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Page 1 of 2 ☒ DM ☐ FM ☐ TM

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Revision 4 of RPP-10006 is a complete revision of the document. It incorporates new gas generation rate calculations and more recent Best Basis Inventory data to calculate the flammable gas Waste Group for all DSTs and SSTs.

18. **Justification of the Change** (Use ECN Continuation pages as needed)

Revision 4 is the annual update of the methodology and calculations of the flammable gas Waste Groups for DSTs and SSTs.

The USQ is not applicable because this proposed change is in support of a safety basis amendment being submitted to ORP for approval.

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Resp. Engineer	S. A. Barker	10/27/04	Professional Engineer	
Resp. Manager	T. M. Horner	10/27/04	Project Engineer	
Quality Assurance			Quality Assurance	
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NS&L Engineer			Designer	
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Methodology and Calculations for the Assignment of Waste for the Large Underground Waste Storage Tanks at Hanford Site

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U.S. Department of Energy Contract DE-AC27-99RL14047

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Abstract: This document categorizes each of the large waste storage tanks into one of several categories based on each tank's waste and characteristics. These waste group assignments reflect a tank's propensity to retain a significant volume of flammable gases and the potential of the waste to release retained gas by a buoyant displacement event.

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RPP-10006
Revision 4

Methodology and Calculations for the Waste Groups for Large Underground Waste Storage Tanks at the Hanford Site

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
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EXECUTIVE SUMMARY

The Hanford Site contains 177 large (28 double-shell tanks and 149 single-shell tanks) underground radioactive waste storage tanks that are categorized into one of three waste groups (A, B, and C) based on their waste and tank characteristics. These waste group assignments reflect a tank's propensity to retain a significant volume of flammable gases and the potential of the waste to release retained gas by a buoyant displacement gas release event. Assignments of waste groups to tank wastes in the 177 double-shell tanks and single-shell tanks, as reported in this document, are based on three criteria. This revision of the document reflects tank conditions as stated in the *Best Basis Inventory* on September 27, 2004.

The first criterion estimates the ability of the saturated solids in a tank to retain sufficient flammable gases that if all of the gases were released into the tank headspace, would the headspace flammable gas concentration equal or exceed 100% of the lower flammability limit. If all of the retained gas in a tank's saturated solids were released into the tank's headspace and resulted in a flammable gas mixture below 100% of the lower flammability limit, the tank is classified as a waste group C tank (i.e., no potential flammable gas release hazard). This assignment is independent of whatever gas release mechanisms the tank may exhibit including buoyant displacement gas release events. In other words, a waste group C tank is not expected to reach 100% of the lower flammability limit from the total release of all of the gas retained in its saturated solids. This calculation is used as a quick screen for determining whether a tank poses a potential gas release event hazard and does not model expected tank behavior.

The second criterion considers whether there is sufficient supernatant on top of the saturated solids such that gas-bearing solids have the potential energy required to break up the material and release gas. Tanks that are not waste group C tanks that do not have sufficient supernatant on top of solids (energy ratio < 3.0) are assigned to waste group B (i.e., potential induced flammable gas release hazard, but no spontaneous buoyant displacement flammable gas release hazard). Tanks that are not waste group C tanks that do have sufficient supernatant on top of solids (energy ratio ≥ 3.0), but that pass the third criterion (buoyancy ratio < 1.0, see below) are also assigned to waste group B. Even though the designation as a waste group B (or A) tank identifies the potential for an induced flammable gas release hazard, the hazard only exists for specific operations that can release the retained gas in the tank at a rate and quantity that results in reaching 100% of the lower flammability limit in the tank headspace. The identification and evaluation of tank farm operations that could cause an induced flammable gas release hazard in a waste group B (or A) tank are included in other documents.

The third criterion addresses tanks that are not waste group C double-shell tanks that have sufficient supernatant on top of solids (energy ratio ≥ 3.0). For these double-shell tanks, the third criterion considers whether the saturated solids can retain sufficient gas to exceed neutral buoyancy relative to the supernatant layer and therefore have buoyant displacement gas release events. If neutral buoyancy can be exceeded (buoyancy ratio ≥ 1.0), that double-shell tank is assigned to waste group A (i.e., potential for spontaneous buoyant displacement flammable gas release hazard in addition to a potential induced flammable gas release hazard).

Sensitivity studies of waste group assignments were also performed for the cases of water and caustic additions to the waste tanks and the special cases of the addition of waste to some of the tanks.

Changes in Revison 4 include an improved correlation between convective and nonconvective layer densities; new hydrogen generation rates that have been reduced due to tank cooling and an improved calculation methodology; hydrogen generation rate distribution limits which are less conservative and more closely follow the comparison between hydrogen generation rates and field observations; double-shell tank void fractions are dynamically link to neutral buoyancy void fractions; and all data as updated by the best basis inventory. In this revision, 2 double-shell tanks, 241-AN-102 and 241-SY-102, changed from waste group C to waste group B tanks; 2 double-shell tanks, 241-AP-105 and 241-SY-101, changed from waste group B to waste group C tanks; 1 single-shell tank, 241-B-109, changed from a waste group C to a waste group B tank; and 12 single-shell tanks, 241-AX-101, 241-B-104, 241-B-107, 241-B-201, 241-B-202, 241-BY-108, 241-S-112, 241-SX-102, 241-T-110, 241-T-203, 241-T-204, and 241-TX-116, changed from waste group B to waste group C tanks. There are no changes to waste group A tanks.

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LIST OF TERMS

BBI	*Best Basis Inventory*
BDGRE	buoyant displacement gas release event
BPE	barometric pressure effect
DST	double-shell tank
GRE	gas release event
HGR	hydrogen generation rate
LFL	lower flammability limit
PCSACS	Personal Computer Surveillance Analysis Computer System
PNNL	Pacific Northwest National Laboratory
RGS	retained gas sampler
SpG_L*H_S	product of the specific gravity of the liquid layer and the height in inches of the sediment or settled solids layer
SST	single-shell tank
VFI	void fraction instrument

1.0 INTRODUCTION

Waste stored within tank farm double-shell tanks (DST) and single-shell tanks (SST) generates flammable gas (principally hydrogen) to varying degrees depending on the type, amount, geometry, and condition of the waste. The waste generates hydrogen through the radiolysis of water, thermolytic decomposition of organic compounds, and corrosion of a tank's carbon steel walls. Radiolysis and thermolytic decomposition also generate ammonia. Nonflammable gases, which act as dilutents (such as nitrous oxide), are also produced. Additional flammable gases (e.g., methane) are generated by chemical reactions between various degradation products of organic chemicals present in the tanks. Volatile and semivolatile organic chemicals in tanks also produce organic vapors. The generated gases in tank waste are either released continuously to the tank headspace or are retained in the waste matrix. Retained gas may be released in a spontaneous or induced gas release event (GRE) that can significantly increase the flammable gas concentration in tank headspace as described in RPP-7771, *Flammable Gas Safety Issue Resolution*. Appendices A through M provide supporting information.

1.1 GAS RETENTION IN SINGLE-SHELL TANKS AND DOUBLE-SHELL TANKS

Studies have shown that some tanks store significant volumes of gas in their waste. Free gas can accumulate in submerged solids, which are saturated. Convective fluid layers of waste do not retain significant amounts of insoluble gases (e.g., hydrogen and methane) because bubbles rise through liquid waste as fast as they are generated. Soluble gases (primarily ammonia) are also dissolved in liquid waste; however, evaporation of dissolved ammonia is pronounced only when a free liquid surface is freshly exposed or agitated.

Direct measurements of retained gas are not available for most tanks. Estimates of the amount of retained gas stored in each DST and SST were made based on two indirect methods provided in WHC-SD-WM-ER-526, *Evaluation of Hanford Tanks for Trapped Gas*. Only 58 of the 177 SSTs and DSTs were determined by the barometric pressure effect (BPE) method to have trapped gas and, of these, only 15 tanks, including six DSTs (241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, 241-SY-101, and 241-SY-103) stored relatively large volumes of gas, greater than 9% of the solid waste volume. (Note that gas retention in DST 241-SY-101 has since been remediated, leaving only five DSTs with relatively large volumes of stored gas.) About 50 tanks have so little waste that gas retention is of little concern when released and mixed in the headspace because of the large headspace dilution factor. However, both of the indirect estimation methods include significant uncertainties, as described in WHC-SD-WM-ER-594, *Evaluation of Recommendation for Addition of Tanks to the Flammable Gas Watch List*.

Uncertainties arise because the models are simplified and approximate the physical condition of the waste in all DSTs and SSTs and because the data used lacks the precision necessary to make estimates of the retained gas. Therefore, given the uncertainty in the methods and data, a conservative assumption is that all the DSTs and SSTs retain gas in their solid layers.

Current estimates of retained gas used in this document are based on the void fraction in the saturated solids of each tank considered. Void fraction distributions are based on all available void fraction instrument (VFI) data, retained gas sampler (RGS) data, and appropriate BPE data, and waste similarities in the other tanks as described in SNL-000198, *Flammable Gas Safety Analysis Data Review*.

1.2 GAS RELEASE EVENTS

Gases released from the waste in a DST or SST in a nearly continuous manner can be managed effectively by ventilation. However, it is much more difficult to manage when a significant amount of the gas retained within waste is released relatively rapidly in a buoyant displacement gas release event (BDGRE). The BDGREs were observed in six of the DSTs (241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, 241-SY-101, and 241-SY-103). Data regarding the physics of GRE in the tanks is provided in Pacific Northwest National Laboratory (PNNL) PNNL-11296, *In Situ Rheology and Gas Volume in Hanford Double-Shell Waste Tanks* and PNNL-11536, *Gas Retention and Release Behavior in Double-Shell Waste Tanks*. The most recent estimations of released gas volumes are found in RPP-6655, *Data Observations on Double-Shell Flammable Gas Watchlist Tank Behavior*. The large GREs that occurred in DST 241-SY-101 before they were mitigated by the mixer pump, and then remediated by transfers and dilution, were unique in size and frequency. The largest release was the December 4, 1991 GRE of 183 to 263 m^3 of gas (RPP-6655), or 39 to 56% of its retained gas inventory.[1] The observed frequency of GREs in DST 241-SY-101, prior to remediation, was every 80 to 150 days (RPP-6517, *Evaluation of Hanford High-Level Waste Tank 241-SY-101*). In contrast, the total tank retained gas volumes (including transient and retained gas in the crust and convective layer) and corresponding release fractions are given for the other five GRE DSTs based on VFI and RGS data for these tanks in Table 1-1.

[1] DST 241-SY-101 percent gas released is based on the following calculations. The high estimate is calculated using the December 4, 1991 maximum calculated release volume, 263 m^3 (RPP-6655), with a retained gas volume based on the post mixer pump retained gas volume at standard conditions, 195 m^3 (RPP-6655), corrected for the difference in total waste height at the time of the GRE, 416 in. (height on December 4, 1991 from Personal Computer-Surveillance Analysis Computer System) minus post mixer pump waste height of 399 in. (RPP-6517). The volume of gas released by mixer pump operations is determined to be 177 m^3 ([416 in. – 399 in.] x 2,754 gal/in. x 0.003785 m^3/gal) corrected for pressure (i.e., 1.53 pressure ratio [RPP-6655]) to 271 m^3. The conservative retained gas volume at tank headspace conditions on December 4, 1991 is calculated to be 466 m^3 (195 m^3 + 271 m^3). When the maximum calculated volume of gas released is divided by the calculated retained gas volume, all volumes at headspace conditions, the calculated release volume is 56% of the retained gas volume (263/466). Similarly, the calculated volume for the December 4, 1991 release is 183 m^3, which corresponds to 39% (183/466) of the retained gas volume.

Table 1-1. Total Tank Retained Gas Volumes and Corresponding Release Fractions for Five Double-Shell Tanks.[a]

Tank	Total Retained Gas Volume (Std. m^3)	Release Fraction
241-AN-103	393±64	0.02
241-AN-104	259±48	0.07
241-AN-105	202±68	0.15
241-AW-101	153±38	0.19
241-SY-103	198±86	0.12

Note:
[a]Source: RPP-7771, *Flammable Gas Safety Issue Resolution*, Rev. 0-A, CH2M HILL Hanford Group, Inc., Richland, Washington.

The uncertainties for the total retained gas volumes represent a 95% confidence bound. The release fractions were calculated by dividing maximum observed hydrogen release by total retained hydrogen volume (RPP-7771). None of the gas releases in the DSTs, other than DST 241-SY-101 prior to remediation, have been large enough to create flammable mixtures after mixing in the tank headspace as described in RPP-6517 and RPP-7771.

The ongoing study of gas retention behavior of SST waste forms has narrowed the number of plausible spontaneous release mechanisms to a few possibilities that are capable of only small releases (less than 10 m^3 compared with 100 to 200 m^3 in DST 241-SY-101) and is discussed in HNF-SP-1193, *Flammable Gas Project Topical Report*. Observation of a number of the most active flammable-gas-retaining SSTs indicates that no large BDGREs are occurring and that only a few SSTs experience small spontaneous GREs. The typical spontaneous GRE in an SST has a small release volume of tens of cubic feet of hydrogen and no release in the SSTs has been observed with the "classic" BDGRE properties as described in RPP-7771 and RPP-7249, *Data and Observations of Single-Shell Flammable Gas Watch List Tank Behavior*. The variation in gas release volumes and fractions within the same tank are a good indication of tank waste inhomogeneity and supports the use of uncertainty distributions for the modeling of this type of behavior.

1.3 WASTE GROUPS FOR SINGLE-SHELL TANKS AND DOUBLE-SHELL TANKS

Waste group assignments have been developed to replace the past Facility Group designations for the 177 DSTs and SSTs for application of flammable gas controls. The SST and DST groupings are based on waste tank characteristics and the propensity of the waste to experience a large BDGRE. Waste group selection criteria were developed based on both empirical data and analytical concepts with the objective of identifying and separating waste tanks into groups that posed similar GRE risks.

The SSTs and DSTs are assigned to one of three groups based on the following:

- **Waste Group A**: Tanks with a potential spontaneous BDGRE flammable gas hazard in addition to a potential induced GRE flammable gas hazard. That is, tanks that are:

  1. Conservatively estimated to contain sufficient retained gas to achieve 100% of the lower flammability limit (LFL) if all of the retained gas is released into the tank headspace, <u>and</u>

  2. Determined <u>or</u> predicted to exhibit spontaneous BDGRE behavior.

- **Waste Group B**: Tanks with a potential induced GRE flammable gas hazard, but no potential spontaneous BDGRE flammable gas hazard. That is, tanks that are conservatively estimated to contain sufficient retained gas to achieve 100% of the LFL if all of the retained gas is released into the tank headspace, but are not waste group A tanks (see above).

  Note : Potential induced GRE flammable gas hazards exist in waste group B (and A) tanks only for specific operations that can release the retained gas in the tank at a rate and quantity that results in reaching 100% of the LFL in the tank headspace. The identification and evaluation of tank farm operations that could cause an induced flammable gas release hazard in a waste group B (or A) tank are included in other documents

- **Waste Group C**: Tanks with no potential GRE flammable gas hazard. That is, tanks that are conservatively estimated to contain insufficient retained gas to achieve 100% of the LFL even if all of the retained gas is released into the tank headspace.

2.0 WASTE GROUP SELECTION CRITERIA

2.1 CRITERIA USED TO ASSIGN TANKS TO A WASTE GROUP

The waste parameters or combinations of waste parameters that are used to assign individual SSTs and DSTs to waste groups are as follows.

Head Space Flammable Gas Concentration Following Release of Retained Gas: Saturated settled solids depth[2] and gas volume fraction distribution can be used to determine whether there is sufficient retained gas in the waste to cause the tank headspace to become flammable if the gas was all released at once. The sediment gas volume fraction may be determined using gas fraction data, assigned conservative bounding values, or conservatively calculated as the neutral buoyancy gas fraction (for tanks with liquid-over-sediment waste configuration). This calculation can be used as a quick screen for determining whether a tank poses a potential GRE hazard and does not model expected tank behavior. This criterion determines whether a flammable mixture of gases can be achieved in the tank's headspace if all of the tank's retained gas were released. In other words, is the headspace gas flammable gas concentration equal to or greater than 100% of the LFL? If there is less retained gas than that required to achieve a flammable mixture in the tank's headspace, then flammable conditions cannot be reached. As a result, the tank is classified as a waste group C tank independent of the method the gas is released. Equations 1, 2, and 3 are used to make these calculations relating to headspace flammable gas concentration criterion.

In Equation 2, the pressure on the retained gas is determined. The slightly conservative assumption is made that the gas is stored as particle-displacing bubbles (hydro-dendritic bubbles or lithostatic conditions). The depth of the crust is added to the convective layer depth to determine the pressure contribution from these layers. Because the amount of crust floating above the liquid is not measured, the full crust level is used in the pressure calculation. In addition, it is assumed that the crust has the same density as the convective layer.

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[2] Saturated settled solids depth is considered in the retained gas volume determination versus the depth of solids saturated with liquid. The difference is that the volume of saturated solids in a floating crust layer is not included. This simplification is reasonable for several reasons. First, the existing crusts in the DSTs are less than 1 m thick (Appendix A) and only approximately one half of this depth is saturated with liquid and capable of retaining flammable gas. Second, the retained gas within the crust does not have the same pressure head as the retained gas within the main body of solids, because the liquid layer, which contributes a significant portion of the retained gas pressure head, is below the crust layer. The effective head pressure on the retained gas in the settled solids ranges from 1.7 to 2.3 atmospheres (RPP-6655) when compared to the head pressure on the crust retained gas of about 1 atmosphere. These considerations indicate that the crust's retained gas volume at headspace conditions is small relative to the settled solids retained gas volume. Finally, floating crusts are currently only found in waste group A tanks and would have no impact on the final classification of the tank.

Retained Gas Volume Criterion: $\%LFL_{HS} > 100\%$

$$VG_{WNCL} = H_{WNCL} * VF_{WNCL} * A * \left(\frac{P_{WNCL}}{1atm.}\right) * \left(\frac{T_{VS}}{T_{WNCL}}\right) \quad (1)$$

where:

$$P_{WNCL} = 1atm. + \left(\frac{9.806\frac{m}{sec^2}}{101{,}325\frac{Pa}{atm.}}\right) * \{\rho_{CL} * [H_{CL} + H_C] + [0.5 * \rho_{WNCL} * (2 * H_{TNCL} - H_{WNCL})]\} \quad (2)$$

$$\%LFL_{HS} = \left(\frac{[H_2]_{RG}}{\%LFL_{H2}} + \frac{[CH_4]_{RG}}{\%LFL_{CH4}} + \frac{[NH_3]_{RG}}{\%LFL_{NH3}}\right) * \frac{VG_{WNCL}}{V_{VS}} * F_{GasReleased} \quad (3)$$

where:

A	=	cross sectional area of the tank (m^2)
$[CH_4]_{RG}$	=	methane concentration in the retained gas (volume %)
$[H_2]_{RG}$	=	hydrogen concentrations in the retained gas (volume %)
$[NH_3]_{RG}$	=	ammonia concentration in the retained gas (volume %)
$F_{GasReleased}$	=	fraction of gas released (assumed to be 100%)
H_C	=	height of the crust layer (m)
H_{CL}	=	height of the liquid (convective) layer (m)
H_{TNCL}	=	height of total settled solids (nonconvective) layer (m)
H_{WNCL}	=	height of liquid saturated nonconvective layer (m)
P_{WNCL}	=	calculated representative retained gas pressure in saturated settled solids layer (atm)
T_{VS}	=	representative temperature of headspace of waste tank (K)
T_{WNCL}	=	representative temperature of saturated settled solids layer (K)
V_{VS}	=	volume of headspace of waste tank (m^3)
VF_{WNCL}	=	representative void fraction in saturated settled solids layer
VG_{WNCL}	=	calculated volume of gas retained in the saturated settled solids layer (m^3)
$\%LFL_{CH4}$	=	methane concentration at 100% LFL (5.0 volume %)
$\%LFL_{H2}$	=	hydrogen concentration at 100% LFL (4.0 volume %)
$\%LFL_{NH3}$	=	ammonia concentration at 100% LFL (15.0 volume %)
$\%LFL_{HS}$	=	headspace flammable gas concentration following gas release

ρ_{CL} = density of convective layer (kg/m^3)

ρ_{WNCL} = density of saturated nonconvective layer (kg/m^3).

Notes: Temperatures used are the maximum temperatures recorded over the previous 12 months within the solid waste or within the vapor space as appropriate.

The dilution of released gases by water vapor is not considered.

Uncertainty distributions are utilized to account for the scatter of retained gas volumes in the waste and uncertainty in the solid volumes. Void fraction distributions are based on all available VFI data, RGS data, and appropriate BPE data.

Energy Ratio: The presence of a significant supernatant layer introduces the possibility of BDGREs. The supernatant layer depth can be utilized as a criterion for determining susceptibility to BDGREs by using a term called "energy ratio" as described in PNNL-11391, *Gas Retention and Release Behavior in Hanford Single-Shell Waste Tanks*. The waste in tanks with supernatant layers below an energy ratio threshold of about 3 is not expected to contain sufficient energy to release gas during a buoyant displacement event.

If a tank's waste fails the retained gas volume criterion, the energy ratio criterion is applied. The process of gas release from a gob undergoing buoyant displacement requires that sufficient energy be released to disrupt the waste surrounding the bubbles to allow them to escape as the gob reaches the waste surface. The amount of energy available is directly proportional to the depth of the supernatant through which the gob rises. The energy ratio is the ratio of the buoyant potential energy of the gas-bearing gobs to the energy required to yield the waste and release gas from those gobs participating in buoyant displacements. The depth of the convective layer above a nonconvective layer in a tank's waste determines whether gas retained in gobs from the saturated nonconvective layer can be released.

Equations 4 and 5 are used to make energy ratio calculations. If the energy ratio for the waste in a DST or SST, which does not meet the criterion to be first classified as a waste group C tank, is not less than 3, then that tank is classified as a waste group B tank. The DSTs that fail both the retained gas volume criterion and the energy ratio criterion are examined for tendencies to have spontaneous BDGREs. The criterion comparison value of 3 accounts for the energy needed to overcome the yield stress, plus a factor to account for energy lost through other processes during the gas release. Based on experimental observations and tank behavior, some gas can be released when the energy ratio exceeds 3, and release of a large fraction of stored gas can occur when the energy ratio exceeds 5.

Energy Ratio Criterion: ER < 2.7

$$ER = \left(\frac{NB_{WNCL} * \gamma * 101325 \frac{Pa}{atm.}}{(1 - NB_{WNCL}) * \tau_{WNCL} * \varepsilon_y} \right) * \left(\left(1 + \frac{1}{\gamma}\right) * \ln(1+\gamma) - 1 \right) \quad (4)$$

where:

$$\gamma = \left(\frac{\rho_{CL} * H_{CL}}{1\,\text{atm.}}\right) * \left(\frac{9.806\,\frac{\text{m}}{\text{sec}^2}}{101325\,\frac{\text{Pa}}{\text{atm.}}}\right) \tag{5}$$

where:

atm.	=	atmosphere
ER	=	energy ratio, the ratio of the buoyant potential energy of the gas-bearing gobs to the energy required to yield the waste and release gas from those gobs participating in buoyant displacements
F_{WNCL}	=	retained hydrogen gas concentration in the saturated settled solids layer
H_{CL}		height of the liquid (convective) layer
NB_{WNCL}	=	calculated or measured neutral buoyancy of saturated settled solids layer relative to the convective layer on top of it (calculated neutral buoyancy is one minus the ratio of convective layer density to saturated nonconvective layer density)
Pa	=	Pascal
ρ_{CL}	=	density of convective layer
γ	=	calculated ratio of pressure head of convective layer in a waste tank to the headspace pressure, which is assumed to be one atmosphere
τ_{WNCL}	=	representative yield stress of saturated nonconvective layer (Pa).
ε_y	=	Strain at failure (assumed to be 1).

Only saltcake/salt slurry tanks have exhibited BDGRE behavior. For reasons given in Section 2.4, "Application of Data to Sludge Tanks," the energy ratio is considered valid for both saltcake/salt slurry and sludge tanks.

A preliminary comparison of energy ratio calculation methods as developed by PNNL has found that the methodology used in this document is slightly nonconservative when the decision point is 3. A decision point of 2.7 equalizes this methodology with the energy ratio equation currently used in PNNL-13782, *Analysis of Induced Gas Releases During Retrieval of Hanford Double-Shell Tank Waste*. This value has no effect on the results of the current evaluation; however, it will become important as the DSTs fill and the energy ratio is used to control the tank conditions to avoid BDGREs.

Buoyancy Ratio: This is a semi-empirical relation presented in PNNL-13337, *Preventing Buoyant Displacement Gas Release Events in Hanford Double-Shell Waste Tanks*, which estimates the average waste gas fraction based on a balance of gas generation and background release. The buoyancy ratio represents the average saturated settled solids (nonconvective) layer gas fraction divided by the neutral buoyancy gas fraction. This physics-based buoyancy model was developed from the theory of bubble transport. This model predicts whether there is sufficient gas build up in the saturated settled solids layer in a DST to make gobs of waste buoyant and produce BDGREs (PNNL-13337). If the average void fraction in the saturated settled solids layer of waste is less than the neutral buoyant void fraction, a BDGRE cannot occur. Conversely, an average void fraction greater than the neutral buoyant void fraction

predicts that BDGREs will occur prior to reaching steady state. The ratio of average steady-state void fraction to neutral buoyant void fraction for the case of constant nucleation is given by Equation 6. The constant in the numerator of the first factor is adjusted so that the minimum buoyancy ratio for DSTs experiencing BDGREs is 1.00. In this report, DST 241-AN-103 is used to calculate the constant.

Traditionally, other criteria, such as the Estey criteria described in WHC-SD-WM-TI-755, *An Analysis of Parameters Describing Gas Retention/Release Behavior in Double Shell Tank Waste*, and waste specific gravity have been used to predict BDGRE behavior in the DSTs (RPP-6517). The buoyancy ratio includes as input parameters the layer depths and densities making up the average specific gravity of the waste and the Estey criterion. However, it also includes the other terms that model the underlying physics of BDGRE behavior (PNNL-13337). In application, this model accurately separates the known BDGRE and non-BDGRE tanks with current data. For these reasons, the buoyancy ratio is considered the best discriminator for BDGRE behavior. Use of the other criteria along with the buoyancy ratio does not improve the overall accuracy of the prediction. The DSTs that fail both the retained gas volume criterion and the energy ratio criterion and that fail the buoyancy ratio criterion are classified as waste group A tanks (failure in this instance indicates that the given waste criteria was not met, causing the tank to be classified as a member of the more hazardous waste tank group).

The buoyancy ratio criterion is not applicable for SSTs since it is a semi-empirical relation based on BDGRE experience in DSTs. Therefore, waste additions and large water additions (> 10,000 gal for 100-series tanks, >1,000 gal for 200-series tanks) to SSTs that would lead to failing the first two criteria (i.e., retained gas volume and energy ratio) are prohibited. This prevents the creation of an SST with an unknown and unanalyzed GRE flammable gas hazard.

The buoyancy ratio model is very sensitive at conditions where the convective layer and nonconvective layer densities are very close. Layer buoyancy is very dependant on the amount of gas required to balance (or overcome the balance) of the densities of the two layers. Physically, as the density of the two layers inverts, the nonconvective layer will become buoyant and will rise to the surface releasing its gas. It should be noted that the nonconvective layer also has to have sufficient potential energy to overcome the resistance of the solids to release as a gob. Tank conditions should not be selected which place the condition of the tank in the regime where the buoyancy ratio model is shown to be very sensitive to small density changes. Additional studies are planned in fiscal year 2005 which will better identify where BDGRE hazards actually exist, and appropriate safety factors will be implemented which will ensure safe waste tank conditions.

Buoyancy Ratio Criterion: BR < 1.00

$$BR = \left(\frac{CF}{\rho_{WNCL} - \rho_{CL}}\right) * \left(\frac{G_{WNCL} * T_{WNCL}}{F_{WNCL} * \left(101325 \frac{Pa}{atm.}\right) * P_{WNCL}}\right)^{\frac{1}{3}} * H_{WNCL}^{2} \quad (6)$$

where:

BR	=	buoyancy ratio, the average saturated settled solids layer gas fraction divided by the neutral buoyancy gas fraction. This ratio predicts whether there is sufficient gas build up in the saturated settled solids layer in a DST to make gobs of waste buoyant and produces BDGREs
CF	=	calibration factor (set to 998 for this analysis)
F_{WNCL}	=	retained hydrogen gas concentration in the saturated settled solids layer
G_{WNCL}	=	hydrogen generation rate in saturated settled solids layer (moles/m^3/day)
H_{WNCL}	=	height of liquid saturated nonconvective layer
P_{WNCL}	=	calculated representative retained gas pressure in saturated settled solids layer
T_{WNCL}	=	Representative temperature of saturated settled solids layer.

2.2 SELECTION OF BUOYANCY RATIO CALIBRATION FACTOR

The buoyancy ratio was developed to describe the relationship between DSTs that historically exhibited BDGRE behavior. It was found that tanks exhibiting BDGRE behavior have a relationship between the average saturated settled solids layer gas fraction and the neutral buoyancy gas fraction that is greater than the ratio of these values determined for tanks that never exhibited BDGREs. This buoyancy ratio is used to predict whether there is sufficient gas buildup in the saturated settled solids layer in a DST to make gobs of waste buoyant and produce BDGREs. It was determined that tanks with documented BDGREs would have buoyancy ratios greater than 1 (where the calibration factor was set such that the lowest buoyancy ratio for a tank exhibiting BDGRE behavior would be unity) (PNNL-13337).

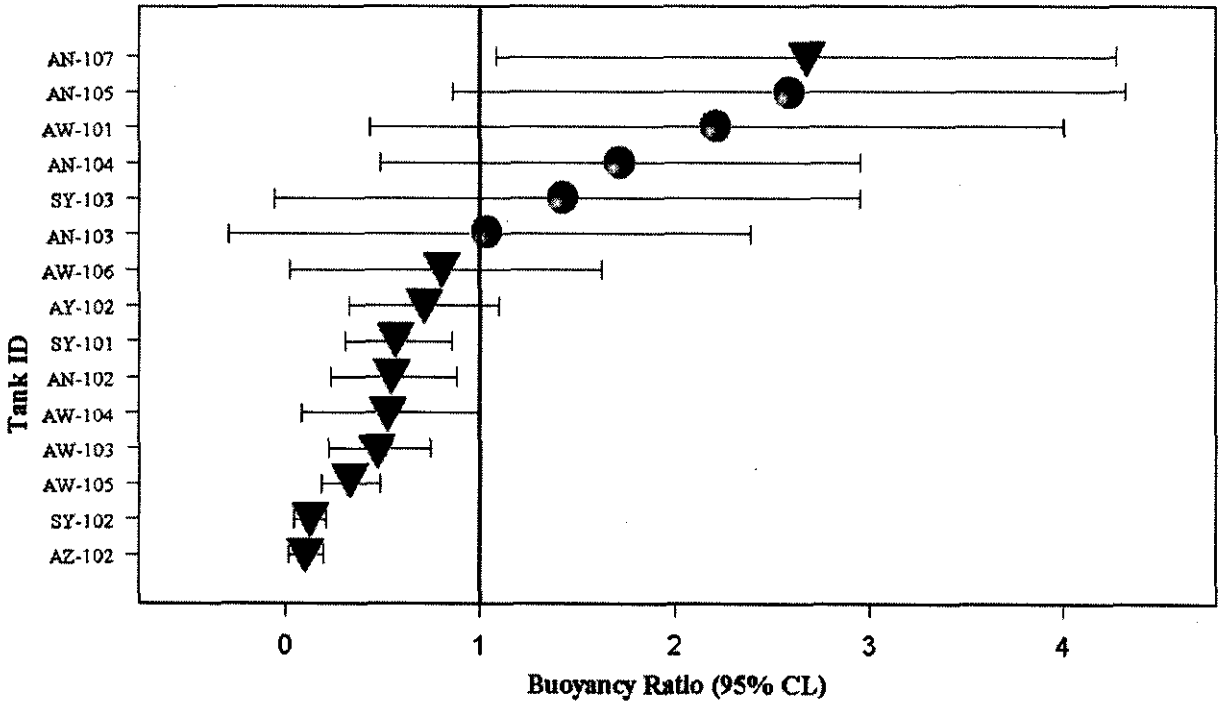
The buoyancy ratio calibration factor is set based on the median properties for each DST which exhibits BDGRE behavior. However, whether or not a tank is classified as a waste group A tank is based on the 95% confidence level for a given set of current tank conditions (the Monte Carlo analysis). The current conditions of all tanks are compared to the "original" buoyancy ratios developed by PNNL at the time PNNL-13337 was published. The methodology for calculating convective layer densities has changed since the 1990s and has been incorporated in the rebaselined buoyancy ratio calibration factor.

2.2.1 Determining the Buoyant Displacement Gas Release Event Tank with the Minimum Buoyancy Ratio

When calibrating the buoyancy ratio, the first step is to determine which tanks exhibit BDGRE behavior. Historically, the tanks are DSTs 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, 241-SY-101, and 241-SY-103. The relationship of the buoyancy ratios for the BDGRE tanks and closely related tanks are illustrated in Figure 2-1, which is based on tank condition uncertainties as reported in this document. In this evaluation, the median values of the buoyancy ratio calculation were used and as a result DST 241-AN-103 has the minimum buoyancy ratio.

Figure 2-1. Comparison of Buoyancy Ratios.

(Based on July 10, 2003 *Best Basis Inventory* data)



In Figure 2-1, the circles indicate tanks that exhibit BDGREs, and the triangles indicate tanks that do not exhibit BDGREs. The vertical separation does not have any meaning and is included to improve clarity.

DSTs 241-AN-107, 241-AW-106, and 241-AY-102 show up in the region of tanks having BDGREs and buoyancy ratios greater than 1 at 95% confidence limit, although none of these tanks has demonstrated BDGRE behavior. DST 241-AN-107 has the highest buoyancy ratio of any tank. This has occurred due to the large increase in the supernatant specific gravity due to caustic additions to adjust the tank pH. DST 241-AY-102 has a high buoyancy ratio due to a large hydrogen generation rate. All three of these tanks have specific gravities greater than 1.41, which tends to result in a high buoyancy ratio as the difference between the solid and liquid densities decreases. DSTs 241-SY-101, 241-AN-102, and 241-AW-104 are the closest tanks to

having a buoyancy ratio equal to 1, but do not fall within the region of tanks that exhibit BDGREs. DSTs 241-SY-101, 241-AW-104, 241-AW-103, 241-AW-105, 241-SY-102, and 241-AZ-102 will not exhibit BDGRE behavior at any fill level within the tank as long as the solids level remains the same and the supernatant density is less than or equal to the current supernatant density within the tank.

However, over the past several years, three GREs were observed in DST 241-AN-107 (HNF-SD-WM-TI-797, *Results of Vapor Space Monitoring of Flammable Gas Watch List Tanks*) which were large enough to suggest that they were BDGREs, and if so, then the tank would be classified as a BDGRE tank. Also, concluding in October 2000, DST 241-SY-101 waste was diluted and partially transferred to DST 241-AY-102. Following the conclusion of DST 241-SY-101 remediation, RPP-6517 was released, which found that the properties of the remaining waste in the tank would not exhibit BDGRE behavior. Due to the uncertainty of the properties for these two tanks, and the uncertainty to which tank the buoyancy ratio calibration factor should be calibrated, additional studies were required to evaluate these two tanks. This uncertainty was caused by the 2000 to 2002 GREs from DST 241-AN-107, which needed to be evaluated to determine if they were BDGREs, and by the short time period (6 months) between the ending of the remediation operations and the evaluation provided in RPP-6517. Because an additional 1.5 years have passed since the evaluation provided in RPP-6517, until the time of this evaluation, it was useful to reevaluate gas retention in DST 241-SY-101. Finally, since April 2000, when DST 241-SY-101 was remediated, there have been no BDGREs observed in DST 241-SY-101.

2.2.1.1 Additional Evaluation of DST 241-AN-107. As reported in TWS02.025, *Investigation of Gas Retention and Release Issues in Tanks AN-107 and SY-101 Supporting Waste Group Determination* (Appendix G):

> Application of the Buoyant Displacement Gas Release Event (BDGRE) predictive indicators has historically shown that tank 241-AN-107 was close to exhibiting BDGRE behavior (Meyer and Stewart 2001 and Johnson et al. 2000). Since the predictive model of BDGRE behavior is based on the group of tanks exhibiting this behavior, inclusion of DST 241-AN-107 in the group has the potential to affect the waste group determinations for the remaining tanks. The three gas release events observed recently in tank 241-AN-107 (McCain 2001) were investigated in detail to determine if the tank indeed belongs in the BDGRE group. The retained gas volume in AN-107 was also evaluated.

The TWS02.025 evaluation (Appendix G) found that two of the three GREs were the result of a calibration or intrusive pumping activities. The third GRE was determined to be a small GRE that did not have the characteristics of a BDGRE. Therefore, DST 241-AN-107 was not considered to be a BDGRE tank.

The retained gas volume may be estimated using changes in the waste surface level in response to barometric pressure changes. The barometric pressure effect model is described in RPP-6655, Appendix B. The model estimates the retained gas volume based on the response of the waste surface level to fluctuations in the barometric pressure due to compression and expansion of stored gas.

Report TWS02.025 (Appendix G) found that there was a correlation between atmospheric pressure and the surface level in DST 241-AN-107. At the 95% confidence level, it is estimated that the in situ retained gas volume in the tank is 2,100 ft^3 at 2 atmospheres of pressure (4,200 ft^3 at atmospheric pressure). The truncation of the distribution is defined by 0 ft^3 and 4,000 ft^3, where 4,000 ft^3 is the volume of gas retained at the neutral buoyancy void fraction for the waste.

In conclusion, TWS02-025 did not find any indication that BDGREs had occurred in DST 241-AN-107 through March 2002; however, there is sufficient retained gas in the tank to allow the waste surface to react proportionally with changes in barometric pressure and for a determination to be made of the volume of retained gas in the sediment.

2.2.1.2 Additional Evaluation of DST 241-SY-101. As reported in TWS02.025 (Appendix G), the potential for large BDGREs in DST 241-SY-101 (PNNL-11536) was eliminated by a series of waste transfers and water dilutions in 1999 and 2000 (RPP-6517). However, like DST 241-AN-107, DST 241-SY-101 in its new configuration is relatively close (in terms of the BDGRE predictive indicators) to the group of tanks exhibiting BDGREs. The previous evaluation of its waste configuration was done in August 2000 (RPP-6517). For this document, another reevaluation of the waste configuration within the tank was performed. DST 241-SY-101 data were updated by an investigation of potential gas retention and a refinement of the sediment layer depth (a significant parameter for identifying the potential of BDGRE behavior). This evaluation of the tank was done using a gamma scan taken in August 2003 and a BPE analysis of the surface response through August 2003.

The waste level in DST 241-SY-101 rose 2 in. from October 2000 to March 2002 after correction for evaporation (TWS02.025). This corresponds to an increase in retained gas of 750 ft^3 at in situ conditions (1,500 ft^3 at atmospheric pressure). Because the operations in DST 241-SY-101 performed during the transfer and dilution activities would have degassed the waste, it is assumed that the March 2002 retained gas inventory was 750 ft^3 at in situ conditions. An additional observation of note is that there appears to have been no additional retained gas accumulation from January 2002 through March 2002, indicating that steady-state gas releases then equaled the gas generation rate.

In addition, TWS02.025 reports that the March 2002 sediment or nonconvective layer depth was 90 in. This evaluation is based on information from temperature profiles, and neutron and gamma scans. This is a reduction in the nonconvective layer depth since the time of RPP-6517, evidence of continuing compaction of the nonconvective layer supporting the above finding that the retained gas volume is small compared to the pre-mitigation retained gas volume.

Due to recent transfer activity into and out of DST 241-SY-101, a solids level reevaluation was done. The latest gamma scan (August 2003) indicates that the solids level is now close to 100 in. The transfer pump intake suction is located at 102 in. and therefore the current evaluation (August 2003) of DST 241-SY-101 uses a nonconvective layer height of 102 in. In addition, a reevaluation of the BPE data has been completed resulting in a new void fraction distribution for DST 241-SY-101 and is documented in Appendix H (TWS04.001, *Tank SY-101 Retained Gas Estimates Based On Correlated Surface Level - Barometric Pressure Data And Transfer Material Balance Discrepancies*). An additional change in the tank conditions due the recent

transfer activity is the reduction of the specific gravity of the supernatant layer to 1.28 from the post-remediation specific gravity of 1.36.

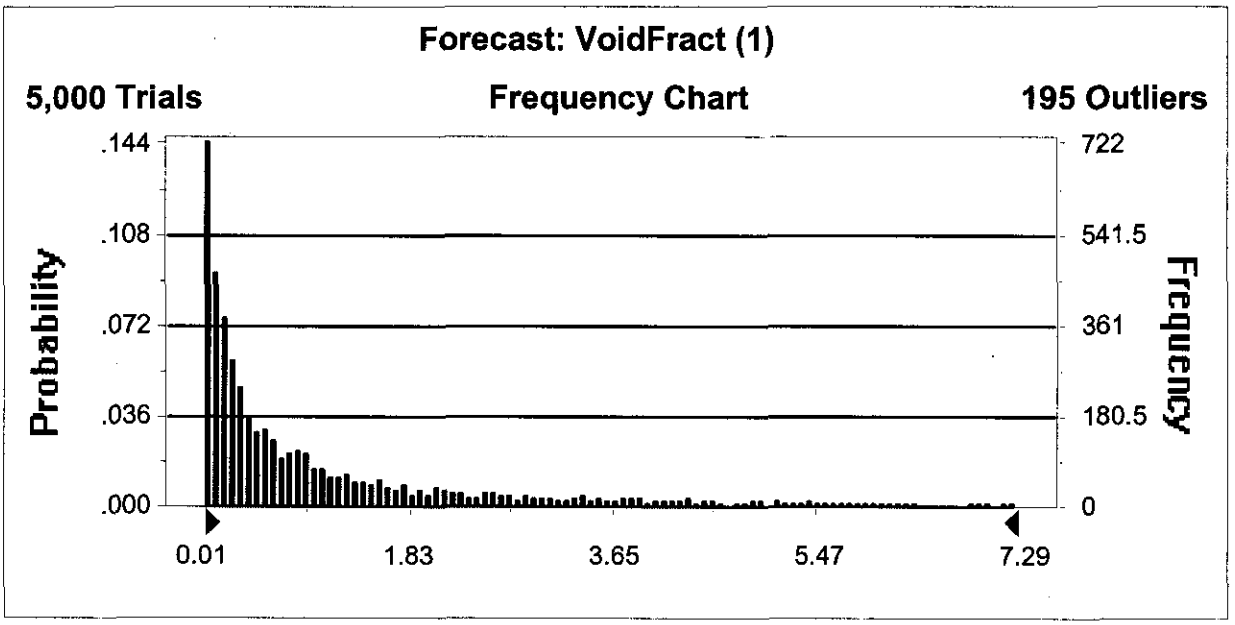
2.2.2 Buoyancy Ratio Calibration Factor Conclusion

After evaluating DSTs 241-AY-107 and 241-SY-101 and finding that neither tank has exhibited BDGRE behavior, it was determined that DST 241-AN-103 was the BDGRE tank with the minimum buoyancy ratio. The buoyancy ratio calibration factor was set to 998 for DST 241-AN-103, which results in the tank having a buoyancy ratio of 1, when the median values of the waste properties are used in Equation 6. In addition, void fraction estimates were created for DSTs 241-AN-107 and 241-SY-101 at current conditions.

For DST 241-AN-107 the void fraction based on the BPE results is described by a log normal distribution with a mean of 3.5117206 and a standard deviation of 20.5772022. Figure 2-2 illustrates the void fraction distribution.

Figure 2-2. Void Fraction Distribution for DST 241-AN-107.

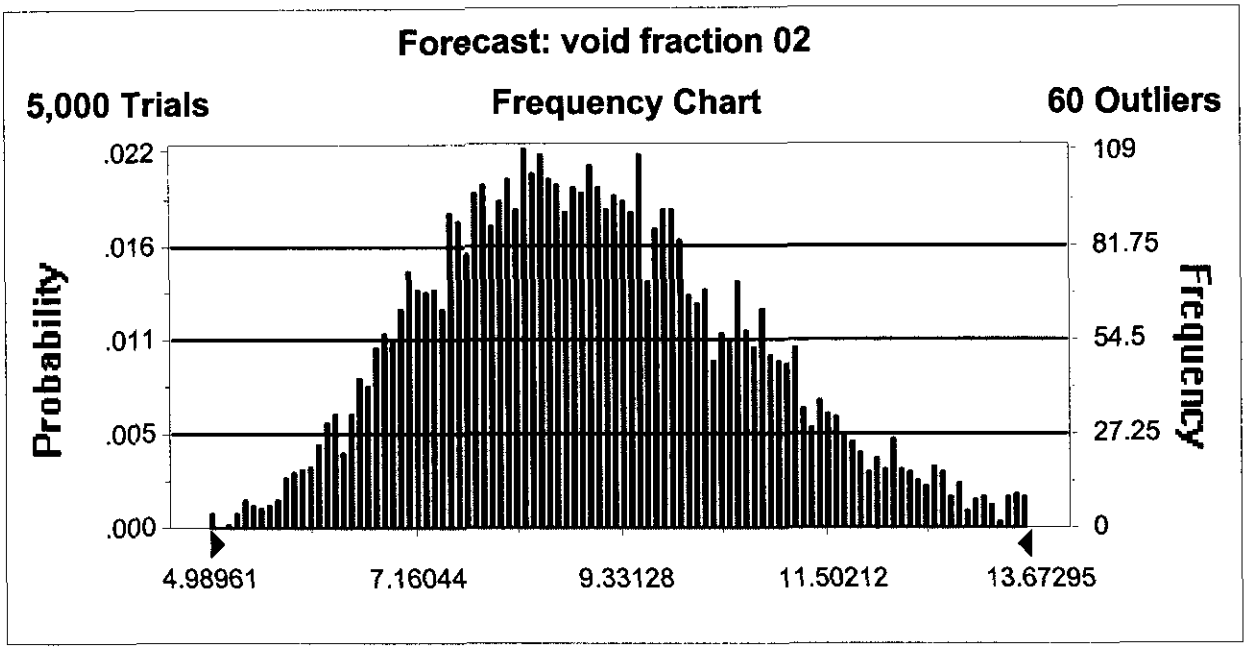
(Based on July 10, 2003 *Best Basis Inventory* data)



The DST 241-SY-101 gas content is now estimated to be in the range of 3,000 to 4,000 ft^3 (void fraction of 8.9%) based on the recent BPE evaluation (Appendix H). Based on this information, a void fraction distribution was created that is described as a log normal distribution with a median of 8.90 and a standard deviation of 1.75, a minimum value of 5.7% (5% confidence level), and a maximum value of 14.4 % (95% confidence level). The RPP-10006 methodology used automatically limits DST void fractions to the neutral buoyancy void fraction, which is less than the maximum value given above. Figure 2-3 illustrates the void fraction distribution.

Figure 2-3. Void Fraction Distribution for DST 241-SY-101.

(Based on July 10, 2003 *Best Basis Inventory* data)



2.3 EXPLANATION OF HOW CRITERIA ARE USED

First the retained gas criterion is applied. If there is not enough retained gas in the waste to allow the tank headspace to reach 100% of the LFL, the tank "passes" and is classified as a waste group C tank. No further calculations are performed. If there is sufficient retained gas in the waste to allow the tank headspace to reach 100% of the LFL, the tank "fails". The energy ratio criterion is used next. The retained gas criterion determines either that a tank is a waste group C tank (passes criterion) or it is a waste group A/B tank and the next criterion must be used.

The energy ratio criterion is the ratio of the buoyant potential energy for gas-bearing gobs to the energy required to yield the waste and release gas from those gobs participating in buoyant displacements. If the ratio is less than 3, the tank "passes" the criterion, the tank is classified as a waste group B tank and no further calculations are performed. If the energy ratio is equal to or greater than 3, the buoyancy ratio criterion is applied. Failing the energy ratio criterion does not make a tank a BDGRE tank. It only says that there is enough buoyant potential energy to support a BDGRE if all the other factors are present. A tank that fails the energy ratio criterion is still a waste group A/B tank and the next criterion is used.

The buoyancy ratio criteria separates the waste group A and waste group B tanks. This criteria predicts whether there is sufficient gas build up in the saturated settled solids layer in a DST to make gobs of waste buoyant and produce BDGREs. If the answer is yes, the tank "fails" and is classified as a waste group A tank. If the answer is no, the tank passes and is classified as a waste group B tank.

2.4 APPLICATION OF DATA TO SLUDGE TANKS

In 1996, PNNL-11391 reported the results of investigations into the gas retention and release behavior of SSTs. It was reported that, given the proper configuration of the materials in the tank, a buoyant displacement was possible in sludge-type materials. In practical experience at the Hanford Site, BDGREs have only been observed in tanks containing saltcake/salt slurry wastes with overlaying supernatant liquid.

The findings (PNNL-11391) were based on bench-scale experiments using Bentonite clay as a simulant for SST sludge materials. The tank used in the experiments was 27 cm in diameter. In the experiment, gases retained in the solids and driving the BDGREs were generated relatively quickly using the decomposition of hydrogen peroxide. The bench-scale observations were then used in the development of the energy ratio criterion, which was found to be applicable to tanks with a significant supernatant layer. When the energy ratio was applied to Hanford DST waste, it was found to be a good predictor of the energetics of the buoyant displacements.

The only Hanford tanks with the propensity to exhibit BDGRE behavior as predicted by the buoyancy ratio are tanks containing saltcake/salt slurry wastes. Because the Hanford tanks containing sludge materials have not historically warranted additional investigation in their behavior with respect to flammable gas retention and release, there is very little data pertaining to these tanks. It has not been demonstrated that the BDGRE prediction criteria, the energy ratio and the buoyancy ratio, apply to the sludge tanks. However, because the original experiments from which the theory of buoyant displacements was developed used sludge simulants, it is assumed that applying the energy criteria will provide a conservative estimation of the propensity of the sludge wastes to exhibit BDGRE behavior.

The buoyancy ratio has been developed using the physics of gas retention and release independent of waste type. The use of the buoyancy ratio to evaluate sludge tanks at the Hanford Site has only predicted non-BDGRE behavior in sludge tanks correctly. In the absence of BDGRE sludge tanks, no method is available to calibrate the buoyancy ratio model to include sludge wastes. The effect of waste type is reflected by the calibration of the model, which is done on the set of saltcake/salt slurry BDGRE tanks at the Hanford Site.

2.5 OTHER CRITERIA RELATED TO SELECTION CRITERIA

Two additional criteria were traditionally used to discriminate BDGRE tanks: the Estey and the waste average specific gravity criteria. The Estey criteria, provided in WHC-SD-WM-TI-755, is an empirical relation developed as a discriminator for tanks with BDGRE behavior. It is defined by the product of the specific gravity of the liquid layer and the height in inches of the sediment or settled solids layer (hereafter denoted SpG_L*H_S). Historically, a limit of 150 in. has been used to differentiate between BDGRE and non-BDGRE tanks (PNNL-13337 and RPP-6517). The waste average specific gravity criteria was developed to differential BDGRE tanks based on tank average waste specific gravity. Typically, BDGRE tanks have waste average specific gravities greater than 1.4.

Report WHC-SD-WM-TI-755 states that no BDGREs were recorded in those tanks with SpG_L*H_S less than 150 in., and that all tanks that exhibit BDGREs have SpG_L*H_S greater than 230 in. (crust thickness is included in the height of the sediment). The input data for the current analysis is given in Table 2-1 and illustrated in Figure 2-4. The limit for BDGRE tanks is now 172 in. (DST 241-SY-103), while the highest average value in non-BDGRE tanks is 142 in. (DST 241-AW-103). In Figure 2-4, the filled circles indicate tanks that exhibit BDGREs, and the triangles indicate tanks that do not have BDGREs, but are close to the BDGRE conditions.

Table 2-1. Estey Criteria Inputs and Results.
(Based on July 10, 2003 *Best Basis Inventory* data)

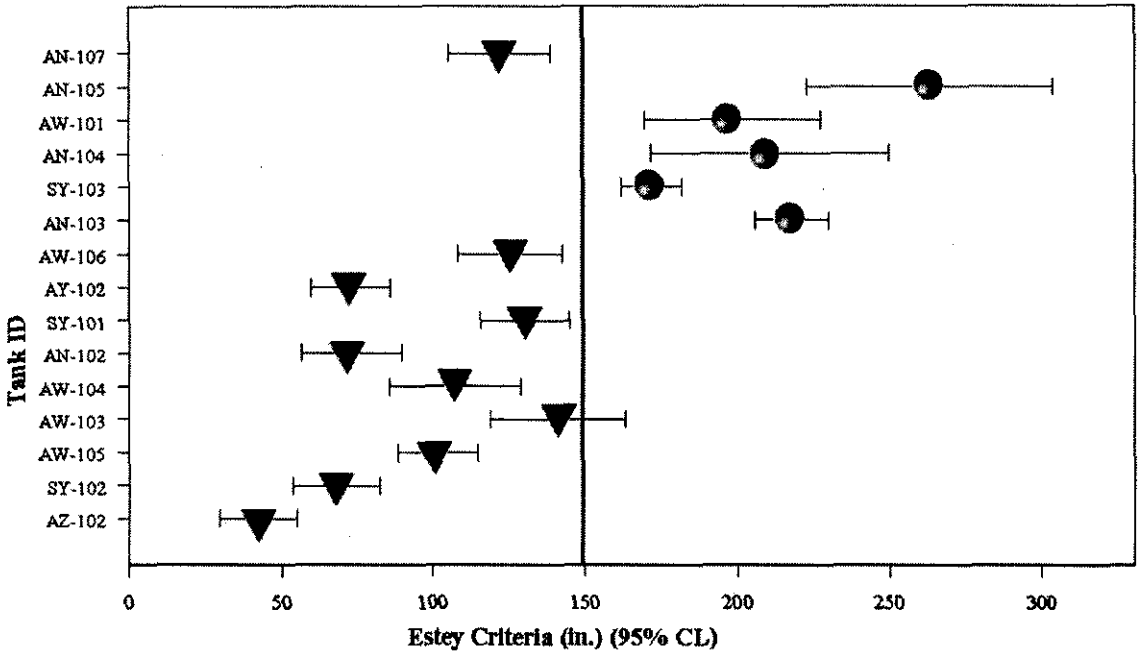
Tank	H_S (in.)	SpG_L	H_C (in.)	SpG_L*H_S (in.)	$SpG_L*(H_S+H_C)$ (in.)	Average
AN-101	0.00	1.29	0.00	0	0	0
AN-102	48.96	1.49	0.00	73	73	73
AN-103	147.10	1.48	35.04	218	270	244
AN-104	150.72	1.40	16.14	211	234	222
AN-105	185.43	1.42	17.72	263	288	276
AN-106	7.97	1.11	0.00	9	9	9
AN-107	85.19	1.43	0.00	122	122	122
AP-101	0.00	1.31	0.00	0	0	0
AP-102	8.63	1.15	0.00	10	10	10
AP-103	0.00	1.35	0.00	0	0	0
AP-104	0.00	1.28	0.00	0	0	0
AP-105	32.87	1.30	0.00	43	43	43
AP-106	0.00	1.21	0.00	0	0	0
AP-107	0.00	1.32	0.00	0	0	0
AP-108	0.00	1.25	0.00	0	0	0
AW-101	135.03	1.47	31.50	198	245	222
AW-102	11.41	1.13	0.00	13	13	13
AW-103	114.13	1.24	0.00	142	142	142
AW-104	81.18	1.32	0.00	107	107	107
AW-105	96.22	1.06	0.00	102	102	102
~~AW-106~~	87.09	1.44	0.00	125	125	125

Table 2-1. Estey Criteria Inputs and Results.
(Based on July 10, 2003 *Best Basis Inventory* data)

Tank	H_S (in.)	SpG_L	H_C (in.)	SpG_L*H_S (in.)	$SpG_L*(H_S+H_C)$ (in.)	Average
AY-101	35.23	1.19	0.00	42	42	42
AY-102	62.21	1.17	0.00	73	73	73
AZ-101	19.33	1.24	0.00	24	24	24
AZ-102	38.17	1.11	0.00	42	42	42
SY-101[a]	101.85	1.28	0.00	130	130	130
SY-102	53.04	1.28	0.00	68	68	68
SY-103	116.77	1.47	3.15	172	176	174

Notes:
[a]SY-101 is in remediated condition.
BDGRE = buoyant displacement gas release event.
BDGRE tanks are denoted in **Bold**.

Figure 2-4. Comparison of the Estey Criteria for Selected Double-Shell Tanks.
(Based on July 10, 2003 *Best Basis Inventory* data)

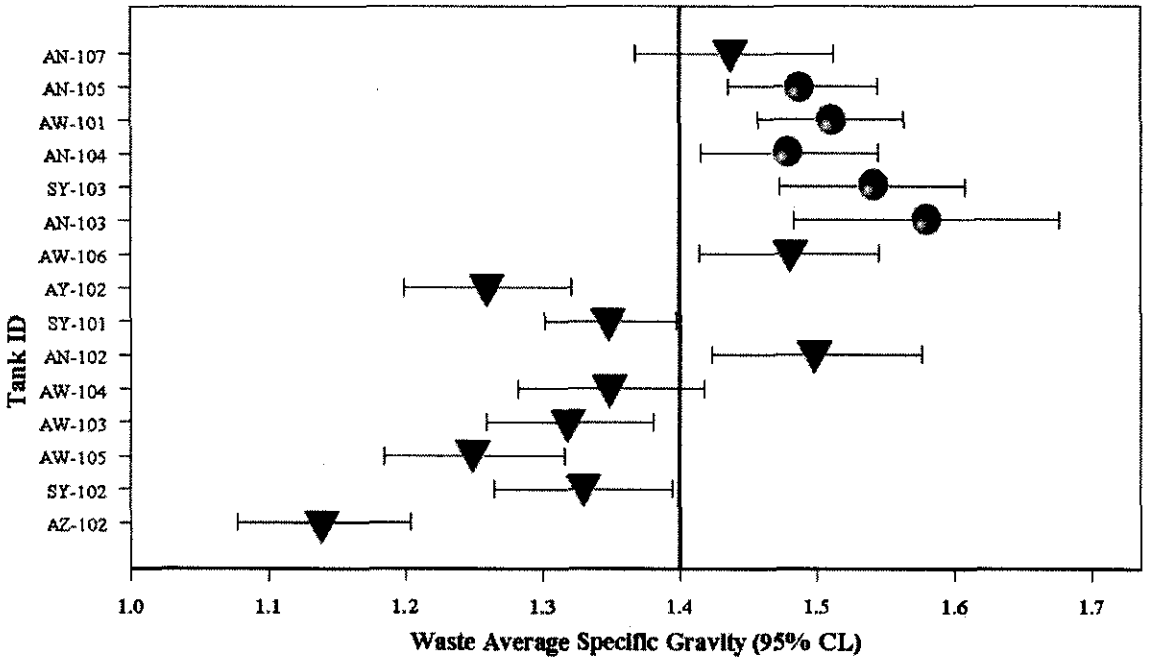


As described in Section 2.1, the buoyancy ratio includes as input parameters the layer depths and densities making up the average specific gravity of the waste and the Estey criterion as described in WHC-SD-WM-TI-755. However, it also includes the other terms that model the underlying physics of BDGRE behavior (PNNL-13337). In application, this model accurately separates the known BDGRE and non-BDGRE tanks with current data. For these reasons, the buoyancy ratio is considered the best discriminator for BDGRE behavior. Use of the other criteria along with the buoyancy ratio does not improve the overall accuracy of the prediction.

The waste average specific gravity criteria historically was developed to indicate that BDGREs only occur in tanks with waste average specific gravities greater than 1.4. As shown in Figure 2-5, which is based on data from this evaluation, all BDGRE tanks have waste average specific gravities greater than 1.4, but several tanks without BDGREs also have tanks in the same range of waste average specific gravities. As a result, the waste average specific gravity criterion by itself is insufficient to predict BDGRE behavior. Once again, waste specific gravities are included in the buoyancy ratio equation.

Figure 2-5. Comparison of Waste Average Specific Gravity for Selected Double-Shell Tanks.

(Based on July 10, 2003 *Best Basis Inventory* data)



In Figure 2-5, the circles indicate tanks that exhibit BDGREs, and the triangles indicate tanks that do not have BDGREs, but are close to the BDGRE conditions based on recent tank analyses.

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3.0 CALCULATIONAL METHODOLOGY

Data on tank wastes is available from a variety of sources. Regardless of the database where data is extracted, tank waste information has a degree of uncertainty associated with its value. The size of property or measurement uncertainty is affected by a number of factors, such as the heterogeneous nature of the waste, uncertainties due to the analysis methodology and measuring devices, and incomplete or missing data. In order to account for this uncertainty in data, the values used in this study have been assigned distributions that reflect the uncertainty in the estimation of the various tank waste information. To perform the calculations necessary to utilize data expressed as distributions, a statistical method known as the Monte Carlo methodology was utilized in this study.

3.1 MONTE CARLO METHODOLOGY

The Monte Carlo methodology is a statistical calculation method. In this method, parameters expressed as distributions are sampled repeatedly and the single-point calculation is run many times to produce a result that is a distribution that accounts for the ranges of all of the individual data parameters. In the Monte Carlo analysis, the analyst selects the number of simulation runs to perform, 'n'. A random number table is produced, which allows the calculation to select 'n' discrete values from a given input distribution. These values are then used in 'sampled' order to perform the calculation. This process is repeated for each distribution in the calculation. After this selection is completed, 'n' values have been selected from each distribution. If 'n' is sufficiently large, the frequency of the selected values mirrors the frequency of the values in the original distribution. The 'sampled' values are then used in order of their selection (not in numerical order) in the single-point calculation. The results of the 'n' single-point calculations form a distribution that will reflect the combined uncertainties from the original data. One of the advantages of the Monte Carlo simulation is that bounding property data can be used in the evaluation, but the likelihood of bounding data for all properties to be used simultaneously is very small, therefore, physically unrealistic conditions are less likely to be the basis for a decision.

This evaluation includes distributions for 13 parameters with uncertainty for which we account. The uncertainty is used to describe uncertainties in waste measurements, waste properties, and retained gas volumes and compositions. Each analysis is performed with 5,000 trials. This involves 5,000 randomly sampled values from each distribution for a total of 65,000 data points. These values are then combined in the order they are sampled and are used in the model calculation to create a population of results with 5,000 answers that are combined to produce the result distributions. If the number of runs selected is large enough, the results of the Monte Carlo simulation can be rerun many times with different sets of randomly selected values and the resulting distribution will vary within limits acceptable to the analysis. To test the stability or reproducibility of the model, DST 241-AN-107 and SST 241-B-104 were selected for evaluation.

These tanks are the tanks closest to the boundary between waste groups B and C on the waste group C side.

The stability test checks the operation of the model using different "seed" numbers for the random number generation algorithm. This study ran the DST 241-AN-107 and SST 241-B-104 models 50 times each, with 5,000 trials per run. Fifty runs equates to 250,000 trials using 3,250,000 data points.

The initial analysis (5,000 trials) for DST 241-AN-107 resulted in 95.72% of the trials indicating that tank 241-AN-107 is a waste group C tank. The stability test gave a mean value of 95.55% waste group C and a median value of 95.59 % waste group C. This is not a significant variance and confirms that 5,000 trials are adequate. Table 3-1 presents the results of the 50 trial stability tests for this tank. Based on the stability test, 47 times the DST 241-AN-107 would be classified as a waste group C tank—2 times the tank would initially be classified as a waste group B tank for the "As Is" case. Also, in all but 3 stability test cases, the water or caustic addition sensitivity test classified the tank as a waste group C tank.

Table 3-1. Stability Test Results.

(Based on September 27, 2004 *Best Basis Inventory* data)

Tank	DST 241-AN-107	SST 241-B-104		
Value tracked	Confidence level tank is a waste group C tank	Confidence level tank is a waste group C tank		
Reported value (run #1)	95.55 (this value is more than the 95 required to classify this tank as a waste group C tank)	95.50 (this value is more than the 95 required to classify this tank as a waste group C tank)		
		"As Is"	**"Water Addition"**	**"Caustic Addition"**
Number of repetitions	50	50		
Number of trials per repetition	5,000	5,000		
Mean	95.55	95.38	95.24	95.10
Median	95.59	95.40	95.24	95.08
Standard deviation	0.29	0.29	0.30	0.32
Minimum	94.98	94.60	94.40	94.22
Maximum	96.08	96.00	95.90	95.78

Note:
DST = single-shell tank.
SST = single-shell tank.

On the other hand, the results for SST 241-B-104 were not as clear. The initial analysis (5,000 trials) for SST 241-B-104 resulted in 95.50% of the trials indicating that tank SST 241-B-104 is a waste group C tank. The stability test gave a mean value of 95.38% waste group C and a median value of 95.40% in waste group C. This is not a significant variance and confirms that 5,000 trials are adequate. Table 3-1 presents the results of the 50 trial stability tests for this tank.

Based on the stability test, 44 times SST 241-B-104 would be classified as a waste group C tank, and 6 times the tank would initially be classified as a waste group B tank. However, in 17 stability test cases, the water or caustic addition sensitivity test classified the tank as a waste group B tank. As seen in Table 3.1 the confidence level for SST 241-B-104 overlaps the decision point of 95% for the water and caustic addition cases. So even though the results for the "As Is" case are satisfactory, it is not expected that the water and caustic addition cases are also acceptable. With 5,000 trials, further evaluation finds that SST 241-B-104 cannot be placed into the waste group C category, but must be classified as a waste group B tank.

Based on the results presented in Table 3-1 at confidence levels between 95 and 95.5% it cannot be assumed that a tank is a waste group C tank. Without further evaluation, it must be assumed that the tanks in this range are actually waste group B tanks due to differences in the "As Is" conditions and the water or caustic addition cases. Conversely the same can be said about the waste group B tanks in the 94.5 to 95% range. However, since a waste classification of B for these tanks is conservative, there is no need for further evaluation.

3.2 APPLICATION OF CRYSTAL BALL[3]

Crystal Ball is an Excel[4] add-in, which performs the data sampling and handling for the Monte Carlo simulation. Appropriate distributions are selected and defined as assumptions in the Crystal Ball analysis. The model-calculated results of interest are determined and defined as forecast values. The number of runs and random number seed value (optional) is also selected to control the selection of random numbers and termination of the program. Crystal Ball will generate a table of random numbers sufficiently large to randomly sample all distributions once for each run. The number of random numbers in the table is the product of the number of distributions times the number of runs. Crystal Ball will then sample each distribution based on its random number and perform the model calculation once for each run. The individual run results are kept and a product or forecast distribution is calculated at the completion of the simulation. Crystal Ball can graphically display the forecast distributions as the runs are performed and then produces a report as desired.

3.3 ASSUMPTIONS

The following assumptions are used in this methodology.

- Gas releases are rapid with respect to the ventilation rate.
- One hundred percent of the gas is released.

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[3] Crystal Ball is a trademark of Decisioneering, Inc., Denver, Colorado.

[4] Excel is a trademark of Microsoft Corporation, Redmond, Washington.

- BDGRE behavior has been modeled based on small-scale tests with sludge-type materials. The models have only been validated based on observations on the existing BDGRE tanks, which are all saltcake/salt slurry tanks. The BDGRE models have not been confirmed based on behavior in sludge-waste tanks, other than we know that at the current tank conditions we do not observe BDGRE behavior in these tanks, which happens to be consistent with the model predictions.

- An energy ratio of 3 indicates that a BDGRE is capable of releasing retained gas. Experimental data and tank observations indicate that an energy ratio of 5 or greater is required to produce a significant gas release.

- In situ measurements of yield stress are not readily available. The distribution for yield stress is conservative towards favoring BDGRE behavior as indicated by the energy ratio.

- Assuming that the gas is retained under lithostatic conditions rather than hydrostatic conditions may produce conservative results (i.e., indicate larger amounts of retained gas).

- Assuming the headspace gas concentrations are proportional to retained gas concentrations may be a conservative assumption.

- Available void fraction information for sludge tanks with at least 1 m of supernatant is not sufficient for the creation of a distribution for this tank configuration. The default void fraction derived for saltcake/salt slurry tanks with 1 m of liquid is assumed to be conservative for this tank configuration.

- Void fractions are considered constant in tanks that have been saltwell pumped when compared to the pre-pumping condition of the tank.

- Retained gas void fractions are bound by the neutral buoyancy void fraction in DSTs only.

- There is no correlation assumed between H_2 and NH_3 gas concentrations.

- The volume of waste, when less than the dish height, is assumed to be proportional to the height within the dish. When converting waste height to volume this is conservative by overestimating the volume of waste and therefore overestimating the volume of retained gas when waste is contained only in the dish.

- The volume of waste, when less than the knuckle height, is assumed to be proportional to the height within the knuckle. When converting waste height to volume this is conservative by overestimating the volume of waste and therefore overestimating the volume of retained gas when waste is contained only in the knuckle.

- Nonconvective layer density is determined by the relationship between convective layer density, solid particle density and nonconvective layer porosity.

4.0 SOURCES OF INPUT DATA AND HIERARCHY

The *Best Basis Inventory* (BBI) database is the preferred database for waste characterization information. This database is used whenever possible to help keep consistency between various engineering documents produced by Hanford Site contractors. For this evaluation, the BBI database was queried on September 27, 2004 (July 10, 2004, BBI data set). These same data are used in the preparation of RPP-5926, *Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste.* Data not available in the BBI, such as vapor data, were obtained from other sources as described below. All data used in these analyses are presented in Appendix A, Tables A-1 through A-8. All data sources documented in Appendix B, Tables B-1 through B-8, provide the data sources on an individual data point basis. Table B-9 provides the key to the references. A summary of the input data required for this evaluation and the primary source for that information is presented in Table 4-1.

Table 4-1. Data Source Summary Table. (2 sheets)

Variable	Variable type	Primary source of information
Total nonconvective waste depth (m)	Distribution	Ref 6
Saturated nonconvective waste depth (m)	Distribution	Ref 6
Convective waste depth (m)	Distribution	Ref 6
Crust depth (m)	Distribution	Ref 7
Nonconvective waste porosity	Distribution	Ref 6
Convective waste density (kg/m^3)	Distribution	Ref 6
Nonconvective waste average temperature (K)	Single point value	Ref 5
Tank headspace average temperature (K)	Single point value	Ref 5
Tank type group	Single point value	Ref 1
Total tank volume (m^3)	Single point value	Ref 1
Tank operating capacity (m)	Single point value	Ref 1
Tank headspace volume (m^3)	Single point value	Ref 1
Dish type	Single point value	Ref 1
Dish height (m)	Single point value	Ref 1
Dish volume (kL)	Single point value	Ref 1
Tank capacity (kL/m)	Single point value	Ref 1
Void fraction or maximum saturated solids void fraction (%)	Distribution	Ref 3
Nonconvective waste yield stress dist (Pa)	Distribution	Ref 4
Retained gas ratio CH_4 dist	Distribution	Ref 2
Retained gas ratio N_2O dist	Distribution	Ref 2
Retained gas composition N_2 (%)	Distribution	Ref 2
Retained gas composition NH_3 (%)	Distribution	Ref 2
Hydrogen generation rate in nonconvective waste (moles/m^3/day)	Distribution	Ref 5
Cross sectional area of tank (m^2)	Single point value	Ref 1

Table 4-1. Data Source Summary Table. (2 sheets)

Variable	Variable type	Primary source of information

Notes:

Ref 1, RPP-13019, 2003, *Tank Volume Calculations*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

Ref 2, Appendix J, "Derivation Of Retained Gas Compositions."

Ref 3, Appendix K, "Derivation Of Void Fraction."

Ref 4, Appendix F, TWS03.044, 2003, *Summary of Yield Stress in Shear Data for Hanford Waste*, Pacific Northwest National Laboratory, Richland, Washington.

Ref 5, RPP-5926, 2004, *Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste*, Rev 4, CH2M HILL Hanford Group, Inc., Richland, Washington.

Ref 6, *Best Basis Inventory*, [database accessed September 27, 2004], internet address: http://twins.pnl.gov:8001.

Ref 7, RPP-6655, 2000, *Data Observations On Double-Shell Flammable Gas Watchlist Tank Behavior*, Rev 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

4.1 POINT VALUES

The July 24, 2003, BBI database is the default source of data for the waste and tank characteristic information. The information obtained from the BBI database includes the waste layer depth information and the layer waste density information. The hydrogen generation rates, waste temperatures, and headspace temperatures were obtained from RPP-5926. Another primary source of temperature data is the Personal Computer Surveillance Analysis Computer System (PCSACS). Uncertainty information on the BBI data was obtained from an email from S. L. Wilmarth to S. A. Barker (Appendix I). In future releases of the BBI, the uncertainty data will be included and may be used as a primary source. Data pertaining to the tanks that display buoyant displacement behavior were obtained from RPP-6655. Updates of waste characteristics for these tanks can be obtained from the BBI database. However, the time the sample was taken for analysis in relationship to the BDGRE event can affect the results of the analysis. Retained gas volumes may be reduced in BDGRE tanks following a BDGRE, where the property data can cause misleading results in a waste tank grouping evaluation. Tank dimensions are based on updated tank volume calculations presented in RPP-13019, *Tank Volume Calculations*.

4.2 DISTRIBUTIONS

A number of important waste characterization properties were needed to properly determine the classification of the tanks. For characterization information that is not included in the BBI database, or for information with values that are uncertain, the information is expressed as distributions. PNNL reported yield stress for six tanks (DSTs 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, 241-SY-103, and 241-SY-101 [pre-mitigation]) based on in situ ball rheometer testing (RPP-6655). A suitable distribution for yield stress based on this data was suggested by PNNL (Appendix F). Finally, due to the recent activities in DSTs 241-AN-107 and 241-SY-101, the void fractions were reevaluated for this analysis. The results of this evaluation are reported in TWS02.025 (Appendix G). Gas composition data and void fraction information is not available in the BBI database and data distributions from RGS results were used from Appendices J and K. Information from these appendices also reports the results of a statistical

evaluation that estimates a distribution for the void fraction and retained gas composition for tanks where no data is available. For tanks where data is available for gas compositions, the RGS measured gas compositions are used. For tanks with acceptable void fraction measurements, such as VFI data or good BPE data, the void fraction used in this evaluation is the measured value.

The hydrogen generation rate (HGR) distributions are based on the evaluation of model-calculated and field-observed rates from RPP-3851, *Empirical Rate Equation Model and Rate Calculations of Hydrogen Generation for Hanford Tank Waste*, as presented in Table 4-2. In Table 4-2, positive "Relative Differences" indicate overestimation of the HGR; negative "Relative Differences" indicate model underestimation of the HGR. Based on this evaluation the HGR distributions are described by a triangular distribution with the upper and lower bounds defined as listed below:

Model Estimated HGR	Upper Bound	Lower Bound
$HGR_{est} \geq 1.5E\text{-}03$ (ft^3/min)	1.10 * HGR_{est}	HGR_{est} / 3
$1.5E\text{-}03 \geq HGR_{est} \geq 1.0E\text{-}03$ (ft^3/min)	1.50 * HGR_{est}	HGR_{est} / 2
1.0E-03 (ft^3/min) $\geq HGR_{est}$	1.90 * HGR_{est}	HGR_{est} / 2

Table 4-2. Comparison of Model-Calculated and Field-Observed Hydrogen Generation Rates (RPP-3851). (2 pages)

Tanks	Gmod (ft^3/min) Total HGR from Model	Gfield (ft^3/min) Total HGR from Field	Gmod (L/day) Total HGR from Model	Gmod (L/day) Total HGR from Field	Relative Differences [Model vs Field data]
241-AN-101	1.73E-04	2.50E-04	7	10	-31%
241-U-107	4.71E-04	8.27E-04	19	34	-43%
241-U-109	5.44E-04	7.11E-04	22	29	-23%
241-SX-101	6.64E-04	4.20E-04	27	17	58%
241-U-108	9.42E-04	1.41E-03	39	57	-33%
241-SY-102	9.66E-04	7.26E-04	40	30	33%
241-U-102	1.05E-03	1.10E-03	43	45	-4%
241-U-106	1.12E-03	6.62E-04	46	27	69%
241-S-102	1.25E-03	1.64E-03	51	67	-24%
241-SX-104	1.31E-03	2.51E-04	53	10	420%
241-U-105	1.37E-03	1.61E-03	56	65	-15%
241-U-103	1.46E-03	1.48E-03	60	60	-1%
241-SX-106	1.53E-03	1.24E-03	63	50	24%
241-C-104	2.56E-03	2.21E-03	105	90	16%

Table 4-2. Comparison of Model-Calculated and Field-Observed Hydrogen Generation Rates (RPP-3851). (2 pages)

Tanks	Gmod (ft^3/min) Total HGR from Model	Gfield (ft^3/min) Total HGR from Field	Gmod (L/day) Total HGR from Model	Gmod (L/day) Total HGR from Field	Relative Differences [Model vs Field data]
241-SX-103	3.03E-03	1.27E-03	124	52	139%
241-AW-101	3.55E-03	3.17E-03	146	129	12%
241-SY-103	3.63E-03	3.54E-03	149	145	2%
241-AN-103	4.54E-03	4.76E-03	186	195	-5%
241-AN-105	5.14E-03	3.06E-03	211	125	68%
241-AN-104	5.53E-03	2.55E-03	227	104	117%
241-A-101	5.76E-03	2.14E-03	236	87	169%
241-SX-105	5.77E-03	4.82E-03	236	197	20%
241-AN-107	1.09E-02	5.25E-03	447	214	108%
241-C-106	1.62E-02	9.03E-03	664	368	79%
241-AY-102	2.10E-02	1.70E-02	859	691	24%
241-AZ-101	2.79E-02	9.44E-03	1144	385	196%
241-AZ-102	2.90E-02	1.90E-02	1190	775	53%
241-SY-101	5.96E-02	2.44E-02	2441	993	145%

Notes:

RPP-3851, 2004, *Empirical Rate Equation Model and Rate Calculations of Hydrogen Generation for Hanford Tank Waste*, Rev. 1, CH2M HILL Hanford Group, Inc., Richland Washington.

HGR = hydrogen generation rate.

Due to the nature of various waste properties, some distributions are constrained to be sure that the sampled properties are in the range of expected values and also so that nonphysical conditions are not selected by the Monte Carlo sampler. There are two types of constraints used in this model: limits on property ranges; and controls on range values or interactions that are dynamically calculated. The limits on property ranges are listed in Appendix A for each distribution. The constraints and dynamic controls are listed in Table 4-3.

Table 4-3. Monte Carlo Model Dynamic Constraints.

Variable	Constraint
Total waste depth (m)	Constrained to tank operating limit
Total nonconvective waste depth (m)	Constrained to total waste depth
Saturated nonconvective waste depth (m)	Constrained to always be less than or equal to "total nonconvective waste depth"
Convective waste depth (m)	Calculated by difference
Crust depth (m)	No dynamic constraint
Nonconvective waste porosity (kg/m^3)	Porosity is constrained to less than 0.9
Convective waste density (kg/m^3)	No dynamic constraint
Void fraction or maximum saturated solids void fraction (%)	No dynamic constraint for SSTs. For BDGRE DSTs the void fraction is dynamically limited to the α_{NB} void fraction
Nonconvective waste yield stress dist (Pa)	No dynamic constraint
Retained gas ratio CH_4 dist	No dynamic constraint
Retained gas ratio N_2O dist	No dynamic constraint
Retained gas composition N_2 (%)	No dynamic constraint
Retained gas composition NH_3 (%)	No dynamic constraint
Hydrogen generation rate in nonconvective waste (moles/m^3/day)	No dynamic constraint

Notes:
BDGRE = buoyant displacement gas release event.
SST = single-shell tank.
DST = double-shell tank.

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5.0 RESULTS OF CALCULATIONS

An evaluation of the SSTs and DSTs at the Hanford Site has been completed using the methodology presented in Section 3.0, the data presented in Appendices A and B, and the model presented in Appendices C, D, and E. Each tank was evaluated based on the waste conditions published in the BBI on September 27, 2004. Three conditions were then evaluated for each tank:

- Base condition as of the selected data date (AS IS case)
- Base case with an addition of 10,000 gal of water (10,000-gal water addition case) (1,000-gal addition for 200-series SSTs)
- Base case with an addition of 10,000 gal of caustic (10,000-gal caustic addition case) (1,000-gal addition for 200-series SSTs).

The last two cases were performed to determine if any tanks changed classification as the result of the addition of modest amounts of water or caustic. These two cases demonstrate what can happen to the tank classification during normal operations as the result of a number of water flushes over time, or if caustic is added to the water flush in order to condition the water. An additional constraint was placed on the tanks relating to these additions. Near-full tanks were not allowed to exceed the tank operating limit for waste volume.

Appendix E contains a sample output file from the program. The sample output contains the Monte Carlo results for all variables that were tracked, the input distributions (or assumptions) for the given tank, and a table summarizing key variables that were used to verify proper operation of the model (this table is located at the top of the file so that the user does not have to search through pages of output for the desired results). A compact disc is available from the authors that contain the complete set of output files, as well as the model.

5.1 WASTE GROUP ASSIGNMENTS

The methodology used in this waste classification evaluation indicates that if the tank exhibits category C behavior at the 95% confidence level (the 95% confidence level can also be expressed as 95% of the trials), the waste tank is classified as waste group C. If the tank waste exhibits category C behavior at less than the 95% confidence level, but exhibits combined category C and category B behavior at more than 95% confidence level, the tank is then classified as a waste group B tank. For all remaining tanks, those that exhibit category A behavior, over more than 5% of the trials are placed in waste group A.

A confidence level of 95% was chosen for the selection criteria prior to the start of the evaluation in order not to pre-suppose the result of this analysis. Selecting a confidence level allows bounding property data to be used in the evaluation. While the likelihood of a Monte Carlo simulation result using bounding data for all properties simultaneously is very small, providing a

confidence level will limit decisions based on combinations of many physically bounding conditions. On the other hand, the possibility of making a nonconservative waste group assignment is reduced by the problem definition, which states that 100% of the gas is released, a very conservative assumption. Past experience with all tanks, indicates that the largest observed gas release is on the order of 56% of the retained gas (see Section 1.2). Except for releases from DST 241-SY-101 (pre-remediation), the largest gas release reported in RPP-7771 was 19% for DST 241-AW-101 (see Section 1.2, Table 1-1).

This classification strategy can be demonstrated using examples from Table 5-1.

- DST 241-AN-101 exhibits category C characteristics for 100% of the trials – it is classified in waste group C.
- DST 241-AY-102 exhibits category C characteristics for 98.2% of the trials, category B characteristics for 1.8% of the trials, and category A characteristics for 0% of the trials – it is classified in waste group C.
- DST 241-AW-101 exhibits category C characteristics for 47.7% of the trials and category A characteristics for 51.9% of the trials – it is classified in waste group A.
- DST 241-AW-103 exhibits category C characteristics for 22.9% of the trials, category B characteristics for 77.0% of the trials, and category A characteristics for 0.1% of the trials – because it exhibits category B and C characteristics for 99.9% of the trials, it is classified in waste group B.
- DST 241-AN-103 exhibits category C characteristics for 8.4% of the trials, category B characteristics for 34.2% of the trials, and category A characteristics for 57.4% of the trials – it is classified in waste group A.
- DST 241-AN-104 exhibits category C characteristics for 23.2% of the trials, category B characteristics for 6.5% of the trials, and category A characteristics for 70.3% of the trials – it is classified in waste group A.

Table 5-1. Determination of Classification.

(Based on September 27, 2004 BBI data) (6 sheets)

As Is	Type	Waste Type[a]	Category A (%)	Category B (%)	Category C (%)	"Worst" Condition
241-AN-101	DST	SL-LIQ	0.0	0.0	100.0	C
241-AN-102	DST	SC/SS-LIQ	0.0	6.9	93.1	B
241-AN-103	DST	SC/SS-LIQ	57.4	34.2	8.4	A
241-AN-104	DST	SC/SS-LIQ	70.3	6.5	23.2	A
241-AN-105	DST	SC/SS-LIQ	87.4	0.0	12.6	A
241-AN-106	DST	SC/SS-LIQ	0.0	0.0	100.0	C
241-AN-107	DST	SC/SS-LIQ	8.2	37.4	54.4	C
241-AP-101	DST	LIQ	0.0	0.0	100.0	C

Table 5-1. Determination of Classification.
(Based on September 27, 2004 BBI data) (6 sheets)

As Is	Type	Waste Type[a]	Category A (%)	Category B (%)	Category C (%)	"Worst" Condition
241-AP-102	DST	LIQ	0.0	0.0	100.0	C
241-AP-103	DST	LIQ	0.0	0.0	100.0	C
241-AP-104	DST	LIQ	0.0	0.0	100.0	C
241-AP-105	DST	SC/SS-LIQ	0.0	0.0	100.0	C
241-AP-106	DST	LIQ	0.0	0.0	100.0	C
241-AP-107	DST	LIQ	0.0	0.0	100.0	C
241-AP-108	DST	LIQ	0.0	0.0	100.0	C
241-AW-101	DST	SC/SS-LIQ	51.9	0.4	47.7	A
241-AW-102	DST	SC/SS-NL	0.0	0.0	100.0	C
241-AW-103	DST	SL-LIQ	0.0	77.0	22.9	B
241-AW-104	DST	SL-LIQ	0.0	46.3	53.7	B
241-AW-105	DST	SL-LIQ	0.0	0.1	99.9	C
241-AW-106	DST	SC/SS-LIQ	0.0	11.4	88.6	B
241-AY-101	DST	SL-NL	0.0	0.0	100.0	C
241-AY-102[b]	DST	SL-LIQ	0.0	1.8	98.2	C[b]
241-AZ-101	DST	SL-LIQ	0.0	0.0	100.0	C
241-AZ-102	DST	SL-LIQ	0.0	1.8	98.2	C
241-SY-101	DST	SC/SS-LIQ	0.0	0.0	100.0	C
241-SY-102	DST	SL-LIQ	0.0	5.9	94.1	B
241-SY-103[c]	DST	SC/SS-LIQ	3.6	5.3	91.1	A[c]
241-A-101	SST	SC/SS-NL	na	63.5	36.5	B
241-A-102	SST	MIX-NL	na	0.0	100.0	C
241-A-103	SST	SL-NL	na	0.0	100.0	C
241-A-104	SST	SL-NL	na	0.0	100.0	C
241-A-105	SST	SL-NL	na	0.0	100.0	C
241-A-106	SST	SL-NL	na	0.0	100.0	C
241-AX-101	SST	SC/SS-NL	na	0.0	100.0	C
241-AX-102	SST	SC/SS-NL	na	0.0	100.0	C
241-AX-103	SST	SC/SS-NL	na	0.0	100.0	C
241-AX-104	SST	SL-NL	na	0.0	100.0	C
241-B-101	SST	SC/SS-NL	na	0.4	99.6	C
241-B-102	SST	SC/SS-NL	na	0.0	100.0	C
241-B-103	SST	SC/SS-NL	na	0.0	100.0	C
241-B-104	SST	SL-NL	na	4.5	95.5	C
241-B-105	SST	SC/SS-NL	na	4.7	95.3	B
241-B-106	SST	SL-NL	na	0.0	100.0	C

Table 5-1. Determination of Classification.
(Based on September 27, 2004 BBI data) (6 sheets)

As Is	Type	Waste Type[a]	Category A (%)	Category B (%)	Category C (%)	"Worst" Condition
241-B-107	SST	MIX-NL	na	2.6	97.4	C
241-B-108	SST	MIX-NL	na	0.0	100.0	C
241-B-109	SST	MIX-NL	na	0.1	99.9	C
241-B-110	SST	SL-NL	na	1.0	99.0	C
241-B-111	SST	SL-NL	na	1.2	98.8	C
241-B-112	SST	SL-NL	na	0.0	100.0	C
241-B-201	SST	SL-NL	na	0.0	100.0	C
241-B-202	SST	SL-NL	na	0.0	100.0	C
241-B-203	SST	SL-NL	na	49.2	50.8	B
241-B-204	SST	SL-NL	na	46.9	53.1	B
241-BX-101	SST	SL-NL	na	0.0	100.0	C
241-BX-102	SST	SL-NL	na	0.0	100.0	C
241-BX103	SST	SL-NL	na	0.0	100.0	C
241-BX-104	SST	SL-NL	na	0.0	100.0	C
241-BX-105	SST	SL-NL	na	0.0	100.0	C
241-BX-106	SST	SL-NL	na	0.0	100.0	C
241-BX-107	SST	SL-NL	na	0.0	100.0	C
241-BX-108	SST	SL-NL	na	0.0	100.0	C
241-BX-109	SST	SL-NL	na	0.0	100.0	C
241-BX-110	SST	MIX-NL	na	0.0	100.0	C
241-BX-111	SST	SC/SS-NL	na	0.8	99.2	C
241-BX-112	SST	SL-NL	na	0.0	100.0	C
241-BY-101	SST	SC/SS-NL	na	27.3	72.7	B
241-BY-102	SST	SC/SS-NL	na	3.9	96.1	B
241-BY-103	SST	SC/SS-NL	na	44.1	55.9	B
241-BY-104	SST	MIX-NL	na	16.3	83.7	B
241-BY-105	SST	SC/SS-NL	na	41.9	58.1	B
241-BY-106	SST	SC/SS-NL	na	7.0	93.0	B
241-BY-107	SST	SC/SS-NL	na	5.0	95.0	B
241-BY-108	SST	MIX-NL	na	1.3	98.7	C
241-BY-109	SST	SC/SS-NL	na	5.1	94.9	B
241-BY-110	SST	SC/SS-NL	na	21.4	78.6	B
241-BY-111	SST	SC/SS-NL	na	6.2	93.8	B
241-BY-112	SST	SC/SS-NL	na	0.0	100.0	C
241-C-101	SST	SL-NL	na	0.0	100.0	C
241-C-102	SST	SL-NL	na	0.0	100.0	C

Table 5-1. Determination of Classification.
(Based on September 27, 2004 BBI data) (6 sheets)

As Is	Type	Waste Type[a]	Category A (%)	Category B (%)	Category C (%)	"Worst" Condition
241-C-103	SST	SL-NL	na	0.0	100.0	C
241-C-104	SST	SL-NL	na	0.0	100.0	C
241-C-105	SST	SL-NL	na	0.0	100.0	C
241-C-106	SST	SL-NL	na	0.0	100.0	C
241-C-107	SST	SL-NL	na	0.0	100.0	C
241-C-108	SST	SL-NL	na	0.0	100.0	C
241-C-109	SST	SL-NL	na	0.0	100.0	C
241-C-110	SST	SL-NL	na	0.2	99.8	C
241-C-111	SST	SL-NL	na	0.0	100.0	C
241-C-112	SST	SL-NL	na	0.0	100.0	C
241-C-201	SST	SL-NL	na	0.0	100.0	C
241-C-202	SST	SL-NL	na	0.0	100.0	C
241-C-203	SST	SL-NL	na	0.0	100.0	C
241-C-204	SST	SL-NL	na	0.0	100.0	C
241-S-101	SST	MIX-NL	na	1.0	99.0	C
241-S-102	SST	SC/SS-NL	na	72.2	27.8	B
241-S-103	SST	SC/SS-NL	na	22.8	77.2	B
241-S-104	SST	SL-NL	na	0.9	99.1	C
241-S-105	SST	SC/SS-NL	na	7.6	92.4	B
241-S-106	SST	SC/SS-NL	na	55.0	45.0	B
241-S-107	SST	SL-NL	na	0.0	100.0	C
241-S-108	SST	SC/SS-NL	na	31.9	68.1	B
241-S-109	SST	SC/SS-NL	na	31.5	68.5	B
241-S-110	SST	MIX-NL	na	39.5	60.5	B
241-S-111	SST	SC/SS-LIQ	na	10.2	89.8	B
241-S-112	SST	SC/SS-NL	na	0.0	100.0	C
241-SX-101	SST	SC/SS-NL	na	19.9	80.1	B
241-SX-102	SST	SC/SS-LIQ	na	0.0	100.0	C
241-SX-103	SST	SC/SS-NL	na	15.6	84.4	B
241-SX-104	SST	SC/SS-NL	na	0.0	100.0	C
241-SX-105	SST	SC/SS-NL	na	6.6	93.4	B
241-SX-106	SST	SC/SS-NL	na	26.8	73.2	B
241-SX-107	SST	SL-NL	na	0.0	100.0	C
241-SX-108	SST	SL-NL	na	0.0	100.0	C
241-SX-109	SST	SC/SS-NL	na	0.0	100.0	C
241-SX-110	SST	SL-NL	na	0.0	100.0	C

Table 5-1. Determination of Classification.
(Based on September 27, 2004 BBI data) (6 sheets)

As Is	Type	Waste Type[a]	Category A (%)	Category B (%)	Category C (%)	"Worst" Condition
241-SX-111	SST	SL-NL	na	0.0	100.0	C
241-SX-112	SST	SL-NL	na	0.0	100.0	C
241-SX-113	SST	SL-NL	na	0.0	100.0	C
241-SX-114	SST	SL-NL	na	0.0	100.0	C
241-SX-115	SST	SL-NL	na	0.0	100.0	C
241-T-101	SST	MIX-NL	na	0.0	100.0	C
241-T-102	SST	SL-NL	na	0.0	100.0	C
241-T-103	SST	SL-NL	na	0.0	100.0	C
241-T-104	SST	SL-NL	na	2.2	97.8	C
241-T-105	SST	SL-NL	na	0.0	100.0	C
241-T-106	SST	SL-NL	na	0.0	100.0	C
241-T-107	SST	SL-NL	na	0.0	100.0	C
241-T-108	SST	MIX-NL	na	0.0	100.0	C
241-T-109	SST	SC/SS-NL	na	0.0	100.0	C
241-T-110	SST	SL-NL	na	4.3	95.7	C
241-T-111	SST	SL-NL	na	7.8	92.2	B
241-T-112	SST	SL-NL	na	0.0	100.0	C
241-T-201	SST	SL-NL	na	8.0	92.0	B
241-T-202	SST	SL-NL	na	0.0	100.0	C
241-T-203	SST	SL-NL	na	0.0	100.0	C
241-T-204	SST	SL-NL	na	0.0	100.0	C
241-TX-101	SST	SL-NL	na	0.0	100.0	C
241-TX-102	SST	SC/SS-NL	na	0.0	100.0	C
241-TX-103	SST	SC/SS-NL	na	0.0	100.0	C
241-TX-104	SST	MIX-NL	na	0.0	100.0	C
241-TX-105	SST	SC/SS-NL	na	27.8	72.2	B
241-TX-106	SST	SC/SS-NL	na	22.8	77.2	B
241-TX-107	SST	SC/SS-NL	na	0.0	100.0	C
241-TX-108	SST	SC/SS-NL	na	0.0	100.0	C
241-TX-109	SST	SL-NL	na	0.0	100.0	C
241-TX-110	SST	SC/SS-NL	na	15.0	85.0	B
241-TX-111	SST	SC/SS-NL	na	11.9	88.1	B
241-TX-112	SST	SC/SS-NL	na	73.4	26.6	B
241-TX-113	SST	MIX-NL	na	52.9	47.1	B
241-TX-114	SST	SC/SS-NL	na	39.7	60.3	B
241-TX-115	SST	SC/SS-NL	na	54.3	45.7	B

Table 5-1. Determination of Classification.
(Based on September 27, 2004 BBI data) (6 sheets)

As Is	Type	Waste Type[a]	Category A (%)	Category B (%)	Category C (%)	"Worst" Condition
241-TX-116	SST	SC/SS-NL	na	0.0	100.0	C
241-TX-117	SST	SC/SS-NL	na	6.8	93.2	B
241-TX-118	SST	SC/SS-NL	na	6.0	94.0	B
241-TY-101	SST	MIX-NL	na	0.0	100.0	C
241-TY-102	SST	SC/SS-NL	na	0.0	100.0	C
241-TY-103	SST	SL-NL	na	0.0	100.0	C
241-TY-104	SST	SL-NL	na	0.0	100.0	C
241-TY-105	SST	SL-NL	na	0.1	99.9	C
241-TY-106	SST	SL-NL	na	0.0	100.0	C
241-U-101	SST	SL-NL	na	0.0	100.0	C
241-U-102	SST	SC/SS-NL	na	51.4	48.6	B
241-U-103	SST	SC/SS-NL	na	57.6	42.4	B
241-U-104	SST	MIX-NL	na	0.0	100.0	C
241-U-105	SST	SC/SS-NL	na	38.8	61.2	B
241-U-106	SST	SC/SS-NL	na	0.0	100.0	C
241-U-107	SST	SC/SS-NL	na	10.2	89.8	B
241-U-108	SST	SC/SS-NL	na	51.5	48.5	B
241-U-109	SST	SC/SS-NL	na	10.4	89.6	B
241-U-110	SST	SL-NL	na	0.0	100.0	C
241-U-111	SST	SC/SS-NL	na	9.1	90.9	B
241-U-112	SST	SL-NL	na	0.0	100.0	C
241-U-201	SST	SL-NL	na	0.0	100.0	C
241-U-202	SST	SL-NL	na	0.0	100.0	C
241-U-203	SST	SL-NL	na	0.0	100.0	C
241-U-204	SST	SL-NL	na	0.0	100.0	C

Notes:

[a]RPP-6171, 2000, *Determination Of Waste Groupings For Safety Analyses*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

[b]DST 241-AY-102 hydrogen generation rate was revised downward just prior to the release of this document. The revised value is not included in this document. It would have no effect on the waste group classification.

[c]DST 241-SY-103 was given a waste group A classification due to ongoing GREs and engineering judgment.

DST = double-shell tank.
LIQ = deep liquid layer above solids, liquid layer is at least 1 m deep.
MIX = mixed waste, less than 75 volume % sludge or saltcake.
NA = not applicable.
NL = no deep liquid layer above solids, liquid layer is less than 1 m deep.
SC/SS = Saltcake/salt slurry solids, at least 75 volume % saltcake/salt slurry solids.
SL = Sludge solids, at least 75 volume % sludge solids.
SST = single-shell tank.

Table 5-2 lists the 6 tanks that have a median buoyancy ratio greater than 1. DSTs 241-AN-103, 241-AN-104, 241-AN-105, and 241-AW-101 exhibit BDGRE behavior and are waste group A tanks. DST 241-SY-103 has properties and observations which indicate BDGRE releases probably occur within the tank, but only exhibits category A behavior less than 4% of the time and as a result is classified as a waste group B tank based on the model results. However, because of the observations that indicate BDGRE releases occur within the tank (RPP-6655), DST 241-SY-103 is reclassified as a waste group A tank. DST 241-AN-107 has too little waste or too low a gas retention rate and is classified as waste group C tank. In this revision of the document, an increase in buoyancy ratios in the DSTs has been noted. The greatest increase in buoyancy ratio is in DST 241-AN-107. This tank has not exhibited any BDGRE behavior to date. Its buoyancy ratio has increased due to a large increase in the supernatant density as a result of caustic addition to control the tank pH. As presented in Table 5-2, all 6 tanks exceed the BDGRE criteria based on energy ratio and buoyancy ratio. DST 241-AN-107 does not exceed the "specific gravity (convective layer)" X "nonconvective layer depth" (Estey criteria) (150 in.) and DST 241-AY-102 does not exceed the "waste average specific gravity criteria" (1.4). It should be noted that historically only DSTs 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, 241-SY-101 (pre-mitigation), and 241-SY-103 have documented BDGRE behavior (RPP-6655).

Table 5-2. Indicators of Buoyant Displacement Gas Release Event Behavior.
(Based on September 27, 2004 BBI data)

Tank	Tank Type	[%A]	[%B]	[%C]	Head-space Flam Gas Conc (%LFL) (95% CL)	"Specific Gravity (CL)" X "NCL Depth" (in) (95% CL)	Energy Ratio (Dimension-less) (95% CL)	Buoyancy Ratio (Dimension-less) (Median)	Buoyancy Ratio (Dimension-less) (95% CL)	Waste Ave Specific Gravity (na) (95% CL)
241-AN-103	DST	57.4	34.2	8.4	359%	262	16	1.04	1.27	1.66
241-AN-104	DST	70.3	6.5	23.2	246%	268	27	1.44	2.19	1.57
241-AN-105	DST	87.4	0.0	12.6	334%	319	21	2.22	3.24	1.56
241-AN-107	DST	0.6	3.7	95.7	95%	134	35	0.84	1.26	1.52
241-AW-101	DST	51.9	0.4	47.7	171%	244	24	1.81	2.88	1.61
241-SY-103	DST	3.6	5.3	91.1	109%	198	11	1.20	1.79	1.64

Notes:
95% CL = 95% confidence level.
CL = convective layer.
DST = double-shell tank.
LFL = lower flammability limit.
na = not applicable.
NCL = nonconvective layer.

5.1.1 Double-Shell Tanks

As shown in Table 5-3, 18 of the 28 DSTs are classified as waste group C tanks. That is, even if 100% of the retained gas is released from these tanks, the headspace flammable gas concentration will not exceed 100% LFL. Six DSTs (241-AP-105, 241-AW-103, 241-AW-104, 241-AW-106, 241-SY-101, and 241-SY-103) are classified as waste group B tanks based on the model. However, DST 241-SY-103 is known to exhibit regular small BDGREs and BDGRE behavior is predicted by the energy ratio and buoyancy ratio criteria. The retained gas volume criterion indicates that 100% of the LFL is rarely exceeded, resulting in the tank being classified by the model as waste group B. Upon consideration of the actual BDGRE behavior, DST 241-SY-103 is classified as a waste group A tank. The four remaining DSTs, 241-AN-103, 241-AN-104, 241-AN-105, and 241-AW-101, have exhibited BDGRE behavior, and based on this evaluation are classified as waste group A tanks.

Table 5-3. Waste Group Assignments for Double-Shell Tanks.
(Based on September 27, 2004 BBI data)

Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition	Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition
241-AN-101	DST	C	C	C	241-AW-101	DST	A	A	A
241-AN-102	DST	B	B	B	241-AW-102	DST	C	C	C
241-AN-103	DST	A	A	A	241-AW-103	DST	B	B	B
241-AN-104	DST	A	A	A	241-AW-104	DST	B	B	B
241-AN-105	DST	A	A	A	241-AW-105	DST	C	C	C
241-AN-106	DST	C	C	C	241-AW-106	DST	B	B	B
241-AN-107	DST	C	C	C	241-AY-101	DST	C	C	C
241-AP-101	DST	C	C	C	241-AY-102[a]	DST	C	C	C
241-AP-102	DST	C	C	C	241-AZ-101	DST	C	C	C
241-AP-103	DST	C	C	C	241-AZ-102	DST	C	C	C
241-AP-104	DST	C	C	C	241-SY-101	DST	C	C	C
241-AP-105	DST	C	C	C	241-SY-102	DST	B	B	B
241-AP-106	DST	C	C	C	241-SY-103[a]	DST	A[a]	A[a]	A[a]
241-AP-107	DST	C	C	C					
241-AP-108	DST	C	C	C					

Note:
[a]DST 241-SY-103 was given a waste group A classification due to BDGRE behavior and engineering judgment. Actual results for DST 241-SY-103 were waste group B for all three cases.
DST = double-shell tank.

In all cases, additional liquids, up to 10,000 gal of water or caustic, can be added to the DSTs during routine operations without affecting the waste groupings as summarized in Table 5-3. In addition, based on additional analyses of DSTs 241-AN-101, 241-AN-102, 241-AN-106, 241-AW-102, 241-AW-103, 241-AW-105, 241-SY-102, and 241-AZ-102, these tanks will not

exhibit BDGRE behavior at any fill level within the tank as long as the solids level remains the same and the supernatant density is less than or equal to the current supernatant density within the tank.

5.1.2 Single-Shell Tanks

As provided in Table 5-4, 105 of the 149 SSTs are classified as waste group C tanks based on the "as is" conditions. That is, even if 100% of the retained gas is released from these tanks, the headspace flammable gas concentration will not exceed 100% LFL. Two additional tanks, SSTs 241-B-105 and 241-BY-102, were classified as waste group "C" tanks based on their "as is" conditions, but are reclassified as waste group B tanks, since the addition of 10,000 gal of water caused the model to reclassify these tanks. This reduces the number of waste group C tanks to 103. The remaining 46 tanks are classified as waste group B tanks, and the headspace flammable gas concentration can reach 100% of the LFL if all of the retained gas is released, but do not exhibit BDGRE behavior. None of the SSTs have tank/waste configurations that support BDGREs and none of the SSTs which could reach 100% LFL in the headspace have energy ratios > 3, therefore, the BDGRE calculation is not applicable.

