	**Segment 2 Core 31 1:1 Dilution**	**Segment 2 Core 31 3:1 Dilution**	**Segment 2 Core 31 3:1 Dilution**	**Segment 8 Core 31**	**Segment 8 Core 31 1:1 Dilution**	**Segment 8 Core 31 1:1 Dilution**	**Segment 8 Core 31 3:1 Dilution**
Model Basis	**Salty**	**Washed**	**Washed**	**Washed**	**Washed**	**Salty**	**Washed**	**Washed**	**Washed**
Source of Data	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**
Solid Phases (vol% of bulk)									
$(NaAlO_2)_2 \bullet 2.5H_2O$	-	-	-	-	-	-	-	-	-
Ag_2CO_3	*0.00385*	*0.00012*	*0.00012*	*0.00017*	*0.00017*	*0.00554*	*0.00192*	*0.00192*	*0.00071*
Bi_2O_3	*0.60186*	*0.01823*	*0.01823*	*0.02712*	*0.02712*	*0.86544*	*0.29978*	*0.29978*	*0.11028*
BiOCl	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	-	-	-	-	-	-
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-
CaF_2	*0.22133*	*0.00671*	*0.00671*	*0.00997*	*0.00997*	*0.31826*	*0.11024*	*0.11024*	*0.04055*
CrOOH	-	-	-	-	-	-	-	-	-
FeOOH	*1.20472*	*0.03650*	*0.03650*	*0.05428*	*0.05428*	*1.73233*	*0.60006*	*0.60006*	*0.22074*
Gibbsite	-	-	-	-	-	-	-	-	-
HgO	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-
$LaPO_4 \bullet 2H_2O$	*0.22553*	*0.00683*	*0.00683*	*0.01016*	*0.01016*	*0.32430*	*0.11233*	*0.11233*	*0.04132*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	*1.06760*	*0.03234*	*0.03234*	*0.04810*	*0.04810*	*1.53515*	*0.53176*	*0.53176*	*0.19561*
$MnCO_3$	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	-	-	-	-	-	-	-	-	-
$NaAlCO_3(OH)_2$	*0.15717*	*0.00476*	*0.00476*	*0.00708*	*0.00708*	*0.22600*	*0.07828*	*0.07828*	*0.02880*
$NaAlSiO_4$	-	-	-	-	-	-	-	-	-
$Ni(OH)_2$	-	-	-	-	-	-	-	-	-
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \bullet 2H_2O$	*0.03715*	*0.00113*	*0.00113*	*0.00167*	*0.00167*	*0.05341*	*0.01850*	*0.01850*	*0.00681*
$Pb(OH)_2$	-	-	-	-	-	-	-	-	-
$Pb_3(PO_4)_2$	*0.00985*	*0.00030*	*0.00030*	*0.00044*	*0.00044*	*0.01416*	*0.00491*	*0.00491*	*0.00180*
$PbCO_3$	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00009*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00013*	*0.00005*	*0.00005*	*0.00002*
SiO_2	*0.24581*	*0.00745*	*0.00745*	*0.01108*	*0.01108*	*0.35347*	*0.12244*	*0.12244*	*0.04504*
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.02892*	*0.00088*	*0.00088*	*0.00130*	*0.00130*	*0.04159*	*0.01441*	*0.01441*	*0.00530*
TcO_2	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00004*	*0.00000*	*0.00000*	*0.00000*	*0.00000*	*0.00006*	*0.00002*	*0.00002*	*0.00001*
KNO_3	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.41852*	-	-	-	-	*0.60182*	-	-	-
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	*2.39164*	-	-	-	-	*3.43905*	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	-	-	-	-	-	-	-	-	-
$NaHCO_3$	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-
$NaNO_3$	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	-	-	-	-	-	-	-	-	-
Total Volume % UDS	*6.61*	*0.12*	*0.12*	*0.17*	*0.17*	*9.51*	*1.89*	*1.89*	*0.70*
Solids Concentration (g/L)	*226.1*	*5.2*	*5.2*	*7.8*	*7.8*	*325.1*	*85.9*	*85.9*	*31.6*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-111

Rheological Data

Model/model Parameter									
Temperature (°C)		**27**	**95**	**28**	**95**		**27**	**95**	**95**
Source of Data	***SD-WM-DP-024***	***SD-WM-DP-024***	***SD-WM-DP-024***	***SD-WM-DP-024***	***SD-WM-DP-024***		***SD-WM-DP-024***	***SD-WM-DP-024***	***SD-WM-DP-024***
Instrumentation		**Haake M500 MV1**	**Haake M500 MV1**	**Haake M500 MV1**	**Haake M500 MV1**		**Haake M500 MV1**	**Haake M500 MV1**	**Haake M500 MV1**
Newtonian:									
η – Newtonian viscosity (cP)		n/a	n/a	1.76	1.60		n/a	n/a	n/a
r – correlation coefficient		n/a	n/a				n/a	n/a	n/a
Ostwald (or Power Law):									
m – the consistency coefficient ($Pa\cdot s^{-n}$)		n/a	n/a	n/a	n/a		n/a	n/a	n/a
n – the power-law exponent		n/a	n/a	n/a	n/a		n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a	n/a		n/a	n/a	n/a
Bingham Plastic:									
τ_B- the Bingham yield stress (Pa)		1.05	1.04	0.27	0.24		0.58	0.79	0.25
η_p - the plastic viscosity (Pa·s)		0.0038	0.0008	0.0018	0.0016		0.0054	0.0026	0.0016
r – correlation coefficient		1.00	0.73	0.99	0.97		0.99	0.98	0.96
Herschel-Bulkley:									
τ_H- the yield stress (Pa)		n/a	n/a	n/a	n/a		0.36	n/a	n/a
k - the Herschel-Bulkely consistency coefficient ($Pa\cdot s^{-b}$)		n/a	n/a	n/a	n/a		0.0258	n/a	n/a
b - the Hershel-Bulkely power-law exponent		n/a	n/a	n/a	n/a		0.75	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a	n/a		1.00	n/a	n/a
n/a = not applicable									