Table 5-4. Waste Group Assignments for Single-Shell Tanks.
(Based on September 27, 2004 BBI data) (3 sheets)

Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition	Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition
241-A-101	SST	B	B	B	241-S-110	SST	B	B	B
241-A-102	SST	C	C	C	241-S-111	SST	B	B	B
241-A-103	SST	C	C	C	241-S-112	SST	C	C	C
241-A-104	SST	C	C	C	241-SX-101	SST	B	B	B
241-A-105	SST	C	C	C	241-SX-102	SST	C	C	C
241-A-106	SST	C	C	C	241-SX-103	SST	B	B	B
241-AX-101	SST	C	C	C	241-SX-104	SST	C	C	C
241-AX-102	SST	C	C	C	241-SX-105	SST	B	B	B
241-AX-103	SST	C	C	C	241-SX-106	SST	B	B	B
241-AX-104	SST	C	C	C	241-SX-107	SST	C	C	C
241-B-101	SST	C	C	C	241-SX-108	SST	C	C	C
241-B-102	SST	C	C	C	241-SX-109	SST	C	C	C
241-B-103	SST	C	C	C	241-SX-110	SST	C	C	C
241-B-104	SST	C	C	C	241-SX-111	SST	C	C	C
241-B-105[b]	SST	C[b]	B[b]	B[b]	241-SX-112	SST	C	C	C
241-B-106	SST	C	C	C	241-SX-113	SST	C	C	C
241-B-107	SST	C	C	C	241-SX-114	SST	C	C	C
241-B-108	SST	C	C	C	241-SX-115	SST	C	C	C

Table 5-4. Waste Group Assignments for Single-Shell Tanks.
(Based on September 27, 2004 BBI data) (3 sheets)

Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition	Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition
241-B-109	SST	C	C	C	241-T-101	SST	C	C	C
241-B-110	SST	C	C	C	241-T-102	SST	C	C	C
241-B-111	SST	C	C	C	241-T-103	SST	C	C	C
241-B-112	SST	C	C	C	241-T-104	SST	C	C	C
241-B-201	SST	C	C	C	241-T-105	SST	C	C	C
241-B-202	SST	C	C	C	241-T-106	SST	C	C	C
241-B-203	SST	B	B	B	241-T-107	SST	C	C	C
241-B-204	SST	B	B	B	241-T-108	SST	C	C	C
241-BX-101	SST	C	C	C	241-T-109	SST	C	C	C
241-BX-102	SST	C	C	C	241-T-110	SST	C	C	C
241-BX103	SST	C	C	C	241-T-111	SST	B	B	B
241-BX-104	SST	C	C	C	241-T-112	SST	C	C	C
241-BX-105	SST	C	C	C	241-T-201	SST	B	B	B
241-BX-106	SST	C	C	C	241-T-202	SST	C	C	C
241-BX-107	SST	C	C	C	241-T-203	SST	C	C	C
241-BX-108	SST	C	C	C	241-T-204	SST	C	C	C
241-BX-109	SST	C	C	C	241-TX-101	SST	C	C	C
241-BX-110	SST	C	C	C	241-TX-102	SST	C	C	C
241-BX-111	SST	C	C	C	241-TX-103	SST	C	C	C
241-BX-112	SST	C	C	C	241-TX-104	SST	C	C	C
241-BY-101	SST	B	B	B	241-TX-105	SST	B	B	B
241-BY-102	SST	C	B[b]	B[b]	241-TX-106	SST	B	B	B
241-BY-103	SST	B	B	B	241-TX-107	SST	C	C	C
241-BY-104	SST	B	B	B	241-TX-108	SST	C	C	C
241-BY-105	SST	B	B	B	241-TX-109	SST	C	C	C
241-BY-106	SST	B	B	B	241-TX-110	SST	B	B	B
241-BY-107	SST	B	B	B	241-TX-111	SST	B	B	B
241-BY-108[b]	SST	C	C	C	241-TX-112	SST	B	B	B
241-BY-109	SST	B	B	B	241-TX-113	SST	B	B	B
241-BY-110	SST	B	B	B	241-TX-114	SST	B	B	B
241-BY-111	SST	B	B	B	241-TX-115	SST	B	B	B
241-BY-112	SST	C	C	C	241-TX-116	SST	C	C	C
241-C-101	SST	C	C	C	241-TX-117	SST	B	B	B
241-C-102	SST	C	C	C	241-TX-118	SST	B	B	B

Table 5-4. Waste Group Assignments for Single-Shell Tanks.
(Based on September 27, 2004 BBI data) (3 sheets)

Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition	Tank	Type	"As Is" condition	10,000 gal H_2O addition	10,000 gal caustic addition
241-C-103	SST	C	C	C	241-TY-101	SST	C	C	C
241-C-104	SST	C	C	C	241-TY-102	SST	C	C	C
241-C-105	SST	C	C	C	241-TY-103	SST	C	C	C
241-C-106	SST	C	C	C	241-TY-104	SST	C	C	C
241-C-107	SST	C	C	C	241-TY-105	SST	C	C	C
241-C-108	SST	C	C	C	241-TY-106	SST	C	C	C
241-C-109	SST	C	C	C	241-U-101	SST	C	C	C
241-C-110	SST	C	C	C	241-U-102	SST	B	B	B
241-C-111	SST	C	C	C	241-U-103	SST	B	B	B
241-C-112	SST	C	C	C	241-U-104	SST	C	C	C
241-C-201	SST	C	C	C	241-U-105	SST	B	B	B
241-C-202	SST	C	C	C	241-U-106	SST	C	C	C
241-C-203	SST	C	C	C	241-U-107	SST	B	B	B
241-C-204	SST	C	C	C	241-U-108	SST	B	B	B
241-S-101	SST	C	C	C	241-U-109	SST	B	B	B
241-S-102	SST	B	B	B	241-U-110	SST	C	C	C
241-S-103	SST	B	B	B	241-U-111	SST	B	B	B
241-S-104	SST	C	C	C	241-U-112	SST	C	C	C
241-S-105	SST	B	B	B	241-U-201	SST	C	C	C
241-S-106	SST	B	B	B	241-U-202	SST	C	C	C
241-S-107	SST	C	C	C	241-U-203	SST	C	C	C
241-S-108	SST	B	B	B	241-U-204	SST	C	C	C
241-S-109	SST	B	B	B					

Notes:

[a]Tanks where only 1,000 gal of water or caustic are added.

[b]Tanks reclassified to waste group B due to effect of water additions.

[c]Tank not reclassified to waste group B due to prohibition of large caustic additions to SSTs without further evaluation and approval.

SST = single-shell tank.

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APPENDIX A

INPUT DATA

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Spreadsheet Title: "RPP-10006r4 !!Waste Groups-rev-40-042026 .xls" and
"RPP-10006r4 Database Creator 041021 .xls"

Title: RPP-10006 Rev 4, *Methodology and Calculations for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site*

The following pages (pages A-1 through A-57) in Appendix A contains a series of tables which containt the database used in the main flammable gas calculation. The data has been peer reviewed per TFC-ENG-CHEM-D-33, REV B, *SPREADSHEET VERIFICATION.*

Spreadsheet Verification Number: 273 & 274

Originator: S. A. Barker Date: 10/27/04

Checker: D. C. Hedengren Date: 10/27/04

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Table A-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
A-101	SST	3.65	0.241	3.65	0.241	0.010	3.28	0.165	0.010
A-102	SST	0.37	0.006	0.34	0.165	0.010	0.34	0.165	0.010
A-103	SST	3.43	0.006	3.39	0.241	0.010	3.39	0.241	0.010
A-104	SST	0.26	0.165	0.26	0.165	0.010	0.00	0.165	0.000
A-105	SST	0.00	0.165	0.00	0.165	0.000	0.00	0.165	0.000
A-106	SST	0.73	0.241	0.73	0.241	0.010	0.52	0.165	0.010
AN-101	DST	8.85	0.006	0.29	0.000	0.010	0.29	0.000	0.010
AN-102	DST	9.91	0.006	1.24	0.165	0.010	1.24	0.165	0.010
AN-103	DST	8.86	0.006	4.24	0.070	0.010	4.24	0.070	0.010
AN-104	DST	9.73	0.006	4.12	0.400	0.010	4.12	0.400	0.010
AN-105	DST	10.40	0.006	4.97	0.420	0.010	4.97	0.420	0.010
AN-106	DST	8.00	0.006	0.43	0.165	0.010	0.43	0.165	0.010
AN-107	DST	10.18	0.006	2.13	0.165	0.010	2.13	0.165	0.010
AP-101	DST	10.25	0.006	0.00	0.000	0.000	0.00	0.000	0.000
AP-102	DST	10.14	0.006	0.22	0.000	0.010	0.22	0.000	0.010
AP-103	DST	8.28	0.006	0.00	0.000	0.000	0.00	0.000	0.000
AP-104	DST	10.17	0.006	0.00	0.000	0.000	0.00	0.000	0.000
AP-105	DST	6.35	0.006	0.83	0.165	0.010	0.83	0.165	0.010
AP-106	DST	10.50	0.006	0.00	0.000	0.000	0.00	0.000	0.000
AP-107	DST	10.43	0.006	0.00	0.000	0.000	0.00	0.000	0.000
AP-108	DST	7.59	0.006	0.00	0.000	0.000	0.00	0.000	0.000
AW-101	DST	10.42	0.006	3.66	0.300	0.010	3.66	0.300	0.010
AW-102	DST	1.11	0.006	0.06	0.165	0.010	0.06	0.165	0.010
AW-103	DST	10.15	0.006	2.89	0.241	0.010	2.89	0.241	0.010
AW-104	DST	9.92	0.006	2.06	0.241	0.010	2.06	0.241	0.010
AW-105	DST	3.89	0.006	2.44	0.165	0.010	2.44	0.165	0.010
AW-106	DST	8.33	0.006	2.62	0.165	0.010	2.62	0.165	0.010

Table A-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
AX-101	SST	3.30	0.241	3.30	0.241	0.010	0.00	0.165	0.000
AX-102	SST	0.28	0.241	0.28	0.241	0.010	0.00	0.165	0.000
AX-103	SST	0.98	0.241	0.98	0.241	0.010	0.83	0.165	0.010
AX-104	SST	0.07	0.165	0.07	0.165	0.010	0.00	0.165	0.000
AY-101	DST	1.69	0.006	0.89	0.165	0.010	0.89	0.165	0.010
AY-102	DST	7.90	0.006	1.40	0.165	0.010	1.40	0.165	0.010
AZ-101	DST	8.62	0.006	0.49	0.165	0.010	0.49	0.165	0.010
AZ-102	DST	9.09	0.006	0.97	0.165	0.010	0.97	0.165	0.010
B-101	SST	1.22	0.241	1.22	0.241	0.010	1.22	0.165	0.010
B-102	SST	0.48	0.006	0.45	0.165	0.010	0.45	0.165	0.010
B-103	SST	0.71	0.241	0.71	0.241	0.010	0.00	0.165	0.000
B-104	SST	3.69	0.241	3.69	0.241	0.010	3.60	0.165	0.010
B-105	SST	2.91	0.241	2.91	0.241	0.010	1.18	0.165	0.010
B-106	SST	1.36	0.006	1.35	0.165	0.010	1.35	0.165	0.010
B-107	SST	1.72	0.241	1.72	0.241	0.010	1.65	0.165	0.010
B-108	SST	1.06	0.241	1.06	0.241	0.010	0.88	0.165	0.010
B-109	SST	1.38	0.241	1.38	0.241	0.010	1.05	0.165	0.010
B-110	SST	2.50	0.006	2.49	0.165	0.010	2.49	0.165	0.010
B-111	SST	2.46	0.006	2.45	0.165	0.010	2.45	0.165	0.010
B-112	SST	0.51	0.006	0.48	0.241	0.010	0.48	0.241	0.010
B-201	SST	4.18	0.165	4.18	0.165	0.010	0.00	0.165	0.000
B-202	SST	4.05	0.165	4.05	0.165	0.010	0.00	0.165	0.000
B-203	SST	6.93	0.006	6.86	0.165	0.010	6.86	0.165	0.010
B-204	SST	6.82	0.006	6.72	0.165	0.010	6.72	0.165	0.010
BX-101	SST	0.63	0.165	0.63	0.165	0.010	0.00	0.165	0.000
BX-102	SST	0.94	0.165	0.94	0.165	0.010	0.00	0.165	0.000
BX-103	SST	0.89	0.006	0.77	0.165	0.010	0.77	0.165	0.010

Table A-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
BX-104	SST	1.14	0.006	1.12	0.165	0.010	1.12	0.165	0.010
BX-105	SST	0.87	0.006	0.82	0.165	0.010	0.82	0.165	0.010
BX-106	SST	0.54	0.165	0.54	0.165	0.010	0.00	0.165	0.000
BX-107	SST	3.44	0.165	3.44	0.165	0.010	0.00	0.165	0.000
BX-108	SST	0.48	0.165	0.48	0.165	0.010	0.00	0.165	0.000
BX-109	SST	2.01	0.165	2.01	0.165	0.010	1.97	0.165	0.010
BX-110	SST	2.13	0.006	2.11	0.241	0.010	2.11	0.241	0.010
BX-111	SST	1.97	0.241	1.97	0.241	0.010	1.10	0.165	0.010
BX-112	SST	1.75	0.006	1.74	0.165	0.010	1.74	0.165	0.010
BY-101	SST	3.65	0.241	3.65	0.241	0.010	2.39	0.165	0.010
BY-102	SST	2.81	0.241	2.81	0.241	0.010	1.71	0.165	0.010
BY-103	SST	4.08	0.241	4.08	0.241	0.010	3.10	0.165	0.010
BY-104	SST	3.54	0.241	3.54	0.241	0.010	2.26	0.165	0.010
BY-105	SST	4.68	0.241	4.68	0.241	0.010	2.55	0.165	0.010
BY-106	SST	4.50	0.241	4.50	0.241	0.010	1.26	0.165	0.010
BY-107	SST	2.74	0.241	2.74	0.241	0.010	1.79	0.165	0.010
BY-108	SST	2.29	0.241	2.29	0.241	0.010	1.74	0.165	0.010
BY-109	SST	2.88	0.241	2.88	0.241	0.010	2.74	0.165	0.010
BY-110	SST	3.61	0.241	3.61	0.241	0.010	2.51	0.165	0.010
BY-111	SST	3.01	0.241	3.01	0.241	0.010	1.80	0.165	0.010
BY-112	SST	2.88	0.241	2.88	0.241	0.010	0.74	0.165	0.010
C-101	SST	1.02	0.165	1.02	0.165	0.010	0.00	0.165	0.000
C-102	SST	3.15	0.165	3.15	0.165	0.010	0.00	0.165	0.000
C-103	SST	0.87	0.006	0.87	0.165	0.010	0.87	0.165	0.010
C-104	SST	2.62	0.165	2.62	0.165	0.010	0.00	0.165	0.000
C-105	SST	1.45	0.165	1.45	0.165	0.010	0.00	0.165	0.000
C-106	SST	0.06	0.006	0.06	0.165	0.010	0.06	0.165	0.010

Table A-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
C-107	SST	2.51	0.165	2.51	0.165	0.010	0.00	0.165	0.000
C-108	SST	0.81	0.165	0.81	0.165	0.010	0.00	0.165	0.000
C-109	SST	0.79	0.165	0.79	0.165	0.010	0.00	0.165	0.000
C-110	SST	1.88	0.006	1.87	0.165	0.010	1.87	0.165	0.010
C-111	SST	0.73	0.165	0.73	0.165	0.010	0.00	0.165	0.000
C-112	SST	1.18	0.165	1.18	0.165	0.010	0.00	0.165	0.000
C-201	SST	0.19	0.165	0.19	0.165	0.010	0.00	0.165	0.000
C-202	SST	0.18	0.165	0.18	0.165	0.010	0.00	0.165	0.000
C-203	SST	0.34	0.165	0.34	0.165	0.010	0.00	0.165	0.000
C-204	SST	0.36	0.165	0.36	0.165	0.010	0.00	0.165	0.000
S-101	SST	3.47	0.241	3.47	0.241	0.010	3.15	0.165	0.010
S-102	SST	4.27	0.241	4.27	0.241	0.010	4.27	0.165	0.010
S-103	SST	2.42	0.006	2.41	0.241	0.010	2.41	0.241	0.010
S-104	SST	2.89	0.241	2.89	0.241	0.010	2.83	0.165	0.010
S-105	SST	3.98	0.241	3.98	0.241	0.010	1.39	0.165	0.010
S-106	SST	4.44	0.241	4.44	0.241	0.010	1.36	0.165	0.010
S-107	SST	3.54	0.241	3.54	0.241	0.010	3.11	0.165	0.010
S-108	SST	5.31	0.241	5.31	0.241	0.010	1.61	0.165	0.010
S-109	SST	5.16	0.241	5.16	0.241	0.010	1.70	0.165	0.010
S-110	SST	3.83	0.241	3.83	0.241	0.010	3.30	0.165	0.010
S-111	SST	4.03	0.241	4.03	0.241	0.010	1.70	0.165	0.010
S-112	SST	1.30	0.241	1.30	0.241	0.010	1.30	0.165	0.010
SX-101	SST	4.05	0.241	4.05	0.241	0.010	3.06	0.165	0.010
SX-102	SST	3.96	0.241	3.96	0.241	0.010	0.00	0.165	0.000
SX-103	SST	4.89	0.241	4.89	0.241	0.010	2.27	0.165	0.010
SX-104	SST	4.31	0.241	4.31	0.241	0.010	2.38	0.165	0.010
SX-105	SST	3.66	0.241	3.66	0.241	0.010	2.44	0.165	0.010

Table A-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
SX-106	SST	3.85	0.241	3.85	0.241	0.010	1.97	0.165	0.010
SX-107	SST	1.06	0.241	1.06	0.241	0.010	0.00	0.165	0.000
SX-108	SST	0.87	0.165	0.87	0.165	0.010	0.00	0.165	0.000
SX-109	SST	2.42	0.241	2.42	0.241	0.010	0.00	0.165	0.000
SX-110	SST	0.71	0.241	0.71	0.241	0.010	0.00	0.165	0.000
SX-111	SST	1.25	0.241	1.25	0.241	0.010	0.25	0.165	0.010
SX-112	SST	0.88	0.241	0.88	0.241	0.010	0.00	0.165	0.000
SX-113	SST	0.35	0.165	0.35	0.165	0.010	0.00	0.165	0.000
SX-114	SST	1.62	0.241	1.62	0.241	0.010	0.00	0.165	0.000
SX-115	SST	0.07	0.165	0.07	0.165	0.010	0.00	0.165	0.000
SY-101	DST	3.52	0.165	2.55	0.165	0.010	2.55	0.165	0.010
SY-102	DST	8.93	0.006	1.35	0.165	0.010	1.35	0.165	0.010
SY-103	DST	6.93	0.006	3.17	0.030	0.010	3.17	0.030	0.010
T-101	SST	1.13	0.241	1.13	0.241	0.010	0.00	0.165	0.000
T-102	SST	0.48	0.006	0.36	0.165	0.010	0.36	0.165	0.010
T-103	SST	0.44	0.006	0.40	0.165	0.010	0.40	0.165	0.010
T-104	SST	3.16	0.165	3.16	0.165	0.010	2.72	0.165	0.010
T-105	SST	1.12	0.165	1.12	0.165	0.010	0.00	0.165	0.000
T-106	SST	0.38	0.165	0.38	0.165	0.010	0.00	0.165	0.000
T-107	SST	1.83	0.165	1.83	0.165	0.010	0.00	0.165	0.000
T-108	SST	0.33	0.241	0.33	0.241	0.010	0.00	0.165	0.000
T-109	SST	0.77	0.241	0.77	0.241	0.010	0.57	0.165	0.010
T-110	SST	3.65	0.006	3.64	0.165	0.010	3.64	0.165	0.010
T-111	SST	4.36	0.165	4.36	0.165	0.010	4.24	0.165	0.010
T-112	SST	0.82	0.006	0.75	0.165	0.010	0.75	0.165	0.010
T-201	SST	4.32	0.006	4.01	0.165	0.010	4.01	0.165	0.010
T-202	SST	3.02	0.165	3.02	0.165	0.010	0.00	0.165	0.000

Table A-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
T-203	SST	5.04	0.165	5.04	0.165	0.010	0.00	0.165	0.000
T-204	SST	5.14	0.165	5.14	0.165	0.010	0.00	0.165	0.000
TX-101	SST	1.05	0.241	1.05	0.241	0.010	0.00	0.165	0.000
TX-102	SST	2.24	0.241	2.24	0.241	0.010	1.52	0.165	0.010
TX-103	SST	1.57	0.241	1.57	0.241	0.010	0.00	0.165	0.000
TX-104	SST	0.84	0.006	0.82	0.241	0.010	0.82	0.241	0.010
TX-105	SST	5.56	0.241	5.56	0.241	0.010	1.43	0.165	0.010
TX-106	SST	3.45	0.241	3.45	0.241	0.010	2.42	0.165	0.010
TX-107	SST	0.46	0.241	0.46	0.241	0.010	0.00	0.165	0.000
TX-108	SST	1.39	0.241	1.39	0.241	0.010	0.00	0.165	0.000
TX-109	SST	3.59	0.165	3.59	0.165	0.010	3.20	0.165	0.010
TX-110	SST	4.55	0.241	4.55	0.241	0.010	1.48	0.165	0.010
TX-111	SST	3.60	0.241	3.60	0.241	0.010	1.79	0.165	0.010
TX-112	SST	6.09	0.241	6.09	0.241	0.010	3.37	0.165	0.010
TX-113	SST	6.13	0.241	6.13	0.241	0.010	1.87	0.165	0.010
TX-114	SST	5.14	0.241	5.14	0.241	0.010	1.99	0.165	0.010
TX-115	SST	5.34	0.241	5.34	0.241	0.010	2.53	0.165	0.010
TX-116	SST	5.76	0.241	5.76	0.241	0.010	0.00	0.165	0.000
TX-117	SST	4.67	0.241	4.67	0.241	0.010	1.11	0.165	0.010
TX-118	SST	2.52	0.241	2.52	0.241	0.010	2.05	0.165	0.010
TY-101	SST	1.32	0.241	1.32	0.241	0.010	0.00	0.165	0.000
TY-102	SST	0.84	0.241	0.84	0.241	0.010	0.00	0.165	0.000
TY-103	SST	1.66	0.241	1.66	0.241	0.010	1.61	0.165	0.010
TY-104	SST	0.60	0.006	0.59	0.165	0.010	0.59	0.165	0.010
TY-105	SST	2.37	0.165	2.37	0.165	0.010	1.68	0.165	0.010
TY-106	SST	0.33	0.165	0.33	0.165	0.010	0.00	0.165	0.000
U-101	SST	0.40	0.165	0.40	0.165	0.010	0.00	0.165	0.000

Table A-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
U-102	SST	3.25	0.006	3.24	0.241	0.010	3.24	0.241	0.010
U-103	SST	4.08	0.006	4.08	0.241	0.010	4.08	0.241	0.010
U-104	SST	1.35	0.165	1.35	0.165	0.010	0.00	0.165	0.000
U-105	SST	3.49	0.241	3.49	0.241	0.010	2.60	0.165	0.010
U-106	SST	1.80	0.006	1.79	0.165	0.010	1.79	0.165	0.010
U-107	SST	2.95	0.241	2.95	0.241	0.010	1.94	0.165	0.010
U-108	SST	3.49	0.241	3.49	0.241	0.010	3.01	0.165	0.010
U-109	SST	3.94	0.241	3.94	0.241	0.010	2.01	0.165	0.010
U-110	SST	1.85	0.165	1.85	0.165	0.010	0.79	0.165	0.010
U-111	SST	2.28	0.241	2.28	0.241	0.010	1.81	0.165	0.010
U-112	SST	0.61	0.165	0.61	0.165	0.010	0.00	0.165	0.000
U-201	SST	0.70	0.006	0.54	0.165	0.010	0.54	0.165	0.010
U-202	SST	0.66	0.006	0.50	0.165	0.010	0.50	0.165	0.010
U-203	SST	0.62	0.006	0.46	0.165	0.010	0.46	0.165	0.010
U-204	SST	0.54	0.006	0.38	0.165	0.010	0.38	0.165	0.010

Table A-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective Waste Density Mean (kg/m3)**	**Convective Waste Density Std Dev (kg/m3)**	**Convective Waste Density Min (kg/m3)**	**Convective Waste Density Max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean**
A-101	0.00	0.006	0.00	1490	45	1399	1581	normal	0.70
A-102	0.03	0.006	0.00	1570	59	1452	1688	normal	0.86
A-103	0.04	0.006	0.00	1181	32	1091	1270	normal	0.86
A-104	0.00	0.006	0.00	1170	38	1094	1246	normal	0.67
A-105	0.00	0.006	0.00	0	0	0	0	normal	#VALUE!
A-106	0.00	0.006	0.00	1170	38	1094	1246	normal	0.63
AN-101	8.56	0.006	0.00	1410	79	1253	1567	normal	0.88
AN-102	8.66	0.006	0.00	1400	43	1315	1485	normal	0.84
AN-103	3.72	0.006	0.89	1490	47	1396	1584	normal	0.68
AN-104	5.20	0.006	0.41	1400	69	1263	1537	normal	0.76
AN-105	4.98	0.006	0.45	1420	50	1319	1521	normal	0.81
AN-106	7.57	0.006	0.00	1120	65	991	1249	normal	0.61
AN-107	8.05	0.006	0.00	1390	72	1246	1534	normal	0.89
AP-101	10.25	0.006	0.00	1310	24	1261	1359	normal	0.66
AP-102	9.93	0.006	0.00	1390	8	1373	1407	normal	0.56
AP-103	8.28	0.006	0.00	1350	35	1281	1419	normal	0.69
AP-104	10.17	0.006	0.00	1280	6	1268	1292	normal	0.64
AP-105	5.52	0.006	0.00	1270	51	1168	1372	normal	0.63
AP-106	10.50	0.006	0.00	1210	7	1196	1224	normal	0.59
AP-107	10.43	0.006	0.00	1280	48	1183	1377	normal	0.64
AP-108	7.59	0.006	0.00	1430	5	1420	1440	normal	0.76
AW-101	5.96	0.006	0.80	1470	69	1332	1608	normal	0.84
AW-102	1.05	0.006	0.00	1070	47	976	1163	normal	0.78
AW-103	7.26	0.006	0.00	1240	64	1112	1368	normal	0.82
AW-104	7.86	0.006	0.00	1350	22	1306	1394	normal	0.89
AW-105	1.45	0.006	0.00	1050	38	974	1126	normal	0.80
AW-106	5.71	0.006	0.00	1300	15	1271	1329	normal	0.66

Table A-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective Waste Density Mean (kg/m3)**	**Convective Waste Density Std Dev (kg/m3)**	**Convective Waste Density Min (kg/m3)**	**Convective Waste Density Max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean**
AX-101	0.00	0.006	0.00	1530	108	1314	1746	normal	0.74
AX-102	0.00	0.006	0.00	1390	46	1298	1482	normal	0.77
AX-103	0.00	0.006	0.00	1450	48	1354	1546	normal	0.83
AX-104	0.00	0.006	0.00	1170	38	1094	1246	normal	0.56
AY-101	0.79	0.006	0.00	1190	68	1054	1326	normal	0.65
AY-102	6.50	0.006	0.00	1,180	48	1083	1277	normal	0.74
AZ-101	8.14	0.006	0.00	1240	19	1203	1277	normal	0.71
AZ-102	8.12	0.006	0.00	1110	20	1070	1150	normal	0.80
B-101	0.00	0.006	0.00	1300	43	1214	1386	normal	0.79
B-102	0.04	0.006	0.00	1260	42	1177	1343	normal	0.63
B-103	0.00	0.006	0.00	1260	42	1177	1343	normal	0.62
B-104	0.00	0.006	0.00	1180	38	1104	1256	normal	0.86
B-105	0.00	0.006	0.00	1260	42	1177	1343	normal	0.58
B-106	0.01	0.006	0.00	1180	38	1104	1256	normal	0.86
B-107	0.00	0.006	0.00	1340	25	1290	1390	normal	0.70
B-108	0.00	0.006	0.00	1380	25	1331	1429	normal	0.68
B-109	0.00	0.006	0.00	1260	47	1166	1354	normal	0.50
B-110	0.01	0.006	0.00	1190	39	1113	1267	normal	0.88
B-111	0.01	0.006	0.00	1180	38	1104	1256	normal	0.81
B-112	0.03	0.006	0.00	1180	38	1104	1256	normal	0.78
B-201	0.00	0.006	0.00	1180	38	1104	1256	normal	0.81
B-202	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
B-203	0.07	0.006	0.00	1050	7	1036	1064	normal	0.75
B-204	0.10	0.006	0.00	1050	12	1027	1073	normal	0.75
BX-101	0.00	0.006	0.00	1283	42	1200	1366	normal	0.74
BX-102	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
BX-103	0.12	0.006	0.00	1070	35	1001	1139	normal	0.65

Table A-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective Waste Density Mean (kg/m3)**	**Convective Waste Density Std Dev (kg/m3)**	**Convective Waste Density Min (kg/m3)**	**Convective Waste Density Max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean**
BX-104	0.03	0.006	0.00	1280	14	1252	1308	normal	0.70
BX-105	0.05	0.006	0.00	1290	42	1206	1374	normal	0.73
BX-106	0.00	0.006	0.00	1170	38	1094	1246	normal	0.67
BX-107	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
BX-108	0.00	0.006	0.00	1170	38	1094	1246	normal	0.80
BX-109	0.00	0.006	0.00	1170	38	1094	1246	normal	0.76
BX-110	0.01	0.006	0.00	1440	130	1180	1700	normal	0.74
BX-111	0.00	0.006	0.00	1450	64	1322	1578	normal	0.67
BX-112	0.01	0.006	0.00	1180	29	1123	1237	normal	0.82
BY-101	0.00	0.006	0.00	1510	50	1410	1610	normal	0.55
BY-102	0.00	0.006	0.00	1440	48	1345	1535	normal	0.83
BY-103	0.00	0.006	0.00	1290	53	1185	1395	normal	0.59
BY-104	0.00	0.006	0.00	1510	57	1397	1623	normal	0.75
BY-105	0.00	0.006	0.00	1440	76	1288	1592	normal	0.52
BY-106	0.00	0.006	0.00	1310	123	1064	1556	normal	0.59
BY-107	0.00	0.006	0.00	1460	24	1412	1508	normal	0.69
BY-108	0.00	0.006	0.00	1330	56	1218	1442	normal	0.84
BY-109	0.00	0.006	0.00	1500	20	1459	1541	normal	0.71
BY-110	0.00	0.006	0.00	1440	36	1369	1511	normal	0.83
BY-111	0.00	0.006	0.00	1420	9	1402	1438	normal	0.69
BY-112	0.00	0.006	0.00	1470	7	1456	1484	normal	0.64
C-101	0.00	0.006	0.00	1170	38	1094	1246	normal	0.57
C-102	0.00	0.006	0.00	1170	38	1094	1246	normal	0.64
C-103	0.01	0.006	0.00	1070	63	944	1196	normal	0.67
C-104	0.00	0.006	0.00	1170	38	1094	1246	normal	0.64
C-105	0.00	0.006	0.00	1230	40	1150	1310	normal	0.77
C-106	0.00	0.006	0.00	1020	60	899	1141	normal	0.66

Table A-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective Waste Density Mean (kg/m3)**	**Convective Waste Density Std Dev (kg/m3)**	**Convective Waste Density Min (kg/m3)**	**Convective Waste Density Max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean**
C-107	0.00	0.006	0.00	1170	32	1106	1234	normal	0.73
C-108	0.00	0.006	0.00	1170	38	1094	1246	normal	0.78
C-109	0.00	0.006	0.00	1170	38	1094	1246	normal	0.74
C-110	0.01	0.006	0.00	1100	64	973	1227	normal	0.84
C-111	0.00	0.006	0.00	1170	38	1094	1246	normal	0.74
C-112	0.00	0.006	0.00	1170	107	957	1383	normal	0.70
C-201	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
C-202	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
C-203	0.00	0.006	0.00	1170	38	1094	1246	normal	0.69
C-204	0.00	0.006	0.00	1170	38	1094	1246	normal	0.69
S-101	0.00	0.006	0.00	1470	54	1363	1577	normal	0.78
S-102	0.00	0.006	0.00	1460	122	1217	1703	normal	0.82
S-103	0.01	0.006	0.00	1450	25	1401	1499	normal	0.78
S-104	0.00	0.006	0.00	1370	17	1335	1405	normal	0.75
S-105	0.00	0.006	0.00	1450	48	1354	1546	normal	0.72
S-106	0.00	0.006	0.00	1430	51	1328	1532	normal	0.62
S-107	0.00	0.006	0.00	1310	84	1143	1477	normal	0.64
S-108	0.00	0.006	0.00	1450	48	1354	1546	normal	0.70
S-109	0.00	0.006	0.00	1490	49	1392	1588	normal	0.76
S-110	0.00	0.006	0.00	1430	67	1297	1563	normal	0.73
S-111	0.00	0.006	0.00	1450	69	1312	1588	normal	0.88
S-112	0.00	0.006	0.00	1450	29	1391	1509	normal	0.67
SX-101	0.00	0.006	0.00	1480	19	1442	1518	normal	0.72
SX-102	0.00	0.006	0.00	1460	98	1264	1656	normal	0.69
SX-103	0.00	0.006	0.00	1470	39	1391	1549	normal	0.64
SX-104	0.00	0.006	0.00	1470	14	1443	1497	normal	0.69
SX-105	0.00	0.006	0.00	1470	29	1413	1527	normal	0.78

Table A-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective Waste Density Mean (kg/m3)**	**Convective Waste Density Std Dev (kg/m3)**	**Convective Waste Density Min (kg/m3)**	**Convective Waste Density Max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean**
SX-106	0.00	0.006	0.00	1290	43	1205	1375	normal	0.68
SX-107	0.00	0.006	0.00	1500	49	1403	1597	normal	0.77
SX-108	0.00	0.006	0.00	1170	38	1094	1246	normal	0.58
SX-109	0.00	0.006	0.00	1390	46	1298	1482	normal	0.58
SX-110	0.00	0.006	0.00	1170	38	1094	1246	normal	0.60
SX-111	0.00	0.006	0.00	1500	49	1403	1597	normal	0.79
SX-112	0.00	0.006	0.00	1500	49	1403	1597	normal	0.78
SX-113	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
SX-114	0.00	0.006	0.00	1500	49	1403	1597	normal	0.82
SX-115	0.00	0.006	0.00	1170	38	1094	1246	normal	0.57
SY-101	0.97	0.006	0.00	1300	35	1229	1371	normal	0.76
SY-102	7.58	0.006	0.00	1300	109	1082	1519	normal	0.80
SY-103	3.69	0.006	0.08	1470	81	1307	1633	normal	0.81
T-101	0.00	0.006	0.00	1450	54	1341	1559	normal	0.89
T-102	0.12	0.006	0.00	1140	37	1066	1214	normal	0.55
T-103	0.04	0.006	0.00	1190	39	1113	1267	normal	0.63
T-104	0.00	0.006	0.00	1170	101	968	1372	normal	0.81
T-105	0.00	0.006	0.00	1180	92	995	1365	normal	0.80
T-106	0.00	0.006	0.00	1170	38	1094	1246	normal	0.71
T-107	0.00	0.006	0.00	1170	90	990	1350	normal	0.73
T-108	0.00	0.006	0.00	1260	47	1166	1354	normal	0.72
T-109	0.00	0.006	0.00	1260	42	1177	1343	normal	0.63
T-110	0.01	0.006	0.00	1050	28	994	1106	normal	0.87
T-111	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
T-112	0.07	0.006	0.00	1100	4	1092	1108	normal	0.88
T-201	0.31	0.006	0.00	1060	6	1047	1073	normal	0.84
T-202	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81

Table A-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective Waste Density Mean (kg/m3)**	**Convective Waste Density Std Dev (kg/m3)**	**Convective Waste Density Min (kg/m3)**	**Convective Waste Density Max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean**
T-203	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
T-204	0.00	0.006	0.00	1170	38	1094	1246	normal	0.81
TX-101	0.00	0.006	0.00	1450	47	1356	1544	normal	0.75
TX-102	0.00	0.006	0.00	1450	48	1354	1546	normal	0.78
TX-103	0.00	0.006	0.00	1442	48	1347	1537	normal	0.77
TX-104	0.02	0.006	0.00	1440	15	1410	1470	normal	0.65
TX-105	0.00	0.006	0.00	1450	48	1354	1546	normal	0.75
TX-106	0.00	0.006	0.00	1450	48	1354	1546	normal	0.77
TX-107	0.00	0.006	0.00	1463	48	1367	1560	normal	0.57
TX-108	0.00	0.006	0.00	1450	48	1354	1546	normal	0.77
TX-109	0.00	0.006	0.00	1170	38	1094	1246	normal	0.82
TX-110	0.00	0.006	0.00	1450	48	1354	1546	normal	0.78
TX-111	0.00	0.006	0.00	1450	48	1354	1546	normal	0.78
TX-112	0.00	0.006	0.00	1424	47	1330	1518	normal	0.73
TX-113	0.00	0.006	0.00	1450	54	1341	1559	normal	0.81
TX-114	0.00	0.006	0.00	1332	44	1244	1420	normal	0.65
TX-115	0.00	0.006	0.00	1450	48	1354	1546	normal	0.76
TX-116	0.00	0.006	0.00	1390	3	1384	1396	normal	0.67
TX-117	0.00	0.006	0.00	1260	42	1177	1343	normal	0.66
TX-118	0.00	0.006	0.00	1450	48	1354	1546	normal	0.68
TY-101	0.00	0.006	0.00	1260	47	1166	1354	normal	0.64
TY-102	0.00	0.006	0.00	1363	45	1273	1452	normal	0.53
TY-103	0.00	0.006	0.00	1450	47	1356	1544	normal	0.80
TY-104	0.01	0.006	0.00	1180	38	1104	1256	normal	0.67
TY-105	0.00	0.006	0.00	1170	38	1094	1246	normal	0.75
TY-106	0.00	0.006	0.00	1170	38	1094	1246	normal	0.84
U-101	0.00	0.006	0.00	1170	12	1145	1195	normal	0.58

Table A-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective Waste Density Mean (kg/m3)**	**Convective Waste Density Std Dev (kg/m3)**	**Convective Waste Density Min (kg/m3)**	**Convective Waste Density Max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean**
U-102	0.01	0.006	0.00	1480	95	1289	1671	normal	0.73
U-103	0.00	0.006	0.00	1440	44	1353	1527	normal	0.66
U-104	0.00	0.006	0.00	1400	52	1295	1505	normal	0.66
U-105	0.00	0.006	0.00	1460	34	1392	1528	normal	0.72
U-106	0.01	0.006	0.00	1340	68	1203	1477	normal	0.75
U-107	0.00	0.006	0.00	1390	112	1167	1613	normal	0.57
U-108	0.00	0.006	0.00	1400	74	1252	1548	normal	0.65
U-109	0.00	0.006	0.00	1470	17	1437	1503	normal	0.75
U-110	0.00	0.006	0.00	1170	38	1094	1246	normal	0.62
U-111	0.00	0.006	0.00	1400	22	1356	1444	normal	0.74
U-112	0.00	0.006	0.00	1170	38	1094	1246	normal	0.60
U-201	0.16	0.006	0.00	1260	41	1178	1342	normal	0.72
U-202	0.16	0.006	0.00	1280	41	1197	1363	normal	0.83
U-203	0.16	0.006	0.00	1280	41	1197	1363	normal	0.77
U-204	0.16	0.006	0.00	1110	36	1038	1182	normal	0.76

Table A-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev	Non-Convective Waste Porosity Min	Non-Convective Waste Porosity Max	Non-Convective Waste Porosity Dist	Non-Convective Waste Average Temperature (K)	Tank Vapor Space Average Temperature (K)	Tank type group	Total tank volume (m3)	Tank operating capacity (m)	Dish type	Dish height (m)
A-101	0.03	0.65	0.75	normal	335	308	a	4,988	9.24	flat	0.0000
A-102	0.05	0.80	0.89	normal	306	307	a	4,988	9.24	flat	0.0000
A-103	0.06	0.77	0.89	normal	323	309	a	4,988	9.24	flat	0.0000
A-104	0.05	0.60	0.75	normal	349	307	a	4,988	9.24	flat	0.0000
A-105	na	na	na	normal	273	307	a	4,988	9.24	flat	0.0000
A-106	0.05	0.56	0.70	normal	328	312	a	4,988	9.24	flat	0.0000
AN-101	0.07	0.78	0.89	normal	309	316	an	5,324	10.72	flat	0.0000
AN-102	0.03	0.79	0.88	normal	304	303	an	5,324	10.72	flat	0.0000
AN-103	0.02	0.64	0.71	normal	309	301	an	5,324	10.72	flat	0.0000
AN-104	0.04	0.71	0.82	normal	312	305	an	5,324	10.72	flat	0.0000
AN-105	0.03	0.76	0.85	normal	307	301	an	5,324	10.72	flat	0.0000
AN-106	0.04	0.55	0.66	normal	297	297	an	5,324	10.72	flat	0.0000
AN-107	0.05	0.82	0.89	normal	306	304	an	5,324	10.72	flat	0.0000
AP-101	0.03	0.61	0.71	normal	295	295	ap	5,324	10.72	flat	0.0000
AP-102	0.03	0.51	0.61	normal	299	298	ap	5,324	10.72	flat	0.0000
AP-103	0.04	0.64	0.74	normal	297	297	ap	5,324	10.72	flat	0.0000
AP-104	0.03	0.59	0.69	normal	297	298	ap	5,324	10.72	flat	0.0000
AP-105	0.03	0.60	0.67	normal	296	294	ap	5,324	10.72	flat	0.0000
AP-106	0.03	0.55	0.64	normal	295	295	ap	5,324	10.72	flat	0.0000
AP-107	0.03	0.59	0.69	normal	296	292	ap	5,324	10.72	flat	0.0000
AP-108	0.04	0.70	0.82	normal	312	314	ap	5,324	10.72	flat	0.0000
AW-101	0.04	0.77	0.89	normal	306	301	aw	5,324	10.72	flat	0.0000
AW-102	0.05	0.71	0.85	normal	304	303	aw	5,324	10.72	flat	0.0000
AW-103	0.08	0.70	0.89	normal	294	296	aw	5,324	10.72	flat	0.0000
AW-104	0.07	0.79	0.89	normal	308	303	aw	5,324	10.72	flat	0.0000
AW-105	0.06	0.70	0.89	normal	292	293	aw	5,324	10.72	flat	0.0000
AW-106	0.02	0.62	0.69	normal	314	317	aw	5,324	10.72	flat	0.0000
AX-101	0.05	0.66	0.82	normal	308	298	ax	5,046	9.24	flat	0.0000
AX-102	0.05	0.69	0.85	normal	297	298	ax	5,046	9.24	flat	0.0000
AX-103	0.03	0.79	0.87	normal	316	306	ax	5,046	9.24	flat	0.0000

Table A-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev	Non-Convective Waste Porosity Min	Non-Convective Waste Porosity Max	Non-Convective Waste Porosity Dist	Non-Convective Waste Average Temperature (K)	Tank Vapor Space Average Temperature (K)	Tank type group	Total tank volume (m3)	Tank operating capacity (m)	Dish type	Dish height (m)
AX-104	0.04	0.50	0.62	normal	305	305	ax	5,046	9.24	flat	0.0000
AY-101	0.11	0.48	0.82	normal	309	301	ay	5,325	9.24	flat	0.0000
AY-102	0.06	0.65	0.84	normal	321	317	ay	5,325	9.24	flat	0.0000
AZ-101	0.04	0.65	0.78	normal	336	337	az	5,324	9.24	flat	0.0000
AZ-102	0.03	0.75	0.85	normal	319	319	az	5,324	9.24	flat	0.0000
B-101	0.05	0.71	0.87	normal	312	310	b	3,215	4.90	dished	0.3048
B-102	0.04	0.56	0.69	normal	291	293	b	3,215	4.90	dished	0.3048
B-103	0.04	0.56	0.69	normal	290	293	b	3,215	4.90	dished	0.3048
B-104	0.06	0.76	0.89	normal	293	295	b	3,215	4.90	dished	0.3048
B-105	0.04	0.52	0.64	normal	291	294	b	3,215	4.90	dished	0.3048
B-106	0.02	0.82	0.89	normal	291	292	b	3,215	4.90	dished	0.3048
B-107	0.02	0.67	0.74	normal	289	294	b	3,215	4.90	dished	0.3048
B-108	0.04	0.61	0.75	normal	289	294	b	3,215	4.90	dished	0.3048
B-109	0.02	0.47	0.52	normal	291	293	b	3,215	4.90	dished	0.3048
B-110	0.03	0.84	0.89	normal	295	296	b	3,215	4.90	dished	0.3048
B-111	0.03	0.76	0.87	normal	297	298	b	3,215	4.90	dished	0.3048
B-112	0.06	0.69	0.87	normal	295	294	b	3,215	4.90	dished	0.3048
B-201	0.08	0.70	0.89	normal	290	293	b2	224	7.14	dished	0.1524
B-202	0.07	0.71	0.89	normal	292	294	b2	224	7.14	dished	0.1524
B-203	0.02	0.71	0.78	normal	292	285	b2	224	7.14	dished	0.1524
B-204	0.03	0.70	0.79	normal	292	296	b2	224	7.14	dished	0.1524
BX-101	0.05	0.66	0.82	normal	296	296	bx	3,215	4.90	dished	0.3048
BX-102	0.06	0.72	0.89	normal	293	294	bx	3,215	4.90	dished	0.3048
BX-103	0.05	0.58	0.72	normal	294	295	bx	3,215	4.90	dished	0.3048
BX-104	0.09	0.57	0.83	normal	303	298	bx	3,215	4.90	dished	0.3048
BX-105	0.05	0.65	0.81	normal	293	294	bx	3,215	4.90	dished	0.3048
BX-106	0.02	0.64	0.71	normal	294	294	bx	3,215	4.90	dished	0.3048
BX-107	0.03	0.77	0.85	normal	294	294	bx	3,215	4.90	dished	0.3048
BX-108	0.06	0.71	0.89	normal	293	294	bx	3,215	4.90	dished	0.3048
BX-109	0.01	0.74	0.77	normal	295	295	bx	3,215	4.90	dished	0.3048

Table A-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev	Non-Convective Waste Porosity Min	Non-Convective Waste Porosity Max	Non-Convective Waste Porosity Dist	Non-Convective Waste Average Temperature (K)	Tank Vapor Space Average Temperature (K)	Tank type group	Total tank volume (m3)	Tank operating capacity (m)	Dish type	Dish height (m)
BX-110	0.07	0.64	0.84	normal	293	294	bx	3,215	4.90	dished	0.3048
BX-111	0.05	0.60	0.73	normal	293	291	bx	3,215	4.90	dished	0.3048
BX-112	0.02	0.79	0.85	normal	292	292	bx	3,215	4.90	dished	0.3048
BY-101	0.04	0.49	0.60	normal	300	299	by	3,967	7.00	dished	0.3048
BY-102	0.12	0.64	0.89	normal	295	295	by	3,967	7.00	dished	0.3048
BY-103	0.04	0.53	0.65	normal	299	297	by	3,967	7.00	dished	0.3048
BY-104	0.02	0.71	0.79	normal	323	295	by	3,967	7.00	dished	0.3048
BY-105	0.03	0.48	0.56	normal	316	298	by	3,967	7.00	dished	0.3048
BY-106	0.06	0.51	0.67	normal	323	298	by	3,967	7.00	dished	0.3048
BY-107	0.06	0.60	0.78	normal	298	297	by	3,967	7.00	dished	0.3048
BY-108	0.05	0.77	0.89	normal	318	299	by	3,967	7.00	dished	0.3048
BY-109	0.05	0.63	0.78	normal	292	290	by	3,967	7.00	dished	0.3048
BY-110	0.04	0.77	0.89	normal	318	294	by	3,967	7.00	dished	0.3048
BY-111	0.05	0.62	0.76	normal	303	293	by	3,967	7.00	dished	0.3048
BY-112	0.04	0.57	0.70	normal	299	297	by	3,967	7.00	dished	0.3048
C-101	0.02	0.54	0.61	normal	305	306	c	3,215	4.90	dished	0.3048
C-102	0.05	0.57	0.71	normal	299	299	c	3,215	4.90	dished	0.3048
C-103	0.05	0.60	0.74	normal	319	314	c	3,215	4.90	dished	0.3048
C-104	0.06	0.55	0.74	normal	309	307	c	3,215	4.90	dished	0.3048
C-105	0.06	0.68	0.85	normal	317	316	c	3,215	4.90	dished	0.3048
C-106	0.04	0.60	0.72	normal	304	304	c	3,215	4.90	dished	0.3048
C-107	0.07	0.62	0.84	normal	321	315	c	3,215	4.90	dished	0.3048
C-108	0.15	0.56	0.89	normal	300	300	c	3,215	4.90	dished	0.3048
C-109	0.03	0.68	0.79	normal	299	299	c	3,215	4.90	dished	0.3048
C-110	0.08	0.72	0.89	normal	294	296	c	3,215	4.90	dished	0.3048
C-111	0.05	0.66	0.82	normal	299	299	c	3,215	4.90	dished	0.3048
C-112	0.07	0.60	0.80	normal	301	301	c	3,215	4.90	dished	0.3048
C-201	0.06	0.72	0.89	normal	289	293	c2	224	7.14	dished	0.1524
C-202	0.06	0.72	0.89	normal	289	292	c2	224	7.14	dished	0.1524
C-203	0.05	0.62	0.75	normal	292	292	c2	224	7.14	dished	0.1524

Table A-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev	Non-Convective Waste Porosity Min	Non-Convective Waste Porosity Max	Non-Convective Waste Porosity Dist	Non-Convective Waste Average Temperature (K)	Tank Vapor Space Average Temperature (K)	Tank type group	Total tank volume (m3)	Tank operating capacity (m)	Dish type	Dish height (m)
C-204	0.05	0.61	0.76	normal	291	289	c2	224	7.14	dished	0.1524
S-101	0.04	0.72	0.85	normal	319	304	s	3,975	7.00	dished	0.3048
S-102	0.07	0.72	0.89	normal	311	296	s	3,975	7.00	dished	0.3048
S-103	0.05	0.70	0.86	normal	301	297	s	3,975	7.00	dished	0.3048
S-104	0.06	0.67	0.83	normal	313	304	s	3,975	7.00	dished	0.3048
S-105	0.05	0.65	0.80	normal	299	297	s	3,975	7.00	dished	0.3048
S-106	0.05	0.55	0.69	normal	298	296	s	3,975	7.00	dished	0.3048
S-107	0.04	0.57	0.71	normal	313	300	s	3,975	7.00	dished	0.3048
S-108	0.05	0.63	0.77	normal	301	298	s	3,975	7.00	dished	0.3048
S-109	0.05	0.69	0.84	normal	302	297	s	3,975	7.00	dished	0.3048
S-110	0.06	0.64	0.82	normal	317	300	s	3,975	7.00	dished	0.3048
S-111	0.06	0.79	0.89	normal	297	296	s	3,975	7.00	dished	0.3048
S-112	0.05	0.60	0.75	normal	300	294	s	3,975	7.00	dished	0.3048
SX-101	0.06	0.63	0.81	normal	330	301	sx	4,903	9.24	dished	0.3778
SX-102	0.05	0.62	0.76	normal	333	305	sx	4,903	9.24	dished	0.3778
SX-103	0.05	0.56	0.73	normal	343	301	sx	4,903	9.24	dished	0.3778
SX-104	0.01	0.68	0.70	normal	333	301	sx	4,903	9.24	dished	0.3778
SX-105	0.06	0.69	0.87	normal	348	305	sx	4,903	9.24	dished	0.3778
SX-106	0.05	0.62	0.75	normal	310	299	sx	4,903	9.24	dished	0.3778
SX-107	0.06	0.68	0.85	normal	348	324	sx	4,903	9.24	dished	0.3778
SX-108	0.04	0.52	0.64	normal	358	332	sx	4,903	9.24	dished	0.3778
SX-109	0.04	0.52	0.64	normal	330	321	sx	4,903	9.24	dished	0.3778
SX-110	0.04	0.53	0.66	normal	332	323	sx	4,903	9.24	dished	0.3778
SX-111	0.06	0.70	0.87	normal	358	327	sx	4,903	9.24	dished	0.3778
SX-112	0.06	0.69	0.86	normal	327	324	sx	4,903	9.24	dished	0.3778
SX-113	0.06	0.72	0.89	normal	301	301	sx	4,903	9.24	dished	0.3778
SX-114	0.06	0.73	0.89	normal	327	325	sx	4,903	9.24	dished	0.3778
SX-115	0.04	0.50	0.63	normal	299	298	sx	4,903	9.24	dished	0.3778
SY-101	0.04	0.70	0.81	normal	300	300	sy	5,324	10.72	flat	0.0000
SY-102	0.07	0.69	0.89	normal	302	298	sy	5,324	10.72	flat	0.0000

Table A-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev	Non-Convective Waste Porosity Min	Non-Convective Waste Porosity Max	Non-Convective Waste Porosity Dist	Non-Convective Waste Average Temperature (K)	Tank Vapor Space Average Temperature (K)	Tank type group	Total tank volume (m3)	Tank operating capacity (m)	Dish type	Dish height (m)
SY-103	0.04	0.74	0.88	normal	306	297	sy	5,324	10.72	flat	0.0000
T-101	0.05	0.82	0.89	normal	295	295	t	3,215	4.90	dished	0.3048
T-102	0.04	0.49	0.61	normal	291	291	t	3,215	4.90	dished	0.3048
T-103	0.05	0.56	0.70	normal	292	293	t	3,215	4.90	dished	0.3048
T-104	0.07	0.71	0.89	normal	293	294	t	3,215	4.90	dished	0.3048
T-105	0.13	0.60	0.89	normal	290	289	t	3,215	4.90	dished	0.3048
T-106	0.05	0.63	0.79	normal	293	294	t	3,215	4.90	dished	0.3048
T-107	0.06	0.64	0.81	normal	293	295	t	3,215	4.90	dished	0.3048
T-108	0.04	0.67	0.78	normal	289	294	t	3,215	4.90	dished	0.3048
T-109	0.04	0.56	0.69	normal	292	293	t	3,215	4.90	dished	0.3048
T-110	0.03	0.82	0.89	normal	292	294	t	3,215	4.90	dished	0.3048
T-111	0.06	0.72	0.89	normal	294	295	t	3,215	4.90	dished	0.3048
T-112	0.07	0.78	0.89	normal	292	294	t	3,215	4.90	dished	0.3048
T-201	0.06	0.75	0.89	normal	291	293	t2	224	7.14	dished	0.1524
T-202	0.05	0.73	0.89	normal	290	293	t2	224	7.14	dished	0.1524
T-203	0.05	0.73	0.89	normal	290	293	t2	224	7.14	dished	0.1524
T-204	0.03	0.76	0.86	normal	290	294	t2	224	7.14	dished	0.1524
TX-101	0.06	0.67	0.83	normal	298	297	tx	3,967	7.00	dished	0.3048
TX-102	0.05	0.70	0.86	normal	301	298	tx	3,967	7.00	dished	0.3048
TX-103	0.05	0.69	0.85	normal	295	295	tx	3,967	7.00	dished	0.3048
TX-104	0.05	0.58	0.73	normal	294	294	tx	3,967	7.00	dished	0.3048
TX-105	0.05	0.68	0.83	normal	309	297	tx	3,967	7.00	dished	0.3048
TX-106	0.05	0.69	0.85	normal	300	299	tx	3,967	7.00	dished	0.3048
TX-107	0.04	0.51	0.63	normal	295	295	tx	3,967	7.00	dished	0.3048
TX-108	0.05	0.69	0.85	normal	293	294	tx	3,967	7.00	dished	0.3048
TX-109	0.06	0.73	0.89	normal	312	318	tx	3,967	7.00	dished	0.3048
TX-110	0.05	0.70	0.85	normal	301	295	tx	3,967	7.00	dished	0.3048
TX-111	0.05	0.70	0.86	normal	300	296	tx	3,967	7.00	dished	0.3048
TX-112	0.05	0.66	0.81	normal	296	290	tx	3,967	7.00	dished	0.3048
TX-113	0.04	0.75	0.88	normal	296	296	tx	3,967	7.00	dished	0.3048

Table A-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev	Non-Convective Waste Porosity Min	Non-Convective Waste Porosity Max	Non-Convective Waste Porosity Dist	Non-Convective Waste Average Temperature (K)	Tank Vapor Space Average Temperature (K)	Tank type group	Total tank volume (m3)	Tank operating capacity (m)	Dish type	Dish height (m)
TX-114	0.04	0.59	0.72	normal	294	291	tx	3,967	7.00	dished	0.3048
TX-115	0.05	0.68	0.84	normal	295	295	tx	3,967	7.00	dished	0.3048
TX-116	0.05	0.60	0.74	normal	294	293	tx	3,967	7.00	dished	0.3048
TX-117	0.04	0.59	0.73	normal	294	293	tx	3,967	7.00	dished	0.3048
TX-118	0.06	0.58	0.77	normal	295	293	tx	3,967	7.00	dished	0.3048
TY-101	0.03	0.59	0.69	normal	293	294	ty	3,975	7.00	dished	0.3048
TY-102	0.04	0.48	0.58	normal	289	293	ty	3,975	7.00	dished	0.3048
TY-103	0.06	0.71	0.89	normal	303	294	ty	3,975	7.00	dished	0.3048
TY-104	0.05	0.60	0.74	normal	293	293	ty	3,975	7.00	dished	0.3048
TY-105	0.06	0.67	0.83	normal	299	295	ty	3,975	7.00	dished	0.3048
TY-106	0.06	0.75	0.89	normal	289	293	ty	3,975	7.00	dished	0.3048
U-101	0.04	0.52	0.64	normal	292	295	u	3,215	4.90	dished	0.3048
U-102	0.05	0.66	0.80	normal	295	294	u	3,215	4.90	dished	0.3048
U-103	0.04	0.59	0.72	normal	304	297	u	3,215	4.90	dished	0.3048
U-104	0.03	0.60	0.71	normal	301	298	u	3,215	4.90	dished	0.3048
U-105	0.03	0.67	0.76	normal	305	301	u	3,215	4.90	dished	0.3048
U-106	0.05	0.68	0.83	normal	300	300	u	3,215	4.90	dished	0.3048
U-107	0.06	0.48	0.66	normal	299	298	u	3,215	4.90	dished	0.3048
U-108	0.03	0.59	0.70	normal	301	301	u	3,215	4.90	dished	0.3048
U-109	0.06	0.66	0.84	normal	294	292	u	3,215	4.90	dished	0.3048
U-110	0.05	0.55	0.69	normal	299	299	u	3,215	4.90	dished	0.3048
U-111	0.05	0.66	0.81	normal	300	300	u	3,215	4.90	dished	0.3048
U-112	0.04	0.53	0.67	normal	294	295	u	3,215	4.90	dished	0.3048
U-201	0.10	0.57	0.87	normal	292	293	u2	224	7.14	dished	0.1524
U-202	0.06	0.73	0.89	normal	291	293	u2	224	7.14	dished	0.1524
U-203	0.19	0.47	0.89	normal	292	292	u2	224	7.14	dished	0.1524
U-204	0.06	0.67	0.85	normal	291	292	u2	224	7.14	dished	0.1524

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)
A-101	0.0000	0.0000	0.0000	409.7933	14.500	7.25	0.01	40	Normal
A-102	0.0000	0.0000	0.0000	409.7933	9.269	8.0838	0.01	40	Normal
A-103	0.0000	0.0000	0.0000	409.7933	0.422	0.211107075	0.01	26.5	Normal
A-104	0.0000	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
A-105	0.0000	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
A-106	0.0000	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
AN-101	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AN-102	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AN-103	0.0000	0.3048	123.4350	409.7933	11.500	5.75	0.01	15.11	Normal
AN-104	0.0000	0.3048	123.4350	409.7933	5.600	2.8	0.01	15.11	Normal
AN-105	0.0000	0.3048	123.4350	409.7933	3.700	1.85	0.01	15.11	Normal
AN-106	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AN-107	0.0000	0.3048	123.4350	409.7933	3.512	20.58	0.01	12.18	LogNorm
AP-101	0.0000	0.3048	123.4350	409.7933	0.015	0.001	0.01	0.02	Normal
AP-102	0.0000	0.3048	123.4350	409.7933	0.015	0.001	0.01	0.02	Normal
AP-103	0.0000	0.3048	123.4350	409.7933	0.015	0.001	0.01	0.02	Normal
AP-104	0.0000	0.3048	123.4350	409.7933	0.015	0.001	0.01	0.02	Normal
AP-105	0.0000	0.3048	123.4350	409.7933	6.368	3.184046439	0.01	15.11	Normal
AP-106	0.0000	0.3048	123.4350	409.7933	0.015	0.001	0.01	0.02	Normal
AP-107	0.0000	0.3048	123.4350	409.7933	0.015	0.001	0.01	0.02	Normal
AP-108	0.0000	0.3048	123.4350	409.7933	0.015	0.001	0.01	0.02	Normal
AW-101	0.0000	0.3048	123.4350	409.7933	4.000	2	0.01	15.11	Normal
AW-102	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AW-103	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)
AW-104	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AW-105	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AW-106	0.0000	0.3048	123.4350	409.7933	3.001	3.20488	0.01	40	Normal
AX-101	0.0000	0.1524	62.2278	409.7933	8.669	4.334669524	0.01	40	Normal
AX-102	0.0000	0.1524	62.2278	409.7933	9.269	8.0838	0.01	40	Normal
AX-103	0.0000	0.1524	62.2278	409.7933	0.174	0.086925383	0.01	40	Normal
AX-104	0.0000	0.1524	62.2278	409.7933	2.232	5.606394	0.01	26.5	LogNorm
AY-101	0.0000	0.3048	123.4350	409.7933	5.921	2.960526316	0.01	15.11	Normal
AY-102	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AZ-101	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
AZ-102	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm
B-101	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
B-102	47.3176	1.2171	477.9268	409.7933	0.279	0.139534884	0.01	40	Normal
B-103	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
B-104	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
B-105	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
B-106	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
B-107	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
B-108	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
B-109	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
B-110	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
B-111	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
B-112	47.3176	1.2171	477.9268	409.7933	0.571	0.285572386	0.01	26.5	Normal
B-201	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)
B-202	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
B-203	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
B-204	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
BX-101	47.3176	1.2171	477.3116	409.7933	1.968	0.984057254	0.01	26.5	Normal
BX-102	47.3176	1.2171	477.3116	409.7933	2.232	5.606394	0.01	26.5	LogNorm
BX-103	47.3176	1.2171	477.3116	409.7933	0.393	0.196459961	0.01	26.5	Normal
BX-104	47.3176	1.2171	477.3116	409.7933	11.903	5.951704834	0.01	26.5	Normal
BX-105	47.3176	1.2171	477.3116	409.7933	0.276	0.137864652	0.01	26.5	Normal
BX-106	47.3176	1.2171	477.3116	409.7933	2.232	5.606394	0.01	26.5	LogNorm
BX-107	47.3176	1.2171	477.3116	409.7933	3.116	1.557782924	0.01	26.5	Normal
BX-108	47.3176	1.2171	477.3116	409.7933	2.232	5.606394	0.01	26.5	LogNorm
BX-109	47.3176	1.2171	477.3116	409.7933	0.331	0.16550811	0.01	26.5	Normal
BX-110	47.3176	1.2171	477.3116	409.7933	4.864	2.432219523	0.01	40	Normal
BX-111	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BX-112	47.3176	1.2171	477.3116	409.7933	0.568	0.284090909	0.01	26.5	Normal
BY-101	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-102	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-103	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-104	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-105	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-106	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-107	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-108	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-109	47.3176	1.2171	477.3116	409.7933	9.200	4.6	0.01	40	Normal

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)
BY-110	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-111	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
BY-112	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
C-101	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-102	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-103	47.3176	1.2171	477.9268	409.7933	0.107	0.053410652	0.01	26.5	Normal
C-104	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-105	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-106	47.3176	1.2171	477.9268	409.7933	2.500	1.25	0.01	26.5	Normal
C-107	47.3176	1.2171	477.9268	409.7933	0.416	0.207773768	0.01	26.5	Normal
C-108	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-109	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-110	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-111	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-112	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
C-201	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
C-202	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
C-203	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
C-204	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
S-101	47.3176	1.2171	477.3116	409.7933	5.280	2.640183096	0.01	40	Normal
S-102	47.3176	1.2171	477.3116	409.7933	19.550	9.775	0.01	40	Normal
S-103	47.3176	1.2171	477.3116	409.7933	15.727	7.863701888	0.01	40	Normal
S-104	47.3176	1.2171	477.3116	409.7933	2.232	5.606394	0.01	26.5	LogNorm
S-105	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)
S-106	47.3176	1.2171	477.3116	409.7933	17.800	8.9	0.01	40	Normal
S-107	47.3176	1.2171	477.3116	409.7933	3.505	1.752251796	0.01	26.5	Normal
S-108	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
S-109	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
S-110	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
S-111	47.3176	1.2171	477.3116	409.7933	17.700	8.85	0.01	15.11	Normal
S-112	47.3176	1.2171	477.3116	409.7933	14.320	6.39	0.01	40	Normal
SX-101	70.0301	0.0000	0.0000	409.7933	9.269	8.0838	0.01	40	Normal
SX-102	70.0301	0.0000	0.0000	409.7933	6.570	3.011241	0.01	15.11	LogNorm
SX-103	70.0301	0.0000	0.0000	409.7933	9.269	8.0838	0.01	40	Normal
SX-104	70.0301	0.0000	0.0000	409.7933	1.662	0.830977906	0.01	40	Normal
SX-105	70.0301	0.0000	0.0000	409.7933	9.269	8.0838	0.01	40	Normal
SX-106	70.0301	0.0000	0.0000	409.7933	18.950	9.475	0.01	40	Normal
SX-107	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SX-108	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SX-109	70.0301	0.0000	0.0000	409.7933	9.269	8.0838	0.01	40	Normal
SX-110	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SX-111	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SX-112	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SX-113	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SX-114	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SX-115	70.0301	0.0000	0.0000	409.7933	2.232	5.606394	0.01	26.5	LogNorm
SY-101	0.0000	0.3048	123.4350	409.7933	9.500	0.9214	0.1	2.457060524	Normal
SY-102	0.0000	0.3048	123.4350	409.7933	6.570	3.011241	0.01	15.11	LogNorm

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)
SY-103	0.0000	0.3048	123.4350	409.7933	6.900	3.45	0.01	15.11	Normal
T-101	47.3176	1.2171	477.9268	409.7933	0.099	0.049678997	0.01	40	Normal
T-102	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-103	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-104	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-105	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-106	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-107	47.3176	1.2171	477.9268	409.7933	3.478	1.739201377	0.01	26.5	Normal
T-108	47.3176	1.2171	477.9268	409.7933	7.316	3.657957245	0.01	40	Normal
T-109	47.3176	1.2171	477.9268	409.7933	0.446	0.222757375	0.01	40	Normal
T-110	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-111	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-112	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
T-201	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
T-202	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
T-203	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
T-204	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
TX-101	47.3176	1.2171	477.3116	409.7933	0.213	0.106337729	0.01	26.5	Normal
TX-102	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-103	47.3176	1.2171	477.3116	409.7933	9.598	4.798965822	0.01	40	Normal
TX-104	47.3176	1.2171	477.3116	409.7933	0.265	0.132289714	0.01	40	Normal
TX-105	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-106	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-107	47.3176	1.2171	477.3116	409.7933	0.905	0.452313259	0.01	40	Normal

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)	Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)
TX-108	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-109	47.3176	1.2171	477.3116	409.7933	0.067	0.033438398	0.01	26.5	Normal
TX-110	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-111	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-112	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-113	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-114	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-115	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-116	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-117	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TX-118	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TY-101	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TY-102	47.3176	1.2171	477.3116	409.7933	9.269	8.0838	0.01	40	Normal
TY-103	47.3176	1.2171	477.3116	409.7933	2.232	5.606394	0.01	26.5	LogNorm
TY-104	47.3176	1.2171	477.3116	409.7933	0.433	0.21629416	0.01	26.5	Normal
TY-105	47.3176	1.2171	477.3116	409.7933	2.232	5.606394	0.01	26.5	LogNorm
TY-106	47.3176	1.2171	477.3116	409.7933	1.493	0.746268657	0.01	26.5	Normal
U-101	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
U-102	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
U-103	47.3176	1.2171	477.9268	409.7933	15.500	7.75	0.01	40	Normal
U-104	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
U-105	47.3176	1.2171	477.9268	409.7933	9.696	4.848149165	0.01	40	Normal
U-106	47.3176	1.2171	477.9268	409.7933	2.304	1.152199115	0.01	40	Normal
U-107	47.3176	1.2171	477.9268	409.7933	9.247	4.623565166	0.01	40	Normal

Table A-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void Fraction or Maximum Wetted Solids Void Fraction Mean (Dimension-less)**	**Void Fraction or Maximum Wetted Solids Void Fraction Uncertainty (Dimension-less)**	**Void Fraction or Maximum Wetted Solids Void Fraction Minimum (Dimension-less)**	**Void Fraction or Maximum Wetted Solids Void Fraction Maximum (Dimension-less)**	**Void Fraction or Maximum Wetted Solids Void Fraction Dist Type (Dimension-less)**
U-108	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
U-109	47.3176	1.2171	477.9268	409.7933	14.750	7.375	0.01	40	Normal
U-110	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
U-111	47.3176	1.2171	477.9268	409.7933	9.269	8.0838	0.01	40	Normal
U-112	47.3176	1.2171	477.9268	409.7933	2.232	5.606394	0.01	26.5	LogNorm
U-201	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
U-202	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
U-203	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm
U-204	2.2334	0.9065	22.6102	29.1732	2.232	5.606394	0.01	26.5	LogNorm

Table A-5. Input Data (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**Non-convective waste yield stress mean (Pa)**	**Non-convective waste yield stress std dev (Pa)**	**Non-convective waste yield stress min (Pa)**	**Non-convective waste yield stress max (Pa)**	**Non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
A-101	631.250	260.880	109.490	1,674.770	Normal	0.021	0.021	0.001	0.018	0.024
A-102	631.25	260.88	109.49	1674.77	Normal	0.053	0.053	0.056	0.001	0.318
A-103	1143.27	272.08	327.03	2231.59	LogNorm	0.053	0.053	0.056	0.001	0.318
A-104	1143.27	272.08	327.03	2231.59	LogNorm	0.053	0.053	0.056	0.001	0.318
A-105	1143.27	272.08	327.03	2231.59	LogNorm	0.053	0.053	0.056	0.001	0.318
A-106	1143.27	272.08	327.03	2231.59	LogNorm	0.053	0.053	0.056	0.001	0.318
AN-101	829.55	218.64	173.63	1704.11	LogNorm	0.053	0.053	0.056	0.001	0.318
AN-102	144	13.87	88.52	199.48	Normal	0.053	0.053	0.056	0.001	0.318
AN-103	144	13.87	88.52	199.48	Normal	0.086	0.086	0.036	0.022	0.164
AN-104	144	13.87	88.52	199.48	Normal	0.059	0.059	0.014	0.027	0.099
AN-105	144	13.87	88.52	199.48	Normal	0.022	0.022	0.006	0.011	0.036
AN-106	631.25	260.88	109.49	1674.77	Normal	0.053	0.053	0.056	0.001	0.318
AN-107	144	13.87	88.52	199.48	Normal	0.053	0.053	0.056	0.001	0.318
AP-101	144	13.87	88.52	199.48	Normal	0.053	0.053	0.056	0.001	0.318
AP-102	144	13.87	88.52	199.48	Normal	0.053	0.053	0.056	0.001	0.318
AP-103	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
AP-104	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
AP-105	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
AP-106	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
AP-107	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
AP-108	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
AW-101	144	13.87	88.52	199.48	Normal	0.21	0.21	0.02	0.16	0.28
AW-102	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
AW-103	829.55	218.64	173.63	1704.11	LogNorm	0.05	0.05	0.06	0.00	0.32
AW-104	829.55	218.64	173.63	1704.11	LogNorm	0.05	0.05	0.06	0.00	0.32
AW-105	829.55	218.64	173.63	1704.11	LogNorm	0.05	0.05	0.06	0.00	0.32

Table A-5. Input Data (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**Non-convective waste yield stress mean (Pa)**	**Non-convective waste yield stress std dev (Pa)**	**Non-convective waste yield stress min (Pa)**	**Non-convective waste yield stress max (Pa)**	**Non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
AW-106	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
AX-101	631.25	260.88	109.49	1674.77	Normal	0.06	0.06	0.01	0.04	0.08
AX-102	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
AX-103	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
AX-104	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
AY-101	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
AY-102	829.55	218.64	173.63	1704.11	LogNorm	0.05	0.05	0.06	0.00	0.32
AZ-101	829.55	218.64	173.63	1704.11	LogNorm	0.05	0.05	0.06	0.00	0.32
AZ-102	829.55	218.64	173.63	1704.11	LogNorm	0.05	0.05	0.06	0.00	0.32
B-101	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
B-102	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
B-103	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
B-104	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-105	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
B-106	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-107	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
B-108	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
B-109	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
B-110	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-111	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-112	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-201	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-202	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-203	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
B-204	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-101	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-102	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32

Table A-5. Input Data (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**Non-convective waste yield stress mean (Pa)**	**Non-convective waste yield stress std dev (Pa)**	**Non-convective waste yield stress min (Pa)**	**Non-convective waste yield stress max (Pa)**	**Non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
BX-103	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-104	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-105	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-106	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-107	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-108	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-109	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BX-110	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BX-111	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BX-112	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
BY-101	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-102	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-103	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-104	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-105	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-106	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-107	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-108	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-109	631.25	260.88	109.49	1674.77	Normal	0.09	0.09	0.03	0.03	0.16
BY-110	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-111	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
BY-112	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
C-101	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-102	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-103	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-104	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-105	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32

Table A-5. Input Data (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**Non-convective waste yield stress mean (Pa)**	**Non-convective waste yield stress std dev (Pa)**	**Non-convective waste yield stress min (Pa)**	**Non-convective waste yield stress max (Pa)**	**Non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
C-106	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-107	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-108	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-109	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-110	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-111	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-112	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-201	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-202	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-203	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
C-204	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
S-101	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
S-102	631.25	260.88	109.49	1674.77	Normal	0.02	0.02	0.00	0.01	0.03
S-103	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
S-104	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
S-105	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
S-106	631.25	260.88	109.49	1674.77	Normal	0.01	0.01	0.01	0.00	0.03
S-107	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
S-108	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
S-109	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
S-110	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
S-111	144	13.87	88.52	199.48	Normal	0.01	0.01	0.00	0.01	0.02
S-112	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
SX-101	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
SX-102	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
SX-103	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
SX-104	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32

Table A-5. Input Data (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**Non-convective waste yield stress mean (Pa)**	**Non-convective waste yield stress std dev (Pa)**	**Non-convective waste yield stress min (Pa)**	**Non-convective waste yield stress max (Pa)**	**Non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
SX-105	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
SX-106	631.25	260.88	109.49	1674.77	Normal	0.02	0.02	0.01	0.00	0.03
SX-107	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SX-108	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SX-109	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
SX-110	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SX-111	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SX-112	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SX-113	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SX-114	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SX-115	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
SY-101	144	13.87	88.52	199.48	Normal	0.07	0.07	0.03	0.01	0.15
SY-102	829.55	218.64	173.63	1704.11	LogNorm	0.05	0.05	0.06	0.00	0.32
SY-103	144	13.87	88.52	199.48	Normal	0.05	0.05	0.06	0.00	0.32
T-101	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
T-102	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-103	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-104	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-105	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-106	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-107	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-108	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
T-109	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
T-110	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-111	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-112	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-201	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32

Table A-5. Input Data (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**Non-convective waste yield stress mean (Pa)**	**Non-convective waste yield stress std dev (Pa)**	**Non-convective waste yield stress min (Pa)**	**Non-convective waste yield stress max (Pa)**	**Non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
T-202	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-203	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
T-204	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
TX-101	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
TX-102	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-103	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-104	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-105	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-106	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-107	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-108	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-109	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
TX-110	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-111	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-112	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-113	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-114	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-115	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-116	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-117	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TX-118	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TY-101	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TY-102	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
TY-103	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
TY-104	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
TY-105	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
TY-106	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32

Table A-5. Input Data (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**Non-convective waste yield stress mean (Pa)**	**Non-convective waste yield stress std dev (Pa)**	**Non-convective waste yield stress min (Pa)**	**Non-convective waste yield stress max (Pa)**	**Non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
U-101	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
U-102	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
U-103	631.25	260.88	109.49	1674.77	Normal	0.06	0.06	0.01	0.03	0.08
U-104	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
U-105	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
U-106	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
U-107	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
U-108	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
U-109	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.01	0.02	0.09
U-110	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
U-111	631.25	260.88	109.49	1674.77	Normal	0.05	0.05	0.06	0.00	0.32
U-112	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
U-201	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
U-202	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
U-203	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32
U-204	1143.27	272.08	327.03	2231.59	LogNorm	0.05	0.05	0.06	0.00	0.32

Table A-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	Headspace gas ratio CH4 type	Headspace gas ratio N2O dist	Headspace gas ratio N2O mean	Headspace gas ratio N2O std dev	Headspace gas ratio N2O min	Headspace gas ratio N2O max	Headspace gas ratio N2O type	Retained gas composition N2 (%) dist	Retained gas composition N2 mean
A-101	Normal	0.071	0.071	0.005	0.058	0.084	Normal	19.001	19.001
A-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
A-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
A-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
A-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
A-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AN-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AN-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AN-103	Normal	0.053	0.053	0.007	0.037	0.077	Normal	28.660	28.660
AN-104	Normal	0.308	0.308	0.032	0.223	0.401	Normal	29.173	29.173
AN-105	Normal	0.169	0.169	0.018	0.125	0.220	Normal	24.571	24.571
AN-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AN-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AP-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AW-101	Normal	0.126	0.126	0.021	0.078	0.174	Normal	53.550	53.550
AW-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AW-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AW-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AW-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840

Table A-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
AW-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AX-101	Normal	0.142	0.142	0.008	0.122	0.163	Normal	16.683	16.683
AX-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AX-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AX-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AY-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AY-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AZ-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
AZ-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-109	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-201	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-202	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-203	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
B-204	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840

Table A-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	Headspace gas ratio CH4 type	Headspace gas ratio N2O dist	Headspace gas ratio N2O mean	Headspace gas ratio N2O std dev	Headspace gas ratio N2O min	Headspace gas ratio N2O max	Headspace gas ratio N2O type	Retained gas composition N2 (%) dist	Retained gas composition N2 mean
BX-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-109	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BX-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-109	Normal	0.236	0.236	0.021	0.178	0.305	Normal	29.045	29.045
BY-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
BY-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840

Table A-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
C-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-109	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-201	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-202	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-203	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
C-204	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-102	Normal	0.481	0.481	0.022	0.414	0.549	Normal	32.246	32.246
S-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-106	Normal	0.131	0.131	0.015	0.098	0.169	Normal	25.217	25.217
S-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-109	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
S-111	Normal	0.135	0.135	0.017	0.092	0.190	Normal	20.990	20.990
S-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840

Table A-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
SX-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-106	Normal	0.315	0.315	0.015	0.275	0.360	Normal	20.203	20.203
SX-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-109	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-113	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-114	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SX-115	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SY-101	Normal	0.361	0.361	0.049	0.226	0.501	Normal	33.875	33.875
SY-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
SY-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-109	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-201	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840

Table A-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	Headspace gas ratio CH4 type	Headspace gas ratio N2O dist	Headspace gas ratio N2O mean	Headspace gas ratio N2O std dev	Headspace gas ratio N2O min	Headspace gas ratio N2O max	Headspace gas ratio N2O type	Retained gas composition N2 (%) dist	Retained gas composition N2 mean
T-202	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-203	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
T-204	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-109	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-113	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-114	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-115	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-116	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-117	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TX-118	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TY-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TY-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TY-103	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TY-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TY-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
TY-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840

Table A-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	Headspace gas ratio CH4 type	Headspace gas ratio N2O dist	Headspace gas ratio N2O mean	Headspace gas ratio N2O std dev	Headspace gas ratio N2O min	Headspace gas ratio N2O max	Headspace gas ratio N2O type	Retained gas composition N2 (%) dist	Retained gas composition N2 mean
U-101	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-102	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-103	Normal	0.603	0.603	0.015	0.561	0.645	Normal	36.711	36.711
U-104	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-105	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-106	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-107	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-108	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-109	Normal	0.489	0.489	0.031	0.402	0.577	Normal	46.777	46.777
U-110	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-111	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-112	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-201	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-202	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-203	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840
U-204	LogNorm	0.253	0.253	0.176	0.001	0.619	LogNorm	29.840	29.840

Table A-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
A-101	2.326	11.352	26.594	Normal	2.457	2.457	0.295	1.242
A-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
A-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
A-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
A-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
A-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AN-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AN-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AN-103	5.153	14.912	42.804	Normal	0.597	0.597	0.066	0.400
AN-104	4.918	14.334	41.436	Normal	0.882	0.882	0.134	0.377
AN-105	3.635	14.166	34.339	Normal	0.500	0.500	0.065	0.303
AN-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AN-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AP-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AW-101	2.707	45.453	62.012	Normal	0.571	0.571	0.100	0.272
AW-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AW-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010

Table A-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
AW-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AW-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AW-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AX-101	4.284	4.648	27.392	Normal	6.585	6.585	1.769	3.094
AX-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AX-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AX-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AY-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AY-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AZ-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
AZ-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-109	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-201	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-202	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-203	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
B-204	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010

Table A-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
BX-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-109	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BX-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-109	4.437	16.678	42.377	Normal	0.191	0.191	0.034	0.081
BY-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
BY-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010

Table A-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
C-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-109	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-201	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-202	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-203	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
C-204	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-102	3.074	23.974	40.719	Normal	0.932	0.932	0.288	0.347
S-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-106	3.789	15.249	34.922	Normal	0.299	0.299	0.067	0.094
S-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-109	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
S-111	5.953	4.556	34.751	Normal	0.929	0.929	0.285	0.355
S-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010

Table A-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
SX-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-106	3.446	10.198	29.551	Normal	4.202	4.202	1.255	1.790
SX-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-109	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-113	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-114	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SX-115	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SY-101	6.784	13.360	53.313	Normal	9.172	9.172	2.987	3.274
SY-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
SY-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-109	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010

Table A-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
T-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-201	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-202	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-203	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
T-204	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-109	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-113	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-114	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-115	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-116	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-117	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TX-118	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TY-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TY-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TY-103	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TY-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010

Table A-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
TY-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
TY-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-101	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-102	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-103	2.018	30.945	42.561	Normal	0.596	0.596	0.156	0.246
U-104	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-105	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-106	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-107	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-108	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-109	3.188	36.854	56.618	Normal	1.007	1.007	0.328	0.354
U-110	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-111	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-112	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-201	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-202	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-203	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010
U-204	12.010	4.500	80.000	LogNorm	0.250	0.250		0.010

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)**	**Cross sectional area of tank (m2)**	**Solid Particle Density (g/mL)**
A-101	3.347	Normal	2.55E-03	8.49E-04	2.80E-03	triangular	410.43	2.2
A-102	18.318	ContLin	9.16E-03	3.05E-03	1.01E-02	triangular	410.43	2.3
A-103	18.318	ContLin	2.95E-03	9.85E-04	3.25E-03	triangular	410.43	2.6
A-104	18.318	ContLin	3.50E-03	1.17E-03	3.84E-03	triangular	410.43	2.6
A-105	18.318	ContLin	3.50E-03	1.17E-03	3.84E-03	triangular	410.43	2.6
A-106	18.318	ContLin	9.36E-03	3.12E-03	1.03E-02	triangular	410.43	2.6
AN-101	18.318	ContLin	1.30E-03	4.34E-04	1.43E-03	triangular	410.43	2.6
AN-102	18.318	ContLin	3.74E-03	1.25E-03	4.11E-03	triangular	410.43	2.2
AN-103	0.782	Normal	8.50E-04	4.25E-04	1.61E-03	triangular	410.43	2.2
AN-104	1.293	Normal	1.59E-03	5.30E-04	1.75E-03	triangular	410.43	2.2
AN-105	0.762	Normal	9.44E-04	4.72E-04	1.79E-03	triangular	410.43	2.2
AN-106	18.318	ContLin	2.05E-03	6.83E-04	2.25E-03	triangular	410.43	2.2
AN-107	18.318	ContLin	3.88E-03	1.29E-03	4.27E-03	triangular	410.43	2.2
AP-101	18.318	ContLin	3.29E-04	1.65E-04	6.26E-04	triangular	410.43	2.2
AP-102	18.318	ContLin	1.29E-03	4.30E-04	1.42E-03	triangular	410.43	2.2
AP-103	18.318	ContLin	7.52E-04	3.76E-04	1.43E-03	triangular	410.43	2.2
AP-104	18.318	ContLin	6.33E-04	3.17E-04	1.20E-03	triangular	410.43	2.2
AP-105	18.318	ContLin	8.18E-04	4.09E-04	1.55E-03	triangular	410.43	2.2
AP-106	18.318	ContLin	5.93E-04	2.97E-04	1.13E-03	triangular	410.43	2.2
AP-107	18.318	ContLin	3.92E-04	1.96E-04	7.44E-04	triangular	410.43	2.2
AP-108	18.318	ContLin	1.66E-03	5.52E-04	1.82E-03	triangular	410.43	2.2
AW-101	0.959	Normal	9.18E-04	4.59E-04	1.74E-03	triangular	410.43	2.2
AW-102	18.318	ContLin	5.11E-03	1.70E-03	5.62E-03	triangular	410.43	2.2
AW-103	18.318	ContLin	3.99E-04	1.99E-04	7.58E-04	triangular	410.43	2.6

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	Retained gas composition NH3 max	Retained gas composition NH3 type	Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)	Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)	Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)	Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)	Cross sectional area of tank (m2)	Solid Particle Density (g/mL)
AW-104	18.318	ContLin	7.40E-04	3.70E-04	1.41E-03	triangular	410.43	2.6
AW-105	18.318	ContLin	4.12E-04	2.06E-04	7.84E-04	triangular	410.43	2.6
AW-106	18.318	ContLin	9.25E-04	4.63E-04	1.76E-03	triangular	410.43	2.2
AX-101	10.784	Normal	1.22E-03	4.07E-04	1.34E-03	triangular	410.43	2.2
AX-102	18.318	ContLin	7.90E-03	2.63E-03	8.69E-03	triangular	410.43	2.2
AX-103	18.318	ContLin	3.60E-03	1.20E-03	3.96E-03	triangular	410.43	2.2
AX-104	18.318	ContLin	4.52E-02	1.51E-02	4.97E-02	triangular	410.43	2.6
AY-101	18.318	ContLin	2.09E-02	6.98E-03	2.30E-02	triangular	410.43	2.6
AY-102	18.318	ContLin	9.68E-02	3.23E-02	0.106480257	triangular	410.43	2.6
AZ-101	18.318	ContLin	8.01E-02	2.67E-02	8.81E-02	triangular	410.43	2.6
AZ-102	18.318	ContLin	4.07E-02	1.36E-02	4.48E-02	triangular	410.43	2.6
B-101	18.318	ContLin	1.54E-03	5.12E-04	1.69E-03	triangular	410.43	2.2
B-102	18.318	ContLin	3.50E-03	1.17E-03	3.85E-03	triangular	410.43	2.2
B-103	18.318	ContLin	1.84E-03	6.15E-04	2.03E-03	triangular	410.43	2.2
B-104	18.318	ContLin	4.15E-04	2.07E-04	7.88E-04	triangular	410.43	2.6
B-105	18.318	ContLin	4.80E-04	2.40E-04	9.11E-04	triangular	410.43	2.2
B-106	18.318	ContLin	1.06E-03	3.54E-04	1.17E-03	triangular	410.43	2.6
B-107	18.318	ContLin	7.48E-04	3.74E-04	1.42E-03	triangular	410.43	2.3
B-108	18.318	ContLin	1.18E-03	3.92E-04	1.29E-03	triangular	410.43	2.3
B-109	18.318	ContLin	9.05E-04	4.52E-04	1.72E-03	triangular	410.43	2.3
B-110	18.318	ContLin	9.49E-04	4.74E-04	1.80E-03	triangular	410.43	2.6
B-111	18.318	ContLin	1.39E-03	4.62E-04	1.52E-03	triangular	410.43	2.6
B-112	18.318	ContLin	3.35E-03	1.12E-03	3.68E-03	triangular	410.43	2.6
B-201	18.318	ContLin	8.67E-04	4.33E-04	1.65E-03	triangular	29.19	2.6

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)**	**Cross sectional area of tank (m2)**	**Solid Particle Density (g/mL)**
B-202	18.318	ContLin	8.52E-04	4.26E-04	1.62E-03	triangular	29.19	2.6
B-203	18.318	ContLin	1.77E-03	5.90E-04	1.95E-03	triangular	29.19	2.6
B-204	18.318	ContLin	1.78E-03	5.94E-04	1.96E-03	triangular	29.19	2.6
BX-101	18.318	ContLin	2.19E-03	7.30E-04	2.41E-03	triangular	410.43	2.6
BX-102	18.318	ContLin	1.35E-03	4.51E-04	1.49E-03	triangular	410.43	2.6
BX-103	18.318	ContLin	2.26E-03	7.53E-04	2.49E-03	triangular	410.43	2.6
BX-104	18.318	ContLin	1.61E-03	5.35E-04	1.77E-03	triangular	410.43	2.6
BX-105	18.318	ContLin	1.75E-03	5.82E-04	1.92E-03	triangular	410.43	2.6
BX-106	18.318	ContLin	3.24E-03	1.08E-03	3.57E-03	triangular	410.43	2.6
BX-107	18.318	ContLin	5.07E-04	2.53E-04	9.63E-04	triangular	410.43	2.6
BX-108	18.318	ContLin	3.32E-03	1.11E-03	3.65E-03	triangular	410.43	2.6
BX-109	18.318	ContLin	1.13E-03	3.78E-04	1.25E-03	triangular	410.43	2.6
BX-110	18.318	ContLin	7.88E-04	3.94E-04	1.50E-03	triangular	410.43	2.3
BX-111	18.318	ContLin	6.62E-04	3.31E-04	1.26E-03	triangular	410.43	2.2
BX-112	18.318	ContLin	8.84E-04	4.42E-04	1.68E-03	triangular	410.43	2.6
BY-101	18.318	ContLin	8.82E-04	4.41E-04	1.68E-03	triangular	410.43	2.2
BY-102	18.318	ContLin	5.37E-04	2.69E-04	1.02E-03	triangular	410.43	2.2
BY-103	18.318	ContLin	4.43E-04	2.22E-04	8.42E-04	triangular	410.43	2.2
BY-104	18.318	ContLin	7.43E-04	3.72E-04	1.41E-03	triangular	410.43	2.3
BY-105	18.318	ContLin	5.09E-04	2.55E-04	9.68E-04	triangular	410.43	2.2
BY-106	18.318	ContLin	6.78E-04	3.39E-04	1.29E-03	triangular	410.43	2.2
BY-107	18.318	ContLin	7.35E-04	3.67E-04	1.40E-03	triangular	410.43	2.2
BY-108	18.318	ContLin	8.13E-04	4.07E-04	1.55E-03	triangular	410.43	2.3
BY-109	0.321	Normal	5.23E-04	2.62E-04	9.94E-04	triangular	410.43	2.2

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)**	**Cross sectional area of tank (m2)**	**Solid Particle Density (g/mL)**
BY-110	18.318	ContLin	1.33E-03	4.44E-04	1.46E-03	triangular	410.43	2.2
BY-111	18.318	ContLin	4.93E-04	2.46E-04	9.36E-04	triangular	410.43	2.2
BY-112	18.318	ContLin	5.11E-04	2.55E-04	9.71E-04	triangular	410.43	2.2
C-101	18.318	ContLin	1.54E-03	5.12E-04	1.69E-03	triangular	410.43	2.6
C-102	18.318	ContLin	6.47E-04	3.24E-04	1.23E-03	triangular	410.43	2.6
C-103	18.318	ContLin	5.57E-02	1.86E-02	6.13E-02	triangular	410.43	2.6
C-104	18.318	ContLin	2.63E-03	8.78E-04	2.90E-03	triangular	410.43	2.6
C-105	18.318	ContLin	2.64E-03	8.79E-04	2.90E-03	triangular	410.43	2.6
C-106	18.318	ContLin	1.58E-01	5.28E-02	1.74E-01	triangular	410.43	2.6
C-107	18.318	ContLin	4.81E-03	1.60E-03	5.29E-03	triangular	410.43	2.6
C-108	18.318	ContLin	2.10E-03	7.00E-04	2.31E-03	triangular	410.43	2.6
C-109	18.318	ContLin	4.77E-03	1.59E-03	5.25E-03	triangular	410.43	2.6
C-110	18.318	ContLin	1.77E-03	5.90E-04	1.95E-03	triangular	410.43	2.6
C-111	18.318	ContLin	9.69E-03	3.23E-03	1.07E-02	triangular	410.43	2.6
C-112	18.318	ContLin	6.49E-03	2.16E-03	7.14E-03	triangular	410.43	2.6
C-201	18.318	ContLin	1.23E-02	4.10E-03	1.35E-02	triangular	29.19	2.6
C-202	18.318	ContLin	1.42E-02	4.73E-03	1.56E-02	triangular	29.19	2.6
C-203	18.318	ContLin	4.87E-03	1.62E-03	5.36E-03	triangular	29.19	2.6
C-204	18.318	ContLin	4.57E-03	1.52E-03	5.02E-03	triangular	29.19	2.6
S-101	18.318	ContLin	1.25E-03	4.17E-04	1.38E-03	triangular	410.43	2.3
S-102	1.624	Normal	7.49E-04	3.75E-04	1.42E-03	triangular	410.43	2.2
S-103	18.318	ContLin	9.19E-04	4.60E-04	1.75E-03	triangular	410.43	2.2
S-104	18.318	ContLin	8.92E-04	4.46E-04	1.69E-03	triangular	410.43	2.6
S-105	18.318	ContLin	3.92E-04	1.96E-04	7.45E-04	triangular	410.43	2.2

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)**	**Cross sectional area of tank (m2)**	**Solid Particle Density (g/mL)**
S-106	0.520	Normal	5.00E-04	2.50E-04	9.51E-04	triangular	410.43	2.2
S-107	18.318	ContLin	8.59E-04	4.29E-04	1.63E-03	triangular	410.43	2.6
S-108	18.318	ContLin	3.33E-04	1.67E-04	6.33E-04	triangular	410.43	2.2
S-109	18.318	ContLin	3.48E-04	1.74E-04	6.62E-04	triangular	410.43	2.2
S-110	18.318	ContLin	6.17E-04	3.09E-04	1.17E-03	triangular	410.43	2.3
S-111	1.603	Normal	6.94E-04	3.47E-04	1.32E-03	triangular	410.43	2.2
S-112	18.318	ContLin	1.19E-03	3.95E-04	1.30E-03	triangular	410.43	2.2
SX-101	18.318	ContLin	1.41E-03	4.71E-04	1.55E-03	triangular	410.43	2.2
SX-102	18.318	ContLin	2.19E-03	7.31E-04	2.41E-03	triangular	410.43	2.2
SX-103	18.318	ContLin	6.29E-03	2.10E-03	6.92E-03	triangular	410.43	2.2
SX-104	18.318	ContLin	2.06E-03	6.87E-04	2.27E-03	triangular	410.43	2.2
SX-105	18.318	ContLin	5.90E-03	1.97E-03	6.49E-03	triangular	410.43	2.2
SX-106	6.805	Normal	8.47E-04	4.24E-04	1.61E-03	triangular	410.43	2.2
SX-107	18.318	ContLin	3.75E-03	1.25E-03	4.12E-03	triangular	410.43	2.6
SX-108	18.318	ContLin	2.69E-03	8.98E-04	2.96E-03	triangular	410.43	2.6
SX-109	18.318	ContLin	2.85E-03	9.49E-04	3.13E-03	triangular	410.43	2.2
SX-110	18.318	ContLin	4.74E-03	1.58E-03	5.21E-03	triangular	410.43	2.6
SX-111	18.318	ContLin	4.79E-03	1.60E-03	5.27E-03	triangular	410.43	2.6
SX-112	18.318	ContLin	2.73E-03	9.11E-04	3.01E-03	triangular	410.43	2.6
SX-113	18.318	ContLin	5.32E-03	1.77E-03	5.85E-03	triangular	410.43	2.6
SX-114	18.318	ContLin	4.15E-03	1.38E-03	4.56E-03	triangular	410.43	2.6
SX-115	18.318	ContLin	3.84E-02	1.28E-02	4.22E-02	triangular	410.43	2.6
SY-101	15.767	Normal	6.42E-04	3.21E-04	1.22E-03	triangular	410.43	2.2
SY-102	18.318	ContLin	2.42E-03	8.08E-04	2.66E-03	triangular	410.43	2.6

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)**	**Cross sectional area of tank (m2)**	**Solid Particle Density (g/mL)**
SY-103	18.318	ContLin	1.56E-03	5.21E-04	1.72E-03	triangular	410.43	2.2
T-101	18.318	ContLin	1.27E-03	4.22E-04	1.39E-03	triangular	410.43	2.3
T-102	18.318	ContLin	5.41E-03	1.80E-03	5.95E-03	triangular	410.43	2.6
T-103	18.318	ContLin	4.29E-03	1.43E-03	4.72E-03	triangular	410.43	2.6
T-104	18.318	ContLin	4.86E-04	2.43E-04	9.23E-04	triangular	410.43	2.6
T-105	18.318	ContLin	1.41E-03	4.70E-04	1.55E-03	triangular	410.43	2.6
T-106	18.318	ContLin	4.51E-03	1.50E-03	4.96E-03	triangular	410.43	2.6
T-107	18.318	ContLin	1.06E-03	3.53E-04	1.16E-03	triangular	410.43	2.6
T-108	18.318	ContLin	6.07E-03	2.02E-03	6.68E-03	triangular	410.43	2.3
T-109	18.318	ContLin	1.66E-03	5.55E-04	1.83E-03	triangular	410.43	2.2
T-110	18.318	ContLin	1.02E-03	3.42E-04	1.13E-03	triangular	410.43	2.6
T-111	18.318	ContLin	4.11E-04	2.05E-04	7.80E-04	triangular	410.43	2.6
T-112	18.318	ContLin	1.75E-03	5.84E-04	1.93E-03	triangular	410.43	2.6
T-201	18.318	ContLin	2.07E-03	6.88E-04	2.27E-03	triangular	29.19	2.6
T-202	18.318	ContLin	9.13E-04	4.57E-04	1.74E-03	triangular	29.19	2.6
T-203	18.318	ContLin	7.85E-04	3.92E-04	1.49E-03	triangular	29.19	2.6
T-204	18.318	ContLin	7.80E-04	3.90E-04	1.48E-03	triangular	29.19	2.6
TX-101	18.318	ContLin	1.74E-03	5.81E-04	1.92E-03	triangular	410.43	2.6
TX-102	18.318	ContLin	6.57E-04	3.29E-04	1.25E-03	triangular	410.43	2.2
TX-103	18.318	ContLin	8.74E-04	4.37E-04	1.66E-03	triangular	410.43	2.2
TX-104	18.318	ContLin	1.96E-03	6.54E-04	2.16E-03	triangular	410.43	2.3
TX-105	18.318	ContLin	3.55E-04	1.78E-04	6.75E-04	triangular	410.43	2.2
TX-106	18.318	ContLin	5.10E-04	2.55E-04	9.68E-04	triangular	410.43	2.2
TX-107	18.318	ContLin	3.54E-03	1.18E-03	3.89E-03	triangular	410.43	2.2

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)**	**Cross sectional area of tank (m2)**	**Solid Particle Density (g/mL)**
TX-108	18.318	ContLin	9.29E-04	4.64E-04	1.76E-03	triangular	410.43	2.2
TX-109	18.318	ContLin	6.08E-04	3.04E-04	1.16E-03	triangular	410.43	2.6
TX-110	18.318	ContLin	3.82E-04	1.91E-04	7.26E-04	triangular	410.43	2.2
TX-111	18.318	ContLin	4.36E-04	2.18E-04	8.29E-04	triangular	410.43	2.2
TX-112	18.318	ContLin	3.27E-04	1.63E-04	6.20E-04	triangular	410.43	2.2
TX-113	18.318	ContLin	3.04E-04	1.52E-04	5.78E-04	triangular	410.43	2.3
TX-114	18.318	ContLin	3.39E-04	1.69E-04	6.44E-04	triangular	410.43	2.2
TX-115	18.318	ContLin	3.39E-04	1.69E-04	6.44E-04	triangular	410.43	2.2
TX-116	18.318	ContLin	3.12E-04	1.56E-04	5.93E-04	triangular	410.43	2.2
TX-117	18.318	ContLin	3.51E-04	1.75E-04	6.67E-04	triangular	410.43	2.2
TX-118	18.318	ContLin	7.99E-04	4.00E-04	1.52E-03	triangular	410.43	2.2
TY-101	18.318	ContLin	9.50E-04	4.75E-04	1.80E-03	triangular	410.43	2.3
TY-102	18.318	ContLin	1.55E-03	5.18E-04	1.71E-03	triangular	410.43	2.2
TY-103	18.318	ContLin	1.03E-03	3.44E-04	1.13E-03	triangular	410.43	2.6
TY-104	18.318	ContLin	2.76E-03	9.20E-04	3.03E-03	triangular	410.43	2.6
TY-105	18.318	ContLin	9.34E-04	4.67E-04	1.77E-03	triangular	410.43	2.6
TY-106	18.318	ContLin	6.31E-03	2.10E-03	6.94E-03	triangular	410.43	2.6
U-101	18.318	ContLin	5.33E-03	1.78E-03	5.86E-03	triangular	410.43	2.6
U-102	18.318	ContLin	1.23E-03	4.10E-04	1.35E-03	triangular	410.43	2.2
U-103	0.963	Normal	1.12E-03	3.75E-04	1.24E-03	triangular	410.43	2.2
U-104	18.318	ContLin	1.64E-03	5.48E-04	1.81E-03	triangular	410.43	2.3
U-105	18.318	ContLin	1.13E-03	3.75E-04	1.24E-03	triangular	410.43	2.2
U-106	18.318	ContLin	2.17E-03	7.22E-04	2.38E-03	triangular	410.43	2.2
U-107	18.318	ContLin	7.59E-04	3.80E-04	1.44E-03	triangular	410.43	2.2

Table A-8. Input Data. (7 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen Generation Rate in Non-Convective Waste (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Min (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Max (moles/m3/day)**	**Hydrogen Generation Rate in Non-Convective Waste Dist Type (moles/m3/day)**	**Cross sectional area of tank (m2)**	**Solid Particle Density (g/mL)**
U-108	18.318	ContLin	9.73E-04	4.86E-04	1.85E-03	triangular	410.43	2.2
U-109	1.812	Normal	6.41E-04	3.20E-04	1.22E-03	triangular	410.43	2.2
U-110	18.318	ContLin	1.20E-03	3.99E-04	1.32E-03	triangular	410.43	2.6
U-111	18.318	ContLin	9.26E-04	4.63E-04	1.76E-03	triangular	410.43	2.2
U-112	18.318	ContLin	2.76E-03	9.20E-04	3.04E-03	triangular	410.43	2.6
U-201	18.318	ContLin	2.86E-03	9.54E-04	3.15E-03	triangular	29.19	2.6
U-202	18.318	ContLin	3.09E-03	1.03E-03	3.40E-03	triangular	29.19	2.6
U-203	18.318	ContLin	3.37E-03	1.12E-03	3.71E-03	triangular	29.19	2.6
U-204	18.318	ContLin	4.19E-03	1.40E-03	4.60E-03	triangular	29.19	2.6

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APPENDIX B

INPUT DATA SOURCE

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Spreadsheet Title: "RPP-10006r4 !!Waste Groups-rev-40-042026 .xls" and
"RPP-10006r4 Database Creator 041021 .xls"

Title: RPP-10006 Rev 4, *Methodology and Calculations for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site*

The following pages (pages B-1 through B-59) in Appendix A contains a series of tables which contain the database used in the main flammable gas calculation. The data has been peer reviewed per TFC-ENG-CHEM-D-33, REV B, *SPREADSHEET VERIFICATION.*

Spreadsheet Verification Number: 273 & 274

Originator: S. A. Barker Date: 10/27/04

Checker: D. C. Hedengren Date: 10/27/04

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Table B-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
A-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
A-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
A-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
A-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
A-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
A-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AN-101	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AN-102	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AN-103	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AN-104	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AN-105	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AN-106	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AN-107	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-101	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-102	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-103	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-104	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-105	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-106	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-107	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AP-108	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AW-101	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AW-102	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AW-103	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AW-104	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AW-105	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AW-106	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption

Table B-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
AX-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AX-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AX-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AX-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AY-101	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AY-102	DST	Ref 6	Ref 1	Ref 6	Ref 1	Boundary Assumption	Ref 6	Ref 1	Boundary Assumption
AZ-101	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
AZ-102	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-201	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-202	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-203	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
B-204	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption

Table B-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
BX-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BX-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
BY-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption

Table B-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
C-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-201	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-202	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-203	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
C-204	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
S-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption

Table B-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
SX-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-113	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-114	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SX-115	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SY-101	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SY-102	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
SY-103	DST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-201	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-202	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption

Table B-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
T-203	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
T-204	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-113	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-114	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-115	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-116	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-117	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TX-118	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TY-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TY-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TY-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TY-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TY-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
TY-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-101	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption

Table B-1. Input Data. (7 sheets)

1	2	3	4	5	6	7	8	9	10
Tank	**Tank type**	**Total waste depth (m)**	**Total waste depth uncertainty (m)**	**Total non-convective waste depth (m)**	**Total non-convective waste depth uncertainty (m)**	**Total non-convective waste depth lower bound (m)**	**Wetted non-convective waste depth (m)**	**Wetted non-convective waste depth uncertainty (m)**	**Wetted non-convective waste depth lower bound (m)**
U-102	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-103	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-104	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-105	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-106	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-107	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-108	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-109	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-110	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-111	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-112	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-201	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-202	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-203	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption
U-204	SST	Ref 7	Ref 1	Ref 7	Ref 1	Boundary Assumption	Ref 7	Ref 1	Boundary Assumption