Physical Property Data

Physical Property	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**	**T-111**
Source of Data	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**	**SD-WM-DP-024**
Temperature (°C)									**28**
Zeta Potential (mV)									
Bulk Density (g/mL)	1.19	***1.06***	***1.06***	***1.03***	***1.03***	1.28	***1.12***	***1.12***	***1.05***
vol% Settled Solids	100	85.7		52.1		100	78.1		36.4
Density of Centrifuged Solids (g/mL)	1.22					1.22			
vol% Centrifuged Solids	65.8					71.9			
wt% Centrifuged Solids	67					76			
Supernatant Density (g/mL)	1.07	***1.06***	***1.06***	***1.03***	***1.03***	1.1	***1.06***	***1.06***	***1.03***
Density of Settled Solids (g/mL)									
wt% Settled Supernatant	0					0			
wt% dissolved solids in supernatant									
wt% total solids in Centrifuged Sludge									
wt% Total Solids	22.4					29.3			
wt% UDS	19.00	***0.49***	***0.49***	***0.75***	***0.75***	25.40	***7.67***	***7.67***	***3.01***
Density of Solids (g/cc)	***3.42***	***4.54***	***4.54***	***4.54***	***4.54***	***3.42***	***4.54***	***4.54***	***4.54***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule		**T-111**		**T-111**			**T-111**		
Source of Data		**SD-WM-DP-024**		**SD-WM-DP-024**			**SD-WM-DP-024**		
Temperature (°C)		**29**		**28**			**29**		
Total initial volume		11		11.9			11.8		
5 minutes									
10 minutes									
15 minutes		11		11.8			11.8		
20 minutes									
30 minutes		11		11.6			11.8		
40 minutes									
50 minutes									
1 hour		10.7		11.2			11.6		
2 hours		10.6		10.8			11.5		
3 hours		10.5		10.2			11.5		
4 hours		10.4		9.6			11.5		
5 hours		10.3		8.9			11.4		
6 hours		10.2		8.5			11.3		
24 hours		9.5		6.3			10.3		
32 hours		9.4		6.2			10.2		
48 hours		9.3		6.2			9.6		
56 hours		9.3		6.2			9.2		
72 hours final settled		9.3		6.2			9.2		

Shear Strength Data

Shear Strength Schedule	**T-111**					**T-111**			
Source of Data	**SD-WM-DP-024 Personal Communication with JM Tingey**					**SD-WM-DP-024 Personal Communication with JM Tingey**			
Instrumentation	**Haake M500 Shear Vane**					**Haake M500 Shear Vane**			
Temperature (°C)	**30**					**30**			
Description	**Segment 2 Core 31**					**Segment 8 Core 31**			
Gelation Time/Shear Strength (Pa)									
5 minutes									
10 minutes									
15 minutes									
20 minutes									
30 minutes									
40 minutes									
50 minutes									
1 hour									
2 hours									
3 hours									
4 hours									
5 hours									
6 hours									
24 hours									
32 hours									
48 hours									
56 hours									
72 hours									
Infinte time (GRE)	180					450			

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-203

Model Chemical Data From ESP

Analyte\Sample	T-203	T-203	T-203	T-203
Description	Homogenized Tank Composite	30 wt% dilution of a core composite	1:1 Dilution of a core composite	4:1 Dilution of a core composite
Model Basis	Salty	Washed	Washed	Washed
Source of Data	PNNL-14365	PNNL-14365	PNNL-14365	PNNL-14365
Solid Phases (vol% of bulk)				
$(NaAlO_2)_2•2.5H_2O$	-	-	-	-
Ag_2CO_3	*0.00003*	*0.00010*	*0.00004*	*0.00001*
Bi_2O_3	*0.33825*	*1.00803*	*0.39795*	*0.13122*
BiOCl	-	-	-	-
Boehmite	-	-	-	-
$Ca(OH)_2$	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	-
$CaC_2O_4·H_2O$	-	-	-	-
$CaCO_3$	-	-	-	-
CaF_2	*0.01498*	*0.04465*	*0.01763*	*0.00581*
CrOOH	-	-	-	-
FeOOH	*0.10698*	*0.31881*	*0.12586*	*0.04150*
Gibbsite	-	-	-	-
HgO	-	-	-	-
$KAlSiO_4$	*0.00888*	*0.02645*	*0.01044*	*0.00344*
$La(OH)_3$	-	-	-	-
$LaPO_4•2H_2O$	*0.20946*	*0.62422*	*0.24643*	*0.08126*
$Mn(OH)_2$	*0.26426*	*0.78753*	*0.31090*	*0.10252*
$Mn_3(PO_4)_2$	-	-	-	-
$MnCO_3$	*0.14380*	*0.42855*	*0.16918*	*0.05579*
$Na_2U_2O_7$	*0.00152*	*0.00452*	*0.00178*	*0.00059*
$NaAlCO_3(OH)_2$	-	-	-	-
$NaAlSiO_4$	-	-	-	-
$Ni(OH)_2$	*0.00402*	*0.01197*	*0.00473*	*0.00156*
$Ni_3(PO_4)_2$	-	-	-	-
$NiC_2O_4•2H_2O$	-	-	-	-
$Pb(OH)_2$	*0.00022*	*0.00067*	*0.00026*	*0.00009*
$Pb_3(PO_4)_2$	-	-	-	-
$PbCO_3$	-	-	-	-
$Pu(OH)_4$	*0.00004*	*0.00013*	*0.00005*	*0.00002*
SiO_2	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-
$SrCO_3$	*0.01695*	*0.05051*	*0.01994*	*0.00657*
TcO_2	-	-	-	-
ZrO_2	*0.00003*	*0.00009*	*0.00004*	*0.00001*
KNO_3	-	-	-	-
$Na_2C_2O_4$	-	-	-	-
$Na_2CO_3·H_2O$	-	-	-	-
Na_2SO_4	-	-	-	-
$Na_2SO_4·10H_2O$	-	-	-	-
Na_3FSO_4	-	-	-	-
$Na_3NO_3SO_4·H_2O$	-	-	-	-
$Na_3PO_4·8H_2O$	-	-	-	-
$Na_4P_2O_7·10H_2O$	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-
NaF	-	-	-	-
$NaF(PO_4)_2·19H_2O$	-	-	-	-
$NaHCO_3$	-	-	-	-
$NaNO_2$	-	-	-	-
$NaNO_3$	-	-	-	-
$Na_3PO_4·0.25NaOH·12H_2O$	-	-	-	-
Total Volume % UDS	*1.11*	*3.31*	*1.31*	*0.43*
Solids Concentration (g/L)	*63.0*	*187.7*	*74.1*	*24.4*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-203

Rheological Data

Model/model Parameter		**T-203**	**T-203**	**T-203**
Temperature (°C)		**25**	**25**	**25**
Source of Data		***PNNL-14365***	***PNNL-14365***	***PNNL-14365***
Instrumentation		**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**
Newtonian:				
η – Newtonian viscosity (cP)		n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a
Ostwald (or Power Law):				
m – the consistency coefficient (Pa·s^{-n})		n/a	n/a	n/a
n – the power-law exponent		n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a
Bingham Plastic:				
τ_B- the Bingham yield stress (Pa)		35.50	3.18	0.10
η_p - the plastic viscosity (Pa·s)		0.0148	0.0031	0.0015
r – correlation coefficient		0.99	1.00	1.00
Herschel-Bulkley:				
τ_H- the yield stress (Pa)		n/a	n/a	n/a
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})		n/a	n/a	n/a
b - the Hershel-Bulkely power-law exponent		n/a	n/a	n/a
r – correlation coefficient		n/a	n/a	n/a
n/a = not applicable				

Physical Property Data

Physical Property	***T-203***	***T-203***	***T-203***	***T-203***
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Temperature (°C)				
Zeta Potential (mV)				
Bulk Density (g/mL)	1.22	1.29	1.14	1.05
vol% Settled Solids	100	100	92.8	44.8
Density of Centrifuged Solids (g/mL)	1.39	1.3	1.31	1.29
vol% Centrifuged Solids	87.6	71.5	38.6	15.0
wt% Centrifuged Solids	***100***	***72***	***44***	***18***
Supernatant Density (g/mL)	1.17	1.14	1.08	1.03
Density of Settled Solids (g/mL)				
wt% Settled Supernatant				
wt% dissolved solids in supernatant				
wt% total solids in Centrifuged Sludge				
wt% Total Solids	34.3	30.7	16.4	6.4
wt% UDS	***5.16***	***14.55***	***6.50***	***2.33***
Density of Solids (g/cc)	***5.68***	***5.68***	***5.68***	***5.68***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule				
Source of Data			**PNNL-14365**	**PNNL-14365**
Temperature (°C)				
Total initial volume			13.7	13.4
5 minutes			13.7	
10 minutes			13.7	13.1
15 minutes			13.7	12.7
20 minutes			13.7	12.2
30 minutes			13.7	11.7
40 minutes			13.7	
50 minutes			13.7	
1 hour			13.7	10.1
2 hours			13.7	7.9
3 hours			13.5	7.2
4 hours			13.4	7
5 hours				
6 hours				
24 hours			13	6.3
32 hours				6.3
48 hours			12.7	6.3
56 hours			12.7	6.2
72 hours final settled			12.7	6.2

Shear Strength Data

Shear Strength Schedule	**T-203**	**T-203**		
Source of Data	**PNNL-14365**	**PNNL-14365**		
Instrumentation	**Haake RS300 Shear Vane**	**Haake RS300 Shear Vane**		
Temperature (°C)	**25**	**25**		
Description	**Homogenized Tank Composite**	**30 wt% dilution of the tank composite**		
Gelation Time/Shear Strength (Pa)				
5 minutes				
10 minutes				
15 minutes				
20 minutes				
30 minutes				
40 minutes				
50 minutes				
1 hour				
2 hours				
3 hours				
4 hours				
5 hours				
6 hours				
24 hours				
32 hours				
48 hours				
56 hours				
72 hours	3770	310		
Infinte time (GRE)				

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-204

Model Chemical Data From ESP

Analyte\Sample	T-204	T-204	T-204	T-204
Description	**Homogenized Tank Composite**	**30 wt% dilution of a core composite**	**1:1 Dilution of a core composite**	**4:1 Dilution of a core composite**
Model Basis	**Salty**	**Washed**	**Washed**	**Washed**
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Solid Phases (vol% of bulk)				
$(NaAlO_2)_2{\bullet}2.5H_2O$	-	-	-	-
Ag_2CO_3	*0.00002*	*0.00011*	*0.00005*	*0.00001*
Bi_2O_3	*0.21416*	*1.13735*	*0.49136*	*0.13952*
BiOCl	-	-	-	-
Boehmite	-	-	-	-
$Ca(OH)_2$	-	-	-	-
$Ca_5OH(PO_4)_3$	-	-	-	-
$CaC_2O_4{\cdot}H_2O$	-	-	-	-
$CaCO_3$	-	-	-	-
CaF_2	*0.00419*	*0.02226*	*0.00962*	*0.00273*
CrOOH	*0.00512*	*0.02717*	*0.01174*	*0.00333*
FeOOH	*0.05008*	*0.26599*	*0.11491*	*0.03263*
Gibbsite	-	-	-	-
HgO	-	-	-	-
$KAlSiO_4$	*0.00340*	*0.01806*	*0.00780*	*0.00222*
$La(OH)_3$	-	-	-	-
$LaPO_4{\bullet}2H_2O$	*0.11411*	*0.60603*	*0.26182*	*0.07434*
$Mn(OH)_2$	*0.23176*	*1.23083*	*0.53175*	*0.15098*
$Mn_3(PO_4)_2$	-	-	-	-
$MnCO_3$	-	-	-	-
$Na_2U_2O_7$	*0.00112*	*0.00593*	*0.00256*	*0.00073*
$NaAlCO_3(OH)_2$	-	-	-	-
$NaAlSiO_4$	-	-	-	-
$Ni(OH)_2$	*0.00309*	*0.01641*	*0.00709*	*0.00201*
$Ni_3(PO_4)_2$	-	-	-	-
$NiC_2O_4{\bullet}2H_2O$	-	-	-	-
$Pb(OH)_2$	*0.00158*	*0.00838*	*0.00362*	*0.00103*
$Pb_3(PO_4)_2$	-	-	-	-
$PbCO_3$	-	-	-	-
$Pu(OH)_4$	*0.00001*	*0.00008*	*0.00003*	*0.00001*
SiO_2	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-
$SrCO_3$	*0.00797*	*0.04230*	*0.01828*	*0.00519*
TcO_2	-	-	-	-
ZrO_2	*0.00001*	*0.00004*	*0.00002*	*0.00000*
KNO_3	-	-	-	-
$Na_2C_2O_4$	-	-	-	-
$Na_2CO_3{\cdot}H_2O$	-	-	-	-
Na_2SO_4	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-
Na_3FSO_4	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-
NaF	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	-	-	-	-
$NaHCO_3$	-	-	-	-
$NaNO_2$	-	-	-	-
$NaNO_3$	-	-	-	-
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	-	-	-	-
Total Volume % UDS	*0.64*	*3.38*	*1.46*	*0.41*
Solids Concentration (g/L)	*37.3*	*197.9*	*85.5*	*24.3*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