Table B-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective waste density mean (kg/m3)**	**Convective waste density std dev (kg/m3)**	**Convective waste density min (kg/m3)**	**Convective waste density max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean (kg/m3)**
A-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
A-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
A-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
A-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
A-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
A-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AN-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AN-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AN-103	Ref 7	Ref 1	Ref 8	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AN-104	Ref 7	Ref 1	Ref 8	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AN-105	Ref 7	Ref 1	Ref 8	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AN-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AN-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AP-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AW-101	Ref 7	Ref 1	Ref 8	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AW-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AW-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AW-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AW-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AW-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10

Table B-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective waste density mean (kg/m3)**	**Convective waste density std dev (kg/m3)**	**Convective waste density min (kg/m3)**	**Convective waste density max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean (kg/m3)**
AX-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AX-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AX-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AX-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AY-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AY-102	Ref 6	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AZ-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
AZ-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-201	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-202	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-203	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
B-204	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10

Table B-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective waste density mean (kg/m3)**	**Convective waste density std dev (kg/m3)**	**Convective waste density min (kg/m3)**	**Convective waste density max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean (kg/m3)**
BX-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BX-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
BY-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10

Table B-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective waste density mean (kg/m3)**	**Convective waste density std dev (kg/m3)**	**Convective waste density min (kg/m3)**	**Convective waste density max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean (kg/m3)**
C-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-201	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-202	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-203	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
C-204	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
S-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10

Table B-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective waste density mean (kg/m3)**	**Convective waste density std dev (kg/m3)**	**Convective waste density min (kg/m3)**	**Convective waste density max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean (kg/m3)**
SX-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-113	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-114	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SX-115	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SY-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SY-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
SY-103	Ref 7	Ref 1	Ref 8	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-201	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-202	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10

Table B-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective waste density mean (kg/m3)**	**Convective waste density std dev (kg/m3)**	**Convective waste density min (kg/m3)**	**Convective waste density max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean (kg/m3)**
T-203	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
T-204	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-113	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-114	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-115	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-116	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-117	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TX-118	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TY-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TY-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TY-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TY-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TY-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
TY-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-101	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10

Table B-2. Input Data. (7 sheets)

	11	12	13	14	15	16	17	18	19
Tank	**Convective waste depth (m)**	**Convective waste depth uncertainty (m)**	**Crust depth (m)**	**Convective waste density mean (kg/m3)**	**Convective waste density std dev (kg/m3)**	**Convective waste density min (kg/m3)**	**Convective waste density max (kg/m3)**	**Convective Waste Density Dist (kg/m3)**	**Non-Convective Waste Porosity Mean (kg/m3)**
U-102	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-103	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-104	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-105	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-106	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-107	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-108	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-109	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-110	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-111	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-112	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-201	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-202	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-203	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10
U-204	Ref 7	Ref 1	na	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10	Ref 10

Table B-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev (kg/m3)	Non-Convective Waste Porosity Min (kg/m3)	Non-Convective Waste Porosity Max (kg/m3)	Non-Convective Waste Porosity Dist (kg/m3)	Non-convective waste average temperature (K)	Tank vapor space average temperature (K)	Tank type group	Total tank volume (m^3)	Tank operating capacity (m)	Dish type	Dish height (m)
A-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
A-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
A-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
A-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
A-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
A-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AN-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AN-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AN-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AN-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AN-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AN-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AN-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AP-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AW-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AW-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AW-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AW-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AW-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AW-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AX-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AX-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AX-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2

Table B-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	**Non-Convective Waste Porosity Std Dev (kg/m3)**	**Non-Convective Waste Porosity Min (kg/m3)**	**Non-Convective Waste Porosity Max (kg/m3)**	**Non-Convective Waste Porosity Dist (kg/m3)**	**Non-convective waste average temperature (K)**	**Tank vapor space average temperature (K)**	**Tank type group**	**Total tank volume (m^3)**	**Tank operating capacity (m)**	**Dish type**	**Dish height (m)**
AX-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AY-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AY-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AZ-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
AZ-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-201	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-202	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-203	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
B-204	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2

Table B-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	**Non-Convective Waste Porosity Std Dev (kg/m3)**	**Non-Convective Waste Porosity Min (kg/m3)**	**Non-Convective Waste Porosity Max (kg/m3)**	**Non-Convective Waste Porosity Dist (kg/m3)**	**Non-convective waste average temperature (K)**	**Tank vapor space average temperature (K)**	**Tank type group**	**Total tank volume (m^3)**	**Tank operating capacity (m)**	**Dish type**	**Dish height (m)**
BX-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BX-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
BY-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-201	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-202	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
C-203	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2

Table B-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	Non-Convective Waste Porosity Std Dev (kg/m3)	Non-Convective Waste Porosity Min (kg/m3)	Non-Convective Waste Porosity Max (kg/m3)	Non-Convective Waste Porosity Dist (kg/m3)	Non-convective waste average temperature (K)	Tank vapor space average temperature (K)	Tank type group	Total tank volume (m^3)	Tank operating capacity (m)	Dish type	Dish height (m)
C-204	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
S-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-113	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-114	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SX-115	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SY-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
SY-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2

Table B-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	**Non-Convective Waste Porosity Std Dev (kg/m3)**	**Non-Convective Waste Porosity Min (kg/m3)**	**Non-Convective Waste Porosity Max (kg/m3)**	**Non-Convective Waste Porosity Dist (kg/m3)**	**Non-convective waste average temperature (K)**	**Tank vapor space average temperature (K)**	**Tank type group**	**Total tank volume (m^3)**	**Tank operating capacity (m)**	**Dish type**	**Dish height (m)**
SY-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-201	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-202	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-203	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
T-204	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-113	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2

Table B-3. Input Data. (6 sheets)

	20	21	22	23	24	25	26	27	28	29	30
Tank	**Non-Convective Waste Porosity Std Dev (kg/m3)**	**Non-Convective Waste Porosity Min (kg/m3)**	**Non-Convective Waste Porosity Max (kg/m3)**	**Non-Convective Waste Porosity Dist (kg/m3)**	**Non-convective waste average temperature (K)**	**Tank vapor space average temperature (K)**	**Tank type group**	**Total tank volume (m^3)**	**Tank operating capacity (m)**	**Dish type**	**Dish height (m)**
TX-114	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-115	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-116	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-117	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TX-118	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TY-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TY-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TY-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TY-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TY-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
TY-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-101	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-102	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-103	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-104	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-105	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-106	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-107	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-108	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-109	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-110	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-111	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-112	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-201	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-202	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-203	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2
U-204	Ref 10	Ref 10	Ref 10	Ref 10	Ref 6	Ref 6	Ref 2	Ref 2	Ref 2	Ref 2	Ref 2

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void fraction or maximum wetted solids *void fraction* mean (dimension-less)**	**Void fraction or maximum wetted solids *void fraction* uncertainty (dimension-less)**	**Void fraction or maximum wetted solids *void fraction* minimum (dimension-less)**	**Void fraction or maximum wetted solids *void fraction* maximum (dimension-less)**	**Void fraction or maximum wetted solids *void fraction* dist type (dimension-less)**
A-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
A-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
A-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
A-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
A-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
A-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AN-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AN-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AN-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AN-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AN-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AN-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AN-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AP-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AW-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AW-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AW-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void fraction or maximum wetted solids void fraction mean (dimension-less)**	**Void fraction or maximum wetted solids void fraction uncertainty (dimension-less)**	**Void fraction or maximum wetted solids void fraction minimum (dimension-less)**	**Void fraction or maximum wetted solids void fraction maximum (dimension-less)**	**Void fraction or maximum wetted solids void fraction dist type (dimension-less)**
AW-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AW-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AW-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AX-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AX-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AX-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AX-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AY-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AY-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AZ-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
AZ-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-201	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	Dish volume (kL)	Knuckle height (m)	Knuckle volume (kL)	Tank capacity (kL/m)	Void fraction or maximum wetted solids void fraction mean (dimension-less)	Void fraction or maximum wetted solids void fraction uncertainty (dimension-less)	Void fraction or maximum wetted solids void fraction minimum (dimension-less)	Void fraction or maximum wetted solids void fraction maximum (dimension-less)	Void fraction or maximum wetted solids void fraction dist type (dimension-less)
B-202	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-203	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
B-204	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BX-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void fraction or maximum wetted solids void fraction mean (dimension-less)**	**Void fraction or maximum wetted solids void fraction uncertainty (dimension-less)**	**Void fraction or maximum wetted solids void fraction minimum (dimension-less)**	**Void fraction or maximum wetted solids void fraction maximum (dimension-less)**	**Void fraction or maximum wetted solids void fraction dist type (dimension-less)**
BY-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
BY-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-201	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-202	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-203	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
C-204	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void fraction or maximum wetted solids void fraction mean (dimension-less)**	**Void fraction or maximum wetted solids void fraction uncertainty (dimension-less)**	**Void fraction or maximum wetted solids void fraction minimum (dimension-less)**	**Void fraction or maximum wetted solids void fraction maximum (dimension-less)**	**Void fraction or maximum wetted solids void fraction dist type (dimension-less)**
S-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
S-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-113	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-114	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SX-115	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
SY-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 9	Ref 9	Ref 9	Ref 9	Ref 9
SY-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void fraction or maximum wetted solids void fraction mean (dimension-less)**	**Void fraction or maximum wetted solids void fraction uncertainty (dimension-less)**	**Void fraction or maximum wetted solids void fraction minimum (dimension-less)**	**Void fraction or maximum wetted solids void fraction maximum (dimension-less)**	**Void fraction or maximum wetted solids void fraction dist type (dimension-less)**
SY-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-201	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-202	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-203	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
T-204	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void fraction or maximum wetted solids void fraction mean (dimension-less)**	**Void fraction or maximum wetted solids void fraction uncertainty (dimension-less)**	**Void fraction or maximum wetted solids void fraction minimum (dimension-less)**	**Void fraction or maximum wetted solids void fraction maximum (dimension-less)**	**Void fraction or maximum wetted solids void fraction dist type (dimension-less)**
TX-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-113	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-114	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-115	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-116	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-117	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TX-118	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TY-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TY-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TY-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TY-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TY-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
TY-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-101	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-102	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-103	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-104	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-105	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-106	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-107	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-4. Input Data. (8 sheets)

	31	32	33	34	35	36	37	38	39
Tank	**Dish volume (kL)**	**Knuckle height (m)**	**Knuckle volume (kL)**	**Tank capacity (kL/m)**	**Void fraction or maximum wetted solids void fraction mean (dimension-less)**	**Void fraction or maximum wetted solids void fraction uncertainty (dimension-less)**	**Void fraction or maximum wetted solids void fraction minimum (dimension-less)**	**Void fraction or maximum wetted solids void fraction maximum (dimension-less)**	**Void fraction or maximum wetted solids void fraction dist type (dimension-less)**
U-108	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-109	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-110	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-111	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-112	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-201	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-202	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-203	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4
U-204	Ref 2	Ref 2	Ref 2	Ref 2	Ref 4	Ref 4	Ref 4	Ref 4	Ref 4

Table B-5. Input Data. (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**non-convective waste yield stress mean (Pa)**	**non-convective waste yield stress std dev (Pa)**	**non-convective waste yield stress min (Pa)**	**non-convective waste yield stress max (Pa)**	**non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
A-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-5. Input Data. (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**non-convective waste yield stress mean (Pa)**	**non-convective waste yield stress std dev (Pa)**	**non-convective waste yield stress min (Pa)**	**non-convective waste yield stress max (Pa)**	**non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
AX-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AY-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AY-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AZ-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AZ-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-201	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-202	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-203	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-204	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-5. Input Data. (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**non-convective waste yield stress mean (Pa)**	**non-convective waste yield stress std dev (Pa)**	**non-convective waste yield stress min (Pa)**	**non-convective waste yield stress max (Pa)**	**non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
BX-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-5. Input Data. (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**non-convective waste yield stress mean (Pa)**	**non-convective waste yield stress std dev (Pa)**	**non-convective waste yield stress min (Pa)**	**non-convective waste yield stress max (Pa)**	**non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
C-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-201	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-202	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-203	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-204	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-5. Input Data. (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**non-convective waste yield stress mean (Pa)**	**non-convective waste yield stress std dev (Pa)**	**non-convective waste yield stress min (Pa)**	**non-convective waste yield stress max (Pa)**	**non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
SX-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-113	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-114	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-115	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-201	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-202	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-5. Input Data. (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**non-convective waste yield stress mean (Pa)**	**non-convective waste yield stress std dev (Pa)**	**non-convective waste yield stress min (Pa)**	**non-convective waste yield stress max (Pa)**	**non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
T-203	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-204	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-113	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-114	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-115	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-116	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-117	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-118	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-101	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-5. Input Data. (7 sheets)

	40	41	42	43	44	45	46	47	48	49
Tank	**non-convective waste yield stress mean (Pa)**	**non-convective waste yield stress std dev (Pa)**	**non-convective waste yield stress min (Pa)**	**non-convective waste yield stress max (Pa)**	**non-convective waste yield stress dist type (Pa)**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 mean**	**Headspace gas ratio CH4 std dev**	**Headspace gas ratio CH4 min**	**Headspace gas ratio CH4 max**
U-102	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-103	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-104	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-105	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-106	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-107	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-108	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-109	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-110	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-111	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-112	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-201	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-202	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-203	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-204	Ref 5	Ref 5	Ref 5	Ref 5	Ref 5	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
A-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
AX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AZ-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AZ-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
BX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
C-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
SX-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-113	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-114	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-115	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	Headspace gas ratio CH4 type	Headspace gas ratio N2O dist	Headspace gas ratio N2O mean	Headspace gas ratio N2O std dev	Headspace gas ratio N2O min	Headspace gas ratio N2O max	Headspace gas ratio N2O type	Retained gas composition N2 (%) dist	Retained gas composition N2 mean
T-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-113	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-114	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-115	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-116	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-117	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-118	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-6. Input Data. (7 sheets)

	50	51	52	53	54	55	56	57	58
Tank	**Headspace gas ratio CH4 type**	**Headspace gas ratio N2O dist**	**Headspace gas ratio N2O mean**	**Headspace gas ratio N2O std dev**	**Headspace gas ratio N2O min**	**Headspace gas ratio N2O max**	**Headspace gas ratio N2O type**	**Retained gas composition N2 (%) dist**	**Retained gas composition N2 mean**
U-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
A-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
A-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AN-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AP-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AW-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
AX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AZ-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
AZ-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
B-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
BX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BX-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
BY-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
C-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
C-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
S-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
SX-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-113	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-114	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SX-115	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
SY-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
T-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
T-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-113	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-114	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-115	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-116	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-117	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TX-118	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
TY-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-101	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-7. Input Data. (7 sheets)

	59	60	61	62	63	64	65	66
Tank	**Retained gas composition N2 std dev**	**Retained gas composition N2 min**	**Retained gas composition N2 max**	**Retained gas composition N2 type**	**Retained gas composition NH3 dist**	**Retained gas composition NH3 (%) mean**	**Retained gas composition NH3 std dev**	**Retained gas composition NH3 min**
U-102	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-103	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-104	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-105	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-106	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-107	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-108	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-109	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-110	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-111	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-112	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-201	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-202	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-203	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3
U-204	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3	Ref 3

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
A-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
A-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
A-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
A-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
A-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
A-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AN-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AN-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AN-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AN-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AN-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AN-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AN-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AP-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AW-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AW-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AW-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
AW-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AW-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AW-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AX-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AX-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AX-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AX-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AY-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AY-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AZ-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
AZ-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-201	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
B-202	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-203	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
B-204	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BX-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
BY-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
BY-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-201	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-202	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-203	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
C-204	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
S-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
S-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-113	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-114	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SX-115	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SY-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
SY-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
SY-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-201	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-202	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-203	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
T-204	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
TX-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-113	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-114	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-115	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-116	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-117	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TX-118	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TY-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TY-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TY-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TY-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TY-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
TY-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-101	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-102	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-103	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-104	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-105	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-106	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-107	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-8. Input Data. (8 sheets)

	67	68	69	70	71	72	73	74
Tank	**Retained gas composition NH3 max**	**Retained gas composition NH3 type**	**Hydrogen generation rate in non-convective waste (moles/m3/day)**	**Hydrogen generation rate in non-convective waste min (moles/m3/day)**	**Hydrogen generation rate in non-convective waste max (moles/m3/day)**	**Hydrogen generation rate in non-convective waste dist type (moles/m3/day)**	**Cross sectional area of tank (m^2)**	**Solid Particle Density**
U-108	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-109	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-110	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-111	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-112	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-201	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-202	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-203	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10
U-204	Ref 3	Ref 3	Ref 6	Ref 6	Ref 6	Ref 6	calc	Ref 10

Table B-9. Input Data Source Key.

Boundary Assumption	Assumed value to constrain lognormal distribution so that minimums do not go less than zero or greater than 6 sigma. Required due to nature of lognormal distributions.
Calc	Calculated value
na	Not applicable
Ref 1	Willmarth, S. L., Jan 16, 2002, Personal Email to S. A. Barker, CH2MHILL Hanford Group, Inc., Richland, WA.
Ref 2	RPP-13019, 2003, "Tank Volume Calculations", Rev 0, CH2M HILL Hanford Group, Inc., Richland, Washington.
Ref 3	Appendix J – Derivation Of Retained Gas Compositions
Ref 4	Appendix K – Derivation Of Void Fraction
Ref 5	Appendix F – TWS03.044, 2003, "Summary of Yield Stress in Shear Data for Hanford Waste", Pacific Northwest National Laboratory, Richland, Washington.
Ref 6	RPP-5926, Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste, Rev 4, CH2MHILL Hanford Group, Inc., Richland, Washington.
Ref 7	Best Basis Inventory, [database accessedSeptember 27, 2004], internet address: http://twins.pnl.gov:8001.
Ref 8	RPP-6655, 2000, Data Observations On Double-Shell Flammable Gas Watchlist Tank Behavior, Rev 0, CH2MHILL Hanford Group, Inc., Richland, Washington.
Ref 9	Appendix H - J. L. Huckaby and P. D. Whitney 2003, "Tank SY-101 Retained Gas Estimates Based On Correlated Surface Level - Barometric Pressure Data And Transfer Material Balance Discrepancies", Tws04.001 Pacific Northwest National Laboratory, Richland, Washington.
Ref 10	Appendix M -- Determination of Solid Waste Porosities for Hanford Tank Wastes

APPENDIX C

CALCULATION MODEL

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Calculation Reviewed: RPP-10006 Rev 4, Methodology and Calculations for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site

Scope of Review: Spreadsheet Title: RPP-10006r4 !!Waste Groups-rev-40-042026 .xls
(e.g., document section or portion of calculation)

Engineer/Analyst: S. A. Barker S. A. Barker Date: 10/27/2004

Organizational Mgr: T. M. Horner T. M. Horner Date: 10/27/2004

This document consists of ~~60~~ 62 TMH 10/27/04 pages and the following attachments (if applicable):

Yes	No	NA*		
[X]	[ ]	[ ]	1.	Analytical and technical approaches and results are reasonable and appropriate.
[X]	[ ]	[ ]	2.	Necessary assumptions are reasonable, explicitly stated, and supported.
[X]	[ ]	[ ]	3.	Ensure calculations that use software include a paper printout, microfiche, CD ROM, or other electronic file of the input data and identification to the computer codes and versions used, or provide alternate documentation to uniquely and clearly identify the exact coding and execution process.
[X]	[ ]	[ ]	4.	Input data were checked for consistency with original source information.
[X]	[ ]	[ ]	5.	For both qualitative and quantitative data, uncertainties are recognized and discussed.
[X]	[ ]	[ ]	6.	Mathematical derivations were checked including dimensional consistency of results.
[X]	[ ]	[ ]	7.	Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information.
[X]	[ ]	[ ]	8.	Software verification and validation are addressed adequately.
[X]	[ ]	[ ]	9.	Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references.
[X]	[ ]	[ ]	10.	Conclusions are consistent with analytical results and applicable limits.
[X]	[ ]	[ ]	11.	Results and conclusions address all points in the purpose.
[X]	[ ]	[ ]	12.	Referenced documents are retrievable or otherwise available.
[X]	[ ]	[ ]	13.	The version or revision of each reference is cited.
[X]	[ ]	[ ]	14.	The document was prepared in accordance with Attachment A, "Calculation Format and Preparation Instructions."
[X]	[ ]	[ ]	15.	Impacts on requirements have been assessed and change documentation initiated to incorporate revisions to affected documents as appropriate.
[X]	[ ]	[ ]	16.	All checker comments have been dispositioned and the design media matches the calculations.

D. C. Hedengren D. C. Hedengren 10/27/2004
Checker (Printed Name and Signature) Date

* If No or NA is chosen, an explanation must be provided on or attached to this form.

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ASSUMPTIONS

The following assumptions are used in this methodology.

- Gas releases are instantaneous. Although this assumption is considered to be conservative, especially in actively ventilated tanks, the conditions of the release timing are not as important in passively ventilated tanks, where experience indicates that slow gas releases have a significant impact on headspace flammable gas concentrations.

- 100% of the gas is released.

- BDGRE behavior has been modeled based on small-scale tests with sludge-type materials. The models have only been validated based on observations on the existing BDGRE tanks, which are all saltcake/saltslurry tanks. The BDGRE models have not been confirmed based on behavior in sludge-waste tanks, other than we know that at the current tank conditions we do not observe BDGRE behavior in these tanks, which happens to be consistent with the model predictions.

- An Energy Ratio (ER) of 3 indicates that a BDGRE is capable of releasing retained gas. Experimental data and tank observations indicate that an Energy ratio of 5 or greater is required to produce a significant gas release.

- In-situ measurements of Yield Stress are not readily available. The distribution for yield stress is conservative towards favoring BDGRE behavior as indicated by the ER.

- Assuming that the gas is retained under lithostatic conditions rather than hydrostatic conditions may produce conservative results (i.e. indicate larger amounts of retained gas).

- Assuming the headspace gas concentrations are proportional to retained gas concentrations may be a conservative assumption.

- Available void fraction information for sludge tanks with at least 1 m of supernatant is not sufficient for the creation of a distribution for this tank configuration. The default void fraction derived for saltcake/saltslurry tanks with 1 m of liquid is assumed to be conservative for this tank configuration.

- Void fractions are considered constant in tanks that have been saltwell pumped when compared to the pre-pumping condition of the tank.

- Retained gas void fractions are bound by the neutral buoyancy void fraction in DSTs only.

- There is no correlation assumed between H2 and NH3 gas concentrations.

- The volume of waste, when less than the dish height, is assumed to be proportional to the height within the dish. When converting waste height to volume this is conservative by overestimating the volume of waste and therefore overestimating the volume of retained gas when waste is contained only in the dish.

- The volume of waste, when less than the knuckle height, is assumed to be proportional to the height within the knuckle. When converting waste height to volume this is conservative by overestimating the volume of waste and therefore overestimating the volume of retained gas when waste is contained only in the knuckle.

- Non-convective layer density is determined by the relationship between convective layer density, solid particle density and non-convective layer porosity.

Program Printout

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	A	B	C	D	E	F	G	H	I	J	K
1	A	B	C	D	E	F	G	H	I	J	K
2						Program Version Date:	26-Oct-04				Copy Check:
3						"=IF(OR(G8>G20,G87>G20,G166>G20),"Warning: Tank Operating Capacity Exceeded","")		<= = = = Warning If Tank Goes over Operating Limit			
4							0.741533263	" = + G14			
5						Over Tank Limit Forecast	0	" = IF (OR (G8>G20, G87>G20, G166>G20) , 1, 0)	Mean		Uncertainty
6	1					Tank ID	AY-102	" = VLOOKUP ($A6, ValuesUsed, 5, FALSE)			
7	2					Tank Type	DST	" = VLOOKUP ($A7, ValuesUsed, 5, FALSE)			
8	3	4				Total Waste Depth (m)	7.90	" = + Y8	7.895	" = VLOOKUP (G6 , ValuesUsed , $A8 , FALSE)	0.01
9	5	6	7			Total Non-Convective Waste Depth (m)	1.40	" = + Y9	1.40	" = VLOOKUP (G6 , ValuesUsed , $A9 , FALSE)	0.17
10	8	9	10			Wetted Non-Convective Waste Depth (m)	1.40	" = IF (I11>0.001, G9, IF (ZA101R1>ZA120R1, ZA120R1, ZA101R1))	1.40	" = VLOOKUP (G6 , ValuesUsed , $A10 , FALSE)	0.17
11	11	12				Convective Waste Depth (m)	6.50	" = + G8 - G9 - G12	6.50	" = VLOOKUP (G6 , ValuesUsed , $A11 , FALSE)	0.01
12	13					Crust Depth (m)	0.00	" = + I12	0.00	" = VLOOKUP (G6 , ValuesUsed , $A12 , FALSE)	
13	14	15	16	17	18	Convective Waste Density (kg/m3)	1,180	" = + ZA121R1	1,180.00	" = IF (VLOOKUP (G6 , ValuesUsed , $A13 , FALSE) <10 , VLOOKUP (G6 , ValuesUsed , $A14 , FALSE) , VLOOKUP (G6 , ValuesUsed , $A13 , FALSE))	4.85E+01
14	19	20	21	22	23	Porosity (fraction)	0.74	" = + Y14	0.74	" = IF (VLOOKUP (G6 , ValuesUsed , $A14 , FALSE) >900 , VLOOKUP (G6 , ValuesUsed , $A14 , FALSE) , 1000)	-
15						Non-Convective Waste Density (kg/m³)	1,547	" = + G14*G13 + (1 - G14) *G45			
16	24					Non-Convective Waste Ave Temp (K)	321	" = VLOOKUP ($A16, ValuesUsed, 5, FALSE)			
17	25					Tank Vapor Space Ave Temp (K)	317	" = VLOOKUP ($A17, ValuesUsed, 5, FALSE)			
18	26					Tank Type Group	sy	" = VLOOKUP ($A18, ValuesUsed, 5, FALSE)			

	A	B	C	D	E	F	G	H	I	J	K
19	27					Total Tank Volume (m^3)	5,325	" = VLOOKUP ($A19, ValuesUsed, 5, FALSE)			
20	28					Tank Operating Capacity (m)	9.24	" = VLOOKUP ($A20, ValuesUsed, 5, FALSE)			
21						Tank Vapor Space Volume (m3)	2,091	" = + G19 - G28			
22	29					dish type	flat	" = VLOOKUP ($A22, ValuesUsed, 5, FALSE)			
23	30					Dish Height (m)	0.0000	" = VLOOKUP ($A23, ValuesUsed, 5, FALSE)			
24	31					Dish Volume (kL)	-	" = VLOOKUP ($A24, ValuesUsed, 5, FALSE)			
25	32					Knuckle Height (m)	0.30	" = VLOOKUP ($A25, ValuesUsed, 5, FALSE)			
26	33					Knuckle Volume (kL)	123.43	" = VLOOKUP ($A26, ValuesUsed, 5, FALSE)			
27	34					Tank Capacity (kL/m)	409.7933071	" = VLOOKUP ($A27, ValuesUsed, 5, FALSE)			
28						Total Waste Volume (m^3)	3.23E+03	" = IF (G8>G23 + G25, G24 + G26 + (G8 - G23 - G25) *G27, IF (G8>G23, G24 + (G8 - G23) *G26 / G25, + G8*G24 / G23))	dish height comment		
29	35	36	37	38	39	Void Fraction (Dimensionless)	6.57	" = IF (Q29" = "normal", IF (Y29<0.1, 0.1, + Y29) , IF (Q29" = "Gamma", Y28, IF (Q29" = "Triangular", Y27, + Y30)))	6.569867	" = VLOOKUP (G6 , ValuesUsed , $A29 , FALSE)	3.011241
30						Neutral Buoyancy Void Fraction (na)	0.24	" = IF (G15>0, 1 - (G13 / G15) , 1 - (G13 / G15 - 0.000001))			
31	40	41	42	43	44	Non-Convective Waste Yield Stress (Pa)	829.55	" = IF (Q31" = "normal", + Y31, + Y32)	829.55	" = VLOOKUP (G6 , ValuesUsed , $A31 , FALSE)	218.6400
32						Ave Gas Pressure in NCL Waste (atm)	1.84659031	" = IF (OR (G6" = "A - 101", G6" = "ax - 101") , 1 + (9.806 / 101325) * ((G13* (0.001)) + (0.5*G15* (2*G9 - G10))) , 1 + (9.806 / 101325) * ((G13* (G11 + G12)) + (0.5*G15* (2*G9 - G10))))			
33	46	47	48	49	50	headspace Gas Ratio CH4	0.0529	" = IF (Q33" = "normal", + Y33, + Y34)	0.05	" = VLOOKUP (G6 , ValuesUsed , $A33 , FALSE)	0.06
34	52	53	54	55	56	headspace Gas Ratio N2O	0.2533	" = IF (Q34" = "normal", + Y35, + Y36)	0.25	" = VLOOKUP (G6 , ValuesUsed , $A34 , FALSE)	0.18
35	58	59	60	61	62	retained Gas Composition N2	29.84	" = IF (Q35" = "normal", + Y37, + Y38)	29.84	" = VLOOKUP (G6 , ValuesUsed , $A35 , FALSE)	12.01

	A	B	C	D	E	F	G	H	I	J	K
36	64	65	66	67	68	retained Gas Composition NH3 (%)	15	" = IF (Q36" = "normal", + Y39, + Y40)	0.25	" = VLOOKUP (G6 , ValuesUsed , $A36 , FALSE)	
37						CH4 Term	0.055843566	" = + G33 / (1 - G33)			
38						N2O Term	0.339225927	" = + G34 / (1 - G34)			
39						Retained [H2] Calc'd (%)	39.00954016	" = (100 - (G35 + G36)) / (1 + G37 + G37*G38 + G38)	ations not reflected in HS compositions		
40						Retained [CH4] Calc'd (%)	2.18E+00	" = + G39*G37			
41						Retained [N2O] Calc'd (%)	13.97	" = + (G39 + G40) *G38	100	" = + G41 + G40 + G39 + G36 + G35	
42	69	70	71	72		HGR in NCL Waste (moles/m ^{3}/day)	0.10	" = + Y43	0.10	" = VLOOKUP (G6 , ValuesUsed , $A42 , FALSE)	
43	1					Tank ID	AY-102	" = VLOOKUP ($A43, ValuesUsed, 5, FALSE)			
44	73					Cross Sectional Area of Tank (m ^{2})	410	" = VLOOKUP ($A44, ValuesUsed, 5, FALSE)			
45	74					Particle Density (kg/m3)	2,600.00000000	" = VLOOKUP ($A45, ValuesUsed, 5, FALSE) *1000			
46						Discounted H2 Fraction for 100% LFL (na)	0.038144804	" = 0.04* (1 - G55 / 0.05 - G56 / 0.15)			
47						Vol Gas Released (m3)	89	" = G10*G29 / 100*G44* (G32 / 1) * (G17 / G16)			
48						Gas Release for LFL (m3)	208.2	" = G50* (G46 / (G39 / 100))			
49						Wnd Depth Criterion	3.03	" = + G48 / G47			
50						Vol Headspace After Release (m3)	2,128.89	" = IF (G7" = "DST", + G21 + G47 / (G32 / 1) / (G17 / G16) , G21)			
51						Vol H2 Released (m3)	2662.84%	" = + G47*G39 / 100			
52						Vol CH4 Released (m3)	149.82%	" = + G47*G40 / 100			

	A	B	C	D	E	F	G	H	I	J	K
53						Vol NH3 Released (m3)	1031.81%	" = + G47*G36 / 100			
54						Headspace [H2] (%)	1.26%	" = + G51 / G$50			
55						Headspace [CH4] (%)	0.07%	" = + G52 / G$50			
56						Headspace [NH3] (%)	0.48%	" = + G53 / G$50			
57						Headspace [H2] (%LFL)	31.5051%	" = + G54 / 0.04			
58						Headspace [CH4] (%LFL)	0.014074886	" = + G55 / 0.05			
59						Headspace [NH3] (%LFL)	0.03	" = + G56 / 0.15			
60						Headspace Flam Gas Conc (%LFL)	0.36	" = + G54 / 0.04 + G55 / 0.05 + G56 / 0.15			
61						Waste Category	3.00000	" = IF (G60<1, 3, IF (G11<0.01, 2, IF (G54<3, 2, IF (G67<1, 2, 1))))			
62	1					Tank ID	AY-102	" = VLOOKUP ($A62, ValuesUsed, 5, FALSE)			
63						Gamma for Energy Ratio Calc (na)	0.74	" = IF (OR (G8" = "A - 101", G8" = "AX - 101") , G13*9.806*0.001 / 101325, IF (G11>0, G13*9.806*G11 / 101325, 0.000000001))			
64						Energy Ratio (Dimensionless)	8.539	" = G30*G63*101325 / (1 - G30) / G31* ((1 + 1 / G63) *LN (1 + G63) - 1)			
65						Waste Ave Specific Gravity (na)	1.245057373	" = (G15*G9 + G13* (G11 + G12)) / G8 / 1000			
66						"Specific Gravity (CL)" X "NCL Depth" (in)	85.01745357	" = (G13 / 1000) * (G10*39.37)			
67						Buoyancy Ratio (Dimensionless)	0.40070793	" = (+ Y3) / (G15 - G13) * (((G42 / (G39 / 100)) *G15 / (G32*101325)) ^ (1 / 3)) *G10*G10			
68						Special Buoyancy Test	0	" = IF (AND (G67>" = 1, G64>" = 3) , 1, 0)			
69											

	A	B	C	D	E	F	G	H	I	J	K
70											
71						Water Addition Case					
72											
73	1					Tank ID	AY-102	" = VLOOKUP ($A73, ValuesUsed, 5, FALSE)			
74	2					Tank Type	DST	" = VLOOKUP ($A74, ValuesUsed, 5, FALSE)			
75						WA - Liquid Added (gallons)	10000	" = IF (VALUE (MID (G73, FIND (" - ", G73, 1) + 1, 1)) " = 2, 1000, 10000)			
76						WA - Liquid Density (kg/m3)	1,000.00	1000			
77						WA - Liquid added (kL)	37.85	" = + G75*0.003785411784			
78						WA - Void Fraction	0.07	" = + G29 / 100			
79						WA - Possible change in height of wetted solids (m)	0.12	" = (+ G77 / G27) / (G4)			
80						WA - Total Non-Convective Waste Depth (m)	1.40	" = + G9			
81						WA - Wetted Non-Convective Waste Depth Before WA (m)	1.40	" = + G10			
82						WA - Convective Waste Depth (m)	6.496	" = + G11			
83						WA - Revised Wetted Non-Convective Waste Depth (m)	1.40	" = IF (G81 + G79>G80, G80, G81 + G79)			
84						WA - Liquid remaining after wetting solids (kL)	37.85	" = + G77 - (G83 - G81) *G4*G27	11896.54406	" = (+ G89 - (+ G86 - G97)) / G85*G74	
85						WA - Liquid remaining after wetting solids (m)	0.09	" = + G84 / G27			
86						WA - Revised Convective Waste Depth (m)	6.59	" = + G82 + G85			

	A	B	C	D	E	F	G	H	I	J	K
87	3	4				WA - Total Waste Depth (m)	7.99	" = G88 + G90 + G91			
88	5	6	7			WA - Total Non-Convective Waste Depth (m)	1.40	" = + G9			
89	8	9	10			WA - Wetted Non-Convective Waste Depth (m)	1	" = + G83			
90	11	12				WA - Convective Waste Depth (m)	7	" = + G86			
91	13					WA - Crust Depth (m)	0	" = + G12			
92	14	15	16	17	18	WA - Convective Waste Density (kg/m3)	1,178	" = ((G10* (G4 - G29 / 100) + G11) *G27*G13 + G76*G77) / ((G10* (G4 - G29 / 100) + G11) *G27 + G77)			
93	19	20	21	22	23	Porosity (fraction)	0.74	" = + G14			
94						Non-Convective Waste Density (kg/m^3)	1,547	" = + G15			
95	24					WA - Non-Convective Waste Ave Temp (K)	321.11	" = VLOOKUP ($A95, ValuesUsed, 5, FALSE)			
96	25					WA - Tank Vapor Space Ave Temp (K)	317	" = VLOOKUP ($A96, ValuesUsed, 5, FALSE)			
97	26					WA - Tank Type Group	ey	" = VLOOKUP ($A97, ValuesUsed, 5, FALSE)			
98	27					WA - Total Tank Volume (m3)	5,325.2019	" = VLOOKUP ($A98, ValuesUsed, 5, FALSE)			
99	28					Tank Operating Capacity (m)	9.24	" = VLOOKUP ($A99, ValuesUsed, 5, FALSE)			
100						WA - Tank Vapor Space Volume (m3)	2,051.83	" = + G98 - G107			
101	29					WA - dish type	flat	" = VLOOKUP ($A101, ValuesUsed, 5, FALSE)			
102	30					WA - Dish Height (m)	0	" = VLOOKUP ($A102, ValuesUsed, 5, FALSE)			
103	31					WA - Dish Volume (kL)	0.00	" = VLOOKUP ($A103, ValuesUsed, 5, FALSE)			

	A	B	C	D	E	F	G	H	I	J	K
104	32					Knuckle Height (m)	0.30	" = VLOOKUP ($A104, ValuesUsed, 5, FALSE)			
105	33					Knuckle Volume (kL)	123.43	" = VLOOKUP ($A105, ValuesUsed, 5, FALSE)			
106	34					WA - Tank Capacity (kL/m)	409.7933071	" = VLOOKUP ($A106, ValuesUsed, 5, FALSE)			
107						WA - Total Waste Volume (m3)	3273.37257	" = IF (G87>G102, G103 + (G87 - G102) *G106, + G103*G87 / G102)			
108	35	36	37	38	39	WA - Void Fraction (Dimensionless)	6.589867	" = + G29			
109						WA - Neutral Buoyancy Void Fraction (ne)	0.238671133	" = IF (G94>0, 1 - (G92 / G94) , 1 - (G92 / G92 - 0.000001))			
110	40	41	42	43	44	WA - Non-Convective Waste Yield Stress (Pa)	829.55	" = + G31			
111						WA - Ave Gas Pressure in NCL Waste (atm)	1.865732037	" = IF (OR (G73" = "A - 101", G73" = "ax - 101") , 1 + (9.806 / 101325) * ((G92* (0.001)) + (0.5*G94* (2*G88 - G89))) , 1 + (9.806 / 101325) * ((G92* (G90 + G91)) + (0.5*G94* (2*G88 - G89))))			
112	46	47	48	49	50	WA - headspace Gas Ratio CH4	0.06289	" = + G33			
113	52	53	54	55	56	WA - headspace Gas Ratio N2O	0.2533	" = + G34			
114	58	59	60	61	62	WA - retained Gas Composition N2	29.84	" = + G35			
115	64	65	66	67	68	WA - retained Gas Composition NH3 (%)	1.50E+01	" = + G36			
116						WA - CH4 Term	0.06	" = + G37			
117						WA - N2O Term	0.34	" = + G38			
118						WA - Retained [H2] Calc'd (%)	39.00954016	" = + G39			
119						WA - Retained [CH4] Calc'd (%)	2	" = + G40			
120						WA - Retained [N2O] Calc'd (%)	13.9720	" = + G41			

	A	B	C	D	E	F	G	H	I	J	K
121	69	70	71	72		WA - HGR in NCL Waste (moles/m3/day)	0.096800234	" = + G42			
122	1					WA - Tank ID	AY-102	" = VLOOKUP ($A122, ValuesUsed, 5, FALSE)			
123	73					WA - Cross Sectional Area of Tank (m2)	410.4	" = VLOOKUP ($A123, ValuesUsed, 5, FALSE)			
124	74					Particle Density (kg/m3)	2,600.00	" = VLOOKUP ($A124, ValuesUsed, 5, FALSE) *1000			
125						WA - Discounted H2 Fraction for 100% LFL (na)	0.04	" = 0.04* (1 - G134 / 0.05 - G135 / 0.15)			
126						WA - Vol Gas Released (m3)	6911.44%	" = G89*G108 / 100*G123* (G111 / 1) * (G96 / G95)			
127						WA - Gas Release for LFL (m3)	20427.56%	" = G129* (G125 / (G118 / 100))			
128						WA - Wncl Depth Criterion	295.56%	" = + G127 / G126			
129						WA - Vol Headspace After Release (m3)	2089.567287	" = IF (G74" = "DST", + G100 + G126 / (G111 / 1) / (G96 / G95) , G100)			
130						WA - Vol H2 Released (m3)	28.96120754	" = + G126*G118 / 100			
131						WA - Vol CH4 Released (m3)	1.505609979	" = + G126*G119 / 100			
132						WA - Vol NH3 Released (m3)	1037%	" = + G126*G115 / 100			
133						WA - Headspace [H2] (%)	0.012664435	" = + G130 / G$50			
134						WA - Headspace [CH4] (%)	0.00	" = + G131 / G$50			
135						WA - Headspace [NH3] (%)	0.00	" = + G132 / G$50			
136						WA - Headspace [H2] (%LFL)	0.31661	" = + G133 / 0.04			
137						WA - Headspace [CH4] (%LFL)	0.01	" = + G134 / 0.05			

	A	B	C	D	E	F	G	H	I	J	K
138						WA - Headspace [NH3] (%LFL)	0.03	" = + G135 / 0.15			
139						WA - Headspace Flam Gas Conc (%LFL)	0.363	" = + G133 / 0.04 + G134 / 0.05 + G135 / 0.15			
140						WA - Waste Category	3	" = IF (G139<1, 3, IF (G90<0.01, 2, IF (G143<3, 2, IF (G146<1, 2, 1))))			
141	1					WA - Tank ID	AY-102	" = VLOOKUP ($A141, ValuesUsed, 5, FALSE)			
142						WA - Gamma for Energy Ratio Calc (na)	0.750965034	" = IF (OR (G73" = "A - 101", G73" = "AX - 101"), G92"9.806"0.001 / 101325, IF (G90>0, G92"9.806"G90 / 101325, 0.000000001))			
143						**WA - Energy Ratio (Dimensionless)**	8.801973417	" = G109"G142"101325 / (1 - G109) / G110" ((1 + 1 / G142) "LN (1 + G142) - 1)			
144						**WA - Waste Ave Specific Gravity (na)**	1.242484789	" = (G94"G86 + G92" (G90 + G91)) / G87 / 1000			
145						WA - "Specific Gravity (CL)" X "NCL Depth" (in)	64.89586385	" = (G92 / 1000) " (G89"39.37)			
146						WA - Buoyancy Ratio (Dimensionless)	0.397857738	" = + Y3 / (G94 - G92) " (((G121 / (G118 / 100)) "G95 / (G111"101325)) ^ (1 / 3)) "G89"G89			
147											
148											
149											
150						Caustic Addition Case					
151											
152	1					Tank ID	AY-102	" = VLOOKUP ($A152, ValuesUsed, 5, FALSE)			
153	2					Tank Type	DST	" = VLOOKUP ($A153, ValuesUsed, 5, FALSE)			
154						CA - Liquid Added (gallons)	10,000.00	" = IF (VALUE (MID (G152, FIND (" - ", G152, 1) + 1, 1)) " = 2, 1000, 10000)			

	A	B	C	D	E	F	G	H	I	J	K
155						CA - Liquid Density (kg/m3)	1,525.00	1525			
156						CA - Liquid added (kL)	37.85	" = + G154*0.003785411784			
157						CA - Void Fraction	0.07	" = + G29 / 100			
158						CA - Possible change in height of wetted solids (m)	0.12	" = (+ G156 / G27) / (G4)			
159						CA - Total Non-Convective Waste Depth (m)	1.40	" = + G9			
160						CA - Wetted Non-Convective Waste Depth Before WA (m)	1.400	" = + G10			
161						CA - Convective Waste Depth (m)	8.50	" = + G11			
162						CA - Revised Wetted Non-Convective Waste Depth (m)	1.40	" = IF (G160 + G158>G159, G159, G160 + G158)			
163						CA - Liquid remaining after wetting solids (kL)	37.85	" = + G156 - (G162 - G160) *G4*G27			
164						CA - Liquid remaining after wetting solids (m)	0.09	" = + G163 / G27			
165						CA - Revised Convective Waste Depth (m)	6.59	" = + G161 + G164			
166	3	4				CA - Total Waste Depth (m)	7.99	" = G167 + G169 + G170			
167	5	6	7			CA - Total Non-Convective Waste Depth (m)	1	" = + G9			
168	8	9	10			CA - Wetted Non-Convective Waste Depth (m)	1.40	" = + G162			
169	11	12				CA - Convective Waste Depth (m)	7	" = + G165			
170	13					CA - Crust Depth (m)	0	" = + G12			
171	14	15	16	17	18	CA - Convective Waste Density (kg/m3)	1,184.83	" = + ZA123R1	1,184.83	" = + (G11*G14 + G151*0.000009222948438635*G152) / (G11 + G151*0.000009222948438635)	48.48483835

	A	B	C	D	E	F	G	H	I	J	K
172	19	20	21	22	23	CA - Porosity (fraction)	1	" = + G14			
173						Non-Convective Waste Density (kg/m³)	1,547.02	" = + G15			
174	24					CA - Non-Convective Waste Ave Temp (K)	321	" = VLOOKUP ($A174, ValuesUsed, 5, FALSE)			
175	25					CA - Tank Vapor Space Ave Temp (K)	316.91	" = VLOOKUP ($A175, ValuesUsed, 5, FALSE)			
176	26					CA - Tank Type Group	ay	" = VLOOKUP ($A176, ValuesUsed, 5, FALSE)			
177	27					CA - Total Tank Volume (m3)	5,325.20	" = VLOOKUP ($A177, ValuesUsed, 5, FALSE)			
178	28					Tank Operating Capacity (m)	9.24	" = VLOOKUP ($A178, ValuesUsed, 5, FALSE)			
179						CA - Tank Vapor Space Volume (m3)	2,051.83	" = + G177 - G186			
180	29					CA - dish type	flat	" = VLOOKUP ($A180, ValuesUsed, 5, FALSE)			
181	30					CA - Dish Height (m)	0.0000	" = VLOOKUP ($A181, ValuesUsed, 5, FALSE)			
182	31					CA - Dish Volume (kL)	-	" = VLOOKUP ($A182, ValuesUsed, 5, FALSE)			
183	32					Knuckle Height (m)	0.30	" = VLOOKUP ($A183, ValuesUsed, 5, FALSE)			
184	33					Knuckle Volume (kL)	123.4349963	" = VLOOKUP ($A184, ValuesUsed, 5, FALSE)			
185	34					CA - Tank Capacity (kL/m)	409.7933071	" = VLOOKUP ($A185, ValuesUsed, 5, FALSE)			
186						CA - Total Waste Volume (m3)	3273.37257	" = IF (G166>G181, G182 + (G166 - G181) *G185, + G182*G166 / G181)			
187	35	36	37	38	39	CA - Void Fraction (Dimensionless)	6.569867	" = IF (+ G29>I187, I187, G29)	23.41	G188*100, VLOOKUP ($D187, ValuesUsed, 5, FALSE)) , VLOOKUP ($D187, ValuesUsed, 5, FALSE))	
188						CA - Neutral Buoyancy Void Fraction (ne)	0.234122628	" = IF (G171>0, 1 - (G171 / G173) , 1 - (G171 / G173 - 0.000001))			

	A	B	C	D	E	F	G	H	I	J	K
189	40	41	42	43	44	CA - Non-Convective Waste Yield Stress (Pa)	829.55	" = + G31			
190						CA - Ave Gas Pressure in NCL Waste (atm)	2.066625657	" = IF (OR (G152" = "z - 101", G152" = "zx - 101") , 1 + (9.806 / 101325) * ((G173* (0.001)) + (0.5*G171* (2*G167 - G168))) , 1 + (9.806 / 101325) * ((G173* (G169 + G170)) + (0.5*G171* (2*G167 - G168))))			
191	46	47	48	49	50	CA - headspace Gas Ratio CH4	0.05289	" = + G33			
192	52	53	54	55	56	CA - headspace Gas Ratio N2O	0.2533	" = + G34			
193	58	59	60	61	62	CA - retained Gas Composition N2	2.98E+01	" = + G35			
194	64	65	66	67	68	CA - retained Gas Composition NH3 (%)	15.00	" = + G36			
195						CA - CH4 Term	0.06	" = + G191 / (1 - G191)			
196						CA - N2O Term	0.339225927	" = + G192 / (1 - G192)			
197						CA - Retained [H2] Calc'd (%)	39	" = + G39			
198						CA - Retained [CH4] Calc'd (%)	2.1784	" = + G40			
199						CA - Retained [N2O] Calc'd (%)	13.972028	" = + G41			
200	69	70	71	72		CA - HGR in NCL Waste (moles/m3/day)	0	" = + Y43			
201	1					CA - Tank ID	AY-102	" = VLOOKUP ($A201, ValuesUsed, 5, FALSE)			
202	73					CA - Cross Sectional Area of Tank (m2)	410.43	" = VLOOKUP ($A202, ValuesUsed, 5, FALSE)			
203	74					Particle Density (kg/m3)	2,600.00	" = VLOOKUP ($A203, ValuesUsed, 5, FALSE) *1000			
204						CA - Discounted H2 Fraction for 100% LFL (na)	3.79%	" = 0.04* (1 - G213 / 0.05 - G214 / 0.15)			
205						CA - Vol Gas Released (m3)	7896.89%	" = G168*G187 / 100*G202* (G190 / 1) * (G175 / G174)			

	A	B	C	D	E	F	G	H	I	J	K
206						CA - Gas Release for LFL (m3)	20314.06%	" = G208" (G204 / (G197 / 100))			
207						CA - Wncl Depth Criterion	2.63925662	" = + G206 / G205			
208						CA - Vol Headspace After Release (m3)	2089.567287	" = IF (G153" = "DST", + G179 + G205 / (G190 / 1) / (G175 / G174) , G179)			
209						CA - Vol H2 Released (m3)	30.02520168	" = + G205*G197 / 100			
210						CA - Vol CH4 Released (m3)	168%	" = + G205*G198 / 100			
211						CA - Vol NH3 Released (m3)	11.54533027	" = + G205*G194 / 100			
212						CA - Headspace [H2] (%)	0.01	" = + G209 / G$50			
213						CA - Headspace [CH4] (%)	0.00	" = + G210 / G$50			
214						CA - Headspace [NH3] (%)	0.00542	" = + G211 / G$50			
215						CA - Headspace [H2] (%LFL)	0.35	" = + G212 / 0.04			
216						CA - Headspace [CH4] (%LFL)	0.02	" = + G213 / 0.05			
217						CA - Headspace [NH3] (%LFL)	0.036	" = + G214 / 0.15			
218						CA - Headspace Flam Gas Conc (%LFL)	0.404498413	" = + G212 / 0.04 + G213 / 0.05 + G214 / 0.15			
219						CA - Waste Category	3	" = IF (G218<1, 3, IF (G169<0.01, 2, IF (G222<3, 2, IF (G225<1, 2, 1))))			
220	1					CA - Tank ID	AY-102	" = VLOOKUP ($A220, ValuesUsed, 5, FALSE)			
221						CA - Gamma for Energy Ratio Calc (na)	0.76	" = IF (OR (G152" = "z - 101", G152" = "zX - 101") , G171*9.806*0.001 / 101325, IF (G169>0, G171*9.806*G169 / 101325, 0.000000001))			
222						CA - Energy Ratio (Dimensionless)	8.67701	" = G188*G221*101325 / (1 - G188) / G189* ((1 + 1 / G221) *LN (1 + G221) - 1)			

	A	B	C	D	E	F	G	H	I	J	K
223						CA - Waste Ave Specific Gravity (ne)	1.25	" = (G173*G167 + G171* (G169 + G170)) / G166 / 1000			
224						CA - "Specific Gravity (CL)" X "NCL Depth" (in)	85.28	" = (G171 / 1000) * (G168*39.37)			
225						CA - Buoyancy Ratio (Dimensionless)	0.391	" = + Y3 / (G173 - G171) * (((G200 / (G197 / 100)) *G174 / (G190*101325)) ^ (1 / 3)) *G168*G168			

	L	M	N	O	P	Q	R	S
1	L	M	N	O	P	Q	R	S
2	= IF (AI4>0, "Copy Bad", "Copy OK")		" = IF (AI4>0 , "Copy Bad" , "Copy OK")					
3								
4								
5		Min		Max		Dist Type		
6								
7								
8	" = VLOOKUP ($B8, ValuesUsed, 5, FALSE)	0.01	0.01	9.23736853	" = + G20	Normal	Normal	
9	" = VLOOKUP ($B9, ValuesUsed, 5, FALSE)	0.01	" = VLOOKUP ($C9, ValuesUsed, 5, FALSE)	9.237	" = + G20	Normal	Normal	
10	" = VLOOKUP ($B10, ValuesUsed, 5, FALSE)	0.01	" = VLOOKUP ($C10, ValuesUsed, 5, FALSE)	9.237	" = + G20	Normal	Normal	
11	" = VLOOKUP ($B11, ValuesUsed, 5, FALSE)	1.00E-09	0.000000001	9.237	" = + G20	Normal	Normal	
12						Normal	Normal	
13	" = IF (VLOOKUP ($B13, ValuesUsed, 5, FALSE) >0, VLOOKUP ($B13, ValuesUsed, 5, FALSE) , I13*Y2)	1,083.03	" = IF (VLOOKUP ($C13, ValuesUsed, 5, FALSE) >0, VLOOKUP ($C13, ValuesUsed, 5, FALSE) , $I13 - 2*$K13)	1,276.97	" = IF (VLOOKUP ($D13, ValuesUsed, 5, FALSE) >0, VLOOKUP (D13, ValuesUsed, 5, FALSE) , $I13 + 2*$K13)	normal	" = (VLOOKUP ($E13, ValuesUsed, 5, FALSE))	
14	" = IF (VLOOKUP ($B14, ValuesUsed, 5, FALSE) >1, VLOOKUP ($B14, ValuesUsed, 5, FALSE) , I14*Y2)	0.65	" = IF (VLOOKUP ($C14, ValuesUsed, 5, FALSE) >0, VLOOKUP ($C14, ValuesUsed, 5, FALSE) , $I14 - 2*$K14)	0.84	" = IF (VLOOKUP ($D14, ValuesUsed, 5, FALSE) >0, VLOOKUP (D14, ValuesUsed, 5, FALSE) , $I14 + 2*$K14)	normal	" = (VLOOKUP ($E14, ValuesUsed, 5, FALSE))	
15								
16								
17								
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	L	M	N	O	P	Q	R	S
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29	" = VLOOKUP ($B29, ValuesUsed, 5, FALSE)	0.01	" = VLOOKUP ($C29, ValuesUsed, 5, FALSE)	23.72	" = IF (G7" = "dST", IF (G30>0.02, + G30*100, VLOOKUP ($D29, ValuesUsed, 5, FALSE)) , VLOOKUP ($D29, ValuesUsed, 5, FALSE))	LogNorm	" = VLOOKUP ($E29, ValuesUsed, 5, FALSE)	
30								
31	" = VLOOKUP ($B31, ValuesUsed, 5, FALSE)	173.6300	" = VLOOKUP ($C31, ValuesUsed, 5, FALSE)	1,704.11	" = VLOOKUP ($D31, ValuesUsed, 5, FALSE)	LogNorm	" = VLOOKUP ($E31, ValuesUsed, 5, FALSE)	
32								
33	" = VLOOKUP ($B33, ValuesUsed, 5, FALSE)	0.00	" = VLOOKUP ($C33, ValuesUsed, 5, FALSE)	0.32	" = VLOOKUP ($D33, ValuesUsed, 5, FALSE)	LogNorm	" = VLOOKUP ($E33, ValuesUsed, 5, FALSE)	
34	" = VLOOKUP ($B34, ValuesUsed, 5, FALSE)	0.00	" = VLOOKUP ($C34, ValuesUsed, 5, FALSE)	0.82	" = VLOOKUP ($D34, ValuesUsed, 5, FALSE)	LogNorm	" = VLOOKUP ($E34, ValuesUsed, 5, FALSE)	
35	" = VLOOKUP ($B35, ValuesUsed, 5, FALSE)	4.5	" = VLOOKUP ($C35, ValuesUsed, 5, FALSE)	80	" = VLOOKUP ($D35, ValuesUsed, 5, FALSE)	LogNorm	" = VLOOKUP ($E35, ValuesUsed, 5, FALSE)	

	L	M	N	O	P	Q	R	S
36	" = VLOOKUP ($B36, ValuesUsed, 5, FALSE)	0.01	" = VLOOKUP ($C36, ValuesUsed, 5, FALSE)	18.3176	" = VLOOKUP ($D36, ValuesUsed, 5, FALSE)	ContLin	" = VLOOKUP ($E36, ValuesUsed, 5, FALSE)	
37								
38								
39								
40		x	x					
41								
42		0.03226674	" = VLOOKUP ($B42, ValuesUsed, 5, FALSE)	0.10648026	" = VLOOKUP ($C42, ValuesUsed, 5, FALSE)	triangular	" = VLOOKUP ($D42, ValuesUsed, 5, FALSE)	
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170								
171	" = IF (VLOOKUP ($B171, ValuesUsed, 5, FALSE) >0, VLOOKUP ($B171, ValuesUsed, 5, FALSE) , I171*Y2)	1087.86005	" = IF (I171>900, + I171 - 2*K171, 900)	1281.79941	" = IF (I171>900, + I171 + 2*K171, 1100)	Normal	Normal	

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1	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
2							AN-10	AN-103	AN - 103	AN-107		
3					Buoyancy Ratio Factor =	998	998	1155	1334.3	1401.8692		
4					Density Constraint (kg/m ^{3}) =	1						
5					Effect of Caustic on Density =	-4.82973102	"=+I13-I171					
6	Distribution		Calculated		Description	Mean		St Dev		truncate		truncate
7	Type		Value							low		high
8	Normal	Normal	7.89548876	" = IF (+ I8<0.001, 0.000001, I8)	Total Waste Depth (m)	7.89548876		0.00635	" = IF (+ $I8<0.001, 0.00000001, K8)	0.01	" = IF (+ I8<0.001, 0.000000001, M8)	9.23736853
9	Normal	Normal	1.40	" = IF (+ I9<0.001, 0.000001, I9)	Total Non-Convective Waste Depth (m)	1.40		0.1651	" = IF (+ I9<0.001, 0.00000001, K9)	0.01	" = IF (+ I9<0.001, 0.000000001, M9)	9.23736853
10	Normal	Normal	1.39953104	" = IF (+ I10<0.001, 0.000001, I10)	Wetted Non-Convective Waste Depth (m)	1.40		0.1651	" = IF (+ I10<0.001, 0.00000001, K10)	0.01	" = IF (+ I10<0.001, 0.000000001, M10)	9.23736853
11	Normal	Normal	6.496	" = + I11	Convective Waste Depth (m)	6.50		0.00635	" = + K11	1E-09	" = + M11	9.23736853
12	Normal	Normal	0.000	" = + I12	Crust Depth (m)	0.00		0	" = + K12	0	" = + M12	0
13	Normal	Normal	1,180.000	" = + I13	Convective Waste Density (kg/m ^{3})	1,180.00		48.48483835	" = + K13	1083.0303	" = + M13	1276.96968
14	Normal	Normal	0.742	" = + I14	Porosity	0.74		0	" = + K14	0.65	" = + M14	0.8375
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27	Triangular	Triangular	0.000	" = IF (Q29" = "Triangular", + I29, 0.00031)	Void Fraction (na) (Triangular)	0.0003				0.00	" = IF ($Q29" = "Triangular", + K29, + ZA131R2 / 2)	23.724458
28	Gamma	Gamma	0.000	" = IF (Q29" = "Gamma", + I29, 0.00031)	Void Fraction (na) (Gamma)	0.0003		-0.00031	" = IF ($Q29" = "Gamma", + I29, - 0.00031)	0.01	" = IF ($Q29" = "Gamma", + K29, 0.0093)	17
29	Normal	Normal	15	" = IF (Q29" = "normal", + I29, 15)	Void Fraction (na) (Normal)	15		6.2	" = IF ($Q29" = "normal", + K29, 6.2)	0.00	" = IF ($Q29" = "normal", + M29, 0.00000001)	20
30	LogNormal	LogNormal	6.569867	" = IF (Q29" = "LogNorm", + I29, 0.0776)	Void Fraction (na) (LogNormal)	6.569867		3.011241	" = IF ($Q29" = "LogNorm", + K29, 1.49)	0.01	" = IF ($Q29" = "LogNorm", + M29, 0.1)	23.724458
31	LogNorm	LogNorm	144	" = IF (Q31" = "normal", + I31, 144)	Non-Convective Waste Yield Stress (Pa)	144.0000		13.87	" = IF ($Q31" = "normal", + K31, 13.87)	88.52	" = IF ($Q31" = "normal", + M31, 88.52)	199.48
32	LogNormal	LogNormal	829.55	" = IF (Q31" = "LogNorm", + I31, 829.55)	Non-Convective Waste Yield Stress (Pa)	829.5500		218.64	" = IF ($Q31" = "LogNorm", + K31, 218.64)	173.63	" = IF ($Q31" = "LogNorm", + M31, 173.63)	1704.11
33	Normal	Normal	15	" = IF (Q33" = "normal", + I33, 15)	headspace Gas Ratio CH4 (Normal)	15.0000		6.2	" = IF ($Q33" = "normal", + K33, 6.2)	0.00	" = IF ($Q33" = "normal", + M33, 0.00000001)	20
34	LogNormal	LogNormal	0.05289	" = IF (Q33" = "LogNorm", + I33, 0.053)	headspace Gas Ratio CH4 (LogNorm)	0.0529		0.05626	" = IF ($Q33" = "LogNorm", + K33, 0.056)	0.00	" = IF ($Q33" = "LogNorm", + M33, 0.001)	0.3178
35	Normal	Normal	15	" = IF (Q34" = "normal", + I34, 15)	headspace Gas Ratio N2O (Normal)	15.0000		6.2	" = IF ($Q34" = "normal", + K34, 6.2)	0.00	" = IF ($Q34" = "normal", + M34, 0.00000001)	20

	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
36	LogNormal	LogNormal	0.2533	" = IF (Q34" = "LogNorm", + I34, 0.253)	headspace Gas Ratio N2O (LogNorm)	0.2533		0.1758	" = IF ($Q34" = "LogNorm", + K34, 0.176)	0.00	" = IF ($Q34" = "LogNorm", + M34, 0.001)	0.6189
37	Normal	Normal	29.84	" = IF (Q35" = "Normal", I35, 29.84)	retained Gas Composition N2	29.8400		5	" = IF ($Q35" = "normal", + K35, 5)	14.00	" = IF ($Q35" = "normal", + M35, 14)	80
38	LogNormal	LogNormal	29.84	" = IF (Q35" = "LogNorm", I35, 29.84)	retained Gas Composition N2	29.84		12.01	" = IF ($Q35" = "LogNorm", + K35, 12)	4.50	" = IF ($Q35" = "LogNorm", + M35, 5)	80
39	Normal	Normal	15	" = IF (Q36" = "normal", + I36, 15)	retained Gas Composition NH3 (%) (Normal	15		6.2	" = IF ($Q36" = "normal", + K36, 6.2)	0.00	" = IF ($Q36" = "normal", + M36, 0.00000001)	20
40	ContLin	ContLin	15	" = IF (Q36" = "ContLin", + V39, 3.4)	retained Gas Composition NH3 (%) (contLin)	15				w14:y68	w14:y68	
41										x11..x65	x11..x65	
42										x11..y65	x11..y65	
43	Triangular	Triangular	0.09680023	" = IF (+ I42<0.00001, 0.000001, I42)	HGR in NCL Waste (moles/m ^{3}/day)	0.09680023				0.03	" = + M42	0.10648026
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85					coversion factor (gallons to m)			9.22295E-06	9.22295E-06			
86					coversion factor (inches to m)			0.0254	0.0254			

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170												
171	Normal	Normal	1184.82973	" = + I171	Convective Waste Density (kg/m3)	1184.82973		48.48483835	" = + K171	1087.8601	" = + M171	1281.79941

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3					
4			Sum:	0	" = SUM (AI9:AI205)
5					
6				Copy	
7				Check	
8	" = + O8			0	" = IF (V8" = Y8, 0, 1)
9	" = + O9			0	" = IF (V9" = Y9, 0, 1)
10	" = + O10			0	" = IF (V10" = Y10, 0, 1)
11	" = + O11			0	" = IF (V11" = Y11, 0, 1)
12	" = + O12			0	" = IF (V12" = Y12, 0, 1)
13	" = + O13			0	" = IF (V13" = Y13, 0, 1)
14	" = + O14			0	" = IF (V14" = Y14, 0, 1)
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27	" = IF ($Q29" = "Triangular", + M29, O29)			0	" = IF (V27" = Y27, 0, 1)
28	" = IF ($Q29" = "Gamma", + M29, 17)	0.2	" = IF ($Q29" = "Gamma", O29, 0.2)	0	" = IF (V28" = Y28, 0, 1)
29	" = IF ($Q29" = "normal", + O29, 20)			0	" = IF (V29" = Y29, 0, 1)
30	" = IF ($Q29" = "LogNorm", + O29, 26)			0	" = IF (V30" = Y30, 0, 1)
31	" = IF ($Q31" = "normal", + O31, 199.48)			0	" = IF (V31" = Y31, 0, 1)
32	" = IF ($Q31" = "LogNorm", + O31, 1704.11)			0	" = IF (V32" = Y32, 0, 1)
33	" = IF ($Q33" = "normal", + O33, 20)			0	" = IF (V33" = Y33, 0, 1)
34	" = IF ($Q33" = "LogNorm", + O33, 0.318)			0	" = IF (V34" = Y34, 0, 1)
35	" = IF ($Q34" = "normal", + O34, 20)			0	" = IF (V35" = Y35, 0, 1)

	AF	AG	AH	AI	AJ
36	" = IF ($Q34" = "LogNorm", + O34, 0.619)			0	" = IF (V36" = Y36, 0, 1)
37	" = IF ($Q35" = "normal", + O35, 80)			0	" = IF (V37" = Y37, 0, 1)
38	" = IF ($Q35" = "LogNorm", + O35, 80)			0	" = IF (V38" = Y38, 0, 1)
39	" = IF ($Q36" = "normal", + O36, 20)			0	" = IF (V39" = Y39, 0, 1)
40				0	" = IF (V40" = Y40, 0, 1)
41					
42					
43	" = + O42			0	" = IF (V43" = Y43, 0, 1)
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171	" = + O171			0	" = IF (V171" = Y171, 0, 1)

	AF	AG	AH	AI	AJ
172				0	" = IF (V169" = Y169 , 0 , 1)
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APPENDIX D

CALCULATION INSTRUCTIONS

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Instructions for the Monte Carlo Evaluation -- Tab MC

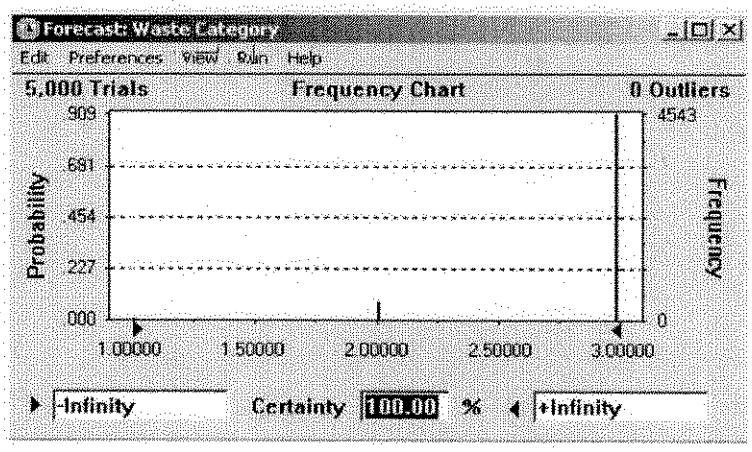
by: SA Barker

Step	Instruction
1	Update any data for tank on Tab "Data"
2	Enter Tank ID in cell "G6"
3	If required, Update Waste Porosity in cell "G4"
4	If required, Update Sensitivity analysis for Water Addition "Volume" in cell "G72"
5	If required, Update Sensitivity analysis for Caustic Addition "Volume" in cell "G150"
6	If required, Update Sensitivity analysis for Caustic Addition "Density" in cell "G151"
7	Copy range "UO9..U20" to cell "W9", use special paste "values only"!!
8	Verify that the cell "L2" indicates the Copy is successful by presenting the message "Copy OK". If the cell "L2" says "Copy Bad" repeat the copy until the message is changed to "Copy OK"
9	Clear Previous Crystal Ball Simulation. Use icon or the menu sequence "Run", "Reset"
10	Run Crystal Ball, 5000 iterations
11	Create the Crystal Ball Report (use the Icon or from the menu "Run" "Create Report".
12	Copy cells "K3..AF27" from "" to the newly created report in cell "K3"
13	Enter tank ID in cell "K6" in new report
14	From the Crystal Ball Graph "Forecast: Waste Category"...

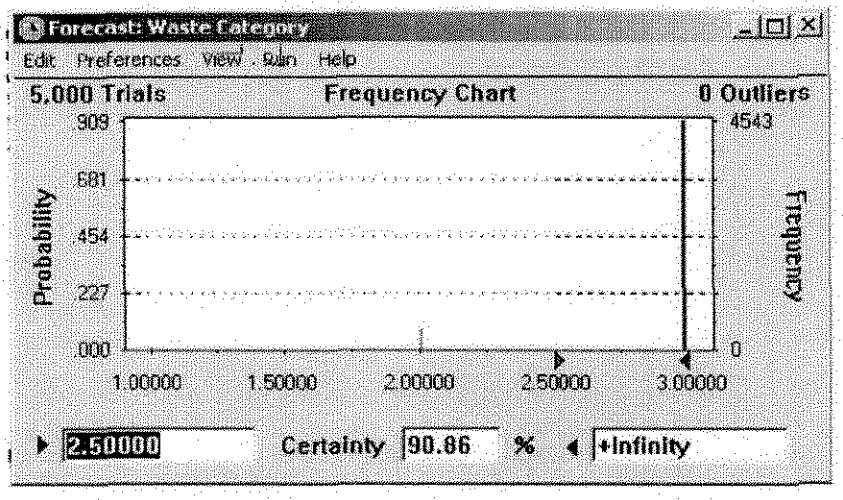
If you have problems finding the report you can use the following procedure to find it...

"Run", "Forecast Windows", "Close All Forecasts"

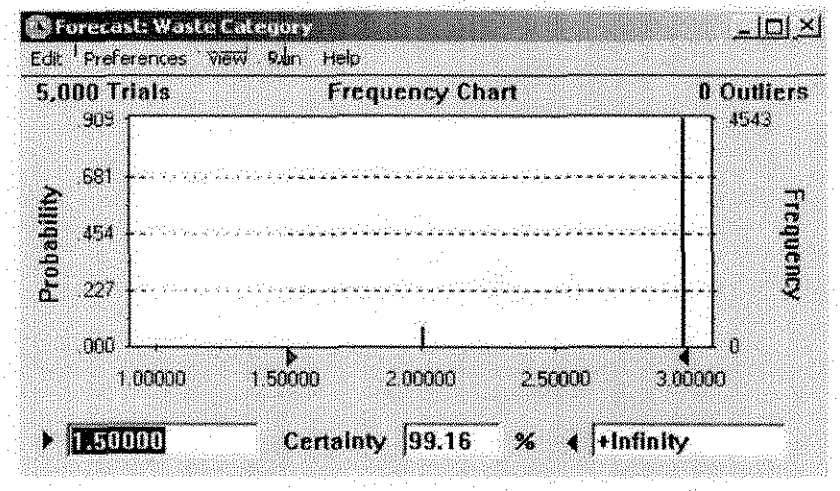
"Run", "Forecast Windows", Select the appropriate forecast(s) in the scrolling window on the left, then select "Opens Selected Forecasts".



enter 2.5 in the "CB Results graph" lower left cell and press <Enter>.



The certainty, 90.86 in this case, is now the Percent of runs for this tank that were classified as class "C". Enter this number in the Monte Carlo Report spreadsheet in cell "N26". Next enter 1.5 in the "CB Results graph" lower left cell and press <Enter>.

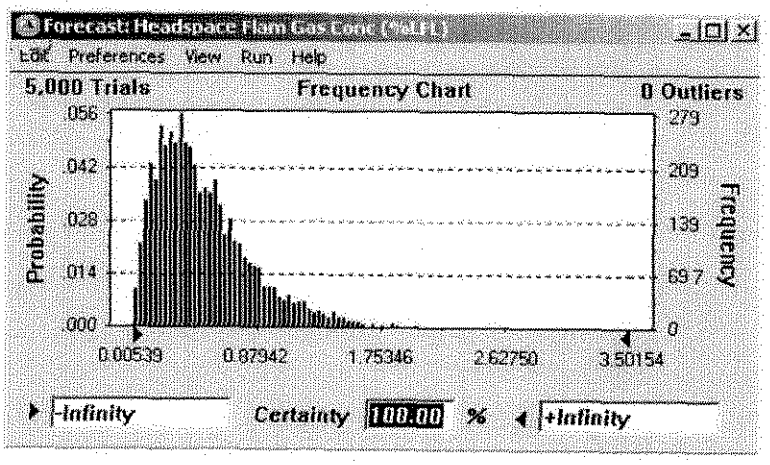


The certainty, 99.16 in this case, is now the Percent of runs for this tank that were classified as class "C" or "B". Enter this number in the Monte Carlo Report spreadsheet in cell "M26". Use a formula structured as follows --

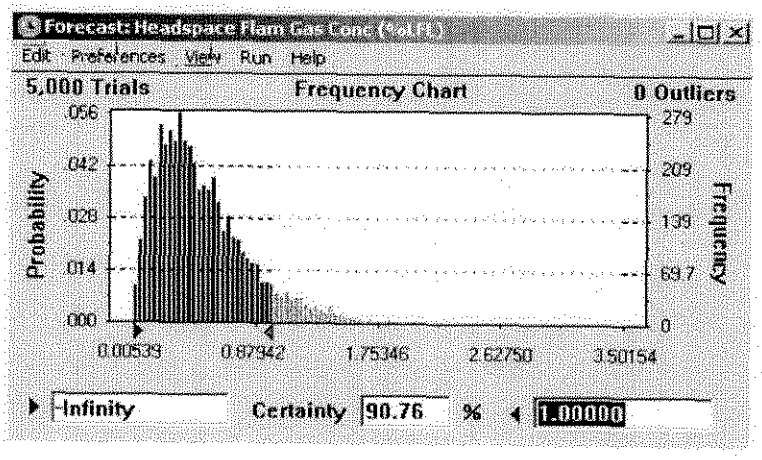
=99.16 - N26

This will calculate the Percent of runs for this tank that were classified as class "B". The formula in cell "L26" will now automatically calculate the Percent of runs for this tank that were classified as class "A", 0.84 in this case.

15 From the Crystal Ball Graph "Forecast: Headspace Flam Gas Conc"...

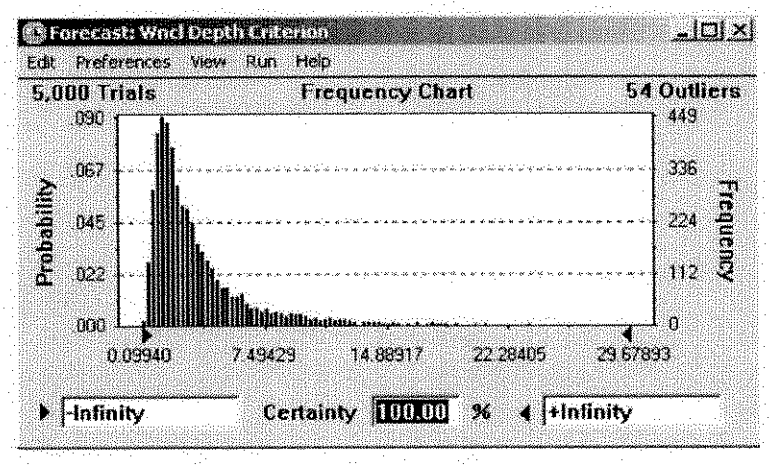


enter 1 in the "CB Results graph" lower right cell and press <Enter>.

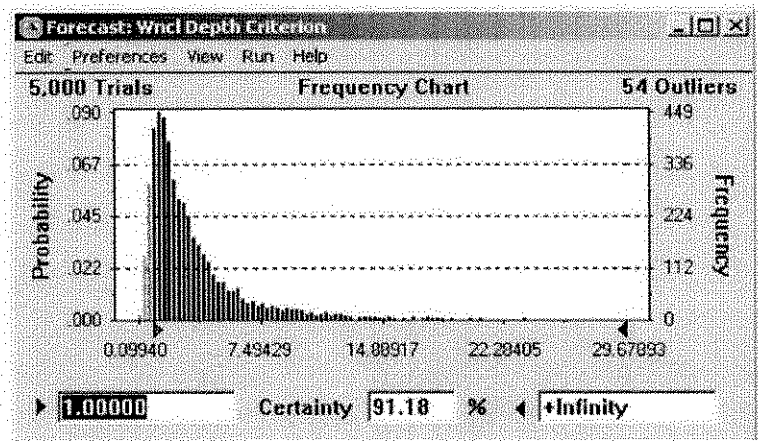


The certainty, 90.76 in this case, is now the Percent of runs for this tank that passed this criteria and are classified as class "C". Enter this number in the Monte Carlo Report spreadsheet in cell "W26".

16 From the Crystal Ball Graph "Forecast: Wncl Depth Criterion"...



enter 1 in the "CB Results graph" lower left cell and press <Enter>.



The certainty, 91.18 in this case, is now the Percent of runs for this tank that passed this criteria and are classified as class "C". Enter this number in the Monte Carlo Report spreadsheet in cell "V26".

17 Name, Save, and Close the Crystal Ball report

APPENDIX E

SAMPLE OUTPUT

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Spreadsheet Title: RPP-10006r4 !!Waste Groups-rev-40-042026 .xls

Title: RPP-10006 Rev 4, *Methodology and Calculations for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site*

Author: S. A. Barker

The following pages (pages E-1 through E-57) in Appendix A contains a series of tables which contain the output from the main flammable gas calculations. The data have been peer reviewed per TFC-ENG-CHEM-D-33, REV B, *Spreadsheet Verification.*

Spreadsheet Verification Number: 274

Originator: S. A. Barker Date: 10/27/04

Checker: D. C. Hedengren Date: 10/27/04

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SUMMARY TABLES

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	Total Waste Depth (m) (5% CL)	Waste Category (5% CL)	Waste Category (Mean)	Waste Category (Median)	Waste Category (95% CL)	Void Fraction (Dimensionless) (5% CL)	Void Fraction (Dimensionless) (Mean)	Void Fraction (Dimensionless) (95% CL)	Retained [H2] Calc'd (%) (Mean)	Headspace [H2] (%) (Mean)
SY-103	6.92	B	C	C	C	1.37	5.25	8.95	48.98	2.20%
	H96	**H1200**	**H1171**	**H1172**	**H1202**	**H464**	**H435**	**H466**	**H619**	**H849**
	96	1200	1171	1172	1202	464	435	466	619	849
	A58	**A1162**	**A1162**	**A1162**	**A1162**	**A426**	**A426**	**A426**	**A610**	**A840**

Water Addition	WA - Total Waste Depth (m) (Median)	WA - Waste Category (5% CL)	WA - Waste Category (Mean)	WA - Waste Category (Median)	WA - Waste Category (95% CL)	Void Fraction (Dimensionless) (5% CL)	Void Fraction (Dimensionless) (Mean)	Void Fraction (Dimensionless) (95% CL)	Retained [H2] Calc'd (%) (Mean)	Headspace [H2] (%) (Mean)
SY-103	7.02	B	B	C	C	na	na	na	na	na
	H1448	**H1936**	**H1907**	**H1908**	**H1938**	**H464**	**H435**	**H466**	**H987**	**H1217**
	1448	1936	1907	1908	1938	464	435	466	987	1217
	A1438	**A1898**	**A1898**	**A1898**	A1898	**A426**	**A426**	**A426**	**A978**	**A1208**

Caustic Addition	CA - Total Waste Depth (m) (Median)	CA - Waste Category (5% CL)	CA - Waste Category (Mean)	CA - Waste Category (Median)	CA - Waste Category (95% CL)	CA - Void Fraction (Dimensionless) (5% CL)	CA - Void Fraction (Dimensionless) (Mean)	CA - Void Fraction (Dimensionless) (Median)	Retained [H2] Calc'd (%) (Mean)	CA - Headspace [H2] (%) (Mean)
SY-103	7.02	B	B	C	C	1.37	4.84	8.43	na	2.09%
	H2138	**H2718**	**H2689**	**H2690**	**H2720**	**H2304**	**H2276**	**H2306**	**H1309**	**H2367**
	2138	2718	2689	2690	2720	2304	2276	2306	1309	2367
	A2128	**A2680**	**A2680**	**A2680**	A2680	**A2266**	**A2266**	**A2266**	**A1300**	**A2358**

	%A	%B	%C	Headspace Flam Gas Conc (%LFL) (Median)	Headspace Flam Gas Conc (%LFL) (95% CL)	"Specific Gravity (CL)" X "NCL Depth" (i (Median)	"Specific Gravity (CL)" X "NCL Depth" (i (95% CL)	Energy Ratio (Dimensionless) (Mean)	Energy Ratio (Dimensionless) (95% CL)	Buoyancy Ratio (Dimensionless) (Median)
SY-103	3.60	5.3000	91.1000	56.44%	108.90%	183.31	198.46	7.95	10.75	1.1955
	Value at 1.5	**96.4**	**^^^^**	**H1126**	**H1156**	**AD5**	**AE5**	**AB5**	**AC5**	**AF5**
			Value at 2.5	1126	1156					
				A1116	**A1116**					

Tank	Over Tank Limit Forecast (5% CL)	Over Tank Limit Forecast (Mean)	Over Tank Limit Forecast (Median)	Over Tank Limit Forecast (95% CL)	Total Waste Depth (m) (5% CL)	Total Waste Depth (m) (Mean)	Total Waste Depth (m) (Median)	Total Waste Depth (m) (95% CL)	Total Non-Convective Waste Depth (m) (5% CL)	Total Non-Convective Waste Depth (m) (Mean)
SY-103	0.00	0.0000	0.00	0.00	6.92	6.93	6.93	6.94	3.12	3.17
	H44	H15	H16	H46	H96	H67	H68	H98	H142	H113
	44	15	16	46	96	67	68	98	142	113
42	A6	A6	A6	A6	A58	A58	A58	A58	A104	A104

231.28

Tank	Non-Convective Waste Density (kg/m3) (5% CL)	Non-Convective Waste Density (kg/m3) (Mean)	Non-Convective Waste Density (kg/m3) (Median)	Non-Convective Waste Density (kg/m3) (95% CL)	Tank Vapor Space Volume (m3) (5% CL)	Tank Vapor Space Volume (m3) (Mean)	Tank Vapor Space Volume (m3) (Median)	Tank Vapor Space Volume (m3) (95% CL)	Void Fraction (Dimensionless) (5% CL)	Void Fraction (Dimensionless) (Mean)
SY-103	1504.04	1610.1139	1610.81	1712.81	2480.84	2485.08	2485.06	2489.35	1.37	5.25
	H372	H343	H344	H374	H418	H389	H390	H420	H464	H435
	372	343	344	374	418	389	390	420	464	435
	A334	A334	A334	A334	A380	A380	A380	A380	A426	A426

Tank	Retained [CH4] Calc'd (%) (5% CL)	Retained [CH4] Calc'd (%) (Mean)	Retained [CH4] Calc'd (%) (Median)	Retained [CH4] Calc'd (%) (95% CL)	Retained [N2O] Calc'd (%) (5% CL)	Retained [N2O] Calc'd (%) (Mean)	Retained [N2O] Calc'd (%) (Median)	Retained [N2O] Calc'd (%) (95% CL)	Vol Gas Released (m3) (5% CL)	Vol Gas Released (m3) (Mean)
SY-103	0.40	2.6014	1.80	7.56	4.46	15.21	13.16	33.03	31.04	118.01
	H694	H665	H666	H696	H740	H711	H712	H742	H786	H757
	694	665	666	696	740	711	712	742	786	757
	A656	A656	A656	A656	A702	A702	A702	A702	A748	A748

Tank	Headspace [H2] (%LFL) (5% CL)	Headspace [H2] (%LFL) (Mean)	Headspace [H2] (%LFL) (Median)	Headspace [H2] (%LFL) (95% CL)	Headspace [CH4] (%LFL) (5% CL)	Headspace [CH4] (%LFL) (Mean)	Headspace [CH4] (%LFL) (Median)	Headspace [CH4] (%LFL) (95% CL)	Headspace [NH3] (%LFL) (5% CL)	Headspace [NH3] (%LFL) (Mean)
SY-103	0.13	0.5506	0.53	1.04	0.00	0.02	0.01	0.07	0.00	0.01
	H1016	H987	H988	H1018	H1062	H1033	H1034	H1064	H1108	H1079
	1016	987	988	1018	1062	1033	1034	1064	1108	1079
	A978	A978	A978	A978	A1024	A1024	A1024	A1024	A1070	A1070

Tank	"Specific Gravity (CL)" X "NCL Depth" (i (5% CL)	"Specific Gravity (CL)" X "NCL Depth" (i (Mean)	"Specific Gravity (CL)" X "NCL Depth" (i (Median)	"Specific Gravity (CL)" X "NCL Depth" (i (95% CL)	Buoyancy Ratio (Dimensionless) (5% CL)	Buoyancy Ratio (Dimensionless) (Mean)	Buoyancy Ratio (Dimensionless) (Median)	Buoyancy Ratio (Dimensionless) (95% CL)	Special Buoyancy Test (5% CL)	Special Buoyancy Test (Mean)
SY-103	168.07	183.2851	183.31	198.46	0.83	1.24	1.20	1.79	0.00	0.78
	H1338	H1309	H1310	H1340	H1384	H1355	H1356	H1386	H1430	H1401
	1338	1309	1310	1340	1384	1355	1356	1386	1430	1401
	A1300	A1300	A1300	A1300	A1346	A1346	A1346	A1346	A1392	A1392

Tank	WA - Gas Release for LFL (m3) (5% CL)	WA - Gas Release for LFL (m3) (Mean)	WA - Gas Release for LFL (m3) (Median)	WA - Gas Release for LFL (m3) (95% CL)	WA - Wncl Depth Criterion (5% CL)	WA - Wncl Depth Criterion (Mean)	WA - Wncl Depth Criterion (Median)	WA - Wncl Depth Criterion (95% CL)	WA - Headspace [H2] (%LFL) (5% CL)	WA - Headspace [H2] (%LFL) (Mean)
SY-103	146.04	219.9622	198.31	371.61	0.89	3.13	1.78	7.22	0.13	0.55
	H1660	**H1631**	**H1632**	**H1662**	**H1706**	**H1677**	**H1678**	**H1708**	**H1752**	**H1723**
	1660	1631	1632	1662	1706	1677	1678	1708	1752	1723
	A1622	**A1622**	**A1622**	**A1622**	**A1668**	**A1668**	**A1668**	**A1668**	**A1714**	**A1714**

Tank	WA - Energy Ratio (Dimensionless) (5% CL)	WA - Energy Ratio (Dimensionless) (Mean)	WA - Energy Ratio (Dimensionless) (Median)	WA - Energy Ratio (Dimensionless) (95% CL)	WA - Waste Ave Specific Gravity (na) (5% CL)	WA - Waste Ave Specific Gravity (na) (Mean)	WA - Waste Ave Specific Gravity (na) (Median)	WA - Waste Ave Specific Gravity (na) (95% CL)	WA - "Specific Gravity (CL)" X "NCL Dept (5% CL)	WA - "Specific Gravity (CL)" X "NCL Dept (Mean)
SY-103	6.12	8.7147	8.61	11.66	1.42	1.53	1.53	1.64	167.43	182.41
	H1982	**H1953**	**H1954**	**H1984**	**H2028**	**H1999**	**H2000**	**H2030**	**H2074**	**H2045**
	1982	1953	1954	1984	2028	1999	2000	2030	2074	2045
	A1944	**A1944**	**A1944**	**A1944**	**A1990**	**A1990**	**A1990**	**A1990**	**A2036**	**A2036**

Tank	CA - Void Fraction (Dimensionless) (5% CL)	CA - Void Fraction (Dimensionless) (Mean)	CA - Void Fraction (Dimensionless) (Median)	CA - Void Fraction (Dimensionless) (95% CL)	CA - Wncl Depth Criterion (5% CL)	CA - Wncl Depth Criterion (Mean)	CA - Wncl Depth Criterion (Median)	CA - Wncl Depth Criterion (95% CL)	CA - Headspace [H2] (%) (5% CL)	CA - Headspace [H2] (%) (Mean)
SY-103	1.37	4.8392	4.84	8.43	0.94	3.23	1.90	7.25	0.01	0.02
	H2304	**H2275**	**H2276**	**H2306**	**H2350**	**H2321**	**H2322**	**H2352**	**H2396**	**H2367**
	2304	2275	2276	2306	2350	2321	2322	2352	2396	2367
	A2266	**A2266**	**A2266**	**A2266**	**A2312**	**A2312**	**A2312**	**A2312**	**A2358**	**A2358**

Tank	CA - Headspace [NH3] (%LFL) (5% CL)	CA - Headspace [NH3] (%LFL) (Mean)	CA - Headspace [NH3] (%LFL) (Median)	CA - Headspace [NH3] (%LFL) (95% CL)	CA - Headspace Flam Gas Conc (%LFL) (5% CL)	CA - Headspace Flam Gas Conc (%LFL) (Mean)	CA - Headspace Flam Gas Conc (%LFL) (Median)	CA - Headspace Flam Gas Conc (%LFL) (95% CL)	CA - Waste Category (5% CL)	CA - Waste Category (Mean)
SY-103	0.00	0.0101	0.00	0.04	0.14	0.55	0.53	1.05	2.00	2.92
104	**H2626**	**H2597**	**H2598**	**H2628**	**H2672**	**H2643**	**H2644**	**H2674**	**H2718**	**H2689**
	2626	2597	2598	2628	2672	2643	2644	2674	2718	2689
	A2588	**A2588**	**A2588**	**A2588**	**A2634**	**A2634**	**A2634**	**A2634**	**A2680**	**A2680**

	Headspace [NH3] (%) (Mean)	Headspace [H2] (%LFL) (Mean)	Headspace Flam Gas Conc (%LFL) (Mean)	Headspace Flam Gas Conc (%LFL) (95% CL)	Wncl Depth Criterion (Mean)	Wncl Depth Criterion (95% CL)	Energy Ratio (Dimensionless) (Mean)	Energy Ratio (Dimensionless) (95% CL)	"Specific Gravity (CL)" X "NCL Depth" (i (Median)	"Specific Gravity (CL)" X "NCL Depth" (i (95% CL)
SY-103	0.16%	55.06%	58.47%	108.90%	3.20	7.38	7.95	10.75	183.31	198.46
	H941	H987	H1125	H1156	H803	H834	H1217	H1248	H1310	H1340
	941	987	1125	1156	803	834	1217	1248	1310	1340
	A932	A978	A1116	A1116	A794	A794	A1208	A1208	A1300	A1300

Water Addition	Headspace [CH4] (%) (Mean)	Headspace [NH3] (%) (Mean)	WA - Headspace [NH3] (%LFL) (Median)	WA - Headspace [NH3] (%LFL) (95% CL)	WA - Wncl Depth Criterion (Median)	WA - Wncl Depth Criterion (95% CL)	WA - Energy Ratio (Dimensionless) (5% CL)	WA - Energy Ratio (Dimensionless) (Mean)	WA - "Specific Gravity (CL)" X "NCL Dept (Median)	WA - "Specific Gravity (CL)" X "NCL Dept (95% CL)
SY-103	na	na	0.51%	3.74%	1.78	7.22	8.61	11.66	182.44	197.35
	H1263	H1309	H1816	H1846	H1678	H1708	H1954	H1984	H2046	H2076
	1263	1309	1816	1846	1678	1708	1954	1984	2046	2076
	A1254	A1300	A1806	A1806	A1668	A1668	A1944	A1944	A2036	A2036

Caustic Addition	CA - Headspace [H2] (%) (Median)	CA - Headspace [H2] (%) (95% CL)	CA - Headspace Flam Gas Conc (%LFL) (Median)	CA - Headspace Flam Gas Conc (%LFL) (95% CL)	CA - Wncl Depth Criterion (Median)	CA - Wncl Depth Criterion (95% CL)	CA - Energy Ratio (Dimensionless) (Median)	CA - Energy Ratio (Dimensionless) (95% CL)	CA - "Specific Gravity (CL)" X "NCL Dept (Median)	CA - "Specific Gravity (CL)" X "NCL Dept (95% CL)
SY-103	1.99%	4.00%	53.19%	104.91%	1.90	7.25	8.23	17.02	183.33	198.93
	H2368	H2398	H2644	H2674	H2322	H2352	H2736	H2766	H2828	H2858
	2368	2398	2644	2674	2322	2352	2736	2766	2828	2858
	A2358	A2358	A2634	A2634	A2312	A2312	A2726	A2726	A2818	A2818

	Buoyancy Ratio (Dimensionless) (95% CL)	Waste Ave Specific Gravity (na) (Median)	Waste Ave Specific Gravity (na) (95% CL)	FG Group AS IS	FG Group 10,000 gal Water Add'n	FG Group 10,000 gal Caustic Add'n	Over Tank Limit Forecast (max)	Retained [H2] Calc'd (%) (Median)	Headspace [H2] (%) (Median)	Total Waste Depth (m) (Median)
SY-103	1.7863	1.53	1.64	B	B	B	No	49.77	2.1%	6.93
	AG5	AH5	AI5	M5	m13	m21	H46	H620	H850	H68
							46	620	850	68
							A6	A610	A840	A58

Tank	Total Non-Convective Waste Depth (m) (Median)	Total Non-Convective Waste Depth (m) (95% CL)	Wetted Non-Convective Waste Depth (m) (5% CL)	Wetted Non-Convective Waste Depth (m) (Mean)	Wetted Non-Convective Waste Depth (m) (Median)	Wetted Non-Convective Waste Depth (m) (95% CL)	Convective Waste Depth (m) (5% CL)	Convective Waste Depth (m) (Mean)	Convective Waste Depth (m) (Median)	Convective Waste Depth (m) (95% CL)
SY-103	3.17	3.21	3.12	3.17	3.17	3.21	3.63	3.68	3.68	3.74
	H114	H144	H188	H159	H160	H190	H234	H205	H206	H236
	114	144	188	159	160	190	234	205	206	236
42	A104	A104	A150	A150	A150	A150	A196	A196	A196	A196

228.34 24 25 26 27 30

Tank	Void Fraction (Dimensionless) (Median)	Void Fraction (Dimensionless) (95% CL)	Non-Convective Waste Yield Stress (Pa) (5% CL)	Non-Convective Waste Yield Stress (Pa) (Mean)	Non-Convective Waste Yield Stress (Pa) (Median)	Non-Convective Waste Yield Stress (Pa) (95% CL)	retained Gas Composition N2 (5% CL)	retained Gas Composition N2 (Mean)	retained Gas Composition N2 (Median)	retained Gas Composition N2 (95% CL)
SY-103	5.31	8.95	120.77	143.84	143.88	166.88	14.55	29.65	27.65	52.43
	H436	H466	H510	H481	H482	H512	H556	H527	H528	H558
	436	466	510	481	482	512	556	527	528	558
	A426	A426	A472	A472	A472	A472	A518	A518	A518	A518

Tank	Vol Gas Released (m3) (Median)	Vol Gas Released (m3) (95% CL)	Wncl Depth Criterion (5% CL)	Wncl Depth Criterion (Mean)	Wncl Depth Criterion (Median)	Wncl Depth Criterion (95% CL)	Headspace [H2] (%) (5% CL)	Headspace [H2] (%) (Mean)	Headspace [H2] (%) (Median)	Headspace [H2] (%) (95% CL)
SY-103	119.79	200.89	0.91	3.20	1.82	7.38	0.01	0.02	0.02	0.04
	H758	H788	H832	H803	H804	H834	H878	H849	H850	H880
	758	788	832	803	804	834	878	849	850	880
	A748	A748	A794	A794	A794	A794	A840	A840	A840	A840

Tank	Headspace [NH3] (%LFL) (Median)	Headspace [NH3] (%LFL) (95% CL)	Headspace Flam Gas Conc (%LFL) (5% CL)	Headspace Flam Gas Conc (%LFL) (Mean)	Headspace Flam Gas Conc (%LFL) (Median)	Headspace Flam Gas Conc (%LFL) (95% CL)	Waste Category (5% CL)	Waste Category (Mean)	Waste Category (Median)	Waste Category (95% CL)
SY-103	0.01	0.04	0.14	0.58	0.56	1.09	2.00	2.88	3.00	3.00
	H1080	H1110	H1154	H1125	H1126	H1156	H1200	H1171	H1172	H1202
	1080	1110	1154	1125	1126	1156	1200	1171	1172	1202
	A1070	A1070	A1116	A1116	A1116	A1116	A1162	A1162	A1162	A1162

Tank	Special Buoyancy Test (Median)	Special Buoyancy Test (95% CL)	WA - Total Waste Depth (m) (5% CL)	WA - Total Waste Depth (m) (Mean)	WA - Total Waste Depth (m) (Median)	WA - Total Waste Depth (m) (95% CL)	WA - Convective Waste Depth (m) (5% CL)	WA - Convective Waste Depth (m) (Mean)	WA - Convective Waste Depth (m) (Median)	WA - Convective Waste Depth (m) (95% CL)
SY-103	1.00	1.00	7.01	7.02	7.02	7.03	3.73	3.78	3.78	3.83
	H1402	H1432	H1476	H1447	H1448	H1478	H1522	H1493	H1494	H1524
	1402	1432	1476	1447	1448	1478	1522	1493	1494	1524
	A1392	A1392	A1438	A1438	A1438	A1438	A1484	A1484	A1484	A1484

Tank	WA - Headspace [H2] (%LFL) (Median)	WA - Headspace [H2] (%LFL) (95% CL)	WA - Headspace [CH4] (%LFL) (5% CL)	WA - Headspace [CH4] (%LFL) (Mean)	WA - Headspace [CH4] (%LFL) (Median)	WA - Headspace [CH4] (%LFL) (95% CL)	WA - Headspace [NH3] (%LFL) (5% CL)	WA - Headspace [NH3] (%LFL) (Mean)	WA - Headspace [NH3] (%LFL) (Median)	WA - Headspace [NH3] (%LFL) (95% CL)
SY-103	0.53	1.04	0.00	0.02	0.02	0.07	0.00	0.01	0.01	0.04
	H1724	H1754	H1798	H1769	H1770	H1800	H1844	H1815	H1816	H1846
	1724	1754	1798	1769	1770	1800	1844	1815	1816	1846
	A1714	A1714	A1760	A1760	A1760	A1760	A1806	A1806	A1806	A1806

Tank	WA - "Specific Gravity (CL)" X "NCL Dept (Median)	WA - "Specific Gravity (CL)" X "NCL Dept (95% CL)	WA - Buoyancy Ratio (Dimensionless) (5% CL)	WA - Buoyancy Ratio (Dimensionless) (Mean)	WA - Buoyancy Ratio (Dimensionless) (Median)	WA - Buoyancy Ratio (Dimensionless) (95% CL)	CA - Total Waste Depth (m) (5% CL)	CA - Total Waste Depth (m) (Mean)	CA - Total Waste Depth (m) (Median)	CA - Total Waste Depth (m) (95% CL)
SY-103	182.44	197.35	0.80	1.17	1.13	1.66	7.01	7.02	7.02	7.03
	H2046	H2076	H2120	H2091	H2092	H2122	H2166	H2137	H2138	H2168
	2046	2076	2120	2091	2092	2122	2166	2137	2138	2168
	A2036	A2036	A2082	A2082	A2082	A2082	A2128	A2128	A2128	A2128

Tank	CA - Headspace [H2] (%) (Median)	CA - Headspace [H2] (%) (95% CL)	CA - Headspace [CH4] (%) (5% CL)	CA - Headspace [CH4] (%) (Mean)	CA - Headspace [CH4] (%) (Median)	CA - Headspace [CH4] (%) (95% CL)	CA - Headspace [NH3] (%) (5% CL)	CA - Headspace [NH3] (%) (Mean)	CA - Headspace [NH3] (%) (Median)	CA - Headspace [NH3] (%) (95% CL)
SY-103	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	H2368	H2398	H2442	H2413	H2414	H2444	H2488	H2459	H2460	H2490
	2368	2398	2442	2413	2414	2444	2488	2459	2460	2490
	A2358	A2358	A2404	A2404	A2404	A2404	A2450	A2450	A2450	A2450

Tank	CA - Waste Category (Median)	CA - Waste Category (95% CL)	CA - Energy Ratio (Dimensionless) (5% CL)	CA - Energy Ratio (Dimensionless) (Mean)	CA - Energy Ratio (Dimensionless) (Median)	CA - Energy Ratio (Dimensionless) (95% CL)	CA - Waste Ave Specific Gravity (na) (5% CL)	CA - Waste Ave Specific Gravity (na) (Mean)	CA - Waste Ave Specific Gravity (na) (Median)	CA - Waste Ave Specific Gravity (na) (95% CL)
SY-103	3.00	3.00	-1.17	8.14	8.23	17.02	1.45	1.53	1.53	1.61
104	H2690	H2720	H2764	H2735	H2736	H2766	H2810	H2781	H2782	H2812
	2690	2720	2764	2735	2736	2766	2810	2781	2782	2812
	A2680	A2680	A2726	A2726	A2726	A2726	A2772	A2772	A2772	A2772

	Buoyancy Ratio (Dimensionless) (Median)	Buoyancy Ratio (Dimensionless) (95% CL)	Waste Ave Specific Gravity (na) (Median)	Waste Ave Specific Gravity (na) (95% CL)	Special Buoyancy Test (Mean)	Special Buoyancy Test (Median)
SY-103	1.20	1.79	1.53	1.64	0.78	1.00
	H1356	H1386	H1264	H1294	H1401	H1402
	1356	1386	1264	1294	1401	1402
	A1346	A1346	A1254	A1254	A1392	A1392

xx xx

Water Addition	WA - Buoyancy Ratio (Dimensionless) (Median)	WA - Buoyancy Ratio (Dimensionless) (95% CL)	WA - Waste Ave Specific Gravity (na) (Median)	WA - Waste Ave Specific Gravity (na) (95% CL)		
SY-103	1.13	1.66	1.53	1.53		
	H2092	H2122	H1999	H2000		
	2092	2122	1999	2000		
	A2082	A2082	A1990	A1990		

Caustic Addition	CA - Buoyancy Ratio (Dimensionless) (Median)	CA - Buoyancy Ratio (Dimensionless) (95% CL)	CA - Waste Ave Specific Gravity (na) (Median)	CA - Waste Ave Specific Gravity (na) (95% CL)		
SY-103	1.04	5.85	1.53	1.61		
	H2874	H2904	H2782	H2812		
	2874	2904	2782	2812		
	A2864	A2864	A2772	A2772		

	Total Waste Depth (m) (95% CL)	Wetted Non-Convective Waste Depth (m) (Median)	Wetted Non-Convective Waste Depth (m) (95% CL)	Convective Waste Depth (m) (Median)	Convective Waste Depth (m) (95% CL)	Porosity (fraction) (Median)	Porosity (fraction) (95% CL)
SY-103	6.94	3.17	3.21	3.68	3.74	0.81	0.86
	H98	H160	H190	H206	H236	H298	H328
	98	160	190	206	236	298	328
	A58	A150	A150	A196	A196	A288	A288

Tank	Convective Waste Density (kg/m3) (5% CL)	Convective Waste Density (kg/m3) (Mean)	Convective Waste Density (kg/m3) (Median)	Convective Waste Density (kg/m3) (95% CL)	Porosity (fraction) (5% CL)	Porosity (fraction) (Mean)	Porosity (fraction) (Median)	Porosity (fraction) (95% CL)
SY-103	1352.25	1470.51	1470.72	1590.28	0.75	0.81	0.81	0.86
	H280	H251	H252	H282	H326	H297	H298	H328
	280	251	252	282	326	297	298	328
42	A242	A242	A242	A242	A288	A288	A288	A288

34 38

Tank	retained Gas Composition NH3 (%) (5% CL)	retained Gas Composition NH3 (%) (Mean)	retained Gas Composition NH3 (%) (Median)	retained Gas Composition NH3 (%) (95% CL)	Retained [H2] Calc'd (%) (5% CL)	Retained [H2] Calc'd (%) (Mean)	Retained [H2] Calc'd (%) (Median)	Retained [H2] Calc'd (%) (95% CL)
SY-103	0.45	3.55	1.74	10.99	26.83	48.98	49.77	68.00
	H602	H573	H574	H604	H648	H619	H620	H650
	602	573	574	604	648	619	620	650
	A564	A564	A564	A564	A610	A610	A610	A610

Tank	Headspace [CH4] (%) (5% CL)	Headspace [CH4] (%) (Mean)	Headspace [CH4] (%) (Median)	Headspace [CH4] (%) (95% CL)	Headspace [NH3] (%) (5% CL)	Headspace [NH3] (%) (Mean)	Headspace [NH3] (%) (Median)	Headspace [NH3] (%) (95% CL)
SY-103	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	H924	H895	H896	H926	H970	H941	H942	H972
	924	895	896	926	970	941	942	972
	A886	A886	A886	A886	A932	A932	A932	A932

Tank	Energy Ratio (Dimensionless) (5% CL)	Energy Ratio (Dimensionless) (Mean)	Energy Ratio (Dimensionless) (Median)	Energy Ratio (Dimensionless) (95% CL)	Waste Ave Specific Gravity (na) (5% CL)	Waste Ave Specific Gravity (na) (Mean)	Waste Ave Specific Gravity (na) (Median)	Waste Ave Specific Gravity (na) (95% CL)
SY-103	5.47	7.95	7.83	10.75	1.42	1.53	1.53	1.64
	H1246	H1217	H1218	H1248	H1292	H1263	H1264	H1294
	1246	1217	1218	1248	1292	1263	1264	1294
	A1208	A1208	A1208	A1208	A1254	A1254	A1254	A1254