241-T-204

Rheological Data

Model/model Parameter			**T-204**	**T-204**
Temperature (°C)			**25**	**25**
Source of Data			***PNNL-14365***	***PNNL-14365***
Instrumentation			**Haake RS300 Concentric Cylinders with a 3 mm Gap**	**Haake RS300 Concentric Cylinders with a 3 mm Gap**
Newtonian:				
η – Newtonian viscosity (cP)			n/a	n/a
r – correlation coefficient			n/a	n/a
Ostwald (or Power Law):				
m – the consistency coefficient (Pa·s^{-n})			n/a	n/a
n – the power-law exponent			n/a	n/a
r – correlation coefficient			n/a	n/a
Bingham Plastic:				
τ_B- the Bingham yield stress (Pa)			3.11	0.19
η_p - the plastic viscosity (Pa·s)			0.0038	0.0019
r – correlation coefficient			1.00	1.00
Herschel-Bulkley:				
τ_H- the yield stress (Pa)			n/a	0.14
k - the Herschel-Bulkely consistency coefficient (Pa·s^{-b})			n/a	0.0052
b - the Hershel-Bulkely power-law exponent			n/a	0.83
r – correlation coefficient			n/a	1.00
n/a = not applicable				

Physical Property Data

Physical Property	***T-204***	***T-204***	***T-204***	***T-204***
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**
Temperature (°C)				
Zeta Potential (mV)				
Bulk Density (g/mL)	1.17	1.28	1.13	1.05
vol% Settled Solids	100	100	88	46.2
Density of Centrifuged Solids (g/mL)	1.4	1.36	1.3	1.35
vol% Centrifuged Solids	83.7	79.9	40	16.7
wt% Centrifuged Solids	***100***	***85***	***46***	***21***
Supernatant Density (g/mL)	1.14	1.12	1.06	1.03
Density of Settled Solids (g/mL)				
wt% Settled Supernatant				
wt% dissolved solids in supernatant				
wt% total solids in Centrifuged Sludge				
wt% Total Solids	31.5	29.4	14.6	6.1
wt% UDS	***3.18***	***15.46***	***7.56***	***2.31***
Density of Solids (g/cc)	***5.85***	***5.85***	***5.85***	***5.85***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Settling Data

Settling Schedule				
Source of Data			**PNNL-14365**	**PNNL-14365**
Temperature (°C)				
Total initial volume			13.6	13.1
5 minutes			13.6	12.8
10 minutes			13.6	11.6
15 minutes			13.6	10.6
20 minutes			13.6	10.1
30 minutes			13.6	9
40 minutes			13.6	
50 minutes			13.6	
1 hour			13.6	7.6
2 hours			13.45	7.2
3 hours			13.4	6.8
4 hours			13.2	6.6
5 hours				
6 hours			13.1	6.6
24 hours			12.5	6.6
32 hours				
48 hours			12	6.5
56 hours			12	6.5
72 hours final settled			12	6.5

Shear Strength Data

Shear Strength Schedule	***T-204***	***T-204***	***T-204***	
Source of Data	**PNNL-14365**	**PNNL-14365**	**PNNL-14365**	
Instrumentation	**Haake RS300 Shear Vane**	**Haake RS300 Shear Vane**	**Haake RS300 Shear Vane**	
Temperature (°C)	**25**	**25**	**25**	
Description	**Homogenized Tank Composite**	**30 wt% dilution of the tank composite**	**Settled Solids from the 1:1 Dilution (18.0 wt% total solids)**	
Gelation Time/Shear Strength (Pa)				
5 minutes				
10 minutes				
15 minutes				
20 minutes				
30 minutes				
40 minutes				
50 minutes				
1 hour				
2 hours				
3 hours				
4 hours				
5 hours				
6 hours				
24 hours				
32 hours				
48 hours				
56 hours				
72 hours	1520	842	20	
Infinte time (GRE)				