Tank	Non-Convective Waste Density (kg/m3) (5% CL)	Non-Convective Waste Density (kg/m3) (Mean)	Non-Convective Waste Density (kg/m3) (Median)	Non-Convective Waste Density (kg/m3) (95% CL)	WA - Discounted H2 Fraction for 100% LFL (5% CL)	WA - Discounted H2 Fraction for 100% LFL (Mean)	WA - Discounted H2 Fraction for 100% LFL (Median)	WA - Discounted H2 Fraction for 100% LFL (95% CL)
SY-103	1504.04	1610.11	1610.81	1712.81	0.04	0.04	0.04	0.04
	H1568	H1539	H1540	H1570	H1614	H1585	H1586	H1616
	1568	1539	1540	1570	1614	1585	1586	1616
	A1530	A1530	A1530	A1530	A1576	A1576	A1576	A1576

Tank	WA - Headspace Flam Gas Conc (%LFL) (5% CL)	WA - Headspace Flam Gas Conc (%LFL) (Mean)	WA - Headspace Flam Gas Conc (%LFL) (Median)	WA - Headspace Flam Gas Conc (%LFL) (95% CL)	WA - Waste Category (5% CL)	WA - Waste Category (Mean)	WA - Waste Category (Median)	WA - Waste Category (95% CL)
SY-103	0.14	0.59	0.57	1.10	2.00	2.88	3.00	3.00
	H1890	**H1861**	**H1862**	**H1892**	**H1936**	**H1907**	**H1908**	**H1938**
	1890	1861	1862	1892	1936	1907	1908	1938
	A1852	**A1852**	**A1852**	**A1852**	**A1898**	**A1898**	**A1898**	**A1898**

Tank	CA - Convective Waste Depth (m) (5% CL)	CA - Convective Waste Depth (m) (Mean)	CA - Convective Waste Depth (m) (Median)	CA - Convective Waste Depth (m) (95% CL)	CA - Convective Waste Density (kg/m3) (5% CL)	CA - Convective Waste Density (kg/m3) (Mean)	CA - Convective Waste Density (kg/m3) (Median)	CA - Convective Waste Density (kg/m3) (95% CL)
SY-103	3.73	3.78	3.78	3.83	1352.42	1471.29	1470.15	1594.83
	H2212	**H2183**	**H2184**	**H2214**	**H2258**	**H2229**	**H2230**	**H2260**
	2212	2183	2184	2214	2258	2229	2230	2260
	A2174	**A2174**	**A2174**	**A2174**	**A2220**	**A2220**	**A2220**	**A2220**

Tank	CA - Headspace [H2] (%LFL) (5% CL)	CA - Headspace [H2] (%LFL) (Mean)	CA - Headspace [H2] (%LFL) (Median)	CA - Headspace [H2] (%LFL) (95% CL)	CA - Headspace [CH4] (%LFL) (5% CL)	CA - Headspace [CH4] (%LFL) (Mean)	CA - Headspace [CH4] (%LFL) (Median)	CA - Headspace [CH4] (%LFL) (95% CL)
SY-103	0.13	0.52	0.50	1.00	0.00	0.02	0.01	0.07
	H2534	**H2505**	**H2506**	**H2536**	**H2580**	**H2551**	**H2552**	**H2582**
	2534	2505	2506	2536	2580	2551	2552	2582
	A2496	**A2496**	**A2496**	**A2496**	**A2542**	**A2542**	**A2542**	**A2542**

Tank	CA - "Specific Gravity (CL)" X "NCL Dept (5% CL)	CA - "Specific Gravity (CL)" X "NCL Dept (Mean)	CA - "Specific Gravity (CL)" X "NCL Dept (Median)	CA - "Specific Gravity (CL)" X "NCL Dept (95% CL)	CA - Buoyancy Ratio (Dimensionless) (5% CL)	CA - Buoyancy Ratio (Dimensionless) (Mean)	CA - Buoyancy Ratio (Dimensionless) (Median)	CA - Buoyancy Ratio (Dimensionless) (95% CL)
SY-103	168.48	183.38	183.33	198.93	-3.40	0.76	1.04	5.85
104	**H2856**	**H2827**	**H2828**	**H2858**	**H2902**	**H2873**	**H2874**	**H2904**
	2856	2827	2828	2858	2902	2873	2874	2904
	A2818	**A2818**	**A2818**	**A2818**	**A2864**	**A2864**	**A2864**	**A2864**

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OUTPUT DETAILS

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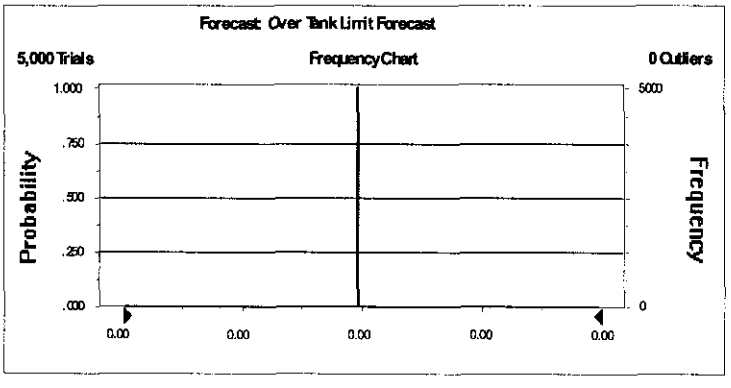
Crystal Ball Report
Simulation started on 10/23/04 at 17:34:23
Simulation stopped on 10/23/04 at 17:35:13

Forecast: Over Tank Limit Forecast **Cell: G5**

Summary:
Display Range is from 0.00 to 0.00
Entire Range is from 0.00 to 0.00
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	0.00
Median	0.00
Mode	0.00
Standard Deviation	0.00
Variance	0.00
Skewness	0.00
Kurtosis	+Infinity
Coeff. of Variability	+Infinity
Range Minimum	0.00
Range Maximum	0.00
Range Width	0.00
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	0.00
2.5%	0.00
5.0%	0.00
50.0%	0.00
95.0%	0.00
97.5%	0.00

Forecast: Over Tank Limit Forecast (cont'd) **Cell: G5**

Percentile	Value
100.0%	0.00

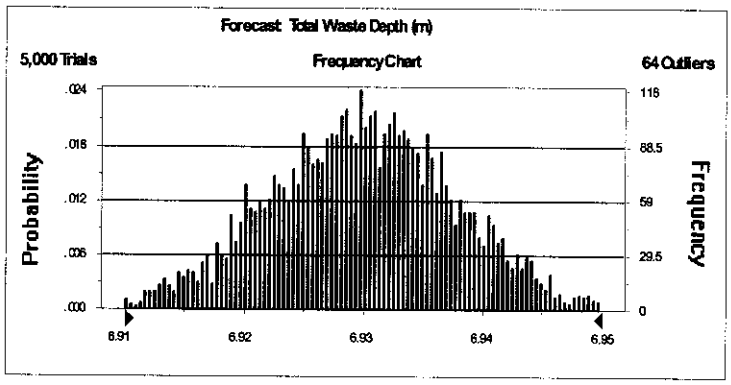
End of Forecast

Forecast: Total Waste Depth (m) **Cell: G8**

Summary:

Display Range is from 6.91 to 6.95
Entire Range is from 6.90 to 6.95
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	6.93
Median	6.93
Mode	---
Standard Deviation	0.01
Variance	0.00
Skewness	-0.05
Kurtosis	3.02
Coeff. of Variability	0.00
Range Minimum	6.90
Range Maximum	6.95
Range Width	0.05
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	6.90
2.5%	6.92
5.0%	6.92
50.0%	6.93
95.0%	6.94
97.5%	6.94
100.0%	6.95

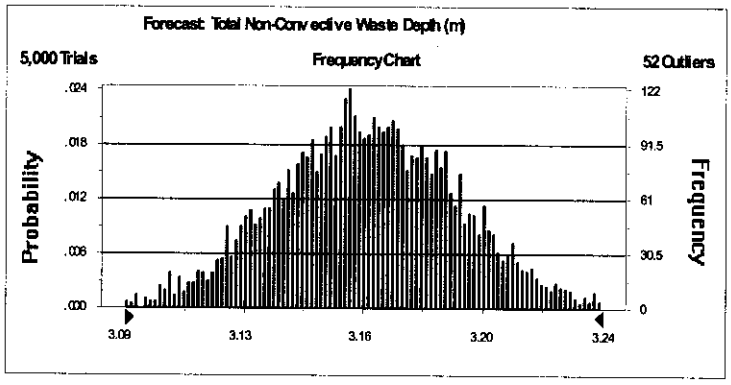
End of Forecast

Forecast: Total Non-Convective Waste Depth (m) **Cell: G9**

Summary:

Display Range is from 3.09 to 3.24
Entire Range is from 3.05 to 3.27
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	3.17
Median	3.17
Mode	---
Standard Deviation	0.03
Variance	0.00
Skewness	0.01
Kurtosis	3.05
Coeff. of Variability	0.01
Range Minimum	3.05
Range Maximum	3.27
Range Width	0.23
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	3.05
2.5%	3.11
5.0%	3.12
50.0%	3.17
95.0%	3.21
97.5%	3.22
100.0%	3.27

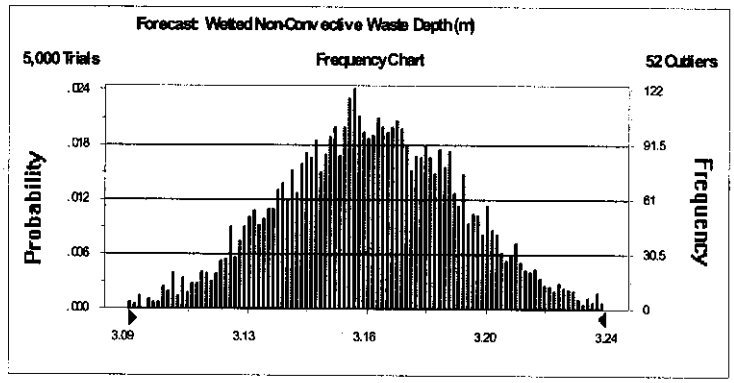
End of Forecast

Forecast: Wetted Non-Convective Waste Depth (m) **Cell: G10**

Summary:

Display Range is from 3.09 to 3.24
Entire Range is from 3.05 to 3.27
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	3.17
Median	3.17
Mode	---
Standard Deviation	0.03
Variance	0.00
Skewness	0.01
Kurtosis	3.05
Coeff. of Variability	0.01
Range Minimum	3.05
Range Maximum	3.27
Range Width	0.23
Mean Std. Error	0.00



Percentiles:

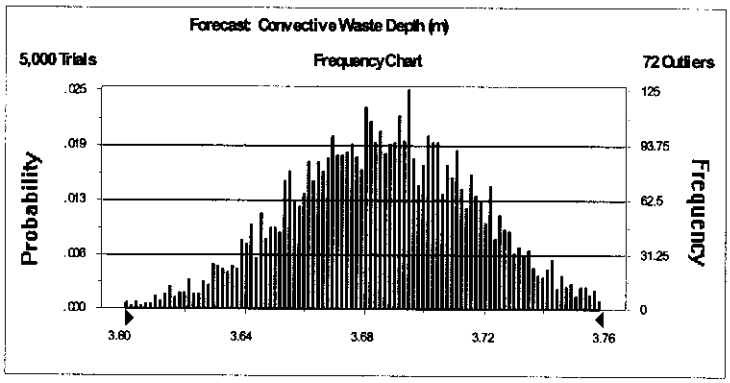
Percentile	Value
0.0%	3.05
2.5%	3.11
5.0%	3.12
50.0%	3.17
95.0%	3.21
97.5%	3.22
100.0%	3.27

End of Forecast

Forecast: Convective Waste Depth (m) **Cell: G11**

Summary:
Display Range is from 3.60 to 3.76
Entire Range is from 3.58 to 3.80
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	3.68
Median	3.68
Mode	---
Standard Deviation	0.03
Variance	0.00
Skewness	-0.02
Kurtosis	3.04
Coeff. of Variability	0.01
Range Minimum	3.58
Range Maximum	3.80
Range Width	0.22
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	3.58
2.5%	3.62
5.0%	3.63
50.0%	3.68
95.0%	3.74
97.5%	3.74
100.0%	3.80

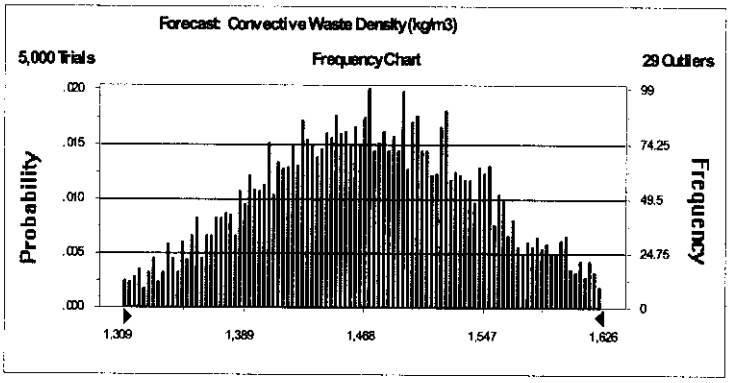
End of Forecast

Forecast: Convective Waste Density (kg/m3) **Cell: G13**

Summary:

Display Range is from 1,309 to 1,626
Entire Range is from 1,307 to 1,633
After 5,000 Trials, the Std. Error of the Mean is 1

Statistics:	Value
Trials	5000
Mean	1,471
Median	1,471
Mode	---
Standard Deviation	71
Variance	5,037
Skewness	-0.01
Kurtosis	2.38
Coeff. of Variability	0.05
Range Minimum	1,307
Range Maximum	1,633
Range Width	326
Mean Std. Error	1.00



Percentiles:

Percentile	Value
0.0%	1,307
2.5%	1,333
5.0%	1,352
50.0%	1,471
95.0%	1,590
97.5%	1,605
100.0%	1,633

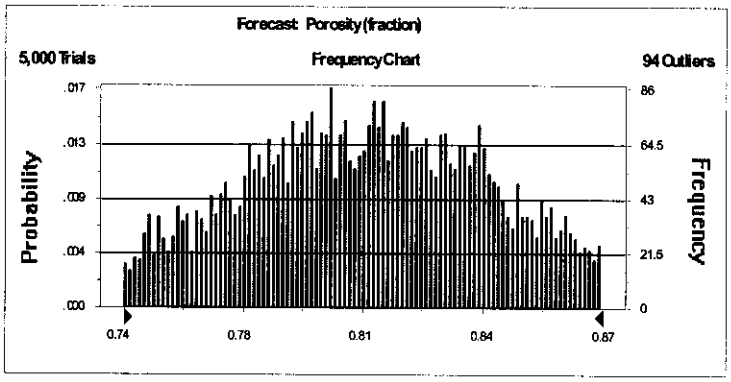
End of Forecast

Forecast: Porosity (fraction) **Cell: G14**

Summary:

Display Range is from 0.74 to 0.87
Entire Range is from 0.74 to 0.88
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	0.81
Median	0.81
Mode	---
Standard Deviation	0.03
Variance	0.00
Skewness	0.00
Kurtosis	2.20
Coeff. of Variability	0.04
Range Minimum	0.74
Range Maximum	0.88
Range Width	0.13
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	0.74
2.5%	0.75
5.0%	0.75
50.0%	0.81
95.0%	0.86
97.5%	0.87
100.0%	0.88

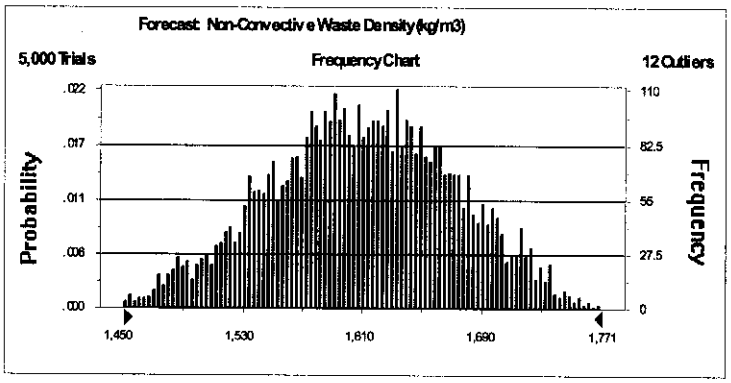
End of Forecast

Forecast: Non-Convective Waste Density (kg/m3) **Cell: G15**

Summary:

Display Range is from 1,450 to 1,771
Entire Range is from 1,433 to 1,774
After 5,000 Trials, the Std. Error of the Mean is 1

Statistics:	Value
Trials	5000
Mean	1,610
Median	1,611
Mode	---
Standard Deviation	62
Variance	3,882
Skewness	-0.09
Kurtosis	2.54
Coeff. of Variability	0.04
Range Minimum	1,433
Range Maximum	1,774
Range Width	341
Mean Std. Error	0.88



Percentiles:

Percentile	Value
0.0%	1,433
2.5%	1,486
5.0%	1,504
50.0%	1,611
95.0%	1,713
97.5%	1,725
100.0%	1,774

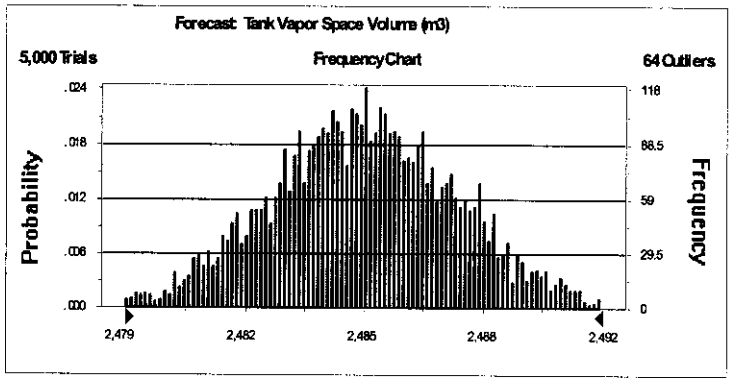
End of Forecast

Forecast: Tank Vapor Space Volume (m3) **Cell: G21**

Summary:

Display Range is from 2,479 to 2,492
Entire Range is from 2,477 to 2,496
After 5,000 Trials, the Std. Error of the Mean is 0

Statistics:	Value
Trials	5000
Mean	2,485
Median	2,485
Mode	---
Standard Deviation	3
Variance	7
Skewness	0.05
Kurtosis	3.02
Coeff. of Variability	0.00
Range Minimum	2,477
Range Maximum	2,496
Range Width	19
Mean Std. Error	0.04



Percentiles:

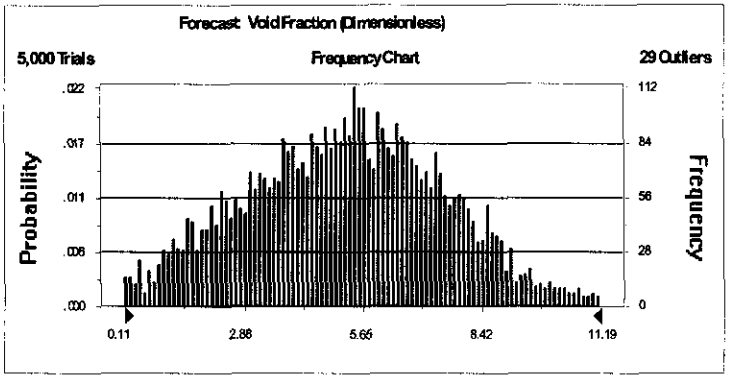
Percentile	Value
0.0%	2,477
2.5%	2,480
5.0%	2,481
50.0%	2,485
95.0%	2,489
97.5%	2,490
100.0%	2,496

End of Forecast

Forecast: Void Fraction (Dimensionless) **Cell: G29**

Summary:
Display Range is from 0.11 to 11.19
Entire Range is from 0.10 to 12.68
After 5,000 Trials, the Std. Error of the Mean is 0.03

Statistics:	Value
Trials	5000
Mean	5.25
Median	5.31
Mode	0.10
Standard Deviation	2.31
Variance	5.33
Skewness	0.03
Kurtosis	2.54
Coeff. of Variability	0.44
Range Minimum	0.10
Range Maximum	12.68
Range Width	12.58
Mean Std. Error	0.03



Percentiles:

Percentile	Value
0.0%	0.10
2.5%	0.91
5.0%	1.37
50.0%	5.31
95.0%	8.95
97.5%	9.66
100.0%	12.68

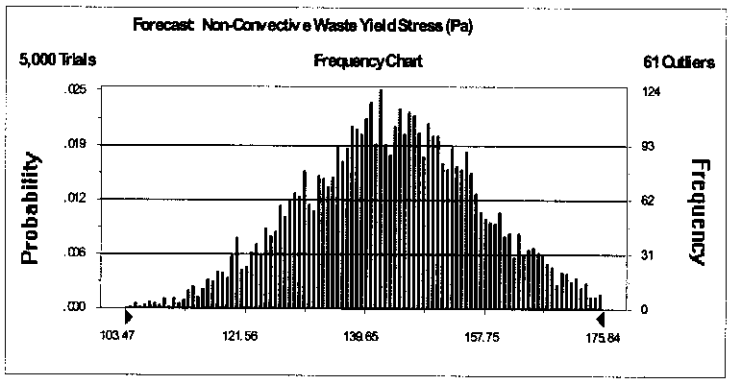
End of Forecast

Forecast: Non-Convective Waste Yield Stress (Pa) **Cell: G31**

Summary:

Display Range is from 103.47 to 175.84
Entire Range is from 95.43 to 189.67
After 5,000 Trials, the Std. Error of the Mean is 0.19

Statistics:	Value
Trials	5000
Mean	143.84
Median	143.88
Mode	---
Standard Deviation	13.78
Variance	189.87
Skewness	0.00
Kurtosis	2.97
Coeff. of Variability	0.10
Range Minimum	95.43
Range Maximum	189.67
Range Width	94.24
Mean Std. Error	0.19



Percentiles:

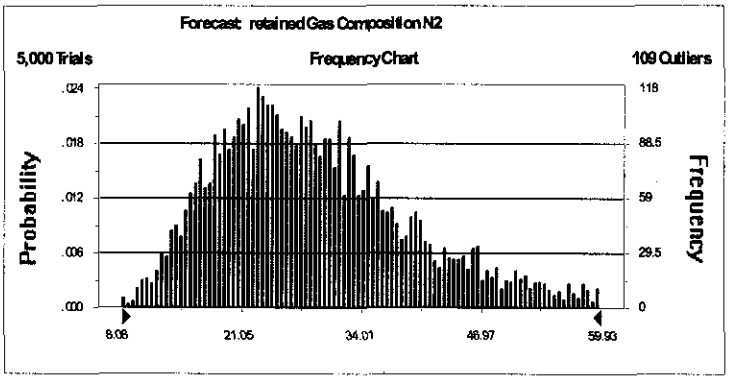
Percentile	Value
0.0%	95.43
2.5%	117.30
5.0%	120.77
50.0%	143.88
95.0%	166.88
97.5%	171.18
100.0%	189.67

End of Forecast

Forecast: retained Gas Composition N2 **Cell: G35**

Summary:
Display Range is from 8.08 to 59.93
Entire Range is from 5.70 to 79.73
After 5,000 Trials, the Std. Error of the Mean is 0.16

Statistics:	Value
Trials	5000
Mean	29.65
Median	27.65
Mode	---
Standard Deviation	11.66
Variance	136.00
Skewness	1.02
Kurtosis	4.20
Coeff. of Variability	0.39
Range Minimum	5.70
Range Maximum	79.73
Range Width	74.03
Mean Std. Error	0.16



Percentiles:

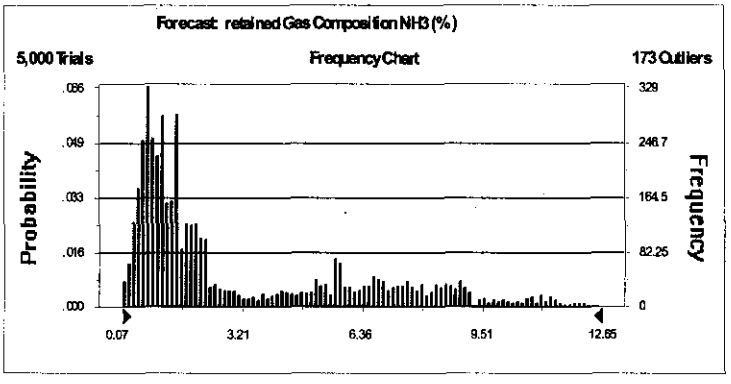
Percentile	Value
0.0%	5.70
2.5%	12.88
5.0%	14.55
50.0%	27.65
95.0%	52.43
97.5%	58.69
100.0%	79.73

End of Forecast

Forecast: retained Gas Composition NH3 (%) **Cell: G36**

Summary:
Display Range is from 0.07 to 12.65
Entire Range is from 0.02 to 17.60
After 5,000 Trials, the Std. Error of the Mean is 0.05

Statistics:	Value
Trials	5000
Mean	3.55
Median	1.74
Mode	---
Standard Deviation	3.65
Variance	13.33
Skewness	1.44
Kurtosis	4.57
Coeff. of Variability	1.03
Range Minimum	0.02
Range Maximum	17.60
Range Width	17.58
Mean Std. Error	0.05



Percentiles:

Percentile	Value
0.0%	0.02
2.5%	0.33
5.0%	0.45
50.0%	1.74
95.0%	10.99
97.5%	13.64
100.0%	17.60

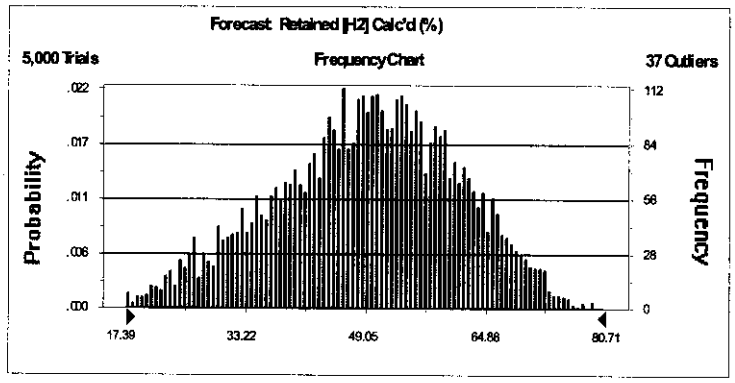
End of Forecast

Forecast: Retained [H2] Calc'd (%) **Cell: G39**

Summary:

Display Range is from 17.39 to 80.71
Entire Range is from 7.92 to 84.22
After 5,000 Trials, the Std. Error of the Mean is 0.17

Statistics:	Value
Trials	5000
Mean	48.98
Median	49.77
Mode	---
Standard Deviation	12.32
Variance	151.80
Skewness	-0.29
Kurtosis	2.73
Coeff. of Variability	0.25
Range Minimum	7.92
Range Maximum	84.22
Range Width	76.30
Mean Std. Error	0.17



Percentiles:

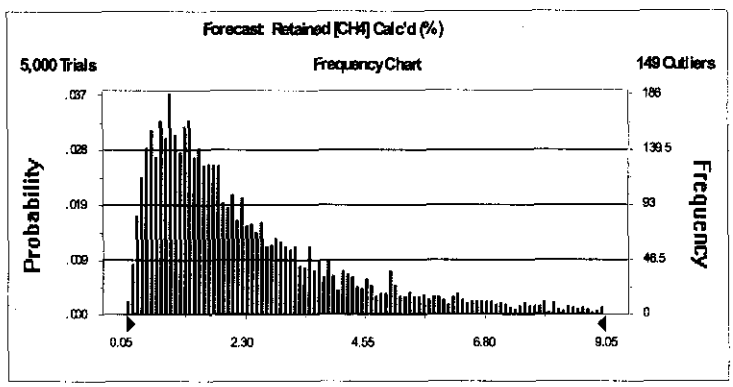
Percentile	Value
0.0%	7.92
2.5%	23.47
5.0%	26.83
50.0%	49.77
95.0%	68.00
97.5%	70.78
100.0%	84.22

End of Forecast

Forecast: Retained [CH4] Calc'd (%) **Cell: G40**

Summary:
Display Range is from 0.05 to 9.05
Entire Range is from 0.05 to 19.99
After 5,000 Trials, the Std. Error of the Mean is 0.04

Statistics:	Value
Trials	5000
Mean	2.60
Median	1.80
Mode	---
Standard Deviation	2.48
Variance	6.14
Skewness	2.35
Kurtosis	10.42
Coeff. of Variability	0.95
Range Minimum	0.05
Range Maximum	19.99
Range Width	19.94
Mean Std. Error	0.04



Percentiles:

Percentile	Value
0.0%	0.05
2.5%	0.30
5.0%	0.40
50.0%	1.80
95.0%	7.56
97.5%	9.55
100.0%	19.99

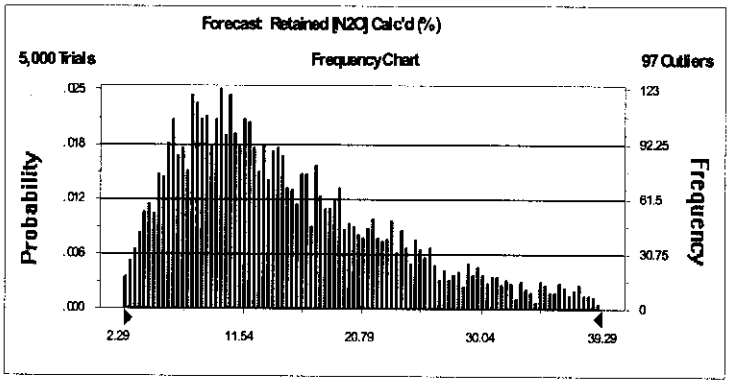
End of Forecast

Forecast: Retained [N2O] Calc'd (%) **Cell: G41**

Summary:

Display Range is from 2.29 to 39.29
Entire Range is from 0.91 to 50.93
After 5,000 Trials, the Std. Error of the Mean is 0.12

Statistics:	Value
Trials	5000
Mean	15.21
Median	13.16
Mode	---
Standard Deviation	8.78
Variance	77.18
Skewness	1.03
Kurtosis	3.80
Coeff. of Variability	0.58
Range Minimum	0.91
Range Maximum	50.93
Range Width	50.03
Mean Std. Error	0.12



Percentiles:

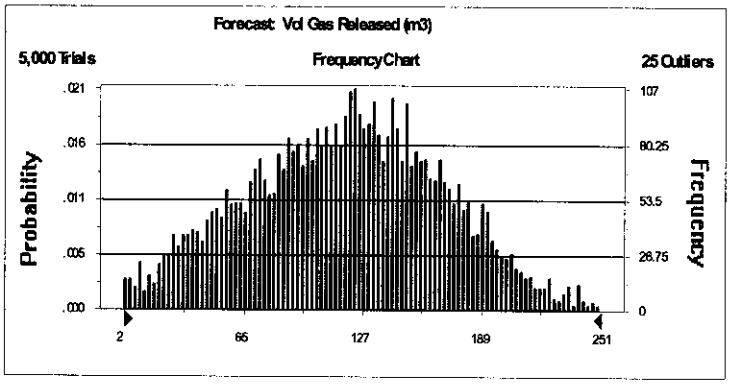
Percentile	Value
0.0%	0.91
2.5%	3.67
5.0%	4.46
50.0%	13.16
95.0%	33.03
97.5%	37.24
100.0%	50.93

End of Forecast

Forecast: Vol Gas Released (m3) **Cell: G47**

Summary:
Display Range is from 2 to 251
Entire Range is from 2 to 276
After 5,000 Trials, the Std. Error of the Mean is 1

Statistics:	Value
Trials	5000
Mean	118
Median	120
Mode	---
Standard Deviation	51
Variance	2640
Skewness	-0.01
Kurtosis	2.51
Coeff. of Variability	0.44
Range Minimum	2
Range Maximum	276
Range Width	274
Mean Std. Error	0.73



Percentiles:

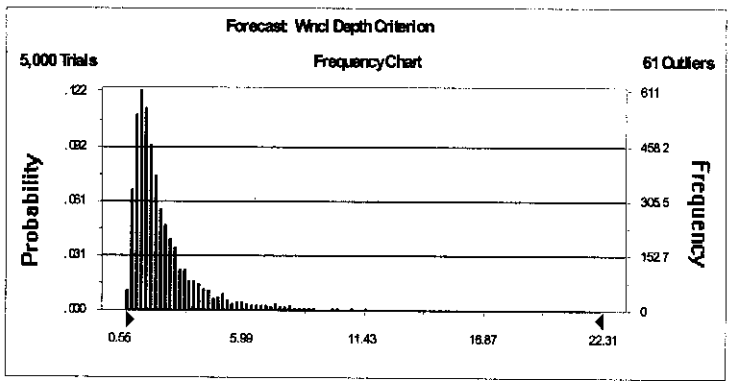
Percentile	Value
0.0%	2
2.5%	20
5.0%	31
50.0%	120
95.0%	201
97.5%	215
100.0%	276

End of Forecast

Forecast: Wncl Depth Criterion **Cell: G49**

Summary:
Display Range is from 0.55 to 22.31
Entire Range is from 0.55 to 141.18
After 5,000 Trials, the Std. Error of the Mean is 0.11

Statistics:	Value
Trials	5000
Mean	3.20
Median	1.82
Mode	---
Standard Deviation	7.59
Variance	57.63
Skewness	11.03
Kurtosis	148.29
Coeff. of Variability	2.38
Range Minimum	0.55
Range Maximum	141.18
Range Width	140.64
Mean Std. Error	0.11



Percentiles:

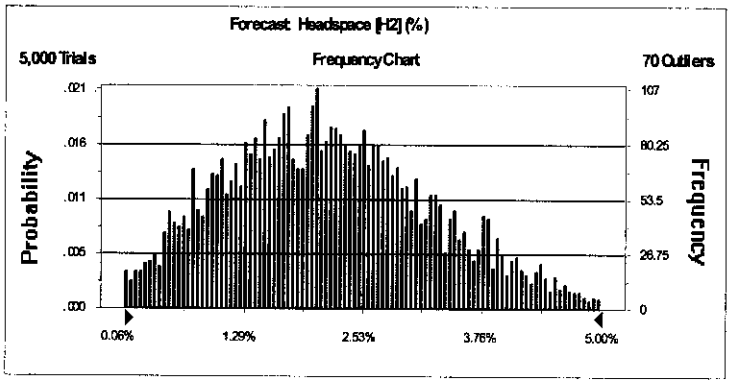
Percentile	Value
0.0%	0.55
2.5%	0.83
5.0%	0.91
50.0%	1.82
95.0%	7.38
97.5%	11.70
100.0%	141.18

End of Forecast

Forecast: Headspace [H2] (%) **Cell: G54**

Summary:
Display Range is from 0.06% to 5.00%
Entire Range is from 0.03% to 7.21%
After 5,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	5000
Mean	2.20%
Median	2.12%
Mode	---
Standard Deviation	1.10%
Variance	0.01%
Skewness	0.41
Kurtosis	2.88
Coeff. of Variability	0.50
Range Minimum	0.03%
Range Maximum	7.21%
Range Width	7.18%
Mean Std. Error	0.02%



Percentiles:

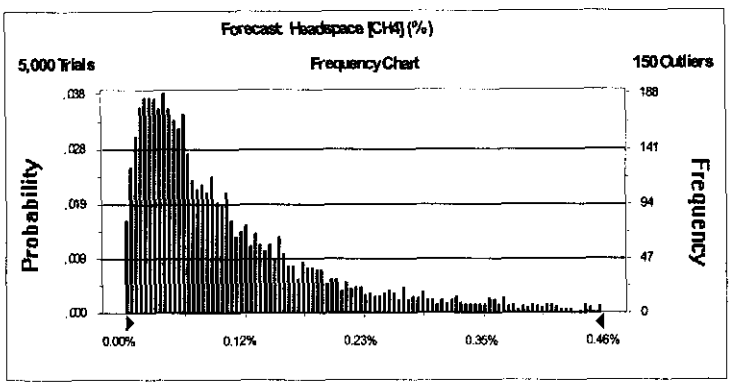
Percentile	Value
0.0%	0.03%
2.5%	0.34%
5.0%	0.54%
50.0%	2.12%
95.0%	4.14%
97.5%	4.51%
100.0%	7.21%

End of Forecast

Forecast: Headspace [CH4] (%) **Cell: G55**

Summary:
Display Range is from 0.00% to 0.46%
Entire Range is from 0.00% to 1.53%
After 5,000 Trials, the Std. Error of the Mean is 0.00%

Statistics:	Value
Trials	5000
Mean	0.12%
Median	0.07%
Mode	---
Standard Deviation	0.13%
Variance	0.00%
Skewness	2.81
Kurtosis	15.18
Coeff. of Variability	1.11
Range Minimum	0.00%
Range Maximum	1.53%
Range Width	1.53%
Mean Std. Error	0.00%



Percentiles:

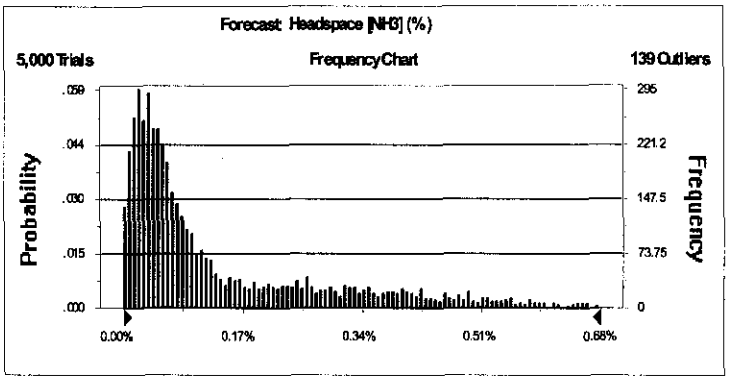
Percentile	Value
0.0%	0.00%
2.5%	0.01%
5.0%	0.01%
50.0%	0.07%
95.0%	0.37%
97.5%	0.49%
100.0%	1.53%

End of Forecast

Forecast: Headspace [NH3] (%) **Cell: G56**

Summary:
Display Range is from 0.00% to 0.68%
Entire Range is from 0.00% to 1.44%
After 5,000 Trials, the Std. Error of the Mean is 0.00%

Statistics:	Value
Trials	5000
Mean	0.16%
Median	0.08%
Mode	---
Standard Deviation	0.19%
Variance	0.00%
Skewness	2.03
Kurtosis	7.73
Coeff. of Variability	1.19
Range Minimum	0.00%
Range Maximum	1.44%
Range Width	1.44%
Mean Std. Error	0.00%



Percentiles:

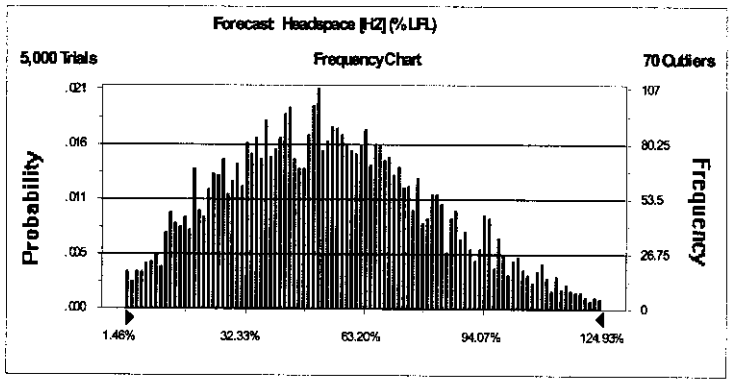
Percentile	Value
0.0%	0.00%
2.5%	0.01%
5.0%	0.01%
50.0%	0.08%
95.0%	0.56%
97.5%	0.70%
100.0%	1.44%

End of Forecast

Forecast: Headspace [H2] (%LFL) **Cell: G57**

Summary:
Display Range is from 1.46% to 124.93%
Entire Range is from 0.71% to 180.14%
After 5,000 Trials, the Std. Error of the Mean is 0.39%

Statistics:	Value
Trials	5000
Mean	55.06%
Median	53.07%
Mode	---
Standard Deviation	27.53%
Variance	7.58%
Skewness	0.41
Kurtosis	2.88
Coeff. of Variability	0.50
Range Minimum	0.71%
Range Maximum	180.14%
Range Width	179.43%
Mean Std. Error	0.39%



Percentiles:

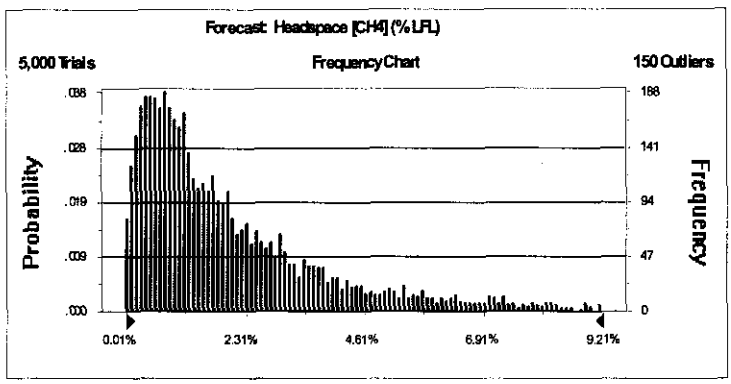
Percentile	Value
0.0%	0.71%
2.5%	8.44%
5.0%	13.38%
50.0%	53.07%
95.0%	103.59%
97.5%	112.87%
100.0%	180.14%

End of Forecast

Forecast: Headspace [CH4] (%LFL) **Cell: G58**

Summary:
Display Range is from 0.01% to 9.21%
Entire Range is from 0.01% to 30.70%
After 5,000 Trials, the Std. Error of the Mean is 0.04%

Statistics:	Value
Trials	5000
Mean	2.33%
Median	1.50%
Mode	---
Standard Deviation	2.58%
Variance	0.07%
Skewness	2.81
Kurtosis	15.18
Coeff. of Variability	1.11
Range Minimum	0.01%
Range Maximum	30.70%
Range Width	30.69%
Mean Std. Error	0.04%



Percentiles:

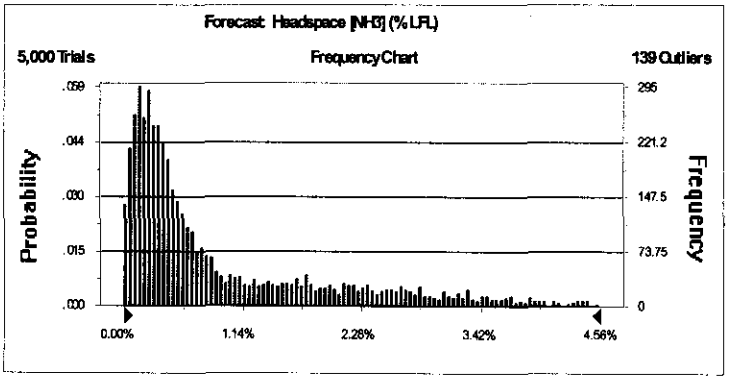
Percentile	Value
0.0%	0.01%
2.5%	0.14%
5.0%	0.22%
50.0%	1.50%
95.0%	7.37%
97.5%	9.88%
100.0%	30.70%

End of Forecast

Forecast: Headspace [NH3] (%LFL) **Cell: G59**

Summary:
Display Range is from 0.00% to 4.56%
Entire Range is from 0.00% to 9.58%
After 5,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	5000
Mean	1.07%
Median	0.50%
Mode	---
Standard Deviation	1.28%
Variance	0.02%
Skewness	2.03
Kurtosis	7.73
Coeff. of Variability	1.19
Range Minimum	0.00%
Range Maximum	9.58%
Range Width	9.58%
Mean Std. Error	0.02%



Percentiles:

Percentile	Value
0.0%	0.00%
2.5%	0.05%
5.0%	0.07%
50.0%	0.50%
95.0%	3.72%
97.5%	4.66%
100.0%	9.58%

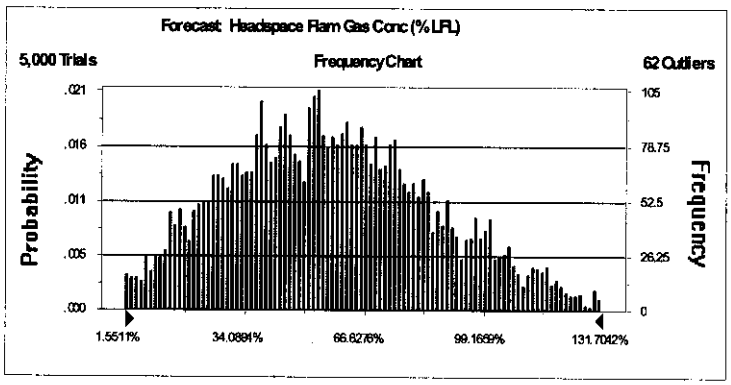
End of Forecast

Forecast: Headspace Flam Gas Conc (%LFL) **Cell: G60**

Summary:

Display Range is from 1.5511% to 131.7042%
Entire Range is from 0.7214% to 181.7270%
After 5,000 Trials, the Std. Error of the Mean is 0.4072%

Statistics:	Value
Trials	5000
Mean	58.4690%
Median	56.4430%
Mode	---
Standard Deviation	28.7903%
Variance	8.2888%
Skewness	0.37
Kurtosis	2.80
Coeff. of Variability	0.49
Range Minimum	0.7214%
Range Maximum	181.7270%
Range Width	181.0056%
Mean Std. Error	0.4072%



Percentiles:

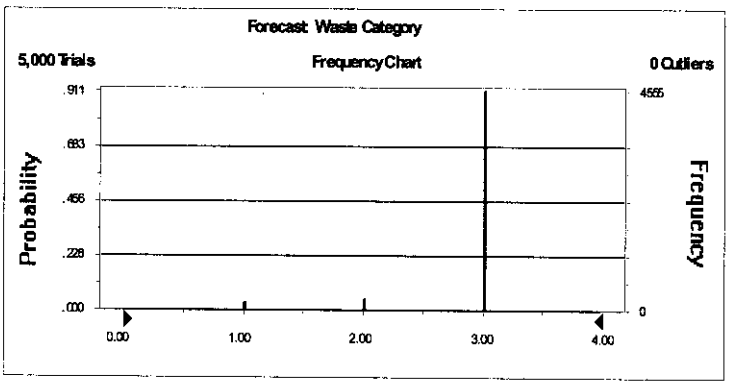
Percentile	Value
0.0%	0.7214%
2.5%	8.9458%
5.0%	14.3724%
50.0%	56.4430%
95.0%	108.9025%
97.5%	118.0835%
100.0%	181.7270%

End of Forecast

Forecast: Waste Category **Cell: G61**

Summary:
Display Range is from 0.00 to 4.00
Entire Range is from 1.00 to 3.00
After 5,000 Trials, the Std. Error of the Mean is 0.01

Statistics:	Value
Trials	5000
Mean	2.88
Median	3.00
Mode	3.00
Standard Deviation	0.43
Variance	0.18
Skewness	-3.51
Kurtosis	14.47
Coeff. of Variability	0.15
Range Minimum	1.00
Range Maximum	3.00
Range Width	2.00
Mean Std. Error	0.01



Percentiles:

Percentile	Value
0.0%	1.00
2.5%	1.00
5.0%	2.00
50.0%	3.00
95.0%	3.00
97.5%	3.00
100.0%	3.00

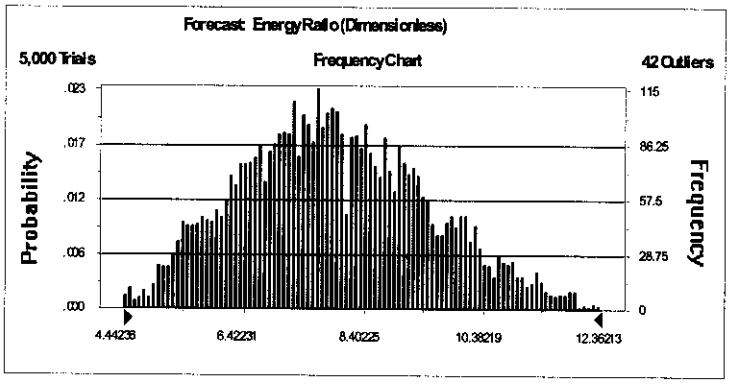
End of Forecast

Forecast: Energy Ratio (Dimensionless) **Cell: G64**

Summary:

Display Range is from 4.44236 to 12.36213
Entire Range is from 3.92354 to 16.00396
After 5,000 Trials, the Std. Error of the Mean is 0.02264

Statistics:	Value
Trials	5000
Mean	7.94988
Median	7.83463
Mode	---
Standard Deviation	1.60095
Variance	2.56304
Skewness	0.35
Kurtosis	2.97
Coeff. of Variability	0.20
Range Minimum	3.92354
Range Maximum	16.00396
Range Width	12.08042
Mean Std. Error	0.02264



Percentiles:

Percentile	Value
0.0%	3.92354
2.5%	5.19709
5.0%	5.47206
50.0%	7.83463
95.0%	10.75180
97.5%	11.28154
100.0%	16.00396

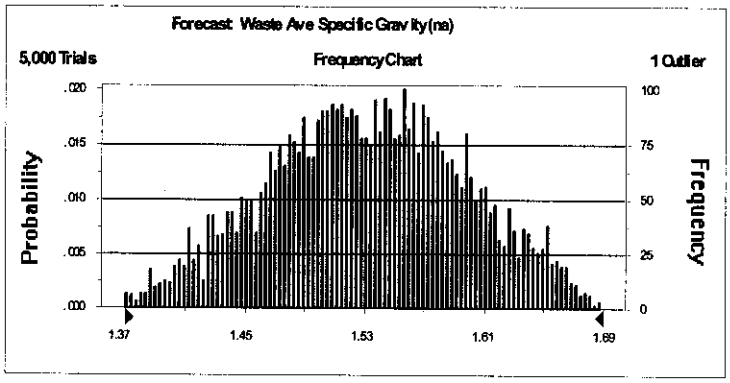
End of Forecast

Forecast: Waste Ave Specific Gravity (na) **Cell: G65**

Summary:

Display Range is from 1.37 to 1.69
Entire Range is from 1.37 to 1.70
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	1.53
Median	1.53
Mode	---
Standard Deviation	0.07
Variance	0.00
Skewness	-0.03
Kurtosis	2.42
Coeff. of Variability	0.04
Range Minimum	1.37
Range Maximum	1.70
Range Width	0.33
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	1.37
2.5%	1.41
5.0%	1.42
50.0%	1.53
95.0%	1.64
97.5%	1.66
100.0%	1.70

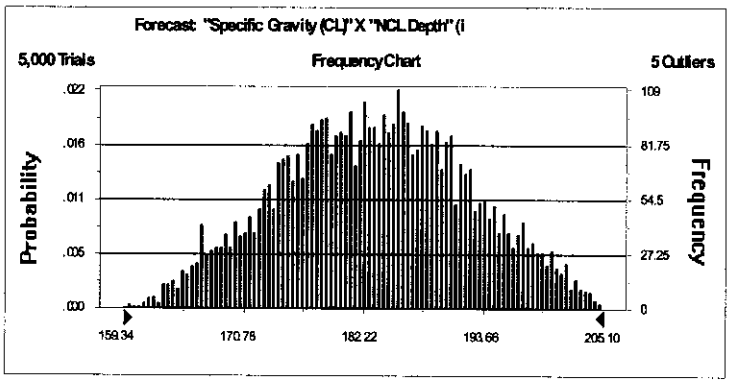
End of Forecast

Forecast: "Specific Gravity (CL)" X "NCL Depth" (i **Cell: G66**

Summary:

Display Range is from 159.34 to 205.10
Entire Range is from 158.95 to 207.20
After 5,000 Trials, the Std. Error of the Mean is 0.13

Statistics:	Value
Trials	5000
Mean	183.29
Median	183.31
Mode	---
Standard Deviation	9.02
Variance	81.38
Skewness	0.00
Kurtosis	2.44
Coeff. of Variability	0.05
Range Minimum	158.95
Range Maximum	207.20
Range Width	48.25
Mean Std. Error	0.13



Percentiles:

Percentile	Value
0.0%	158.95
2.5%	166.17
5.0%	168.07
50.0%	183.31
95.0%	198.46
97.5%	200.49
100.0%	207.20

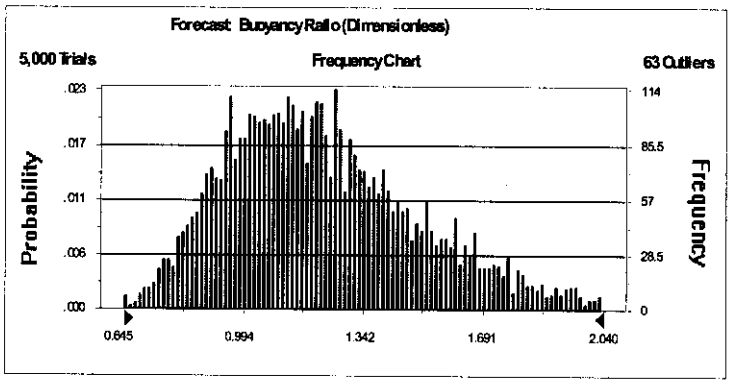
End of Forecast

Forecast: Buoyancy Ratio (Dimensionless) **Cell: G67**

Summary:

Display Range is from 0.645 to 2.040
Entire Range is from 0.597 to 2.832
After 5,000 Trials, the Std. Error of the Mean is 0.004

Statistics:	Value
Trials	5000
Mean	1.235
Median	1.196
Mode	---
Standard Deviation	0.295
Variance	0.087
Skewness	0.79
Kurtosis	3.75
Coeff. of Variability	0.24
Range Minimum	0.597
Range Maximum	2.832
Range Width	2.235
Mean Std. Error	0.004



Percentiles:

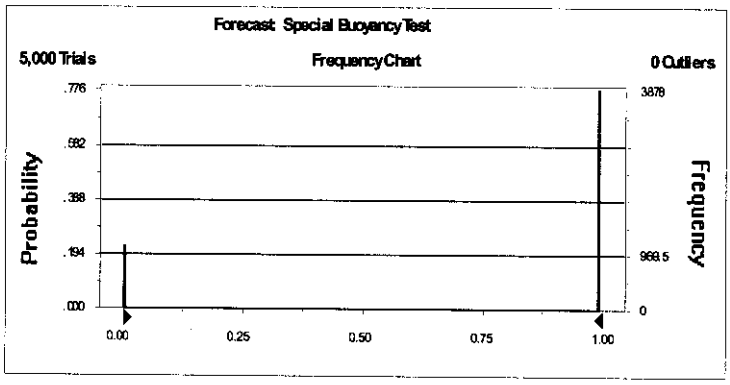
Percentile	Value
0.0%	0.597
2.5%	0.782
5.0%	0.832
50.0%	1.196
95.0%	1.786
97.5%	1.917
100.0%	2.832

End of Forecast

Forecast: Special Buoyancy Test **Cell: G68**

Summary:
Display Range is from 0.00 to 1.00
Entire Range is from 0.00 to 1.00
After 5,000 Trials, the Std. Error of the Mean is 0.01

Statistics:	Value
Trials	5000
Mean	0.78
Median	1.00
Mode	1.00
Standard Deviation	0.42
Variance	0.17
Skewness	-1.32
Kurtosis	2.74
Coeff. of Variability	0.54
Range Minimum	0.00
Range Maximum	1.00
Range Width	1.00
Mean Std. Error	0.01



Percentiles:

Percentile	Value
0.0%	0.00
2.5%	0.00
5.0%	0.00
50.0%	1.00
95.0%	1.00
97.5%	1.00
100.0%	1.00

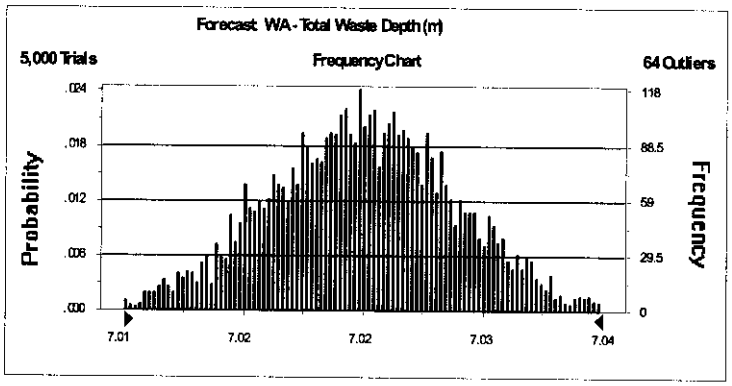
End of Forecast

Forecast: WA - Total Waste Depth (m) **Cell: G87**

Summary:

Display Range is from 7.01 to 7.04
Entire Range is from 7.00 to 7.04
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	7.02
Median	7.02
Mode	---
Standard Deviation	0.01
Variance	0.00
Skewness	-0.05
Kurtosis	3.02
Coeff. of Variability	0.00
Range Minimum	7.00
Range Maximum	7.04
Range Width	0.05
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	7.00
2.5%	7.01
5.0%	7.01
50.0%	7.02
95.0%	7.03
97.5%	7.04
100.0%	7.04

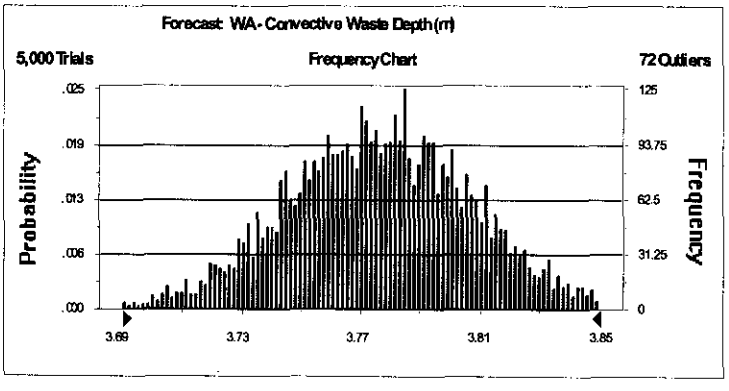
End of Forecast

Forecast: WA - Convective Waste Depth (m) **Cell: G90**

Summary:

Display Range is from 3.69 to 3.85
Entire Range is from 3.67 to 3.89
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	3.78
Median	3.78
Mode	---
Standard Deviation	0.03
Variance	0.00
Skewness	-0.02
Kurtosis	3.04
Coeff. of Variability	0.01
Range Minimum	3.67
Range Maximum	3.89
Range Width	0.22
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	3.67
2.5%	3.72
5.0%	3.73
50.0%	3.78
95.0%	3.83
97.5%	3.84
100.0%	3.89

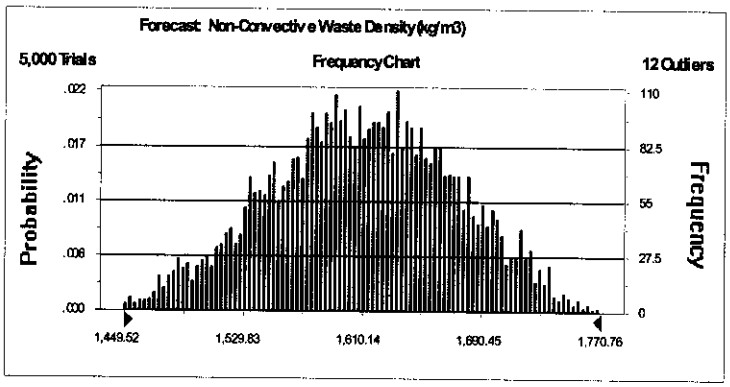
End of Forecast

Forecast: Non-Convective Waste Density (kg/m3) **Cell: G94**

Summary:

Display Range is from 1,449.52 to 1,770.76
Entire Range is from 1,432.97 to 1,773.53
After 5,000 Trials, the Std. Error of the Mean is 0.88

Statistics:	Value
Trials	5000
Mean	1,610.11
Median	1,610.81
Mode	---
Standard Deviation	62.31
Variance	3,882.36
Skewness	-0.09
Kurtosis	2.54
Coeff. of Variability	0.04
Range Minimum	1,432.97
Range Maximum	1,773.53
Range Width	340.56
Mean Std. Error	0.88



Percentiles:

Percentile	Value
0.0%	1,432.97
2.5%	1,485.73
5.0%	1,504.04
50.0%	1,610.81
95.0%	1,712.81
97.5%	1,725.32
100.0%	1,773.53

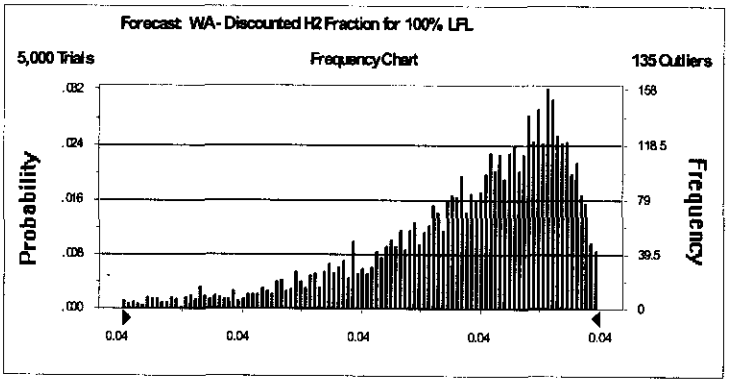
End of Forecast

Forecast: WA - Discounted H2 Fraction for 100% LFL **Cell: G125**

Summary:

Display Range is from 0.04 to 0.04
Entire Range is from 0.03 to 0.04
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	0.04
Median	0.04
Mode	---
Standard Deviation	0.00
Variance	0.00
Skewness	-2.13
Kurtosis	10.19
Coeff. of Variability	0.03
Range Minimum	0.03
Range Maximum	0.04
Range Width	0.01
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	0.03
2.5%	0.04
5.0%	0.04
50.0%	0.04
95.0%	0.04
97.5%	0.04
100.0%	0.04

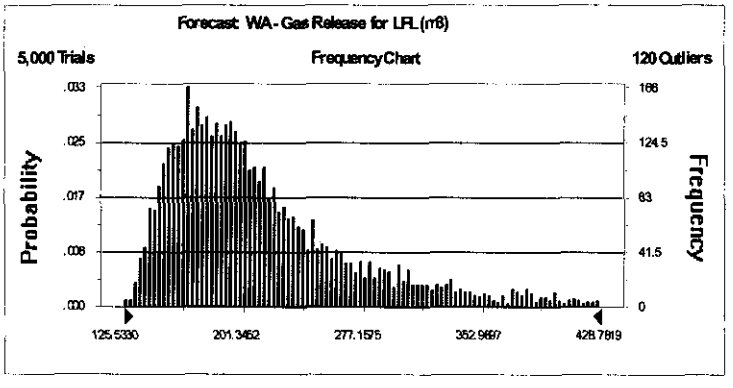
End of Forecast

Forecast: WA - Gas Release for LFL (m3) **Cell: G127**

Summary:

Display Range is from 125.5330 to 428.7819
Entire Range is from 119.3655 to 1,258.8371
After 5,000 Trials, the Std. Error of the Mean is 1.1413

Statistics:	Value
Trials	5000
Mean	219.9622
Median	198.3128
Mode	---
Standard Deviation	80.6999
Variance	6,512.4764
Skewness	3.42
Kurtosis	26.18
Coeff. of Variability	0.37
Range Minimum	119.3655
Range Maximum	1,258.8371
Range Width	1,139.4717
Mean Std. Error	1.1413



Percentiles:

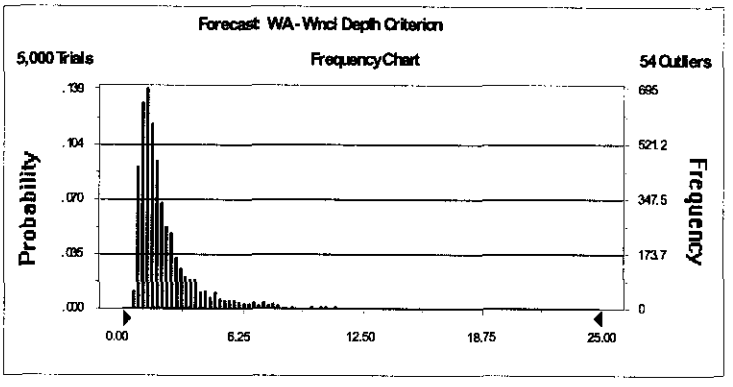
Percentile	Value
0.0%	119.3655
2.5%	141.0043
5.0%	146.0413
50.0%	198.3128
95.0%	371.6129
97.5%	420.8725
100.0%	1,258.8371

End of Forecast

Forecast: WA - Wncl Depth Criterion **Cell: G128**

Summary:
Display Range is from 0.00 to 25.00
Entire Range is from 0.54 to 138.14
After 5,000 Trials, the Std. Error of the Mean is 0.11

Statistics:	Value
Trials	5000
Mean	3.13
Median	1.78
Mode	---
Standard Deviation	7.43
Variance	55.17
Skewness	11.03
Kurtosis	148.29
Coeff. of Variability	2.37
Range Minimum	0.54
Range Maximum	138.14
Range Width	137.60
Mean Std. Error	0.11



Percentiles:

Percentile	Value
0.0%	0.54
2.5%	0.82
5.0%	0.89
50.0%	1.78
95.0%	7.22
97.5%	11.45
100.0%	138.14

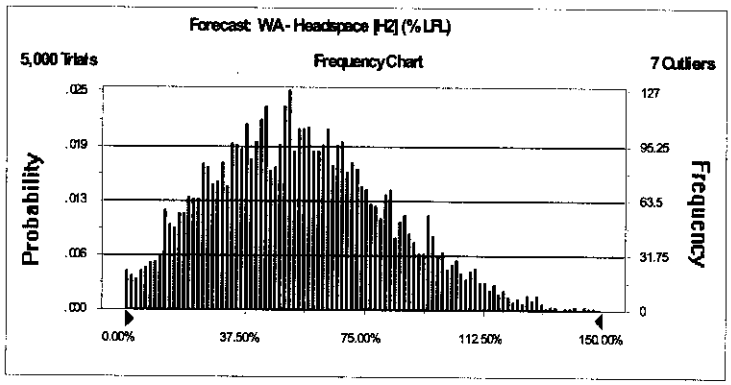
End of Forecast

Forecast: WA - Headspace [H2] (%LFL) **Cell: G136**

Summary:

Display Range is from 0.00% to 150.00%
Entire Range is from 0.71% to 181.18%
After 5,000 Trials, the Std. Error of the Mean is 0.39%

Statistics:	Value
Trials	5000
Mean	55.39%
Median	53.38%
Mode	---
Standard Deviation	27.69%
Variance	7.67%
Skewness	0.41
Kurtosis	2.88
Coeff. of Variability	0.50
Range Minimum	0.71%
Range Maximum	181.18%
Range Width	180.46%
Mean Std. Error	0.39%



Percentiles:

Percentile	Value
0.0%	0.71%
2.5%	8.49%
5.0%	13.46%
50.0%	53.38%
95.0%	104.20%
97.5%	113.52%
100.0%	181.18%

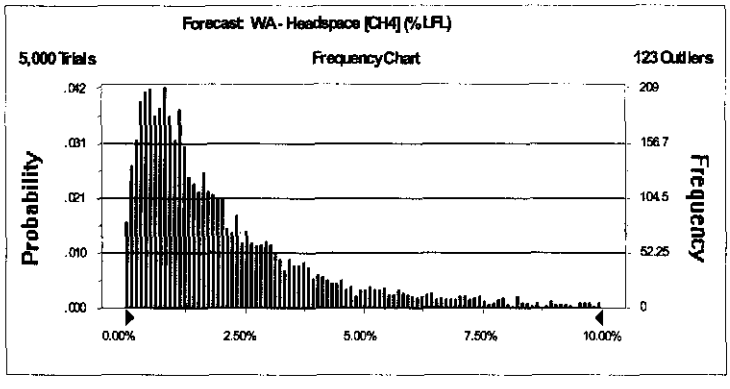
End of Forecast

Forecast: WA - Headspace [CH4] (%LFL) **Cell: G137**

Summary:

Display Range is from 0.00% to 10.00%
Entire Range is from 0.01% to 30.87%
After 5,000 Trials, the Std. Error of the Mean is 0.04%

Statistics:	Value
Trials	5000
Mean	2.35%
Median	1.51%
Mode	---
Standard Deviation	2.60%
Variance	0.07%
Skewness	2.81
Kurtosis	15.18
Coeff. of Variability	1.11
Range Minimum	0.01%
Range Maximum	30.87%
Range Width	30.87%
Mean Std. Error	0.04%



Percentiles:

Percentile	Value
0.0%	0.01%
2.5%	0.15%
5.0%	0.22%
50.0%	1.51%
95.0%	7.41%
97.5%	9.94%
100.0%	30.87%

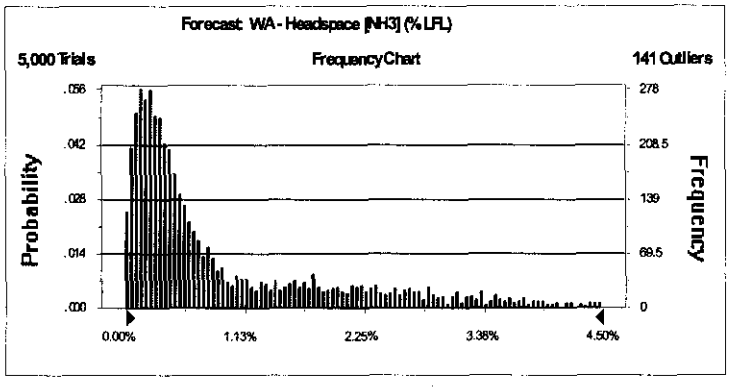
End of Forecast

Forecast: WA - Headspace [NH3] (%LFL) **Cell: G138**

Summary:

Display Range is from 0.00% to 4.50%
Entire Range is from 0.00% to 9.64%
After 5,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	5000
Mean	1.08%
Median	0.51%
Mode	---
Standard Deviation	1.29%
Variance	0.02%
Skewness	2.03
Kurtosis	7.73
Coeff. of Variability	1.19
Range Minimum	0.00%
Range Maximum	9.64%
Range Width	9.63%
Mean Std. Error	0.02%



Percentiles:

Percentile	Value
0.0%	0.00%
2.5%	0.05%
5.0%	0.07%
50.0%	0.51%
95.0%	3.74%
97.5%	4.69%
100.0%	9.64%

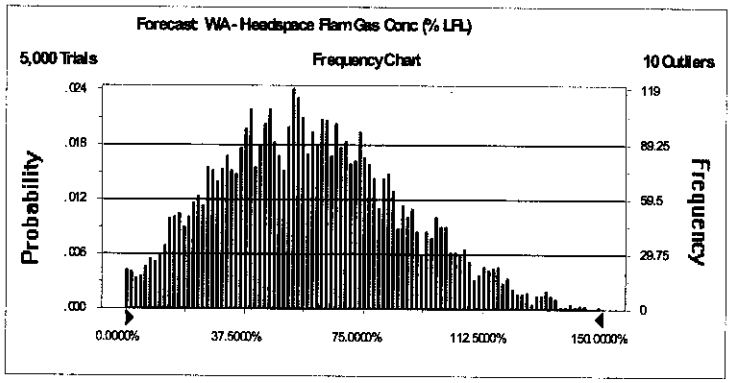
End of Forecast

Forecast: WA - Headspace Flam Gas Conc (%LFL) **Cell: G139**

Summary:

Display Range is from 0.0000% to 150.0000%
Entire Range is from 0.7256% to 182.7754%
After 5,000 Trials, the Std. Error of the Mean is 0.4095%

Statistics:	Value
Trials	5000
Mean	58.8132%
Median	56.7782%
Mode	---
Standard Deviation	28.9583%
Variance	8.3859%
Skewness	0.37
Kurtosis	2.80
Coeff. of Variability	0.49
Range Minimum	0.7256%
Range Maximum	182.7754%
Range Width	182.0497%
Mean Std. Error	0.4095%



Percentiles:

Percentile	Value
0.0%	0.7256%
2.5%	8.9991%
5.0%	14.4580%
50.0%	56.7782%
95.0%	109.5350%
97.5%	118.7737%
100.0%	182.7754%

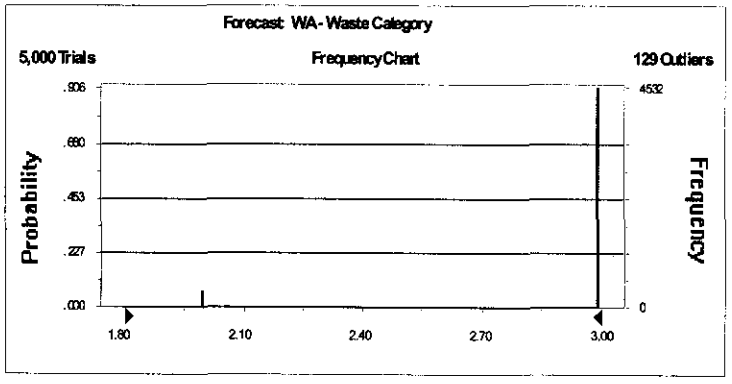
End of Forecast

Forecast: WA - Waste Category **Cell: G140**

Summary:

Display Range is from 1.80 to 3.00
Entire Range is from 1.00 to 3.00
After 5,000 Trials, the Std. Error of the Mean is 0.01

Statistics:	Value
Trials	5000
Mean	2.88
Median	3.00
Mode	3.00
Standard Deviation	0.40
Variance	0.16
Skewness	-3.49
Kurtosis	14.80
Coeff. of Variability	0.14
Range Minimum	1.00
Range Maximum	3.00
Range Width	2.00
Mean Std. Error	0.01



Percentiles:

Percentile	Value
0.0%	1.00
2.5%	1.00
5.0%	2.00
50.0%	3.00
95.0%	3.00
97.5%	3.00
100.0%	3.00

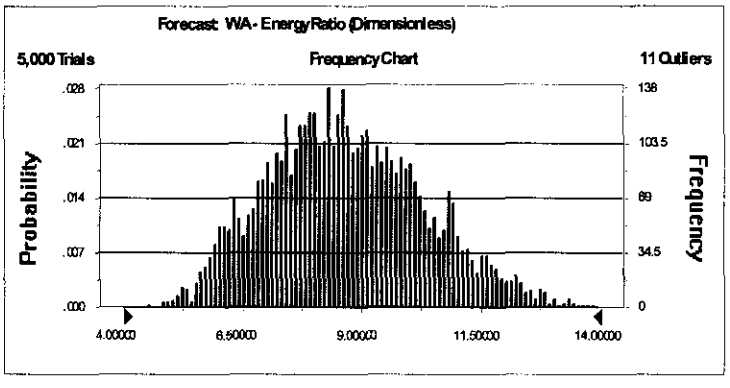
End of Forecast

Forecast: WA - Energy Ratio (Dimensionless) **Cell: G143**

Summary:

Display Range is from 4.00000 to 14.00000
Entire Range is from 4.56663 to 17.17354
After 5,000 Trials, the Std. Error of the Mean is 0.02374

Statistics:	Value
Trials	5000
Mean	8.71466
Median	8.60864
Mode	---
Standard Deviation	1.67834
Variance	2.81682
Skewness	0.35
Kurtosis	2.99
Coeff. of Variability	0.19
Range Minimum	4.56663
Range Maximum	17.17354
Range Width	12.60691
Mean Std. Error	0.02374



Percentiles:

Percentile	Value
0.0%	4.56663
2.5%	5.81128
5.0%	6.11933
50.0%	8.60864
95.0%	11.65714
97.5%	12.21561
100.0%	17.17354

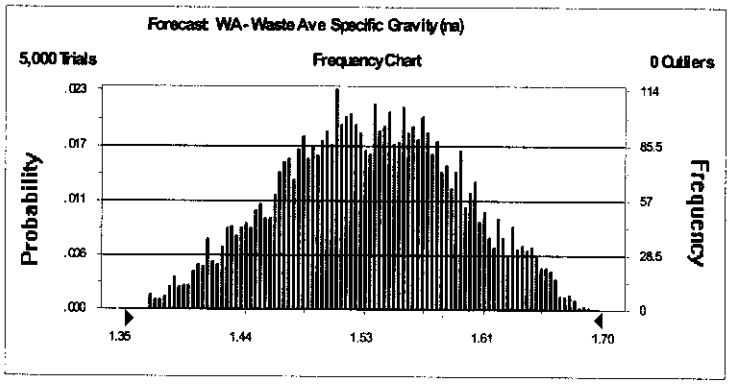
End of Forecast

Forecast: WA - Waste Ave Specific Gravity (na) **Cell: G144**

Summary:

Display Range is from 1.35 to 1.70
Entire Range is from 1.37 to 1.69
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	1.53
Median	1.53
Mode	---
Standard Deviation	0.07
Variance	0.00
Skewness	-0.03
Kurtosis	2.42
Coeff. of Variability	0.04
Range Minimum	1.37
Range Maximum	1.69
Range Width	0.32
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	1.37
2.5%	1.40
5.0%	1.42
50.0%	1.53
95.0%	1.64
97.5%	1.65
100.0%	1.69

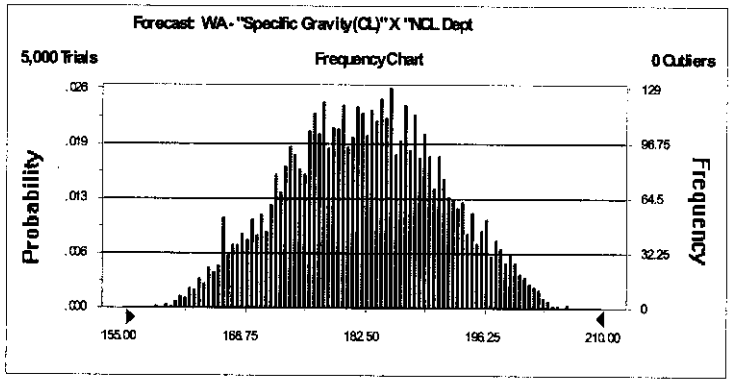
End of Forecast

Forecast: WA - "Specific Gravity (CL)" X "NCL Dept **Cell: G145**

Summary:

Display Range is from 155.00 to 210.00
Entire Range is from 158.38 to 206.03
After 5,000 Trials, the Std. Error of the Mean is 0.13

Statistics:	Value
Trials	5000
Mean	182.41
Median	182.44
Mode	---
Standard Deviation	8.89
Variance	79.06
Skewness	0.00
Kurtosis	2.44
Coeff. of Variability	0.05
Range Minimum	158.38
Range Maximum	206.03
Range Width	47.66
Mean Std. Error	0.13



Percentiles:

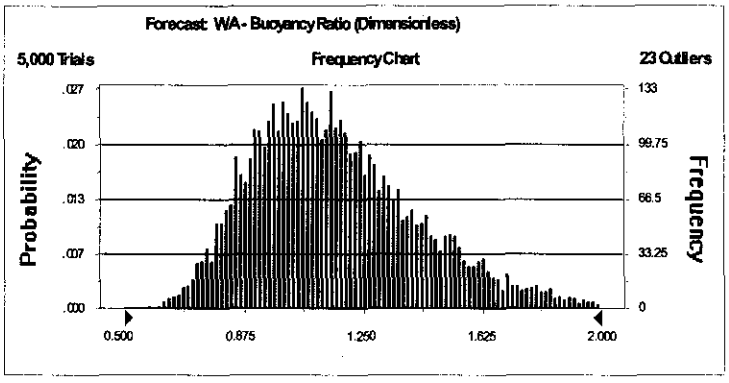
Percentile	Value
0.0%	158.38
2.5%	165.55
5.0%	167.43
50.0%	182.44
95.0%	197.35
97.5%	199.36
100.0%	206.03

End of Forecast

Forecast: WA - Buoyancy Ratio (Dimensionless) **Cell: G146**

Summary:
Display Range is from 0.500 to 2.000
Entire Range is from 0.583 to 2.601
After 5,000 Trials, the Std. Error of the Mean is 0.004

Statistics:	Value
Trials	5000
Mean	1.168
Median	1.134
Mode	---
Standard Deviation	0.265
Variance	0.070
Skewness	0.75
Kurtosis	3.70
Coeff. of Variability	0.23
Range Minimum	0.583
Range Maximum	2.601
Range Width	2.018
Mean Std. Error	0.004



Percentiles:

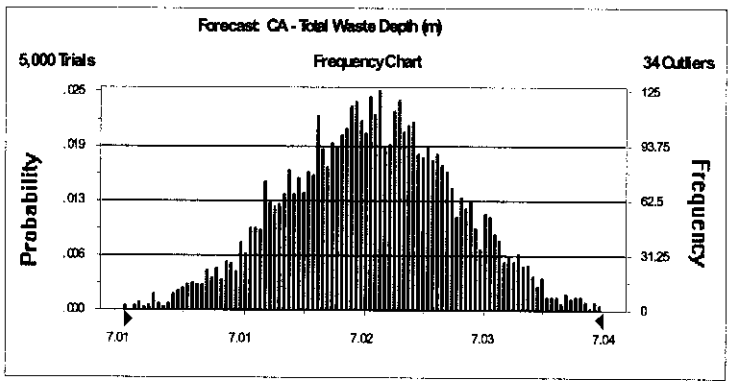
Percentile	Value
0.0%	0.583
2.5%	0.754
5.0%	0.800
50.0%	1.134
95.0%	1.656
97.5%	1.786
100.0%	2.601

End of Forecast

Forecast: CA - Total Waste Depth (m) **Cell: G166**

Summary:
Display Range is from 7.01 to 7.04
Entire Range is from 7.00 to 7.04
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	7.02
Median	7.02
Mode	---
Standard Deviation	0.01
Variance	0.00
Skewness	-0.05
Kurtosis	3.02
Coeff. of Variability	0.00
Range Minimum	7.00
Range Maximum	7.04
Range Width	0.05
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	7.00
2.5%	7.01
5.0%	7.01
50.0%	7.02
95.0%	7.03
97.5%	7.04
100.0%	7.04

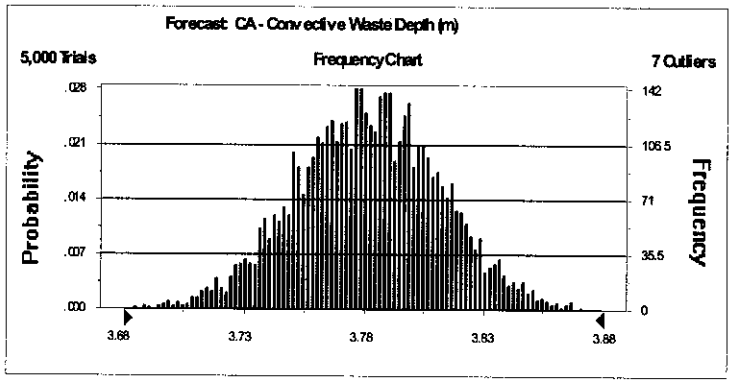
End of Forecast

Forecast: CA - Convective Waste Depth (m) **Cell: G169**

Summary:

Display Range is from 3.68 to 3.88
Entire Range is from 3.67 to 3.89
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	3.78
Median	3.78
Mode	---
Standard Deviation	0.03
Variance	0.00
Skewness	-0.02
Kurtosis	3.04
Coeff. of Variability	0.01
Range Minimum	3.67
Range Maximum	3.89
Range Width	0.22
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	3.67
2.5%	3.72
5.0%	3.73
50.0%	3.78
95.0%	3.83
97.5%	3.84
100.0%	3.89

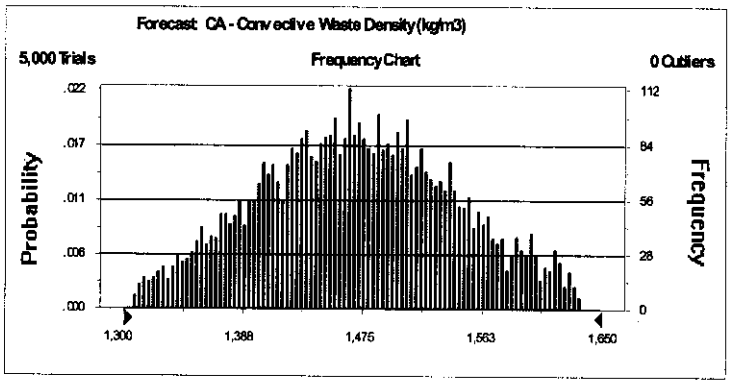
End of Forecast

Forecast: CA - Convective Waste Density (kg/m3) **Cell: G171**

Summary:

Display Range is from 1,300 to 1,650
Entire Range is from 1,309 to 1,634
After 5,000 Trials, the Std. Error of the Mean is 1

Statistics:	Value
Trials	5000
Mean	1,471
Median	1,470
Mode	---
Standard Deviation	72
Variance	5,156
Skewness	0.03
Kurtosis	2.39
Coeff. of Variability	0.05
Range Minimum	1,309
Range Maximum	1,634
Range Width	326
Mean Std. Error	1.02



Percentiles:

Percentile	Value
0.0%	1,309
2.5%	1,335
5.0%	1,352
50.0%	1,470
95.0%	1,595
97.5%	1,611
100.0%	1,634

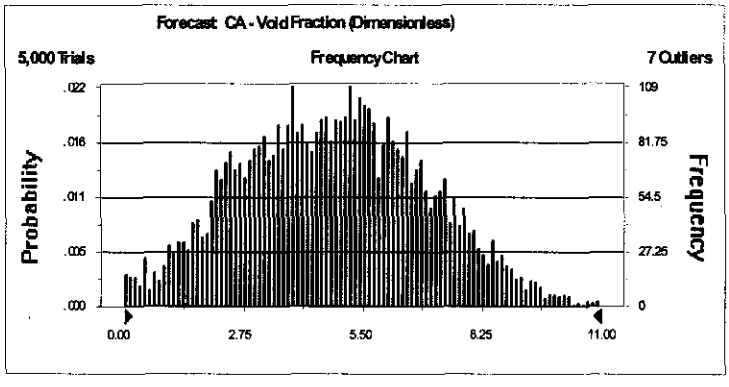
End of Forecast

Forecast: CA - Void Fraction (Dimensionless) **Cell: G187**

Summary:

Display Range is from 0.00 to 11.00
Entire Range is from 0.10 to 12.43
After 5,000 Trials, the Std. Error of the Mean is 0.03

Statistics:	Value
Trials	5000
Mean	4.84
Median	4.84
Mode	0.10
Standard Deviation	2.14
Variance	4.57
Skewness	0.13
Kurtosis	2.56
Coeff. of Variability	0.44
Range Minimum	0.10
Range Maximum	12.43
Range Width	12.33
Mean Std. Error	0.03



Percentiles:

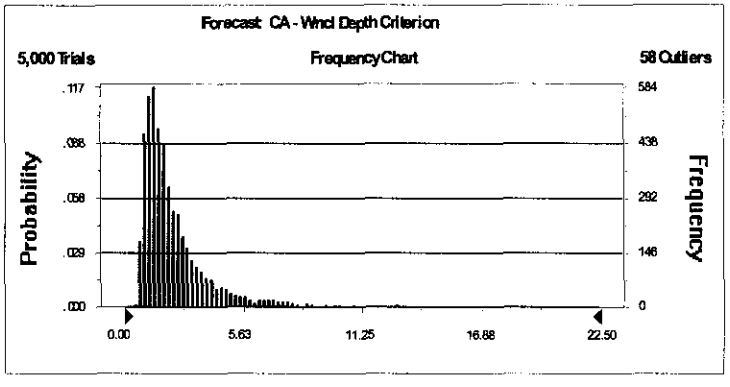
Percentile	Value
0.0%	0.10
2.5%	0.91
5.0%	1.37
50.0%	4.84
95.0%	8.43
97.5%	9.02
100.0%	12.43

End of Forecast

Forecast: CA - Wncl Depth Criterion **Cell: G207**

Summary:
Display Range is from 0.00 to 22.50
Entire Range is from 0.52 to 134.80
After 5,000 Trials, the Std. Error of the Mean is 0.10

Statistics:	Value
Trials	5000
Mean	3.23
Median	1.90
Mode	---
Standard Deviation	7.30
Variance	53.26
Skewness	10.99
Kurtosis	147.61
Coeff. of Variability	2.26
Range Minimum	0.52
Range Maximum	134.80
Range Width	134.27
Mean Std. Error	0.10



Percentiles:

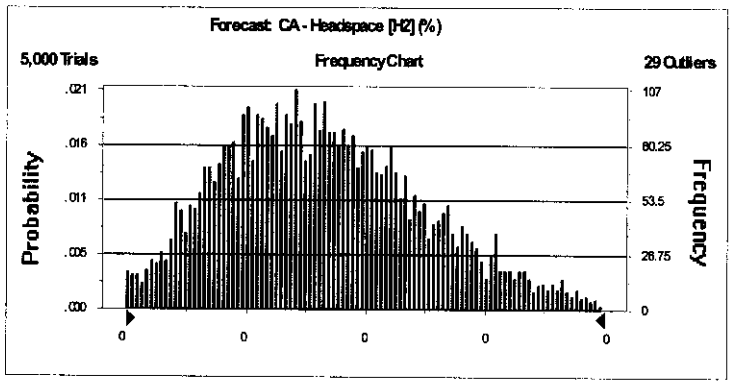
Percentile	Value
0.0%	0.52
2.5%	0.85
5.0%	0.94
50.0%	1.90
95.0%	7.25
97.5%	11.32
100.0%	134.80

End of Forecast

Forecast: CA - Headspace [H2] (%) **Cell: G212**

Summary:
Display Range is from 0 to 0
Entire Range is from 0 to 0
After 5,000 Trials, the Std. Error of the Mean is 0

Statistics:	Value
Trials	5000
Mean	0
Median	0
Mode	---
Standard Deviation	0
Variance	0
Skewness	0.49
Kurtosis	2.97
Coeff. of Variability	0.51
Range Minimum	0
Range Maximum	0
Range Width	0
Mean Std. Error	0.00



Percentiles:

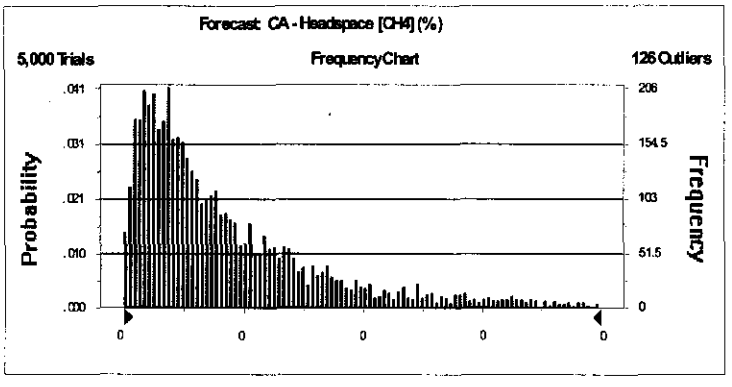
Percentile	Value
0.0%	0
2.5%	0
5.0%	0
50.0%	0
95.0%	0
97.5%	0
100.0%	0

End of Forecast

Forecast: CA - Headspace [CH4] (%) **Cell: G213**

Summary:
Display Range is from 0 to 0
Entire Range is from 0 to 0
After 5,000 Trials, the Std. Error of the Mean is 0

Statistics:	Value
Trials	5000
Mean	0
Median	0
Mode	---
Standard Deviation	0
Variance	0
Skewness	2.79
Kurtosis	14.62
Coeff. of Variability	1.10
Range Minimum	0
Range Maximum	0
Range Width	0
Mean Std. Error	0.00



Percentiles:

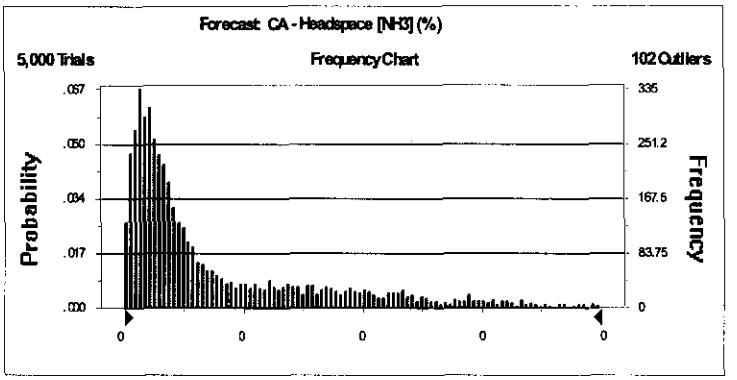
Percentile	Value
0.0%	0
2.5%	0
5.0%	0
50.0%	0
95.0%	0
97.5%	0
100.0%	0

End of Forecast

Forecast: CA - Headspace [NH3] (%) **Cell: G214**

Summary:
Display Range is from 0 to 0
Entire Range is from 0 to 0
After 5,000 Trials, the Std. Error of the Mean is 0

Statistics:	Value
Trials	5000
Mean	0
Median	0
Mode	---
Standard Deviation	0
Variance	0
Skewness	2.11
Kurtosis	8.26
Coeff. of Variability	1.20
Range Minimum	0
Range Maximum	0
Range Width	0
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	0
2.5%	0
5.0%	0
50.0%	0
95.0%	0
97.5%	0
100.0%	0

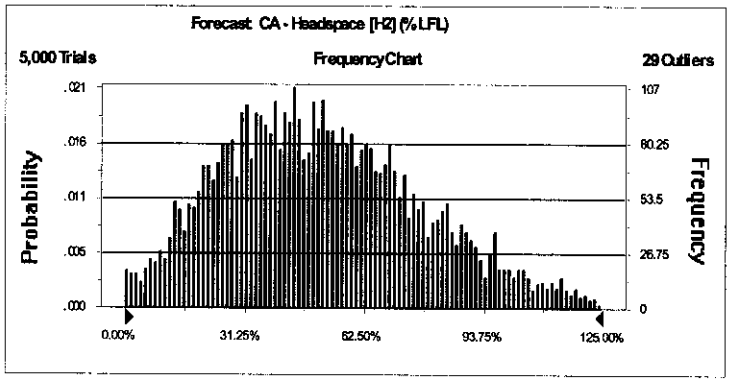
End of Forecast

Forecast: CA - Headspace [H2] (%LFL) **Cell: G215**

Summary:

Display Range is from 0.00% to 125.00%
Entire Range is from 0.73% to 185.96%
After 5,000 Trials, the Std. Error of the Mean is 0.37%

Statistics:	Value
Trials	5000
Mean	52.13%
Median	49.81%
Mode	---
Standard Deviation	26.44%
Variance	6.99%
Skewness	0.49
Kurtosis	2.97
Coeff. of Variability	0.51
Range Minimum	0.73%
Range Maximum	185.96%
Range Width	185.23%
Mean Std. Error	0.37%



Percentiles:

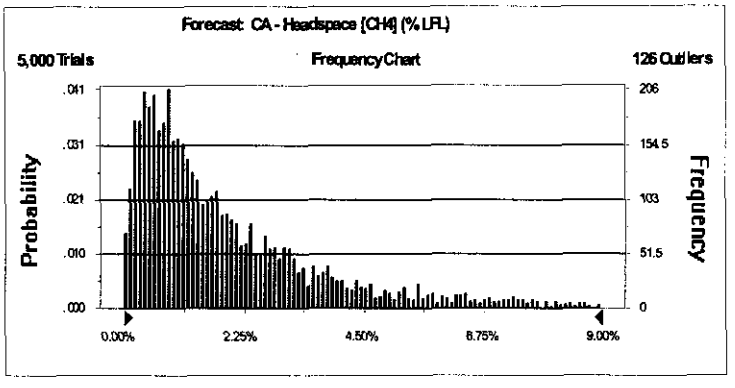
Percentile	Value
0.0%	0.73%
2.5%	8.44%
5.0%	13.41%
50.0%	49.81%
95.0%	99.90%
97.5%	110.08%
100.0%	185.96%

End of Forecast

Forecast: CA - Headspace [CH4] (%LFL) **Cell: G216**

Summary:
Display Range is from 0.00% to 9.00%
Entire Range is from 0.01% to 26.58%
After 5,000 Trials, the Std. Error of the Mean is 0.03%

Statistics:	Value
Trials	5000
Mean	2.20%
Median	1.40%
Mode	---
Standard Deviation	2.42%
Variance	0.06%
Skewness	2.79
Kurtosis	14.62
Coeff. of Variability	1.10
Range Minimum	0.01%
Range Maximum	26.58%
Range Width	26.57%
Mean Std. Error	0.03%



Percentiles:

Percentile	Value
0.0%	0.01%
2.5%	0.13%
5.0%	0.21%
50.0%	1.40%
95.0%	6.98%
97.5%	9.07%
100.0%	26.58%

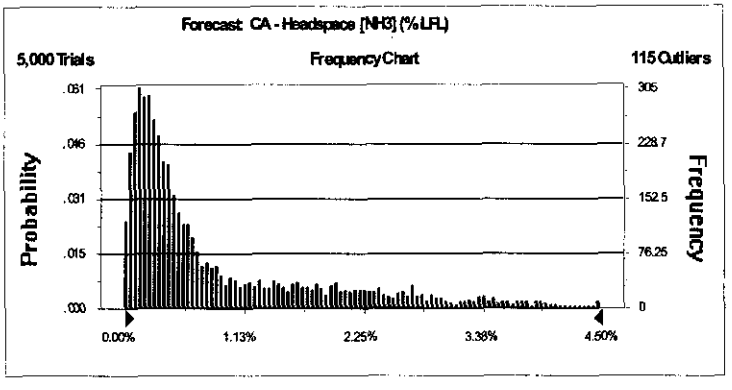
End of Forecast

Forecast: CA - Headspace [NH3] (%LFL) **Cell: G217**

Summary:

Display Range is from 0.00% to 4.50%
Entire Range is from 0.00% to 8.70%
After 5,000 Trials, the Std. Error of the Mean is 0.02%

Statistics:	Value
Trials	5000
Mean	1.01%
Median	0.47%
Mode	---
Standard Deviation	1.22%
Variance	0.01%
Skewness	2.11
Kurtosis	8.26
Coeff. of Variability	1.20
Range Minimum	0.00%
Range Maximum	8.70%
Range Width	8.70%
Mean Std. Error	0.02%



Percentiles:

Percentile	Value
0.0%	0.00%
2.5%	0.05%
5.0%	0.07%
50.0%	0.47%
95.0%	3.56%
97.5%	4.43%
100.0%	8.70%

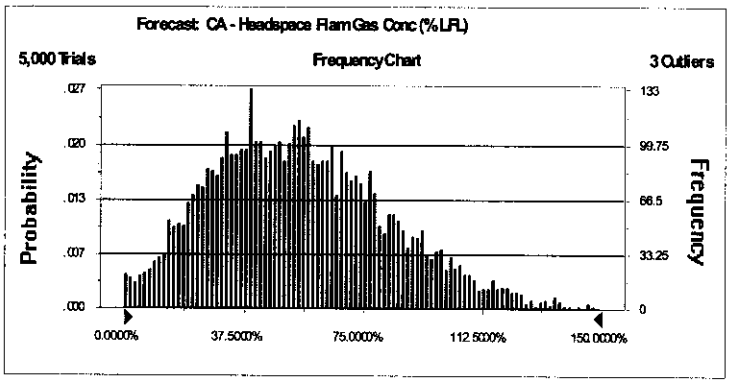
End of Forecast

Forecast: CA - Headspace Flam Gas Conc (%LFL) **Cell: G218**

Summary:

Display Range is from 0.0000% to 150.0000%
Entire Range is from 0.7436% to 187.6023%
After 5,000 Trials, the Std. Error of the Mean is 0.3907%

Statistics:	Value
Trials	5000
Mean	55.3473%
Median	53.1906%
Mode	---
Standard Deviation	27.6273%
Variance	7.6327%
Skewness	0.45
Kurtosis	2.88
Coeff. of Variability	0.50
Range Minimum	0.7436%
Range Maximum	187.6023%
Range Width	186.8587%
Mean Std. Error	0.3907%



Percentiles:

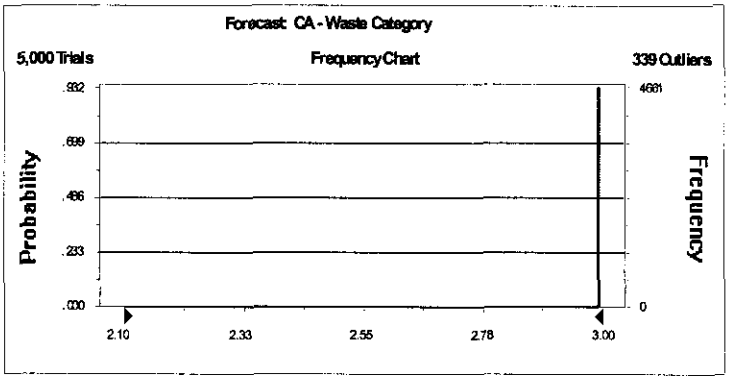
Percentile	Value
0.0%	0.7436%
2.5%	9.1107%
5.0%	14.3616%
50.0%	53.1906%
95.0%	104.9065%
97.5%	115.6363%
100.0%	187.6023%

End of Forecast

Forecast: CA - Waste Category **Cell: G219**

Summary:
Display Range is from 2.10 to 3.00
Entire Range is from 1.00 to 3.00
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	2.92
Median	3.00
Mode	3.00
Standard Deviation	0.31
Variance	0.10
Skewness	-4.20
Kurtosis	21.35
Coeff. of Variability	0.11
Range Minimum	1.00
Range Maximum	3.00
Range Width	2.00
Mean Std. Error	0.00



Percentiles:

Percentile	Value
0.0%	1.00
2.5%	2.00
5.0%	2.00
50.0%	3.00
95.0%	3.00
97.5%	3.00
100.0%	3.00

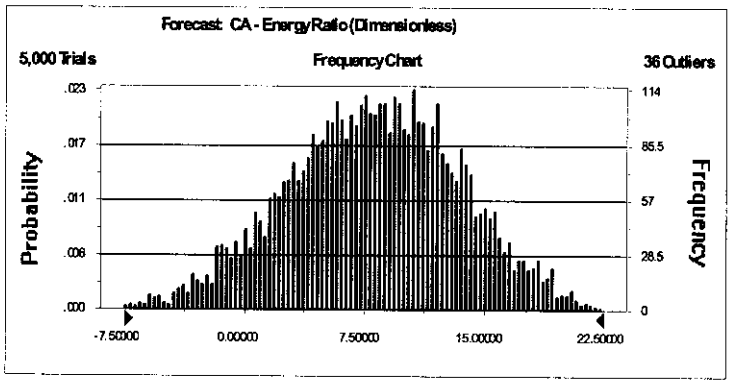
End of Forecast

Forecast: CA - Energy Ratio (Dimensionless) **Cell: G222**

Summary:

Display Range is from -7.50000 to 22.50000
Entire Range is from -9.23437 to 29.60177
After 5,000 Trials, the Std. Error of the Mean is 0.07801

Statistics:	Value
Trials	5000
Mean	8.14332
Median	8.23099
Mode	---
Standard Deviation	5.51582
Variance	30.42432
Skewness	-0.07
Kurtosis	2.92
Coeff. of Variability	0.68
Range Minimum	-9.23437
Range Maximum	29.60177
Range Width	38.83614
Mean Std. Error	0.07801



Percentiles:

Percentile	Value
0.0%	-9.23437
2.5%	-2.90142
5.0%	-1.16791
50.0%	8.23099
95.0%	17.01824
97.5%	18.59349
100.0%	29.60177

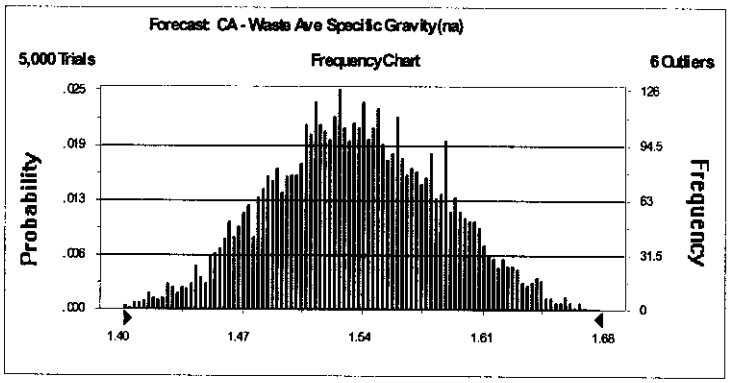
End of Forecast

Forecast: CA - Waste Ave Specific Gravity (na) **Cell: G223**

Summary:

Display Range is from 1.40 to 1.68
Entire Range is from 1.37 to 1.68
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	1.53
Median	1.53
Mode	---
Standard Deviation	0.05
Variance	0.00
Skewness	0.00
Kurtosis	2.64
Coeff. of Variability	0.03
Range Minimum	1.37
Range Maximum	1.68
Range Width	0.31
Mean Std. Error	0.00



Percentiles:

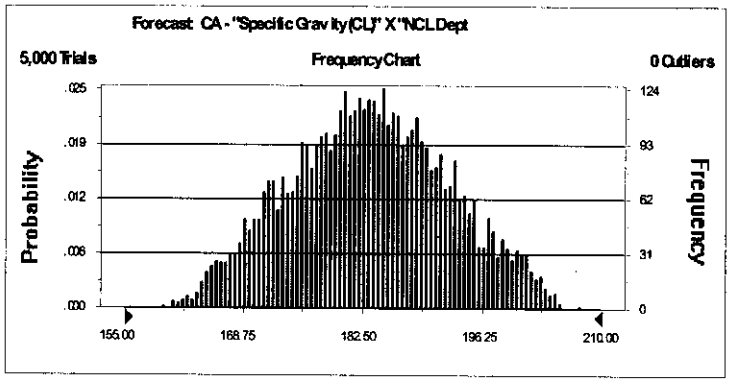
Percentile	Value
0.0%	1.37
2.5%	1.44
5.0%	1.45
50.0%	1.53
95.0%	1.61
97.5%	1.63
100.0%	1.68