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**
Description	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Solid Phases (vol% of bulk)																		
$(NaAlO_2)_2 \cdot 2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00074*	*0.00141*	*0.00114*	*0.00123*	*0.00141*	*0.00114*	*0.00105*	*0.00105*	*0.00159*	*0.00159*	*0.00204*	*0.00002*	*0.00159*	*0.00159*	*0.00159*	*0.00132*	*0.00002*	*0.00150*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.05848*	*0.11197*	*0.09057*	*0.09770*	*0.11197*	*0.09057*	*0.08344*	*0.08344*	*0.12623*	*0.12623*	*0.16189*	*0.00142*	*0.12623*	*0.12623*	*0.12623*	*0.10483*	*0.00142*	*0.11910*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.10998*	*0.21059*	*0.17035*	*0.18376*	*0.21059*	*0.17035*	*0.15693*	*0.15693*	*0.23742*	*0.23742*	*0.30449*	*0.00267*	*0.23742*	*0.23742*	*0.23742*	*0.19717*	*0.00267*	*0.22400*
FeOOH	*0.07194*	*0.13775*	*0.11143*	*0.12020*	*0.13775*	*0.11143*	*0.10265*	*0.10265*	*0.15530*	*0.15530*	*0.19917*	*0.00175*	*0.15530*	*0.15530*	*0.15530*	*0.12898*	*0.00175*	*0.14653*
Gibbsite	*1.09353*	*2.09384*	*1.69372*	*1.82709*	*2.09384*	*1.69372*	*1.56034*	*1.56034*	*2.36059*	*2.36059*	*3.02746*	*0.02654*	*2.36059*	*2.36059*	*2.36059*	*1.96046*	*0.02654*	*2.22721*
HgO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4 \cdot 2H_2O$	*0.00092*	*0.00176*	*0.00143*	*0.00154*	*0.00176*	*0.00143*	*0.00131*	*0.00131*	*0.00199*	*0.00199*	*0.00255*	*0.00002*	*0.00199*	*0.00199*	*0.00199*	*0.00165*	*0.00002*	*0.00188*
$Mn(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.01853*	*0.03548*	*0.02870*	*0.03096*	*0.03548*	*0.02870*	*0.02644*	*0.02644*	*0.04000*	*0.04000*	*0.05129*	*0.00045*	*0.04000*	*0.04000*	*0.04000*	*0.03322*	*0.00045*	*0.03774*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.27603*	*0.52852*	*0.42752*	*0.46119*	*0.52852*	*0.42752*	*0.39386*	*0.39386*	*0.59585*	*0.59585*	*0.76418*	*0.00670*	*0.59585*	*0.59585*	*0.59585*	*0.49486*	*0.00670*	*0.56219*
$Ni(OH)_2$	*0.00566*	*0.01083*	*0.00876*	*0.00945*	*0.01083*	*0.00876*	*0.00807*	*0.00807*	*0.01221*	*0.01221*	*0.01566*	*0.00014*	*0.01221*	*0.01221*	*0.01221*	*0.01014*	*0.00014*	*0.01152*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiC_2O_4 \cdot 2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00202*	*0.00387*	*0.00313*	*0.00338*	*0.00387*	*0.00313*	*0.00288*	*0.00288*	*0.00436*	*0.00436*	*0.00560*	*0.00005*	*0.00436*	*0.00436*	*0.00436*	*0.00362*	*0.00005*	*0.00412*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00003*	*0.00005*	*0.00004*	*0.00004*	*0.00005*	*0.00004*	*0.00004*	*0.00004*	*0.00006*	*0.00006*	*0.00007*	*0.00000*	*0.00006*	*0.00006*	*0.00006*	*0.00005*	*0.00000*	*0.00005*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00109*	*0.00209*	*0.00169*	*0.00182*	*0.00209*	*0.00169*	*0.00156*	*0.00156*	*0.00236*	*0.00236*	*0.00302*	*0.00003*	*0.00236*	*0.00236*	*0.00236*	*0.00196*	*0.00003*	*0.00222*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00045*	*0.00085*	*0.00069*	*0.00074*	*0.00085*	*0.00069*	*0.00064*	*0.00064*	*0.00096*	*0.00096*	*0.00123*	*0.00001*	*0.00096*	*0.00096*	*0.00096*	*0.00080*	*0.00001*	*0.00091*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.39014*	*0.74703*	*0.60427*	*0.65186*	*0.74703*	*0.60427*	*0.55669*	*0.55669*	*0.84219*	*0.84219*	*1.08012*	*0.00947*	*0.84219*	*0.84219*	*0.84219*	*0.69944*	*0.00947*	*0.79461*
$Na_2CO_3 \cdot H_2O$	*2.15427*	*4.12488*	*3.33664*	*3.59938*	*4.12488*	*3.33664*	*3.07389*	*3.07389*	*4.65038*	*4.65038*	*5.96412*	*0.05228*	*4.65038*	*4.65038*	*4.65038*	*3.86213*	*0.05228*	*4.38763*
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	*1.07463*	*2.05766*	*1.66445*	*1.79552*	*2.05766*	*1.66445*	*1.53338*	*1.53338*	*2.31979*	*2.31979*	*2.97514*	*0.02608*	*2.31979*	*2.31979*	*2.31979*	*1.92659*	*0.02608*	*2.18873*
NaF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*1.80837*	*3.46258*	*2.80090*	*3.02146*	*3.46258*	*2.80090*	*2.58034*	*2.58034*	*3.90370*	*3.90370*	*5.00651*	*0.04388*	*3.90370*	*3.90370*	*3.90370*	*3.24202*	*0.04388*	*3.68314*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*12.18716*	*23.33536*	*18.87608*	*20.36251*	*23.33536*	*18.87608*	*17.38966*	*17.38966*	*26.30822*	*26.30822*	*33.74035*	*0.29575*	*26.30822*	*26.30822*	*26.30822*	*21.84894*	*0.29575*	*24.82179*
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	*1.99871*	*3.82703*	*3.09570*	*3.33948*	*3.82703*	*3.09570*	*2.85193*	*2.85193*	*4.31458*	*4.31458*	*5.53346*	*0.04850*	*4.31458*	*4.31458*	*4.31458*	*3.58326*	*0.04850*	*4.07081*
Total Volume % UDS	*21.25*	*40.69*	*32.92*	*35.51*	*40.69*	*32.92*	*30.33*	*30.33*	*45.88*	*45.88*	*58.84*	*0.52*	*45.88*	*45.88*	*45.88*	*38.10*	*0.52*	*43.29*
Solids Concentration (g/L)	*471.3*	*902.4*	*730.0*	*787.5*	*902.4*	*730.0*	*672.5*	*672.5*	*1,017.4*	*1,017.4*	*1,304.8*	*11.4*	*1,017.4*	*1,017.4*	*1,017.4*	*844.9*	*11.4*	*959.9*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Physical Property Data

Physical Property	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***	***U-103***
Source of Data																		
Temperature (°C)																		
Zeta Potential (mV)																		
Bulk Density (g/mL)	1.61	1.76	1.70	1.72	1.76	1.70	1.68	1.68	1.80	1.80	1.90	1.45	1.80	1.80	1.80	1.74	1.45	1.78
vol% Settled Solids																		
Density of Centrifuged Solids (g/mL)																		
vol% Centrifuged Solids																		
wt% Centrifuged Solids																		
Supernatant Density (g/mL)	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***	***1.45***
Density of Settled Solids (g/mL)																		
wt% Settled Supernatant																		
wt% dissolved solids in supernatant																		
wt% total solids in Centrifuged Sludge																		
wt% Total Solids																		
wt% UDS	***29.27***	***51.27***	***42.94***	***45.78***	***51.27***	***42.94***	***40.03***	***40.03***	***56.52***	***56.52***	***68.67***	***0.79***	***56.52***	***56.52***	***56.52***	***48.56***	***0.79***	***53.93***
Density of Solids (g/cc)	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***	***2.22***