End of Forecast

Forecast: CA - "Specific Gravity (CL)" X "NCL Dept **Cell: G224**

Summary:
Display Range is from 155.00 to 210.00
Entire Range is from 159.81 to 207.61
After 5,000 Trials, the Std. Error of the Mean is 0.13

Statistics:	Value
Trials	5000
Mean	183.38
Median	183.33
Mode	---
Standard Deviation	9.09
Variance	82.66
Skewness	0.03
Kurtosis	2.44
Coeff. of Variability	0.05
Range Minimum	159.81
Range Maximum	207.61
Range Width	47.80
Mean Std. Error	0.13



Percentiles:

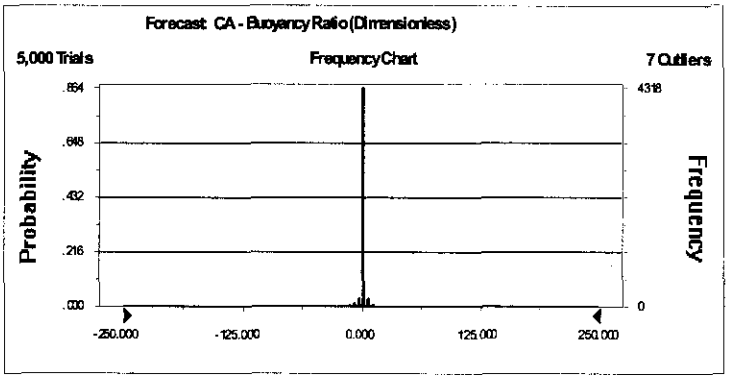
Percentile	Value
0.0%	159.81
2.5%	166.16
5.0%	168.48
50.0%	183.33
95.0%	198.93
97.5%	201.08
100.0%	207.61

End of Forecast

Forecast: CA - Buoyancy Ratio (Dimensionless) **Cell: G225**

Summary:
Display Range is from -250.000 to 250.000
Entire Range is from -5011.478 to 1581.152
After 5,000 Trials, the Std. Error of the Mean is 1.092

Statistics:	Value
Trials	5000
Mean	0.759
Median	1.039
Mode	---
Standard Deviation	77.185
Variance	5957.541
Skewness	-53.22
Kurtosis	3,596.97
Coeff. of Variability	101.65
Range Minimum	-5011.478
Range Maximum	1581.152
Range Width	6592.630
Mean Std. Error	1.092



Percentiles:

Percentile	Value
0.0%	-5011.478
2.5%	-8.114
5.0%	-3.403
50.0%	1.039
95.0%	5.848
97.5%	11.198
100.0%	1581.152

End of Forecast

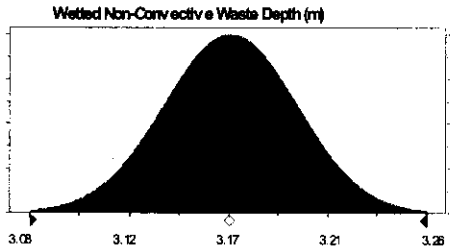
Assumptions

Assumption: Wetted Non-Convective Waste Depth (m) **Cell: Y10**

Normal distribution with parameters:

Mean	3.17	(=Y10)
Standard Dev.	0.03	(=AA10)

Selected range is from -Infinity to +Infinity

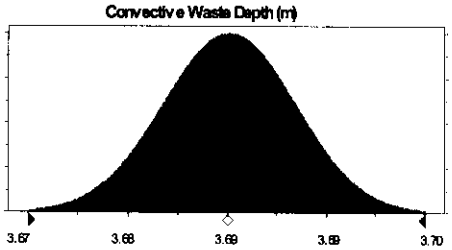


Assumption: Convective Waste Depth (m) **Cell: Y11**

Normal distribution with parameters:

Mean	3.69	(=Y11)
Standard Dev.	0.01	(=AA11)

Selected range is from 0.00(=AC11) to 10.72(=AE11)



Assumption: Void Fraction (na) (Normal) **Cell: Y29**

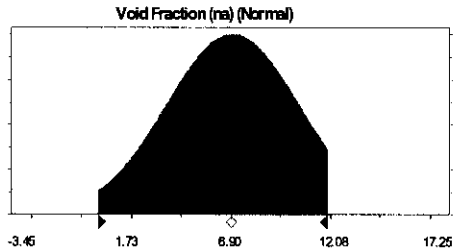
Normal distribution with parameters:

Mean	6.90	(=V29)
Standard Dev.	3.45	(=AA29)

Selected range is from 0.01(=AC29) to 11.85(=AE29)

** Cell references are dynamic **

Assumption: Void Fraction (na) (Normal) (cont'd) **Cell: Y29**

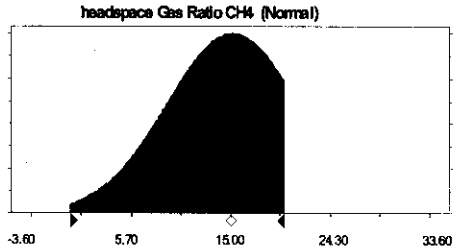


Assumption: headspace Gas Ratio CH4 (Normal) **Cell: Y33**

Normal distribution with parameters:

Mean	15.00	(=Y33)
Standard Dev.	6.20	(=AA33)

Selected range is from 0.00(=AC33) to 20.00(=AE33)

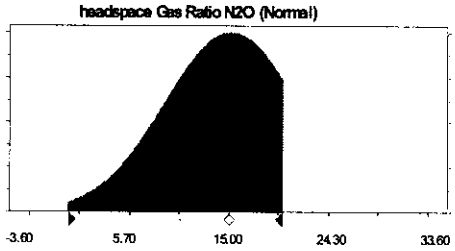


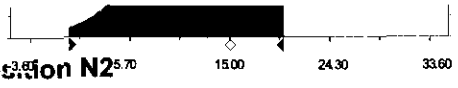
Assumption: headspace Gas Ratio N2O (Normal) **Cell: Y35**

Normal distribution with parameters:

Mean	15.00	(=Y35)
Standard Dev.	6.20	(=AA35)

Selected range is from 0.00(=AC35) to 20.00(=AE35)



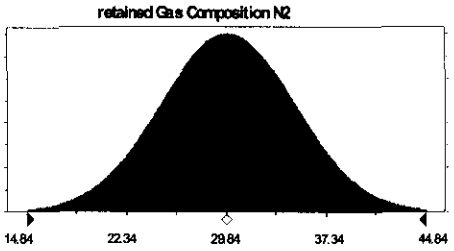


Assumption: retained Gas Composition N2 **Cell: Y37**

Normal distribution with parameters:

Mean	29.84	(=Y37)
Standard Dev.	5.00	(=AA37)

Selected range is from 14.00(=AC37) to 80.00(=AE37)

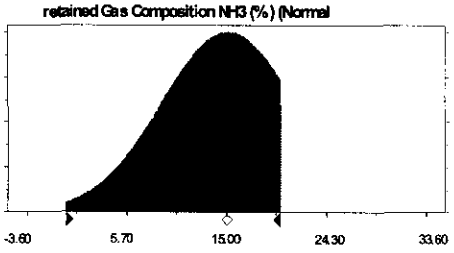


Assumption: retained Gas Composition NH3 (%) (Normal **Cell: Y39**

Normal distribution with parameters:

Mean	15.00	(=Y39)
Standard Dev.	6.20	(=AA39)

Selected range is from 0.00(=AC39) to 20.00(=AE39)



Assumption: Void Fraction (na) (LogNormal) **Cell: Y30**

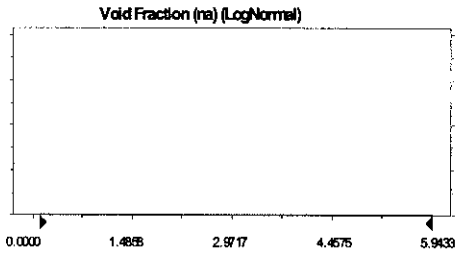
Lognormal distribution with parameters:

Mean	0.0776	(=V30)
Standard Dev.	1.4900	(=AA30)

Selected range is from 0.1000(=AC30) to 26.0000(=AE30)

** Cell references are dynamic **

Assumption: Void Fraction (na) (LogNormal) (cont'd) **Cell: Y30**

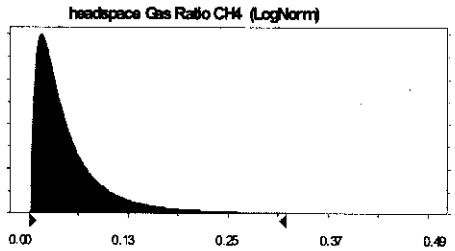


Assumption: headspace Gas Ratio CH4 (LogNorm) **Cell: Y34**

Lognormal distribution with parameters:

Mean	0.05	(=Y34)
Standard Dev.	0.06	(=AA34)

Selected range is from 0.00(=AC34) to 0.32(=AE34)

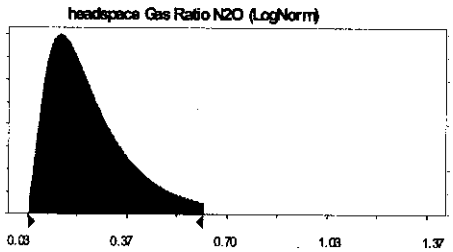


Assumption: headspace Gas Ratio N2O (LogNorm) **Cell: Y36**

Lognormal distribution with parameters:

Mean	0.25	(=Y36)
Standard Dev.	0.18	(=AA36)

Selected range is from 0.00(=AC36) to 0.62(=AE36)



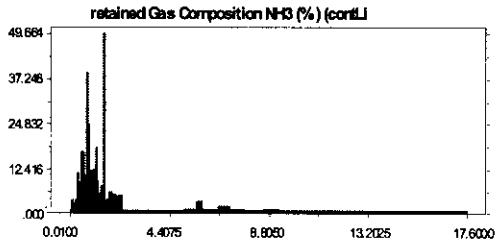
Assumption: retained Gas Composition NH3 (%) (contLi **Cell: Y40**

Custom distribution with parameters:

				Relative Prob.
Continuous range	0.0100	to	0.0311	0.02
Continuous range	0.0311	to	0.0695	0.04
Continuous range	0.0695	to	0.1171	0.06
Continuous range	0.1171	to	0.1370	0.07
Continuous range	0.1370	to	0.1920	0.09
Continuous range	0.1920	to	0.2343	0.11
Continuous range	0.2343	to	0.2963	0.13
Continuous range	0.2963	to	0.3346	0.15
Continuous range	0.3346	to	0.3492	0.17
Continuous range	0.3492	to	0.3760	0.19
Continuous range	0.3760	to	0.3990	0.20
Continuous range	0.3990	to	0.4549	0.22
Continuous range	0.4549	to	0.4919	0.24
Continuous range	0.4919	to	0.5320	0.26
Continuous range	0.5320	to	0.5482	0.28
Continuous range	0.5482	to	0.5792	0.30
Continuous range	0.5792	to	0.5978	0.31
Continuous range	0.5978	to	0.6364	0.33
Continuous range	0.6364	to	0.6717	0.35
Continuous range	0.6717	to	0.7074	0.37
Continuous range	0.7074	to	0.7668	0.39
Continuous range	0.7668	to	0.7772	0.41
Continuous range	0.7772	to	0.8102	0.43
Continuous range	0.8102	to	0.8280	0.44
Continuous range	0.8280	to	0.8595	0.46
Continuous range	0.8595	to	0.9235	0.48
Continuous range	0.9235	to	0.9648	0.50
Continuous range	0.9648	to	1.0291	0.52
Continuous range	1.0291	to	1.0720	0.54
Continuous range	1.0720	to	1.1281	0.56
Continuous range	1.1281	to	1.1597	0.57
Continuous range	1.1597	to	1.2173	0.59
Continuous range	1.2173	to	1.2854	0.61
Continuous range	1.2854	to	1.3978	0.63
Continuous range	1.3978	to	1.4821	0.65
Continuous range	1.4821	to	1.4956	0.67
Continuous range	1.4956	to	1.5774	0.69
Continuous range	1.5774	to	1.7573	0.70
Continuous range	1.7573	to	1.8741	0.72
Continuous range	1.8741	to	2.0080	0.74
Continuous range	2.0080	to	2.1571	0.76
Continuous range	2.1571	to	2.3184	0.78
Continuous range	2.3184	to	3.0867	0.80

Assumption: retained Gas Composition NH3 (%) (contLi (cont'd) **Cell: Y40**

Continuous range	3.0867	to	4.1636	0.81
Continuous range	4.1636	to	4.9957	0.83
Continuous range	4.9957	to	5.6075	0.85
Continuous range	5.6075	to	5.8423	0.87
Continuous range	5.8423	to	6.5631	0.89
Continuous range	6.5631	to	7.0487	0.91
Continuous range	7.0487	to	7.7154	0.93
Continuous range	7.7154	to	8.5787	0.94
Continuous range	8.5787	to	9.2357	0.96
Continuous range	9.2357	to	11.5184	0.98
Continuous range	11.5184	to	17.6000	1.00
Total Relative Probability				27.50

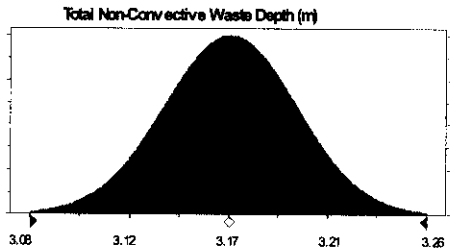


Assumption: Total Non-Convective Waste Depth (m) **Cell: Y9**

Normal distribution with parameters:

Mean	3.17	(=Y9)
Standard Dev.	0.03	(=AA9)

Selected range is from 0.01(=AC9) to 10.72(=AE9)

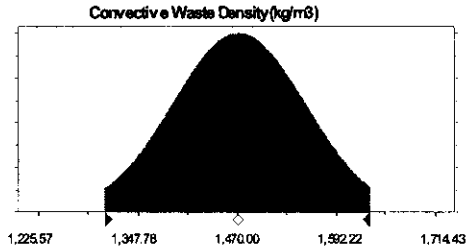


Assumption: Convective Waste Density (kg/m3) **Cell: Y13**

Normal distribution with parameters:

Mean	1,470.00	(=Y13)
Standard Dev.	81.48	(=AA13)

Selected range is from 1,307.04(=AC13) to 1,632.96(=AE13)

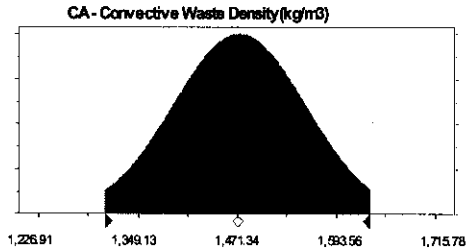


Assumption: CA - Convective Waste Density (kg/m3) **Cell: Y171**

Normal distribution with parameters:

Mean	1,471.34	(=Y171)
Standard Dev.	81.48	(=AA171)

Selected range is from 1,308.39(=AC171) to 1,634.30(=AE171)



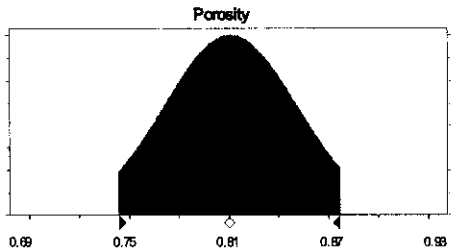
Assumption: Porosity **Cell: Y14**

Normal distribution with parameters:

Mean	0.81	(=Y14)
Standard Dev.	0.04	(=AA14)

Selected range is from 0.74(=AC14) to 0.88(=AE14)

Assumption: Porosity (cont'd) **Cell: Y14**



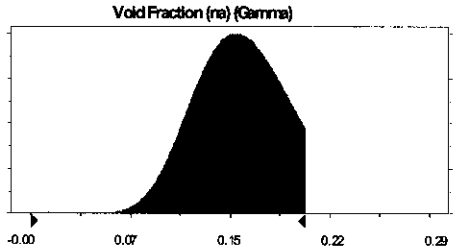
Assumption: Void Fraction (na) (Gamma) **Cell: Y28**

Gamma distribution with parameters:

Location	0.00	(=AA28)
Scale	0.01	(=AC28)
Shape	17	(=AE28)

Selected range is from -Infinity to 0.20(=AG28)

** Cell references are dynamic **

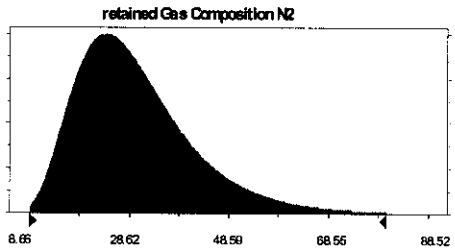


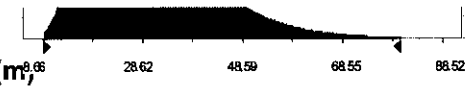
Assumption: retained Gas Composition N2 **Cell: Y38**

Lognormal distribution with parameters:

Mean	29.84	(=Y38)
Standard Dev.	12.01	(=AA38)

Selected range is from 4.50(=AC38) to 80.00(=AE38)



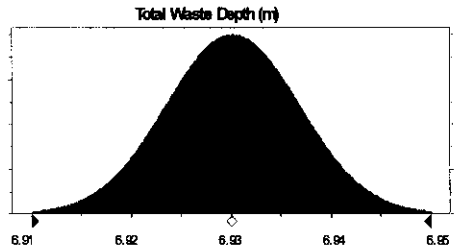


Assumption: Total Waste Depth (m) **Cell: Y8**

Normal distribution with parameters:

Mean	6.93	(=Y8)
Standard Dev.	0.01	(=AA8)

Selected range is from 0.01(=AC8) to 10.72(=AE8)



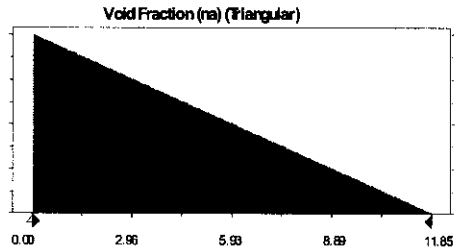
Assumption: Void Fraction (na) (Triangular) **Cell: Y27**

Triangular distribution with parameters:

Minimum	0.00	(=AC27)
Likeliest	0.00	(=V27)
Maximum	11.85	(=AE27)

Selected range is from -Infinity to +Infinity

** Cell references are dynamic **



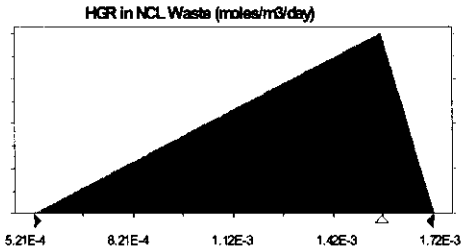
Assumption: HGR in NCL Waste (moles/m3/day) **Cell: Y43**

Triangular distribution with parameters:

Minimum	5.21E-04	(=AC43)
Likeliest	1.56E-03	(=V43)
Maximum	1.72E-03	(=AE43)

Selected range is from 5.21E-4(=AC43) to 1.72E-3(=AE43)

Assumption: HGR in NCL Waste (moles/m3/day) (cont'd) **Cell: Y43**

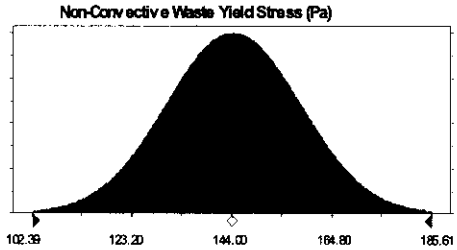


Assumption: Non-Convective Waste Yield Stress (Pa) **Cell: Y31**

Normal distribution with parameters:

Mean	144.00	(=Y31)
Standard Dev.	13.87	(=AA31)

Selected range is from 88.52(=AC31) to 199.48(=AE31)

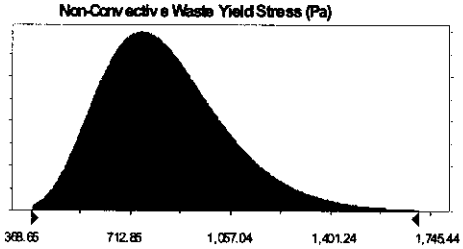


Assumption: Non-Convective Waste Yield Stress (Pa) **Cell: Y32**

Lognormal distribution with parameters:

Mean	829.55	(=Y32)
Standard Dev.	218.64	(=AA32)

Selected range is from 173.63(=AC32) to 1,704.11(=AE32)



End of Assumptions

APPENDIX F

WELLS, B. E., AND S. A. BARKER,
2003,
SUMMARY OF YIELD STRESS IN SHEAR DATA FOR HANFORD WASTE,
TWS03.044,
PACIFIC NORTHWEST NATIONAL LABORATORY,
RICHLAND, WASHINGTON

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TWS03.044

Pacific Northwest National Laboratory
Operated by Battelle for the
U.S. Department of Energy

September 15, 2003

Bill Cowley, Manager
Flammable Gas Project
CH2M HILL Hanford Group, Inc.
MSIN S4-44
Richland, WA 99352

Dear Bill:

SUMMARY OF YIELD STRESS IN SHEAR DATA FOR HANFORD WASTE

Enclosed is PNNL letter report TWS03.044, *Summary of Yield Stress in Shear Data for Hanford Waste*, by BE Wells and SA Barker.

If you have any questions, please call me at 375-6671. Changes to distribution can be made by e-mail or phone.

Sincerely,

Beric E. Wells, Manager
PNNL Flammable Gas Project

BEW:ekm

cc:	File T1.3.1/LB	
	SA Barker	S7-90
	WL Cowley	S4-44
	JM Grigsby	S7-90
	DC Hedengren	R1-44
	LJ Kripps	S7-90
	CHG Correspondence Control	H6-08
	TCSRC	R1-10

902 Battelle Boulevard • P.O. Box 999 • Richland, WA 99352

Telephone (509) 375-6671 ■ Email beric.wells@pnl.gov ■ Fax (509) 375-3865

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TWS03.044

Summary of Yield Stress in Shear Data for Hanford Waste

BE Wells
Pacific Northwest National Laboratory

SA Barker
CH2MHILL Hanford Group, Inc.

September 2003

Pacific Northwest National Laboratory
Richland, Washington

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1.0 Introduction

The Hanford waste tanks are categorized into waste groups based on the tank's retention of flammable gas and the potential for that gas to be released by a buoyant displacement gas release event (BDGRE). In support of this categorization, data pertaining to the yield stress in shear of the waste sediments are herein reviewed.

Waste management and retrieval issues such as flammable gas retention and release and waste mixing are dependent on the yield stress in shear of the waste sediment. The waste sediment is a solid, liquid, and gas matrix that varies in composition from tank to tank. Yield stress in shear, or shear strength as it is commonly referred to in Hanford literature, may be defined as the point at which the sediment material ceases to deform like a solid under applied stress but instead flows like a truly viscous material with a finite viscosity.

Limitations of available instrumentation, the varied sediment conditions and compositions, and the influence of the sediment history for a given tank or waste sample render the determination of in situ sediment shear strength a challenging task. In this document, sediments are grouped into categories similar to those of Barker and Lechelt (2000), and representative shear strength data pertaining to these waste types are reviewed.

In Section 2, an overview of shear strength measurement techniques used on the Hanford sediment is presented. Data is presented in Section 3, and general trends related with waste type are discussed. Cited references are listed in Section 4.

2.0 Shear Strength Measurement Techniques

Ex-tank (laboratory measurements performed on samples removed from the waste tank) and in situ shear strength measurements have been conducted on Hanford sediment. The ex-tank measurement techniques are discussed in Section 2.1, and the in situ measurements are discussed in Section 2.2.

2.1 Ex-tank Shear Strength Measurements

Numerous techniques to determine a material's shear strength have been developed. A review of both direct (direct assessment of the point at which the material yields or starts to flow) and indirect (extrapolation of shear stress-shear rate data to zero shear rate) techniques is presented by Nguyen and Boger (1992). Typical ex-tank measurements at Hanford are made with a shear vane (direct) or Couette type viscometers (indirect). Shear strength estimates have also been made based on horizontal waste core extrusion behavior.

2.1.1 Couette Viscometer

As discussed in the literature (Nguyen and Boger 1983 and 1992, Barnes 1999), Couette viscometer data at low shear rates suffers due to the sensitivity of the instrument and additional shearing and slip caused by the configuration of the instrument. The model assumed (i.e. Bingham, Casson, etc.) for the data can also affect the results (Nguyen and Boger 1992, Chhabra 1992). The data presented in Tingey et al. (2003) demonstrates that, at least for those wastes they considered, the waste has overshoot behavior, resulting in under-prediction of the yield point if the traditional models are applied.

Additionally, as has been noted in the referenced literature and with Hanford sediment (Onishi et al. 2003), sample disturbance history can have a direct impact on the measured shear stress. Aside from sample history prior to introduction into the viscometer, the configuration of the Couette viscometer itself may therefore also preclude the applicability of shear strength estimates from this devise to in situ conditions.

2.1.2 Shear Vane

Issues with the Coutte type viscometers such as slip and the sensitivity at low rotational speeds may be resolved by the use of a rotating vane device. However, although the instrument sample configuration is more representative of in situ conditions than that of the Couette viscometer, the sample history may still have significant impact on the results. Results of shear vane measurements are typically significantly larger than the in situ shear strength (Gauglitz and Aikin 1997, Heath 1987, Onishi et al. 2003).

2.1.3 Waste Core Extrusion Behavior

Gauglitz and Aikin (1997) developed a methodology to determine the shear stress of waste sediment based on a visual comparison of horizontal waste core extrusion behavior for simulants with known shear strength to that of Hanford Waste. In this document, estimates based on this methodology are termed "visual observations." Their results generally agreed within a factor of two with the in situ ball rheometer data (see Section 2.2 for a discussion of the ball rheometer).

An "extrusion length" methodology based on the simulant extrusion data of Gauglitz and Aikin (1997) for estimating the yield stress in shear of Hanford Waste was developed in Rassat et al. (2003). This methodology relies on measuring the initial extrusion length of the waste core at plastic failure and produces shear strength values similar in magnitude and with similar trends as the ball rheometer results. It was concluded that, in the absence of definitive in situ measurements, or in support of them, this methodology is expected to produce representative results for the waste shear strength.

Note that although both of the waste core extrusion estimates rely on ex-tank core extrusion behavior, they are as representative of in situ conditions as is available ex-tank. Further, all applicable core segments from a given tank are evaluated, which, given that differences in shear strength have been observed with depth, may provide a more complete data set.

2.2 In Situ Shear Strength Measurements

The ball rheometer was developed to meet the need for measurement of the in situ rheological properties in Hanford double-shell tanks. The rheology of the waste material can be estimated in situ directly from the drag force on a ball as it moves through the waste at various speeds. The ball rheometer results are typically accepted as being more representative of in situ waste conditions than laboratory measurements (Hedengren et al. 2000).

3.0 Hanford Shear Strength Data

Sediments with shear strength measurements considered in this review are grouped into categories similar to those of Barker and Lechelt (2000). These categories include:

- Saltcake waste with >= 1m liquid over solids (SC-LIQ)
- Saltcake waste with < 1m liquid over solids (SC-NL)
- Sludge waste with >= 1m liquid over solids (SL-LIQ)
- Sludge waste with < 1m liquid over solids (SL-NL)

Data comparing the various ex-tank and in situ measurements are presented in Table 1. For this general analysis, measurements given are typically average or median values. In some instances, multiple measurements are available throughout the depth and/or at different radial locations in the tank. In others, single measurements are reported. No attempt is made to reconcile these differences, and the average values reported are simple arithmetic averages of the data and do not take into account measurement location, etc. Sample results are chosen as close to in situ waste conditions (i.e. solid volume fraction and temperature) as possible.

As expected (see Section 2), for all waste types with both Couette viscometer and shear vane data, the viscometer results are significantly lower than the shear vane results. For SC-LIQ tanks, the waste core extrusion methodologies compare well with the ball rheometer results, are larger that the viscometer results, and are significantly lower than the shear vane results. In SL-LIQ tanks, where the ball rheometer has not been deployed, the extrusion length results compare favorably with the shear vane results. The extrusion length results are also similar in magnitude to the shear vane values in SL-NL wastes. It is postulated that the shear vane and extrusion results are more similar in sludge than saltcake waste due to solids precipitation in the saltcake samples.

Table 1. Hanford Sediment Measured Shear Strength (Pa), [Reference]

Tank	Waste Type	Measurement Technique				
		Couette Viscometer	Shear Vane	Visual Observation	Extrusion Length	Ball Rheometer
AN-103	SC-LIQ		8,000 [2]	225 [2][1]	990 [3]	160 [1][1]
AN-104	SC-LIQ	0.5 [5]			130 [3]	125 [1]
AN-105	SC-LIQ	0.75 [14]				135 [1]
AW-101	SC-LIQ		900 [2]	100 [2]	150 [3]	150 [1]
SY-101[3]	SC-LIQ	60 [15]	290 [15] 730 [8]			
SY-103	SC-LIQ	4 [4]	1,500 [2, 4]	195 [2]	160 [3]	150 [1]
A-101	SC-NL			525 [11]		
S-102	SC-NL			800 [2]		
U-103	SC-NL			885 [11]		
U-107	SC-NL		50 [8]	315 [11]		
AW-103	SL-LIQ		590 [6]			
AY-102	SL-LIQ		510 [6]		1,090 [7]	
AZ-101	SL-LIQ	4.7 [12]	1,770 [6] 1,500 [13]		740 [7]	
AZ-102	SL-LIQ		870 [6]			
AY-101	SL-NL		2,020 [6]			
B-201	SL-NL		1,270 [8]			
B-203	SL-NL	12.3 [9][2]	2,280 [9] 60 [9][2]		1,140 [10]	
B-204	SL-NL				860 [10]	
C-104	SL-NL		850 [6]			
C-107	SL-NL		1,050 [8]			
T-110	SL-NL				1,150 [10]	
T-201	SL-NL				1,770 [10]	
T-202	SL-NL				950 [10]	
T-203	SL-NL	40 [9][2]	3,770 [9] 310 [9][2]		1,030 [10]	
T-204	SL-NL		1,520 [9]		1,090 [10]	

Table References:

[1] Hedengren et al. 2000
[2] Gauglitz and Aikin 1997
[3] Rassat et al. 2003
[4] Bredt PR, JD Hudson, and JM Tingey. 1995. *Effects of Dilution on the Physical, Rheological, and Chemical Properties of Tank 241-SY-103*. Letter Report PNL MIT 092995, Pacific Northwest National Laboratory, Richland, WA.
[5] Herting 1998
[6] Memorandum from DB Bechtold to KE Bell, RA Esch, and FH Steen. *Correction of Shear Strength Measurements Reported by 222-S Laboratory*. March 28, 2001. 8D500-DBB-01-018. Fluor Hanford, Richland, WA.
[7] Analysis performed for W-211 project.

[8] TWINS, Tank Waste Information System, http://twins.pnl.gov/
[9] Tingey et al. 2003
[10] Rassat et al. 2003
[11] Hedengren et al. 2001
[12] Urie et al. 2002
[13] Gray et al. 1993
[14] Herting 1997
[15] Tingey et al. 1994

[1] Upper portion of sediment layer only
[2] Diluted sample; results included to illustrate difference in viscometer and shear vane results.
[3] SY-101 prior to mixer pump and mitigation.

The most representative shear strength values for in situ waste conditions are obtained with the ball rheometer. For waste processing conditions, other methods may be more appropriate. The accuracy of the extrusion length waste core extrusion methodology in reproducing the ball rheometer results indicates that, in the absence of in situ measurements, this methodology is expected to produce representative results for the waste shear strength. The similarity between the extrusion length and shear vane results in sludge suggest that the shear vane results in sludge waste may be representative of in situ conditions. Therefore, using these guidelines, the following methodology to assign shear strength based on waste type is proposed:

- SC-LIQ, Figure 1, Normal distribution with mean 144 and standard deviation 13.87; data from AN-103, AN-104, AN-105, AW-101, and SY-103, ball rheometer
- SC-NL, Figure 2, Normal distribution with mean 631.25, standard deviation 260.88, and minimum truncated at two standard deviations; data from A-101, S-102, U-103, and U-107, visual observation
- SL-LIQ, Figure 3, Log-normal distribution with mean 829.55 and standard deviation 218.64; data from AW-103 and AZ-102, shear vane; AY-102 and AZ-101, extrusion length
- SL-NL, Figure 4, Log-normal distribution with mean 1,143.27 and standard deviation 272.08; data from AY-101, B-201, C-104, and C-107, shear vane; B-203, B-204, T-110, T-201, T-202, T-203, and T-204, extrusion length

The distributions were determined from the data sources specified. The shear strength values listed in Table 1 have varying degrees of uncertainty. Although the uncertainty in the data is not specifically accounted for, by fitting a distribution to the data, some uncertainty is allowed for. A series of goodness-of-fit tests were conducted using Crystal Ball™ to determine the distribution that best fits the data. Normal and log-normal distributions were preferentially chosen. With the limited amount of data points and their varied pedigree, these distributions should not be interpreted as the true distribution; they are representations of the above listed data.

Differences in shear strength in a given waste type exist, and location in the waste, history, etc. may potentially affect shear strength values. As such, the results presented here should only be used as representative values, and should not be used as substitute for specific analysis of a given waste.

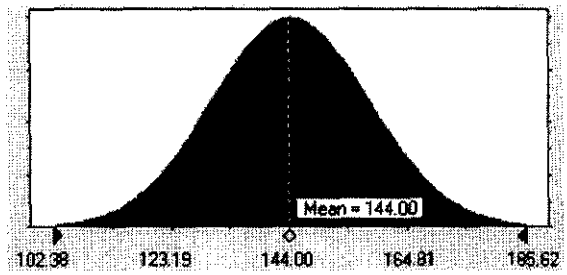

Figure 1. SC-LIQ Shear Strength Distribution (horizontal axis is shear strength (Pa), vertical axis is probability of occurrence)

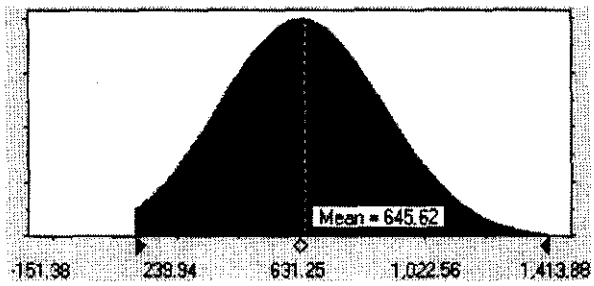

Figure 2. SC-NL Shear Strength Distribution (horizontal axis is shear strength (Pa), vertical axis is probability of occurrence)

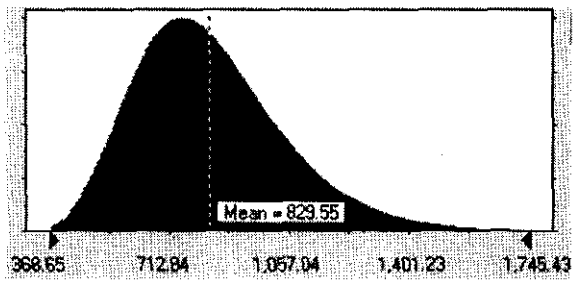

Figure 3. SL-LIQ Shear Strength Distribution (horizontal axis is shear strength (Pa), vertical axis is probability of occurrence)

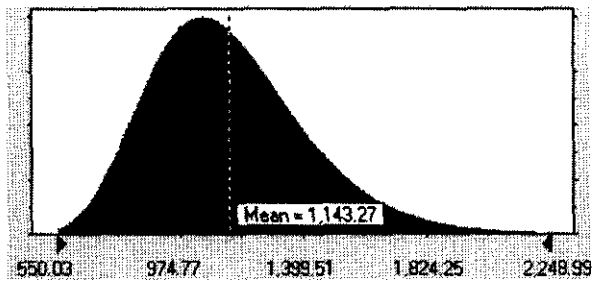

Figure 4. SL-NL Shear Strength Distribution (horizontal axis is shear strength (Pa), vertical axis is probability of occurrence)

4.0 References

Barker SA and AR Lechelt. 2000. *Determination of Waste Groupings for Safety Analyses*. RPP-6171. Rev. 0. CH2M HILL Hanford Group, Inc., Richland, Washington.

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APPENDIX G

WELLS, B. E., 2002B,
***"INVESTIGATION OF GAS RETENTION AND RELEASE ISSUES IN TANKS AN-107 AND SY-101 SUPPORTING WASTE GROUP DETERMINATION"*,**
TWS02.025,
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RICHLAND, WASHINGTON.

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TWS02.025

Investigation of Gas Retention and Release Issues in Tanks AN-107 and SY-101 Supporting Waste Group Determination

BE Wells

May 2002

Pacific Northwest National Laboratory
Richland, Washington

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1.0 Introduction

A methodology has been developed to categorize Hanford waste tanks into waste groups based on the tank's estimated flammable gas inventory and the potential for that gas to be released by a buoyant displacement gas release event (BDGRE). In support of this categorization, the recent (2000-2002) observed gas release events in AN-107 and the retained gas volume in AN-107 and SY-101 were analyzed in detail. The current sediment depth in SY-101 is also investigated.

Application of the BDGRE predictive indicators has historically shown that AN-107 was close to exhibiting BDGRE behavior (Meyer and Stewart 2001, Johnson et al. 2000). Since the predictive model of BDGRE behavior is based on the group of tanks exhibiting this behavior, inclusion of AN-107 in the group has the potential to affect the waste group determinations for the remaining tanks. The three gas release events observed recently in AN-107 (McCain, 2001) were investigated in detail to determine if the tank indeed belongs in the BDGRE group. The retained gas volume in AN-107 was also evaluated.

The potential for large BDGREs in SY-101 (Meyer et al. 1997) was eliminated by a series of waste transfers and water dilutions in 1999 and 2000 (Johnson et al. 2000). However, like AN-107, SY-101 in its new configuration is relatively close to (in terms of the BDGRE predictive indicators) the group of tanks exhibiting BDGREs. The last evaluation of if its waste configuration was done in August 2000 (Johnson et al. 2000). SY-101 data were updated by an investigation of potential gas retention and refinement of the sediment layer depth (a significant parameter for identifying the potential of BDGRE behavior) to ensure that the tank is categorized correctly.

In Section 2, the analyses conducted on AN-107 are described, and Section 3 covers the evaluation of SY-101. The findings pertinent to waste group categorization are summarized in Section 4, and cited references are listed in Section 5.

2.0 AN-107 Analyses

Specific gas release behavior and gas retention issues in AN-107 are investigated as they pertain to waste group determination.

2.1 AN-107 Gas Release Events

Three gas release events have been reported in AN-107. These events occurred on April 30, 2000, January 28, 2001, and February 21, 2002, and were identified via monitoring of the headspace hydrogen concentration in the tank (McCain, 2001). The monitoring is performed by two Whittaker™ electrochemical cells in a standard hydrogen monitoring system (SHMS)-B, from which a daily reading is recorded. The SHMS was installed in February 1998. Tank operations (waste intrusive activities, caustic/water additions, instrument re-calibration, etc.) at the time of the reported gas release events and the nature of the events themselves were investigated to establish whether the events were potentially induced by waste disturbance, were artifacts of the instrumentation, or were indeed *spontaneous* BDGREs (Meyer and Stewart 2001).

Figure 1 is a plot of the hydrogen concentration and waste level around the time of the April 30, 2000 event. The release was very minor, having a maximum recorded hydrogen concentration of 290 ppm (baseline at this time was 110 ppm). No tank operations were identified to be associated with this release. The actual rise in hydrogen concentration in this event was very small (180 ppm), and occurred during a time of fluctuating concentration readings. The hydrogen concentration trend also does not show the typical BDGRE shape discussed in Hedengren et al. (2000) and the release is not reflected in the level history. Therefore, this event was not deemed to be evidence of BDGRE behavior in the tank.

Figure 2 shows the hydrogen concentration and waste level history during the January 28, 2001, event. A maximum hydrogen concentration of 470 ppm (130 ppm at "start" of event) was recorded. Although larger in magnitude than the April 2000 event, it is still relatively minor. Calibration work was being performed on the hydrogen monitoring system during this time, which may have caused a spurious hydrogen concentration elevation.[1] Additionally, it is apparent in Figure 2 that the hydrogen concentration trend does not show the typical BDGRE shape, taking approximately 20 days to return to the baseline concentration. Decay to baseline is typically on the order of a day to a few days in an actively ventilated tank (Hedengren et al. 2000). Again, there was no evidence of a gas release in the waste level history at the time of this event (Figure 2). Therefore, this event was also not deemed to be indicative of BDGRE behavior.

[1] Personal Communication with DC Hedengren, CH2M HILL Hanford Group, March 28, 2002.

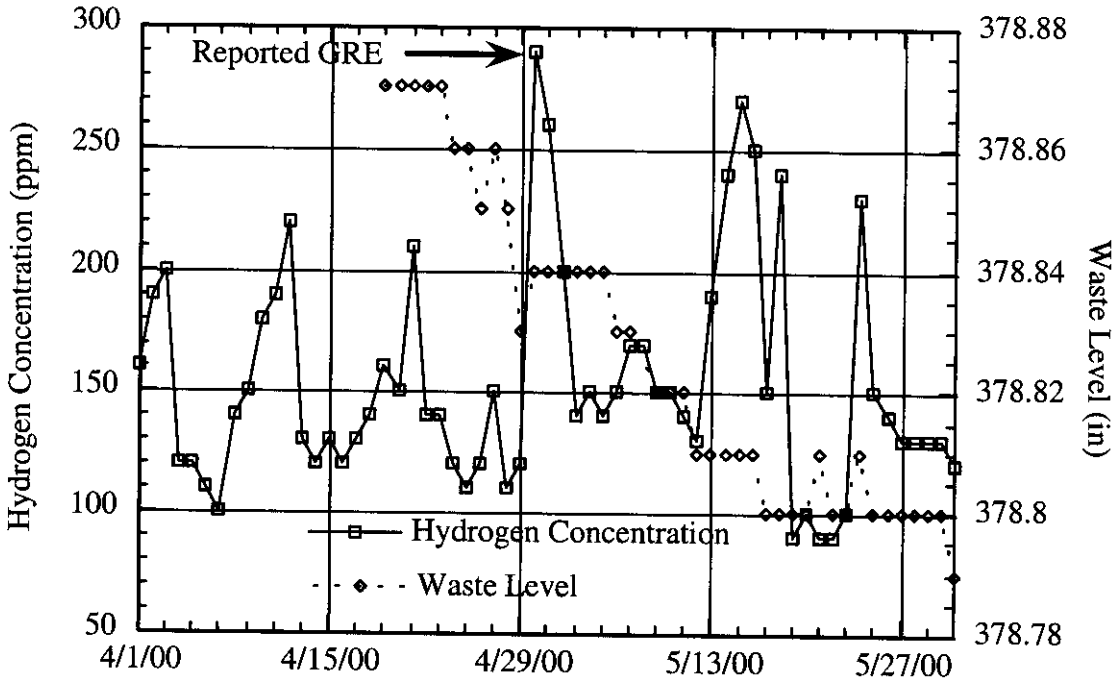

Figure 1. Hydrogen Concentration and Waste Level in AN-107, 4/1/00 to 5/31/00

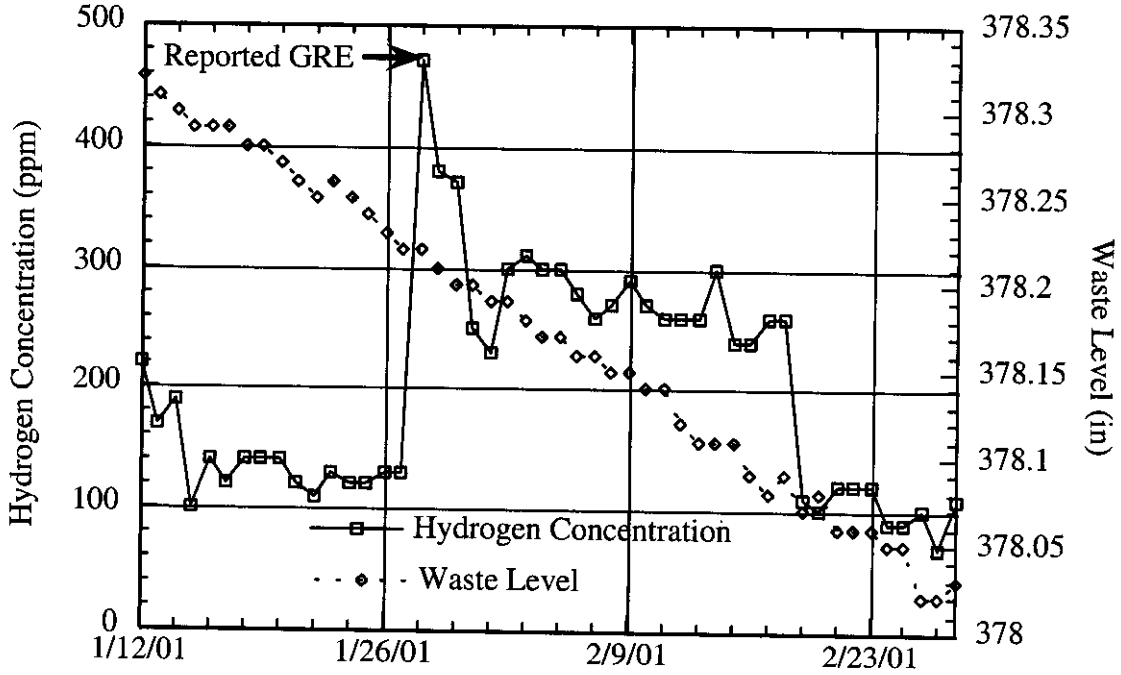

Figure 2. Hydrogen Concentration and Waste Level in AN-107, 1/12/01 to 2/28/01

The final reported event, on February 21, 2002, is illustrated in Figure 3. It also had a maximum recorded hydrogen concentration of 470 ppm. However, it also coincided with the start of the re-circulation pump in preparation for the caustic addition. The pump inlet was just above the sediment layer, and the pump outlet is near the top of the riser above the waste surface. The returned liquid is allowed to freely cascade back into the waste. The recorded release was likely the result of this process, and is therefore not considered indicative of spontaneous BDGRE activity in the tank. The caustic addition to the tank is reflected in the waste level increase beginning on February 21 (Figure 3).

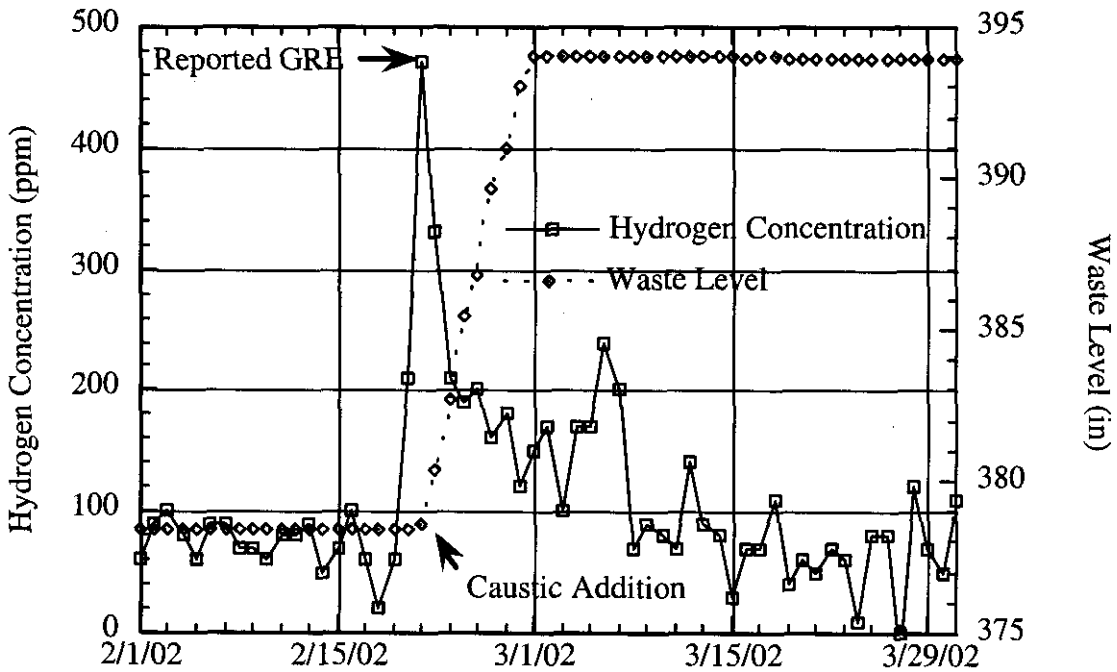

Figure 3. Hydrogen Concentration and Waste Level in AN-107, 2/1/02 to 3/31/02

To summarize, the indicators of BDGRE behavior (gas release signature and magnitude; level history) do not provide clear evidence to indicate that AN-107 is experiencing BDGREs. The one event that can be considered spontaneous was a very small release and the other two are explained by in-tank activities. The BDGRE predictive indicators should not be based on AN-107 (see Meyer and Stewart [2001] for explanation of BDGRE predictive indicator "calibration").

2.2 AN-107 Gas Retention

The retained gas volume may be estimated using changes in the waste surface level in response to barometric pressure changes. The Barometric Pressure Effect (BPE) model is described in Appendix B of Hedengren et al. (2000). The model estimates the retained gas volume based on the response of the waste surface level to fluctuations in the barometric pressure due to compression and expansion of stored gas.

As the model is relatively insensitive to small pressure fluctuations, we are most interested in the waste level response during the winter months when the pressure fluctuations are relatively large. To include two winter seasons, the waste level and barometric pressure correlation was evaluated from June 2000 through March 2002. A histogram of the estimated gas volume from the BPE model in AN-107 is shown in Figure 4. The histogram has been truncated to the physical limits of zero and 4,000 ft^3 imposed by setting the average gas volume fraction in the sediment layer to the neutral buoyancy gas fraction. The in-situ retained gas volume is estimated to be 2,100 ft^3 (4,200 scf for a pressure of 2 atm) at the 95% confidence level (CL) and zero at the median.

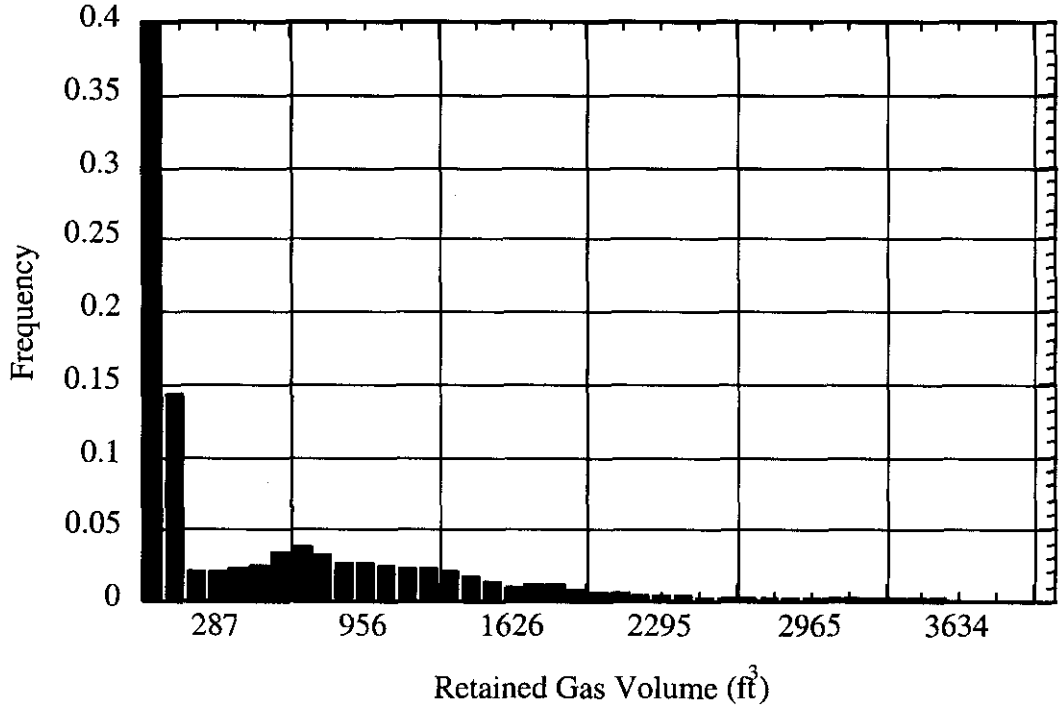

Figure 4. AN-107 Retained Gas Volume (truncated)

The retained gas volumes were also examined as a function of time; i.e. is the tank gaining or loosing gas volume with time? No correlation was identifiable.

3.0 SY-101 Analyses

The two main issues in SY-101 waste group classification were the retained gas inventory and the depth of the sediment layer, an influential parameter in the BDGRE indicator.

3.1 SY-101 Gas Retention

The retained gas volume in SY-101was evaluated using the BPE model as described for AN-107 above. The gas content in SY-101 was also estimated from the waste surface level history accounting for estimated water evaporation as discussed by Johnson et al. (2000).

The waste level and barometric pressure correlation for SY-101 from both of the Enraf™ level instruments was evaluated from June 2000 (post remediation) through March 2002. No meaningful correlation was found. The lack of correlation may be due to the difficulty of the BPE model in detecting a small retained gas volume (Hedengren et al. 2000), or may be a result of the floating "scum" layer (Johnson et al. 2000) affecting the waste surface measurement.

Evaporation of water from the waste can mask a level rise due to gas retention. The evaporation effect in SY-101 was calculated from the difference in specific humidity between the ambient air at the tank inlet and the exhaust air. The evaporation evaluation conducted by Johnson et al. (2000) five months after remediation indicated that gas retention was negligible. The analyses was extended to the present to confirm this was still the case. However, measurements required for this calculation (the tank dome pressure and exhaust air temperature, relative humidity, and flow rate) were not available after October 2000.

In the absence of these data, the exhaust humidity was estimated using the water vapor partial pressure in a concentrated salt solution derived from data for SY-101 simulants as presented in Stewart et al. (2002). The exhaust flow rate was held fixed at the last recorded data point. Using this approximate model, the waste level correction from Johnson et al. (2000) was extrapolated to March 2002. The new model with the alternate sources was "calibrated" to match the results of the "exact" model for the time period during which all data were available. The measured waste level and the corrected waste level trend with the evaporation effect removed are shown in Figure 6. A two-inch waste level rise is shown from October 2000 to March 2002. It is interesting to note that, beginning in January 2002, there has been no continued increase in the corrected waste level, indicating no further gas accumulation. The two-inch level rise corresponds to approximately 750 ft^3 of retained gas in-situ or 1,500 scf accounting for a gas pressure of 2 atm. This relatively minor retained gas volume supports the inability of the BPE model to find meaningful pressure-level correlations (see above).

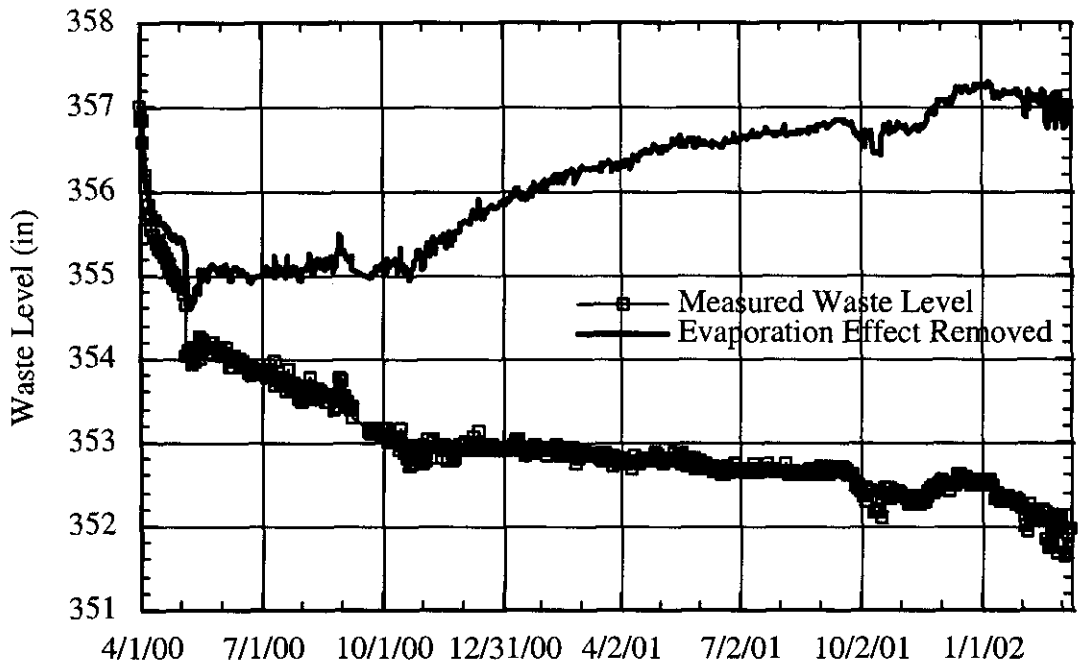

Figure 6. SY-101 Waste Level and Waste Level with Evaporation Effect Removed

3.2 SY-101 Sediment Depth

Determination of a tank's potential for BDGRE behavior is strongly affected by the sediment depth (Meyer and Stewart 2001). The sediment depth in SY-101 was re-examined for the waste group determination since the last evaluation in August 2000 was only five months after mixer pump operations and remediation activities. The available measurements for determining the sediment depth include the neutron and gamma scans and the waste temperature profiles from the multi-function instrument trees (MITs) (see Hedengren et al. [2000] for a detailed description of the waste characterization measurements).

The neutron/gamma logs were last recorded in risers 17B and 17C on June 14, 2001. It is apparent from both the neutron (Figure 7) and gamma (Figure 8) logs that the sediment layer was at or below 100 inches at each riser (the lower count below 100 inches indicates the presence of solids). The gamma log gives the more accurate representation, and indicates that the sediment depth was approximately 95 inches.

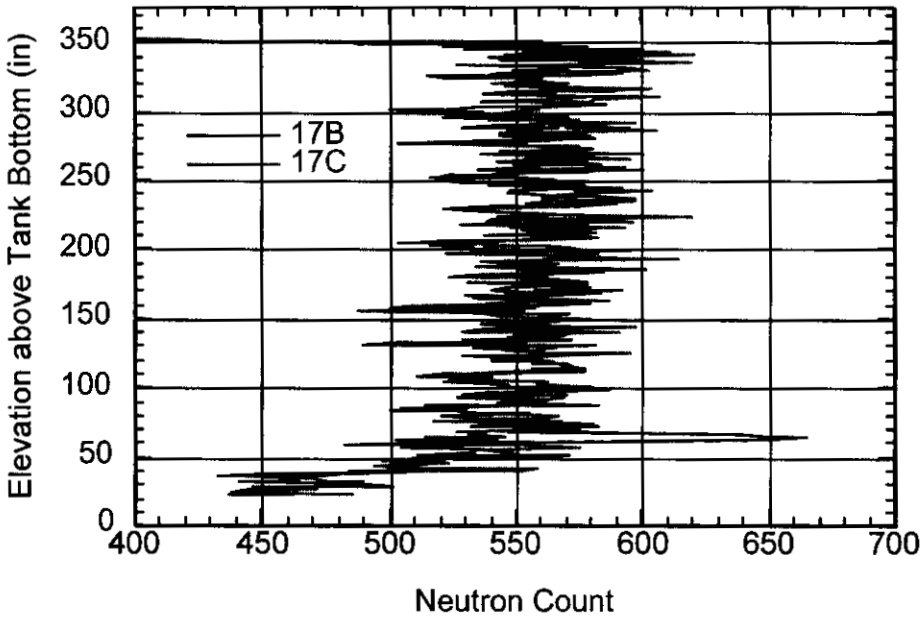

Figure 7. SY-101 Neutron Count Profile, 6/14/01

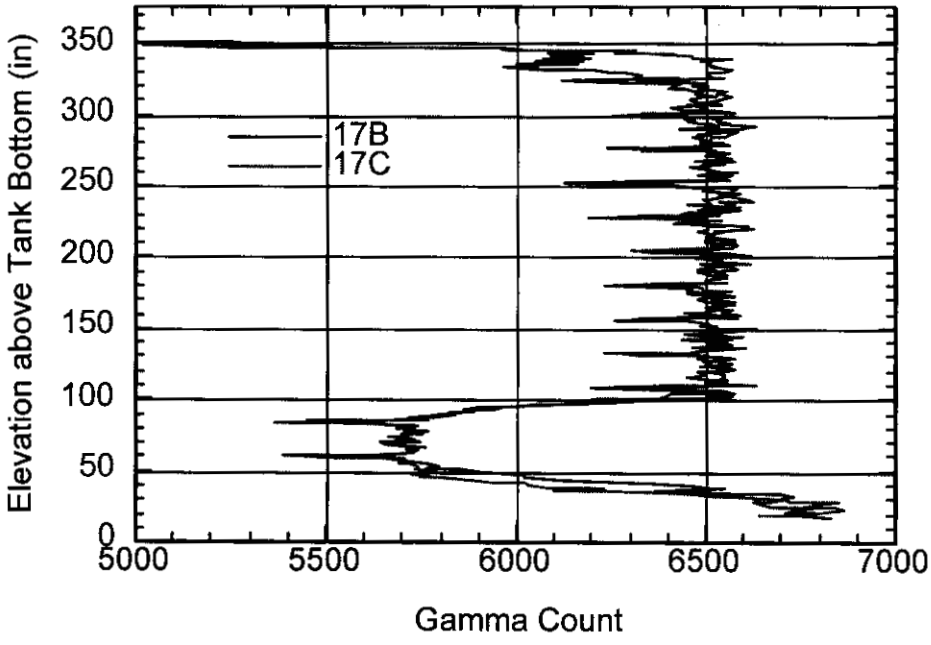

Figure 8. SY-101 Gamma Count Profile, 6/14/01

The waste temperature profiles from risers 17B and 17C, shown in Figures 9 and 10, clearly show the decrease in the settled solid layer height with time after the remediation. Each curve represents a single thermocouple at the specified elevation. The bold black line indicates the 100-inch thermocouple temperature. The upper "cluster" of temperatures represents the thermocouples exposed to the sediment layer; and the lower cluster represents thermocouples

measuring the supernatant liquid. Spikes and jumps in the data are instrumentation artifacts. Note the departure, from left to right on the plots, of subsequently lower thermocouples from the temperature range of the sediment layer into the temperature range of the supernatant liquid. This represents the effect decreasing sediment depth uncovering subsequent thermocouples. The 100-inch thermocouple registered the supernatant liquid temperature in October 2000. The 76-inch thermocouple began to depart from the sediment layer temperature in July 2000 but apparently has not been fully uncovered. The sediment depth is therefore somewhere between 100 and 76 inches.

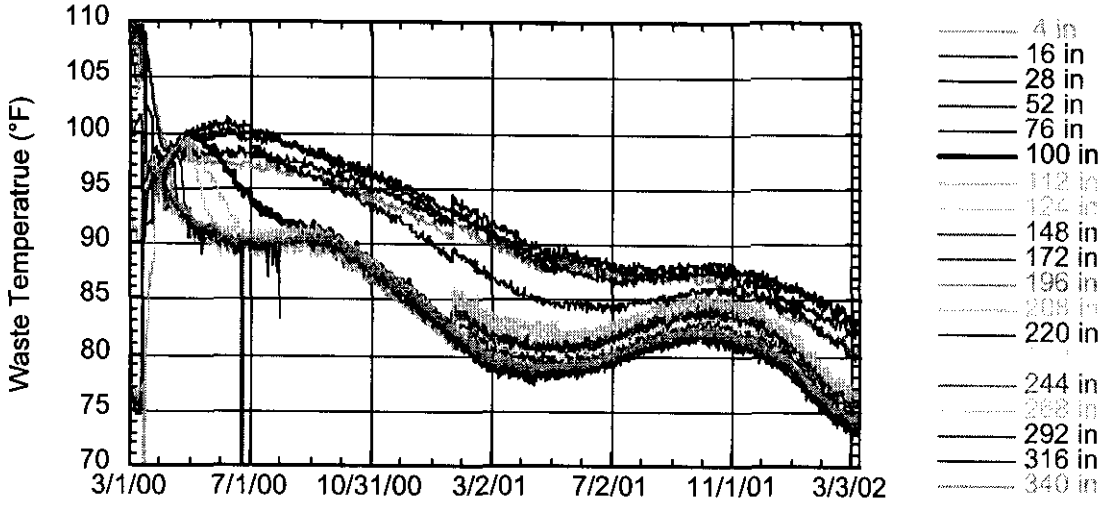

Figure 9. SY-101 Temperature Profile History in Riser 17B

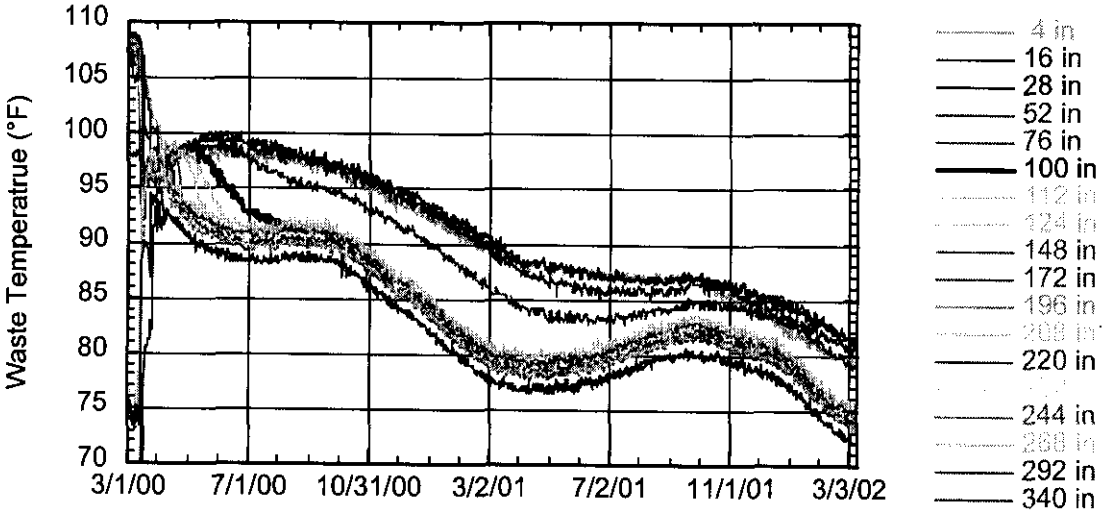

Figure 10. SY-101 Temperature Profile History in Riser 17C

As may be noted in Figures 9 and 10, there are vertical separations of 24 inches between the thermocouples in the region of interest. Validation probe scans, which provide temperature readings every six inches, were completed on April 4, 2002. The resulting

temperature profile is shown in Figure 11. Only the lower portion of the waste is shown in the figure. The sediment layer depth of over 100 inches indicated by the validation probe data in riser 17B is suspect as it does not agree with the thermocouple measurements on the same date. It is believed that either the elevation of the validation probe in 17B was in error, insufficient time was allowed for the probe to equilibrate at each elevation, or there was inadequate contact between the resistance temperature detector and the MIT wall. The validation probe data are consistent with thermocouple readings in 17C. By extrapolating the transition of the uniform supernatant liquid temperature and the sediment layer temperature trend from the April 4, 2002 validation probe scan in riser 17C (as depicted by the bold-dashed-lines in Figure 11), the sediment depth in SY-101 is currently 90 inches.

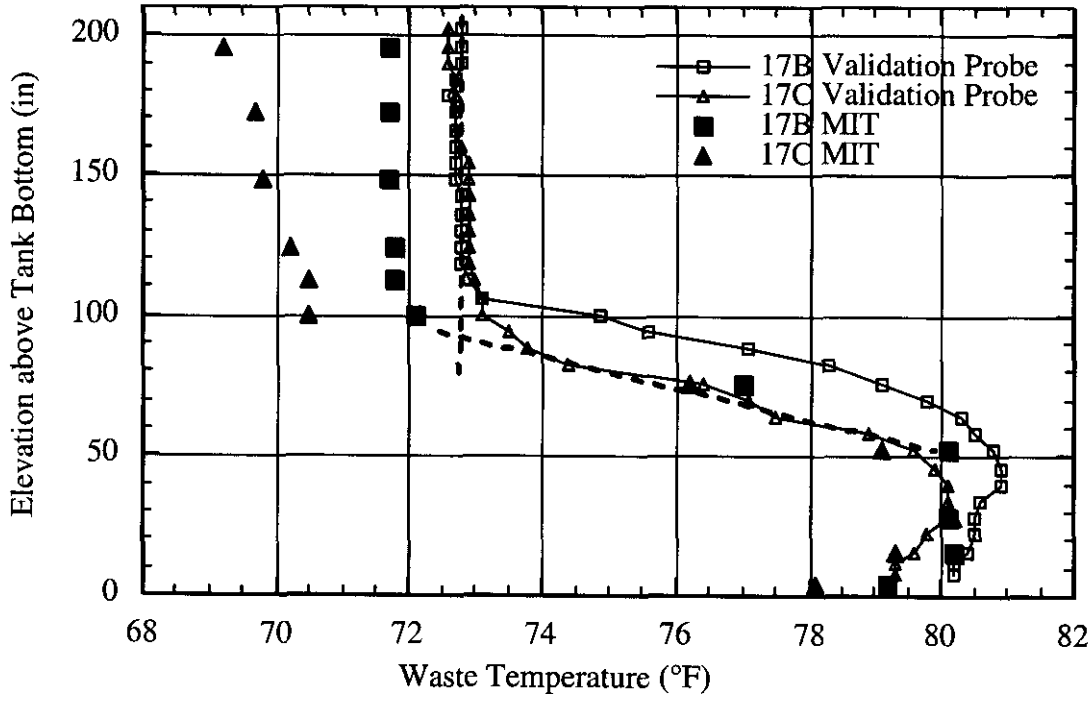

Figure 11. SY-101 Waste Temperature Profile, 4/4/02

4.0 Conclusions

It was determined that none of the three reported gas release events in AN-107 clearly represented a spontaneous BDGRE. Therefore, the BDGRE predictive indicators should not be based on AN-107. The in-situ retained gas volume in AN-107 was estimated to be 2,100 ft^3 at the 95% confidence level using the BPE model.

The in-situ retained gas volume in SY-101 estimated by removing the evaporation effect from the waste surface level is 750 ft^3. Based on the available measurements, the best estimate of the current sediment layer depth in SY-101 is 90 inches.

5.0 References

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Stewart CW, JL Huckaby, and PA Meyer. 2002. *Effects of Globally Waste-Disturbing Activities on Gas Generation, Retention, and Release in Hanford Waste Tanks*. PNNL-13781, Pacific Northwest National Laboratory, Richland, Washington.

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APPENDIX H

J. L. HUCKABY AND P. D. WHITNEY
2003,
***"TANK SY-101 RETAINED GAS ESTIMATES BASED ON CORRELATED SURFACE LEVEL - BAROMETRIC PRESSURE DATA AND TRANSFER MATERIAL BALANCE DISCREPANCIES"*,**
TWS04.001
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RICHLAND, WASHINGTON.

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Pacific Northwest National Laboratory
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October 13, 2003

Nick Kirch, Manager
Flowsheet and Process Models
MS R1-44
CH2M HILL Hanford Group, Inc.
Richland, WA 99352

Dear Nick:

TANK SY-101 RETAINED GAS ESTIMATES BASED ON CORRELATED SURFACE LEVEL - BAROMETRIC PRESSURE DATA AND TRANSFER MATERIAL BALANCE DISCREPANCIES

Enclosed is the letter report, Tank SY-101 Retained Gas Estimates Based on Correlated Surface Lavel – Barometric Pressure Data and Transfer Material Balance Discrepancies, by JL Huckaby and PD Whitney.

If you have any questions regarding this document, please call me at 375-3623.

Sincerely,

Jim Huckaby, Manager
PNNL S-112 Project

JLH:ekm

Enclosure

cc:	File/LB	
	SA Barker	S7-90
	B Barton	S7-90
	RE Bauer	S7-12
	JM Grigsby	S7-90
	D Hedengren	R1-44
	JE Meacham	R1-44
	TC Oten	S5-07

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TANK SY-101 RETAINED GAS ESTIMATES BASED ON CORRELATED SURFACE LEVEL – BAROMETRIC PRESSURE DATA AND TRANSFER MATERIAL BALANCE DISCREPANCIES

J. L. Huckaby and P. D. Whitney

This report describes the analysis of recent tank SY-101 waste surface level data and barometric pressure data to estimate the current volume of gas retained in the non-convective waste layer of SY-101. The statistical methodology used follows that described by Whitney (1995) and Whitney et al. (1996). The analyses provide average retained gas volume estimates for three time intervals between June 1, 2000 and September 29, 2003, corresponding to periods during which the waste surface level in SY-101 was unaffected by significant transfers into or out of the tank. Results from the most recent interval analyzed are extended to the present.

This report also considers material balance data from two separate transfers of waste into SY-101. The discrepancies between the volumes of waste transferred into SY-101 and the volumes indicated by the changes in waste level are evidence that retained gas in SY-101 is being compressed. These data are used to estimate the retained gas volumes, which are used here to corroborate estimates based on the barometric pressure effect (BPE).

SY-101 Recent Fill History and Supernate Specific Gravity Estimates

This report considers the period from June 2000 to October 2003, during which the SY-101 waste surface level and supernate specific gravity (SpG) were affected by transfers of waste into and out of the tank.

Between June 2000 and November 11, 2002, no waste transfers were made into or out of SY-101. The waste surface level during this period went from about 354 in. to about 351 in., the decrease in level presumably due to the evaporation of water. Supernate samples were collected in April 2000 and June 2000, and determined to have average SpG values of 1.363 and 1.340, respectively[1].

Between November 11 and November 15, 2002, a total of 55.8 in. of liquid was transferred from tank SY-102 to SY-101.[2] Supernate grab samples taken from SY-101 via riser 21 on November 18, 2002 indicated the SpG of the supernate near the surface to be about 1.302, and the SpG of the supernate deeper in the tank to be about 1.354. The

[1] Averages are based on bulk (before centrifugation) density or SpG measurements of samples 1SY-00-1, -2, -3, and -4 collected in April 2000; and samples 1SY-00-6 and -7 collected in June 2000.

[2] This value is based on the recorded surface level rise in SY-101. As discussed elsewhere in this report, the level increase in SY-101 underestimates the amount of liquid added to the tank by approximately 2% because of the compression of the gas stored in the solids layer.

lower SpG of the supernate near the surface is consistent with the SpG of SY-102 liquid[3] and the expectation that the lighter liquid transferred from SY-102 would essentially float on the denser pre-existing SY-101 supernate. Furthermore, the pump used to transfer waste from SY-102 to SY-101 was a floating pump in SY-102, and would have removed the lightest liquid from that tank. Assuming the SpG of the upper 55.8-in. layer was 1.302, and that of the approximately 251-in. layer of pre-existing supernate was 1.354, the average SpG of supernate in SY-101 at that time is estimated to have been

$$(55.8(1.302) + 251(1.354)) / (55.8 + 251) = 1.344.$$

Between July 15, 2003 and July 24, 2003, liquid was transferred cross-site out of SY-101, causing the surface level in SY-101 to decrease by about 194 in. This liquid was removed from an elevation of 102 in., and is assumed to have consisted of the denser liquid observed in the lower layer of supernatant in November 2002. With this assumption, the remaining depth of denser liquid was (251 – 194) = 57 inches, and the average SpG of the supernate in SY-101 at the end of the cross-site transfer on July 25, 2003 is estimated to have been

$$(55.8(1.302) + 57(1.354)) / (55.8 + 57) = 1.328.$$

Almost immediately after the completion of the cross-site transfer of waste out of SY-101, approximately 71.9 in. of waste was pumped from SY-102 into SY-101. Supernate samples collected from SY-101 after this transfer, on September 19, 2003, were found to have an average SpG of about 1.273.[4]

Between September 29 and October 1, 2003, S-112 retrieval waste was added to the top of the SY-101 supernatant layer, causing a level increase of 78.9 in. Based on in-line SpG and flow rate measurements, an average SpG of 1.296 has been calculated for this batch of liquid. Based on 78.9 in. of the S-112 liquid and 184.7 in. of SY-101 supernatant with a measured average SpG of 1.273, the average SY-101 supernate SpG as of October 10, 2003, is

$$(78.9(1.296) + 184.7(1.273)) / (78.9 + 184.7) = 1.280.$$

Table 1 summarizes the findings of this section.

---

[3] Supernate grab samples from SY-102 collected in April 2002 had an average SpG of 1.306.

[4] The SpG of the SY-102 waste transferred to SY-101 between July 26 and August 7 can be back-calculated from the measured 1.273 value and the presumed strata of the supernatant layer: 1.273 = ((71.9)(Unknown SY-102 SpG) + (55.8)(1.302) + (57)(1.354)) / (71.9+55.8+57). The result, that the SY-102 liquid had a SpG of about 1.186 is a reasonable, based on comparison to near-surface specific gravities measured at other times in recent SY-102 history. These have ranged from 1.064 (sample 2SY-01-07, August 15, 2001) to 1.279 (2SY-01-04, December 11, 2000).

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Table 1. Specific Gravity History of SY-101 Supernate

Period	Average Supernate Specific Gravity
3/16/00 – 11/11/02	1.354
11/11/02 – 11/15/02 (Addition of waste from SY-102)	n.a.
11/15/02 – 7/15/03	1.344
7/15/2003 – 7/24/2003 (Transfer of waste to 200 East)	n.a.
7/25/2003	1.328
7/25/03 – 8/7/03 (Addition of waste from SY-102)	n.a.
8/7/03 – 9/29/03	1.273
9/29/03 – 10/1/03 (Addition of waste from S-112)	n.a.
10/1/03 – present	1.280

The assumption made above that liquids having a lower SpG remain segregated (i.e., mix poorly) when added to SY-101 is supported by gamma scans of the waste. A gamma scan profile taken in the SY-101 liquid observation well (LOW) on August 29, 2003 is shown in Figure 1, together with a comparison scan made on June 14, 2001. The recent scan showed a lower-gamma layer of liquid in SY-101 between 288 and 210 in. The thickness of this layer roughly agrees with the 71.9 in. of SY-102 liquid that was added. The gamma concentration in the lower layer of supernatant showed a gradient of increasing concentration from the top to the bottom of the layer. In view of this gradient, it seems possible that the November 2002 waste addition was still not fully mixed with the earlier, denser supernatant by August 2003.

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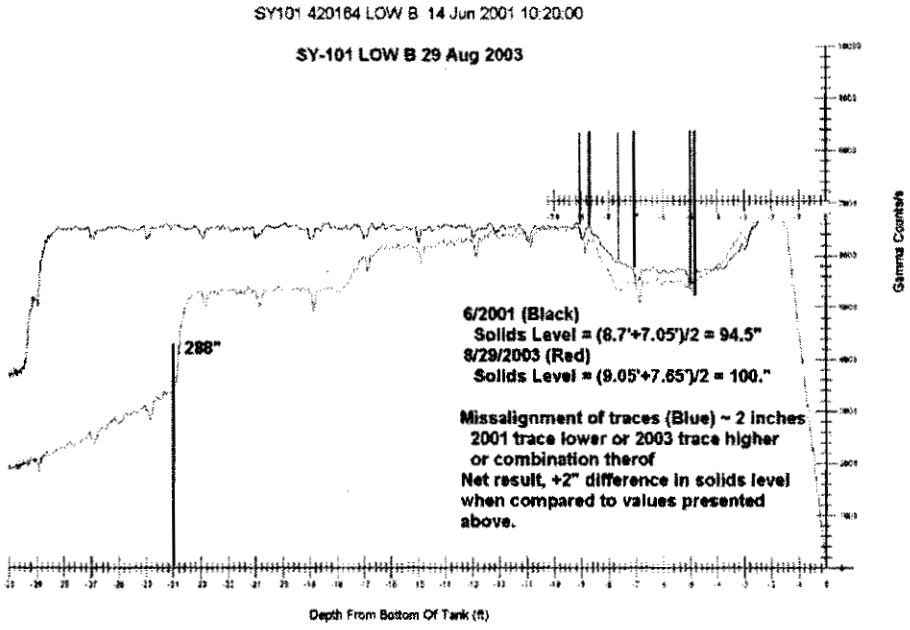

Figure 1. Gamma Scan of SY-101 After August 6-7, 2003 Transfer

Calculation of dL/dP Values from Barometric Pressure and Waste Surface Level Data

This section focuses on how the dL/dP values are estimated from the data, and summarizes the results. There were two data types used in the analysis described in this section:

1. Enraf surface level measurements from SY-101 and
2. Ambient barometric pressure measurements from the Hanford Meteorological Station.

SY-101 surface level measurements were obtained as an electronic file from Darrell Heimberger. The level measurements are the Tank Measurement and CS data from the sensors SY101-LI-R01A-03 and SY101-LI-R01C-01. The data received cover June 1, 2000 through October 5, 2003.

The meteorological data were obtained from the Hanford Meteorological Station (Burk 2003). The pressure data are available on the internal Hanford network at \\hms\metdata\sfcobs.

These data are not taken at co-incident times; the pressure data are recorded hourly, and the level data are recorded only when the reading differs from the previous reading by more than a fixed value. This mismatch was addressed by interpolating the pressure data to the same time-scale as the (typically more frequently recorded) level data.

The dL/dP estimates were obtained and summarized for three time intervals, as given in Table 2. Each interval corresponds to the period between major waste transfers into or out of SY-101. Figure 2 depicts the surface level history of SY-101 for the entire period of interest.

Table 2. Summary of dL/dP Results

Time Interval	dL/dP Median (in. of level/ in. of H_2O)	Number Correlated Data Sets	Lower Limit for 95 % C.I. (in. of level/ in. of H_2O)	Upper Limit for 95 % C.I. (in. of level/ in. of H_2O)
6/1/2000 – 11/10/2002	-0.0104	432	-0.0114	-0.00916
11/15/2002 – 7/15/2003	-0.0124	126	-0.0138	-0.0113
8/7/2003 – 9/28/2003	-0.0142	23	-0.0230	-0.00916

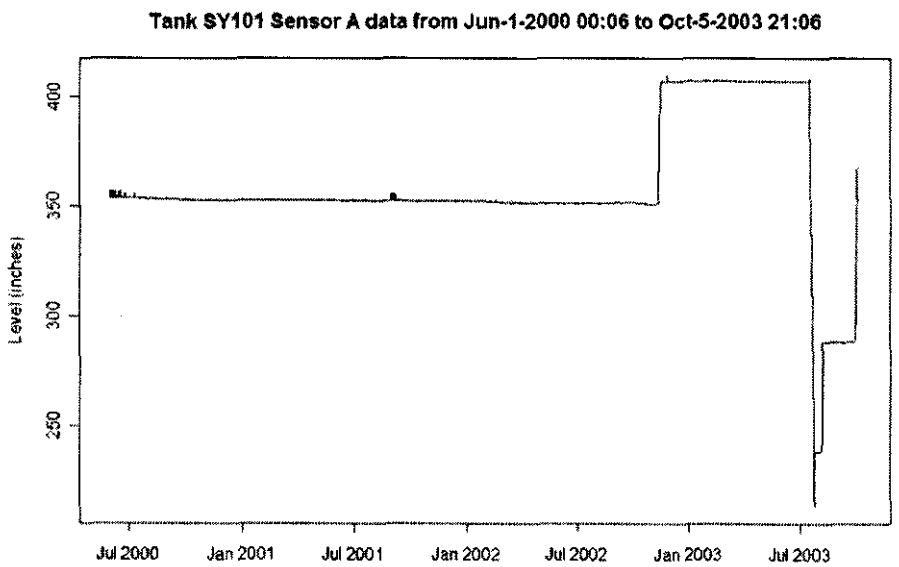

Figure 2. SY-101 waste surface level.

The table combines the estimates from the two sensors. The entries in the third column indicate the total number of linear regressions of surface level on barometric pressure performed within the larger time interval. (See below for a description of how these time intervals were obtained.) The median was used as the summary statistics since there are extremely large positive and extremely large negative slope estimates; these are due to anomalous level measurements, perhaps due to anomalies in the waste or the measurement system itself. The median is not influenced by these few, unusual, dL/dP estimates. ***A key assumption in using the median as a summary is that the retained gas***

quantity and the physical properties of the waste are approximately constant during each of the three time intervals examined.

Three aspects of dL/dP methodology are described here. The first is how the individual dL/dP estimates are obtained (i.e. how the 432 values summarized in the Table 2 were identified), the second is how such values are used to detect the existence of retained gas in the waste, and the third is how the median can be used to summarize the collection of dL/dP estimates.

Two distinct methods for estimating dL/dP were described in Whitney (1995), Whitney et al. (1996), and Whitney and Chen (2002). Because long-term factors (e.g., evaporation, instrument measurement drift, calibration, material transfers) affect the overall level, both methods include the step of working with a shorter time span of surface level and barometric pressure data, before estimating dL/dP as a linear slope from the regression of level measurements on pressure.

The first method was motivated by the observation that daily, and even weekly, surface level measurements were, for some of the Hanford tanks, correlated with atmospheric pressure measurements (Whitney 1995). The second method was motivated by the observation that the high frequency TMACS surface level data showed, for some of the tanks, a hysteresis in the surface level/barometric pressure relationship (Whitney et al 1996). A physical model was developed and reported that explained the hysteresis, and a corresponding data analysis methodology was developed to estimate dL/dP values. The second method essentially focuses on time intervals in which the pressure is changing significantly, and performs a linear regression of surface level on barometric pressure for those time intervals. The dL/dP estimates obtained by this second method tend to be larger (more negative) than the first method; although for some tanks the values tended to be about the same (see Figure 5.1 of Whitney et al. 1996). This second method was used here for the dL/dP estimates summarized in Table 2.

The methodology for deciding whether a collection of dL/dP measurements is correlated is driven by the assumptions:

1. In the absence of retained gas, an equal number of positive and negative dL/dP estimates will tend to be calculated; in the presence of retained gas, dL/dP estimates will tend to be negative.
2. The dL/dP estimates for each time interval are stochastically independent.

Given these assumptions, an indication of retained gas can be based on the proportion of time intervals for which the dL/dP estimates are negative. Specifically, if the proportion of negative dL/dP estimates is sufficiently greater than 0.5, then the level measurements indicate that the tank waste contains retained gas.

A standard statistical test that corresponds with these assumptions is the *sign test* for the proportion; see Gerstam (2003), Ross (1987), Fleis (1981). The assumptions are also consistent with a statistical test for the median dL/dP being less than zero.

The median is, for the dL/dP estimates as calculated for this report, preferable to the average as an overall summary. This is due to the sporadically occurring extreme values of dL/dP. The confidence intervals for the median are calculated as indicated in Knight (2003) and Bland (2003).

Retained Gas Inventory Estimates from Surface Level – Barometric Pressure Data Correlations

The dL/dP values determined by statistical analysis of barometric pressure and waste surface level data are related to the void fraction of gas in the solids layer by the following expression:

$$\frac{dL}{dP} = -\frac{\alpha h}{P} \tag{1}$$

where α is the void fraction in the settled solids layer, h is the height of the settled solids layer, and P is the average pressure on the retained gas. It is assumed here that the void fraction is uniform throughout the settled solids, in lieu of any information that would allow a more accurate specification. This assumption allows P to be expressed

$$P = SpG_S \frac{h}{2} + SpG_L (L - h) + P_{atm} \tag{2}$$

where SpG_S is the specific gravity of the bulk settled solids layer, L is the height of the waste surface, and P_{atm} is the atmospheric pressure (i.e., barometric pressure in the tank headspace). The bulk settled solids specific gravity depends itself on the void fraction, according to the following relationship:

$$SpG_S = (1 - \alpha) SpG_S^* \tag{3}$$

where SpG_S^* is the void-free specific gravity of the settled solids. Once void fraction is determined, the in situ volume of retained gas can be calculated by assuming the volume of settled solids is that of a cylinder 37.5-ft in radius[5] and h in. high:

$$V_G = \alpha \pi (37.5)^2 \frac{h}{12} \tag{4}$$

Eqs. (1) through (4) were applied to calculate void fraction and retained gas volume for the median and 95 % confidence interval limits of the dL/dP data. Table 3 lists the input parameters used in calculations, and Table 4 lists the results. For direct comparison of

[5] SY-101 is a flat-bottomed cylindrical tank with the joint (knuckle) between the floor and wall having a 12-in. radius. The volume excluded by the knuckle is about 50 ft^3, or about 0.1 % of the volume of the settled solids layer.

the results between intervals and results given later in this report, the volume of retained gas at 1 atm (407.06 in. H_2O) has also been given in Table 4 for each interval.

Table 3. Input Parameters for Calculation of Void Fraction

Parameter	Value	Units	Notes
Interval 1. June 2000 – November 11, 2002			
Height of settled solids layer, h	100	in.	1
Waste surface level, L	351.26	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_L	1.354	(unitless)	4
Atmospheric pressure, P_{atm}	393.02	in. H_2O	5
Interval 2. November 15, 2002 – July 15, 2003			
Height of settled solids layer, h	100	in.	1
Waste surface level, L	407.07	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_L	1.344	(unitless)	4
Atmospheric pressure, P_{atm}	394.79	in. H_2O	5
Interval 3. August 7, 2003 – September 29, 2003			
Height of settled solids layer, h	100	in.	1
Waste surface level, L	288.35	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_L	1.273	(unitless)	4
Atmospheric pressure, P_{atm}	395.97	in. H_2O	5
Interval 4. October 1, 2003 – Present			
Waste surface level, L	367.22	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_L	1.280	(unitless)	4
Atmospheric pressure, P_{atm}	392.75	in. H_2O	5

[1] h was assumed to be 100 in. for Intervals 1 – 3 based on estimates from thermocouple tree data, neutron logs, and gamma scans (Johnson et al. 2000).

[2] Waste surface level values are the 4:00 a.m. recorded reading in PCSACS for 11/10/2002, 7/15/2003, 9/28/2003, and 10/8/2003 for Intervals 1, 2, 3, and 4, respectively.

[3] SpG_S^* is that used in the Best Basis Inventory.

[4] SpG_L values are from Table 1.

[5] P_{atm} values were obtained from Hanford Meteorological Station for 4:00 a.m. on 11/10/2002, 7/15/2003, 9/28/2003, and 10/8/2003 for Intervals 1, 2, 3, and 4, respectively.

Table 4. Calculated Void Fractions and Retained Gas Volumes

	Lower 95% C.I.[1]	Median Value	Upper 95% C.I.	Units
Interval 1. June 2000 – November 11, 2002				
Average pressure on retained gas, P	803.6	802.9	802.3	in. H_2O
Void fraction, α	0.074	0.084	0.092	(unitless)
Retained gas volume, V_G	2,706	3,079	3,365	ft^3
Retained gas volume at 1 atm pressure	5,342	6,072	6,631	ft^3
Neutral buoyancy void fraction[2], α_{NB}	n.a.	0.109	n.a.	(unitless)
Interval 2. November 15, 2002 – July 15, 2003				
Average pressure on retained gas, P	876.0	875.2	874.3	in. H_2O
Void fraction, α	0.099	0.109	0.121	(unitless)
Retained gas volume, V_G	3,644	4,000	4,451	ft^3
Retained gas volume at 1 atm pressure	7,842	8,600	9,560	ft^3
Neutral buoyancy void fraction, α_{NB}	n.a.	0.116	n.a.	(unitless)
Interval 3. August 7, 2003 – September 29, 2003				
Average pressure on retained gas, P_1	706.7	704.0	699.4	in. H_2O
Void fraction, α	0.065	0.100	0.161	(unitless)
Retained gas volume, V_G	2,379	3,680	5,920	ft^3
Retained gas volume at 1 atm pressure	4,131	6,365	10,172	ft^3
Neutral buoyancy void fraction, α_{NB}	n.a.	0.163	n.a.	(unitless)
Interval 4. October 1, 2003 – Present				
Average pressure on retained gas, P	807.29	804.60	799.97	in. H_2O
Void fraction, α	0.057	0.089	0.144	(unitless)
Retained gas volume, V_G	2,083	3,220	5,176	ft^3
Retained gas volume at 1 atm pressure	4,131	6,365	10,172	ft^3
Neutral buoyancy void fraction, α_{NB}	n.a.	0.158	n.a.	(unitless)

[1] C.I. = confidence interval. Note that the upper C.I. of the dL/dP distribution translates to the lower C.I. of the void and retained gas volume, and the lower C.I. of the dL/dP distribution translates to the upper C.I. of the void and retained gas volume.

[2] Neutral buoyancy void fraction is not a function of dL/dP.

A check on the reasonableness of the results in Table 4 is whether the retained gas in the settled solids layer would lower the specific gravity of the settled solids layer below that of the supernate. If this condition existed, the settled solids could begin to rise, causing the retained gas to expand, and result in the release of gases and/or the formation of a floating crust in SY-101. The point at which the settled solids have the same specific gravity as the supernate is referred to as neutral buoyancy, and the void fraction required to achieve this is the neutral buoyancy void fraction, α_{NB}. From its definition it follows that at neutral buoyancy

$$SpG_S = SpG_L$$

$$(1-\alpha_{NB})SpG_S^* = SpG_L$$

$$\alpha_{NB} = 1-\frac{SpG_L}{SpG_S^*} \qquad (5)$$

The neutral buoyancy void fraction for each of the time intervals considered has been calculated and is included in Table 4. The calculated median α in Table 4 are all well below the α_{NB}, and only the upper 95 % confidence interval limit α of Interval 2 is greater than the applicable α_{NB}. This suggests that the upper 95 % confidence interval limit for Interval 2, given the assumptions of the model, could only be achieved by the settled solids having suitable shear strength to resist buoyancy.

Retained Gas Inventory Estimates from Waste Transfer Material Balance Discrepancies

Changes in SY-101 waste surface level caused by the compression of the retained gas have also been observed when the pressure on the gas is changed by the addition of waste to the supernate layer. This was recently observed during the transfer of S-112 waste into SY-101 in late September 2003, and a review of the data indicates it had also occurred during the transfer of waste from SY-102 into SY-101 in July and August, 2003. Earlier transfers were not investigated. The analogous effect, in which the retained gas expands due to the removal of waste above it, is expected to be observable, but no other transfers of waste in or out of SY-101 were examined in this study.

Transfers of waste from one tank to another are monitored to verify that the volume of waste removed from the sending tank is indeed the same as that received by the receiver tank. This is routinely done to verify that the transfer lines did not leak and that the waste is not being misrouted to some other tank. This is generally done by comparing the change in waste level in the sending tank to the change in level in the receiving tank, with adjustments made for the addition of any water used to flush the lines and any other waste transfers occurring simultaneously. Data on waste surface level, flush water volumes, and simultaneous transfer volumes are recorded and the necessary calculations are done periodically during the transfer using material balance discrepancy data sheets. These operational material balance discrepancy records for the July 25 through August 6, 2003 transfer of waste from SY-102 to SY-101 have been analyzed here for both evidence of retained gas and to estimate the quantity of retained gas in SY-101. A summary of these data is given in Table 5.

Table 5. Summary of Material Balance Discrepancy Data for the July 25 through August 6, 2003 Transfer of Waste from SY-102 to SY-101

Date	Time	"A" SY-102 Level (in.)	"B" SY-101 Level[1] (in.)	"C" SWP into SY-102[2] (in.)	"D" Flush Water (in.)	A + B - C - D Balance (in.)
7/25/2003	9:30	417.72	215.09	0	0	632.81
7/25/2003	22:00	394.53	238.20	0.24	0	632.49
Total for 7/25/2003:		**-23.19**	**23.11**	**0.24**	**0**	**-0.32**
8/5/2003	9:55	401.86	238.15	0	0	640.01
8/6/2003	15:00	352.30	288.22	0.87	0.37	639.28
Total for 8/5 and 8/6/2003:		**-49.56**	**50.07**	**0.87**	**0.37**	**-0.73**
Total for transfer:		**-72.75**	**73.18**	**1.11**	**0.37**	**-1.05**

[1] SY-101 waste surface level data are from the Enraf level gauge in riser 1A.

[2] SWP = saltwell pumping. Interim stabilization of tanks S-101, S-107, S-111, SX-102, U-107, and U-108 during this period resulted in the listed waste volume additions to SY-102.

As indicated by the values listed in Table 5, there was an apparent material balance discrepancy of 1.05 in. of waste observed.[6] This discrepancy is thought to be due to the compression of retained gas in the settled solids layer of SY-101 caused by the addition of waste above it.

The void fraction in the settled solids layer can be estimated from the apparent material balance discrepancy. Assuming the void fraction is approximately constant throughout the settled solids layer, it can be calculated from the following:

$$\alpha_0 = \frac{1 - \frac{h_1}{h_0}}{1 - \frac{P_0}{P_1}} \tag{6}$$

where α is the void (gas) fraction in the settled solids layer, h is the settled solids layer height, P is the average pressure on the retained gas, and the subscripts 0 and 1 indicate the parameters are before and after the transfer, respectively. Assuming the supernate layer contains negligible gas, it is essentially incompressible, and the difference between the settled solids layer height before and after the transfer is just the waste level discrepancy:

$$h_0 - h_1 = -1.05 \text{ in.} \tag{7}$$

The pressure on the retained gas, in units of in. of H_2O, is given by

[6] This discrepancy exceeded operational guidelines and the appropriate responses (e.g., visual inspection and radiation monitoring of the transfer line) were made per procedure.

$$P_0 = SpG_{S0}\frac{h_0}{2} + SpG_{L0}(L_0 - h_0) + P_{atm0} \tag{8}$$

$$P_1 = SpG_{S1}\frac{h_1}{2} + SpG_{L1}(L_1 - h_1) + P_{atm1} \tag{9}$$

where SpG_S is the specific gravity of the bulk settled solids layer, SpG_L is the specific gravity of the supernate layer, L is the waste surface level, P_{atm} is the atmospheric pressure (i.e., barometric pressure in the tank headspace). The specific gravity of the settled solids layer is itself a function of the void fraction, and is given by

$$SpG_{S0} = (1-\alpha_0)SpG_S^* \tag{10}$$

$$SpG_{S1} = (1-\alpha_1)SpG_S^* \tag{11}$$

where SpG_S^* is the void-free specific gravity of the settled solids. Assuming that the void fraction is approximately constant throughout the waste before and after the transfer, the void fraction of the settled solids layer after the transfer is related to the pre-transfer void fraction by the expression

$$h_1(1-\alpha_1) = h_0(1-\alpha_0) \tag{12}$$

Equations (6) through (12) have been solved for α, P, and SpG_S. Calculation input parameters and results are listed in Table 6. Given α and h_S, the volume of retained gas, in units of ft^3, can be calculated from the tank geometry using the following equation:

$$V_G = \alpha\pi(37.5)^2\frac{h}{12} \tag{13}$$

For comparison of the results with those from the barometric pressure – surface level correlation analyses given above, the volume of retained gas at 1 atm (407.06 in. H_2O) has also been given in Table 6.

Table 6. Input Parameters and Calculated Void Fractions before and after the July 25 through August 6, 2003 Transfer of Waste from SY-102 to SY-101

Parameter	Value	Units	Notes
Pre-Transfer Input Parameters			
Height of settled solids layer, h_0	101.05	in.	1
Waste surface level, L_0	215.09	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_{L0}	1.328	(unitless)	4
Atmospheric pressure, P_{atm0}	394.4	in. H_2O	5
Pre-Transfer Results			
Average pressure on retained gas, P_0	616.2	in. H_2O	
Bulk settled solids specific gravity, SpG_{S0}	1.394	(unitless)	
Void fraction, α_0	0.083	(unitless)	
Retained gas volume, V_{G0}	3,088	ft^3	
Retained gas volume at 1 atm pressure	4,672	ft^3	
Post-Transfer Input Parameters			
Height of settled solids layer, h_1	100	in.	1
Waste surface level, L_1	288.22	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_{L1}	1.273	(unitless)	4
Atmospheric pressure, P_{atm1}	394.0	in. H_2O	5
Post-Transfer Results			
Average pressure on retained gas, P_1	704.0	in. H_2O	
Bulk settled solids specific gravity, SpG_{S1}	1.408	(unitless)	
Void fraction, α_1	0.073	(unitless)	
Retained gas volume, V_{G1}	2,702	ft^3	
Retained gas volume at 1 atm pressure	4,672	ft^3	

[1] h_1 was estimated to be 100 in. prior to the September 29, 2003 start of S-112 retrieval, and h_0 was calculated from Eq. (2).
[2] L_0 and L_1 are from Table 1. These readings were recorded start time of the transfer, 9:00 7/25/2003, and at the stopping time of the transfer, 15:00 8/6/2003.
[3] SpG_S^* is that used in the Best Basis Inventory.
[4] SpG_L values are from Table 1.
[5] P_{atm} values were obtained from Hanford Meteorological Station at the recorded start time of the transfer, 9:00 7/25/2003, and at the recorded stopping time of the transfer 15:00 8/6/2003.

It should be noted that the model given by Eq. (6) through (13) implicitly assumes there is no retained gas in SY-102. If there were a significant volume of retained gas in SY-102, Eq. (6) through (13) would underestimate both the void fraction and retained gas volume in SY-101. This follows from the expectation that as waste was removed from SY-102, the retained gas in that tank would expand, resulting in an underestimation of the actual volume of waste transferred out of SY-102, and a reduction in the apparent discrepancy. There are no recent estimates of the retained gas volume in SY-102, but the settled solids depth in SY-102 is estimated to be only about 53 in.

The same approach can be applied to the material balance discrepancy observed during the transfer of waste from S-112 to SY-101 between September 29 and October 1, 2003. A key difference between that transfer and the transfer of waste from SY-102 conducted in July and August, 2003, is that the volume of waste transferred from S-112 was determined using a mass flow meter instead of from the measurement of waste surface

levels. To establish the total volume of waste transferred, the flow rates recorded by process monitoring computers were integrated over all times when the system was configured to transfer waste to SY-101.[7] Using this approach, the total volume of (diluted) waste transferred to SY-101 was calculated to be 220,332 gal, which would correspond to a level rise in SY-101 of 80.00 in. The observed level rise in SY-101 was 78.51 in., indicating a discrepancy of 1.49 in.

Table 7 lists the input parameters used in Eq. (6) through (13) and results obtained. Data from the transfer of waste from S-112 suggest larger amounts of retained gas in SY-101 than indicated by the transfer of waste from SY-102. This may be due to errors in the mass flow measurement or, as discussed above, to the assumption that there was essentially no retained gas in SY-102 at the time of that transfer. Errors associated with the measurement of flow during the transfer of S-112 waste to SY-101 should be small compared to the observed material balance discrepancy; the Micro Motion Coriolis meter used is considered accurate to about 0.2 % of flow (Onishi et al. 2001), while the observed discrepancy is about (100 %)(1.51)/(80.00) = 1.9 %. Similarly, errors associated with waste surface level measurement are expected to be small, with the accuracy of the Enraf level meters being on the order of 0.01 in. (Onishi et al. 2001).

[7] The S-112 waste flow meter was also used to measure flows that were actually returned directly to S-112 (in recirculation mode), and registered positive flow erratically when no fluid was being passed through it.

Table 7. Input Parameters and Calculated Void Fractions before and after the September 29 through October 1, 2003 Transfer of Waste from S-112 to SY-101

Parameter	Value	Units	Notes
Pre-Transfer Input Parameters			
Height of settled solids layer, h_0	100	in.	1
Waste surface level, L_0	288.56	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_{L0}	1.273	(unitless)	4
Atmospheric pressure, P_{atm0}	395.9	in. H_2O	5
Pre-Transfer Results			
Average pressure on retained gas, P_0	703.1	in. H_2O	
Bulk settled solids specific gravity, SpG_{S0}	1.344	(unitless)	
Void fraction, α_0	0.116	(unitless)	
Retained gas volume, V_{G0}	4,266	ft^3	
Retained gas volume at 1 atm pressure	7,368	ft^3	
Post-Transfer Input Parameters			
Height of settled solids layer, h_1	98.51	in.	1
Waste surface level, L_1	367.06	in.	2
Void-free settled solids specific gravity, SpG_S^*	1.52	(unitless)	3
Supernate specific gravity, SpG_{L1}	1.280	(unitless)	4
Atmospheric pressure, P_{atm1}	395.3	in. H_2O	5
Post-Transfer Results			
Average pressure on retained gas, P_1	806.2	in. H_2O	
Bulk settled solids specific gravity, SpG_{S1}	1.364	(unitless)	
Void fraction, α_1	0.102	(unitless)	
Retained gas volume, V_{G1}	3,717	ft^3	
Retained gas volume at 1 atm pressure	7,368	ft^3	

[1] h_0 was estimated to be 100 in. prior to the September 29, 2003 start of S-112 retrieval, and h_1 was calculated from Eq. (2).
[2] L_0 and L_1 are from Table 1. These readings were recorded start time of the transfer, 5:00 9/29/2003, and at the stopping time of the transfer, 17:00 10/1/2003.
[3] SpG_S^* is that used in the Best Basis Inventory.
[4] SpG_L values are from Table 1.
[5] P_{atm} values were obtained from Hanford Meteorological Station at the recorded start time of the transfer, 5:00 9/29/2003, and at the stopping time of the transfer, 17:00 10/1/2003.

For comparison of the results with those from the barometric pressure – surface level correlation analyses given above, the volume of retained gas at 1 atm (407.06 in. H_2O) has also been given in Table 7.

Discussion of Results

The analyses conducted indicate there has been and currently is a significant amount of retained gas in SY-101. The best estimates of void fraction and retained gas volumes for the four time intervals considered are based on correlated barometric pressure – waste surface level data (the BPE analyses) and are given by the median values in Table 4. Table 4 also lists the 95 % confidence interval limits for these results.

The results given in Table 4 suggest that there was a decrease between Interval 2 and Interval 3. Though median retained gas estimates are well within the neutral buoyancy guideline for each of the intervals considered, the transfer of waste out of SY-101 that occurred between July 15 and 24, 2003 may have raised the void fraction (by reducing the pressure on the retained gas) sufficiently to induce partial release of the retained gas. SY-101 headspace monitoring for flammable gases conducted during the transfer indicated increased monitor activity, but not significant releases.

Void fractions and retained gas volumes estimated from an analysis of material balance discrepancy data from two waste transfers are given in Tables 6 and 7. Comparison of these results with those from the BPE analyses indicates good agreement. Results from material balance discrepancy analyses are well within the 95 % confidence intervals of the corresponding BPE results. Further indication that the BPE results are reasonable is given by a semi-quantitative assessment of the August 29, 2003 gamma scan shown in Figure 1, which suggests a void fraction of 0.05 to 0.10 below about 100 in.

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APPENDIX I

WILLMARTH, S. L.,
JAN 16, 2002,
PERSONAL EMAIL TO S. A. BARKER,
CH2MHILL HANFORD GROUP, INC.,
RICHLAND, WASHINGTON.

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From: Wilmarth, Steven R
Sent: Wednesday, January 16, 2002 1:05 PM
To: Barker, Steven A
Subject: change to best basis volume uncertainty table
Steve,

The 6.0 inch values in the previous file I sent have been changed to 6.5 inches. See the attached files.

Steve W.

File: sludge-SD.doc January 15, 2002

Table cc. Sluge level measurements for ten tanks, units inches, S.D. is standard deviation. Data from TO-040-560, Rev. B-9, Tank Farm Sludge Level Readings.

Tank	Date	Riser No.	Sludge Level	S.D.	Count
241-AN-102	6/29/89	16A	39.25	6.63	3
	6/29/89	1B	32.25		
	6/29/89	1C	26.00		
241-AN-107	6/29/89	16C	46.10	2.78	3
	6/29/89	1C	51.65		
	6/29/89	1A	48.95		
241-AW-101	9/13/87	1B	25.88	9.81	2
	9/13/87	1C	NA		
	9/13/87	16A	NA		
	9/13/87	16C	NA		
	7/8/88	15B	12.00		
241-AW-102	10/20/94	22A	20.50	0.71	2
	10/20/94	22A	19.50		
241-AW-106	7/7/91	1B	99.88	14.71	3
	7/7/91	1C	NA		
	7/7/91	16A	95.50		
	7/7/91	16C	72.50		
	7/7/91	22A	NA		
241-AY-101	7/1/97	15B	39.50	0.88	6
	7/1/97	15J	39.00		
	7/1/97	15N	38.50		
	7/1/97	15R	38.00		
	7/1/97	15F	39.50		
	7/1/97	15C	40.50		
241-AY-102	10/29/88	15B	19.50	4.53	6
	10/29/88	15C	8.00		
	10/29/88	15F	6.50		
	10/29/88	15H	10.25		
	10/29/88	15J	12.00		
	10/29/88	15R	11.00		
241-SY-102	1/30/87	1A	NA	9.96	5
	1/30/87	1B	NA		
	1/30/87	1C	21.00		
	1/30/87	17A	NA		
	1/30/87	17B	NA		
	1/30/87	17C	18.00		
	1/30/87	23A	NA		
	5/12/87	1C	40.00		
	5/12/87	17C	32.00		
	5/12/87	17A	17.25		
241-AZ-101	1/23/89	24B	15.75	3.76	21
	1/23/89	24C	11.25		
	1/23/89	24D	23.00		
	1/23/89	24E	15.50		
	1/23/89	24F	13.00		
	1/23/89	24G	22.50		
	2/28/89	24B	15.50		
	2/28/89	24C	9.75		
	2/28/89	24D	22.50		
	2/28/89	24E	15.25		
	2/28/89	24F	13.00		
	2/28/89	24G	14.50		
	5/30/89	24B	15.50		
	5/30/89	24C	10.25		
	5/30/89	24D	NA		
	5/30/89	24E	14.75		
	5/30/89	24F	12.25		
	5/30/89	24G	15.25		
	12/26/89	24B	NA		
	12/26/89	24C	11.25		
	12/26/89	24D	NA		
	12/26/89	24E	15.25		
	12/26/89	24F	11.75		
	12/26/89	24G	14.75		
241-AZ-102	1/23/89	24C	19.25	7.80	20
	1/23/89	24D	33.25		
	1/23/89	24E	39.25		
	1/23/89	24F	38.75		
	1/23/89	24G	29.25		
	2/28/89	24C	20.25		
	2/28/89	24D	33.25		
	2/28/89	24E	40.75		
	2/28/89	24F	40.25		
	2/28/89	24G	28.25		
	5/30/89	24C	19.75		
	5/30/89	24D	32.75		
	5/30/89	24E	39.25		
	5/30/89	24F	39.25		
	5/30/89	24G	27.25		
	12/26/89	24C	19.75		
	12/26/89	24D	32.25		
	12/26/89	24E	39.25		
	12/26/89	24F	41.45		
	12/26/89	24G	27.95		

Number of Tanks	10	Pooled Variance	42.19
Number of Observations	71	Pooled Standard Deviation	***6.50***

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APPENDIX J

DERIVATION OF RETAINED GAS COMPOSITIONS

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Calculation Reviewed: Appendix J -- Derivation Of Retained Gas Compositions, RPP-10006 Rev 4, Methodology and Calculations for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site

Scope of Review: Appendix J (See also Spreadsheet Verification 271)
(e.g., document section or portion of calculation)

Engineer/Analyst: S. A. Barker Date: 10/27/2004

Organizational Mgr: T. M. Horner Date: 10/27/2004

This document consists of 60 pages and the following attachments (if applicable):

Yes	No	NA*		
[X]	[ ]	[ ]	1.	Analytical and technical approaches and results are reasonable and appropriate.
[X]	[ ]	[ ]	2.	Necessary assumptions are reasonable, explicitly stated, and supported.
[X]	[ ]	[ ]	3.	Ensure calculations that use software include a paper printout, microfiche, CD ROM, or other electronic file of the input data and identification to the computer codes and versions used, or provide alternate documentation to uniquely and clearly identify the exact coding and execution process.
[X]	[ ]	[ ]	4.	Input data were checked for consistency with original source information.
[X]	[ ]	[ ]	5.	For both qualitative and quantitative data, uncertainties are recognized and discussed.
[X]	[ ]	[ ]	6.	Mathematical derivations were checked including dimensional consistency of results.
[X]	[ ]	[ ]	7.	Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information.
[X]	[ ]	[ ]	8.	Software verification and validation are addressed adequately.
[X]	[ ]	[ ]	9.	Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references.
[X]	[ ]	[ ]	10.	Conclusions are consistent with analytical results and applicable limits.
[X]	[ ]	[ ]	11.	Results and conclusions address all points in the purpose.
[X]	[ ]	[ ]	12.	Referenced documents are retrievable or otherwise available.
[X]	[ ]	[ ]	13.	The version or revision of each reference is cited.
[X]	[ ]	[ ]	14.	The document was prepared in accordance with Attachment A, "Calculation Format and Preparation Instructions."
[X]	[ ]	[ ]	15.	Impacts on requirements have been assessed and change documentation initiated to incorporate revisions to affected documents as appropriate.
[X]	[ ]	[ ]	16.	All checker comments have been dispositioned and the design media matches the calculations.

T. A. Campbell 10/27/2004
Checker (Printed Name and Signature) Date

* If No or NA is chosen, an explanation must be provided on or attached to this form.

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INTRODUCTION

This report provides the documentation for the derivation of the Retained Gas composition parameters. The major components for of the flammable gases generated within the Hanford wastes are hydrogen (H_2), nitrogen (N_2), Methane (CH_4), Ammonia (NH_3), and Nitrous Oxide (N_2O). The values for these compositions within a tank are quite variable and are best expressed as a distribution. In order to constrain the compositions in the gas phase during the Monte Carlo simulation, the concentration of N_2O and CH_4 are expressed as ratios with H_2, and the H_2 concentration is determined by difference. The retained gas composition is required in the determination of the Waste Groupings described in the document. This gas composition determined the flammability of the headspace following a release of retained gas.

1.1 OBJECTIVES

The objective of this appendix is to use the available Retained Gas Sampler (RGS) Data for 16 tanks to derive the distributions required to predict the gas composition for the 16 sampled tanks and to prepare default retained gas composition distributions for tanks that have not been sampled.

1.2 DISTRIBUTIONS REQUIRED TO DETERMINE THE RETAINED GAS COMPOSITIONS.

In order to determine the total retained gas composition, the concentration of the five gases, which make up the retained gas must be estimated. These gases are H_2, N_2, CH_4, NH_3, and N_2O. A Monte Carlo simulation picking random values from the individual gas compositions without constrains will rarely pick a set of 5 concentrations that would add up to exactly 100%. In order to constrain the Monte Carlo, the following method for determining the retained gas composition has bee developed. The concentrations of N_2 and NH_3 are determined directly. The compositions for the CH4 and N2O gases are described as ratios to the hydrogen concentrations. Equations 1 and 2 describe these ratios and a solution to the retained gas concentrations is presented.

Given,

Retained gas concentration of N_2	$[N_2] = 29.2\%$
Retained gas concentration of NH_3	$[NH_3] = 0.079\%$
CH_4 gas ratio	$CH_{4ratio\_rg} = 0.114$
N_2O gas ratio	$N_2O_{ratio\_rg} = 0.271$

The CH_4 term is defined as

$$t_{CH4} = \frac{CH_{4ratio\_rg}}{1 - CH_{4ratio\_rg}}$$

The N_2O term is defined as

$[H_2]$ is calculated from the equation $$[H_2] = \frac{1 - ([NH_3] + [N_2])}{1 + t_{CH4} + t_{CH4} * t_{N2O} + t_{N2O}}$$

The CH_4 concentration is calculated from the equation

$$[CH_4] = [H_2] * t_{ch4}$$

And finally the N_2O concentration is calculated from the equation

$$[N_2O] = ([H_2] + [CH_4]) * t_{N2O}$$

2.0 CALCULATION PROCEDURE

The procedure for calculating the retained gas compositions is outlined in the following procedure. The retained gas composition is based on the Retained Gas Sampler (RGS) results published in PNNL-13317, "Ammonia Results Review for Retained Gas Sampling". This procedure begins with scanned in images of Table 2.3 of PNNL-13317.
All calculations are done in EXCEL[1] with the Crystal Ball[2] Monte Carlo add-in.

2.1 SCAN IN RGS DATA TABLES

Spreadsheet "rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls", Tab "1-Major Components"

1. Scan Data into digital format from Document and Proof Read.

Tab "2-Minor comps"

Scan unpublished data on minor component compositions and Proof Read. The Minor components are often listed in the tables as "other". This breakdown allows the approximately 3% of the gases listed as other to be broken down and assigned to the appropriate gas. In this case CH_x hydrocarbons are assigned to methane (CH_4) and nitrous oxides (NO_x) are assigned to nitrogen (N_2)

---

[1] EXCEL is a trademark of Microsoft Corporation, Redmond, Washington.

[2] Crystal Ball is a trademark of Decisioneering, Inc, Denver, Colorado.

2.2 COMBINE PAIRED DISTRIBUTIONS

Combine Paired Distributions for High and Low Salt Conditions to Make a Single Distribution

Assume that a combined stepwise distribution adequately describes combination of high and low salt compositions

Tab "3-revised comps"

1. Copy values from Tabs 1 and 2 and paste and transpose into appropriate column "C" cells

COMBINE DISTRIBUTIONS FOR ALL TANKS EXCEPT FOR SY-101

2. Create Crystal ball Assumption for components listed below with mean and standard deviation data in Columns "D" and "H"

   H2, N2, N2O, CH4, NH3, C2Hx, C3Hx, Other HC , Other NOx

Tank and Sample (or Layer)	Mole Percent of Constituent in Bubbles						Gas Volume Percent	Elevation (cm , in.)
	H2	N2	N2O	CH4	NH3	Other		
AW-101-24A-8	26±9.4 to 24±8.8	68±32 to 70±34	1.8±0.7 to 0.5±0.2	1.0±0.4	0.4±0.2	3.0±1.4 to 3.6±1.6	0.8±0.1 to 0.7±0.1	700, 276.5
AW-101-24A-17	29±3.9	59±8.9 to 62±9.3	5.5±0.9 to 2.9±0.4	1.8±0.3	0.6±0.3	3.4±0.6 to 3.6±0.6	2.7±0.3 to 2.5±0.3	265, 104.5
AW-101-24B-18	19±3.1	68±14 to 71±14	6.7±1.2 to 3.2±0.6	2.0±0.4	0.3±0.1	4.2±0.7 to 4.6±0.8	2.1±0.4 to 1.9±0.4	217, 85.5
AW-101-24A-19	43±3.5 to 44±3.6	47±4.1 to 48±4.1	5.7±0.5 to 3.9±0.3	1.4±0.1	0.8±0.4	1.9±0.2 to 2.0±0.2	5.2±0.5 to 5.0±0.5	169, 66.5
AW-101-24A-21	30±2.5 to 31±2.6	57±4.8 to 59±5.0	8.0±0.7 to 5.3±0.5	1.8±0.3	0.7±0.3	2.5±0.3 to 2.6±0.3	5.1±0.5 to 4.8±0.5	72.3, 36.5
AW-101-24B-22	13±2.1 to 14±2.1	67±11 to 72±12	12±2.0 to 5.2±0.9	2.2±0.4 to 2.3±0.5	0.3±0.1	5.3±1.3 to 6.0±1.4	2.0±0.4 to 1.8±0.4	24.1, 9.5
AW-101 - C(b)	26±9.4 to 24±8.8	68±32 to 70±34	1.8±0.7 to 0.5±0.2	1.0±0.4	0.4±0.2	3.0±1.4 to 3.6±1.6	0.8±0.3 to 0.7±0.3	673, 265
AW-101 - NC(b)	32±3.2 to 33±3.2	56±6.2 to 58±6.4	7.2±0.8 to 4.4±0.5	1.7±0.2	0.6±0.3	3.0±0.5 to 3.2±0.5	3.7±1.8 to 3.5±1.8	131, 51.6
A-101-24-2	63±5.5 to 64±5.6	26±4.9 to 27±4.9	7.4±0.7 to 6.5±0.6	0.4±0.1	2.1±1.0	0.5±0.07	16±1.4	845, 332.5
A-101-15-5	75±8.1	15±4.8	5.7±0.6 to 5.2±0.6	0.7±0.1	3.5±1.2	0.3±0.06	18±2.1	700, 275.5
A-101-15-8	76±7.8	16±5.4	5.3±0.6 to 5.0±0.5	0.7±0.08	2.0±0.6	0.3±0.04	20±2.1	555, 218.5
A-101-24-9	70±6.1	23±4.6	4.9±0.4 to 4.5±0.4	0.8±0.09	1.7±0.3	0.2±0.03	22±2.1 to 21±2.1	507, 199.5
A-101-15-12	12±4.4	63±29 to 73±34	15±6.7 to 4.9±2.2	3.1±1.7 to 3.2±1.8	3.7±1.9	2.6±1.4 to 3.6±1.9	0.7±0.3 to 0.5±0.3	362, 142.5
A-101-24-16	15±4.2 to 14±4.0	64±20 to 74±24	14±4.4 to 4.1±1.3	0.9±0.3	3.7±1.8	2.2±0.9 to 3.0±1.3	0.6±0.3 to 0.5±0.3	169, 66.5
A-101-24-19	18±4.5	65±20 to 72±23	12±3.4 to 4.2±1.2	0.7±0.2	3.3±1.6	1.3±0.5 to 1.6±0.7	1.0±0.3 to 0.8±0.3	24.1, 9.5
A-101 -NC	72±7.1	19±4.9	5.8±0.6 to 5.3±0.5	0.7±0.1	2.5±0.9	0.3±0.05	18±9.0	641, 252
A-101 - C	15±4.5	64±24 to 73±27	14±4.9 to 4.4±1.6	1.7±0.8	3.5±1.8	2.1±0.9 to 2.8±1.3	0.7±0.3 to 0.6±0.3	186, 73
AN-105-7B-4	25±12 to 24±12	58±42 to 66±49	11±5.6 to 3.4±1.8	1.4±0.9	0.6±0.4	3.2±1.4 to 4.3±2.0	0.7±0.3 to 0.5±0.3	893, 351.5
AN-105-12A-15	20±14 to 18±14	64±64 to 73±73	11±8.1 to 3.1±2.4	1.4±1.1	0.4±0.4	3.0±1.7 to 4.4±2.7	0.5±0.2 to 0.3±0.2	362, 142.5
AN-105-7B-16	19±5.9 to 17±5.6	71±28 to 77±31	7.1±2.6 to 2.1±0.8	0.8±0.4	0.3±0.2	2.1±0.9 to 2.7±1.1	0.7±0.2 to 0.5±0.2	314, 123.5
AN-105-12A-17	65±5.2 to 67±5.3	22±2.0 to 23±2.1	11±1.0 to 7.9±0.7	0.6±0.1	0.6±0.3	0.7±0.1	6.9±0.7 to 6.5±0.7	265, 104.5
AN-105-7B-18	55±7.8 to 57±8.1	31±5.0 to 33±5.3	11±1.9 to 6.3±1.1	0.8±0.2	0.5±0.2	1.7±0.5 to 1.8±0.6	2.7±0.4 to 2.4±0.4	217, 85.5
AN-105-12A-19	65±4.9 to 66±5.0	21±3.4 to 22±3.5	12±1.0 to 10±0.8	0.6±0.06	0.5±0.2	0.4±0.1	12±0.8	169, 66.5
AN-105-12A-21	57±4.0 to 60±4.2	22±1.6 to 24±1.7	19±1.5 to 14±1.2	0.8±0.06	0.3±0.2	0.5±0.1	7.4±0.7 to 6.9±0.7	72.4, 28.5
AN-105 - C	25±12 to 24±12	58±42 to 66±49	11±5.6 to 3.4±1.8	1.4±0.9	0.6±0.4	3.2±1.4 to 4.3±2.0	0.5±0.2 to 0.4±0.2	608, 239
AN-105 - NC	60±5.4 to 62±5.5	24±4.0 to 25±3.9	14±1.5 to 11±1.1	0.7±0.09	0.5±0.2	0.6±0.1	5.1±2.6 to 4.8±2.4	136, 53
High composition error bands result from a combination of relatively small amounts of sample gas and large amounts of air contamination.								
The ± values represent the measurement error band. The two central values are, first, the one based on the highest salt effect on gas solubility (lower-bound solubility); second, the one based on the lowest salt effect on gas solubility (upper-bound solubility). Only one central value is given in cases where gas solubility has too little effect to show up in the significant figures.								
Tank and Sample								
(or Layer)	Mole Percent of Constituen	Gas Volume Percent	Elevation (cm , in.)					
	H2	N2	N2O	CH4	NH3	Other		
AN-104-10A-3	25±13	56+49 to 65±58	14±7.6 to 4.0±2.4	1.9±1.3	0.8±0.5	2.6±1.4 to 3.5±1.9	0.9±0.3 to 0.7+0.3	893, 351.5
AN-104-10A-13	41±8.2 to 44±8.6	41±9.7 to 45±11	14±3.7 to 6.7±1.6	1.3±0.5 to 1.4±0.5	0.4±0.2	1.9±0.7 to 2.2±0.8	2.2±0.4 to 1.9±0.4	410, 161.5
AN-104-10A-15	50±8.1 to 52±8.4	32±5.7 to 34±6.0	13±2.5 to 8.8±1.6	1.1±0.3 to 1.2±0.3	1.9±0.9	1.3±0.4 to 1.4±0.5	4.7±0.8 to 4.4±0.8	314, 123.5
AN-104-10A-17	29±6.0 to 30±6.3	53±13 to 55±14	14±3.1 to 10±2.2	1.5±0.3 to 1.6±0.4	0.7±0.3	1.6±0.4 to 1.7±0.4	5.7±0.8 to 5.3±0.8	217, 85.5
AN-104-12A-18	45±3.6 to 47±3.8	37±3.0 to 38±3.2	15±1.5 to 12±1.1	1.1±0.2	0.5±0.2	1.4±0.4 to 1.5±0.4	7.1±0.7 to 6.7±0.7	169, 66.5
AN-104-10A-21	47±7.8 to 49±8.1	21±3.5 to 22±3.6	30±5.1 to 27±4.6	0.6±0.1	0.9±0.4	0.3±0.07	17±1.9 to 16±1.9	24.1, 9.5
AN-104 - C	25±13	56±49 to 65±58	14±7.6 to 4.0±2.4	1.9±1.3	0.8±0.5	2.6±1.4 to 3.5±1.9	0.5±0.2 to 0.4±0.2	695, 274
AN-104 - NC	45±6.9 to 47±7.1	29±4.8 to 31±5.1	23±3.7 to 20±3.2	0.9±0.2	0.9±0.4	0.8±0.2 to 0.9±0.2	8.0±4.0 to 7.5+3.8	115, 45
AN-103-12A-2	62±6.4 to 63±6.4	29±3.2	6.9±0.7 to 6.0±0.6	0.6±0.07	1.4±0.6	0.25±0.04	16±1.4	845, 332.5
AN-103-12A-5	19±10 to 18±10	69±54 to 75±60	7.9±4.7 to 2.3±1.4	1.7±1.3	1.0±0.7	1.4±0.7 to 1.7±0.8	0.8±0.3 to 0.6±0.3	700, 275.5
AN-103-21A-10	20±13 to 18±13	70±70 to 78±76	7.0±4.8 to 1.8±1.3	1.2±0.9 to 1.1±0.9	0.8±0.6	1.4±0.7 to 1.8±0.9	0.6±0.3 to 0.5±0.3	458, 180.5
AN-103-12A-14	55±8.8	38±6.5 to 39±6.6	4.9±0.8 to 3.8+0.6	0.7±0.2	0.7±0.3	0.4±0.1	6.7±1.2 to 6.5±1.2	265, 104.5
AN-103-21A-16	64±7.2	30±3.5 to 31±3.5	3.8±0.4 to 3.3±0.4	0.6±0.1	0.6±0.2	0.4±0.09	12±1.5	169, 66.5
AN-103 crust	62±6.4 to 63±6.4	29±3.2	6.9±0.7 to 6.0±0.6	0.6±0.07	1.4±0.6	0.2±0.03	16±7.9	838, 330

Tank and Sample (or Layer)	Mole Percent of Constituent in Bubbles						Gas Volume Percent	Elevation (cm , in.)
	H2	N2	N2O	CH4	NH3	Other		
AN-103 - C	19±12 to 18±12	70±62 to 76±69	7.5±4.8 to 2.1±1.4	1.4±1.1	0.9±0.6	1.4±0.6 to 1.7±0.8	0.7±0.3 to 0.6±0.3	586, 231
AN-103 - NC	61±7.7 to 62±7.7	33±4.3	4.1±0.6 to 3.4±0.5	0.6±0.1	0.6±0.2	0.4±0.09	9.2±4.6 to 9.0±4.5	160, 63
U-103-7-2	23±1.3	36±2.1 to 37±2.1	40±2.1 to 39±2.1	0.4±0.03	0.13±0.04 to 0.07±0.02	0.5±0.05	42±2.6 to 41±2.6	362, 142.5
U-103-7-5	14±0.9 to 16±1.0	32±2.0 to 36±2.2	51±3.1 to 46±2.8	0.26±0.06	1.6±0.6	0.4±0.1	9.6±0.8 to 8.5±0.8	217, 85.5
U-103-7-7	24±1.5 to 25±1.6	41±2.6 to 44±2.8	32±1.9 to 28±1.7	0.6±0.1	1.1±0.3	1.0±0.1 to 1.1±0.1	11±1.2 to 10±1.2	121, 47.5
U-103-7-8	31±3.1 to 33±3.3	36±3.6 to 39±3.9	29±2.9 to 24±2.4	0.8±0.1	1.1±0.6	1.7±0.2 to 1.8±0.2	7.8±1.0 to 7.1±1.0	72, 28.5
U-103 - NC	23±1.4 to 24±1.5	36±2.3 to 38±2.4	39±2.4 to 37±2.2	0.4±0.05	0.6±0.3 to 0.5±0.2	0.7±0.08	19±9.5 to 18±9.0	277, 109
S-106-7-3	59±5.0 to 60±5.1	32±3.1 to 33±3.2	7.8±0.7 to 5.9±0.5	0.4±0.2	0.3±0.2	0.2±0.1	9.6±0.9 to 9.3±0.9	362, 142.5
S-106-7-5	62±5.5 to 65±5.7	23±3.6	14+1.2 to 11±1.0	0.01±0.01	0.3±0.1	0.5±0.2 to 0.6±0.2	10±1.0	265, 104.5
S-106-8-6	63±8.6 to 65±8.8	25±3.6 to 26±3.7	9.9±1.5 to 7.2±1.1	0.5±0.2	0.5±0.3	0.9±0.5 to 1.0±0.5	7.6±0.8 to 7.3±0.8	217, 85.5
S-106-8-10	65±4.9 to 66±5.1	23±4.2 to 24±4.3	11±0.8 to 9.0±0.7	0.2±0.02	0.2±0.1	0.4±0.2	14±1.2	24, 9.5
S-106 - NC	63±5.7 to 65±5.9	25±3.7 to 26±3.8	11±1.0 to 8.4±0.8	0.3±0.08	0.3±0.2	0.5±0.2	10±5.0	151, 59.5

High composition error bands result from a combination of relatively small amounts of sample gas and large amounts of air contamination.

The ± values represent the measurement error band. The two central values are, first, the one based on the highest salt effect on gas solubility (lower-bound solubility); second, the one based on the lowest salt effect on gas solubility (upper-bound solubility). Only one central value is given in cases where gas solubility has too little effect to show up in the significant figures.

Tank and Sample (or Layer)	Mole Percent of Constituen	Gas Volume Percent	Elevation (cm , in.)					
	H2	N2	N2O	CH4	NH3	Other		
BY-109-12C-4	35±3.6 to 36±3.8	40±7.9 to 42±8.3	21±2.2 to 18±1.9	1.0±0.2	0.3±0.2	2.2±0.3 to 2.3±0.3	6.3±0.4 to 6.1±0.4	121, 47.5
BY-109-10B-5	52±5.5 to 53±5.6	29±5.0	16±1.7 to 15±1.6	0.7±0.1	0.2±0.1	1.8±0.3	8.7±0.8 to 8.4±0.8	121, 47.5
BY-109-10B-6	56±6.4 to 57±6.5	23±3.8	17±3.3 to 16±3.1	0.9±0.1	0.2±0.1	2.6±0.4 to 2.7±0.4	12±1.0	72, 28.5
BY-109 below ILL	50±5.5 to 51±5.6	29±5.1	18±2.5 to 16±2.3	0.9±0.1	0.2±0.1	2.3±0.3	9.4±4.7 to 9.2±4.6	120, 47
SX-106-3-2	22±2.9 to 16±2.4	63±11 to 74±14	11±1.5 to 1.7±0.3	1.4±0.5 to 1.0±0.4	1.0±0.2 to 0.4±0.1	1.9±0.7 to 7.7±2.9	0.1±0.04 to 0.03±0.03	458, 180.5
SX-106-3-4	19±6.1 to 16±5.1	65±28 to 78±34	13±4.8 to 2.2±0.8	0.9±0.4 to 0.7±0.3	0.8±0.3 to 0.4±0.1	1.0±0.4 to 2.5±0.9	0.2±0.07 to 0.07±0.07	362, 142.5
SX-106-6-6	50±5.0 to 53±5.4	23±3.3 to 25±3.5	18±1.9 to 16±1.7	1.9±0.3 to 2.0±0.3	6.7±0.8 to 3.0±0.4	1.0±0.3 to 1.1±0.3	9.1±1.0 to 8.4±1.0	265, 104.5
SX-106-6-6A	51±5.6 to 56±6.2	19±3.3 to 21±3.7	22±2.9 to 17±2.2	2.7±0.9 to 3.0±1.0	4.0±0.5 to 1.8±0.2	1.4±0.4 to 1.6±0.4	4.1±0.6 to 3.6±0.6	265, 104.5
SX-106-3-7	48±8.5 to 50±8.5	19±8.6 to 20±9.0	27±7.1	0.5±0.09	5.7±2.7 to 2.5±1.2	0.3±0.08	30±11 to 29±11	217, 85.5
SX- 106-6-9	60±3.6 to 62±3.6	17±2.0 to 18±2.0	17±1.1	0.4±0.1	4.9±0.8 to 2.2±0.3	0.3±0.09	36±2.2 to 34±2.2	121, 47.5
SX-106-3-10	44±2.8 to 47±2.7	21±2.4 to 22±2.5	28±1.8	0.6±0.05	5.5±0.8 to 2.4±0.4	0.3±0.08	32±2.0 to 31±2.0	72, 28.5
SX-106-C	21±4.9 to 16±4.0	64±21 to 77±26	12±3.4 to 2.1±0.6	1.1±0.4 to 0.8±0.4	0.9±0.2 to 0.4±0.1	1.4±0.5 to 3.9±1.4	0.2±0.1 to 0.05±0.05	418, 164
SX-106 - NC	50±4.5 to 52±4.5	20±3.6 to 21±4.0	24±2.6 to 24±2.7	0.6±0.1	5.6±1.2 to 2.4±0.5	0.3±0.08	26±13 to 25±13	138, 53
AX-101-9D-8	61±5.5 to 64±5.5	17±2.6 to 18±2.7	11±1.0	2.4±0.2 to 2.5±0.2	8.4±1.9 to 4.3±1.0	0.7±0.2	17±1.3 to 16±1.3	362, 142.5
S-102-16-2	36±2.5 to 37±2.5	37±4.4 to 38±4.4	26±1.8 to 24±1.7	0.4±0.05	0.6±0.4 to 0.4±0.2	0.1±0.02	33±4.3 to 32±4.3	458, 180.5
S-102-16 4R	33±2.9 to 37±3.2	31±4.1 to 36±4.7	34±3.4 to 26±2.5	0.2±0.07 to 0.3±0.08	1.3±0.9 to 0.7±0.5	0.3±0.09	7.4±0.7 to 6.4±0.7	362, 142.5
S-102-16-7	27±3.1 to 28±3.2	29±4.2 to 30±4.4	42±4.8 to 41±4.6	0.4±0.06	1.5±0.4 to 0.8±0.2	0.07±0.03	30±1.9 to 29±1.9	217, 85.5
S-102-16-10	43±3.8 to 46±4.1	29±4.3 to 31±4.6	25±2.2 to 21±1.9	0.7±0.08 to 0.8±0.08	1.2±0.3 to 0.6±0.2	0.6±0.1	12±1.1 to 11±1.1	72, 28.5
S-102 tank avg.	33±3.0 to 35±3.1	32±4.3 to 33±4.5	33±3.1 to 31±2.9	0.4±0.06 to 0.5±0.06	1.1±0.4 to 0.6±0.2	0.2±0.04	26±13 to 25±13	292, 115
S-111-6-2	6.3±3.4 to 5.8±3.2	90±68 to 92±70	1.7±1.0 to 0.7±0.4	0.3±0.2	0.2±0.2 to 0.1±0.1	1.0±0.8 to 1.2±0.9	0.8±0.2 to 0.7±0.2	458, 180.5
S-111-6-4	48±24 to 51±25	36±22 to 38±23	14±5.5 to 9.8±4.0	0.6±0.2	0.9±0.4 to 0.5±0.2	0.3±0.08	6.9±2.1 to 6.5±2.1	362, 142.5
S-111-6-6	58±5.1 to 60±5.2	26±3.4 to 27±3.5	14±1.3 to 11±1.1	0.8±0.1	1.2±0.4 to 0.7±0.2	0.5±0.2	15±5	265, 104.5
S-111-6-8	67±7.1 to 68±7.2	20±2.8	12±1.3 to 11±1.2	0.6±0.08	0.7±0.2 to 0.4±0.1	0.2±0.07	20±2.8 to 20±2.9	169, 66.5
S-111-6-10	73±5.6 to 74±5.7	16±2.0 to 16±2.0	9.2±0.8 to 8.5±0.7	0.3±0.04	1.6±0.4 to 0.9±0.3	0.09±0.04	23±3.2 to 22±3.2	72, 28.5

Tank and Sample (or Layer)	Mole Percent of Constituent in Bubbles						Gas Volume Percent	Elevation (cm , in.)
	H2	N2	N2O	CH4	NH3	Other		
S-111 - C	6.3±3.4 to 5.8±3.2	90±68 to 92±70	1.7±1.0 to 0.7±0.4	0.3±0.2	0.2±0.2 to 0.1±0.1	1.0±0.8 to 1.2±0.9	0.8±0.2 to 0.7±0.2	439, 173
S-111 -NC	66±10 to 67±11	21±5.6 to 22±5.8	11±1.7 to 9.6±1.5	0.5±0.08	1.1±0.4 to 0.6±0.2	0.2±0.05	15±7.5 to 14±7.0	139, 55

High composition error bands result from a combination of relatively small amounts of sample gas and large amounts of air contamination.
The ± values represent the measurement error band. The two central values are, first, the one based on the highest salt effect on gas solubility (lower-bound solubility); second, the one based on the lowest salt effect on gas solubility (upper-bound solubility). Only one central value is given in cases where gas solubility has too little effect to show up in the significant figures.

Tank and Sample (or Layer)	Mole Percent of Constituen	Gas Volume Percent	Elevation (cm , in.)					
	H2	N2	N2O	CH4	NH3	Other		
U-109-8-2	20±2.9 to 21±3.1	42±7.6 to 45±8.0	3616.3 to 33±5.7	0.5±0.1 to 0.6±0.09	0.8±0.3 to 0.41±0.2	0.4±0.2	20±2.5 to 19±2.5	362, 142.5
U-109-8-4	24±3.2 to 25±3.3	38±6.3 to 40±6.6	35±4.0 to 33±3.7	0.6±0.08	2.2±0.9 to 1.2±0.5	0.3±0.07	23±2.2 to 22±2.2	265, 104.5
U-109-8-6	28±5.0 to 30±5.2	43±11 to 45±11	26±5.1 to 23±4.4	1.1±0.2 to 1.2±0.2	1.0±0.3 to 0.5±0.2	0.7±0.2	15±1.0 to 14±1.0	169, 66.5
U-109-8-8	27±2.4 to 28±2.5	52±7.5 to 53±7.7	19±1.7 to 17±1.6	0.8±0.9	1.10±4 to 0.5±0.2	0.4+0.07	30±1.9 to 29±1.8	72, 28.5
U-109 - NC	25±3.1 to 26±3.2	46±7.8 to 48±8.1	27±3.5 to 24±3.2	0.7±0.1 to 0.8±0.1	1.2±0.5 to 0.6±0.2	0.4±0.1	22±11 to 21±10	204, 80
SY-101-23A-1	22±3.2 to 23±3.3	47±9.4 to 51±10	23±3.4 to 21±3.1	0.8±0.1 to 0.9±0.1	6.2±1.6 to 2.9±0.8	0.7±0.1 to 0.8±0.1	20±1.5 to 18±1.5	1022, 402
SY-101-23A-2	34±4.8 to 35±5.1	27±4.5 to 30±4.8	21±3.0 to 23±3.0	0.6±0.09	16±3.7 to 7.1±1.6	0.9±0.3 to 1.0±0.3	39±2.9 to 35±2.9	974, 383.5
SY-101-22A-3	34±4.4 to 37±4.6	30±4.9 to 33±5.2	24±3.3 to 24±3.2	0.6±0.2 to 0.7±0.2	11±2.6 to 5.0±1.2	0.4±0.2 to 0.5±0.2	33±2.7 to 30±2.7	959, 377.5
SY-101-23A-3	40±4.4 to 45±4.4	23±3.3 to 26±3.4	18±1.9 to 20±1.8	0.5±0.07 to 0.6±0.07	18±4.7 to 7.6±1.9	0.5±0.09 to 0.6±0.1	61±3.9 to 53±3.9	926, 364.5
SY-101-22A-4	35±3.9 to 44±3.6	21±3.2 to 26±3.4	17±1.8 to 20±1.6	0.5±0.08 to 0.7±0.08	26±6.8 to 8.6±2.1	0.5±0.08	73±7 to 58±3.8	911, 358.5
SY-101-4A-5	38±8.7 to 43±10	27±7.9 to 33±9.4	24±6.1 to 17±4.3	1.1±0.3 to 1.2±0.4	8.8±2.4 to 4.2±1.1	1.1±0.4 to 1.3±0.4	6.0±1.8 to 4.9±1.7	845, 332.5
SY-101-23A-6	24±6.6 to 27±7.5	46±14 to 55±17	21±6.3 to 12±3.5	1.4±0.5 to 1.6±0.6	5.9±1.0 to 2.8±0.8	1.4±0.6 to 1.7±0.7	3.5±1.2 to 2.8±1.2	685, 269.5
SY-101-22A-10	29±10 to 35±12	35±14 to 44±17	25±6.7 to 14±4.7	1.4±0.5 to 1.7±0.6	8.0±2.7 to 3.8±1.3	1.4±0.5 to 1.6±0.6	3.2±1.1 to 2.4±1.0	621, 244.5
SY-101-23A-13	29±9.9 to 34±12	37±14 to 46±18	25±8.6 to 13±4.4	1.2±0.4 to 1.4±0.5	6.7±1.5 to 3.2±1.2	1.5±0.6 to 2.0±0.8	2.8±0.9 to 2.1±0.9	443, 174.5
SY-101-22A-17	30±7.5 to 36±9.2	35±11 to 45±14	27±7.0 to 13±3.5	1.5±0.4 to 1.8±0.5	4.8±0.9 to 2.3±0.7	1.3±0.4 to 1.7±0.6	2.5±0.7 to 1.8±0.7	316, 124.5
SY-101-23A-21	29±8.6 to 34±10	40±13 to 49±17	23±6.9 to 11±3.2	1.6±0.5 to 1.8±0.6	4.6±0.9 to 2.2±0.7	1.4±0.5 to 1.9±0.6	2.3±0.7 to 1.7±0.7	75, 29.5
SY-101-22A-23	32+8.7 to 38±10	36±12 to 45±15	26±7.6 to 12±3.6	1.3±0.4 to 1.6±0.5	4.0±0.6 to 1.9±0.6	1.2±0.4 to 1.7±0.6	2.5±0.8 to 1.9±0.8	28, 11
SY-101-23A crust	35±4.4 to 39±4.5	26±4.6 to 32±4.9	20±2.5 to 21±2.4	0.6±0.09	16±3.9 to 6.7±1.6	0.7±0.2	40±20 to 35±18	953, 375
SY-101-23A liq	27±8.3 to 31±9.8	41±14 to 51±17	23±7.2 to 12±3.7	1.4±0.5 to 1.6±0.6	5.8±1.8 to 2.8±0.9	1.4±0.5 to 1.8±0.7	2.8±1.4 to 2.2±1.1	445, 175
SY-101-22A crust	33±3.9 to 38±4.0	27±4.5 to 32±5.0	20±2.4 to 22±2.3	0.6±0.1 to 0.7±0.1	19±4.8 to 6.6±1.6	0.4±0.1 to 0.5±0.1	54±27 to 46±23	942, 371
SY-101-22A liq.	32±8.8 to 38±10	33±11 to 42±14	26±7.3 to 14±4.1	1.3±0.4 to 1.6±0.5	6.4±1.9 to 3.1±0.9	1.2±0.4 to 1.6±0.6	3.1±1.6 to 2.4±1.2	451, 177

High composition error bands result from a combination of relatively small amounts of sample gas and large amounts of air contamination.
The ± values represent the measurement error band. The two central values are, first, the one based on the highest salt effect on gas solubility (lower-bound solubility); second, the one based on the lowest salt effect on gas solubility (upper-bound solubility). Only one central value is given in cases where gas solubility has too little effect to show up in the significant figures.

Step 2 of 7 - Original Tables for breakdown of "Other" components
Source: "rgs FinalSumTable.doc" Personal Communication from Lenna Mahoney. Not previously published.

Tank and Sample (or Layer)	Mole Percent of Constituent in Bubbles					
		Other				
	CH4	C2Hx	C3Hx	Other HC	Other NOx	Total "Other"
AW-101 solids	1.7±0.2	1.1±0.2 to 1.2±0.2	0.26±0.1 to 0.27±0.1	1.3±0.3 to 1.4±0.3	0.12±0.06 to 0.12±0.07	2.8±0.5 to 2.9±0.6
A-101 upper	0.7±0.1	0.12±0.02	0.07±0.03	0.11±0.03	0.07±0.02	0.3±0.06
AN-105 solids	0.7±0.07	0.11±0.04 to 0.12±0.05	0.05±0.02	0.19±0.06 to 0.20±0.07	0.18±0.04 to 0.21±0.04	0.6±0.1
AN-104 solids	0.9±0.2	0.30±0.10 to 0.31±0.11	0.08±0.03	0.44±0.18 to 0.46±0.19	0.03±0.02	0.8±0.3 to 0.9±0.3
AN-103 crust	0.6±0.07	0.13±0.02	0.04±0.01	0.05±0.01	0.02±0.01	0.2±0.05
AN-103 solids	0.6±0.1	0.15±0.05 to 0.16±0.05	0.07±0.02 to 3.6±0.5	0.15±0.06	0.02±0.02 to 0.03±0.02	0.4±0.1
U-103 slurry	0.4±0.03	0.41±0.04	0±0.02	0.04±0.01	0.01±0.01	0.5±0.06
U-103 solids	0.4±0.06 to 0.5±0.09	0.59±0.10 to 0.64±0.10	0.02±0.02	0.09±0.02	0.14±0.04 to 0.16±0.05	0.8±0.2 to 0.9±0.2
S-106 solids	0.2±0.07	0.24±0.19 to 0.25±0.19	0.13±0.07	0.06±0.03	0.05±0.04 to 0.06±0.04	0.5±0.3
BY-109 below ILL	0.6±0.1	1.0±0.2 to 1.1±0.2	0.15±0.07	1.1±0.2	0.01±0.01 to 0.02±0.01	2.3±0.4
SX-106 solids	0.6±0.1	0.20±0.07 to 0.21±0.07	0.08±0.01	0.06±0.03 to	0.01±0.01 to 0.01±0.01	0.4±0.1
AX-101-9D-8	2.4±0.2 to 2.5±0.2	0.45±0.19 to 0.48±0.20		0.22±0.12 to 0.24±0.13		0.7±0.3
S-102 tank avg.	0.4±0.07	0.10±0.03		0.06±0.03 to 0.07±0.03		0.2±0.06
S-111 solids	0.4±0.07 to 0.5±0.07	0.06±0.03		0.07±0.04		0.2±0.07
U-109 tank avg.	0.7±0.1	0.28±0.08 to 0.29±0.08		0.13±0.07 to		0.4±0.2
SY-101-022 crust	0.6±0.08 to 0.7±0.09	0.56±0.15 to 0.67±0.17		0.06±0.03 to 0.07±0.04		0.6±0.2 to 0.7±0.2
SY-101-021 crust	0.6±0.1 to 0.7±0.1	0.38±0.06 to 0.47±0.10		0.05±0.02 to 0.06±0.03		0.4±0.1 to 0.5±0.1
SY-101-022 liq.	1.3±0.5 to 1.6±0.6	0.70±0.32 to 0.87±0.40		0.67±0.41 to 0.83±0.51		1.4±0.7 to 1.7±0.9
SY-101-021 liq.	1.3±0.4 to 1.6±0.5	0.66±0.27 to 0.83±0.34		0.54±0.31 to 0.67±0.39		1.2±0.6 to 1.5±0.7

Step 3 of 7 - Combine Original and "Other" Component Tables

Tank and Sample (or Layer)		AW-101 solids	cb dists high salt	high salt mean	± high salt range	to high salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	high salt range mean	high salt range std dev	range normalize mean	low salt range std dev	low salt range forecasts	low salt range mean
Mole Percent of Constituent in Bubbles	H2	32±3.2 to 33±3.2	31.906	32.000	3.200	1.067	33.000	33.000	3.200	1.067	31.906	32.06	1.08	30.40	1.08	33.000	32.96
	N2	56±6.2 to 58±6.4	55.000	56.000	6.200	2.067	57.000	58.000	6.400	2.133	55.120	56.21	2.08	53.30	2.08	57.120	58.24
	N2O	7.2±0.8 to 4.4±0.5	7.500	7.200	0.800	0.267	5.000	4.400	0.500	0.167	7.500	7.20	0.28	6.83	0.28	5.000	4.40
	CH4	1.7±0.2	1.700	1.700	0.200	0.067		-	-	0.001	9.383	9.39	0.43	8.90	0.43	8.275	8.26
	NH3	0.6±0.3	0.800	0.600	0.300	0.100		-	-	0.001	0.800	0.60	0.10	0.57	0.10	-	-
	Other	2.8±0.5 to 2.9±0.6		2.800	0.500	0.167		2.900	0.600	0.200							
	CH4	1.7±0.2		1.700	0.200	0.067		-	-	0.001							
	C2Hx	1.1±0.2 to 1.2±0.2	1.100	1.100	0.200	0.067	1.200	1.200	0.200	0.067							
	C3Hx	0.26±0.1 to 0.27±0.1	0.260	0.260	0.100	0.033	0.270	0.270	0.100	0.033							
	Other HC	1.3±0.3 to 1.4±0.3	1.300	1.300	0.300	0.100	1.400	1.400	0.300	0.100							
	Other NOx	0.12±0.06 to 0.12±0.07	0.120	0.120	0.060	0.020	0.120	0.120	0.070	0.023							
	Total "Other"	2.8±0.5 to 2.9±0.6		2.800	0.500	0.167		2.900	0.600	0.200							
				100.28							104.709	105.45		100.00		103.395	103.85
																	0

Tank and Sample (or Layer)		A-101 upper	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	high salt range mean	high salt range std dev	range normalize mean	low salt range std dev	low salt range forecasts	low salt range mean
Mole Percent of Constituent in Bubbles	H2	72±7.1	69.000	72.000	7.100	2.367		-	-	0.001	69.000	72.01	2.30	71.37	2.30	-	-
	N2	19±4.9	20.000	19.000	4.900	1.633	-	-	-	0.001	20.070	19.07	1.64	18.90	1.64	-	-
	N2O	5.8±0.6 to 5.3±0.5	5.700	5.800	0.600	0.200	5.500	5.300	0.500	0.167	5.700	5.80	0.20	5.75	0.20	5.500	5.30
	CH4	0.7±0.1	0.700	0.700	0.100	0.033	-	-	-	0.001	1.515	1.51	0.06	1.50	0.06	-	-
	NH3	2.5±0.9	4.400	2.500	0.900	0.300		-	-	0.001	4.400	2.49	0.30	2.47	0.30	-	-
	Other	0.3±0.06		0.300	0.060	0.020		-	-	0.001							
	CH4	0.7±0.1		0.700	0.100	0.033		-	-	0.001							
	C2Hx	0.12±0.02	0.120	0.120	0.020	0.007	-	-	-	0.001							
	C3Hx	0.07±0.03	0.070	0.070	0.030	0.010	-	-	-	0.001							
	Other HC	0.11±0.03	0.110	0.110	0.030	0.010	-	-	-	0.001							
	Other NOx	0.07±0.02	0.070	0.070	0.020	0.007	-	-	-	0.001							
	Total "Other"	0.3±0.06		0.300	0.060	0.020		-	-	0.001							
				100.37							100.685	100.90		100.00		5.5	5.30
																	0

Tank and Sample (or Layer)		AN-106 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	high salt range mean	high salt range std dev	range normalize mean	low salt range std dev	low salt range forecasts	low salt range mean
Mole Percent of Constituent in Bubbles	H2	60±5.4 to 62±5.5	61.000	60.000	5.400	1.800	63.000	62.000	5.500	1.833	61.000	59.96	1.79	59.67	1.79	63.000	61.85
	N2	24±4.0 to 25±3.9	22.000	24.000	4.000	1.333	23.000	25.000	3.900	1.300	22.180	24.24	1.36	24.13	1.36	23.210	25.24
	N2O	14±1.5 to 11±1.1	15.000	14.000	1.500	0.500	12.000	11.000	1.100	0.367	15.000	14.01	0.49	13.94	0.49	12.000	10.99
	CH4	0.7±0.09	0.700	0.700	0.090	0.030	-	-	-	0.001	1.768	1.77	0.09	1.76	0.09	1.000	1.00
	NH3	0.5±0.2	0.600	0.500	0.200	0.067	-	-	-	0.001	0.600	0.50	0.06	0.50	0.06	-	-
	Other	0.6±0.1		0.600	0.100	0.033		-	-	0.001							

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Combine Original and "Other" Component Tables

CH4	0.7±0.07		0.700	0.070	0.023		-	-	0.001							
C2Hx	0.11±0.04 to 0.12±0.05	0.110	0.110	0.040	0.013	0.120	0.120	0.050	0.017							
C3Hx	0.05±0.02	0.050	0.050	0.020	0.007	-	-	-	0.001							
Other HC	0.19±0.06 to 0.20±0.07	0.190	0.190	0.060	0.020	0.200	0.200	0.070	0.023							
Other NOx	0.18±0.04 to 0.21±0.04	0.180	0.180	0.040	0.013	0.210	0.210	0.040	0.013							
Total "Other"	0.6±0.1		0.600	0.100	0.033		-	-	0.001							0
			99.73							100.5483	100.48		100.00		99.21	99.06

Tank and Sample (or Layer)		AN-104 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	high salt range mean	high salt range std dev	range normalize mean	low salt range std dev	low salt range forecasts	low salt range mean
Mole Percent of Constituent in Bubbles	H2	45±6.9 to 47±7.1	45.000	45.000	6.900	2.300	46.000	47.000	7.100	2.367	45.000	45.01	2.32	44.41	2.32	46.000	46.88
	N2	29±4.8 to 31±5.1	29.000	29.000	4.800	1.600	30.000	31.000	5.100	1.700	29.030	29.06	1.56	28.67	1.56	30.000	30.92
	N2O	23±3.7 to 20±3.2	23.000	23.000	3.700	1.233	21.000	20.000	3.200	1.067	23.000	23.02	1.20	22.72	1.20	21.000	20.05
	CH4	0.9±0.2	0.900	0.900	0.200	0.067	-	-	-	0.001	3.360	3.36	0.24	3.31	0.24	2.357	2.34
	NH3	0.9±0.4	1.400	0.900	0.400	0.133		-	-	0.001	1.400	0.90	0.13	0.88	0.13	-	-
	Other	0.8±0.3 to 0.9±0.3		0.800	0.300	0.100		0.900	0.300	0.100							
	CH4	0.9±0.2		0.900	0.200	0.067		-	-	0.001							
	C2Hx	0.30±0.10 to 0.31±0.11	0.300	0.300	0.100	0.033	0.310	0.310	0.110	0.037							
	C3Hx	0.08±0.03	0.080	0.080	0.030	0.010	-	-	-	0.001							
	Other HC	0.44±0.18 to 0.46±0.19	0.440	0.440	0.180	0.060	0.460	0.460	0.190	0.063							
	Other NOx	0.03±0.02	0.030	0.030	0.020	0.007	-	-	-	0.001							
	Total "Other"	0.8±0.3 to 0.9±0.3		0.800	0.300	0.100		0.900	0.300	0.100							0
				99.85							101.79	101.35		100.00		99.35867	100.19

Tank and Sample (or Layer)		AN-103 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	high salt range mean	high salt range std dev	high salt range mean	low salt range std dev	low salt range forecasts	low salt range mean
Mole Percent of Constituent in Bubbles	H2	61±7.7 to 62±7.7	61.000	61.000	7.700	2.567	62.000	62.000	7.700	2.567	61.000	61.10	2.59	60.74	2.59	62.000	61.88
	N2	33±4.3	33.000	33.000	4.300	1.433	-	-	-	0.001	33.020	33.15	1.44	32.96	1.44	-	-
	N2O	4.1±0.6 to 3.4±0.5	4.200	4.100	0.600	0.200	3.600	3.400	0.500	0.167	4.200	4.11	0.19	4.08	0.19	3.600	3.39
	CH4	0.6±0.1	0.600	0.600	0.100	0.033	-	-	-	0.001	1.625	1.63	0.09	1.62	0.09	9.267	9.26
	NH3	0.6±0.2	0.900	0.600	0.200	0.067		-	-	0.001	0.900	0.60	0.06	0.60	0.06	-	-
	Other	0.4±0.1		0.400	0.100	0.033		-	-	0.001							
	CH4	0.6±0.1		0.600	0.100	0.033		-	-	0.001							
	C2Hx	0.15±0.05 to 0.16±0.05	0.150	0.150	0.050	0.017	0.160	0.160	0.050	0.017							
	C3Hx	0.07±0.02 to 3.6±0.5	0.070	0.070	0.020	0.007	3.600	3.600	0.500	0.167							
	Other HC	0.15±0.06	0.150	0.150	0.060	0.020	-	-	-	0.001							
	Other NOx	0.02±0.02 to 0.03±0.02	0.020	0.020	0.020	0.007	-	0.030	0.020	0.007							
	Total "Other"	0.4±0.1		0.400	0.100	0.033		-	-	0.001							0
				99.89							100.745	100.58		100.00		74.88667	74.53

high salt range | range normalize | low salt range

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Tank and Sample (or Layer)		U-103 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	forecasts	mean	std dev	mean	std dev	forecasts	mean
Mole Percent of Constituent in Bubbles	H2	23±1.4 to 24±1.5	21.000	23.000	1.400	0.467	22.000	24.000	1.500	0.500	21.000	23.01	0.46	22.87	0.46	22.000	24.01
	N2	38±2.3 to 38±2.4	35.000	36.000	2.300	0.767	38.000	38.000	2.400	0.800	35.140	36.19	0.77	35.97	0.77	38.160	38.12
	N2O	39±2.4 to 37±2.2	41.000	39.000	2.400	0.800	38.000	37.000	2.200	0.733	41.000	39.03	0.79	38.79	0.79	38.000	37.00
	CH4	0.4±0.05	0.400	0.400	0.050	0.017		-	-	0.001	1.793	1.79	0.07	1.78	0.07	1.067	1.06
	NH3	0.6±0.3 to 0.5±0.2	1.500	0.600	0.300	0.100	0.800	0.500	0.200	0.067	1.500	0.60	0.10	0.59	0.10	0.800	0.50
	Other	0.8±0.2 to 0.9±0.2		0.800	0.200	0.067		0.900	0.200	0.067							
	CH4	0.4±0.08 to 0.5±0.09		0.400	0.080	0.027		0.500	0.090	0.030							
	C2Hx	0.59±0.10 to 0.64±0.10	0.590	0.590	0.100	0.033	0.640	0.640	0.100	0.033							
	C3Hx	0.02±0.02	0.020	0.020	0.020	0.007	-	-	-	0.001							
	Other HC	0.09±0.02	0.090	0.090	0.020	0.007	-	-	-	0.001							
	Other NOx	0.14±0.04 to 0.16±0.05	0.140	0.140	0.040	0.013	0.160	0.160	0.050	0.017							
	Total "Other"	0.8±0.2 to 0.9±0.2		0.800	0.200	0.067		0.900	0.200	0.067							1
				99.84							100.4333	100.63		100.00		100.0267	100.70

Tank and Sample (or Layer)		S-106 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	mean	std dev	high salt mean	std dev	low salt range forecasts	mean
Mole Percent of Constituent in Bubbles	H2	63±5.7 to 65±5.9	63.000	63.000	5.700	1.900	65.000	65.000	5.900	1.967	63.000	62.94	1.90	62.57	1.90	65.000	64.96
	N2	25±3.7 to 26±3.8	26.000	25.000	3.700	1.233	-	26.000	3.800	1.267	25.050	25.06	1.24	24.91	1.24	0.060	0.06
	N2O	11±1.0 to 8.4±0.8	11.000	11.000	1.000	0.333	9.000	8.400	0.800	0.267	11.000	11.03	0.34	10.96	0.34	9.000	8.40
	CH4	0.3±0.08	0.200	0.300	0.080	0.027	-	-	-	0.001	1.165	1.27	0.14	1.26	0.14	0.417	0.41
	NH3	0.3±0.2	0.400	0.300	0.200	0.067		-	-	0.001	0.400	0.30	0.07	0.30	0.07	-	-
	Other	0.5±0.3		0.500	0.300	0.100		-	-	0.001							
	CH4	0.2±0.07		0.200	0.070	0.023		-	-	0.001							
	C2Hx	0.24±0.19 to 0.25±0.19	0.240	0.240	0.190	0.063	0.250	0.250	0.190	0.063							
	C3Hx	0.13±0.07	0.130	0.130	0.070	0.023	-	-	-	0.001							
	Other HC	0.06±0.03	0.060	0.060	0.030	0.010	-	-	-	0.001							
	Other NOx	0.05±0.04 to 0.06±0.04	0.050	0.050	0.040	0.013	0.060	0.060	0.040	0.013							
	Total "Other"	0.5±0.3		0.500	0.300	0.100		-	-	0.001							0
				100.08							100.615	100.59		100.00		74.47667	73.83

Tank and Sample (or Layer)		BY-109 below salt ILL	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	mean	std dev	high salt range mean	std dev	low salt range forecasts	mean
Mole Percent of Constituent in Bubbles	H2	50±5.5 to 51±5.6	50.000	50.000	5.500	1.833	51.000	51.000	5.600	1.867	50.000	50.03	1.87	47.86	1.87	51.000	51.03
	N2	29±5.1	28.000	29.000	5.100	1.700		-	-	0.001	28.010	29.02	1.78	27.77	1.78	0.020	0.02
	N2O	18±2.5 to 18±2.3	18.000	18.000	2.500	0.833	17.000	16.000	2.300	0.767	18.000	17.93	0.84	17.15	0.84	17.000	16.00
	CH4	0.9±0.1	0.800	0.900	0.100	0.033	-	-	-	0.001	7.242	7.35	0.29	7.03	0.29	1.833	1.83
	NH3	0.2±0.1	0.300	0.200	0.100	0.033		-	-	0.001	0.300	0.20	0.03	0.19	0.03	-	-
	Other	2.3±0.4		2.300	0.400	0.133		-	-	0.001							
	CH4	0.8±0.1		0.800	0.100	0.033		-	-	0.001							

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Combine Original and "Other" Component Tables

C2Hx	1.0±0.2 to 1.1±0.2	1.000	1.000	0.200	0.067	1.100	1.100	0.200	0.067							
C3Hx	0.15±0.07	0.150	0.150	0.070	0.023	-	-	-	0.001							
Other HC	1.1±0.2	1.100	1.100	0.200	0.067	-	-	-	0.001							
Other NOx	0.01±0.01 to 0.02±0.01	0.010	0.010	0.010	0.003	0.020	0.020	0.010	0.003							
Total "Other"	2.3±0.4		2.300	0.400	0.133		-	-	0.001							0
			100.36							103.5617	104.53		100.00		69.85333	68.88

Tank and Sample (or Layer)		SX-106 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	high salt range mean	high salt range std dev	high salt range mean	low salt range std dev	low salt range forecasts	low salt range mean
Mole Percent of Constituent in Bubbles	H2	50±4.5 to 52±4.5	51.000	50.000	4.500	1.500	53.000	52.000	4.500	1.500	51.000	50.03	1.48	49.60	1.48	53.000	51.87
	N2	20±3.8 to 21±4.0	20.000	20.000	3.800	1.267	21.000	21.000	4.000	1.333	20.010	19.99	1.24	19.81	1.24	21.020	20.99
	N2O	24±2.8 to 24±2.7	24.000	24.000	2.800	0.933	-	24.000	2.700	0.900	24.000	23.99	0.92	23.78	0.92	-	-
	CH4	0.6±0.1	0.600	0.600	0.100	0.033	-	-	-	0.001	1.373	1.37	0.07	1.36	0.07	1.833	0.35
	NH3	5.5±1.2 to 2.4±0.5	4.400	5.500	1.200	0.400	1.600	2.400	0.500	0.167	4.400	5.49	0.39	5.45	0.39	1.600	2.41
	Other	0.4±0.1		0.400	0.100	0.033		-	-	0.001							
	CH4	0.6±0.1		0.600	0.100	0.033		-	-	0.001							
	C2Hx	0.20±0.07 to 0.21±0.07	0.200	0.200	0.070	0.023	1.100	0.210	0.070	0.023							
	C3Hx	0.08±0.01	0.080	0.080	0.010	0.003	-	-	-	0.001							
	Other HC	0.06±0.03 to	0.060	0.060	0.030	0.010	-	-	-	0.001							
	Other NOx	0.01±0.01 to 0.01±0.01	0.010	0.010	0.010	0.003	0.020	0.010	0.010	0.003							
	Total "Other"	0.4±0.1		0.400	0.100	0.033		-	-	0.001							0
				100.45							100.7833	100.88		100.00		77.45333	75.81

Tank and Sample (or Layer)		AX-101-9D-8	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	high salt range mean	high salt range std dev	high salt range mean	low salt range std dev	low salt range forecasts	low salt range mean
Mole Percent of Constituent in Bubbles	H2	61±5.5 to 64±5.5	60.000	61.000	5.500	1.833	64.000	64.000	5.500	1.833	60.000	60.99	1.81	60.10	1.81	64.000	63.98
	N2	17±2.6 to 18±2.7	16.000	17.000	2.600	0.867	18.000	18.000	2.700	0.900	16.000	17.02	0.89	16.77	0.89	18.000	17.99
	N2O	11±1.0	11.000	11.000	1.000	0.333	-	-	-	0.001	11.000	11.01	0.34	10.85	0.34	-	-
	CH4	2.4±0.2 to 2.5±0.2	2.400	2.400	0.200	0.067	2.500	2.500	0.200	0.067	4.030	4.03	0.21	3.97	0.21	3.300	3.29
	NH3	8.4±1.9 to 4.3±1.0	9.200	8.400	1.900	0.633	3.500	4.300	1.000	0.333	9.200	8.43	0.65	8.30	0.65	3.500	4.30
	Other	0.7±0.3		0.700	0.300	0.100		-	-	0.001							
	CH4	2.4±0.2 to 2.5±0.2		2.400	0.200	0.067		2.500	0.200	0.067							
	C2Hx	0.45±0.19 to 0.48±0.20	0.450	0.450	0.190	0.063	0.480	0.480	0.200	0.067							
	C3Hx		-	-	-	0.001	-	-	-	0.001							
	Other HC	0.22±0.12 to 0.24±0.13	0.220	0.220	0.120	0.040	-	-	-	0.001							
	Other NOx		-	-	-	0.001	-	-	-	0.001							
	Total "Other"	0.7±0.3		0.700	0.300	0.100		-	-	0.001							0
				100.47							100.23	101.48		100.00		88.8	89.57

high salt range | range normalize | low salt range

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Combine Original and "Other" Component Tables

Tank and Sample (or Layer)		S-102 tank avg.	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	forecasts	mean	std dev	mean	std dev	forecasts	mean
Mole Percent of Constituent in Bubbles	H2	33±3.0 to 35±3.1	32.000	33.000	3.000	1.000	34.000	35.000	3.100	1.033	32.000	33.05	1.05	33.08	1.05	34.000	35.01
	N2	32±4.3 to 33±4.5	31.000	32.000	4.300	1.433	32.000	33.000	4.500	1.500	31.000	31.97	1.41	31.99	1.41	32.000	33.06
	N2O	33±3.1 to 31±2.9	33.000	33.000	3.100	1.033	32.000	31.000	2.900	0.967	33.000	33.00	1.04	33.03	1.04	32.000	31.02
	CH4	0.4±0.06 to 0.5±0.06	0.400	0.400	0.080	0.020	0.500	0.500	0.060	0.020	0.807	0.81	0.05	0.81	0.05	0.500	0.50
	NH3	1.1±0.4 to 0.8±0.2	3.200	1.100	0.400	0.133	1.300	0.600	0.200	0.067	3.200	1.10	0.14	1.10	0.14	1.300	0.60
	Other	0.2±0.06		0.200	0.060	0.020		-	-	0.001							
	CH4	0.4±0.07		0.400	0.070	0.023		-	-	0.001							
	C2Hx	0.10±0.03	0.100	0.100	0.030	0.010	-	-	-	0.001							
	C3Hx		-	-	-	0.001	-	-	-	0.001							
	Other HC	0.06±0.03 to 0.07±0.03	0.060	0.060	0.030	0.010	-	-	-	0.001							
	Other NOx		-	-	-	0.001	-	-	-	0.001							
	Total "Other"	0.2±0.06		0.200	0.060	0.020		-	-	0.001							1
				99.68							100.0067	99.93		100.00		99.8	100.19

Tank and Sample (or Layer)		S-111 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	mean	std dev	high salt range mean	std dev	low salt range forecasts	mean
Mole Percent of Constituent in Bubbles	H2	66±10 to 67±11	68.000	66.000	10.000	3.333	69.000	67.000	11.000	3.667	68.000	66.84	3.21	65.90	3.21	69.000	68.95
	N2	21±5.6 to 22±5.8	20.000	21.000	5.600	1.867	22.000	22.000	5.800	1.933	20.000	21.02	1.91	21.04	1.91	22.000	21.94
	N2O	11±1.7 to 9.8±1.5	11.000	11.000	1.700	0.567	10.000	9.600	1.500	0.500	11.000	11.04	0.59	11.05	0.59	10.000	9.63
	CH4	0.5±0.08	0.400	0.500	0.080	0.027		-	-	0.001	0.813	0.91	0.07	0.91	0.07	-	-
	NH3	1.1±0.4 to 0.6±0.2	1.000	1.100	0.400	0.133	0.600	0.600	0.200	0.067	1.000	1.10	0.13	1.10	0.13	0.600	0.60
	Other	0.2±0.07		0.200	0.070	0.023		-	-	0.001							
	CH4	0.4±0.07 to 0.5±0.07		0.400	0.070	0.023		0.500	0.070	0.023							
	C2Hx	0.08±0.03	0.080	0.080	0.030	0.010	-	-	-	0.001							
	C3Hx		-	-	-	0.001	-	-	-	0.001							
	Other HC	0.07±0.04	0.070	0.070	0.040	0.013	-	-	-	0.001							
	Other NOx		-	-	-	0.001	-	-	-	0.001							
	Total "Other"	0.2±0.07		0.200	0.070	0.023		-	-	0.001							0
				99.75							100.8133	99.91		100.00		101.8	99.12

Tank and Sample (or Layer)		U-109 solids	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	mean	std dev	high salt range mean	std dev	low salt range forecasts	mean
Mole Percent of Constituent in Bubbles	H2	25±3.1 to 26±3.2	25.000	25.000	3.100	1.033	26.000	26.000	3.200	1.067	25.000	24.95	1.04	24.75	1.04	26.000	26.03
	N2	46±7.8 to 48±8.1	45.000	46.000	7.800	2.600	47.000	48.000	8.100	2.700	45.000	46.02	2.66	45.85	2.66	47.000	48.19
	N2O	27±3.5 to 24±3.2	28.000	27.000	3.500	1.167	26.000	24.000	3.200	1.067	28.000	26.95	1.17	26.73	1.17	26.000	23.97
	CH4	0.7±0.1 to 0.8±0.1	0.700	0.700	0.100	0.033	0.800	0.800	0.100	0.033	1.687	1.69	0.11	1.68	0.11	0.800	0.80
	NH3	1.2±0.5 to 0.6±0.2	0.800	1.200	0.500	0.167	0.400	0.600	0.200	0.067	0.800	1.19	0.17	1.18	0.17	0.400	0.60
	Other	0.4±0.2		0.400	0.200	0.067		-	-	0.001							

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Combine Original and "Other" Component Tables

	CH4	0.7±0.1		0.700	0.100	0.033		-	-	0.001						
	C2Hx	0.28±0.08 to 0.29±0.08	0.280	0.280	0.080	0.027	-	0.290	0.080	0.027						
	C3Hx		-	-	-	0.001	-	-	-	0.001						
	Other HC	0.13±0.07 to	0.130	0.130	0.070	0.023	-	-	-	0.001						
	Other NOx		-	-	-	0.001	-	-	-	0.001						
	Total "Other"	0.4±0.2		0.400	0.200	0.067		-	-	0.001						1
				100.31							100.4867	100.80		100.00	100.2	99.58

Tank and Sample (or Layer)		SY-101 ave (see below)	cb dists high salt	high salt mean	high salt range	low salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	mean	std dev	high salt range mean	std dev	low salt range forecasts	mean
Mole Percent of Constituent in Bubbles	H2	31.75±6.35 to 36.5±7.0	31.750	31.750	6.350	2.117	26.000	36.500	7.075	2.358	31.750	31.69	2.17	31.29	2.17	26.000	36.41
	N2	32.25±6.525 to 39.25±1	45.000	32.250	6.525	2.842	47.000	39.250	10.225	3.408	45.000	32.28	2.62	31.68	2.62	47.000	39.35
	N2O	22.25±4.85 to 17.25±3.	28.000	22.250	4.850	1.617	26.000	17.250	3.125	1.042	28.000	22.20	1.60	21.92	1.60	26.000	17.27
	CH4	0.975±0.2725 to 0.975±	0.700	0.975	0.273	0.091	1.150	0.975	0.300	0.100	1.687	3.25	0.30	3.21	0.30	1.150	0.97
	NH3	11.8±3.1 to 4.8±1.25	0.800	11.800	3.100	1.033	0.400	4.800	1.250	0.417	0.800	11.85	1.06	11.70	1.06	0.400	4.80
	Other	0.9±0.4 to 1.1±0.475		0.900	0.400	0.133		1.100	0.475	0.158							
	CH4	0.95±0.27 to 1.15±0.3225		0.950	0.270	0.090		1.150	0.323	0.108							
	C2Hx	0.575±0.205 to 0.71±0.2	0.280	0.575	0.205	0.068	-	0.710	0.253	0.084							
	C3Hx		-	-	-	0.001	-	-	-	0.001							
	Other HC	0.33±0.1925 to 0±0	0.130	0.330	0.193	0.064	-	-	-	0.001							
	Other NOx		-	-	-	0.001	-	-	-	0.001							
	Total "Other"	0.9±0.4 to 1.1±0.475		0.900	0.400	0.133		1.100	0.475	0.158							1
				99.93							107.2367	101.25		100.00		100.55	98.80

Tank and Sample (or Layer)		SY-101-022A crust	cb dists high salt	high salt mean	high salt range	high salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev	high salt range forecasts	mean	std dev	high salt mean	std dev	low salt range forecasts	mean
Mole Percent of Constituent in Bubbles	H2	33±3.9 to 38±4.0	33.000	33.000	3.900	1.300	38.000	38.000	4.000	1.333	33.000	-	-	#DIV/0!	0.00	38.000	-
	N2	27±4.5 to 32±5.0	27.000	27.000	4.500	1.500	32.000	32.000	5.000	1.667	27.000	-	-	#DIV/0!	0.00	32.000	-
	N2O	20±2.4 to 22±2.3	20.000	20.000	2.400	0.800	22.000	22.000	2.300	0.767	20.000	-	-	#DIV/0!	0.00	22.000	-
	CH4	0.6±0.1 to 0.7±0.1	0.600	0.600	0.100	0.033	0.700	0.700	0.100	0.033	1.773	-	-	#DIV/0!	0.00	0.700	-
	NH3	19±4.8 to 6.6±1.6	19.000	19.000	4.800	1.600	6.600	6.600	1.600	0.533	19.000	-	-	#DIV/0!	0.00	6.600	-
	Other	0.6±0.2 to 0.7±0.2		0.600	0.200	0.067		0.700	0.200	0.067							
	CH4	0.6±0.08 to 0.7±0.09		0.600	0.080	0.027		0.700	0.090	0.030							
	C2Hx	0.56±0.15 to 0.67±0.17	0.560	0.560	0.150	0.050	-	0.670	0.170	0.057							
	C3Hx		-	-	-	-	-	-	-	-							
	Other HC	0.06±0.03 to 0.07±0.04	0.060	0.060	0.030	0.010	-	-	-	-							
	Other NOx		-	-	-	-	-	-	-	-							
	Total "Other"	0.6±0.2 to 0.7±0.2		0.600	0.200	0.067		0.700	0.200	0.067							0
				100.22							100.7733	-		#DIV/0!		99.3	-

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Combine Original and "Other" Component Tables

Tank and Sample (or Layer)		SY-101-023A crust	cb dists high salt	high salt mean	high salt range	high salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev
Mole Percent of Constituent in Bubbles	H2	35±4.4 to 39±4.5	25.000	35.000	4.400	1.467	26.000	39.000	4.500	1.500
	N2	28±4.6 to 32±4.9	45.000	28.000	4.600	1.533	47.000	32.000	4.900	1.633
	N2O	20±2.5 to 21±2.4	28.000	20.000	2.500	0.833	26.000	21.000	2.400	0.800
	CH4	0.6±0.09	0.700	0.600	0.090	0.030	-	-	-	-
	NH3	16±3.9 to 6.7±1.6	0.800	16.000	3.900	1.300	0.400	6.700	1.600	0.533
	Other	0.4±0.1 to 0.5±0.1		0.400	0.100	0.033		0.500	0.100	0.033
	CH4	0.6±0.1 to 0.7±0.1		0.600	0.100	0.033		0.700	0.100	0.033
	C2Hx	0.38±0.08 to 0.47±0.10	0.280	0.380	0.080	0.027	-	0.470	0.100	0.033
	C3Hx		-	-	-	-	-	-	-	-
	Other HC	0.05±0.02 to 0.06±0.03	0.130	0.050	0.020	0.007	-	-	-	-
	Other NOx		-	-	-	-	-	-	-	-
	Total "Other"	0.4±0.1 to 0.5±0.1		0.400	0.100	0.033		0.500	0.100	0.033
				100.03						

Tank and Sample (or Layer)		SY-101-022A liq.	cb dists high salt	high salt mean	high salt range	high salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev
Mole Percent of Constituent in Bubbles	H2	32±8.8 to 38±10	25.000	32.000	8.800	2.933	26.000	38.000	10.000	3.333
	N2	33±11 to 42±14	45.000	33.000	11.000	3.667	47.000	42.000	14.000	4.667
	N2O	26±7.3 to 14±4.1	28.000	26.000	7.300	2.433	26.000	14.000	4.100	1.367
	CH4	1.3±0.4 to 1.6±0.5	0.700	1.300	0.400	0.133	-	1.600	0.500	0.167
	NH3	6.4±1.9 to 3.1±0.9	0.800	6.400	1.900	0.633	0.400	3.100	0.900	0.300
	Other	1.4±0.7 to 1.7±0.9		1.400	0.700	0.233		1.700	0.900	0.300
	CH4	1.3±0.5 to 1.6±0.6		1.300	0.500	0.167		1.600	0.600	0.200
	C2Hx	0.70±0.32 to 0.87±0.40	0.280	0.700	0.320	0.107	-	0.870	0.400	0.133
	C3Hx		-	-	-	-	-	-	-	-
	Other HC	0.87±0.41 to 0.83±0.51	0.130	0.870	0.410	0.137	-	-	-	-
	Other NOx		-	-	-	-	-	-	-	-
	Total "Other"	1.4±0.7 to 1.7±0.9		1.400	0.700	0.233		1.700	0.900	0.300
				100.07						

Tank and Sample (or Layer)		SY-101-021 liq.	cb dists high salt	high salt mean	high salt range	high salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev
Mole Percent of Constituent in Bubbles	H2	27±8.3 to 31±9.8	25.000	27.000	8.300	2.767	26.000	31.000	9.800	3.267
	N2	41±14 to 51±17	45.000	41.000	14.000	4.667	47.000	51.000	17.000	5.667
	N2O	23±7.2 to 12±3.7	28.000	23.000	7.200	2.400	26.000	12.000	3.700	1.233
	CH4	1.4±0.5 to 1.6±0.6	0.700	1.400	0.500	0.167	-	1.600	0.600	0.200
	NH3	5.8±1.8 to 2.8±0.9	0.800	5.800	1.800	0.600	0.400	2.800	0.900	0.300
	Other	1.2±0.6 to 1.5±0.7		1.200	0.600	0.200		1.500	0.700	0.233
	CH4	1.3±0.4 to 1.6±0.5		1.300	0.400	0.133		1.600	0.500	0.167
	C2Hx	0.66±0.27 to 0.83±0.34	0.280	0.660	0.270	0.090	-	0.830	0.340	0.113

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Combine Original and "Other" Component Tables

	C3Hx		-	-	-	-	-	-	-	-
	Other HC	0.54±0.31 to 0.67±0.39	0.130	0.540	0.310	0.103	-	-	-	-
	Other NOx		-	-	-	-	-	-	-	-
	Total "Other"	1.2±0.6 to 1.5±0.7		1.200	0.600	0.200		1.500	0.700	0.233
				99.4						

Tank and Sample (or Layer)		SY-101 ave.	cb dists high salt	high salt mean	high salt range	high salt std dev	cb dists low salt	low salt mean	low salt range	low salt std dev
Mole Percent of Constituent in Bubbles	H2	31.75±8.35 to 36.5±7.075		31.8	8.4			36.5	7.1	
	N2	32.25±8.525 to 39.25±10.225		32.3	8.5			39.3	10.2	
	N2O	22.25±4.85 to 17.25±3.125		22.3	4.9			17.3	3.1	
	CH4	0.975±0.2725 to 0.975±0.3		1.0	0.3			1.0	0.3	
	NH3	11.6±3.1 to 4.8±1.25		11.8	3.1			4.8	1.3	
	Other	0.9±0.4 to 1.1±0.475		0.9	0.4			1.1	0.5	
	CH4	0.95±0.27 to 1.15±0.3225		1.0	0.3			1.2	0.3	
	C2Hx	0.575±0.205 to 0.7±0.2525		0.6	0.2			0.7	0.3	
	C3Hx			-	-			-	-	
	Other HC	0.33±0.1925 to 0±0		0.3	0.2			-	-	
	Other NOx			-	-			-	-	
	Total "Other"	0.9±0.4 to 1.1±0.475		0.9	0.4			1.1	0.5	
				99.93						

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Comt

Tank and Sample (or Layer)		std dev	range normalize mean	std dev	Forecast: I5	I4	I5	I6	I7	I8	q4	q5	q6	q7	q8
Mole Percent of Constituent in Bubbles	H2	1.07	32.98	1.07	Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
	N2	2.12	58.24	2.12	Trials	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000
	N2O	0.16	4.40	0.16	Mean	32.06	58.21	7.20	9.39	0.60	32.96	58.24	4.40	8.26	0
	CH4	0.44	8.26	0.44	Median	32.05	58.20	7.19	9.39	0.60	32.97	58.30	4.40	8.26	0
	NH3	-	-	0.00	Mode	—	—	—	—	—	—	—	—	—	—
	Other				Standard Deviation	1.08	2.08	0.28	0.43	0.10	1.07	2.12	0.16	0.44	0
	CH4				Variance	1.17	4.34	0.08	0.19	0.01	1.13	4.50	0.03	0.20	0
	C2Hx				Skewness	0.01	0.07	0.15	0.04	(0.04)	(0.01)	(0.09)	0.12	(0.01)	0
	C3Hx				Kurtosis	3.08	2.90	2.97	2.96	3.10	3.07	2.83	3.01	2.82	0
	Other HC				Coeff. of Variability	0.03	0.04	0.04	0.05	0.17	0.03	0.04	0.04	0.05	0
	Other NOx				Range Minimum	28.59	49.17	6.34	8.07	0.24	29.48	52.31	3.96	6.91	0
	Total "Other"				Range Maximum	35.50	63.64	8.14	10.68	0.93	36.26	64.08	4.90	9.59	0
			103.85		Range Width	6.91	14.47	1.80	2.58	0.69	6.78	11.77	0.95	2.67	0
					Mean Std. Error	0.03	0.07	0.01	0.01	0.00	0.03	0.07	0.01	0.01	0

Tank and Sample (or Layer)		std dev	range normalize mean	std dev	Forecast: I18	I19	I20	I21	I22	I23	q19	q20	q21	q22	q23
Mole Percent of Constituent in Bubbles	H2	-	-	0.00	Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
	N2	-	-	0.00	Trials	1,000.00	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	N2O	0.16	5.30	0.16	Mean	72.01	19.07231	5.804437	1.514441	2.491777	0	0	5.30306	0	0
	CH4	-	-	0.00	Median	71.99	19.10866	5.805911	1.513705	2.490027	0	0	5.297358	0	0
	NH3	-	-	0.00	Mode	—	—	—	—	—	—	—	—	—	—
	Other				Standard Deviation	2.30	1.637824	0.197938	0.056187	0.30377	0	0	0.16398	0	0
	CH4				Variance	5.29	2.681812	0.039179	0.003157	0.092276	0	0	0.02689	0	0
	C2Hx				Skewness	(0.01)	0.002951	0.083533	-0.015194	-0.03119	0	0	0.014966	0	0
	C3Hx				Kurtosis	3.00	2.908455	2.75474	3.342326	2.927564	0	0	2.853928	0	0
	Other HC				Coeff. of Variability	0.03	0.085864	0.034101	0.037101	0.121909	0	0	0.030922	0	0
	Other NOx				Range Minimum	63.84	14.12633	5.175467	1.264558	1.439239	0	0	4.78108	0	0
	Total "Other"				Range Maximum	79.51	23.93819	6.379857	1.708606	3.427062	0	0	5.796693	0	0
			5.30		Range Width	15.66	9.811861	1.20439	0.44205	1.987823	0	0	1.015613	0	0
					Mean Std. Error	0.07	0.051786	0.006259	0.001777	0.009606	0	0	0.005186	0	0

Tank and Sample (or Layer)		std dev	range normalize mean	std dev	Forecast: I33	I34	I35	I36	I37	I38	q34	q35	q36	q37	q38
Mole Percent of Constituent in Bubbles	H2	1.87	61.85	1.87	Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
	N2	1.34	25.24	1.34	Trials	1,000	1,000	1,000	1,000	1,000	1000	1000	1,000	1,000	1,000
	N2O	0.36	10.99	0.36	Mean	59.95776	24.24491	14.00738	1.770787	0.501593	61.854	25.238	10.98679	0.997884	0
	CH4	0.10	1.00	0.10	Median	59.95472	24.25552	13.99685	1.767847	0.49609	61.851	25.228	10.98165	1.000053	0
	NH3	-	-	0.00	Mode	—	—	—	—	—	—	—	—	—	—
	Other				Standard Deviation	1.785854	1.364731	0.493763	0.089343	0.064698	1.870	1.343	0.380386	0.098247	0

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Comt

CH4	Variance	3.189274	1.86249	0.243802	0.007982	0.004186	3.496	1.804	0.129878	0.009652	0
C2Hx	Skewness	-0.005243	-0.174528	-0.017678	0.134001	0.142467	-0.01	0.02	0.049127	-0.091965	0
C3Hx	Kurtosis	3.040792	3.195469	2.923574	2.7839	2.962868	2.70	2.70	3.126106	3.213292	0
Other HC	Coeff. of Variability	0.029785	0.056289	0.03525	0.050454	0.12898	0.03	0.05	0.032802	0.098455	0
Other NOx	Range Minimum	54.04147	19.02917	12.41771	1.516606	0.305079	58.699	21.203	9.868958	0.673734	0
Total "Other"	Range Maximum	65.61884	28.23635	15.42897	2.071723	0.702529	68.932	29.468	12.31259	1.305372	0
99.08	Range Width	11.57736	9.207179	3.011265	0.555117	0.39745	10.233	8.265	2.425627	0.631638	0
	Mean Std. Error	0.058474	0.043157	0.015614	0.002825	0.002046	0.059	0.042	0.011398	0.003107	0

range normalize

Tank and Sample (or Layer)		std dev	mean	std dev	Forecast: forecasts	I50	I51	I52	I53	I54	q50	q51	q52	q53	q54
Mole Percent of Constituent in Bubbles	H2	2.34	48.88	2.34	Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
	N2	1.72	30.92	1.72	Trials	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	N2O	1.07	20.05	1.07	Mean	45.01309	29.06324	23.0237	3.358001	0.896019	46.88424	30.91883	20.05061	2.337768	0
	CH4	0.25	2.34	0.25	Median	44.99726	29.04332	23.05964	3.357393	0.891358	46.97183	30.8813	20.05277	2.339867	0
	NH3	-	-	0.00	Mode	—	—	—	—	—	—	—	—	—	—
	Other				Standard Deviation	2.324619	1.580725	1.199418	0.238141	0.131958	2.342188	1.72249	1.069311	0.254815	0
	CH4				Variance	5.403855	2.435883	1.438603	0.056711	0.017413	5.485845	2.966971	1.143425	0.064931	0
	C2Hx				Skewness	0.064836	0.03668	0.072719	0.026606	0.075835	-0.08027	-0.044557	0.035086	0.011753	0
	C3Hx				Kurtosis	2.949772	2.884611	2.865125	2.888823	2.734561	3.213638	3.078716	2.842746	3.001134	0
	Other HC				Coeff. of Variability	0.051643	0.053701	0.052095	0.070917	0.147271	0.049957	0.05571	0.053331	0.108999	0
	Other NOx				Range Minimum	38.10845	24.77493	19.28304	2.677887	0.535348	38.86256	24.67646	16.60584	1.536088	0
	Total "Other"				Range Maximum	52.91185	33.78235	26.65321	4.080312	1.295246	53.92881	36.58766	23.88315	3.208745	0
			100.19		Range Width	14.8032	9.007419	7.370176	1.402425	0.759898	15.06624	11.9112	7.277312	1.672657	0
					Mean Std. Error	0.073511	0.049354	0.037929	0.007531	0.004173	0.074066	0.05447	0.033815	0.008058	0

low salt range

Tank and Sample (or Layer)		std dev	mean	std dev	Forecast: forecasts	I66	I67	I68	I69	I70	q66	q67	q68	q69	q70
Mole Percent of Constituent in Bubbles	H2	2.45	61.88	2.45	Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
	N2	-	-	0.00	Trials	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	N2O	0.17	3.39	0.17	Mean	61.09724	33.15394	4.107946	1.625054	0.600153	61.87688	0	3.393619	9.256306	0
	CH4	0.43	9.26	0.43	Median	61.06775	33.19719	4.106573	1.623509	0.602614	61.91958	0	3.390024	9.253442	0
	NH3	-	-	0.00	Mode	—	—	—	—	—	—	—	—	—	—
	Other				Standard Deviation	2.589754	1.443814	0.192837	0.090859	0.064592	2.449459	0	0.169177	0.426529	0
	CH4				Variance	6.706826	2.084022	0.037186	0.008255	0.004172	5.999847	0	0.028621	0.181927	0
	C2Hx				Skewness	-0.030381	-0.14043	0.027975	-0.005071	-0.092141	0.008726	0	-0.075192	-0.119742	0
	C3Hx				Kurtosis	3.098639	2.995667	3.209291	2.95928	2.87668	2.738604	0	2.895973	2.91889	0
	Other HC				Coeff. of Variability	0.042387	0.043543	0.046943	0.055912	0.107625	0.039588	0	0.049851	0.04608	0
	Other NOx				Range Minimum	51.37039	28.11163	3.337208	1.335281	0.406688	55.24226	0	2.69077	7.875715	0
	Total "Other"				Range Maximum	69.89569	38.28999	4.795109	1.935551	0.774052	68.8558	0	3.928313	10.69459	0
			74.53		Range Width	18.5253	10.17837	1.457902	0.60027	0.367464	13.61353	0	1.037543	2.818879	0
					Mean Std. Error	0.081895	0.045651	0.006098	0.002873	0.002043	0.077459	0	0.00535	0.013488	0

range normalize

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Step 3 of 7 - Comt

Tank and Sample (or Layer)

Mole Percent of Constituent in Bubbles

	std dev	mean	std dev
H2	0.51	23.84	0.51
N2	0.85	37.86	0.85
N2O	0.73	36.76	0.73
CH4	0.06	1.06	0.06
NH3	0.07	0.49	0.07
Other			
CH4			
C2Hx			
C3Hx			
Other HC			
Other NOx			
Total "Other"			
		100.00	

Forecast: forecasts	I82	I83	I84	I85	I86	q82	q83	q84	q85	q86
Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
Trials	1,000	1000	1000	1000	1000	1,000	1000	1000	1000	1000
Mean	23.01222	36.191	39.032	1.793	0.598	24.01025	38.123	37.002	1.065	0.498
Median	22.99235	36.218	39.028	1.793	0.599	24.00825	38.129	37.009	1.067	0.497
Mode	—	—	—	—	—	—	—	—	—	—
Standard Deviation	0.463845	0.768	0.793	0.066	0.101	0.513694	0.848	0.726	0.057	0.086
Variance	0.214986	0.590	0.628	0.005	0.010	0.263881	0.719	0.527	0.003	0.004
Skewness	0.037809	-0.04	0.00	0.02	-0.01	0.09577	0.06	-0.06	0.03	0.00
Kurtosis	2.863881	2.86	3.00	3.11	3.07	3.0713	2.90	3.18	2.76	2.90
Coeff. of Variability	0.020148	0.02	0.02	0.04	0.17	0.021395	0.02	0.02	0.05	0.13
Range Minimum	21.47335	33.822	36.456	1.551	0.205	22.56075	35.285	34.324	0.906	0.295
Range Maximum	24.6611	38.750	41.607	2.035	0.965	25.93175	40.818	39.371	1.233	0.684
Range Width	3.187744	4.928	5.151	0.483	0.760	3.370996	5.534	5.047	0.327	0.389
Mean Std. Error	0.014662	0.024	0.025	0.002	0.003	0.016244	0.027	0.023	0.002	0.002

low salt

Tank and Sample (or Layer)

Mole Percent of Constituent in Bubbles

	std dev	mean	std dev
H2	1.97	64.98	1.97
N2	0.01	0.06	0.01
N2O	0.26	8.40	0.26
CH4	0.10	0.41	0.10
NH3	-	-	0.00
Other			
CH4			
C2Hx			
C3Hx			
Other HC			
Other NOx			
Total "Other"			
		73.83	

Forecast: forecasts	I98	I99	I100	I101	I102	q98	q99	q100	q101	q102
Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
Trials	1,000	1,000	1,000	1,000	1000	1000	1000	1000	1000	1000
Mean	62.93817	25.06257	11.02574	1.267329	0.300	64.956	0.059	8.401	0.411	0.000
Median	62.94575	25.03802	11.01643	1.270495	0.302	65.037	0.059	8.402	0.408	0.000
Mode	—	—	—	—	—	—	—	—	—	0.000
Standard Deviation	1.90306	1.238056	0.340172	0.135504	0.066	1.966	0.013	0.260	0.104	0.000
Variance	3.621836	1.532782	0.115717	0.018361	0.004	3.863	0.000	0.067	0.011	0.000
Skewness	-0.031757	0.069583	0.070258	0.024109	-0.10	-0.04	0.01	-0.02	-0.04	0.00
Kurtosis	3.187417	2.961485	2.824837	3.361847	2.87	2.91	2.84	2.96	2.90	+Infinity
Coeff. of Variability	0.030237	0.049399	0.030853	0.106921	0.22	0.03	0.22	0.03	0.25	+Infinity
Range Minimum	56.74468	21.36598	9.959403	0.806792	0.082	59.155	0.021	7.591	0.036	0.000
Range Maximum	69.74762	29.04999	12.01873	1.711023	0.478	70.761	0.096	9.246	0.710	0.000
Range Width	13.00294	7.684008	2.059326	0.904231	0.396	11.606	0.076	1.655	0.674	0.000
Mean Std. Error	0.06018	0.039151	0.010757	0.004285	0.002	0.062	0.000	0.008	0.003	0.000

low salt range

Tank and Sample (or Layer)

Mole Percent of Constituent in Bubbles

	std dev	mean	std dev
H2	1.87	51.03	1.87
N2	0.00	0.02	0.00
N2O	0.75	15.00	0.75
CH4	0.11	1.83	0.11
NH3	-	-	0.00
Other			
CH4			

Forecast: forecasts	I114	I115	I116	I117	I118	q114	q115	q116	q117	q118
Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
Trials	1,000	1000	1000	1000	1000	1000	1000	1000	1000	1,000
Mean	50.0274	29.025	17.931	7.349	0.199	51.029	0.020	15.995	1.834	0
Median	50.01945	29.012	17.898	7.351	0.199	50.979	0.020	15.980	1.833	0
Mode	—	—	—	—	—	—	—	—	—	0
Standard Deviation	1.865785	1.785	0.838	0.289	0.033	1.873	0.003	0.752	0.109	0
Variance	3.481152	3.185	0.701	0.083	0.001	3.510	0.000	0.565	0.012	0

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Step 3 of 7 - Comt

C2Hx	Skewness	0.055144	-0.08	0.03	0.06	0.04	0.09	-0.06	0.03	0.04	0
C3Hx	Kurtosis	2.883377	2.87	2.97	2.94	2.98	3.10	2.95	2.96	2.83	+Infinity
Other HC	Coeff. of Variability	0.037295	0.06	0.05	0.04	0.17	0.04	0.17	0.05	0.06	+Infinity
Other NOx	Range Minimum	44.24394	23.386	15.329	6.324	0.091	45.483	0.008	13.721	1.514	0
Total "Other"	Range Maximum	55.60083	34.544	20.507	6.207	0.298	56.993	0.029	18.360	2.147	0
88.86	Range Width	11.36688	11.158	5.177	1.883	0.207	11.510	0.021	4.639	0.632	0
	Mean Std. Error	0.059001	0.056	0.026	0.009	0.001	0.059	0.000	0.024	0.003	0

low salt range

Tank and Sample (or Layer)	std dev	mean	std dev
H2	1.59	51.87	1.59
N2	1.38	20.99	1.36
N2O	-	-	0.00
CH4	0.04	0.35	0.04
NH3	0.17	2.41	0.17
Other			
CH4			
C2Hx			
C3Hx			
Other HC			
Other NOx			
Total "Other"			
	75.61		

Mole Percent of Constituent in Bubbles

Forecast: forecasts	I130 Value	I131 Value	I132 Value	I133 Value	I134 Value	q130 Value	q131 Value	q132 Value	q133 Value	q134 Value
Statistic										
Trials	1000	1000	1000	1,000	1000	1,000	1000	1,000	1000	1,000
Mean	50.035	19.987	23.993	1.373	5.493	51.86914	20.987	0	0.352	2.406496
Median	50.017	19.931	23.969	1.371	5.496	51.84798	21.010	0	0.351	2.405735
Mode	---	---	---	---	---	---	---	0	---	---
Standard Deviation	1.482	1.240	0.924	0.066	0.391	1.589249	1.359	0	0.037	0.167437
Variance	2.195	1.538	0.854	0.004	0.153	2.525711	1.846	0	0.001	0.028035
Skewness	0.07	0.00	0.01	0.08	-0.02	0.123631	-0.11	0	0.12	0.08208
Kurtosis	2.87	2.95	2.88	2.82	2.67	3.160258	3.14	+Infinity	2.86	2.753777
Coeff. of Variability	0.03	0.06	0.04	0.05	0.07	0.03064	0.06	+Infinity	0.11	0.069577
Range Minimum	45.861	15.596	21.324	1.183	4.367	46.48411	16.662	0	0.242	1.916467
Range Maximum	55.077	24.147	26.801	1.575	6.570	57.43874	25.374	0	0.476	2.932501
Range Width	9.196	8.551	5.477	0.393	2.204	10.95462	8.712	0	0.234	1.016035
Mean Std. Error	0.047	0.039	0.029	0.002	0.012	0.050256	0.043	0	0.001	0.005295

low salt range

Tank and Sample (or Layer)	std dev	mean	std dev
H2	1.90	63.98	1.90
N2	0.91	17.99	0.91
N2O	-	-	0.00
CH4	0.13	3.29	0.13
NH3	0.32	4.30	0.32
Other			
CH4			
C2Hx			
C3Hx			
Other HC			
Other NOx			
Total "Other"			
	89.57		

Mole Percent of Constituent in Bubbles

Forecast: forecasts	I146 Value	I147 Value	I148 Value	I149 Value	I150 Value	q146 Value	q147 Value	q148 Value	q149 Value	q150 Value
Statistic										
Trials	1,000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Mean	60.99244	17.020	11.012	4.029	8.427	63.982	17.993	0.000	3.292	4.301
Median	60.95552	17.048	11.008	4.024	8.428	63.976	17.972	0.000	3.297	4.302
Mode	---	---	---	---	---	---	---	0.000	---	---
Standard Deviation	1.806333	0.886	0.338	0.206	0.647	1.903	0.911	0.000	0.128	0.320
Variance	3.262841	0.784	0.114	0.042	0.419	3.622	0.831	0.000	0.016	0.103
Skewness	0.037275	-0.12	0.03	-0.04	0.07	0.08	0.12	0.00	0.01	0.14
Kurtosis	3.02641	2.75	3.02	3.17	3.45	2.63	3.07	+Infinity	3.03	3.00
Coeff. of Variability	0.029616	0.05	0.03	0.05	0.08	0.03	0.05	+Infinity	0.04	0.07
Range Minimum	54.38262	14.379	9.956	3.293	6.358	58.018	15.082	0.000	2.683	3.496
Range Maximum	67.08688	19.280	12.082	4.615	10.986	70.198	21.555	0.000	3.714	5.681
Range Width	12.70426	4.901	2.126	1.321	4.607	12.181	6.473	0.000	0.831	2.186
Mean Std. Error	0.067121	0.028	0.011	0.007	0.020	0.060	0.029	0.000	0.004	0.010

range normalize

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Step 3 of 7 - Comt

Tank and Sample (or Layer)		std dev	mean	std dev
Mole Percent of Constituent in Bubbles	H2	1.04	34.94	1.04
	N2	1.51	33.00	1.51
	N2O	0.96	30.96	0.96
	CH4	0.02	0.50	0.02
	NH3	0.07	0.60	0.07
	Other			
	CH4			
	C2Hx			
	C3Hx			
	Other HC			
	Other NOx			
	Total "Other"			
			100.00	

Forecast: forecasts	I162 Value	I163 Value	I164 Value	I165 Value	I166 Value	q162 Value	q163 Value	q164 Value	q165 Value	q166 Value
Statistic										
Trials	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Mean	33.053	31.969	33.003	0.809	1.100	35.011	33.065	31.015	0.500	0.599
Median	33.047	31.949	32.992	0.806	1.098	34.999	33.108	30.978	0.499	0.600
Mode	—	—	—	—	—	—	—	—	—	—
Standard Deviation	1.049	1.409	1.039	0.046	0.135	1.040	1.514	0.955	0.020	0.066
Variance	1.099	1.986	1.080	0.002	0.018	1.081	2.292	0.913	0.000	0.004
Skewness	-0.10	-0.02	0.09	0.09	-0.04	0.00	0.01	0.15	0.08	-0.17
Kurtosis	3.02	2.80	2.95	2.74	2.94	3.15	2.71	3.21	2.90	3.28
Coeff. of Variability	0.03	0.04	0.03	0.06	0.12	0.03	0.05	0.03	0.04	0.11
Range Minimum	29.403	27.568	29.675	0.654	0.579	31.489	29.137	27.623	0.446	0.349
Range Maximum	36.214	36.207	36.434	0.955	1.499	38.221	37.258	35.156	0.566	0.807
Range Width	6.811	8.619	6.760	0.301	0.921	6.733	8.122	7.532	0.120	0.458
Mean Std. Error	0.033	0.045	0.033	0.002	0.004	0.033	0.048	0.030	0.001	0.002

low salt range

Tank and Sample (or Layer)		std dev	mean	std dev
Mole Percent of Constituent in Bubbles	H2	3.65	68.95	3.65
	N2	1.92	21.94	1.92
	N2O	0.49	9.83	0.49
	CH4	-	-	0.00
	NH3	0.07	0.60	0.07
	Other			
	CH4			
	C2Hx			
	C3Hx			
	Other HC			
	Other NOx			
	Total "Other"			
			99.12	

Forecast: Q180	I178 Value	I179 Value	I180 Value	I181 Value	I182 Value	q178 Value	q179 Value	q180 Value	q181 Value	q182 Value
Statistic										
Trials	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Mean	65.636	21.022	11.037	0.912	1.098	66.945	21.939	9.634	0.000	0.601
Median	65.883	21.082	11.056	0.914	1.092	66.963	22.009	9.618	0.000	0.600
Mode	—	—	—	—	—	—	—	—	0.000	—
Standard Deviation	3.205	1.911	0.586	0.065	0.134	3.651	1.917	0.490	0.000	0.065
Variance	10.274	3.652	0.343	0.004	0.018	13.332	3.674	0.240	0.000	0.004
Skewness	0.02	-0.13	-0.12	-0.02	0.07	-0.08	-0.12	0.16	0.00	-0.01
Kurtosis	3.10	3.20	2.92	2.97	3.06	2.85	2.92	3.20	+Infinity	3.01
Coeff. of Variability	0.05	0.09	0.05	0.07	0.12	0.05	0.09	0.05	+Infinity	0.11
Range Minimum	55.091	13.843	9.250	0.706	0.653	55.800	16.077	7.823	0.000	0.386
Range Maximum	76.886	26.540	12.951	1.121	1.567	77.875	27.331	11.443	0.000	0.791
Range Width	21.796	12.697	3.701	0.415	0.934	22.075	11.254	3.620	0.000	0.406
Mean Std. Error	0.101	0.060	0.019	0.002	0.004	0.115	0.061	0.015	0.000	0.002

low salt range

Tank and Sample (or Layer)		std dev	mean	std dev
Mole Percent of Constituent in Bubbles	H2	1.08	28.14	1.08
	N2	2.76	48.39	2.76
	N2O	1.05	24.07	1.05
	CH4	0.03	0.60	0.03
	NH3	0.07	0.60	0.07
	Other			

Forecast: forecasts	I194 Value	I195 Value	I196 Value	I197 Value	I198 Value	q194 Value	q195 Value	q196 Value	q197 Value	q198 Value
Statistic										
Trials	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Mean	24.950	46.021	26.949	1.689	1.193	26.028	48.185	23.967	0.602	0.598
Median	24.962	46.080	26.978	1.686	1.194	25.966	48.098	23.964	0.600	0.597
Mode	—	—	—	—	—	—	—	—	—	—
Standard Deviation	1.040	2.663	1.167	0.114	0.166	1.083	2.755	1.052	0.035	0.067

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"

Step 3 of 7 - Comt

	CH4			Variance	1.082	7.091	1.363	0.013	0.028	1.172	7.591	1.107	0.001	0.004
	C2Hx			Skewness	-0.02	-0.06	-0.03	-0.04	0.01	-0.03	0.04	0.10	0.05	-0.06
	C3Hx			Kurtosis	2.76	2.97	3.01	2.98	3.07	3.11	3.06	3.32	2.93	2.94
	Other HC			Coeff. of Variability	0.04	0.06	0.04	0.07	0.14	0.04	0.06	0.04	0.04	0.11
	Other NOx			Range Minimum	21.951	38.041	23.451	1.314	0.648	22.102	39.269	20.321	0.694	0.346
	Total "Other"			Range Maximum	28.293	55.583	31.345	1.997	1.728	29.107	58.391	28.111	0.906	0.787
			100.00	Range Width	6.342	17.542	7.894	0.683	1.080	7.005	19.122	7.790	0.212	0.442
				Mean Std. Error	0.033	0.084	0.037	0.004	0.005	0.034	0.087	0.033	0.001	0.002

Tank and Sample (or Layer)		std dev	low salt range mean	std dev
Mole Percent of Constituent in Bubbles	H2	2.32	36.85	2.32
	N2	3.36	39.83	3.36
	N2O	1.06	17.48	1.06
	CH4	0.10	0.98	0.10
	NH3	0.41	4.86	0.41
	Other			
	CH4			
	C2Hx			
	C3Hx			
	Other HC			
	Other NOx			
	Total "Other"			
			100.00	

Forecast: forecasts	l210	l211	l212	l213	l214	q210	q211	q212	q213	q214
Statistic	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
Trials	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Mean	31.687	32.275	22.197	3.249	11.846	36.410	39.352	17.270	0.973	4.799
Median	31.720	32.286	22.249	3.256	11.817	36.448	39.233	17.240	0.973	4.790
Mode	---	---	---	---	---	---	---	---	---	---
Standard Deviation	2.171	2.625	1.596	0.301	1.063	2.321	3.358	1.059	0.099	0.413
Variance	4.715	6.890	2.548	0.090	1.129	5.385	11.276	1.121	0.010	0.170
Skewness	-0.01	-0.03	0.00	0.06	0.00	0.05	0.09	0.00	0.01	-0.05
Kurtosis	2.79	2.91	2.91	2.93	3.04	2.95	3.01	3.05	2.92	3.06
Coeff. of Variability	0.07	0.08	0.07	0.09	0.09	0.06	0.09	0.06	0.10	0.09
Range Minimum	24.928	25.188	17.544	2.399	8.357	28.834	28.320	13.529	0.655	3.352
Range Maximum	38.640	40.524	27.870	4.280	15.561	44.079	51.256	20.510	1.263	6.247
Range Width	13.711	15.336	10.326	1.881	7.204	15.444	22.936	6.981	0.609	2.895
Mean Std. Error	0.069	0.083	0.050	0.010	0.034	0.073	0.106	0.033	0.003	0.013

Tank and Sample (or Layer)		std dev	low salt mean	std dev
Mole Percent of Constituent in Bubbles	H2	-	-	0.00
	N2	-	-	0.00
	N2O	-	-	0.00
	CH4	-	-	0.00
	NH3	-	-	0.00
	Other			
	CH4			
	C2Hx			
	C3Hx			
	Other HC			
	Other NOx			
	Total "Other"			
			-	