Shear Strength Data

Shear Strength Schedule	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**	**U-103**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Instrumentation	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)	***26***	***26***	***29***	***29***	***29***	***29***	***29***	***29***	***28***	***28***	***28***	***26***	***26***	***29***	***29***	***29***	***26***	***26***
Description	**Riser 13 Depth from bottom of tank is 160 inches**	**Riser 13 Depth from bottom of tank is 140 inches**	**Riser 13 Depth from bottom of tank is 110 inches**	**Riser 13 Depth from bottom of tank is 100 inches**	**Riser 13 Depth from bottom of tank is 85 inches**	**Riser 13 Depth from bottom of tank is 70 inches**	**Riser 13 Depth from bottom of tank is 60 inches**	**Riser 13 Depth from bottom of tank is 50 inches**	**Riser 13 Depth from bottom of tank is 25 inches**	**Riser 13 Depth from bottom of tank is 18 inches**	**Riser 13 Depth from bottom of tank is 10 inches**	**Riser 7 Depth from bottom of tank is 170 inches**	**Riser 7 Depth from bottom of tank is 135 inches**	**Riser 7 Depth from bottom of tank is 120 inches**	**Riser 7 Depth from bottom of tank is 110 inches**	**Riser 7 Depth from bottom of tank is 78 inches**	**Riser 2 Depth from bottom of tank is 167 inches**	**Riser 2 Depth from bottom of tank is 157 inches**
Gelation Time/Shear Strength (Pa)																		
5 minutes																		
10 minutes																		
15 minutes																		
20 minutes																		
30 minutes																		
40 minutes																		
50 minutes																		
1 hour																		
2 hours																		
3 hours																		
4 hours																		
5 hours																		
6 hours																		
24 hours																		
32 hours																		
48 hours																		
56 hours																		
72 hours																		
Infinte time (GRE)	100	200	1750	1300	500	1200	800	20	700	150	1000	50	70	150	200	1000	60	250

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data From ESP

Analyte\Sample	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**
Description	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**	**in-situ**
Model Basis	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**	**Salty**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Solid Phases (vol% of bulk)												
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00180*	*0.00180*	*0.00180*	*0.00180*	*0.00180*	*0.00180*	*0.00180*	*0.00193*	*0.00193*	*0.00193*	*0.00168*	*0.00193*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.06931*	*0.06931*	*0.06931*	*0.06931*	*0.06931*	*0.06931*	*0.06931*	*0.07406*	*0.07406*	*0.07406*	*0.06455*	*0.07406*
$CaC_2O_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.11583*	*0.11583*	*0.11583*	*0.11583*	*0.11583*	*0.11583*	*0.11583*	*0.12378*	*0.12378*	*0.12378*	*0.10788*	*0.12378*
FeOOH	*0.14364*	*0.14364*	*0.14364*	*0.14364*	*0.14364*	*0.14364*	*0.14364*	*0.15350*	*0.15350*	*0.15350*	*0.13378*	*0.15350*
Gibbsite	*3.97764*	*3.97764*	*3.97764*	*3.97764*	*3.97764*	*3.97764*	*3.97764*	*4.25066*	*4.25066*	*4.25066*	*3.70462*	*4.25066*
HgO	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4$•$2H_2O$	*0.00153*	*0.00153*	*0.00153*	*0.00153*	*0.00153*	*0.00153*	*0.00153*	*0.00163*	*0.00163*	*0.00163*	*0.00142*	*0.00163*
$Mn(OH)_2$	*0.06228*	*0.06228*	*0.06228*	*0.06228*	*0.06228*	*0.06228*	*0.06228*	*0.06655*	*0.06655*	*0.06655*	*0.05800*	*0.06655*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.01841*	*0.01841*	*0.01841*	*0.01841*	*0.01841*	*0.01841*	*0.01841*	*0.01968*	*0.01968*	*0.01968*	*0.01715*	*0.01968*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.11722*	*0.11722*	*0.11722*	*0.11722*	*0.11722*	*0.11722*	*0.11722*	*0.12527*	*0.12527*	*0.12527*	*0.10918*	*0.12527*
$Ni(OH)_2$	*0.00351*	*0.00351*	*0.00351*	*0.00351*	*0.00351*	*0.00351*	*0.00351*	*0.00375*	*0.00375*	*0.00375*	*0.00327*	*0.00375*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00516*	*0.00516*	*0.00516*	*0.00516*	*0.00516*	*0.00516*	*0.00516*	*0.00552*	*0.00552*	*0.00552*	*0.00481*	*0.00552*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00018*	*0.00018*	*0.00018*	*0.00018*	*0.00018*	*0.00018*	*0.00018*	*0.00019*	*0.00019*	*0.00019*	*0.00017*	*0.00019*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00075*	*0.00075*	*0.00075*	*0.00075*	*0.00075*	*0.00075*	*0.00075*	*0.00080*	*0.00080*	*0.00080*	*0.00070*	*0.00080*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00036*	*0.00036*	*0.00036*	*0.00036*	*0.00036*	*0.00036*	*0.00036*	*0.00038*	*0.00038*	*0.00038*	*0.00033*	*0.00038*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.31053*	*0.31053*	*0.31053*	*0.31053*	*0.31053*	*0.31053*	*0.31053*	*0.33184*	*0.33184*	*0.33184*	*0.28921*	*0.33184*
$Na_2CO_3{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4{\cdot}H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4{\cdot}8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7{\cdot}10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2{\cdot}19H_2O$	*1.54267*	*1.54267*	*1.54267*	*1.54267*	*1.54267*	*1.54267*	*1.54267*	*1.64856*	*1.64856*	*1.64856*	*1.43678*	*1.64856*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*26.81520*	*26.81520*	*26.81520*	*26.81520*	*26.81520*	*26.81520*	*26.81520*	*28.65579*	*28.65579*	*28.65579*	*24.97461*	*28.65579*
$Na_3PO_4{\cdot}0.25NaOH{\cdot}12H_2O$	*13.81566*	*13.81566*	*13.81566*	*13.81566*	*13.81566*	*13.81566*	*13.81566*	*14.76396*	*14.76396*	*14.76396*	*12.86736*	*14.76396*
Total Volume % UDS	*47.00*	*47.00*	*47.00*	*47.00*	*47.00*	*47.00*	*47.00*	*50.23*	*50.23*	*50.23*	*43.78*	*50.23*
Solids Concentration (g/L)	***981.7***	***981.7***	***981.7***	***981.7***	***981.7***	***981.7***	***981.7***	***1,049.0***	***1,049.0***	***1,049.0***	***914.3***	***1,049.0***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Physical Property Data