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"
Cell Equations

Cell	Value	Formula
c4	32±3.2 to 33±3.2	32±3.2 to 33±3.2
c5	56±6.2 to 58±6.4	56±6.2 to 58±6.4
c6	7.2±0.8 to 4.4±0.5	7.2±0.8 to 4.4±0.5
c7	1.7±0.2	1.7±0.2
c8	0.6±0.3	0.6±0.3
c9	2.8±0.5 to 2.9±0.6	2.8±0.5 to 2.9±0.6
c10	1.7±0.2	1.7±0.2
c11	1.1±0.2 to 1.2±0.2	1.1±0.2 to 1.2±0.2
c12	0.26±0.1 to 0.27±0.1	0.26±0.1 to 0.27±0.1
c13	1.3±0.3 to 1.4±0.3	1.3±0.3 to 1.4±0.3
c14	0.12±0.06 to 0.12±0.07	0.12±0.06 to 0.12±0.07
c15	2.8±0.5 to 2.9±0.6	2.8±0.5 to 2.9±0.6
c16		
d4	31.90562462	31.90562462
d5	55	55
d6	7.5	7.5
d7	1.7	1.7
d8	0.8	0.8
d9		
d10		
d11	1.1	1.1
d12	0.26	0.26
d13	1.3	1.3
d14	0.12	0.12
d15		
d16		
e4	32	"=IF (ISERR (FIND (E2, C307, 1)), 0, VALUE (LEFT (C307, FIND (E2, C307, 1) - 1)))
e5	56	"=IF (ISERR (FIND (E2, C308, 1)), 0, VALUE (LEFT (C308, FIND (E2, C308, 1) - 1)))
e6	7.2	"=IF (ISERR (FIND (E2, C309, 1)), 0, VALUE (LEFT (C309, FIND (E2, C309, 1) - 1)))
e7	1.7	"=IF (ISERR (FIND (E2, C310, 1)), 0, VALUE (LEFT (C310, FIND (E2, C310, 1) - 1)))
e8	0.6	"=IF (ISERR (FIND (E2, C311, 1)), 0, VALUE (LEFT (C311, FIND (E2, C311, 1) - 1)))
e9	2.8	"=IF (ISERR (FIND (E2, C312, 1)), 0, VALUE (LEFT (C312, FIND (E2, C312, 1) - 1)))
e10	1.7	"=IF (ISERR (FIND (E2, C313, 1)), 0, VALUE (LEFT (C313, FIND (E2, C313, 1) - 1)))
e11	1.1	"=IF (ISERR (FIND (E2, C314, 1)), 0, VALUE (LEFT (C314, FIND (E2, C314, 1) - 1)))
e12	0.26	"=IF (ISERR (FIND (E2, C315, 1)), 0, VALUE (LEFT (C315, FIND (E2, C315, 1) - 1)))
e13	1.3	"=IF (ISERR (FIND (E2, C316, 1)), 0, VALUE (LEFT (C316, FIND (E2, C316, 1) - 1)))
e14	0.12	"=IF (ISERR (FIND (E2, C317, 1)), 0, VALUE (LEFT (C317, FIND (E2, C317, 1) - 1)))
e15	2.8	"=IF (ISERR (FIND (E2, C318, 1)), 0, VALUE (LEFT (C318, FIND (E2, C318, 1) - 1)))
e16	100.28	"=SUM (E307:E318) - E312 - E313 - E31E
f4	3.2	"=IF (ISERR (FIND (E2, C307)), 0, IF (ISERR (FIND (F2, C307)), VALUE (RIGHT (C307, LEN (C307) - FIND (E2, C307))), VALUE (MID (C307, FIND (E2, C307) + 1, FIND (F2, C307) - FIND (E2, C307) - 1))))
f5	6.2	"=IF (ISERR (FIND (E2, C308)), 0, IF (ISERR (FIND (F2, C308)), VALUE (RIGHT (C308, LEN (C308) - FIND (E2, C308))), VALUE (MID (C308, FIND (E2, C308) + 1, FIND (F2, C308) - FIND (E2, C308) - 1))))
f6	0.8	"=IF (ISERR (FIND (E2, C309)), 0, IF (ISERR (FIND (F2, C309)), VALUE (RIGHT (C309, LEN (C309) - FIND (E2, C309))), VALUE (MID (C309, FIND (E2, C309) + 1, FIND (F2, C309) - FIND (E2, C309) - 1))))
f7	0.2	"=IF (ISERR (FIND (E2, C310)), 0, IF (ISERR (FIND (F2, C310)), VALUE (RIGHT (C310, LEN (C310) - FIND (E2, C310))), VALUE (MID (C310, FIND (E2, C310) + 1, FIND (F2, C310) - FIND (E2, C310) - 1))))

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"
Cell Equations

Cell	Value	Formula
f8	0.3	"=IF (ISERR (FIND (E2, C311)), 0, IF (ISERR (FIND (F2, C311)), VALUE (RIGHT (C311, LEN (C311) - FIND (E2, C311))), VALUE (MID (C311, FIND (E2, C311) + 1, FIND (F2, C311) - FIND (E2, C311) - 1))))
f9	0.5	"=IF (ISERR (FIND (E2, C312)), 0, IF (ISERR (FIND (F2, C312)), VALUE (RIGHT (C312, LEN (C312) - FIND (E2, C312))), VALUE (MID (C312, FIND (E2, C312) + 1, FIND (F2, C312) - FIND (E2, C312) - 1))))
f10	0.2	"=IF (ISERR (FIND (E2, C313)), 0, IF (ISERR (FIND (F2, C313)), VALUE (RIGHT (C313, LEN (C313) - FIND (E2, C313))), VALUE (MID (C313, FIND (E2, C313) + 1, FIND (F2, C313) - FIND (E2, C313) - 1))))
f11	0.2	"=IF (ISERR (FIND (E2, C314)), 0, IF (ISERR (FIND (F2, C314)), VALUE (RIGHT (C314, LEN (C314) - FIND (E2, C314))), VALUE (MID (C314, FIND (E2, C314) + 1, FIND (F2, C314) - FIND (E2, C314) - 1))))
f12	0.1	"=IF (ISERR (FIND (E2, C315)), 0, IF (ISERR (FIND (F2, C315)), VALUE (RIGHT (C315, LEN (C315) - FIND (E2, C315))), VALUE (MID (C315, FIND (E2, C315) + 1, FIND (F2, C315) - FIND (E2, C315) - 1))))
f13	0.3	"=IF (ISERR (FIND (E2, C316)), 0, IF (ISERR (FIND (F2, C316)), VALUE (RIGHT (C316, LEN (C316) - FIND (E2, C316))), VALUE (MID (C316, FIND (E2, C316) + 1, FIND (F2, C316) - FIND (E2, C316) - 1))))
f14	0.06	"=IF (ISERR (FIND (E2, C317)), 0, IF (ISERR (FIND (F2, C317)), VALUE (RIGHT (C317, LEN (C317) - FIND (E2, C317))), VALUE (MID (C317, FIND (E2, C317) + 1, FIND (F2, C317) - FIND (E2, C317) - 1))))
f15	0.5	"=IF (ISERR (FIND (E2, C318)), 0, IF (ISERR (FIND (F2, C318)), VALUE (RIGHT (C318, LEN (C318) - FIND (E2, C318))), VALUE (MID (C318, FIND (E2, C318) + 1, FIND (F2, C318) - FIND (E2, C318) - 1))))
f16		
g4	2.366666667	"=IF (ISERR (F307 / 3) , 0.001, MAX (+ F307 / 3, 0.001))
g5	1.633333333	"=IF (ISERR (F308 / 3) , 0.001, MAX (+ F308 / 3, 0.001))
g6	0.2	"=IF (ISERR (F309 / 3) , 0.001, MAX (+ F309 / 3, 0.001))
g7	0.033333333	"=IF (ISERR (F310 / 3) , 0.001, MAX (+ F310 / 3, 0.001))
g8	0.3	"=IF (ISERR (F311 / 3) , 0.001, MAX (+ F311 / 3, 0.001))
g9	0.02	"=IF (ISERR (F312 / 3) , 0.001, MAX (+ F312 / 3, 0.001))
g10	0.033333333	"=IF (ISERR (F313 / 3) , 0.001, MAX (+ F313 / 3, 0.001))
g11	0.006666667	"=IF (ISERR (F314 / 3) , 0.001, MAX (+ F314 / 3, 0.001))
g12	0.01	"=IF (ISERR (F315 / 3) , 0.001, MAX (+ F315 / 3, 0.001))
g13	0.01	"=IF (ISERR (F316 / 3) , 0.001, MAX (+ F316 / 3, 0.001))
g14	0.006666667	"=IF (ISERR (F317 / 3) , 0.001, MAX (+ F317 / 3, 0.001))
g15	0.02	"=IF (ISERR (F318 / 3) , 0.001, MAX (+ F318 / 3, 0.001))
g16		
h4	33	33
h5	57	57
h6	5	5
h7		
h8		
h9		
h10		
h11	1.2	1.2
h12	0.27	0.27
h13	1.4	1.4
h14	0.12	0.12
h15		
h16		
I4	33	"=IF (ISERR (FIND (F2, C307)), 0, VALUE (MID (C307, FIND (F2, C307) + LEN (F2) , FIND (E2, C307, FIND (F2, C307) + 1) - (FIND (F2, C307) + LEN (F2)))))
I5	58	"=IF (ISERR (FIND (F2, C308)), 0, VALUE (MID (C308, FIND (F2, C308) + LEN (F2) , FIND (E2, C308, FIND (F2, C308) + 1) - (FIND (F2, C308) + LEN (F2)))))
I6	4.4	"=IF (ISERR (FIND (F2, C309)), 0, VALUE (MID (C309, FIND (F2, C309) + LEN (F2) , FIND (E2, C309, FIND (F2, C309) + 1) - (FIND (F2, C309) + LEN (F2)))))
I7	0	"=IF (ISERR (FIND (F2, C310)), 0, VALUE (MID (C310, FIND (F2, C310) + LEN (F2) , FIND (E2, C310, FIND (F2, C310) + 1) - (FIND (F2, C310) + LEN (F2)))))

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"
Cell Equations

Cell	Value	Formula
I8	0	"=IF (ISERR (FIND (F2, C311)) , 0, VALUE (MID (C311, FIND (F2, C311) + LEN (F2) , FIND (E2, C311, FIND (F2, C311) + 1) - (FIND (F2, C311) + LEN (F2)))))
I9	2.9	"=IF (ISERR (FIND (F2, C312)) , 0, VALUE (MID (C312, FIND (F2, C312) + LEN (F2) , FIND (E2, C312, FIND (F2, C312) + 1) - (FIND (F2, C312) + LEN (F2)))))
I10	0	"=IF (ISERR (FIND (F2, C313)) , 0, VALUE (MID (C313, FIND (F2, C313) + LEN (F2) , FIND (E2, C313, FIND (F2, C313) + 1) - (FIND (F2, C313) + LEN (F2)))))
I11	1.2	"=IF (ISERR (FIND (F2, C314)) , 0, VALUE (MID (C314, FIND (F2, C314) + LEN (F2) , FIND (E2, C314, FIND (F2, C314) + 1) - (FIND (F2, C314) + LEN (F2)))))
I12	0.27	"=IF (ISERR (FIND (F2, C315)) , 0, VALUE (MID (C315, FIND (F2, C315) + LEN (F2) , FIND (E2, C315, FIND (F2, C315) + 1) - (FIND (F2, C315) + LEN (F2)))))
I13	1.4	"=IF (ISERR (FIND (F2, C316)) , 0, VALUE (MID (C316, FIND (F2, C316) + LEN (F2) , FIND (E2, C316, FIND (F2, C316) + 1) - (FIND (F2, C316) + LEN (F2)))))
I14	0.12	"=IF (ISERR (FIND (F2, C317)) , 0, VALUE (MID (C317, FIND (F2, C317) + LEN (F2) , FIND (E2, C317, FIND (F2, C317) + 1) - (FIND (F2, C317) + LEN (F2)))))
I15	2.9	"=IF (ISERR (FIND (F2, C318)) , 0, VALUE (MID (C318, FIND (F2, C318) + LEN (F2) , FIND (E2, C318, FIND (F2, C318) + 1) - (FIND (F2, C318) + LEN (F2)))))
I16		
J4	3.2	"=IF (ISERR (FIND (F2, C307)) , 0, VALUE (RIGHT (C307, LEN (C307) - FIND (E2, C307, FIND (F2, C307) + 1) - (LEN (E2) - 1))))
J5	6.4	"=IF (ISERR (FIND (F2, C308)) , 0, VALUE (RIGHT (C308, LEN (C308) - FIND (E2, C308, FIND (F2, C308) + 1) - (LEN (E2) - 1))))
J6	0.5	"=IF (ISERR (FIND (F2, C309)) , 0, VALUE (RIGHT (C309, LEN (C309) - FIND (E2, C309, FIND (F2, C309) + 1) - (LEN (E2) - 1))))
J7	0	"=IF (ISERR (FIND (F2, C310)) , 0, VALUE (RIGHT (C310, LEN (C310) - FIND (E2, C310, FIND (F2, C310) + 1) - (LEN (E2) - 1))))
J8	0	"=IF (ISERR (FIND (F2, C311)) , 0, VALUE (RIGHT (C311, LEN (C311) - FIND (E2, C311, FIND (F2, C311) + 1) - (LEN (E2) - 1))))
J9	0.6	"=IF (ISERR (FIND (F2, C312)) , 0, VALUE (RIGHT (C312, LEN (C312) - FIND (E2, C312, FIND (F2, C312) + 1) - (LEN (E2) - 1))))
J10	0	"=IF (ISERR (FIND (F2, C313)) , 0, VALUE (RIGHT (C313, LEN (C313) - FIND (E2, C313, FIND (F2, C313) + 1) - (LEN (E2) - 1))))
J11	0.2	"=IF (ISERR (FIND (F2, C314)) , 0, VALUE (RIGHT (C314, LEN (C314) - FIND (E2, C314, FIND (F2, C314) + 1) - (LEN (E2) - 1))))
J12	0.1	"=IF (ISERR (FIND (F2, C315)) , 0, VALUE (RIGHT (C315, LEN (C315) - FIND (E2, C315, FIND (F2, C315) + 1) - (LEN (E2) - 1))))
J13	0.3	"=IF (ISERR (FIND (F2, C316)) , 0, VALUE (RIGHT (C316, LEN (C316) - FIND (E2, C316, FIND (F2, C316) + 1) - (LEN (E2) - 1))))
J14	0.07	"=IF (ISERR (FIND (F2, C317)) , 0, VALUE (RIGHT (C317, LEN (C317) - FIND (E2, C317, FIND (F2, C317) + 1) - (LEN (E2) - 1))))
J15	0.6	"=IF (ISERR (FIND (F2, C318)) , 0, VALUE (RIGHT (C318, LEN (C318) - FIND (E2, C318, FIND (F2, C318) + 1) - (LEN (E2) - 1))))
J16		
K4	1.066666667	"=IF (ISERR (J4 / 3) , 0.001, MAX (+ J4 / 3, 0.001))
K5	2.133333333	"=IF (ISERR (J5 / 3) , 0.001, MAX (+ J5 / 3, 0.001))
K6	0.166666667	"=IF (ISERR (J6 / 3) , 0.001, MAX (+ J6 / 3, 0.001))
K7	0.001	"=IF (ISERR (J7 / 3) , 0.001, MAX (+ J7 / 3, 0.001))
K8	0.001	"=IF (ISERR (J8 / 3) , 0.001, MAX (+ J8 / 3, 0.001))
K9	0.2	"=IF (ISERR (J9 / 3) , 0.001, MAX (+ J9 / 3, 0.001))
K10	0.001	"=IF (ISERR (J10 / 3) , 0.001, MAX (+ J10 / 3, 0.001))
K11	0.066666667	"=IF (ISERR (J11 / 3) , 0.001, MAX (+ J11 / 3, 0.001))
K12	0.033333333	"=IF (ISERR (J12 / 3) , 0.001, MAX (+ J12 / 3, 0.001))
K13	0.1	"=IF (ISERR (J13 / 3) , 0.001, MAX (+ J13 / 3, 0.001))
K14	0.023333333	"=IF (ISERR (J14 / 3) , 0.001, MAX (+ J14 / 3, 0.001))
K15	0.2	"=IF (ISERR (J15 / 3) , 0.001, MAX (+ J15 / 3, 0.001))
K16		

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"
Cell Equations

Cell	Value	Formula
l4	31.90562462	"= + D307
l5	55.12	"= + D308 + D317
l6	7.5	"= + D309
l7	9.383333333	"= + D310 + D314*5 / 3 + D315*5 / 2 + D316*4
l8	0.8	"= + D311
l9		
l10		
l11		
l12		
l13		
l14		
l15		
l16	104.708958	"=SUM (L307:L318)
m4	32.05737627	"= + X309
m5	58.20912925	"= + Y309
m6	7.199081032	"= + Z309
m7	9.38931521	"= + AA309
m8	0.599613297	"=AB309
m9		
m10		
m11		
m12		
m13		
m14		
m15		
m16	105.4545151	"=SUM (M307:M318)
n4	1.081848013	"= + X312
n5	2.08239897	"= + Y312
n6	0.278946023	"= + Z312
n7	0.431529823	"= + AA312
n8	0.101245517	"= + AB312
n9		
n10		
n11		
n12		
n13		
n14		
n15		
n16		
o4	30.39924488	"= + M307 / M319*100
o5	53.30177586	"= + M308 / M319*100
o6	6.826716739	"= + M309 / M319*100
o7	8.903663541	"= + M310 / M319*100
o8	0.56859898	"= + M311 / M319*100
o9		
o10		
o11		
o12		
o13		
o14		
o15		
o16	100	"=SUM (O307:O318)
p4	1.081848013	"= + N307
p5	2.08239897	"= + N308
p6	0.278946023	"= + N309
p7	0.431529823	"= + N310
p8	0.101245517	"= + N311
p9		
p10		
p11		
p12		
p13		
p14		

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"
Cell Equations

Cell	Value	Formula
p15		
p16		
q4	33	"= + H307
q5	57.12	"= + H308 + H317
q6	5	"= + H309
q7	8.275	"= + H310 + H314*5 / 3 + H315*5 / 2 + H316*4
q8	0	"= + H311
q9		
q10		
q11		
q12		
q13		
q14		
q15		
q16	103.395	"=SUM (Q307:Q318)
r4	32.95593137	"= + AC309
r5	58.23768653	"= + AD309
r6	4.40194146	"= + AE309
r7	8.256572689	"= + AF309
r8	0	"=AG309
r9		
r10		
r11		
r12		
r13		
r14		
r15	0	"=IF (OR (R307"=0, R308"=0, R309"=0, R310"=0, R311"=0) , 0, 1)
r16	103.852132	"=SUM (R307:R312)
s4	1.065328453	"= + AC312
s5	2.122268326	"= + AD312
s6	0.164811503	"= + AE312
s7	0.442054928	"= + AF312
s8	0	"= + AG312
s9		
s10		
s11		
s12		
s13		
s14		
s15		
s16		
t4	32.95593137	"=IF (R318"=0, + R307, + R307 / R319*100)
t5	58.23768653	"=IF (R318"=0, + R308, + R308 / R319*100)
t6	4.40194146	"=IF (R318"=0, + R309, + R309 / R319*100)
t7	8.256572689	"=IF (R318"=0, + R310, + R310 / R319*100)
t8	0	"=IF (R318"=0, + R311, + R311 / R319*100)
t9		
t10		
t11		
t12		
t13		
t14		
t15		
t16	103.852132	"=SUM (T307:T318)
u4	1.065328453	"= + S307
u5	2.122268326	"= + S308
u6	0.164811503	"= + S309
u7	0.442054928	"= + S310
u8	0	"= + S311
u9		
u10		
u11		
u12		

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "3-Revised comps"
Cell Equations

Cell	Value	Formula
u13		
u14		
u15		
u16		

3. Create Forecasts in Columns "L" and "Q" for the major components. Minor components are added to major components (NOx add to N2 and fuels are added to CH4)
4. Run Crytal Ball for 1000 trials.
5. Prepare Crystal Ball Report
6. Copy summary statistics to Colums "X" through "AG"

COMBINE DISTRIBUTIONS FOR SY-101

7. Copy combined SY-101 values from range "C290 to C301" to "C210 to C221"
8. Repeat Step 2 for SY-101
9. Repeat Step 3 for SY-101
10. Repeat Step 4 for SY-101
11. Repeat Step 5 for SY-101
12. Repeat Step 6 for SY-101
13. Clear all Forecasts and Assumptions from spreadsheet

2.3 CREATE DISTRIBUTIONS FOR RGS TANKS

Create the 4 Distributions Required to Specify the Retained Gas Distributions for Each of the RGS Tanks

Tab "4-Gas comp by tanks"

1. Recalculate Spreadsheet
2. Set up "Step-wise Continuous" assumptions in Cells in rows 8, 20, 32, 45, 58. 71, 84, 97, 110, 123, 136, 149, 162, 175 and Columns "O", "S", "W", "AA"
   a. Clear any existing assumptions
   b. Select custom Distribution
   c. select data, then enter the range of cells listed below the cell where the assumption cells
   d. Rescale to 1.00
   e. Save assumption
   f. If there are not 4 values to choose from use the original normal distribution

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

Tank and Sample (or Layer)		high salt range normalized		low salt range normalized		assumptions			
AW-101 solids		mean	std dev	mean	std dev	low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	30.40	1.08	32.96	1.07	26.07	30.40	32.96	37.22
	N2	53.30	2.08	58.24	2.12	44.97	53.30	58.24	66.73
	N2O	6.83	0.28	4.40	0.16	3.74	4.40	6.83	7.94
	CH4	8.90	0.43	8.26	0.44	6.49	8.26	8.90	10.63
	NH3	0.57	0.10	-	-	-	-	0.57	0.97
1		100.00		100.00					

AW-101				
H2				N2O
26.0719		-	31.6576	3.7427
30.3992		1.0000	I8:N11	4.4019
32.9559		1.0000		6.8267
37.2172		-		7.9425
		12 AW-101 H2	31.6576	1

retainedGasCompositionNH3	0.6000				12 A
retainedGasCompositionN2	53.7300	MEAN	AW-101 H2	31.1400	MEAN
headspaceGasRatioCH4	0.2136	STDDEV	AW-101 H2	2.3981	STDDEV
headspaceGasRatioN2O	0.1256				MEAN STDDEV

Tank and Sample (or Lay	high salt range normal	low salt range	assumptions					
A-101 upper	mean	std dev	mean	std dev	low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	71.37	2.30	-	-	-	-	71.37	80.58
	N2	18.90	1.64	-	-	-	-	18.90	25.45
	N2O	5.75	0.20	5.30	0.18	4.65	5.30	5.75	6.54
	CH4	1.50	0.06	-	-	-	-	1.50	1.73
	NH3	2.47	0.30	-	-	-	-	2.47	3.88
2		100.00		79.23					

A-101				
H2				N2O
-		-	50.6499	4.8471
-		1.0000	I20:N23	5.3031
71.3740		1.0000	I17:N20	5.7528
80.5757		-		6.5446
		24 A-101 H2	50.6499	

retainedGasCompositionNH3	0.6000				24
retainedGasCompositionN2	53.7300	MEAN	4 A-101 H2	31.1400	MEAN
headspaceGasRatioCH4	0.2100	STDDEV	4 A-101 H2	2.2719	STDDEV
headspaceGasRatioN2O	0.1300				MEAN STDDEV

Tank and Sample (or Lay	high salt range normal	low salt range normalize	assumptions					
AN-105 solids	mean	std dev	mean	std dev	low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	59.67	1.79	61.85	1.87	52.53	59.67	61.85	69.33
	N2	24.13	1.36	25.24	1.34	18.67	24.13	25.24	30.61
	N2O	13.94	0.49	10.99	0.36	9.55	10.99	13.94	15.92
	CH4	1.76	0.09	1.00	0.10	0.60	1.00	1.76	2.12

AN-105				
H2				N2O
52.5265		-	60.6674	9.5452
59.6699		1.0000	I32:N35	10.9868
61.8540		1.0000	I25:N28	13.9401
69.3331		-		15.9152

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

	NH3	0.60	0.06	-	-	-	-	0.50	0.76				36 AN-105 H2	60.8674			
3		100.00		100.00						retainedGasCompositionNH3	0.6000						36 /
										retainedGasCompositionN2	53.7300	MEAN	AN-105 H2	31.1400		MEAN	
										headspaceGasRatioCH4	0.2100	STDDEV	AN-105 H2	3.3698		STDDEV	
										headspaceGasRatioN2O	0.1300					MEAN STDDEV	

Tank and Sample (or Layer)		high salt range normalized		low salt range normalized		assumptions			
AN-104 solids		mean	std dev	mean	std dev	low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	44.41	2.32	46.88	2.34	35.11	44.41	46.88	56.25
	N2	28.67	1.56	30.92	1.72	22.43	28.67	30.92	37.81
	N2O	22.72	1.20	20.05	1.07	15.77	20.05	22.72	27.51
	CH4	3.31	0.24	2.34	0.26	1.32	2.34	3.31	4.27
	NH3	0.86	0.13	-	-	-	-	0.86	1.41
4		100.00		100.00					

AN-104					
	H2				N2O
	35.1133		-	45.6702	15.7734
	44.4117		1.0000	I45:N48	20.0506
	46.8842		1.0000	I34:N37	22.7161
	56.2530		-		27.5138
		49 AN-104 H2		45.6702	
retainedGasCompositionNH3	0.6000				49 /
retainedGasCompositionN2	53.7300	MEAN	AN-104 H2	31.1400	MEAN
headspaceGasRatioCH4	0.2100	STDDEV	AN-104 H2	4.3681	STDDEV
headspaceGasRatioN2O	0.1300				MEAN STDDEV

Tank and Sample (or Layer)		high salt range normalized		low salt range normalized		assumptions			
AN-103 solids		mean	std dev	mean	std dev	low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	60.74	2.59	61.88	2.45	50.36	60.74	61.88	71.67
	N2	32.96	1.44	-	-	-	-	32.96	36.74
	N2O	4.08	0.19	3.39	0.17	2.72	3.39	4.08	4.86
	CH4	1.62	0.09	9.26	0.43	1.25	1.62	9.26	10.96
	NH3	0.60	0.06	-	-	-	-	0.60	0.86
5		100.00		75.06					

AN-103					
	H2				N2O
	50.3833		-	61.1273	2.7169
	60.7423		1.0000	I58:N61	3.3936
	61.8769		1.0000	I43:N46	4.0841
	71.6747		-		4.8554
		62 AN-103 H2		61.1273	
retainedGasCompositionNH3	0.6000				62 /

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

										retainedGasCompositionN2headspaceGasRatio	53.7300	MEAN	AN-103 H2	31.1400	MEAN
										CH4headspaceGasRatio	0.2100	STDDEV	AN-103 H2	4.3860	STDDEV
										N2O	0.1300				MEAN STDDEV

Tank and Sample (or U-103 solids		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	22.87	0.46	23.84	0.51	21.01	22.87	23.84	25.90
	N2	35.97	0.77	37.88	0.85	32.89	35.97	37.88	41.25
	N2O	38.79	0.79	36.75	0.73	33.84	36.75	38.79	41.96
	CH4	1.78	0.07	1.06	0.06	0.63	1.06	1.78	2.05
	NH3	0.59	0.10	0.49	0.07	0.23	0.49	0.59	1.00
1		100.00		100.00					

U-103				
H2				N2O
21.0142		-	23.4174	33.8427
22.8687		1.0000	f71:N74	36.7458
23.8437		1.0000	f52:N55	38.7891
25.8985		-		41.9594
	75	U-103 H2	23.4174	

retainedGasCompositionNH3	0.6000				75
retainedGasCompositionN2headspaceGasRatio	53.7300	MEAN	5 U-103 H2	31.1400	MEAN
CH4headspaceGasRatio	0.2100	STDDEV	5 U-103 H2	1.0217	STDDEV
N2O	0.1300				MEAN STDDEV

Tank and Sample (or S-106 solids		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	62.57	1.90	64.96	1.97	54.95	62.57	64.96	72.62
	N2	24.91	1.24	0.06	0.01	0.01	0.06	24.91	29.87
	N2O	10.96	0.34	8.40	0.26	7.36	8.40	10.96	12.32
	CH4	1.26	0.14	0.41	0.10	-	0.41	1.26	1.80
	NH3	0.30	0.07	-	-	-	-	0.30	0.56
2		100.00		74.67					

S-106				
H2				N2O
54.9544		-	63.8400	7.3826
62.5667		1.0000	f84:N87	8.4011
64.9564		1.0000		10.9607
72.8187		-		12.3213
	88	S-106 H2	63.8400	

retainedGasCompositionNH3	0.6000				88
retainedGasCompositionN2headspaceGasRatio	53.7300	MEAN	8 S-106 H2	31.1400	MEAN
CH4headspaceGasRatio	0.2100	STDDEV	8 S-106 H2	3.6380	STDDEV
N2O	0.1300				MEAN STDDEV

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

Tank and Sample (or BY-109 behind salt		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	47.86	1.87	51.03	1.87	40.40	47.86	51.03	58.52
	N2	27.77	1.78	0.02	0.00	0.01	0.02	27.77	34.91
	N2O	17.15	0.84	16.00	0.75	12.99	16.00	17.15	20.50
	CH4	7.03	0.29	1.83	0.11	1.40	1.83	7.03	8.18
	NH3	0.19	0.03	-	-	-	-	0.19	0.32
3		100.00		100.00					

BY-109					
	H2				N2O
	40.3963		-	49.4537	12.9889
	47.8594		1.0000	I97:N100	15.9951
	51.0292		1.0000		17.1537
	58.5226		-		20.5039
		101	BY-109 H2	49.4537	1(
retainedGasCompositionNH3	0.6000				101 I
retainedGasCompositionN2headspaceGasRatio	53.7300	MEAN	BY-109 H2	31.1400	MEAN
CH4headspaceGasRatio	0.2100	STDDEV	BY-109 H2	3.7146	STDDEV
N2O	0.1300				MEAN STDDEV

Tank and Sample (or SX-106 solids		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	49.60	1.48	51.87	1.59	43.67	49.60	51.87	58.23
	N2	19.81	1.24	20.98	1.38	1.74	2.41	5.45	7.01
	N2O	23.78	0.92	-	-	-	-	23.78	27.46
	CH4	1.36	0.07	0.35	0.04	0.20	0.35	1.36	1.63
	NH3	5.45	0.39	2.41	0.17	1.74	2.41	5.45	7.01
4		100.00		75.99					

SX-106					
	H2				N2O
	43.6717		-	50.8674	-
	49.5979		1.0000	I110:N113	-
	51.8691		1.0000		23.7835
	58.2261		-		27.4795
		114	SX-106 H2	50.8674	1
retainedGasCompositionNH3	0.6000				114 I
retainedGasCompositionN2headspaceGasRatio	53.7300	MEAN	SX-106 H2	31.1400	MEAN
CH4headspaceGasRatio	0.2100	STDDEV	SX-106 H2	2.9926	STDDEV
N2O	0.1300				MEAN STDDEV

Tank and Sample (or AX-101-9D-8		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	60.10	1.61	63.98	1.90	52.68	60.10	63.98	71.59
	N2	16.77	0.69	17.99	0.91	13.23	16.77	17.99	21.64
	N2O	10.85	0.34	-	-	-	-	10.85	12.20
	CH4	3.97	0.21	3.29	0.13	2.78	3.29	3.97	4.79
	NH3	8.30	0.66	4.30	0.32	3.02	4.30	8.30	10.89

AX-101					
	H2				N2O
	52.8775		-	62.1605	-
	60.1029		1.0000	I123:N126	-
	63.9822		1.0000		10.8512
	71.5947		-		12.2019
		127	AX-101 H2	62.1605	1

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

5	100.00	88.80

retainedGasCompositionNH3	0.6000					127
retainedGasCompositionN2	53.7300	MEAN	AX-101 H2	31.1400		MEAN
headspaceGasRatioCH4	0.2100	STDDEV	AX-101 H2	3.8615		STDDEV
headspaceGasRatioN2O	0.1300					MEAN STDDEV

Tank and Sample (or S-102 tank avg)		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	33.08	1.05	34.94	1.04	28.88	33.08	34.94	39.10
	N2	31.99	1.41	33.00	1.51	26.35	31.99	33.00	39.06
	N2O	33.03	1.04	30.96	0.98	27.14	30.96	33.03	37.18
	CH4	0.81	0.05	0.50	0.02	0.42	0.50	0.81	1.00
	NH3	1.10	0.14	0.60	0.07	0.33	0.60	1.10	1.64

S-102 H2				N2O
28.8810		-	33.9988	27.1367
33.0750		1.0000	I136:N139	30.9567
34.9445		1.0000		33.0262
39.1030		-		37.1824
	140	S-102 H2	33.9988	

5	100.00	99.30

retainedGasCompositionNH3	0.6000					140
retainedGasCompositionN2	53.7300	MEAN	0 S-102 H2	31.1400		MEAN
headspaceGasRatioCH4	0.2100	STDDEV	0 S-102 H2	2.1742		STDDEV
headspaceGasRatioN2O	0.1300					MEAN STDDEV

Tank and Sample (or S-111 solids		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	65.90	3.21	66.95	3.65	53.08	65.90	66.95	81.55
	N2	21.04	1.91	21.94	1.92	13.40	21.04	21.94	29.61
	N2O	11.05	0.59	9.63	0.49	7.68	9.63	11.05	13.39
	CH4	0.91	0.07	-	-	-	-	0.91	1.17
	NH3	1.10	0.13	0.60	0.07	0.34	0.60	1.10	1.64

S-111 H2				N2O
53.0769		-	67.0058	7.6752
65.6681		1.0000	H49:N152	9.8338
66.9453		1.0000		11.0479
81.5507		-		13.3921
	153	S-111 H2	67.0058	

7	100.00	80.10

retainedGasCompositionNH3	0.6000					153
retainedGasCompositionN2	53.7300	MEAN	3 S-111 H2	31.1400		MEAN
headspaceGasRatioCH4	0.2100	STDDEV	3 S-111 H2	5.8283		STDDEV

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

headspaceGasRatioN2O 0.1300 — MEAN, STDDEV

Tank and Sample (or U-109 tank avg		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	24.75	1.04	26.14	1.08	20.59	24.75	26.14	30.47
	N2	45.65	2.66	48.39	2.76	0.33	0.60	1.18	1.85
	N2O	26.73	1.17	24.07	1.05	19.96	24.07	26.73	31.40
	CH4	1.66	0.11	0.80	0.03	0.87	0.80	1.66	2.13
	NH3	1.18	0.17	0.60	0.07	0.33	0.60	1.18	1.85
8		100.00		99.40					

U-109

H2			N2O
20.5904	-	25.4975	19.8594
24.7512	1.0000	I162:N165	24.0662
26.1374	1.0000		26.7349
30.4683	-		31.4044
	166 U-109 H2	25.4975	

retainedGasCompositionNH3	0.6000				166
retainedGasCompositionN2	53.7300	MEAN	6 U-109 H2	31.1400	MEAN
headspaceGasRatioCH4	0.2100	STDDEV	6 U-109 H2	1.9966	STDDEV
headspaceGasRatioN2O	0.1300				MEAN, STDDEV

Tank and Sample (or SY-101 eve		high salt range mean	high salt range std dev	low salt range mean	low salt range std dev	assumptions low	mean1	mean2	high
Mole Percent of Constituent in Bubbles	H2	31.29	2.17	36.85	2.32	22.61	31.29	36.85	46.13
	N2	31.88	2.62	39.83	3.36	21.38	31.88	39.83	53.26
	N2O	21.92	1.60	17.48	1.06	13.24	17.48	21.92	28.31
	CH4	3.21	0.30	0.98	0.10	0.56	0.98	3.21	4.41
	NH3	11.70	1.06	4.86	0.41	3.21	4.86	11.70	15.95
9		100.00		99.40					

SY-101

H2			N2O
22.6097	-	34.2531	13.2448
31.2949	1.0000	I175:N178	17.4790
36.8513	1.0000		21.9224
46.1337	-		28.3075
	179 SY-101 H2	34.2531	

retainedGasCompositionNH3	0.6000				179
retainedGasCompositionN2	53.7300	MEAN	SY-101 H2	31.1400	MEAN
headspaceGasRatioCH4	0.2100	STDDEV	SY-101 H2	5.1338	STDDEV
headspaceGasRatioN2O	0.1300				MEAN, STDDEV

Foreceets

1 AW-101	NH3	AW-101 NH3	AW-101 sol	31.6576
2 A-101	NH3	A-101 NH3	A-101 uppe	50.6499
3 AN-105	NH3	AN-105 NH3	AN-105 soll	60.8674

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

Mole Percent of Constituent in Bubbles

4 AN-104	NH3	AN-104 NH3		AN-104 soli	45.8702
5 AN-103	NH3	AN-103 NH3		AN-103 soli	61.1273
6 U-103	NH3	U-103 NH3		U-103 solid	23.4174
7 S-106	NH3	S-106 NH3		S-106 solid	63.8400
8 BY-109	NH3	BY-109 NH3		BY-109 bel	49.4537
9 SX-106	NH3	SX-106 NH3		SX-106 soli	50.8674
10 AX-101	NH3	AX-101 NH3		AX-101-9D	62.1605
11 S-102	NH3	S-102 NH3		S-102 tank	33.9988
12 S-114	NH3	S-114 NH3		S-114 solid	67.0058
13 U-109	NH3	U-109 NH3		U-109 tank	25.4975
14 SY-101	NH3	SY-101 NH3		SY-101 ave	34.2531
		Min	-		Min -
		Max	81.5507		Max 41.9594
				Min	23.4174
				Max	67.0058

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			CH4				NH3				N2							H2
	-	5.7387	6.4884		-	8.5670	-		-	0.5141					Row ==>	12 O		
	1.0000	P8:R11	8.2566		1.0000	T8:V11	-		1.0000	X8:Z11						Trials		1000
	1.0000		8.9037		1.0000		0.5696		1.0000							Mean		31.5657
	-		10.6298		-		0.9736		-							Median		31.5002
2 AW-101 N2O		5.7387		12 AW-101 CH4		8.5670		12 AW-101 NH3		0.5141		12 AW-101 N2		53.5226		Mode		—
																Standard D		2.3991
W-101 R_N2O		0.1249		12 R_CH4		0.2130										Variance		5.7556
12 AW-101 N2		6.0600	MEAN	12 AW-101 CH4		8.4700	MEAN	12 AW-101		0.6000	MEAN	12 AW-101		53.7300		Skewness		0.04
12 AW-101 N2		0.9980	STDDEV	12 AW-101 CH4		0.5462	STDDEV	12 AW-101		0.0999	STDDEV	12 AW-101		2.7074		Kurtosis		2.29
W-101 R_N2O		0.1256	MEAN	12 R_CH4		0.2138										Coeff. of V		0.08
W-101 R_N2O		0.0205	STDDEV	12 R_CH4		0.0210										Range Min		26.1555
																Range Ma		37.1098
			CH4				NH3				N2				Row ==>	24 O		
	-	5.5689	-		-	4.0991	-		-	2.0514						Trials		1000
	1.0000	P20:R23	-		1.0000	T20:V23	-		1.0000	X20:Z23						Mean		71.4638
	1.0000	P17:R20	1.5010		1.0000	T17:V20	2.4696		1.0000	X17:Z20						Median		71.4515
	-		1.7257		-		3.6847		-							Mode		—
24 A-101 N2O		5.5689		24 A-101 CH4		4.0991		24 A-101 NH3		2.0514		24 A-101 N2		37.6307		Standard D		2.2718
4 A-101 R_N2O		0.0923		24 R_CH4		0.0749										Variance		5.1614
24 A-101 N2O		6.0600	MEAN	24 A-101 CH4		8.4700	MEAN	24 A-101 N		0.6000	MEAN	24 A-101 N		53.7300		Skewness		0.06
24 A-101 N2O		0.4097	STDDEV	24 A-101 CH4		0.0552	STDDEV	24 A-101 N		0.2953	STDDEV	24 A-101 N		2.3255		Kurtosis		2.98
A-101 R_N2O		0.1300	MEAN	24 R_CH4		0.2100										Coeff. of V		0.03
A-101 R_N2O		0.0053	STDDEV	24 R_CH4		0.0010										Range Min		64.3838
																Range Ma		78.1475
			CH4				NH3				N2				Row ==>	36 O		
	-	12.6131	0.6049		-	1.3702	-		-	1.2940						Trials		1000
	1.0000	P32:R35	0.9979		1.0000	T32:V35	-		1.0000	X32:Z35						Mean		60.8886
	1.0000	P25:R28	1.7623		1.0000	T25:V28	0.4892		1.0000	X25:Z28						Median		60.9210
	-		2.1197		-		0.7580		-							Mode		—

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36 AN-105 N2O	12.6131			36 AN-105 CH4	1.3702			36 AN-105 NH3	1.2940			36 AN-105 N2	23.8553			Standard D	3.3698
AN-105 R_N2O	0.1685			36 R_CH4	0.0220											Variance	11.3558
36 AN-105 N2C	6.0600		MEAN	36 AN-105 CH4	8.4700		MEAN	36 AN-105 N	0.6000		MEAN	36 AN-105	53.7300			Skewness	-0.03
36 AN-105 N2C	1.4296		STDDEV	36 AN-105 CH4	0.3469		STDDEV	36 AN-105 N	0.0649		STDDEV	36 AN-105	3.6349			Kurtosis	2.34
AN-105 R_N2O	0.1300		MEAN	36 R_CH4	0.2100											Coeff. of V:	0.06
AN-105 R_N2O	0.0178		STDDEV	36 R_CH4	0.0056											Range Min	52.7813
																Range Max	68.7882

		CH4				NH3				N2				Row ==>	49 O		
-	21.5408	1.3185		-	2.8060	-		-	2.5263							Trials	1000
1.0000	P45:R48	2.3378		1.0000	T45:V48	-		1.0000	X45:Z48							Mean	45.5987
1.0000	P34:R37	3.3131		1.0000	T34:V37	0.8840		1.0000	X34:Z37							Median	45.7040
-		4.2657		-		1.4119		-								Mode	—
49 AN-104 N2O	21.5408			49 AN-104 CH4	2.8060			49 AN-104 NH3	2.5263			49 AN-104 N2	27.4568			Standard D	4.3661
AN-104 R_N2O	0.3077			49 R_CH4	0.0579											Variance	19.0632
49 AN-104 N2C	6.0600		MEAN	49 AN-104 CH4	8.4700		MEAN	49 AN-104 N	0.6000		MEAN	49 AN-104	53.7300			Skewness	-0.06
49 AN-104 N2C	2.4500		STDDEV	49 AN-104 CH4	0.8511		STDDEV	49 AN-104 N	0.1337		STDDEV	49 AN-104	4.9184			Kurtosis	2.35
AN-104 R_N2O	0.1300		MEAN	49 R_CH4	0.2100											Coeff. of V:	0.10
AN-104 R_N2O	0.0321		STDDEV	49 R_CH4	0.0139											Range Min	35.6334
																Range Max	58.1041

		CH4				NH3				N2				Row ==>	62 O		
-	3.7665	1.2522		-	5.7850	-		-	6.7396							Trials	1000
1.0000	P58:R61	1.6156		1.0000	T58:V61	-		1.0000	X58:Z61							Mean	61.1509
1.0000	P43:R46	9.2583		1.0000	T43:V46	0.5867		1.0000	X43:Z46							Median	61.1759
-		10.9624		-		0.8550		-								Mode	—
62 AN-103 N2O	3.7665			62 AN-103 CH4	5.7850			62 AN-103 NH3	6.7396			62 AN-103 N2	22.5816			Standard D	4.3860
AN-103 R_N2O	0.0533			62 R_CH4	0.0865											Variance	19.2373

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62 AN-103 N2C	6.0600	MEAN	62 AN-103 CH4	8.4700	MEAN	62 AN-103 N	0.6000	MEAN	62 AN-103	53.7300		Skewness	0.01
62 AN-103 N2C	0.4416	STDDEV	62 AN-103 CH4	2.5738	STDDEV	62 AN-103 N	0.0661	STDDEV	62 AN-103	5.1532		Kurtosis	2.40
AN-103 R_N2O	0.1300	MEAN	62 R_CH4	0.2100								Coeff. of V	0.07
AN-103 R_N2O	0.0071	STDDEV	62 R_CH4	0.0356								Range Min	50.5034
												Range Max	71.3726

		CH4			NH3			N2			Row ==>	75 O	
-	37.8475	0.8314	-	1.4322	0.2313	-	0.5892					Trials	1000
1.0000	P71:R74	1.0576	1.0000	T71:V74	0.4944	1.0000	X71:Z74					Mean	23.4438
1.0000	P52:R55	1.7817	1.0000	T52:V55	0.5947	1.0000	X52:Z55					Median	23.4259
-		2.0542	-		1.0001	-						Mode	---
75 U-103 N2O	37.8475		75 U-103 CH4	1.4322		75 U-103 NH3	0.5892		75 U-103 N2	36.7136		Standard D	1.0217
5 U-103 R_N2O	0.6037		75 R_CH4	0.0576								Variance	1.0438
75 U-103 N2O	6.0600	MEAN	75 U-103 CH4	8.4700	MEAN	75 U-103 NH	0.6000	MEAN	75 U-103 N	53.7300		Skewness	0.03
75 U-103 N2O	1.7223	STDDEV	75 U-103 CH4	0.2897	STDDEV	75 U-103 NH	0.1560	STDDEV	75 U-103 N	2.0176		Kurtosis	2.32
U-103 R_N2O	0.1300	MEAN	75 R_CH4	0.2100								Coeff. of V	0.04
U-103 R_N2O	0.0152	STDDEV	75 R_CH4	0.0111								Range Min	21.1146
												Range Max	25.8652

		CH4			NH3			N2			Row ==>	88 O	
-	9.7700	-	-	0.8721	-	-	0.2866					Trials	1000
1.0000	P84:R87	0.4110	1.0000	T84:V87	-	1.0000	X84:Z87					Mean	63.8677
1.0000	P62:R65	1.2598	1.0000	T62:V65	0.2982	1.0000	X62:Z65					Median	63.8747
-		1.8019	-		0.5615	-						Mode	---
88 S-106 N2O	9.7700		88 S-106 CH4	0.8721		88 S-106 NH3	0.2866		88 S-106 N2	25.2314		Standard D	3.6360
8 S-106 R_N2O	0.1312		88 R_CH4	0.0135								Variance	13.2203
88 S-106 N2O	6.0600	MEAN	88 S-106 CH4	8.4700	MEAN	88 S-106 NH	0.6000	MEAN	88 S-106 N	53.7300		Skewness	0.03
88 S-106 N2O	1.1464	STDDEV	88 S-106 CH4	0.4001	STDDEV	88 S-106 NH	0.0873	STDDEV	88 S-106 N	3.7891		Kurtosis	2.34
S-106 R_N2O	0.1300	MEAN	88 R_CH4	0.2100								Coeff. of V	0.06
S-106 R_N2O	0.0150	STDDEV	88 R_CH4	0.0082								Range Min	55.4556

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																	Range Max 72.6088
		CH4				NH3				N2						Row ==>	101 O
-	16.6814	1.3998		-	4.6200	-		-	0.1711								Trials 1000
1.0000	P97:R100	1.8340		1.0000	T97:V100	-		1.0000	X97:Z100								Mean 49.4113
1.0000		7.0301		1.0000		0.1900		1.0000									Median 49.2782
-		8.1845		-		0.3232		-									Mode ---
01 BY-109 N2O	16.6814			101 BY-109 CH4	4.6200			101 BY-109 NH3	0.1711			101 BY-109 N2	29.0738				Standard D 3.7146
BY-109 R_N2O	0.2358			101 R_CH4	0.0854												Variance 13.7982
101 BY-109 N2	6.0600		MEAN	101 BY-109 CH4	8.4700		MEAN	101 BY-109	0.6000		MEAN	101 BY-10	53.7300				Skewness -0.01
101 BY-109 N2	1.5678		STDDEV	101 BY-109 CH4	1.7919		STDDEV	101 BY-109	0.0338		STDDEV	101 BY-10	4.4366				Kurtosis 2.28
BY-109 R_N2O	0.1300		MEAN	101 R_CH4	0.2100												Coeff. of V 0.06
BY-109 R_N2O	0.0213		STDDEV	101 R_CH4	0.0313												Range Min 40.6183
																	Range Max 56.0221

		CH4				NH3				N2						Row ==>	114 O
-	4.1514	0.2028		-	0.8869	1.7367		-	4.1694								Trials 1000
1.0000	P110:R113	0.3521		1.0000	T110:V113	2.4065		1.0000	X110:Z113								Mean 50.89347
1.0000		1.3610		1.0000		5.4454		1.0000									Median 50.75708
-		1.6250		-		7.0089		-									Mode ---
14 SX-106 N2O	4.1514			114 SX-106 CH4	0.8869			114 SX-106 NH3	4.1684			114 SX-106 N2	39.9249				Standard D 2.992561
SX-106 R_N2O	0.0743			114 R_CH4	0.0171												Variance 8.955424
114 SX-106 N2	8.0600		MEAN	114 SX-106 CH4	8.4700		MEAN	114 SX-106	0.6000		MEAN	114 SX-10	53.7300				Skewness 0.089372
114 SX-106 N2	0.9292		STDDEV	114 SX-106 CH4	0.3585		STDDEV	114 SX-106	1.2553		STDDEV	114 SX-10	3.4462				Kurtosis 2.257485
SX-106 R_N2O	0.1300		MEAN	114 R_CH4	0.2100												Coeff. of V 0.0588
SX-106 R_N2O	0.0150		STDDEV	114 R_CH4	0.0069												Range Min 43.90172
																	Range Max 57.8058

		CH4				NH3				N2						Row ==>	127 O
-	7.6844	2.7796		-	3.7220	3.0191		-	6.6646								Trials 1000
1.0000	P123:R126	3.7923		1.0000	T123:V126	4.3011		1.0000	X123:Z126								Mean 62.1476
1.0000		3.9701		1.0000		8.3042		1.0000									Median 62.0682
-		4.7941		-		10.8920		-									Mode ---
27 AX-101 N2O	7.6844			127 AX-101 CH4	3.7220			127 AX-101 NH3	6.6646			127 AX-101 N2	19.7686				Standard D 3.8615

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AX-101 R_N2O	0.1045		127 R_CH4	0.0565								Variance	14.9112
127 AX-101 N2	6.0600	MEAN	127 AX-101 CH4	8.4700	MEAN	127 AX-101	0.6000	MEAN	127 AX-101	53.7300		Skewness	0.06
127 AX-101 N2	0.3294	STDDEV	127 AX-101 CH4	0.4351	STDDEV	127 AX-101	1.7692	STDDEV	127 AX-101	4.2841		Kurtosis	2.25
AX-101 R_N2O	0.1300	MEAN	127 R_CH4	0.2100									
AX-101 R_N2O	0.0060	STDDEV	127 R_CH4	0.0073								Coeff. of V:	0.08
												Range Min	53.4810
												Range Ma	71.3259

		CH4			NH3			N2					
-	32.0935	0.4201	-	0.6853	0.3326	-	0.9282				Row ==>	140 O	
1.0000	P136:R139	0.4957	1.0000	T136:V139	0.5978	1.0000	X136:Z139					Trials	1000
1.0000		0.8095	1.0000		1.1005	1.0000						Mean	33.9814
-		1.0013	-		1.6408	-						Median	34.0062
140 S-102 N2O	32.0935		140 S-102 CH4	0.6853		140 S-102 NH3	0.9282		140 S-102 N2	32.2943		Mode	—
												Standard D	2.1742
) S-102 R_N2O	0.4806		140 R_CH4	0.0198									
												Variance	4.7272
140 S-102 N2C	6.0600	MEAN	140 S-102 CH4	8.4700	MEAN	140 S-102 N	0.6000	MEAN	140 S-102 I	53.7300		Skewness	-0.01
140 S-102 N2C	2.0580	STDDEV	140 S-102 CH4	0.1340	STDDEV	140 S-102 N	0.2880	STDDEV	140 S-102 I	3.0736		Kurtosis	2.31
) S-102 R_N2O	0.1300	MEAN	140 R_CH4	0.2100									
) S-102 R_N2O	0.0220	STDDEV	140 R_CH4	0.0040								Coeff. of V:	0.06
												Range Min	29.1613
												Range Ma	38.8988

		CH4			NH3			N2					
-	10.4567	-	-	0.6959	0.3403	-	0.9292				Row ==>	153 O	
1.0000	P149:R152	-	1.0000	T149:V152	0.6014	1.0000	X149:Z152					Trials	1000
1.0000		0.9133	1.0000		1.0986	1.0000						Mean	66.7076
-		1.1744	-		1.6356	-						Median	66.5125
153 S-111 N2O	10.4567		153 S-111 CH4	0.6959		153 S-111 NH3	0.9292		153 S-111 N2	20.9124		Mode	—
												Standard D	5.6283
3 S-111 R_N2O	0.1338		153 R_CH4	0.0103									
												Variance	33.9686
153 S-111 N2C	6.0600	MEAN	153 S-111 CH4	8.4700	MEAN	153 S-111 N	0.6000	MEAN	153 S-111 I	53.7300		Skewness	0.09
153 S-111 N2C	1.1898	STDDEV	153 S-111 CH4	0.0647	STDDEV	153 S-111 N	0.2852	STDDEV	153 S-111 I	5.9532		Kurtosis	2.45

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3 S-111 R_N2O	0.1300		MEAN	153 R_CH4	0.2100									Coeff. of V:	0.09
3 S-111 R_N2O	0.0167		STDDEV	153 R_CH4	0.0016									Range Min	53.2953
														Range Max	81.0610
		CH4				NH3			N2			Row ==>	166 O		
-	25.5407	0.6665		-	1.3270	0.3331		-	1.0064				Trials	1000	
1.0000	P162:R165	0.8050		1.0000	T162:V165	0.6007		1.0000	X162:Z165				Mean	25.3635	
1.0000		1.6758		1.0000		1.1834		1.0000					Median	25.3495	
-		2.1337		-		1.8493		-					Mode	---	
166 U-109 N2O	25.5407			166 U-109 CH4	1.3270			166 U-109 NH3	1.0064		166 U-109 N2	46.6283	Standard D	1.9986	
3 U-109 R_N2O	0.4877			166 R_CH4	0.0495								Variance	3.9945	
166 U-109 N2C	6.0600		MEAN	166 U-109 CH4	8.4700		MEAN	166 U-109 N	0.6000	MEAN	166 U-109 I	53.7300	Skewness	0.01	
166 U-109 N2C	2.4395		STDDEV	166 U-109 CH4	0.3575		STDDEV	166 U-109 N	0.3279	STDDEV	166 U-109 I	3.1883	Kurtosis	2.36	
3 U-109 R_N2O	0.1300		MEAN	166 R_CH4	0.2100										
3 U-109 R_N2O	0.0306		STDDEV	166 R_CH4	0.0133								Coeff. of V:	0.06	
													Range Min	20.8141	
													Range Max	30.1725	
		CH4				NH3			N2			Row ==>	179 O		
-	20.3360	0.5877		-	2.3158	3.2059		-	8.9931				Trials	1000	
1.0000	P175:R178	0.9647		1.0000	T175:V178	4.8567		1.0000	X175:Z178				Mean	34.1341	
1.0000		3.2083		1.0000		11.6990		1.0000					Median	34.1906	
-		4.4115		-		15.9497		-					Mode	---	
79 SY-101 N2O	20.3360			179 SY-101 CH4	2.3158			179 SY-101 NH3	8.9931		179 SY-101 N2	34.1020	Standard D	5.1338	
SY-101 R_N2O	0.3574			179 R_CH4	0.0633								Variance	26.3559	
179 SY-101 N2	6.0600		MEAN	179 SY-101 CH4	6.4700		MEAN	179 SY-101	0.8000	MEAN	179 SY-101	53.7300	Skewness	0.04	
179 SY-101 N2	3.2064		STDDEV	179 SY-101 CH4	0.9013		STDDEV	179 SY-101	2.9869	STDDEV	179 SY-101	6.7839	Kurtosis	2.25	
SY-101 R_N2O	0.1300		MEAN	179 R_CH4	0.2100										
SY-101 R_N2O	0.0491		STDDEV	179 R_CH4	0.0257								Coeff. of V:	0.15	
													Range Min	22.9031	
													Range Max	45.6397	
AW-101 solids	5.7387			AW-101 solids Cl	8.5670			AW-101 NH	0.5141						
A-101 upper N2	5.5889			A-101 upper CH4	4.0991			A-101 NH3	2.0514						
AN-105 solids !	12.6131			AN-105 solids Cl	1.3702			AN-105 NH3	1.2940						

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AN-104 solids N	21.5408		AN-104 solids CH	2.8060		AN-104 NH3	2.5263	
AN-103 solids N	3.7665		AN-103 solids CH	5.7850		AN-103 NH3	6.7396	
U-103 solids N2	37.8475		U-103 solids CH4	1.4322		U-103 NH3	0.5892	
S-106 solids N2	9.7700		S-106 solids CH4	0.8721		S-106 NH3	0.2866	
BY-109 behigh	16.6814		BY-109 behigh sa	4.8200		BY-109 NH3	0.1711	
SX-106 solids N	4.1514		SX-106 solids CH	0.8869		SX-106 NH3	4.1694	
AX-101-9D-8 N	7.6844		AX-101-9D-8 CH4	3.7220		AX-101 NH3	6.6646	
S-102 tank avg	32.0935		S-102 tank avg. C	0.6853		S-102 NH3	0.9282	
S-114 solids N2	10.4587		S-114 solids CH4	0.6959		S-114 NH3	0.9292	
U-109 tank avg	25.5407		U-109 tank avg. C	1.3270		U-109 NH3	1.0084	
SY-101 ave N2	20.3360		SY-101 ave CH4	2.3158		SY-101 NH3	8.9931	
	Min	-		Min	-			
	Max	10.9624		Max	15.9497			
Min	3.7665		Min	0.6853		Min	0.1711	
Max	37.8475		Max	8.5670		Max	8.9931	

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

N2)	CH4	NH3	N2	R_N2O	R_CH4
S W	AA	AE		13 S W	
1000	1000	1000	1000	1000	1000
5.7806	8.5528	0.5706	53.5503	0.1256	0.2136
5.8013	8.5615	0.5753	53.5713	0.1256	0.2136
—	—	—	—	—	—
0.9980	0.8462	0.0999	2.7074	0.0205	0.0210
0.9960	0.7180	0.0100	7.3298	0.0004	0.0004
-0.01	-0.01	0.01	0.00	0.02	0.07
1.90	2.37	3.07	2.59	2.10	2.63
0.17	0.10	0.18	0.05	0.16	0.10
3.8339	6.5431	0.2715	45.4532	0.0779	0.1565
7.9000	10.5557	0.9587	62.0123	0.1739	0.2751
S W	AA	AE		25 S W	
1000	1000	1000	1000	########	1000
5.5769	1.5018	2.4569	19.0006	0.071038	0.020601
5.5857	1.5047	2.4429	19.0320	0.071142	0.020606
—	—	—	—	—	—
0.4097	0.0552	0.2953	2.3255	0.005261	0.000975
0.1678	0.0030	0.0872	5.4061	2.77E-05	9.5E-07
-0.02	-0.08	0.03	-0.05	0.030571	-0.045602
2.27	2.84	3.28	3.06	2.509441	2.875621
0.07	0.04	0.12	0.12	0.074061	0.047322
4.6557	1.3021	1.2415	11.3516	0.057656	0.017668
6.5122	1.6906	3.3466	26.5940	0.064372	0.023642
S W	AA	AE		37 S W	
1000	1000	1000	1000	1000	1000
12.8562	1.3838	0.5001	24.5713	0.16897	0.02226
12.6099	1.4046	0.4980	24.4745	0.168367	0.022398
—	—	—	—	—	—

Tank	Gas	Mean	Std Dev	Min	Max	Type
AW-101	N2	53.5503	2.7074	45.4532	62.0123	Normal
AW-101	NH3	0.5706	0.0999	0.2715	0.9587	Normal
AW-101	N2O Ratio	0.1256	0.0205	0.0779	0.1739	Normal
AW-101	CH4 Ratio	0.2136	0.0210	0.1565	0.2751	Normal
A-101	N2	19.0006	2.3255	11.3516	26.5940	Normal
A-101	NH3	2.4569	0.2953	1.2415	3.3466	Normal
A-101	N2O Ratio	0.0710	0.0053	0.0577	0.0844	Normal
A-101	CH4 Ratio	0.0206	0.0010	0.0177	0.0236	Normal
AN-105	N2	24.5713	3.6349	14.1664	34.3390	Normal
AN-105	NH3	0.5001	0.0649	0.3029	0.7818	Normal
AN-105	N2O Ratio	0.1690	0.0178	0.1246	0.2196	Normal
AN-105	CH4 Ratio	0.0223	0.0056	0.0108	0.0359	Normal

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

1.4296	0.3469	0.0649	3.6349	0.017801	0.005617
2.0437	0.1203	0.0042	13.2122	0.000317	3.16E-05
0.07	-0.11	0.12	0.05	0.062049	-0.052725
2.15	2.00	3.04	2.70	2.425953	2.070183
0.11	0.25	0.13	0.15	0.105352	0.252341
9.6383	0.6186	0.3029	14.1664	0.124604	0.010841
15.7712	2.0888	0.7618	34.3390	0.219849	0.035899

S	W	AA	AE	50 S	W
1000	1000	1000	1000	1000	1000
21.5176	2.8291	0.8820	29.1727	0.308064	0.058752
21.4626	2.8696	0.8861	29.0970	0.307336	0.059095
—	—	—	—	—	—
2.4500	0.6511	0.1337	4.9184	0.032057	0.013932
6.0023	0.4240	0.0179	24.1907	0.001028	0.000194
0.09	-0.08	-0.07	0.02	0.130719	0.017435
2.33	2.17	2.96	2.53	2.709504	2.34522
0.11	0.23	0.15	0.17	0.10406	0.237128
16.0419	1.3793	0.3767	14.3337	0.223149	0.026568
27.3782	4.2057	1.2932	41.4358	0.401107	0.0987

AN-104	N2	29.1727	4.9184	14.3337	41.4358	Normal
AN-104	NH3	0.8820	0.1337	0.3767	1.2932	Normal
AN-104	N2O Ratio	0.3061	0.0321	0.2231	0.4011	Normal
AN-104	CH4 Ratio	0.0586	0.0139	0.0266	0.0987	Normal

S	W	AA	AE	63 S	W
1000	1000	1000	1000	1000	1000
3.7613	5.8310	0.5966	28.6602	0.053411	0.086029
3.7417	5.8219	0.5978	26.5760	0.053069	0.087424
—	—	—	—	—	—
0.4416	2.5736	0.0661	5.1532	0.007096	0.035624
0.1950	6.6235	0.0044	26.5559	5.04E-05	0.001269

AN-103	N2	28.6602	5.1532	14.9119	42.8042	Normal
AN-103	NH3	0.5966	0.0661	0.4003	0.7819	Normal
AN-103	N2O Ratio	0.0534	0.0071	0.0374	0.0768	Normal
AN-103	CH4 Ratio	0.0860	0.0356	0.0215	0.1639	Normal

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

0.13	0.01	-0.08	-0.04	0.25907	-0.032474
2.26	1.75	2.83	2.57	2.738004	1.83637
0.12	0.44	0.11	0.18	0.132855	0.414089
2.7635	1.3003	0.4003	14.9119	0.037432	0.021524
4.8238	10.7868	0.7819	42.6042	0.076807	0.163913

S	W	AA	AE	76 S	W
1000	1000	1000	1000	1000	1000
37.8238	1.4250	0.5960	36.7114	0.6032	0.057236
37.8124	1.4184	0.5887	36.7171	0.603535	0.057138
—	—	—	—	—	—
1.7223	0.2897	0.1560	2.0176	0.015214	0.011062
2.9664	0.0839	0.0243	4.0707	0.000231	0.000122
0.01	0.03	0.15	-0.04	-0.002835	0.03366
2.30	1.93	2.33	2.59	2.604428	2.009707
0.05	0.20	0.26	0.05	0.025222	0.193275
33.9731	0.8448	0.2463	30.9455	0.560894	0.03398
41.8525	2.0322	0.9627	42.5608	0.844936	0.082005

S	W	AA	AE	89 S	W
1000	1000	1000	1000	1000	1000
9.7450	0.8718	0.2988	25.2167	0.130954	0.013483
9.6785	0.8727	0.3008	25.3057	0.130202	0.013815
—	—	—	—	—	—
1.1464	0.4001	0.0673	3.7891	0.01501	0.006204
1.3143	0.1601	0.0045	14.3575	0.000225	3.85E-05
0.11	0.07	-0.08	-0.01	0.140627	0.104516
2.01	2.16	3.03	2.43	2.23079	2.241314
0.12	0.46	0.23	0.15	0.114616	0.460099
7.3941	0.0142	0.0942	15.2492	0.098175	0.000211

U-103	N2	36.7114	2.0176	30.9455	42.5608	Normal
U-103	NH3	0.5960	0.1560	0.2463	0.9627	Normal
U-103	N2O Ratio	0.6032	0.0152	0.5609	0.6449	Normal
U-103	CH4 Ratio	0.0572	0.0111	0.0340	0.0820	Normal

S-106	N2	25.2167	3.7891	15.2492	34.9225	Normal
S-106	NH3	0.2988	0.0673	0.0942	0.5200	Normal
S-106	N2O Ratio	0.1310	0.0150	0.0982	0.1695	Normal
S-106	CH4 Ratio	0.0135	0.0062	0.0002	0.0297	Normal

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

12.2462	1.7881	0.5200	34.9225	0.169499	0.029665	

S	W	AA	AE	102 S	W						
1000	1000	1000	1000	1000	1000	BY-109	N2	29.0445	4.4366	18.6779	42.3766	Normal
16.6879	4.6650	0.1912	29.0445	0.236212	0.085707	BY-109	NH3	0.1912	0.0338	0.0812	0.3206	Normal
16.6419	4.7290	0.1902	29.0978	0.236007	0.08591	BY-109	N2O Ratio	0.2362	0.0213	0.1781	0.3051	Normal
—	—	—	—	—	—	BY-109	CH4 Ratio	0.0857	0.0313	0.0278	0.1609	Normal
1.5678	1.7919	0.0338	4.4366	0.021337	0.031271							
2.4581	3.2109	0.0011	19.6835	0.000455	0.000978							
0.07	-0.01	0.06	-0.03	0.047369	-0.00373							
2.40	1.82	3.00	2.59	2.740707	1.925684							
0.09	0.38	0.18	0.15	0.090331	0.364864							
13.0703	1.4917	0.0812	16.6779	0.178078	0.027751							
20.3392	8.1346	0.3206	42.3766	0.30508	0.160899							

S	W	AA	AE	115 S	W						
1000	1000	1000	1000	1000	1000	SX-106	N2	20.2029	3.4462	10.1979	29.5507	Normal
23.81928	0.88216	4.202221	20.20287	0.315482	0.017059	SX-106	NH3	4.2022	1.2553	1.7899	6.8047	Normal
23.81457	0.860751	4.197705	20.24646	0.315041	0.016474	SX-106	N2O Ratio	0.3155	0.0150	0.2753	0.3600	Normal
—	—	—	—	—	—	SX-106	CH4 Ratio	0.0171	0.0089	0.0046	0.0340	Normal
0.929249	0.358488	1.2553	3.446216	0.015031	0.00695							
0.863503	0.128513	1.575779	11.87641	0.000226	4.83E-05							
0.119374	0.089557	0.025571	-0.130026	0.1494	0.140778							
3.26284	1.848724	1.978149	2.482026	2.807714	1.939413							
0.039012	0.406375	0.298723	0.17058	0.047643	0.407385							
20.45172	0.239585	1.789907	10.19791	0.275264	0.004601							
27.17027	1.594964	6.804736	29.55086	0.360009	0.033974							

S	W	AA	AE	128 S	W						
1000	1000	1000	1000	1000	1000	AX-101	N2	16.6825	4.2841	4.6480	27.3917	Normal
10.8483	3.7365	6.5851	16.6825	0.14172	0.056888	AX-101	NH3	6.5851	1.7692	3.0943	10.7840	Normal
10.8489	3.7218	6.6081	16.8103	0.141378	0.056377	AX-101	N2O Ratio	0.1417	0.0080	0.1219	0.1633	Normal
—	—	—	—	—	—	AX-101	CH4 Ratio	0.0569	0.0073	0.0402	0.0764	Normal
0.3294	0.4351	1.7692	4.2841	0.00804	0.00726							

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

0.1085	0.1893	3.1300	18.3533	6.46E-05	5.27E-05
-0.02	0.10	0.06	-0.10	0.1553	0.152108
2.87	2.12	2.11	2.48	2.413915	2.292104
0.03	0.12	0.27	0.26	0.056732	0.127623
9.9324	2.8278	3.0943	4.6480	0.121906	0.040168
11.9319	4.7405	10.7840	27.3917	0.163299	0.076391

S	W	AA	AE	141 S	W
1000	1000	1000	1000	1000	1000
32.1436	0.6872	0.9317	32.2461	0.481049	0.019883
32.1775	0.6856	0.9216	32.1859	0.480987	0.019694
—	—	—	—	—	—
2.0580	0.1340	0.2880	3.0736	0.022026	0.004036
4.2354	0.0180	0.0830	9.4468	0.000485	1.63E-05
0.03	0.11	0.17	0.00	0.067397	0.219862
2.33	2.04	2.15	2.60	2.74117	2.165423
0.06	0.20	0.31	0.10	0.045788	0.202997
27.4178	0.4271	0.3470	23.9737	0.413829	0.011642
37.0568	0.9930	1.6237	40.7194	0.548543	0.030686

S	W	AA	AE	154 S	W
1000	1000	1000	1000	1000	1000
10.4610	0.9126	0.9287	20.9901	0.134526	0.0136
10.4608	0.9136	0.9043	21.1214	0.134671	0.013492
—	—	—	—	—	—
1.1898	0.0647	0.2852	5.9532	0.018671	0.001556
1.4156	0.0042	0.0813	35.4405	0.000278	2.42E-06
0.03	-0.13	0.19	-0.08	0.13788	0.35688
2.31	3.01	2.17	2.40	2.727512	3.003592

S-102	N2	32.2461	3.0736	23.9737	40.7194	Normal
S-102	NH3	0.9317	0.2880	0.3470	1.6237	Normal
S-102	N2O Ratio	0.4810	0.0220	0.4138	0.5485	Normal
S-102	CH4 Ratio	0.0199	0.0040	0.0116	0.0307	Normal

S-111	N2	20.9901	5.9532	4.5555	34.7510	Normal
S-111	NH3	0.9287	0.2852	0.3545	1.6035	Normal
S-111	N2O Ratio	0.1345	0.0167	0.0924	0.1900	Normal
S-111	CH4 Ratio	0.0136	0.0016	0.0098	0.0192	Normal

"rgs FinalSumTable Rev 1 Tab_6MC 030823 .xls",Tab "4-Gas comp by tanks"

0.11	0.07	0.31	0.28	0.123923	0.114375
7.7837	0.7009	0.3545	4.5555	0.092432	0.009773
13.1623	1.1045	1.8035	34.7510	0.190021	0.019236

S	W	AA	AE	187 S	W
1000	1000	1000	1000	1000	1000
25.5498	1.3026	1.0071	46.7771	0.488936	0.048947
25.5228	1.2787	0.9995	46.8855	0.489142	0.048328
—	—	—	—	—	—
2.4395	0.3575	0.3279	3.1883	0.03062	0.013326
5.9511	0.1278	0.1075	10.1655	0.000938	0.000176
0.04	0.18	0.15	-0.09	-0.014956	0.251231
2.23	1.94	2.18	2.70	2.546964	2.172118
0.10	0.27	0.33	0.07	0.062625	0.272249
20.0417	0.8707	0.3542	36.8539	0.402124	0.023892
31.3397	2.0859	1.8118	56.6161	0.576907	0.087352

S	W	AA	AE	180 S	W
1000	1000	1000	1000	1000	1000
20.4748	2.3443	9.1721	33.8747	0.380501	0.065052
20.4076	2.3458	9.2867	33.8499	0.380514	0.063944
—	—	—	—	—	—
3.2064	0.9013	2.9869	6.7839	0.049085	0.025704
10.2810	0.8124	8.8215	46.0215	0.002409	0.000661
0.11	0.03	0.00	0.00	0.072111	0.260286
2.23	2.00	2.00	2.61	2.700979	2.463738
0.16	0.36	0.33	0.20	0.136158	0.395124
13.3785	0.6343	3.2737	13.3597	0.228125	0.014589
28.0281	4.3541	15.7673	53.3132	0.501277	0.14984

U-109	N2	46.7771	3.1883	36.8539	56.6161	Normal
U-109	NH3	1.0071	0.3279	0.3542	1.8118	Normal
U-109	N2O Ratio	0.4889	0.0306	0.4021	0.5769	Normal
U-109	CH4 Ratio	0.0489	0.0133	0.0239	0.0874	Normal

SY-101	N2	33.8747	6.7839	13.3597	53.3132	Normal
SY-101	NH3	9.1721	2.9869	3.2737	15.7673	Normal
SY-101	N2O Ratio	0.3605	0.0491	0.2261	0.5013	Normal
SY-101	CH4 Ratio	0.0651	0.0257	0.0146	0.1498	Normal

3. Setup Forecasts in Cells in Rows 12, 13,24, 25, 36, 37, 49, 50, 62, 63, 75, 76, 88, 89, 101, 102, 114, 115, 127, 128, 140, 141, 153, 154, 166, 167, 179, 180 and Columns "O", "S", "W", "AA"
   a. Clear any existing forecasts
4. Run Crystal Ball for 1000 trials.
5. Prepare Crystal Ball Report
6. Copy summary statistics from Crystal Ball Report to Columns "AH" through "AO"
   a. Save assumption
7. Final Database distributions for the RGS tanks are given in ROWS "AQ" through "AW"

2.4 CREATE DISTRIBUTIONS FOR NON-RGS TANKS

Create the 4 Distributions Required to Specify the Retained Gas Distributions for Non-RGS Tanks

- Capture 1,000 Data points from each RGS Distribution, then reduce data down to 420 points for each gas including 30 points from each RGS tank
- Determine the default N2 distribution for non-RGS tanks
- Assume that the first 30 data points from the 1000 are random and represent the overall distribution for the tank.

Tab "5 - 'CB05all Tab_5mc RGS Forecast Values 030823 .xls'" (Note this tab is in separate spreadsheet)

Note: This spreadsheet is set up for 1,000 trials with the same variables as given in 'CB05all Tab_5mc RGS Forecast Values 030823.xls'

1. Extract Forecast data from Crystal Ball using the menu items "RUN" "EXTRACT DATA"
2. Open Spredsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' or a copy
3. Copy all extracted data to TAB "All Tab_5mc RGS Forecast Values"
4. On the following TABs copy range 'Q5:Q424' to 'R5:R424' and 'S5:S424' using "Paste Special" "values"
   a. Use TABS "H2", "N2O", "CH4", "NH3" and "N2"
5. On Tab "N2" regress all 420 combined data points for N2 to produce a combined distribution using Crystal Ball
   a. Create a distribution using Crystal Ball to fit the data by::
      1.) Create Assumption

2.) Select fit Data

3.) Enter range of data, S5:S424

4.) Allow Crystal Ball to fit the data to the regression curves

Reduce the 420 data points for "H2", "N2O", "CH4", "NH3" and the minumum and maximum values from all 16,000 datapoints for each gas to produce continuous Linear Distribution made up of 55 data pairs

Use every 8th data point from the 420 combined points, following numerical sorting of the values, to define 53 of the data pairs.

Use the Minimum and Maximum Data points as the bounding values for the Continuous Linear Distributions

Tab "6- Gas Forecast Data"

1. Copy from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' to this spreadsheet, TAB "6- Gas Forecast Data"

a. For H2 - From Range 'S5:S424 in TAB "H2" to 'b5:b424' using "Paste Special" "values"

b. For N2O - From Range 'S5:S424 in TAB "N2O" to 'k5:k424' using "Paste Special" "values"

c. For CH4 - From Range 'S5:S424 in TAB "CH4" to 't5:t424' using "Paste Special" "values"

d. For NH3 - From Range 'S5:S424 in TAB "NH3" to 'ac5:ac424' using "Paste Special" "values"

2. Sort the raw data as given below

a. For H2 - Sort range a5:c424 with sort keys: 1 -- column C decending; 2 -- column A ascending; 3 -- NONE

b. For N2O - Sort range J5:L424 with sort keys: 1 -- column J decending; 2 -- column L ascending; 3 -- NONE

c. For CH4 - Sort range S5:U424 with sort keys: 1 -- column U decending; 2 -- column S ascending; 3 -- NONE

d. For NH3 - Sort range AB5:AD424 with sort keys: 1 -- column AD decending; 2 -- column AB ascending; 3 -- NONE

3. Sort columns based on mask in colmns to the right of the original data

a. For H2 -

1.) Copy range B5:B57 to range D7:D59

2.) Copy H2 minumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O39' in TAB H2 to this spreadsheet in TAB "6- Gas Forecast Data" cell 'D6'

3.) Copy H2 maxumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O40' in TAB H2 to this spreadsheet in TAB "6- Gas Forecast Data" cell 'D60'

b. For N2O -

1.) Copy range K5:K57 to range M7:M59

2.) Copy N2O minumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O39' in TAB N2O to this spreadsheet in TAB "6- Gas Forecast Data" cell 'M6'

3.) Copy N2O maxumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O40' in TAB N2O to this spreadsheet in TAB "6- Gas Forecast Data" cell 'M60'

c. For CH4 -

1.) Copy range T5:T57 to range V7:V59

2.) Copy CH4 minumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O39' in TAB CH4 to this spreadsheet in TAB "6- Gas Forecast Data" cell 'V6'

3.) Copy CH4 maxumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O40' in TAB CH4 to this spreadsheet in TAB "6- Gas Forecast Data" cell 'V60'

a. For NH3 -

1.) Copy range AC5:AC57 to range AE7:AE59

2.) Copy NH3 minumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O39' in TAB NH3 to this spreadsheet in TAB "6- Gas Forecast Data" cell 'AE6'

3.) Copy NH3 maxumum from the spreadsheet 'CB05all Tab_5mc RGS Forecast Values 030823 .xls' cell 'O40' in TAB NH3 to this spreadsheet in TAB "6- Gas Forecast Data" cell 'AE60'

4. Sort the raw data as given below

a. For H2 - Sort range a5:c424 with sort keys: 1 -- column A ascending; 2 -- NONE; 3 -- NONE

b. For N2O - Sort range J5:L424 with sort keys: 1 -- column L ascending; 2 -- NONE; 3 -- NONE

c. For CH4 - Sort range S5:U424 with sort keys: 1 -- column S ascending; 2 -- NONE; 3 -- NONE

d. For NH3 - Sort range AB5:AD424 with sort keys: 1 -- column AB ascending; 2 -- NONE; 3 -- NONE

Calculate the "CH4 Ratio" and "N2O Ratio" distributions

5. Calculate distributions for "CH4 Ratio" and "N2O Ratio"

a. create Assumption Distributions for H2, N2O, CH4, and NH3 in cells H6, Q6, Z6, and AI6

1.) Use the Continuous Linear function....

a). Select Creat Assumption

b.) Select Custom Distribution

c.) Select Data

d.) Enter range of data I.e., d6:e60 for H2 and make sure the "cumaltive data" selection is selected.

e). Select "OK" to create the distribution

b. Create forecasts for "N2", "CH4 Ratio" and "N2O Ratio" values

1.) the formulas behind the forecasts are:

a.) For N2: 100 - [H2] - {N2O] - [CH4] - [NH3]

b.) For "CH4 Ratio": [CH4] / ([CH4] + [H2])

c.) For "N2O Ratio": [N2O] / ([N2O] + [CH4] + [H2])

2.) Extract data for "CH4 Ratio" and "N2O Ratio" and copy to TAB "7-OverallDistributions"

TAB "7-OverallDistributions"

1. Use Crystal Ball to fit 1,000 trails of data into distribution for "CH4 Ratio" and "N2O Ratio"

a. Create a distribution using Crystal Ball to fit the data by::

1.) Create Assumption

2.) Select fit Data

3.) Enter range of data

a.) For "CH4 Ratio" use the range B8:B1007

b.) For "N2O Ratio" use the range C8:C1007

4.) Allow Crystal Ball to fit the data to the regression curves

2.5 REFORMAT RESULTS TO FIT DATABASE

8-RPP-10006 DB values

1. For RGS Tanks copy data values from TAB "4-Gas comp by tanks" range AQ7:AW178 to TAB "8-RPP-10006 DB values" cell A4
2. Remove blank lines and sort by Tank Name
3. When positioned as given in TAB "8-RPP-10006 DB values" the numbers will automatically be rearranged to fit the database format by the imbedded formulas.

4. The same procedure is used for the values for the default gas composition specifications.

3.0 RESULTS

Table J.3.1 presents the distributions obtained by the methodology explained in Section 2. Included in the results are the gas concentration distributions for all 16 RGS tanks as well as the gas concentration distributions for non-RGS tanks, which are labeled "DEFAULT". Following Table J.3.1 are 3 Figures illustrating the distributions overlaying the frequency bins for the DEFAULT distributions, demonstrating the closeness of fit achieved Crystal Ball by its regression algorithm.

Table J.3.1. Retained Gas Concentration Distribution Results (4 pages)

Tank	Gas	Mean	Std Dev	Min	Max	Distribution Type
A-101	CH4 Ratio	0.0206	0.0010	0.0177	0.0236	Normal
A-101	N2	19.0006	2.3255	11.3516	26.5940	Normal
A-101	N2O Ratio	0.0710	0.0053	0.0577	0.0844	Normal
A-101	NH3	2.4569	0.2953	1.2415	3.3466	Normal
AN-103	CH4 Ratio	0.0860	0.0356	0.0215	0.1639	Normal
AN-103	N2	28.6602	5.1532	14.9119	42.8042	Normal
AN-103	N2O Ratio	0.0534	0.0071	0.0374	0.0768	Normal
AN-103	NH3	0.5966	0.0661	0.4003	0.7819	Normal
AN-104	CH4 Ratio	0.0588	0.0139	0.0266	0.0987	Normal
AN-104	N2	29.1727	4.9184	14.3337	41.4358	Normal
AN-104	N2O Ratio	0.3081	0.0321	0.2231	0.4011	Normal
AN-104	NH3	0.8820	0.1337	0.3767	1.2932	Normal
AN-105	CH4 Ratio	0.0223	0.0056	0.0108	0.0359	Normal
AN-105	N2	24.5713	3.6349	14.1664	34.3390	Normal
AN-105	N2O Ratio	0.1690	0.0178	0.1246	0.2198	Normal
AN-105	NH3	0.5001	0.0649	0.3029	0.7618	Normal
AW-101	CH4 Ratio	0.2136	0.0210	0.1565	0.2751	Normal
AW-101	N2	53.5503	2.7074	45.4532	62.0123	Normal
AW-101	N2O Ratio	0.1256	0.0205	0.0779	0.1739	Normal
AW-101	NH3	0.5706	0.0999	0.2715	0.9587	Normal

Table J.3.1. Retained Gas Concentration Distribution Results (4 pages)

Tank	Gas	Mean	Std Dev	Min	Max	Distribution Type
AX-101	CH4 Ratio	0.0568883	0.0072603	0.040168	0.0763907	Normal
AX-101	N2	16.682515	4.2840712	4.6480254	27.391705	Normal
AX-101	N2O Ratio	0.1417203	0.0080401	0.1219057	0.1632994	Normal
AX-101	NH3	6.5851237	1.769175	3.094251	10.784005	Normal
BY-109	CH4 Ratio	0.0857066	0.0312712	0.0277509	0.1608994	Normal
BY-109	N2	29.044525	4.4366125	16.677941	42.376593	Normal
BY-109	N2O Ratio	0.2362124	0.0213373	0.1780785	0.3050799	Normal
BY-109	NH3	0.1912388	0.0337871	0.081167	0.3206144	Normal
S-102	CH4 Ratio	0.0198833	0.0040362	0.0116416	0.0306858	Normal
S-102	N2	32.246089	3.0735677	23.973682	40.719438	Normal
S-102	N2O Ratio	0.4810489	0.0220261	0.4138286	0.5485435	Normal
S-102	NH3	0.9317253	0.2880169	0.3470069	1.6237296	Normal
S-106	CH4 Ratio	0.0134833	0.0062037	0.000211	0.0296648	Normal
S-106	N2	25.216722	3.7891284	15.249227	34.922471	Normal
S-106	N2O Ratio	0.1309545	0.0150095	0.0981745	0.1694995	Normal
S-106	NH3	0.2988262	0.0672631	0.0941543	0.5200336	Normal
S-111	CH4 Ratio	0.0136002	0.0015555	0.0097731	0.0192358	Normal
S-111	N2	20.990104	5.9531917	4.5555037	34.751033	Normal
S-111	N2O Ratio	0.1345261	0.0166708	0.0924325	0.1900213	Normal
S-111	NH3	0.9286594	0.2851553	0.354503	1.6034667	Normal
SX-106	CH4 Ratio	0.0170592	0.0069497	0.0046007	0.0339737	Normal
SX-106	N2	20.202874	3.4462161	10.197908	29.550656	Normal
SX-106	N2O Ratio	0.3154821	0.0150306	0.2752638	0.3600094	Normal
SX-106	NH3	4.2022214	1.2553005	1.7899067	6.8047356	Normal
SY-101	CH4 Ratio	0.0650518	0.0257035	0.0145888	0.1498403	Normal

Table J.3.1. Retained Gas Concentration Distribution Results (4 pages)

Tank	Gas	Mean	Std Dev	Min	Max	Distribution Type
SY-101	N2	33.874694	6.7839154	13.359652	53.313162	Normal
SY-101	N2O Ratio	0.360501	0.0490851	0.226125	0.5012775	Normal
SY-101	NH3	9.1721	2.9868881	3.2737398	15.767285	Normal
U-103	CH4 Ratio	0.0572362	0.0110623	0.0339797	0.0820054	Normal
U-103	N2	36.711397	2.0175933	30.945456	42.560795	Normal
U-103	N2O Ratio	0.6032003	0.015214	0.5608941	0.644936	Normal
U-103	NH3	0.5959713	0.1560355	0.2463287	0.9627055	Normal
U-109	CH4 Ratio	0.0489471	0.0133258	0.0238921	0.0873525	Normal
U-109	N2	46.777093	3.1883437	36.853937	56.618098	Normal
U-109	N2O Ratio	0.4889364	0.0306199	0.4021244	0.5769073	Normal
U-109	NH3	1.0070756	0.3279163	0.3542088	1.8118107	Normal
DEFAULT	CH4 Ratio	0.0529	0.0563	0.0010	0.3178	LogNorm
DEFAULT	N2	29.84	12.01	4.5000	80.0000	LogNorml
DEFAULT	N2O Ratio	0.2533	0.1758	0.0010	0.6189	LogNrom

Figure J.3.1. Distribution fit of CH_4 Ratio

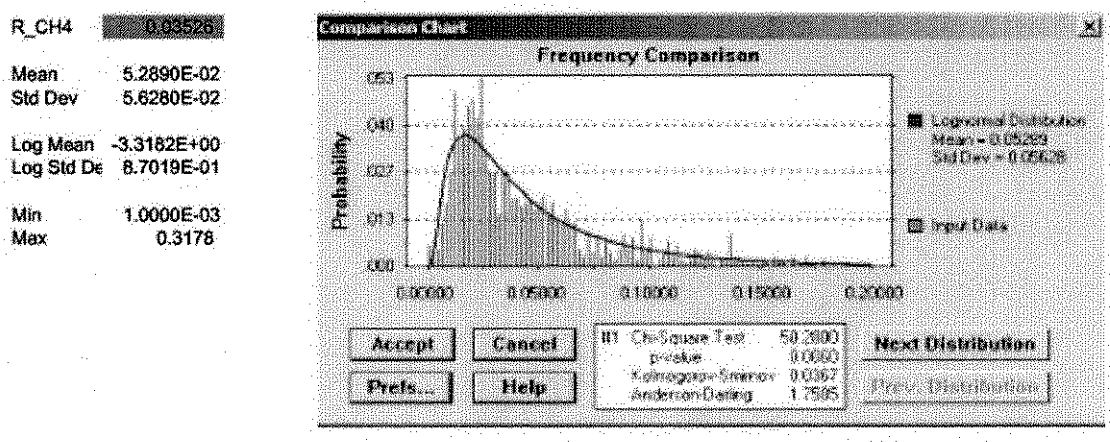


Figure J.3.2. Distribution fit of N_2O Ratio

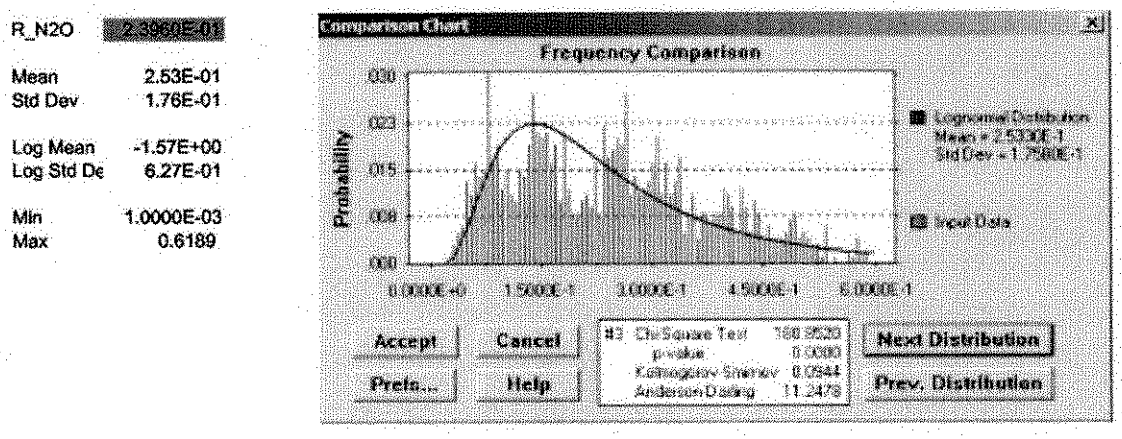
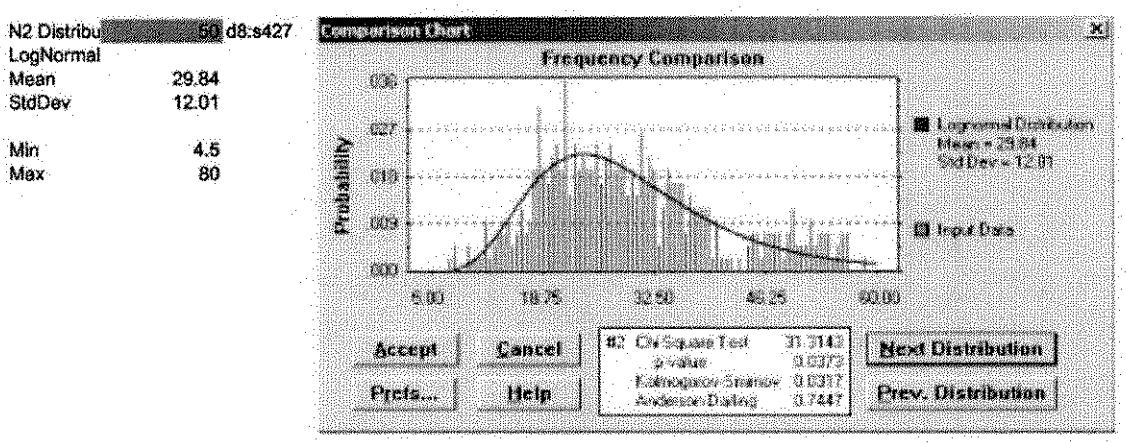


Figure J.3.3. Distribution fit of N_2 Concentration



4.0 REFERENCES

Mahoney, L., 2000, "Ammonia Results Review for Retained Gas Sampling", PNNL-13317, Pacific Northwest National Laboratory, Richland, Washington.

APPENDIX K

DETERMINATION OF VOID FRACTION

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CALCULATION REVIEWED: Appendix K Determination Of Void Fraction Rpp-10006 Rev 4, Methodology And Calculations For The Assignment Of Waste Groups For The Large Underground Waste Storage Tanks At The Hanford Site

Scope of Review: Appendix J (See also Spreadsheet Verification 270)
(e.g., document section or portion of calculation)

Engineer/Analyst: S. A. Barker Date: 10/27/2004

Organizational Mgr: T. M. Horner Date: 10/27/2004

This document consists of 14 pages and the following attachments (if applicable):

Yes	No	NA*		
[X]	[ ]	[ ]	1.	Analytical and technical approaches and results are reasonable and appropriate.
[X]	[ ]	[ ]	2.	Necessary assumptions are reasonable, explicitly stated, and supported.
[X]	[ ]	[ ]	3.	Ensure calculations that use software include a paper printout, microfiche, CD ROM, or other electronic file of the input data and identification to the computer codes and versions used, or provide alternate documentation to uniquely and clearly identify the exact coding and execution process.
[X]	[ ]	[ ]	4.	Input data were checked for consistency with original source information.
[X]	[ ]	[ ]	5.	For both qualitative and quantitative data, uncertainties are recognized and discussed.
[X]	[ ]	[ ]	6.	Mathematical derivations were checked including dimensional consistency of results.
[X]	[ ]	[ ]	7.	Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information.
[X]	[ ]	[ ]	8.	Software verification and validation are addressed adequately.
[X]	[ ]	[ ]	9.	Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references.
[X]	[ ]	[ ]	10.	Conclusions are consistent with analytical results and applicable limits.
[X]	[ ]	[ ]	11.	Results and conclusions address all points in the purpose.
[X]	[ ]	[ ]	12.	Referenced documents are retrievable or otherwise available.
[X]	[ ]	[ ]	13.	The version or revision of each reference is cited.
[X]	[ ]	[ ]	14.	The document was prepared in accordance with Attachment A, "Calculation Format and Preparation Instructions."
[X]	[ ]	[ ]	15.	Impacts on requirements have been assessed and change documentation initiated to incorporate revisions to affected documents as appropriate.
[X]	[ ]	[ ]	16.	All checker comments have been dispositioned and the design media matches the calculations.

T. A. Campbell 10/27/2004
Checker (Printed Name and Signature) Date

* If No or NA is chosen, an explanation must be provided on or attached to this form.

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LIST OF TERMS

AB	Authorization Basis
BPE	Barometric Pressure Effect
BPE1	Original BPE Model
BPE2	Steep Slope Form of the BPE Model
dL/dP	Change in Tank Level Divided by Corresponding Change in Pressure
DST	Double-Shell Tank
GRE	Gas Release Event
HEPA	High Efficiency Particulate Air Filter
HDW	Hanford Defined Waste
LFL	Lower Flammability Limit
LIQ	Liquid Waste Form
MIX-LIQ	Mixed Waste Form with ≥ 1m Liquid Over Solids
MIX-NL	Mixed Waste Form with < 1m Liquid Over Solids
PNNL	Pacific Northwest National Laboratory
RGS	Retained Gas Sampler
RSA	Refined Safety Analysis
SC/SS	Saltcake/Salt Slurry
SC/SS-LIQ	Saltcake/Salt Slurry Waste Form with ≥ 1m Liquid Over Solids
SC/SS-NL	Saltcake/Salt Slurry Waste Form with < 1m Liquid Over Solids
SHMS	Standard Hydrogen Monitoring System
SL	Sludge
SL-LIQ	Sludge Waste Form with ≥ 1m Liquid Over Solids
SL-NL	Sludge Waste Form with < 1m Liquid Over Solids
SLR	Surface Level Rise
SMM	Supernatant Mixing Model
SST	Single-Shell Tank
TLM	Tank Layer Model
TRU	Transuranic
VFI	Void Fraction Instrument
WSTRS	Waste Status and Transaction Record Summary
vol%	Volume Percent

1.0 INTRODUCTION

When analyzing tank hazards relating to Flammable gas accidents it is important understand the ability of solid wastes to retain gas and then release it due to change in tank characteristics or due to outside influence or waste disturbing activities. This Appendix documents the calculations performed to develop void fraction estimates for the waste tanks at Hanford.

2.0 VOID FRACTION DATA

Void fraction data are available from the following sources:

- Void Fraction Instrument (VFI) & Retained Gas Sampler (RGS): An average gas volume fraction may be estimated from direct measurements of the local gas volume fraction with the VFI and/or the RGS.
- Barometric Pressure Effect (BPE) method: An average void fraction can be computed from the correlation of the changes in waste surface level in response to barometric pressure fluctuations.
- Surface Level Rise (SLR): An increase in global average void fraction may be indicated by a rise in waste surface level.
- Core Sample X-ray: Voids or gaps shown in X-rays of core samples may indicate stored gas. However, these observations are only qualitative and cannot be used to derive an average void fraction value.

2.1.1.1 Void Fraction Instrument

A VFI deployment produces a relatively large number of data points in the vertical direction, but only from two risers. Each measurement is based on sampling a 367 ml waste volume (roughly a cylinder 3 inches in diameter and 3 inches long). A basic assumption made in computing the average void fraction is that data from two risers represent the entire tank. In five of the six DSTs sampled with the VFI, RGS samples from two additional risers and BPE results have provided independent corroboration that this assumption is valid. Uncertainties in the average void fraction derived from VFI data range from 10 - 30% standard deviation due mainly to variability in the data (PNNL-11536). For these reasons the Analyst Team concluded that VFI data, with or without additional data from RGS samples, are sufficiently representative to characterize the average void fraction for a specific tank.

2.1.1.2 Retained Gas Sampler

A single RGS gas fraction measurement is made on a 19-inch core sample segment. The void value from an RGS segment is generally as accurate as a single VFI data point, but there are far fewer RGS data. There are usually only three to six RGS measurements per tank, one to three per riser, compared to 20 - 40 VFI data points. Therefore, it is much more difficult to show that the RGS measurements are representative of the entire tank. In comparing the results for DSTs, the RGS differed with the VFI by about 50% on two tanks (Tanks 241-AN-103 and 241-AW-101) where the sparse RGS data missed the bulk of the stored gas (PNNL-10865). VFI data for single-shell tank (SST) waste are not available. For SSTs, the average gas fraction measurements with the RGS are compared with results from BPE and SLR analyses. Where the latter two support each other, the RGS value may differ by 50% (PNNL-10865, PNNL-11777). Based on these comparisons, where only RGS data are available, Pacific Northwest National Laboratory (PNNL) assigns an uncertainty of ±50% to the RGS value. For these reasons, the Analyst Team concluded that RGS data alone are not sufficiently representative to characterize the average void fraction in the tank waste, but can be used in determining void fraction distributions for the respective waste forms.

2.1.1.3 Barometric Pressure Effect Method

The BPE method is the only means available to directly measure the total gas volume in the tank waste independent of its past history. A correlation between waste level change and barometric pressure indicates the presence of gas. However, the waste and surface level measurement system must meet the following criteria before the correlation can be used as a measurement (PNNL-11536):

- The waste must be wet. The free liquid level must be above or within a few inches of the top of the gas-retaining solids, or the solids must contain sufficient gas to float on the liquid, or both.
- The tank must contain minimal suspended hardware items (that could support the waste and interfere with level change measurements).
- The waste must not be disturbed by mixing (such as done in Tank 241-SY-101) that suspends solids and gas bubbles during the period of the BPE measurement.
- The effective pressure on the stored gas must not change significantly during the BPE measurement (e.g., by transfers).
- The precision of the waste surface level instrument must be within 0.1 inches and the level must be recorded at least daily. Because of an amplification effect that is not fully understood, the BPE method cannot be applied to interstitial liquid level data obtained with the neutron probe.

Ideally, the pressure-level correlation should be developed using data obtained from the period November - February when barometric pressure fluctuations are greatest. The

"steep slope" BPE model, abbreviated here as the BPE2 model, uses only data obtained during these months to correlate barometric pressure and waste level. The BPE2 model also accounts for the effect of waste strength (PNNL-11693), unlike the original, more simplified BPE model (which will be abbreviated here as the BPE1 model). In cases where only BPE1 data are available, they will be included in the development of an average void fraction value on a case-by-case basis.

The overall uncertainty in the void fraction value determined with a BPE model is driven by the uncertainty in determining both the effective pressure of the stored gas and the correlation of waste height change with barometric pressure change (the dL/dP value). The computed uncertainty varies from 20 - 50%, and void fractions determined with a BPE model can differ from RGS and VFI average void values by about the same amount. The BPE method also has a lower detection limit of 1000 - 1500 ft^3 of gas (PNNL-11890). Thus, the Analyst Team concluded that the BPE data alone are not sufficiently accurate to characterize the average void fraction in a specific tank, but in spite of the difficulties mentioned above, the BPE method can be used to assist in determining void fraction distributions for the respective waste forms.

2.1.1.4 Surface Level Rise

A steady, long-term increase in the waste level indicates the accumulation of gas. The total retained gas volume can also be estimated by SLR if the gas volume is known at some prior time. However, unless the volume measured at some point by RGS, VFI or BPE can be used as a base value, the uncertainty in a gas volume estimate by SLR cannot usually be quantified.

The use of SLR data to compute the change in gas volume is subject to fewer conditions than application of the BPE methodology. The Analyst Team concluded gas accumulation is likely the dominant cause of gradual SLR. However, the team recommended quantitative estimates using SLR data should not be made in tanks that have been saltwell pumped or where the liquid level is more than a few inches below the waste surface. No limitation was found on the level measurement system except that neutron probe data for interstitial liquid levels should not be used because they are subject to gradual porosity changes. No correction should be attempted for evaporation, leaks, intrusions, or other second order effects because their uncertainties are typically far larger than the correction. However, because of these potential effects, the Analyst Team concluded the absence of level rise cannot imply the absence of gas.

Because of the broad uncertainties in the SLR methodology, SLR data cannot be used to determine an average void fraction.

2.1.2 Tank Void Fraction Data

Table 3.1 lists the tanks in which void fraction measurements were made with the VFI, RGS or BPE. For each tank the best estimate of the average void fraction determined by each method is listed in Table 3.1. BPE void fractions reported for tanks with RGS measurements (PNNL-10865, PNNL-11777) are calculated with the BPE2 model specifically supporting RGS analysis or taken from PNNL-11693. Whitney (1999) calculated void fractions over the period from 1997 through 1999 using the BPE1 model for tanks meeting BPE requirements, and the results were reported at the Data Review Workshops.

An approximate BPE2 value was derived for those tanks where a BPE2 value was reported in PNNL-11693 by multiplying the current BPE1 value by the ratio BPE2/BPE1 (if BPE2 > BPE1) from the reference. Only BPE2 values are shown in Table 2.1. Tanks for which only BPE1 void fractions are available are listed in Table 2.2.

Table 2.1. Summary of Average Void Fraction Data

TANK	Waste	RGS	VFI + RGS	BPE2	Reference/Comment
AN-103	SC/SS-LIQ	0.08	0.124±0.005	0.11	NCL only. Values computed by Guang Chen, PNNL, for PNNL-11536 Rev. 2. [1]
AN-104	SC/SS-LIQ	0.057	0.056±0.004	0.06	
AN-105	SC/SS-LIQ	0.04	0.037±0.011	0.04	
AW-101	SC/SS-LIQ	0.025	0.04±0.004	0.04	
SY-103	SC/SS-LIQ	-	0.07±0.02	0.06	
SY-101 crust	SC/SS-LIQ	0.35 to 0.46	0.30±0.04	-	VFI: Stewart et al. (1998a). RGS: Personal communication with Lenna Mahoney 6/11/99
SY-101 non-crust	SC/SS-LIQ	0.026± 0.013	0.013±0.001	-	
A-101	SC/SS-NL	0.17		0.12	Compiled by Lenna Mahoney for final RGS report to be published late FY99
AX-101	SC/SS-NL	0.17		-	
BY-109	SC/SS-NL	0.09		-	
S-102	SC/SS-NL	0.25		0.14	
S-106	SC/SS-NL	0.10		0.26	
S-111	SC/SS-NL	0.16		0.19	
SX-106	SC/SS-NL	0.24		0.14	
U-103	SC/SS-NL	0.20		0.11	
U-109	SC/SS-NL	0.20		0.09	
BX-101	SL-NL			0.02	LMHC Process Engineering Calculation
BX-104	SL-NL			0.12	
BX-107	SL-NL			0.03	
BX-110	MX-NL			0.05	
S-103	SC/SS-NL			0.16	
S-107	SL-NL			0.04	
U-105	SC/SS-NL			0.10	
U-106	SC/SS-NL			0.02	
U-107	SC/SS-NL			0.09	
C-106	SL-NL			0.025±0.01	PNNL-11890 LMHC Process Engineering Calculation
C-107	SL-NL			0.004	
T-107	SL-NL			0.04	
TX-103	SL-NL			0.10	

[1] BPE void fraction value for the DST non-convective layer was determined from the total in-situ gas volume calculated from the measured dL/dP and subtracting the estimated crust and convective layer gas volume.

Table 2.2. Summary of Void Fractions Computed with the BPE1 Method

TANK	Waste	BPE1
AP-105	SL-LIQ	0.06
AY-102	SL-LIQ	0.11
SY-102	SL-LIQ	0.01
A-103	SL-NL	0.004
AY-101	SL-NL	0.06
B-112	SL-NL	0.01
BX-103	SL-NL	0.004
BX-105	SL-NL	0.003
BX-109	SL-NL	0.003
BX-112	SL-NL	0.01
C-103	SL-NL	0.001
T-101	SL-NL	0.001
T-109	SL-NL	0.004
TX-101	SL-NL	0.002
TX-109	SL-NL	0.001
TY-104	SL-NL	0.004
TY-106	SL-NL	0.02
AX-103	SC/SS-NL	0.002
SX-104	SC/SS-NL	0.02
T-108	MX-NL	0.07
TX-104	MX-NL	0.003
TX-107	SC/SS-NL	0.01
B-102	SC/SS-NL	0.003
S-101	MIX-NL	0.05

2.1.3 Tank Average Void Fraction

The distribution of all available tank average void fraction values determined from VFI data (with or without RGS data added) or RGS and BPE data are used to derive an average void fraction distribution for a waste form. When available for a specific tank, RGS and VFI data are combined into a single average. A distribution of individual RGS segment voids is not appropriate to characterize a tank average void since, at present, there are very few data points per tank (e.g., three to six) and they represent local effects.

Therefore, in the cases where RGS data are available, it is only appropriate to use them to develop an average void fraction distribution for each waste form.

The average void fraction distribution determined for a specific tank from VFI data (with or without RGS data added) should be used in preference to the void fraction distribution for the tank waste form.

3.0 RESULTS

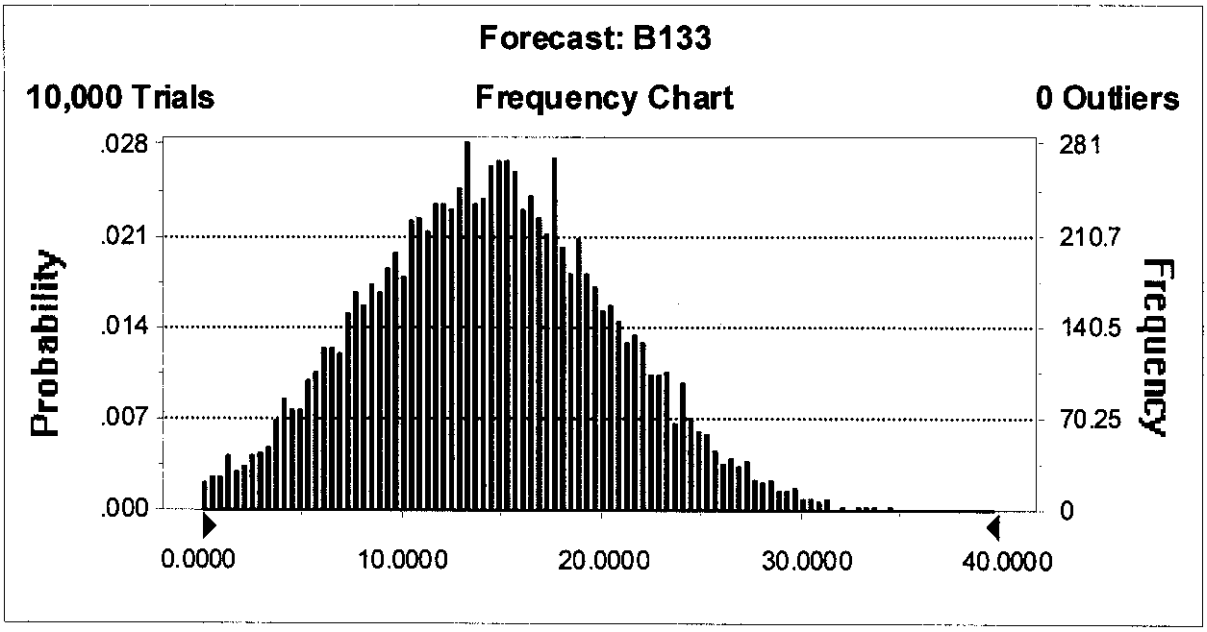
The void fraction analysis was performed based on the type of waste found in the tanks. A full discussion of the waste type classification can be found in RPP-6171, "Determination Of Waste Groupings For Safety Analyses". The results address the following waste categories: saltcake/saltslurry waste without at least 1 m of supernatant liquid (SCSS-NL), sludge waste without at least 1 m of supernatant liquid (SL-NL), saltcake/saltslurry waste with at least 1 m of supernatant liquid (SCSS-LIQ), sludge waste with at least 1 m of supernatant liquid (SL-LIQ), liquid waste (LIQUID), mixed waste without at least 1 m of supernatant liquid (MIX-NL), and mixed waste with at least 1 m of supernatant liquid (MIX-LIQ). The results are grouped together to conservatively estimate void fractions for waste types, which do not have sufficient void fraction data to perform a valid statistical analysis. The analysis in this section does not include the revised void fraction estimates for Tanks 241-SY-101, 241-AN-107, and 241-AW-106 at this time.

3.1 SCSS-NL AND MIX-NL VOID FRACTIONS

The data for SCSS-NL and MIX-NL wastes have been regressed to fit a truncated normal distribution as shown in Figure 3.1. The graph represents a truncated normal distribution with a mean and standard deviation as shown below.

Truncated Normal Distribution	
Mean	9.269
Std Dev	8.084
Trunc low	0.01
Trunc High	40

Figure 3.1. Void Fraction Regression Results for SCSS-NL and MIX-NL wastes



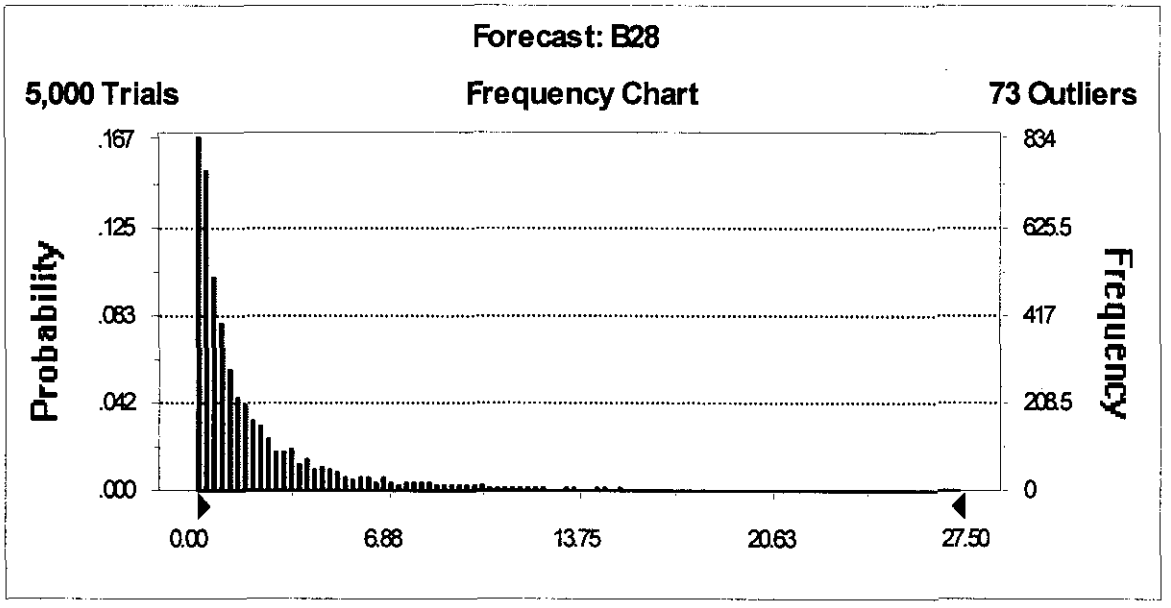
3.2 SL-NL VOID FRACTIONS

The data for SL-NL wastes have been regressed to fit a truncated lognormal distribution as shown in Figure 3.2. The graph represents a truncated lognormal distribution with a mean and standard deviation as shown below.

Truncated LogNormal

Mean	2.2324
StdDev	5.6064
Trunc low	0.01
Trunc high	26.5

Figure 3.2. Void Fraction Regression Results for SL-NL wastes



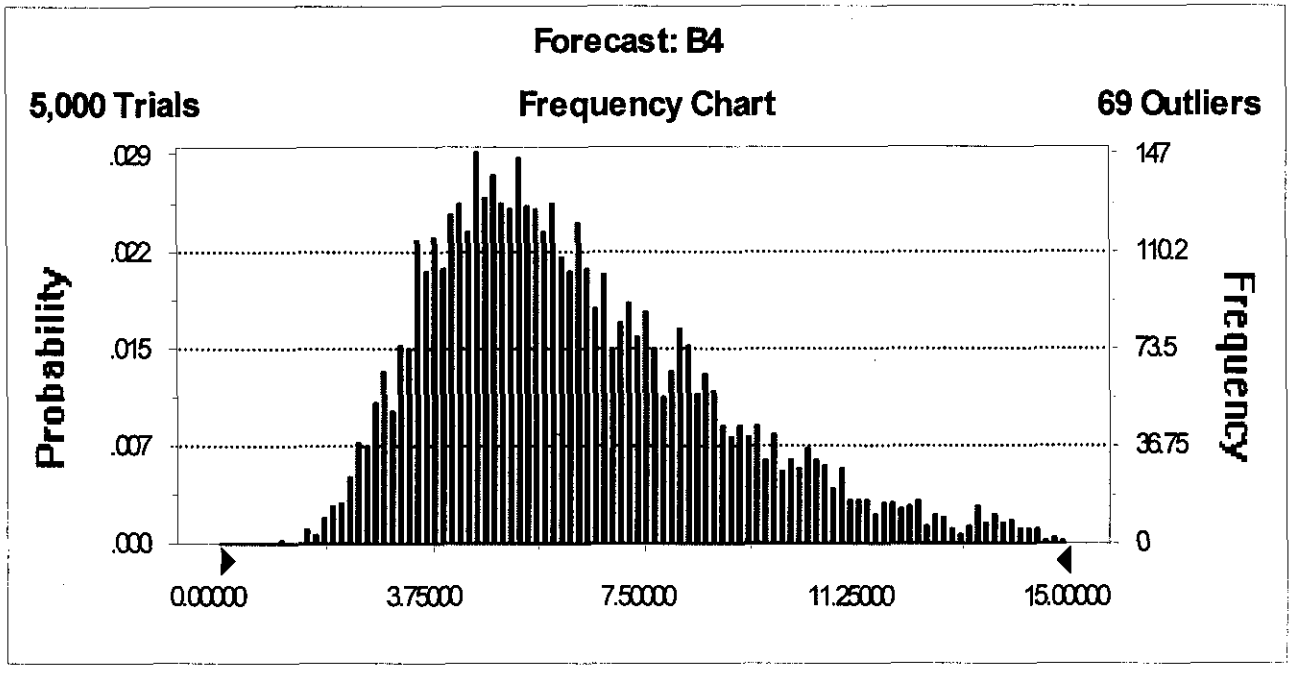
3.3 SCSS-LIQ, SL-LIQ, AND MIX-LIQ VOID FRACTIONS

The data for SCSS-LIQ, SL-LIQ, and MIX-LIQ wastes have been regressed to fit a truncated lognormal distribution as shown in Figure 3.3. The graph represents a truncated lognormal distribution with a mean and standard deviation as shown below. In addition wastes with significant supernatant (greater than 1 m depth) have an upper bound at the neutral buoyancy void fraction for the waste. The modification of the upper limit of the void fraction to account for the neutral buoyancy void fraction within a given tank is done within the model at execution time and is not reflected here.

Truncated LogNormal

Mean	6.56987
StdDev	3.01124
Trunc low	0.01
Trunc high	15.11

Figure 3.3. Void Fraction Regression Results for SCSS-LIQ, SL-LIQ, and MIX-LIQ wastes



3.4 LIQUID WASTE VOID FRACTIONS

Liquid wastes do no retain gas. Any gas found in the liquid wastes is considered transient and is not considered as trapped or retained gas. Therefore the void fraction for liquid waste is 0.

4.0 REFERENCES

PNNL-11777, 1997, "*Composition and Quantities of Retained Gas Measured in Hanford Waste Tanks 241-U-103, S-106, BY-101, and BY-109*", Revision 1, Pacific Northwest National Laboratory, Richland, Washington.

PNNL-11536, 1997, "*Gas Retention and Release Behavior in Hanford Double-Shell Waste Tanks*", Revision 1, Pacific Northwest National Laboratory, Richland, Washington.

PNNL-10865, 1997, "*Composition and Quantities of Retained Gas Measured in Hanford Waste Tanks 241-AW-101, A-101, AN-105, AN-104, and AN-103*", Pacific Northwest National Laboratory, Richland, Washington.

PNNL-11890, 1998, "*Baseline Estimate of the Retained Gas Volume in Tank 241-C-106*", PNNL-11890, Pacific Northwest National Laboratory, Richland, Washington.

PNNL-11693, 1997, "*Estimating Retained Gas Volumes in the Hanford Tanks using Waste Level Measurements*", Pacific Northwest National Laboratory, Richland, Washington.

Whitney, P. D., 1999, Personal Communication (May 4, 1999) to W.B. Barton and S. A. Barker.

APPENDIX L

WASTE GROUP ASSIGNMENT OF SINGLE-SHELL TANK 241-C-203 FOR TRANSFERS FROM TANKS 241-C-201, 241-C-202, AND 241-C-204

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Calculation Review Checklist

Calculation Reviewed: RPP-10006, Rev. 4

Scope of Review: Complete document
(e.g., document section or portion of calculation)

Engineer/Analyst: D. C. Hedengren D. C. Hedengren Date: 10/27/04

Organizational Mgr: T. M. Horner T. M. Horner Date: 10/27/04

Yes	No	NA*		
[X]	[ ]	[ ]	1.	Analytical and technical approaches and results are reasonable and appropriate.
[X]	[ ]	[ ]	2.	Necessary assumptions are reasonable, explicitly stated, and supported.
[X]	[ ]	[ ]	3.	Ensure calculations that use software include a paper printout, microfiche, CD ROM, or other electronic file of the input data and identification to the computer codes and versions used, or provide alternate documentation to uniquely and clearly identify the exact coding and execution process.
[X]	[ ]	[ ]	4.	Input data were checked for consistency with original source information.
[X]	[ ]	[ ]	5.	For both qualitative and quantitative data, uncertainties are recognized and discussed.
[X]	[ ]	[ ]	6.	Mathematical derivations were checked including dimensional consistency of results.
[X]	[ ]	[ ]	7.	Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information.
[X]	[ ]	[ ]	8.	Software verification and validation are addressed adequately.
[X]	[ ]	[ ]	9.	Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references.
[X]	[ ]	[ ]	10.	Conclusions are consistent with analytical results and applicable limits.
[X]	[ ]	[ ]	11.	Results and conclusions address all points in the purpose.
[X]	[ ]	[ ]	12.	Referenced documents are retrievable or otherwise available.
[X]	[ ]	[ ]	13.	The version or revision of each reference is cited.
[X]	[ ]	[ ]	14.	The document was prepared in accordance with Attachment A, "Calculation Format and Preparation Instructions."
[X]	[ ]	[ ]	15.	All checker comments have been dispositioned and the design media matches the calculations.

S. A. Barker S A Barker 10/27/04
Checker (Printed Name and Signature) Date

* If No or NA is chosen, an explanation must be provided on or attached to this form.

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1.0 OBJECTIVE/PURPOSE

The purpose of this evaluation is to determine the flammable gas waste group of single-shell tank (SST) 241-C-203 as a result of transfers of waste from SSTs 241-C-201, 241-C-202, and 241-C-204. This evaluation is used to determine the potential of the commingled waste in SST 241-C-203 to trap gas. The trapping of flammable gas in wetted, nonconvective solids may be of concern during spontaneous and induced gas release events that increase the flammability of a tank's vapor space. The results of this evaluation are valid if any of the C-200 series tanks are the recipient vessel. This evaluation is being performed to support the retrieval of waste from the C-200 series tanks for transfer to a double-shell tank (DST).

2.0 SUMMARY OF RESULTS AND CONCLUSIONS

As a bounding case for the transfer of waste from SSTs 241-C-201, 241-C-202, and 241-C-204 to SST 241-C-203, the expected waste in SST 241-C-203 was evaluated for its potential to trap flammable gas in a maximum 44.6 in. of wetted solids in SST 241-C-203. At a 95% confidence level for the bounding convective waste (supernatant) specific gravity of 1.17, a nonconvective (wetted solids) specific gravity of 1.62, and a total waste level in the tank of 134.5 in., SST 241-C-203 remains a "C" waste group tank (99.4% of 5,000 Monte Carlo runs were "C," 0.6% were "B," and 0.0% were "A").

3.0 INPUT DATA

The input data of waste heights and densities used in the analyses reported in this document include (other data are from the original analysis of SST 241-C-203 reported in RPP-10006, Rev. 2A):

- Total waste depth: 134.5 in.
- Total convective waste depth: 89.9 in.
- Convective waste mean specific gravity: 1.17
- Total nonconvective waste depth: 44.6 in.
- Nonconvective waste mean specific gravity: 1.62.

4.0 ASSUMPTIONS

For the purposes of this calculation (in addition to the assumptions associated with the methodology of RPP-10006) the following assumptions are made:

1. 100% of the retained gas is released instantaneously.
2. The specific gravity of the waste to be transferred from SSTs 241-C-201, 241-C-202, and 241-C-204 to SST 241-C-203 will result in a supernatant specific gravity no greater than 1.17 in SST 241-C-203.
3. No precipitation of solids will occur upon liquid cooling.
4. Final supernatant specific gravity is based on maximum specific gravity of the liquid waste to be pumped into SST 241-C-203.
5. Solid waste currently in SST 241-C-203 will not dissolve under post-transfer conditions.
6. Hydrogen generation rate for SST 241-C-202 used since it bounds the hydrogen generation rates of the other tanks supplying waste to SST 241-C-203.

5.0 METHOD OF ANALYSIS

This evaluation used the methodology as reported in RPP-10006, Rev. 2A.

6.0 USE OF COMPUTER SOFTWARE

The analyses reported in this document made use of the computer software programs Crystal Ball[1] and EXCEL[2]. Crystal Ball is an EXCEL add-in, which performs the data sampling and handling for the Monte Carlo simulation. Appropriate distributions are selected and defined as assumptions in the Crystal Ball analysis. The model-calculated results of interest are determined and defined as forecast values. The number of runs and random number seed value (optional) is also selected to control the selection of random numbers and termination of the program. Crystal Ball will generate a table of random numbers sufficiently large to randomly sample all distributions once for each run. The number of random numbers in the table is the product of the number of distributions times the number of runs. Crystal Ball will then sample each distribution based on its random number and perform the model calculation once for each run. The individual run results are kept and a product or forecast distribution is calculated at the

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[1] Crystal Ball is a trademark of Decisioneering, Inc., Denver, Colorado.

[2] EXCEL is a trademark of Microsoft Corporation, Redmond, Washington.

completion of the simulation. Crystal Ball can graphically display the forecast distributions as the runs are performed and then produces a report as desired (see Attachment A).

7.0 RESULTS

As a bounding case for the expected waste in SST 241-C-203 from a waste transfer from SSTs 241-C-201, 241-C-202, and 241-C-204, the waste in SST 241-C-203 was evaluated for its potential to trap flammable gas in its wetted solids. At a 95% confidence level, for the bounding convective waste (supernatant) specific gravity of 1.17 and a total waste level in the tank of 134.5 in., SST 241-C-203 is a waste group "C" tank (99.4% of 5,000 Monte Carlo runs were "C," 0.6% were "B," and 0.0% were "A"). A summary of the results of these calculations is presented in Table 1. Detailed results are given in Attachment M1. An independent check of the methodology used and the results is presented in Attachment M2. Because of the amount of supernatant, the median energy ratio is 1.08 well below the criterion of 3.0. The addition of more solids and/or supernatant could, therefore, cause SST 241-C-203 to eventually become a waste group "B" tank.

Table 1. SST 241-C-203 from Waste Transfer from SSTs 241-C-201, 241-C-202, and 241-C-204 (Run #C-203).

Percent of cases in each waste group			Tank AS IS waste group	Tank AS IS plus 3,000 gal H_2O addition	Tank AS IS plus 3,000 gal caustic addition	Tank AS IS plus -Tank op limit exceeded?	Buoyancy ratio (median)	Buoyancy ratio (95%CI)	Energy ratio (Median)	Energy ratio (95%CI)	Density of convective liquid mean (kg/m^3)	Waste level mean (in.)
A	B	C										
0.0	0.6	99.4	C	C	C	NO	0.16	0.26	1.08	1.70	1,170	134.5

8.0 CONCLUSIONS

The result of this analysis is that SST 241-C-203 can be filled to a total level of 134.5 in. of waste with waste from SSTs 241-C-201, 241-C-202, and 241-C-204 resulting in a solids level of no more than 34.1 in. and be no higher than a waste group "C" tank. This conclusion is valid for a resultant supernatant specific gravity of 1.29 or less in SST 241-C-203.

In addition, the addition of 3,000 gal or less of either water or caustic will not change the waste category of "C" for SST 241-C-203.

This analysis has been developed to support the documented safety analysis (DSA). The procedure is being put forward as a required methodology for evaluation of tanks prior to transfers as part of the waste compatibility study performed by Process Engineering. The methodology has been accepted by the Office of River Protection (ORP) as part of the revised safety basis that was implemented on October 27, 2003.

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APPENDIX M

DETERMINATION OF DENSITY UNCERTAINTIES AND NON-CONVECTIVE LAYER POROSITIES

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CALCULATION REVIEWED: Appendix M Determination Of Density Uncertainties And Non-convective Layer Porosities, RPP-10006 Rev 4, Methodology And Calculations For The Assignment Of Waste Groups For The Large Underground Waste Storage Tanks At The Hanford Site

Scope of Review: Appendix M (See also Spreadsheet Verification 272)
(e.g., document section or portion of calculation)

Engineer/Analyst: S. A. Barker Date: 10/27/2004

Organizational Mgr: T. M. Horner Date: 10/27/2004

This document consists of 36 pages and the following attachments (if applicable):

Yes	No	NA*		
[X]	[ ]	[ ]	1.	Analytical and technical approaches and results are reasonable and appropriate.
[X]	[ ]	[ ]	2.	Necessary assumptions are reasonable, explicitly stated, and supported.
[X]	[ ]	[ ]	3.	Ensure calculations that use software include a paper printout, microfiche, CD ROM, or other electronic file of the input data and identification to the computer codes and versions used, or provide alternate documentation to uniquely and clearly identify the exact coding and execution process.
[X]	[ ]	[ ]	4.	Input data were checked for consistency with original source information.
[X]	[ ]	[ ]	5.	For both qualitative and quantitative data, uncertainties are recognized and discussed.
[X]	[ ]	[ ]	6.	Mathematical derivations were checked including dimensional consistency of results.
[X]	[ ]	[ ]	7.	Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information.
[X]	[ ]	[ ]	8.	Software verification and validation are addressed adequately.
[X]	[ ]	[ ]	9.	Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references.
[X]	[ ]	[ ]	10.	Conclusions are consistent with analytical results and applicable limits.
[X]	[ ]	[ ]	11.	Results and conclusions address all points in the purpose.
[X]	[ ]	[ ]	12.	Referenced documents are retrievable or otherwise available.
[X]	[ ]	[ ]	13.	The version or revision of each reference is cited.
[X]	[ ]	[ ]	14.	The document was prepared in accordance with Attachment A, "Calculation Format and Preparation Instructions."
[X]	[ ]	[ ]	15.	Impacts on requirements have been assessed and change documentation initiated to incorporate revisions to affected documents as appropriate.
[X]	[ ]	[ ]	16.	All checker comments have been dispositioned and the design media matches the calculations.

T. A. Campbell 10/27/2004
Checker (Printed Name and Signature) Date

* If No or NA is chosen, an explanation must be provided on or attached to this form.

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LIST OF TERMS

CL	Convective Layer (liquid)
DST	Double-Shell Tank
LIQ	Liquid Waste Form
MIX-LIQ	Mixed Waste Form with ≥ 1m Liquid over Solids
MIX-NL	Mixed Waste Form with < 1m Liquid over Solids
NCL	Non-convective Layer (solid)
PNNL	Pacific Northwest National Laboratory
SC/SS	Saltcake/Salt Slurry
SC/SS-LIQ	Saltcake/Salt Slurry Waste Form with ≥ 1m Liquid over Solids
SC/SS-NL	Saltcake/Salt Slurry Waste Form with < 1m Liquid over Solids
SL	Sludge
SL-LIQ	Sludge Waste Form with ≥ 1m Liquid over Solids
SL-NL	Sludge Waste Form with < 1m Liquid over Solids
SST	Single-Shell Tank
Std Dev	Standard Deviation

1.0 INTRODUCTION

An external review of RPP-10006 found that the relationship between non-convective and convective layer densities were not correlated, and the relative uncertainty for densities as listed in the Best Basis Inventory (BBI) database seemed to be high. In response to those comments, a review of density data was undertaken, and a correlation between the layer densities based on solids porosity was developed.

In addition, density information was developed for the various waste layers:

SC/SS-LIQ	Saltcake/Salt Slurry waste form with ≥ 1m Liquid over Solids
SC/SS-NL	Saltcake/Salt Slurry waste form with < 1m Liquid over Solids
SL-LIQ	Sludge waste form with ≥ 1m Liquid over Solids
SL-NL	Sludge waste form with < 1m Liquid over Solids
MIX-LIQ	Mixed waste form with ≥ 1m Liquid over Solids
MIX-NL	Mixed waste form with < 1m Liquid over Solids
LIQ	Liquid waste form (no appreciable solids present)

The various waste forms are determined by determining the predominant type of waste. For example, a Saltcake/Salt Slurry waste form contains at least 75% Saltcake/Salt Slurry solids; Sludge waste form contains at least 75% Saltcake/Salt Slurry solids; and mixed tanks have no waste form which comprises at least 75% of the solids.

For this evaluation no distinction is given between density and specific gravity data.

2.0 EVALUATION OF SAMPLE DENSITY DATA

Density data are available from the following sources:

- Tank Characterization Database contains raw laboratory results for a majority of tanks and layers. This data contains the following applicable data
  - 2005 liquid density measurements for 100 tanks
  - 1424 solid density measurements for 102 tanks

- Best Basis Inventory (BBI) contains density information in the calculation detail and tank density and percent water reports.

Tables 2-1 and 2-2 present the summary statistical evaluation for the tank characterization density data for the tank liquids and solids, respectively.

Table 2-1 Liquid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
A-101	43	1.420	0.043	0.030	1.33	1.506
A-102	0					
A-103	0					
A-104	0					
A-105	0					
A-106	0					
AN-101	23	1.268	0.071	0.056	1.2	1.419
AN-102	51	1.445	0.044	0.030	1.37	1.56
AN-103	54	1.454	0.046	0.031	1.31	1.57
AN-104	76	1.410	0.069	0.049	1.06	1.54
AN-105	89	1.425	0.051	0.035	1.3	1.56
AN-106	19	1.176	0.068	0.058	1.02	1.272
AN-107	56	1.391	0.072	0.052	1.109	1.485
AP-101	11	1.279	0.024	0.019	1.245	1.312
AP-102	36	1.201	0.007	0.006	1.19	1.218
AP-103	8	1.325	0.034	0.026	1.282	1.381
AP-104	7	1.280	0.006	0.005	1.272	1.289
AP-105	11	1.353	0.054	0.040	1.288	1.492
AP-106	4	1.215	0.007	0.006	1.207	1.224
AP-107	4	1.262	0.048	0.038	1.22	1.307
AP-108	3	1.465	0.005	0.003	1.462	1.471
AW-101	127	1.474	0.069	0.047	1.22	1.75
AW-102	27	1.070	0.047	0.044	1.02	1.174
AW-103	14	1.105	0.057	0.051	1.01	1.186
AW-104	3	1.348	0.022	0.016	1.326	1.37
AW-105	32	1.050	0.038	0.036	1.01	1.174
AW-106	3	1.450	0.016	0.011	1.439	1.469
AX-101	45	1.421	0.100	0.071	1.06	1.572
AX-102	0					
AX-103	0					
AX-104	0					
AY-101	40	1.141	0.065	0.057	1.059	1.292
AY-102	245	1.108	0.046	0.041	1.006	1.217
AZ-101	57	1.230	0.018	0.015	1.16	1.261
AZ-102	28	1.120	0.020	0.018	1.094	1.177

Table 2-1 Liquid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
B-101	2	1.500			1.5	1.5
B-102	0					
B-103	0					
B-104	2	1.300			1.3	1.3
B-105	0					
B-106	1	1.400			1.4	1.4
B-107	6	1.336	0.025	0.019	1.315	1.371
B-108	3	1.367	0.024	0.018	1.34	1.387
B-109	0					
B-110	0					
B-111	0					
B-112	0					
B-201	0					
B-202	0					
B-203	6	1.054	0.007	0.007	1.045	1.064
B-204	6	1.052	0.012	0.011	1.03	1.06
BX-101	0					
BX-102	0					
BX-103	0					
BX-104	4	1.280	0.014	0.011	1.27	1.3
BX-105	0					
BX-106	0					
BX-107	0					
BX-108	0					
BX-109	2	1.269	0.005	0.004	1.265	1.272
BX-110	16	1.386	0.125	0.090	1.15	1.582
BX-111	3	1.418	0.063	0.044	1.35	1.473
BX-112	4	1.183	0.029	0.024	1.16	1.22
BY-101	0					
BY-102	2	1.458	0.004	0.002	1.455	1.46
BY-103	6	1.253	0.051	0.041	1.189	1.3
BY-104	2	1.400			1.4	1.4
BY-105	71	1.401	0.074	0.053	1.08	1.54
BY-106	12	1.276	0.120	0.094	1.1	1.52
BY-107	20	1.461	0.024	0.017	1.396	1.49

Table 2-1 Liquid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
BY-108	6	1.300	0.055	0.042	1.25	1.4
BY-109	4	1.500	0.020	0.014	1.483	1.524
BY-110	10	1.436	0.035	0.025	1.384	1.5
BY-111	6	1.423	0.009	0.006	1.414	1.435
BY-112	4	1.471	0.007	0.005	1.462	1.478
C-101	0					
C-102	0					
C-103	10	1.108	0.065	0.059	1.01	1.22
C-104	2	1.143	0.005	0.004	1.139	1.146
C-105	2	1.199	0.069	0.057	1.15	1.247
C-106	17	1.153	0.068	0.059	1.022	1.246
C-107	7	1.162	0.032	0.027	1.1	1.193
C-108	0					
C-109	2	1.100			1.1	1.1
C-110	7	1.123	0.065	0.058	1.01	1.19
C-111	0					
C-112	3	1.267	0.115	0.091	1.2	1.4
C-201	0					
C-202	0					2
C-203	0					
C-204	0					
S-101	13	1.400	0.051	0.036	1.342	1.482
S-102	28	1.383	0.115	0.083	1.01	1.6
S-103	6	1.450	0.025	0.017	1.431	1.496
S-104	3	1.370	0.017	0.013	1.36	1.39
S-105	0					
S-106	36	1.429	0.051	0.036	1.32	1.526
S-107	13	1.265	0.081	0.064	1.1	1.362
S-108	0					
S-109	6	1.469	0.048	0.033	1.37	1.494
S-110	12	1.393	0.065	0.047	1.26	1.454
S-111	21	1.390	0.066	0.047	1.23	1.461
S-112	6	1.455	0.030	0.020	1.411	1.477
SX-101	18	1.485	0.019	0.013	1.456	1.525
SX-102	13	1.433	0.096	0.067	1.28	1.65

Table 2-1 Liquid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
SX-103	27	1.476	0.040	0.027	1.36	1.59
SX-104	6	1.469	0.014	0.009	1.457	1.492
SX-105	36	1.468	0.029	0.019	1.391	1.525
SX-106	18	1.402	0.046	0.033	1.29	1.496
SX-107	0					
SX-108	0					
SX-109	0					
SX-110	0					
SX-111	0					
SX-112	0					
SX-113	0					
SX-114	0					
SX-115	0					
SY-101	42	1.339	0.036	0.027	1.252	1.46
SY-102	116	1.237	0.104	0.084	1.02	1.51
SY-103	13	1.480	0.082	0.055	1.31	1.64
T-101	0					
T-102	0					
T-103	0					
T-104	3	1.187	0.103	0.086	1.1	1.3
T-105	10	1.170	0.092	0.078	1.05	1.38
T-106	0					
T-107	8	1.129	0.087	0.077	1.02	1.26
T-108	0					
T-109	0					
T-110	8	1.064	0.028	0.027	1.045	1.113
T-111	2	1.110	0.085	0.076	1.05	1.17
T-112	4	1.104	0.004	0.003	1.101	1.109
T-201	10	1.058	0.006	0.006	1.05	1.071
T-202	0					
T-203	2	1.086	0.002	0.002	1.084	1.087
T-204	0					
TX-101	0					
TX-102	0					
TX-103	0					

Table 2-1 Liquid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
TX-104	8	1.412	0.015	0.010	1.396	1.441
TX-105	0					
TX-106	0					
TX-107	0					
TX-108	0					
TX-109	0					
TX-110	0					
TX-111	0					
TX-112	0					
TX-113	0					
TX-114	0					
TX-115	0					
TX-116	4	1.353	0.003	0.002	1.349	1.355
TX-117	0					
TX-118	0					
TY-101	0					
TY-102	0					
TY-103	0					
TY-104	0					
TY-105	0					
TY-106	0					
U-101	8	1.162	0.012	0.011	1.133	1.17
U-102	12	1.410	0.091	0.064	1.21	1.515
U-103	25	1.425	0.043	0.030	1.343	1.52
U-104	0					
U-105	6	1.462	0.034	0.023	1.408	1.499
U-106	12	1.381	0.071	0.051	1.32	1.55
U-107	58	1.391	0.112	0.080	1.03	1.66
U-108	11	1.393	0.074	0.053	1.21	1.52
U-109	3	1.472	0.017	0.011	1.457	1.49
U-110	0					
U-111	6	1.398	0.022	0.016	1.375	1.427
U-112	0					
U-201	2	1.256	0.001	0.001	1.255	1.256
U-202	2	1.282	0.015	0.012	1.271	1.292

Table 2-1 Liquid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
U-203	2	1.279	0.005	0.004	1.275	1.282
U-204	2	1.113	0.002	0.002	1.111	1.114

Table 2-2 Solid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
A-101	42	1.672	0.077	0.046	1.31	1.75
A-102	1	1.700			1.7	1.7
A-103	0					
A-104	0					
A-105	0					
A-106	0					
AN-101	0					
AN-102	7	1.541	0.058	0.037	1.5	1.66
AN-103	2	1.865	0.007	0.004	1.86	1.87
AN-104	25	1.592	0.055	0.035	1.52	1.76
AN-105	27	1.583	0.049	0.031	1.5	1.68
AN-106	0					
AN-107	26	1.512	0.059	0.039	1.43	1.66
AP-101	0					
AP-102	0					
AP-103	0					
AP-104	0					
AP-105	2	1.630	0.028	0.017	1.61	1.65
AP-106	0					
AP-107	0					
AP-108	0					
AW-101	27	1.600	0.080	0.050	1.51	1.86
AW-102	1	1.600			1.6	1.6
AW-103	37	1.508	0.146	0.097	1.23	1.77
AW-104	0					

Table 2-2 Solid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
AW-105	29	1.291	0.102	0.079	1.06	1.5
AW-106	0					
AX-101	30	1.671	0.106	0.063	1.38	1.97
AX-102	1	1.820			1.82	1.82
AX-103	7	1.595	0.040	0.025	1.533	1.65
AX-104	0					
AY-101	6	1.577	0.272	0.173	1.28	1.95
AY-102	51	1.518	0.131	0.086	1.3	1.88
AZ-101	7	1.644	0.102	0.062	1.5	1.74
AZ-102	21	1.429	0.057	0.040	1.32	1.55
B-101	0					
B-102	0					
B-103	0					
B-104	0					
B-105	0					
B-106	9	1.369	0.037	0.027	1.33	1.43
B-107	7	1.639	0.054	0.033	1.58	1.7
B-108	6	1.733	0.113	0.065	1.57	1.91
B-109	2	1.840	0.014	0.008	1.83	1.85
B-110	2	1.315	0.007	0.005	1.31	1.32
B-111	7	1.257	0.053	0.043	1.2	1.3
B-112	0					
B-201	18	1.294	0.123	0.095	1.2	1.65
B-202	13	1.125	0.092	0.081	1.01	1.25
B-203	40	1.188	0.034	0.029	1.09	1.27
B-204	96	1.194	0.050	0.042	1.1	1.38
BX-101	0					
BX-102	0					
BX-103	0					
BX-104	7	1.677	0.208	0.124	1.43	1.9
BX-105	0					
BX-106	2	1.640	0.057	0.034	1.6	1.68
BX-107	3	1.440	0.036	0.025	1.4	1.47
BX-108	0					
BX-109	2	1.510	0.014	0.009	1.5	1.52

Table 2-2 Solid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
BX-110	7	1.787	0.125	0.070	1.54	1.89
BX-111	4	1.450	0.098	0.068	1.34	1.57
BX-112	23	1.307	0.031	0.024	1.24	1.35
BY-101	1	1.870			1.87	1.87
BY-102	7	1.586	0.237	0.149	1.25	1.86
BY-103	0					
BY-104	19	1.747	0.057	0.032	1.63	1.83
BY-105	17	1.869	0.067	0.036	1.74	1.98
BY-106	10	1.665	0.139	0.084	1.43	1.89
BY-107	13	1.729	0.149	0.086	1.45	1.91
BY-108	8	1.505	0.084	0.056	1.35	1.6
BY-109	13	1.723	0.126	0.073	1.49	2
BY-110	2	1.804	0.093	0.052	1.738	1.87
BY-111	6	1.702	0.122	0.072	1.56	1.88
BY-112	6	1.757	0.122	0.069	1.56	1.86
C-101	2	1.785	0.078	0.044	1.73	1.84
C-102	0					
C-103	0					
C-104	12	1.688	0.166	0.098	1.42	1.97
C-105	0					
C-106	3	1.563	0.029	0.018	1.53	1.58
C-107	2	1.550	0.156	0.100	1.44	1.66
C-108	2	1.575	0.304	0.193	1.36	1.79
C-109	3	1.233	0.058	0.047	1.2	1.3
C-110	4	1.335	0.131	0.098	1.21	1.48
C-111	1	1.590			1.59	1.59
C-112	4	1.500	0.141	0.094	1.3	1.6
C-201	1	1.440			1.44	1.44
C-202	0					
C-203	3	1.607	0.106	0.066	1.51	1.72
C-204	0					
S-101	23	1.652	0.085	0.052	1.5	1.8
S-102	46	1.682	0.115	0.068	1.44	1.92
S-103	0					
S-104	1	1.640			1.64	1.64

Table 2-2 Solid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
S-105	0					
S-106	5	1.736	0.135	0.078	1.58	1.92
S-107	10	1.773	0.122	0.069	1.57	1.99
S-108	0					
S-109	1	1.730			1.73	1.73
S-110	19	1.699	0.139	0.082	1.27	1.92
S-111	15	1.665	0.105	0.063	1.47	1.87
S-112	4	1.693	0.123	0.072	1.56	1.82
SX-101	13	1.726	0.143	0.083	1.53	1.94
SX-102	14	1.723	0.099	0.057	1.59	1.91
SX-103	18	1.726	0.146	0.085	1.24	1.88
SX-104	2	1.495	0.007	0.005	1.49	1.5
SX-105	21	1.640	0.127	0.077	1.41	1.85
SX-106	15	1.607	0.106	0.066	1.42	1.79
SX-107	0					
SX-108	0					
SX-109	0					
SX-110	0					
SX-111	0					
SX-112	0					
SX-113	0					
SX-114	0					
SX-115	0					
SY-101	107	1.592	0.079	0.049	1.32	1.84
SY-102	4	1.510	0.135	0.090	1.32	1.64
SY-103	12	1.595	0.049	0.031	1.51	1.68
T-101	0					
T-102	1	1.790			1.79	1.79
T-103	0					
T-104	0					
T-105	8	1.391	0.229	0.165	1.07	1.74
T-106	0					
T-107	14	1.560	0.113	0.072	1.42	1.76
T-108	0					
T-109	0					

Table 2-2 Solid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
T-110	17	1.252	0.045	0.036	1.16	1.32
T-111	12	1.141	0.087	0.077	1.036	1.3
T-112	3	1.280	0.095	0.075	1.22	1.39
T-201	5	1.268	0.092	0.073	1.13	1.39
T-202	6	1.192	0.077	0.064	1.09	1.26
T-203	12	1.235	0.079	0.064	1.14	1.39
T-204	12	1.198	0.046	0.039	1.15	1.33
TX-101	0					
TX-102	0					
TX-103	0					
TX-104	5	1.764	0.137	0.077	1.59	1.89
TX-105	0					
TX-106	0					
TX-107	1	1.940			1.94	1.94
TX-108	0					
TX-109	0					
TX-110	0					
TX-111	0					
TX-112	0					
TX-113	0					
TX-114	0					
TX-115	0					
TX-116	0					
TX-117	0					
TX-118	16	1.674	0.158	0.095	1.42	1.91
TY-101	0					
TY-102	0					
TY-103	0					
TY-104	0					
TY-105	0					
TY-106	1	1.590			1.59	1.59
U-101	0					
U-102	27	1.671	0.076	0.046	1.55	1.88
U-103	34	1.692	0.106	0.062	1.49	1.9
U-104	0					

Table 2-2 Solid Density Summary Statistics (May 2004) (6 pages)

Tank	Number of data points	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
U-105	43	1.697	0.074	0.044	1.54	1.81
U-106	9	1.618	0.112	0.069	1.49	1.87
U-107	25	1.639	0.173	0.106	1.3	1.88
U-108	50	1.720	0.076	0.044	1.57	1.88
U-109	47	1.680	0.136	0.081	1.3	1.97
U-110	0					
U-111	0					
U-112	1	1.860			1.86	1.86
U-201	3	1.407	0.195	0.139	1.27	1.63
U-202	1	1.510			1.51	1.51
U-203	3	1.457	0.371	0.254	1.19	1.88
U-204	2	1.465	0.120	0.082	1.38	1.55

Using the above density data, default distributions were created for the 13 possible combinations of waste type (SC/SS-LIQ, SC/SS-NL, SL-LIQ, SL-NL, MIX-LIQ, MIX-NL, and LIQ), tank class (DST or SST) and overall tank average.

3.0 PROCEDURE

The steps in analyzing the density data and preparing the density correlation are listed below.

1) All available density and specific gravity data was downloaded from the TWINS database on May 20, 2004. Queried TCD (Sample Analysis - Show QA records) on 5/19/04 for all tanks for Specific Gravity, Solids Density, Settled Solids Density, Liquid Density, Density Before Centrifuging, Density, and Bulk Density. Spreadsheet "BBI Data 040520 refined #1.xls" contains the data collected.

2) The data were transferred to "TCD Densities 040520.xls" for statistical analysis. The original version of "TCD Densities.xls" was developed in October, 1999 to support RPP-6069, *Hydrogen Generation Rate Model Calculation Input Data.* The product of this spreadsheet is a table of convective and non-convective layer densities and the associated number of samples with the calculated mean, standard deviation, relative standard deviation, minimum value and maximum value.

3) All superfluous result types (kept primary and duplicate results only) were deleted.

4) Removed data with review comments and used engineering judgment to remove additional outliers

   a) implied suspect data outliers and erroneous values were removed
   b) liquid densities < 1 are suspected of being contaminated with hydraulic fluid and have been removed
   c) Old data on active DSTs not consistent with current waste were removed

5) Sorted data by tank, constituent, and reported value.

6) A copy values operation was performed to transfer the data to spreadsheet "RPP-10006 R4 Density and Porosity Determination 041022 .xls" into tab "densityVals"

7) Zeros and divide by zero messages were removed.

8) Waste Group assignments from RPP-6171, "Determination of Waste Groupings for Safety Analyses" were assigned to the respective tank.

9) The overall data was evaluated and the statistics as defined in step 2 were calculated for each waste type in tab "densityVals". The same statistics were developed for an overall default waste type.

10) In tab "FinalDensityDist" a table is developed incorporating all of the available data from the tab "densityVals". For tanks with insufficient or missing data, default values were assigned based on the waste group of the tank. Where there are no values for a group of tanks, the default density information was used. For tanks with 1 or 2 data points, the relative uncertainty information was used from the default values based on the waste group of the tank.

11) The density information from RPP-5926 Rev 4, RPP-5926, 2004, Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste" was added to tab "RPP5926Data".

12) Solid particle densities (tab "Misc Data") were taken from RPP-21336, "Flammable Gas Waste Group Assessment FY-2004-ENG-S-0133" and are based on data from a number of PNNL documents.

13) Using the methodology suggested in RPP-21336, tab "DensityCalcs" derives the solid layer porosity distributions for each solid layer. The following corrections were made since the correlation was less well-behaved than expected.

   a) Minimum and maximum values for the layer densities based on BBI data produced unrealistic results in the porosity distributions. Minimum and

maximum values for the layer densities were created for the layers based on the mean and relative standard deviations.

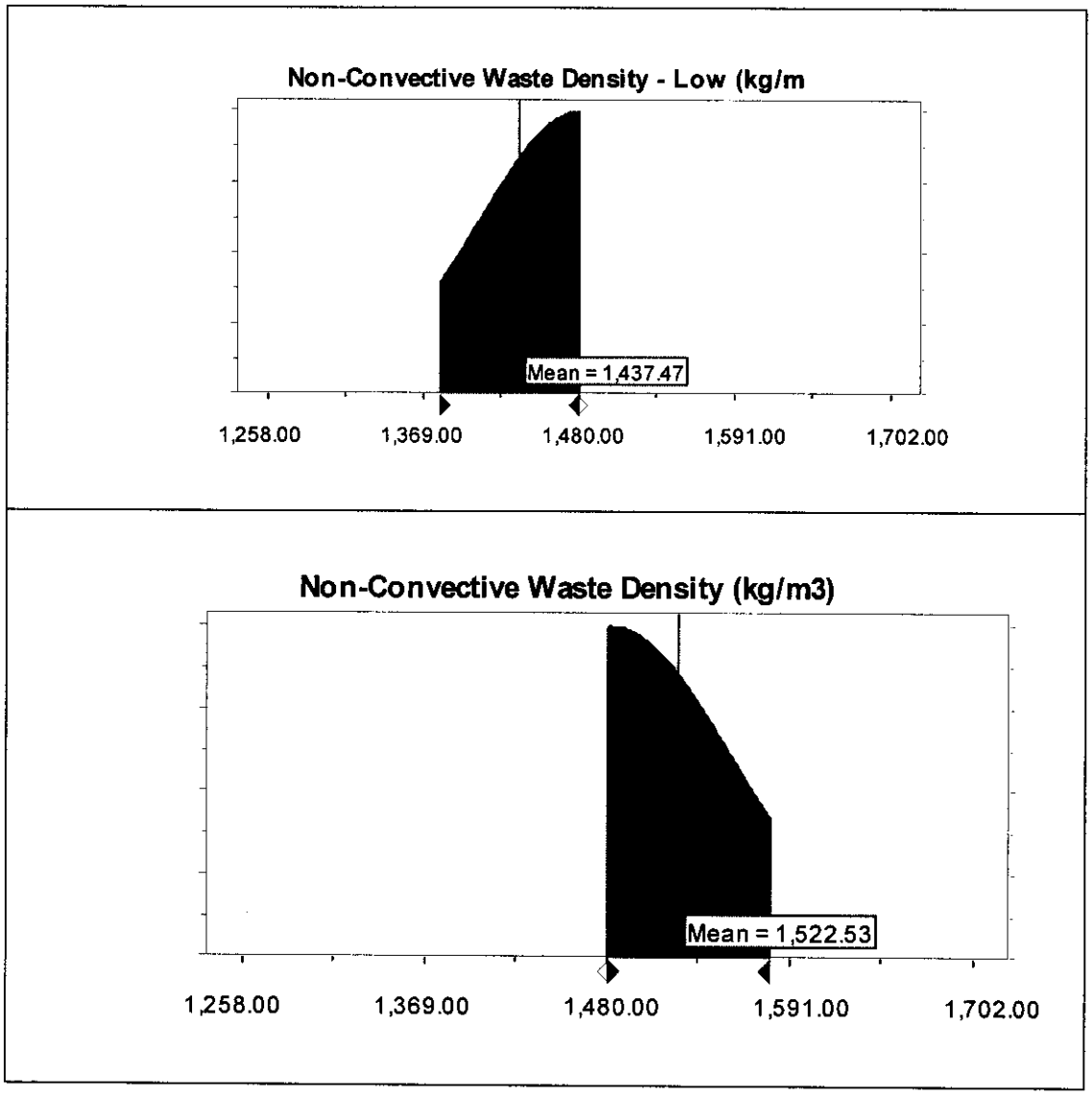
b) Mean values for the densities were selected based on the following priority.
   i) RPP-5926 Rev 4 (or BBI calculation detail) layer densities.
   ii) TWINS mean layer densities.
   iii) Default layer densities.
c) On occasion, the density information did not give feasible results. In those cases mean density data was replaced by engineering judgment using the following priority.
   i) Default density information based on waste type (color coded pink).
   ii) Twins data (color coded orange).
d) Porosities greater than 0.89 were truncated to 0.89. It is suggested that apparent porosities greater than 0.89 are not feasible (RPP-21336).
e) The values for A-105 are ignored since A-105 waste is dry and is not evaluated for flammable gas conditions.

4.0 CALCULATION OF NON-CONVECTIVE LAYER POROSITY

During the Monte Carlo flammable gas evaluation if both non-convective layer (NCL) and convective layer (CL) densities are allowed to vary independently over their full range a large number of data pairs would be selected where CL density is greater than the NCL density. This is a non-physical condition. To account for this, the distributions used in RPP-10006 revision 3 and earlier used split distributions for the densities – two distributions for each layer density which is split at the median (see Figure 4-1). A random distribution determines which halves of the distributions to sample from, i.e. a random number less than 0.5 selects from the pair of lower distributions and a random number greater than or equal to 0.5 selects from the pair of higher distributions.

The equation $\rho_{NCL}=\phi\rho_{CL}+(1-\phi)\rho_S$ creates a one-to-one correspondence between CL and NCL densities without creating artificially large density differences. This equation expresses NCL density (ρ_{NCL}) in terms of a porosity (φ), the liquid Density (ρ_{CL}) and the particle solid density (ρ_S). With this equation and the knowledge of the range of the NCL and CL densities, a distribution can be derived for the solid porosity in each tank..

Figure 4-1. Example of a density distribution split into two parts



5.0 RESULTS

5.1 NON-CONVECTIVE AND CONVECTIVE LAYER DENSITY DISTRIBUTIONS

Based on the methodology and data presented above, the non-convective and convective layer density distributions for all tanks are presented in Table 5-1.

Table 5-1. Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
A-101	SC/SS-NL--SST	1.49	0.030	0.045	1.58	1.40
A-102	MIX-NL--SST	1.57	0.037	0.059	1.69	1.45
A-103	SL-NL--SST	1.18	0.038	0.032	1.27	1.09
A-104	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
A-105	SL-NL--SST	na	0.032	na	na	na
A-106	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
AN-101	SL-LIQ--DST	1.41	0.056	0.079	1.57	1.25
AN-102	SC/SS-LIQ--DST	1.40	0.030	0.043	1.49	1.31
AN-103	SC/SS-LIQ--DST	1.48	0.031	0.046	1.57	1.39
AN-104	SC/SS-LIQ--DST	1.40	0.049	0.069	1.54	1.26
AN-105	SC/SS-LIQ--DST	1.42	0.035	0.050	1.52	1.32
AN-106	SC/SS-NL--DST	1.12	0.058	0.065	1.25	0.99
AN-107	SC/SS-LIQ--DST	1.39	0.052	0.072	1.53	1.25
AP-101	LIQ--DST	1.31	0.019	0.024	1.36	1.26
AP-102	LIQ--DST	1.39	0.006	0.008	1.41	1.37
AP-103	LIQ--DST	1.35	0.026	0.035	1.42	1.28
AP-104	LIQ--DST	1.28	0.005	0.006	1.29	1.27
AP-105	SC/SS-LIQ--DST	1.27	0.040	0.051	1.37	1.17
AP-106	LIQ--DST	1.21	0.006	0.007	1.22	1.20
AP-107	LIQ--DST	1.28	0.038	0.048	1.38	1.18
AP-108	LIQ--DST	1.43	0.003	0.005	1.44	1.42
AW-101	SC/SS-LIQ--DST	1.47	0.047	0.069	1.61	1.33
AW-102	SC/SS-NL--DST	1.07	0.044	0.047	1.16	0.98
AW-103	SL-LIQ--DST	1.24	0.051	0.064	1.37	1.11
AW-104	SL-LIQ--DST	1.35	0.016	0.022	1.39	1.31
AW-105	SL-LIQ--DST	1.05	0.036	0.038	1.13	0.97

Table 5-1. Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
AW-106	SC/SS-LIQ--DST	1.30	0.011	0.015	1.33	1.27
AX-101	SC/SS-NL--SST	1.53	0.071	0.108	1.75	1.31
AX-102	SC/SS-NL--SST	1.39	0.033	0.046	1.48	1.30
AX-103	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
AX-104	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
AY-101	SL-NL--DST	1.19	0.057	0.068	1.33	1.05
AY-102	SL-LIQ--DST	1.18	0.041	0.048	1.28	1.08
AZ-101	SL-LIQ--DST	1.24	0.015	0.019	1.28	1.20
AZ-102	SL-LIQ--DST	1.11	0.018	0.020	1.15	1.07
B-101	SC/SS-NL--SST	1.30	0.000	0.000	1.30	1.30
B-102	SC/SS-NL--SST	1.26	0.033	0.042	1.34	1.18
B-103	SC/SS-NL--SST	1.26	0.033	0.042	1.34	1.18
B-104	SL-NL--SST	1.26	0.000	0.000	1.26	1.26
B-105	SC/SS-NL--SST	1.26	0.033	0.042	1.34	1.18
B-106	SL-NL--SST	1.26	0.000	0.000	1.26	1.26
B-107	MIX-NL--SST	1.34	0.019	0.025	1.39	1.29
B-108	MIX-NL--SST	1.38	0.018	0.025	1.43	1.33
B-109	MIX-NL--SST	1.26	0.037	0.047	1.35	1.17
B-110	SL-NL--SST	1.19	0.032	0.039	1.27	1.11
B-111	SL-NL--SST	1.19	0.032	0.039	1.27	1.11
B-112	SL-NL--SST	1.51	0.032	0.049	1.61	1.41
B-201	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
B-202	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
B-203	SL-NL--SST	1.05	0.007	0.007	1.06	1.04
B-204	SL-NL--SST	1.05	0.011	0.012	1.07	1.03
BX-101	SL-NL--SST	1.28	0.032	0.042	1.37	1.20
BX-102	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
BX-103	SL-NL--SST	1.07	0.032	0.035	1.14	1.00
BX-104	SL-NL--SST	1.28	0.011	0.014	1.31	1.25
BX-105	SL-NL--SST	1.29	0.032	0.042	1.37	1.21
BX-106	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
BX-107	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
BX-108	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
BX-109	SL-NL--SST	1.17	0.004	0.005	1.18	1.16
BX-110	MIX-NL--SST	1.44	0.090	0.130	1.70	1.18
BX-111	SC/SS-NL--SST	1.45	0.044	0.064	1.58	1.32
BX-112	SL-NL--SST	1.18	0.024	0.029	1.24	1.12
BY-101	SC/SS-NL--SST	1.51	0.033	0.050	1.61	1.41

Table 5-1. Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
BY-102	SC/SS-NL--SST	1.44	0.002	0.003	1.45	1.43
BY-103	SC/SS-NL--SST	1.29	0.041	0.053	1.40	1.18
BY-104	MIX-NL--SST	1.51	0.000	0.000	1.51	1.51
BY-105	SC/SS-NL--SST	1.44	0.053	0.076	1.59	1.29
BY-106	SC/SS-NL--SST	1.31	0.094	0.123	1.56	1.06
BY-107	SC/SS-NL--SST	1.46	0.017	0.024	1.51	1.41
BY-108	MIX-NL--SST	1.33	0.042	0.056	1.44	1.22
BY-109	SC/SS-NL--SST	1.50	0.014	0.020	1.54	1.46
BY-110	SC/SS-NL--SST	1.44	0.025	0.036	1.51	1.37
BY-111	SC/SS-NL--SST	1.42	0.006	0.009	1.44	1.40
BY-112	SC/SS-NL--SST	1.47	0.005	0.007	1.48	1.46
C-101	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
C-102	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
C-103	SL-NL--SST	1.07	0.059	0.063	1.20	0.94
C-104	SL-NL--SST	1.17	0.004	0.005	1.18	1.16
C-105	SL-NL--SST	1.23	0.057	0.070	1.37	1.09
C-106	SL-NL--SST	1.02	0.059	0.060	1.14	0.90
C-107	SL-NL--SST	1.17	0.027	0.032	1.23	1.11
C-108	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
C-109	SL-NL--SST	1.17	0.000	0.000	1.17	1.17
C-110	SL-NL--SST	1.10	0.058	0.064	1.23	0.97
C-111	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
C-112	SL-NL--SST	1.17	0.091	0.107	1.38	0.96
C-201	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
C-202	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
C-203	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
C-204	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
S-101	MIX-NL--SST	1.47	0.036	0.054	1.58	1.36
S-102	SC/SS-NL--SST	1.46	0.083	0.122	1.70	1.22
S-103	SC/SS-NL--SST	1.45	0.017	0.025	1.50	1.40
S-104	SL-NL--SST	1.37	0.013	0.017	1.40	1.34
S-105	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
S-106	SC/SS-NL--SST	1.43	0.036	0.051	1.53	1.33
S-107	SL-NL--SST	1.31	0.064	0.084	1.48	1.14
S-108	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
S-109	SC/SS-NL--SST	1.49	0.033	0.049	1.59	1.39
S-110	MIX-NL--SST	1.43	0.047	0.067	1.56	1.30
S-111	SC/SS-LIQ--SST	1.45	0.047	0.069	1.59	1.31

Table 5-1. Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
S-112	SC/SS-NL--SST	1.45	0.020	0.029	1.51	1.39
SX-101	SC/SS-NL--SST	1.48	0.013	0.019	1.52	1.44
SX-102	SC/SS-LIQ--SST	1.46	0.067	0.098	1.66	1.26
SX-103	SC/SS-NL--SST	1.47	0.027	0.039	1.55	1.39
SX-104	SC/SS-NL--SST	1.47	0.009	0.014	1.50	1.44
SX-105	SC/SS-NL--SST	1.47	0.019	0.029	1.53	1.41
SX-106	SC/SS-NL--SST	1.29	0.033	0.043	1.38	1.20
SX-107	SL-NL--SST	1.50	0.032	0.049	1.60	1.40
SX-108	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
SX-109	SC/SS-NL--SST	1.39	0.033	0.046	1.48	1.30
SX-110	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
SX-111	SL-NL--SST	1.50	0.032	0.049	1.60	1.40
SX-112	SL-NL--SST	1.50	0.032	0.049	1.60	1.40
SX-113	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
SX-114	SL-NL--SST	1.50	0.032	0.049	1.60	1.40
SX-115	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
SY-101	SC/SS-LIQ--DST	1.30	0.027	0.035	1.37	1.23
SY-102	SL-LIQ--DST	1.30	0.084	0.109	1.52	1.08
SY-103	SC/SS-LIQ--DST	1.47	0.055	0.081	1.63	1.31
T-101	MIX-NL--SST	1.45	0.037	0.054	1.56	1.34
T-102	SL-NL--SST	1.14	0.032	0.037	1.21	1.07
T-103	SL-NL--SST	1.19	0.032	0.039	1.27	1.11
T-104	SL-NL--SST	1.17	0.086	0.101	1.37	0.97
T-105	SL-NL--SST	1.18	0.078	0.092	1.36	1.00
T-106	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
T-107	SL-NL--SST	1.17	0.077	0.090	1.35	0.99
T-108	MIX-NL--SST	1.26	0.037	0.047	1.35	1.17
T-109	SC/SS-NL--SST	1.26	0.033	0.042	1.34	1.18
T-110	SL-NL--SST	1.05	0.027	0.028	1.11	0.99
T-111	SL-NL--SST	1.17	0.076	0.089	1.35	0.99
T-112	SL-NL--SST	1.10	0.003	0.004	1.11	1.09
T-201	SL-NL--SST	1.06	0.006	0.006	1.07	1.05
T-202	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
T-203	SL-NL--SST	1.17	0.002	0.002	1.17	1.17
T-204	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
TX-101	SL-NL--SST	1.45	0.032	0.047	1.54	1.36
TX-102	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TX-103	SC/SS-NL--SST	1.44	0.033	0.048	1.54	1.35

Table 5-1. Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
TX-104	MIX-NL--SST	1.44	0.010	0.015	1.47	1.41
TX-105	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TX-106	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TX-107	SC/SS-NL--SST	1.46	0.033	0.048	1.56	1.37
TX-108	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TX-109	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
TX-110	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TX-111	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TX-112	SC/SS-NL--SST	1.42	0.033	0.047	1.52	1.33
TX-113	MIX-NL--SST	1.45	0.037	0.054	1.56	1.34
TX-114	SC/SS-NL--SST	1.33	0.033	0.044	1.42	1.24
TX-115	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TX-116	SC/SS-NL--SST	1.39	0.002	0.003	1.40	1.38
TX-117	SC/SS-NL--SST	1.26	0.033	0.042	1.34	1.18
TX-118	SC/SS-NL--SST	1.45	0.033	0.048	1.55	1.35
TY-101	MIX-NL--SST	1.26	0.037	0.047	1.35	1.17
TY-102	SC/SS-NL--SST	1.36	0.033	0.045	1.45	1.27
TY-103	SL-NL--SST	1.45	0.032	0.047	1.54	1.36
TY-104	SL-NL--SST	1.18	0.032	0.038	1.26	1.10
TY-105	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
TY-106	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
U-101	SL-NL--SST	1.17	0.011	0.012	1.19	1.15
U-102	SC/SS-NL--SST	1.48	0.064	0.095	1.67	1.29
U-103	SC/SS-NL--SST	1.44	0.030	0.044	1.53	1.35
U-104	MIX-NL--SST	1.40	0.037	0.052	1.50	1.30
U-105	SC/SS-NL--SST	1.46	0.023	0.034	1.53	1.39
U-106	SC/SS-NL--SST	1.34	0.051	0.068	1.48	1.20
U-107	SC/SS-NL--SST	1.39	0.080	0.112	1.61	1.17
U-108	SC/SS-NL--SST	1.40	0.053	0.074	1.55	1.25
U-109	SC/SS-NL--SST	1.47	0.011	0.017	1.50	1.44
U-110	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
U-111	SC/SS-NL--SST	1.40	0.016	0.022	1.44	1.36
U-112	SL-NL--SST	1.17	0.032	0.038	1.25	1.09
U-201	SL-NL--SST	1.26	0.001	0.001	1.26	1.26
U-202	SL-NL--SST	1.28	0.012	0.015	1.31	1.25
U-203	SL-NL--SST	1.28	0.004	0.005	1.29	1.27
U-204	SL-NL--SST	1.11	0.002	0.002	1.11	1.11

Table 5-2. Non-Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
A-101	SC/SS-NL--SST	1.70	0.046	0.078	1.86	1.54
A-102	MIX-NL--SST	1.67	0.053	0.088	1.85	1.49
A-103	SL-NL--SST	1.37	0.074	0.101	1.58	1.17
A-104	SL-NL--SST	1.64	0.074	0.121	1.88	1.40
A-105	SL-NL--SST	1.54	0.074	0.114	1.77	1.31
A-106	SL-NL--SST	1.70	0.074	0.125	1.95	1.45
AN-101	SL-LIQ--DST	1.55	0.076	0.117	1.78	1.32
AN-102	SC/SS-LIQ--DST	1.53	0.037	0.057	1.64	1.42
AN-103	SC/SS-LIQ--DST	1.72	0.004	0.007	1.73	1.71
AN-104	SC/SS-LIQ--DST	1.59	0.035	0.055	1.70	1.48
AN-105	SC/SS-LIQ--DST	1.57	0.031	0.048	1.67	1.47
AN-106	SC/SS-NL--DST	1.54	0.060	0.093	1.73	1.36
AN-107	SC/SS-LIQ--DST	1.48	0.039	0.058	1.60	1.36
AP-101	LIQ--DST	1.61	0.051	0.033	1.78	1.45
AP-102	LIQ--DST	1.75	0.060	0.106	1.96	1.54
AP-103	LIQ--DST	1.61	0.051	0.033	1.78	1.45
AP-104	LIQ--DST	1.61	0.051	0.033	1.78	1.45
AP-105	SC/SS-LIQ--DST	1.61	0.017	0.028	1.67	1.55
AP-106	LIQ--DST	1.61	0.051	0.033	1.78	1.45
AP-107	LIQ--DST	1.61	0.051	0.033	1.78	1.45
AP-108	LIQ--DST	1.61	0.051	0.033	1.78	1.45
AW-101	SC/SS-LIQ--DST	1.59	0.050	0.079	1.75	1.43
AW-102	SC/SS-NL--DST	1.32	0.060	0.080	1.48	1.16
AW-103	SL-LIQ--DST	1.49	0.097	0.144	1.78	1.20
AW-104	SL-LIQ--DST	1.48	0.076	0.112	1.71	1.26
AW-105	SL-LIQ--DST	1.36	0.079	0.107	1.58	1.15
AW-106	SC/SS-LIQ--DST	1.61	0.033	0.052	1.71	1.51
AX-101	SC/SS-NL--SST	1.70	0.063	0.108	1.92	1.49
AX-102	SC/SS-NL--SST	1.58	0.068	0.107	1.79	1.36
AX-103	SC/SS-NL--SST	1.58	0.025	0.040	1.66	1.50
AX-104	SL-NL--SST	1.80	0.074	0.133	2.07	1.53
AY-101	SL-NL--DST	1.68	0.173	0.291	2.26	1.10
AY-102	SL-LIQ--DST	1.55	0.086	0.133	1.81	1.28
AZ-101	SL-LIQ--DST	1.63	0.062	0.101	1.83	1.43
AZ-102	SL-LIQ--DST	1.41	0.040	0.056	1.52	1.30

Table 5-2. Non-Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
B-101	SC/SS-NL--SST	1.49	0.068	0.101	1.69	1.29
B-102	SC/SS-NL--SST	1.61	0.068	0.110	1.83	1.39
B-103	SC/SS-NL--SST	1.61	0.068	0.110	1.83	1.39
B-104	SL-NL--SST	1.38	0.074	0.102	1.59	1.18
B-105	SC/SS-NL--SST	1.65	0.068	0.112	1.88	1.43
B-106	SL-NL--SST	1.38	0.027	0.037	1.46	1.31
B-107	MIX-NL--SST	1.63	0.033	0.053	1.73	1.52
B-108	MIX-NL--SST	1.68	0.065	0.109	1.89	1.46
B-109	MIX-NL--SST	1.78	0.008	0.014	1.81	1.76
B-110	SL-NL--SST	1.36	0.005	0.007	1.37	1.35
B-111	SL-NL--SST	1.27	0.043	0.054	1.38	1.16
B-112	SL-NL--SST	1.49	0.074	0.110	1.71	1.27
B-201	SL-NL--SST	1.26	0.095	0.120	1.50	1.02
B-202	SL-NL--SST	1.22	0.081	0.099	1.42	1.02
B-203	SL-NL--SST	1.19	0.029	0.034	1.26	1.12
B-204	SL-NL--SST	1.19	0.042	0.050	1.29	1.09
BX-101	SL-NL--SST	1.63	0.074	0.120	1.86	1.39
BX-102	SL-NL--SST	1.04	0.074	0.077	1.19	0.89
BX-103	SL-NL--SST	1.61	0.074	0.119	1.85	1.37
BX-104	SL-NL--SST	1.68	0.124	0.208	2.10	1.26
BX-105	SL-NL--SST	1.64	0.074	0.121	1.88	1.40
BX-106	SL-NL--SST	1.64	0.034	0.057	1.75	1.53
BX-107	SL-NL--SST	1.44	0.025	0.036	1.51	1.37
BX-108	SL-NL--SST	1.46	0.074	0.107	1.67	1.24
BX-109	SL-NL--SST	1.52	0.009	0.014	1.55	1.49
BX-110	MIX-NL--SST	1.66	0.070	0.116	1.90	1.43
BX-111	SC/SS-NL--SST	1.45	0.068	0.098	1.64	1.25
BX-112	SL-NL--SST	1.31	0.024	0.031	1.37	1.25
BY-101	SC/SS-NL--SST	1.82	0.068	0.124	2.07	1.58
BY-102	SC/SS-NL--SST	1.57	0.149	0.235	2.04	1.10
BY-103	SC/SS-NL--SST	1.66	0.068	0.113	1.89	1.43
BY-104	MIX-NL--SST	1.71	0.032	0.055	1.82	1.60
BY-105	SC/SS-NL--SST	1.80	0.036	0.064	1.93	1.67
BY-106	SC/SS-NL--SST	1.67	0.084	0.140	1.95	1.39
BY-107	SC/SS-NL--SST	1.69	0.086	0.145	1.98	1.40
BY-108	MIX-NL--SST	1.48	0.056	0.083	1.65	1.32
BY-109	SC/SS-NL--SST	1.71	0.073	0.125	1.96	1.46
BY-110	SC/SS-NL--SST	1.57	0.052	0.081	1.73	1.40

Table 5-2. Non-Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
BY-111	SC/SS-NL--SST	1.66	0.072	0.120	1.90	1.42
BY-112	SC/SS-NL--SST	1.74	0.069	0.120	1.98	1.50
C-101	SL-NL--SST	1.78	0.044	0.078	1.94	1.62
C-102	SL-NL--SST	1.68	0.074	0.124	1.93	1.43
C-103	SL-NL--SST	1.58	0.074	0.116	1.81	1.34
C-104	SL-NL--SST	1.68	0.098	0.165	2.01	1.35
C-105	SL-NL--SST	1.55	0.074	0.114	1.78	1.32
C-106	SL-NL--SST	1.56	0.018	0.029	1.62	1.50
C-107	SL-NL--SST	1.55	0.100	0.156	1.86	1.24
C-108	SL-NL--SST	1.48	0.193	0.286	2.05	0.91
C-109	SL-NL--SST	1.55	0.047	0.072	1.69	1.40
C-110	SL-NL--SST	1.34	0.098	0.131	1.60	1.08
C-111	SL-NL--SST	1.55	0.074	0.114	1.77	1.32
C-112	SL-NL--SST	1.60	0.094	0.151	1.90	1.30
C-201	SL-NL--SST	1.44	0.074	0.106	1.65	1.23
C-202	SL-NL--SST	1.44	0.074	0.106	1.65	1.23
C-203	SL-NL--SST	1.62	0.066	0.107	1.83	1.41
C-204	SL-NL--SST	1.62	0.074	0.119	1.86	1.38
S-101	MIX-NL--SST	1.65	0.052	0.085	1.82	1.48
S-102	SC/SS-NL--SST	1.59	0.068	0.109	1.81	1.37
S-103	SC/SS-NL--SST	1.61	0.068	0.110	1.83	1.39
S-104	SL-NL--SST	1.68	0.074	0.124	1.92	1.43
S-105	SC/SS-NL--SST	1.66	0.068	0.113	1.88	1.43
S-106	SC/SS-NL--SST	1.72	0.078	0.134	1.99	1.45
S-107	SL-NL--SST	1.78	0.069	0.123	2.02	1.53
S-108	SC/SS-NL--SST	1.68	0.068	0.114	1.91	1.45
S-109	SC/SS-NL--SST	1.66	0.068	0.113	1.88	1.43
S-110	MIX-NL--SST	1.66	0.082	0.136	1.94	1.39
S-111	SC/SS-LIQ--SST	1.54	0.063	0.098	1.74	1.35
S-112	SC/SS-NL--SST	1.69	0.072	0.123	1.94	1.45
SX-101	SC/SS-NL--SST	1.68	0.083	0.139	1.96	1.40
SX-102	SC/SS-LIQ--SST	1.69	0.057	0.097	1.88	1.50
SX-103	SC/SS-NL--SST	1.73	0.085	0.146	2.02	1.44
SX-104	SC/SS-NL--SST	1.69	0.005	0.008	1.71	1.68
SX-105	SC/SS-NL--SST	1.63	0.077	0.126	1.88	1.38
SX-106	SC/SS-NL--SST	1.58	0.066	0.104	1.79	1.37
SX-107	SL-NL--SST	1.75	0.074	0.129	2.01	1.49
SX-108	SL-NL--SST	1.77	0.074	0.130	2.03	1.51

Table 5-2. Non-Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
SX-109	SC/SS-NL--SST	1.73	0.068	0.118	1.97	1.50
SX-110	SL-NL--SST	1.75	0.074	0.129	2.00	1.49
SX-111	SL-NL--SST	1.74	0.074	0.128	1.99	1.48
SX-112	SL-NL--SST	1.74	0.074	0.129	2.00	1.49
SX-113	SL-NL--SST	1.09	0.074	0.080	1.25	0.93
SX-114	SL-NL--SST	1.69	0.074	0.125	1.94	1.44
SX-115	SL-NL--SST	1.79	0.074	0.132	2.05	1.53
SY-101	SC/SS-LIQ--DST	1.52	0.049	0.075	1.67	1.37
SY-102	SL-LIQ--DST	1.56	0.090	0.140	1.84	1.28
SY-103	SC/SS-LIQ--DST	1.61	0.031	0.049	1.71	1.51
T-101	MIX-NL--SST	1.54	0.053	0.082	1.71	1.38
T-102	SL-NL--SST	1.80	0.074	0.132	2.06	1.53
T-103	SL-NL--SST	1.71	0.074	0.126	1.97	1.46
T-104	SL-NL--SST	1.29	0.074	0.095	1.48	1.10
T-105	SL-NL--SST	1.46	0.165	0.241	1.94	0.98
T-106	SL-NL--SST	1.59	0.074	0.117	1.82	1.35
T-107	SL-NL--SST	1.56	0.072	0.113	1.79	1.33
T-108	MIX-NL--SST	1.55	0.053	0.082	1.71	1.38
T-109	SC/SS-NL--SST	1.61	0.068	0.109	1.83	1.39
T-110	SL-NL--SST	1.25	0.036	0.045	1.34	1.16
T-111	SL-NL--SST	1.24	0.077	0.095	1.43	1.05
T-112	SL-NL--SST	1.28	0.075	0.095	1.47	1.09
T-201	SL-NL--SST	1.31	0.073	0.095	1.50	1.12
T-202	SL-NL--SST	1.18	0.064	0.076	1.33	1.03
T-203	SL-NL--SST	1.22	0.064	0.078	1.38	1.06
T-204	SL-NL--SST	1.18	0.039	0.046	1.27	1.09
TX-101	SL-NL--SST	1.74	0.074	0.128	2.00	1.48
TX-102	SC/SS-NL--SST	1.61	0.068	0.110	1.83	1.39
TX-103	SC/SS-NL--SST	1.62	0.068	0.110	1.84	1.40
TX-104	MIX-NL--SST	1.74	0.077	0.135	2.01	1.47
TX-105	SC/SS-NL--SST	1.63	0.068	0.111	1.86	1.41
TX-106	SC/SS-NL--SST	1.62	0.068	0.110	1.84	1.40
TX-107	SC/SS-NL--SST	1.78	0.068	0.121	2.02	1.54
TX-108	SC/SS-NL--SST	1.62	0.068	0.110	1.84	1.40
TX-109	SL-NL--SST	1.43	0.074	0.105	1.64	1.22
TX-110	SC/SS-NL--SST	1.62	0.068	0.110	1.84	1.40
TX-111	SC/SS-NL--SST	1.61	0.068	0.110	1.83	1.39
TX-112	SC/SS-NL--SST	1.63	0.068	0.111	1.85	1.41

Table 5-2. Non-Convective Layer Distributions (5 pages)

Tank	Waste Type	Mean Density RPP-5926	Relative Error	Std Dev	Max	Min
TX-113	MIX-NL--SST	1.61	0.053	0.085	1.78	1.44
TX-114	SC/SS-NL--SST	1.63	0.068	0.111	1.86	1.41
TX-115	SC/SS-NL--SST	1.63	0.068	0.111	1.85	1.41
TX-116	SC/SS-NL--SST	1.66	0.068	0.113	1.88	1.43
TX-117	SC/SS-NL--SST	1.58	0.068	0.107	1.80	1.37
TX-118	SC/SS-NL--SST	1.69	0.095	0.160	2.01	1.37
TY-101	MIX-NL--SST	1.64	0.053	0.086	1.81	1.47
TY-102	SC/SS-NL--SST	1.76	0.068	0.119	1.99	1.52
TY-103	SL-NL--SST	1.68	0.074	0.124	1.93	1.43
TY-104	SL-NL--SST	1.65	0.074	0.122	1.89	1.41
TY-105	SL-NL--SST	1.53	0.074	0.113	1.76	1.30
TY-106	SL-NL--SST	1.40	0.074	0.103	1.61	1.19
U-101	SL-NL--SST	1.77	0.074	0.130	2.03	1.51
U-102	SC/SS-NL--SST	1.67	0.046	0.076	1.83	1.52
U-103	SC/SS-NL--SST	1.70	0.062	0.106	1.91	1.49
U-104	MIX-NL--SST	1.43	0.053	0.075	1.58	1.28
U-105	SC/SS-NL--SST	1.67	0.044	0.073	1.82	1.52
U-106	SC/SS-NL--SST	1.55	0.069	0.107	1.77	1.34
U-107	SC/SS-NL--SST	1.74	0.106	0.183	2.10	1.37
U-108	SC/SS-NL--SST	1.68	0.044	0.075	1.83	1.53
U-109	SC/SS-NL--SST	1.65	0.081	0.134	1.92	1.39
U-110	SL-NL--SST	1.72	0.074	0.126	1.97	1.46
U-111	SC/SS-NL--SST	1.61	0.068	0.109	1.83	1.39
U-112	SL-NL--SST	1.74	0.074	0.128	2.00	1.49
U-201	SL-NL--SST	1.63	0.139	0.226	2.08	1.18
U-202	SL-NL--SST	1.51	0.074	0.111	1.73	1.29
U-203	SL-NL--SST	1.59	0.254	0.405	2.40	0.78
U-204	SL-NL--SST	1.47	0.082	0.121	1.71	1.23

5.2 DEFAULT DENSITY DISTRIBUTIONS BY WASTE TYPE AND TANK CLASS

The tank characterization data were used to develop density distributions based on the waste type and the type of tank. Tables 5-3 and 5-4 present the default distributions for CL and NCL respectively. Table 5-5 presents overall statistics for the sample data. The BBI typically lists relative uncertainties for solid and liquid densities as 5%. This

evaluation indicates that the overall uncertainty for density is about 5%. However, for liquid densities the relative error is 3.3% and the relative error for the solids densities is 6.8%. This information is useful when modeling tank wastes for flammable gas behavior.

Table 5-3 Default Convective Layer Density Distributions by Waste Type

Waste Group	Number in Range	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
SC/SS-LIQ--SST	34	1.41	0.08	0.06	1.23	1.65
SC/SS-NL--SST	552	1.43	0.05	0.03	1.01	1.66
SL-LIQ--SST	0	na	na	na	0.00	0.00
SC/SS-LIQ--SST	34	1.41	0.08	0.06	1.23	1.65
SC/SS-NL--SST	552	1.43	0.05	0.03	1.01	1.66
SL-LIQ--SST	0	na	na	na	0.00	0.00
SC/SS-LIQ--SST	34	1.41	0.08	0.06	1.23	1.65
SC/SS-NL--SST	552	1.43	0.05	0.03	1.01	1.66
SL-LIQ--SST	0	na	na	na	0.00	0.00
SC/SS-LIQ--SST	34	1.41	0.08	0.06	1.23	1.65
SC/SS-NL--SST	552	1.43	0.05	0.03	1.01	1.66
SL-LIQ--SST	0	na	na	na	0.00	0.00
Overall Default	34	1.41	0.08	0.06	1.23	1.65

Table 5-4 Default Non-Convective Layer Density Distributions by Waste Type

Waste Group	Number in Range	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
SC/SS-LIQ--SST	29	1.69	0.10	0.06	1.47	1.91
SC/SS-NL--SST	536	1.70	0.11	0.07	1.24	2.00
SL-LIQ--SST	0	na	na	na	0.00	0.00
SC/SS-LIQ--SST	371	1.44	0.11	0.07	1.01	1.99
SC/SS-NL--SST	97	1.71	0.09	0.05	1.27	1.92
SL-LIQ--SST	0	na	na	na	0.00	0.00
SC/SS-LIQ--SST	235	1.61	0.05	0.03	1.32	1.87
SC/SS-NL--SST	1	1.60	na	na	1.60	1.60
SL-LIQ--SST	149	1.48	0.11	0.08	1.06	1.88
SC/SS-LIQ--SST	6	1.58	0.27	0.17	1.28	1.95
SC/SS-NL--SST	0	na	na	na	0.00	0.00
SL-LIQ--SST	0	na	na	na	0.00	0.00
Overall Default	29	1.69	0.10	0.06	1.47	1.91

Table 5-5 Overall Statistics for Laboratory Sample Data

Tank	Number in Range	Mean	Std Dev	Relative Error	Minimum Value	Maximum Value
Convective Layer	2005	1.294	0.042	0.033	1.01	2.00
Non-Convective Layer	1424	1.573	0.106	0.068	1.01	2.00

5.3 NON-CONVECTIVE LAYER POROSITY DISTRIBUTIONS

Table 5-6 presents the results of this analysis, the porosity distributions for use in the RPP-10006 flammable gas evaluations.

Table 5-6. Non-Convective Layer Porosity Distributions

Tank	Waste Type	Mean Porosity	Relative Error	Std Dev	Max	Min
A-101	SC/SS-NL--SST	0.70	0.046	0.032	0.75	0.65
A-102	MIX-NL--SST	0.86	0.053	0.046	0.89	0.80
A-103	SL-NL--SST	0.86	0.074	0.064	0.89	0.77
A-104	SL-NL--SST	0.67	0.074	0.049	0.75	0.60
A-105	SL-NL--SST	0.67	0.074	0.049	0.75	0.60
A-106	SL-NL--SST	0.63	0.074	0.046	0.70	0.56
AN-101	SL-LIQ--DST	0.88	0.076	0.067	0.89	0.78
AN-102	SC/SS-LIQ--DST	0.84	0.037	0.031	0.88	0.79
AN-103	SC/SS-LIQ--DST	0.67	0.031	0.021	0.70	0.64
AN-104	SC/SS-LIQ--DST	0.76	0.049	0.037	0.82	0.71
AN-105	SC/SS-LIQ--DST	0.81	0.035	0.029	0.85	0.76
AN-106	SC/SS-NL--DST	0.61	0.060	0.037	0.66	0.55
AN-107	SC/SS-LIQ--DST	0.89	0.052	0.046	0.96	0.82
AP-101	LIQ--DST	0.66	0.051	0.034	0.71	0.61
AP-102	LIQ--DST	0.56	0.060	0.034	0.61	0.51
AP-103	LIQ--DST	0.69	0.051	0.036	0.74	0.64
AP-104	LIQ--DST	0.64	0.051	0.033	0.69	0.59
AP-105	SC/SS-LIQ--DST	0.63	0.040	0.025	0.67	0.60
AP-106	LIQ--DST	0.59	0.051	0.031	0.64	0.55
AP-107	LIQ--DST	0.64	0.051	0.033	0.69	0.59
AP-108	LIQ--DST	0.76	0.051	0.039	0.82	0.70
AW-101	SC/SS-LIQ--DST	0.84	0.050	0.042	0.89	0.77
AW-102	SC/SS-NL--DST	0.78	0.060	0.047	0.85	0.71
AW-103	SL-LIQ--DST	0.82	0.097	0.079	0.89	0.70
AW-104	SL-LIQ--DST	0.89	0.076	0.067	0.89	0.79
AW-105	SL-LIQ--DST	0.80	0.079	0.063	0.89	0.70
AW-106	SC/SS-LIQ--DST	0.66	0.033	0.021	0.69	0.62
AX-101	SC/SS-NL--SST	0.74	0.071	0.052	0.82	0.66
AX-102	SC/SS-NL--SST	0.77	0.068	0.052	0.85	0.69
AX-103	SC/SS-NL--SST	0.83	0.033	0.027	0.87	0.79
AX-104	SL-NL--SST	0.56	0.074	0.041	0.62	0.50
AY-101	SL-NL--DST	0.65	0.173	0.112	0.82	0.48
AY-102	SL-LIQ--DST	0.74	0.086	0.064	0.84	0.65
AZ-101	SL-LIQ--DST	0.71	0.062	0.044	0.78	0.65
AZ-102	SL-LIQ--DST	0.80	0.040	0.032	0.85	0.75
B-101	SC/SS-NL--SST	0.79	0.068	0.054	0.87	0.71
B-102	SC/SS-NL--SST	0.63	0.068	0.043	0.69	0.56
B-103	SC/SS-NL--SST	0.62	0.068	0.042	0.69	0.56
B-104	SL-NL--SST	0.91	0.074	0.067	0.89	0.81

Table 5-6. Non-Convective Layer Porosity Distributions

Tank	Waste Type	Mean Porosity	Relative Error	Std Dev	Max	Min
B-105	SC/SS-NL--SST	0.58	0.068	0.040	0.64	0.52
B-106	SL-NL--SST	0.91	0.027	0.025	0.89	0.87
B-107	MIX-NL--SST	0.70	0.033	0.023	0.74	0.67
B-108	MIX-NL--SST	0.68	0.065	0.044	0.75	0.61
B-109	MIX-NL--SST	0.50	0.037	0.019	0.52	0.47
B-110	SL-NL--SST	0.88	0.032	0.028	0.89	0.84
B-111	SL-NL--SST	0.94	0.043	0.040	0.89	0.88
B-112	SL-NL--SST	1.02	0.074	0.075	0.89	0.90
B-201	SL-NL--SST	0.94	0.095	0.089	0.89	0.80
B-202	SL-NL--SST	0.97	0.081	0.079	0.89	0.85
B-203	SL-NL--SST	0.91	0.029	0.026	0.89	0.87
B-204	SL-NL--SST	0.91	0.042	0.038	0.89	0.85
BX-101	SL-NL--SST	0.74	0.074	0.055	0.82	0.66
BX-102	SL-NL--SST	1.09	0.074	0.080	0.89	0.97
BX-103	SL-NL--SST	0.65	0.074	0.048	0.72	0.58
BX-104	SL-NL--SST	0.70	0.124	0.086	0.83	0.57
BX-105	SL-NL--SST	0.73	0.074	0.054	0.81	0.65
BX-106	SL-NL--SST	0.67	0.034	0.023	0.71	0.64
BX-107	SL-NL--SST	0.81	0.032	0.026	0.85	0.77
BX-108	SL-NL--SST	0.80	0.074	0.059	0.89	0.71
BX-109	SL-NL--SST	0.76	0.009	0.007	0.77	0.74
BX-110	MIX-NL--SST	0.74	0.090	0.067	0.84	0.64
BX-111	SC/SS-NL--SST	1.00	0.068	0.068	0.89	0.90
BX-112	SL-NL--SST	0.91	0.024	0.022	0.89	0.88
BY-101	SC/SS-NL--SST	0.55	0.068	0.037	0.60	0.49
BY-102	SC/SS-NL--SST	0.83	0.149	0.124	0.89	0.64
BY-103	SC/SS-NL--SST	0.59	0.068	0.040	0.65	0.53
BY-104	MIX-NL--SST	0.75	0.032	0.024	0.79	0.71
BY-105	SC/SS-NL--SST	0.52	0.053	0.028	0.56	0.48
BY-106	SC/SS-NL--SST	0.59	0.094	0.056	0.67	0.51
BY-107	SC/SS-NL--SST	0.69	0.086	0.060	0.78	0.60
BY-108	MIX-NL--SST	0.84	0.056	0.047	0.89	0.77
BY-109	SC/SS-NL--SST	0.71	0.073	0.052	0.78	0.63
BY-110	SC/SS-NL--SST	0.83	0.052	0.043	0.89	0.77
BY-111	SC/SS-NL--SST	0.69	0.072	0.050	0.76	0.62
BY-112	SC/SS-NL--SST	0.64	0.069	0.044	0.70	0.57
C-101	SL-NL--SST	0.57	0.044	0.025	0.61	0.54
C-102	SL-NL--SST	0.64	0.074	0.047	0.71	0.57
C-103	SL-NL--SST	0.67	0.074	0.049	0.74	0.60
C-104	SL-NL--SST	0.64	0.098	0.063	0.74	0.55

Table 5-6. Non-Convective Layer Porosity Distributions

Tank	Waste Type	Mean Porosity	Relative Error	Std Dev	Max	Min
C-105	SL-NL--SST	0.77	0.074	0.056	0.85	0.68
C-106	SL-NL--SST	0.66	0.059	0.039	0.72	0.60
C-107	SL-NL--SST	0.73	0.100	0.074	0.84	0.62
C-108	SL-NL--SST	0.78	0.193	0.151	0.89	0.56
C-109	SL-NL--SST	0.74	0.047	0.034	0.79	0.68
C-110	SL-NL--SST	0.84	0.098	0.082	0.89	0.72
C-111	SL-NL--SST	0.74	0.074	0.054	0.82	0.66
C-112	SL-NL--SST	0.70	0.094	0.066	0.80	0.60
C-201	SL-NL--SST	0.81	0.074	0.060	0.89	0.72
C-202	SL-NL--SST	0.81	0.074	0.060	0.89	0.72
C-203	SL-NL--SST	0.69	0.066	0.045	0.75	0.62
C-204	SL-NL--SST	0.69	0.074	0.051	0.76	0.61
S-101	MIX-NL--SST	0.78	0.052	0.041	0.85	0.72
S-102	SC/SS-NL--SST	0.82	0.083	0.069	0.89	0.72
S-103	SC/SS-NL--SST	0.78	0.068	0.053	0.86	0.70
S-104	SL-NL--SST	0.75	0.074	0.055	0.83	0.67
S-105	SC/SS-NL--SST	0.72	0.068	0.049	0.80	0.65
S-106	SC/SS-NL--SST	0.62	0.078	0.048	0.69	0.55
S-107	SL-NL--SST	0.64	0.069	0.044	0.71	0.57
S-108	SC/SS-NL--SST	0.70	0.068	0.047	0.77	0.63
S-109	SC/SS-NL--SST	0.76	0.068	0.052	0.84	0.69
S-110	MIX-NL--SST	0.73	0.082	0.060	0.82	0.64
S-111	SC/SS-LIQ--SST	0.88	0.063	0.055	0.89	0.79
S-112	SC/SS-NL--SST	0.67	0.072	0.049	0.75	0.60
SX-101	SC/SS-NL--SST	0.72	0.083	0.060	0.81	0.63
SX-102	SC/SS-LIQ--SST	0.69	0.067	0.046	0.76	0.62
SX-103	SC/SS-NL--SST	0.64	0.085	0.055	0.73	0.56
SX-104	SC/SS-NL--SST	0.69	0.009	0.006	0.70	0.68
SX-105	SC/SS-NL--SST	0.78	0.077	0.060	0.87	0.69
SX-106	SC/SS-NL--SST	0.68	0.066	0.045	0.75	0.62
SX-107	SL-NL--SST	0.77	0.074	0.057	0.85	0.68
SX-108	SL-NL--SST	0.58	0.074	0.043	0.64	0.52
SX-109	SC/SS-NL--SST	0.58	0.068	0.039	0.64	0.52
SX-110	SL-NL--SST	0.60	0.074	0.044	0.66	0.53
SX-111	SL-NL--SST	0.79	0.074	0.058	0.87	0.70
SX-112	SL-NL--SST	0.78	0.074	0.057	0.86	0.69
SX-113	SL-NL--SST	1.06	0.074	0.078	0.89	0.94
SX-114	SL-NL--SST	0.82	0.074	0.061	0.89	0.73
SX-115	SL-NL--SST	0.57	0.074	0.042	0.63	0.50
SY-101	SC/SS-LIQ--DST	0.76	0.049	0.037	0.81	0.70

Table 5-6. Non-Convective Layer Porosity Distributions

Tank	Waste Type	Mean Porosity	Relative Error	Std Dev	Max	Min
SY-102	SL-LIQ--DST	0.80	0.090	0.072	0.89	0.69
SY-103	SC/SS-LIQ--DST	0.81	0.055	0.045	0.88	0.74
T-101	MIX-NL--SST	0.89	0.053	0.047	0.89	0.82
T-102	SL-NL--SST	0.55	0.074	0.041	0.61	0.49
T-103	SL-NL--SST	0.63	0.074	0.046	0.70	0.56
T-104	SL-NL--SST	0.92	0.086	0.079	0.89	0.80
T-105	SL-NL--SST	0.80	0.165	0.132	0.89	0.60
T-106	SL-NL--SST	0.71	0.074	0.052	0.79	0.63
T-107	SL-NL--SST	0.73	0.077	0.056	0.81	0.64
T-108	MIX-NL--SST	0.72	0.053	0.038	0.78	0.67
T-109	SC/SS-NL--SST	0.63	0.068	0.043	0.69	0.56
T-110	SL-NL--SST	0.87	0.036	0.031	0.89	0.82
T-111	SL-NL--SST	0.95	0.077	0.073	0.89	0.84
T-112	SL-NL--SST	0.88	0.075	0.066	0.89	0.78
T-201	SL-NL--SST	0.84	0.073	0.061	0.89	0.75
T-202	SL-NL--SST	0.99	0.064	0.064	0.89	0.90
T-203	SL-NL--SST	0.97	0.064	0.062	0.89	0.87
T-204	SL-NL--SST	0.99	0.039	0.038	0.89	0.94
TX-101	SL-NL--SST	0.75	0.074	0.055	0.83	0.67
TX-102	SC/SS-NL--SST	0.78	0.068	0.053	0.86	0.70
TX-103	SC/SS-NL--SST	0.77	0.068	0.052	0.85	0.69
TX-104	MIX-NL--SST	0.65	0.077	0.051	0.73	0.58
TX-105	SC/SS-NL--SST	0.75	0.068	0.051	0.83	0.68
TX-106	SC/SS-NL--SST	0.77	0.068	0.053	0.85	0.69
TX-107	SC/SS-NL--SST	0.57	0.068	0.039	0.63	0.51
TX-108	SC/SS-NL--SST	0.77	0.068	0.052	0.85	0.69
TX-109	SL-NL--SST	0.82	0.074	0.060	0.89	0.73
TX-110	SC/SS-NL--SST	0.78	0.068	0.053	0.85	0.70
TX-111	SC/SS-NL--SST	0.78	0.068	0.053	0.86	0.70
TX-112	SC/SS-NL--SST	0.73	0.068	0.050	0.81	0.66
TX-113	MIX-NL--SST	0.81	0.053	0.043	0.88	0.75
TX-114	SC/SS-NL--SST	0.65	0.068	0.044	0.72	0.59
TX-115	SC/SS-NL--SST	0.76	0.068	0.052	0.84	0.68
TX-116	SC/SS-NL--SST	0.67	0.068	0.046	0.74	0.60
TX-117	SC/SS-NL--SST	0.66	0.068	0.045	0.73	0.59
TX-118	SC/SS-NL--SST	0.68	0.095	0.064	0.77	0.58
TY-101	MIX-NL--SST	0.64	0.053	0.034	0.69	0.59
TY-102	SC/SS-NL--SST	0.53	0.068	0.036	0.58	0.48
TY-103	SL-NL--SST	0.80	0.074	0.059	0.89	0.71
TY-104	SL-NL--SST	0.67	0.074	0.049	0.74	0.60

Table 5-6. Non-Convective Layer Porosity Distributions

Tank	Waste Type	Mean Porosity	Relative Error	Std Dev	Max	Min
TY-105	SL-NL--SST	0.75	0.074	0.055	0.83	0.67
TY-106	SL-NL--SST	0.84	0.074	0.062	0.89	0.75
U-101	SL-NL--SST	0.58	0.074	0.043	0.64	0.52
U-102	SC/SS-NL--SST	0.73	0.064	0.047	0.80	0.66
U-103	SC/SS-NL--SST	0.66	0.062	0.041	0.72	0.59
U-104	MIX-NL--SST	0.97	0.053	0.051	0.89	0.89
U-105	SC/SS-NL--SST	0.72	0.044	0.031	0.76	0.67
U-106	SC/SS-NL--SST	0.75	0.069	0.052	0.83	0.68
U-107	SC/SS-NL--SST	0.57	0.106	0.060	0.66	0.48
U-108	SC/SS-NL--SST	0.65	0.053	0.034	0.70	0.59
U-109	SC/SS-NL--SST	0.75	0.081	0.061	0.84	0.66
U-110	SL-NL--SST	0.62	0.074	0.046	0.69	0.55
U-111	SC/SS-NL--SST	0.74	0.068	0.050	0.81	0.66
U-112	SL-NL--SST	0.60	0.074	0.044	0.67	0.53
U-201	SL-NL--SST	0.72	0.139	0.100	0.87	0.57
U-202	SL-NL--SST	0.83	0.074	0.061	0.89	0.73
U-203	SL-NL--SST	0.77	0.254	0.195	0.89	0.47
U-204	SL-NL--SST	0.76	0.082	0.062	0.85	0.67

6.0 REFERENCES

Best Basis Inventory, [database accessed May 19, 2004], internet address: http://twins.pnl.gov:8001.

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RPP-5926, 2004, *Steady-State Flammable Gas Release Rate Calculation and Lower Flammability Level Evaluation for Hanford Tank Waste*, Rev. 4, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-6171, 2000, *Determination Of Waste Groupings For Safety Analyses*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

APPENDIX N

PEER REVIEW CHECKLIST

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APPENDIX N
PEER REVIEW CHECKLIST

CHECKLIST FOR TECHNICAL PEER REVIEW

Document Reviewed: RPP-10006, *Methodology and Calculation for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site*, Rev. 4.

Scope of Review (e.g., document section or portion of calculation): Review included the main body of the document and Appendices A, B, C, D, E, J, K, and M and includes all currently active spreadsheets associated with the document.

Yes	No	NA*	
[X]	[ ]	[ ]	1. Previous reviews are complete and cover the analysis, up to the scope of this review, with no gaps.
[X]	[ ]	[ ]	2. Problem is completely defined.
[ ]	[ ]	[X]	3. Accident scenarios are developed in a clear and logical manner.
[X]	[ ]	[ ]	4. Analytical and technical approaches and results are reasonable and appropriate. *(ORP QAPP criterion 2.8)*
[X]	[ ]	[ ]	5. Necessary assumptions are reasonable, explicitly stated, and supported. *(ORP QAPP criterion 2.2)*
[X]	[ ]	[ ]	6. Computer codes and data files are documented.
[X]	[ ]	[ ]	7. Data used in calculations are explicitly stated.
[X]	[ ]	[ ]	8. Bases for calculations, including assumptions and data, are consistent with the supported safety basis document (e.g., the Tank Farms Final Safety Analysis Report).
[X]	[ ]	[ ]	9. Data were checked for consistency with original source information as applicable. *(ORP QAPP criterion 2.9)*
[X]	[ ]	[ ]	10. For both qualitative and quantitative data, uncertainties are recognized and discussed, as appropriate. *(ORP QAPP criterion 2.17)*
[X]	[ ]	[ ]	11. Mathematical derivations were checked including dimensional consistency of results. *(ORP QAPP criterion 2.16)*
[X]	[ ]	[ ]	12. Models are appropriate and were used within their established range of validity or adequate justification was provided for use outside their established range of validity.
[X]	[ ]	[ ]	13. Spreadsheet results and all hand calculations were verified.
[X]	[ ]	[ ]	14. Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information. *(ORP QAPP criterion 2.5)*
[X]	[ ]	[ ]	15. Software input is correct and consistent with the document reviewed.
[X]	[ ]	[ ]	16. Software output is consistent with the input and with the results reported in the document reviewed.
[X]	[ ]	[ ]	17. Software verification and validation are addressed adequately. *(ORP QAPP criterion 2.6)*
[X]	[ ]	[ ]	18. Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references. *(ORP QAPP criterion 2.9)*
[ ]	[ ]	[X]	19. Safety margins are consistent with good engineering practices.
[X]	[ ]	[ ]	20. Conclusions are consistent with analytical results and applicable limits.

CHECKLIST FOR TECHNICAL PEER REVIEW

[X]	[ ]	[ ]	21. Results and conclusions address all points in the purpose. *(ORP QAPP criterion 2.3)*
[ ]	[ ]	[X]	22. All references cited in the text, figures, and tables are contained in the reference list.
[ ]	[ ]	[X]	23. Reference citations (e.g., title and number) are consistent between the text callout and the reference list.
[ ]	[ ]	[X]	24. Only released (i.e., not draft) references are cited. *(ORP QAPP criterion 2.1)*
[ ]	[ ]	[X]	25. Referenced documents are retrievable or otherwise available.
[ ]	[ ]	[X]	26. The most recent version of each reference is cited, as appropriate. *(ORP QAPP criterion 2.1)*
[ ]	[ ]	[X]	27. There are no duplicate citations in the reference list.
[ ]	[ ]	[X]	28. Referenced documents are spelled out (title and number) the first time they are cited.
[ ]	[ ]	[X]	29. All acronyms are spelled out the first time they are used.
[ ]	[ ]	[X]	30. The Table of Contents is correct.
[ ]	[ ]	[X]	31. All figure, table, and section callouts are correct.
[ ]	[ ]	[X]	32. Unit conversions are correct and consistent.
[ ]	[ ]	[X]	33. The number of significant digits is appropriate and consistent.
[ ]	[ ]	[X]	34. Chemical reactions are correct and balanced.
[ ]	[ ]	[X]	35. All tables are formatted consistently and are free of blank cells.
[ ]	[ ]	[X]	36. The document is complete (pages, attachments, and appendices) and in the proper order.
[ ]	[ ]	[X]	37. The document is free of typographical errors.
[ ]	[ ]	[X]	38. The tables are internally consistent.
[X]	[ ]	[ ]	39. The document was prepared in accordance with HNF-2353, Section 4.3, Attachment B, "Calculation Note Format and Preparation Instructions".
[X]	[ ]	[ ]	40. Impacted documents are appropriately identified in Blocks 7 and 25 of the Engineering Change Notice (form A-6003-563.1).
[X]	[ ]	[ ]	41. If more than one Technical Peer Reviewer was designated for this document, an overall review of the entire document was performed after resolution of all Technical Peer Review comments and confirmed that the document is self-consistent and complete.
[x]	[ ]	[ ]	**Concurrence**

D. C. Hedengren

D. C. Hedengren — 10/27/04

Reviewer (Printed Name and Signature) — Date

* If No or NA is chosen, provide an explanation on this form.

3 – No accident scenarios are addressed in this document

19 – Safety margins are not addressed. However, uncertainties are defined.

34 – No chemical reactions are used.

All other NAs were peer reviewed by Technical editor

CHECKLIST FOR TECHNICAL PEER REVIEW

Document Reviewed: RPP-10006 Rev. 4 Tech Edit

Scope of Review (e.g., document section or portion of calculation): Review included the main body of the document and Appendices A, B, C, D, E, J, K, and M and includes all currently active spreadsheets associated with the document.

Yes	No	NA*	
[ ]	[ ]	[X]	1. Previous reviews are complete and cover the analysis, up to the scope of this review, with no gaps.
[ ]	[ ]	[X]	2. Problem is completely defined.
[ ]	[ ]	[X]	3. Accident scenarios are developed in a clear and logical manner.
[ ]	[ ]	[X]	4. Analytical and technical approaches and results are reasonable and appropriate. *(ORP QAPP criterion 2.8)*
[ ]	[ ]	[X]	5. Necessary assumptions are reasonable, explicitly stated, and supported. *(ORP QAPP criterion 2.2)*
[ ]	[ ]	[X]	6. Computer codes and data files are documented.
[ ]	[ ]	[X]	7. Data used in calculations are explicitly stated.
[ ]	[ ]	[X]	8. Bases for calculations, including assumptions and data, are consistent with the supported safety basis document (e.g., the Tank Farms Final Safety Analysis Report).
[ ]	[ ]	[X]	9. Data were checked for consistency with original source information as applicable. *(ORP QAPP criterion 2.9)*
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[ ]	[ ]	[X]	11. Mathematical derivations were checked including dimensional consistency of results. *(ORP QAPP criterion 2.16)*
[ ]	[ ]	[X]	12. Models are appropriate and were used within their established range of validity or adequate justification was provided for use outside their established range of validity.
[ ]	[ ]	[X]	13. Spreadsheet results and all hand calculations were verified.
[ ]	[ ]	[X]	14. Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information. *(ORP QAPP criterion 2.5)*
[ ]	[ ]	[X]	15. Software input is correct and consistent with the document reviewed.
[ ]	[ ]	[X]	16. Software output is consistent with the input and with the results reported in the document reviewed.
[ ]	[ ]	[X]	17. Software verification and validation are addressed adequately. *(ORP QAPP criterion 2.6)*
[ ]	[ ]	[X]	18. Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references. *(ORP QAPP criterion 2.9)*
[ ]	[ ]	[X]	19. Safety margins are consistent with good engineering practices.
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CHECKLIST FOR TECHNICAL PEER REVIEW

[ ]	[ ]	[X]	21. Results and conclusions address all points in the purpose. *(ORP QAPP criterion 2.3)*
[X]	[ ]	[ ]	22. All references cited in the text, figures, and tables are contained in the reference list.
[X]	[ ]	[ ]	23. Reference citations (e.g., title and number) are consistent between the text callout and the reference list.
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[X]	[ ]	[ ]	38. The tables are internally consistent.
[X]	[ ]	[ ]	39. The document was prepared in accordance with HNF-2353, Section 4.3, Attachment B, "Calculation Note Format and Preparation Instructions".
[ ]	[ ]	[X]	40. Impacted documents are appropriately identified in Blocks 7 and 25 of the Engineering Change Notice (form A-6003-563.1).
[X]	[ ]	[ ]	41. If more than one Technical Peer Reviewer was designated for this document, an overall review of the entire document was performed after resolution of all Technical Peer Review comments and confirmed that the document is self-consistent and complete.
[x]	**[ ]**	**[ ]**	**Concurrence**

Leora Aamot [signature] — 10/27/04

Reviewer (Printed Name and Signature) — Date

* If No or NA is chosen, provide an explanation on this form.

Tech Edit.