Physical Property	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***
Source of Data												
Temperature (°C)												
Zeta Potential (mV)												
Bulk Density (g/mL)	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.78	1.78	1.78	1.74	1.78
vol% Settled Solids												
Density of Centrifuged Solids (g/mL)												
vol% Centrifuged Solids												
wt% Centrifuged Solids												
Supernatant Density (g/mL)	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*	*1.47*
Density of Settled Solids (g/mL)												
wt% Settled Supernatant												
wt% dissolved solids in supernatant												
wt% total solids in Centrifuged Sludge												
wt% Total Solids												
wt% UDS	*55.78*	*55.78*	*55.78*	*55.78*	*55.78*	*55.78*	*55.78*	*58.93*	*58.93*	*58.93*	*52.54*	*58.93*
Density of Solids (g/cc)	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*	*2.09*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Instrumentation	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***
Description	**Riser 9 Depth from bottom of tank is 137 inches**	**Riser 9 Depth from bottom of tank is 128 inches**	**Riser 9 Depth from bottom of tank is 118 inches**	**Riser 9 Depth from bottom of tank is 112 inches**	**Riser 9 Depth from bottom of tank is 108 inches**	**Riser 7 Depth from bottom of tank is 131 inches**	**Riser 7 Depth from bottom of tank is 112 inches**	**Riser 7 Depth from bottom of tank is 102 inches**	**Riser 7 Depth from bottom of tank is 93 inches**	**Riser 7 Depth from bottom of tank is 82 inches**	**Riser 7 Depth from bottom of tank is 79 inches**	**Riser 7 Depth from bottom of tank is 73 inches**
Gelation Time/Shear Strength (Pa)												
5 minutes												
10 minutes												
15 minutes												
20 minutes												
30 minutes												
40 minutes												
50 minutes												
1 hour												
2 hours												
3 hours												
4 hours												
5 hours												
6 hours												
24 hours												
32 hours												
48 hours												
56 hours												
72 hours												
Infinte time (GRE)	15	20	25	50	70	50	150	50	200	550	130	380

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Model Chemical Data Fro

Analyte\Sample	U-107	U-107	U-107	U-107	U-107	U-107	U-107	U-107	U-107	U-107	U-107	U-107
Description	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ	in-situ
Model Basis	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty	Salty
Source of Data	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249	RPP-7249
Solid Phases (vol% of bulk)												
$(NaAlO_2)_2$•$2.5H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
Ag_2CO_3	-	-	-	-	-	-	-	-	-	-	-	-
Bi_2O_3	*0.00106*	*0.00156*	*0.00156*	*0.00174*	*0.00174*	*0.00125*	*0.00236*	*0.00137*	*0.00174*	*0.00217*	*0.00186*	*0.00186*
BiOCl	-	-	-	-	-	-	-	-	-	-	-	-
Boehmite	-	-	-	-	-	-	-	-	-	-	-	-
$Ca(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$Ca_5OH(PO_4)_3$	*0.04076*	*0.05979*	*0.05979*	*0.06693*	*0.06693*	*0.04790*	*0.09071*	*0.05266*	*0.06693*	*0.08358*	*0.07168*	*0.07168*
$CaC_2O_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$CaCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
CaF_2	-	-	-	-	-	-	-	-	-	-	-	-
CrOOH	*0.06813*	*0.09993*	*0.09993*	*0.11186*	*0.11186*	*0.08005*	*0.15161*	*0.08800*	*0.11186*	*0.13968*	*0.11981*	*0.11981*
FeOOH	*0.08449*	*0.12392*	*0.12392*	*0.13871*	*0.13871*	*0.09928*	*0.18801*	*0.10914*	*0.13871*	*0.17322*	*0.14857*	*0.14857*
Gibbsite	*2.33950*	*3.43159*	*3.43159*	*3.84113*	*3.84113*	*2.74903*	*5.20625*	*3.02206*	*3.84113*	*4.79671*	*4.11415*	*4.11415*
HgO	-	-	-	-	-	-	-	-	-	-	-	-
$KAlSiO_4$	-	-	-	-	-	-	-	-	-	-	-	-
$La(OH)_3$	-	-	-	-	-	-	-	-	-	-	-	-
$LaPO_4$•$2H_2O$	*0.00090*	*0.00132*	*0.00132*	*0.00147*	*0.00147*	*0.00105*	*0.00200*	*0.00116*	*0.00147*	*0.00184*	*0.00158*	*0.00158*
$Mn(OH)_2$	*0.03663*	*0.05373*	*0.05373*	*0.06014*	*0.06014*	*0.04304*	*0.08152*	*0.04732*	*0.06014*	*0.07510*	*0.06442*	*0.06442*
$Mn_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$MnCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2U_2O_7$	*0.01083*	*0.01589*	*0.01589*	*0.01778*	*0.01778*	*0.01273*	*0.02410*	*0.01399*	*0.01778*	*0.02220*	*0.01904*	*0.01904*
$NaAlCO_3(OH)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$NaAlSiO_4$	*0.06895*	*0.10113*	*0.10113*	*0.11320*	*0.11320*	*0.08102*	*0.15343*	*0.08906*	*0.11320*	*0.14136*	*0.12125*	*0.12125*
$Ni(OH)_2$	*0.00206*	*0.00303*	*0.00303*	*0.00339*	*0.00339*	*0.00243*	*0.00459*	*0.00267*	*0.00339*	*0.00423*	*0.00363*	*0.00363*
$Ni_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
NiC_2O_4•$2H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Pb(OH)_2$	*0.00304*	*0.00445*	*0.00445*	*0.00499*	*0.00499*	*0.00357*	*0.00676*	*0.00392*	*0.00499*	*0.00623*	*0.00534*	*0.00534*
$Pb_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$PbCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
$Pu(OH)_4$	*0.00011*	*0.00016*	*0.00016*	*0.00018*	*0.00018*	*0.00013*	*0.00024*	*0.00014*	*0.00018*	*0.00022*	*0.00019*	*0.00019*
SiO_2	-	-	-	-	-	-	-	-	-	-	-	-
$Sr_3(PO_4)_2$	-	-	-	-	-	-	-	-	-	-	-	-
$SrCO_3$	*0.00044*	*0.00064*	*0.00064*	*0.00072*	*0.00072*	*0.00052*	*0.00098*	*0.00057*	*0.00072*	*0.00090*	*0.00077*	*0.00077*
TcO_2	-	-	-	-	-	-	-	-	-	-	-	-
ZrO_2	*0.00021*	*0.00031*	*0.00031*	*0.00034*	*0.00034*	*0.00025*	*0.00047*	*0.00027*	*0.00034*	*0.00043*	*0.00037*	*0.00037*
KNO_3	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2C_2O_4$	*0.18264*	*0.26790*	*0.26790*	*0.29987*	*0.29987*	*0.21461*	*0.40644*	*0.23593*	*0.29987*	*0.37447*	*0.32118*	*0.32118*
$Na_2CO_3 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
Na_2SO_4	-	-	-	-	-	-	-	-	-	-	-	-
$Na_2SO_4 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
Na_3FSO_4	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3NO_3SO_4 \cdot H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_3PO_4 \cdot 8H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_4P_2O_7 \cdot 10H_2O$	-	-	-	-	-	-	-	-	-	-	-	-
$Na_6(SO_4)_2CO_3$	-	-	-	-	-	-	-	-	-	-	-	-
NaF	-	-	-	-	-	-	-	-	-	-	-	-
$NaF(PO_4)_2 \cdot 19H_2O$	*0.90734*	*1.33089*	*1.33089*	*1.48973*	*1.48973*	*1.06617*	*2.01917*	*1.17206*	*1.48973*	*1.86034*	*1.59561*	*1.59561*
$NaHCO_3$	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_2$	-	-	-	-	-	-	-	-	-	-	-	-
$NaNO_3$	*15.77169*	*23.13403*	*23.13403*	*25.89491*	*25.89491*	*18.53256*	*35.09784*	*20.37315*	*25.89491*	*32.33696*	*27.73549*	*27.73549*
$Na_3PO_4 \cdot 0.25NaOH \cdot 12H_2O$	*8.12585*	*11.91905*	*11.91905*	*13.34151*	*13.34151*	*9.54830*	*18.08301*	*10.49660*	*13.34151*	*16.66056*	*14.28981*	*14.28981*
Total Volume % UDS	*27.64*	*40.55*	*40.55*	*45.39*	*45.39*	*32.48*	*61.52*	*35.71*	*45.39*	*56.68*	*48.61*	*48.61*
Solids Concentration (g/L)	*577.4*	*846.9*	*846.9*	*948.0*	*948.0*	*678.4*	*1,284.9*	*745.8*	*948.0*	*1,183.8*	*1,015.3*	*1,015.3*

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

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Physical Property Data

Physical Property	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***	***U-107***
Source of Data												
Temperature (°C)												
Zeta Potential (mV)												
Bulk Density (g/mL)	1.64	1.72	1.72	1.75	1.75	1.67	1.85	1.69	1.75	1.82	1.77	1.77
vol% Settled Solids												
Density of Centrifuged Solids (g/mL)												
vol% Centrifuged Solids												
wt% Centrifuged Solids												
Supernatant Density (g/mL)	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***	***1.47***
Density of Settled Solids (g/mL)												
wt% Settled Supernatant												
wt% dissolved solids in supernatant												
wt% total solids in Centrifuged Sludge												
wt% Total Solids												
wt% UDS	***35.21***	***49.24***	***49.24***	***54.17***	***54.17***	***40.63***	***69.45***	***44.13***	***54.17***	***65.04***	***57.36***	***57.36***
Density of Solids (g/cc)	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***	***2.09***

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

Shear Strength Data

Shear Strength Schedule	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**	**U-107**
Source of Data	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**	**RPP-7249**
Instrumentation	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**	**Ball Rheometer**
Temperature (°C)	***25***	***25***	***25***	***23***	***25***	***25***	***25***	***25***	***25***	***25***	***25***	***25***
Description	**Riser 7 Depth from bottom of tank is 70 inches**	**Riser 7 Depth from bottom of tank is 58 inches**	**Riser 7 Depth from bottom of tank is 54 inches**	**Riser 2 Depth from bottom of tank is 141 inches**	**Riser 2 Depth from bottom of tank is 137 inches**	**Riser 2 Depth from bottom of tank is 77 inches**	**Riser 2 Depth from bottom of tank is 62 inches**	**Riser 2 Depth from bottom of tank is 58 inches**	**Riser 2 Depth from bottom of tank is 55 inches**	**Riser 2 Depth from bottom of tank is 50 inches**	**Riser 2 Depth from bottom of tank is 40 inches**	**Riser 2 Depth from bottom of tank is 12 inches**
Gelation Time/Shear Strength (Pa)												
5 minutes												
10 minutes												
15 minutes												
20 minutes												
30 minutes												
40 minutes												
50 minutes												
1 hour												
2 hours												
3 hours												
4 hours												
5 hours												
6 hours												
24 hours												
32 hours												
48 hours												
56 hours												
72 hours												
Infinte time (GRE)	380	50	400	30	50	375	300	450	230	100	225	50

Note: Numbers in italics are calculated values. Numbers in normal font are reported data.

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