

Calculation of Demonstration Bulk Vitrification System Melter Inleakage And Off-Gas Generation Rate

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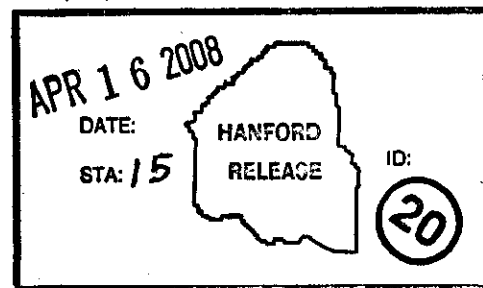
Key Words: DBVS, ICV inleakage, gas generation

Abstract: This calculation estimates the DBVS melter inleakage and gas generation rate based on test data. Inleakage is estimated before the melt was initiated, at one point during the melt, and at the end of the melt. Maximum gas generation rate is also estimated.

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CALCULATION OF DEMONSTRATION BULK VITRIFICATION SYSTEM MELTER INLEAKAGE AND OFF-GAS GENERATION RATE

T. H. May
CH2M-HILL Hanford Group, Inc.

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| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 11. Conclusions are consistent with analytical results and applicable limits. |
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M.W. Leonard *M.W. Leonard* 4/15/08
 Checker (printed name and signature)

Date

* No software was used in this calculation

** All checker comments have been dispositioned. The test data matches the calculations.

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APPENDIX

ICV FLOW AND TEMPERATURE DATA

LIST OF TERMS

| | |
|------|---|
| ACFM | Actual Cubic Feet per Minute |
| DBVS | Demonstration Bulk Vitrification System |
| ICV | In-Container Vitrification |
| OGTS | Off-Gas Treatment System |
| RPP | River Protection Project |
| SCFM | Standard Cubic Feet per Minute |
| SVF | Spreadsheet Verification Form |

TITLE: CALCULATION OF DEMONSTRATION BULK VITRIFICATION SYSTEM MELTER INLEAKAGE AND OFF-GAS GENERATION RATE**ORIGINATOR: T.H. MAY****T.H.M.****DATE: 4/15/08****CHECKER: M.W. LEONARD****M.W.L.****DATE: 4/15/08****ORGANIZATIONAL MANAGER: D.H. SHUFORD****DATE: 4/15/08**

1.0 OBJECTIVE

The River Protection Project (RPP) mission is to safely store, retrieve, treat, immobilize, and dispose of the Hanford Site tank waste. The Demonstration Bulk Vitrification System (DBVS) is a research and development project whose objective is to demonstrate the suitability of Bulk Vitrification treatment technology waste form for disposing of low-activity waste from the Tank Farms.

The objective of this calculation is to determine the DBVS melter inleakage and off-gas generation rate based on full scale testing data from 38D.

2.0 SUMMARY OF RESULTS AND CONCLUSIONS

| | | scfm | | inches water |
|----------------------------------|---|------|---|--------------|
| ICV inleakage before melt | = | 250 | @ | -2.9 |
| ICV inleakage during melt | = | 150 | @ | -1.5 |
| ICV inleakage post melt | = | 140 | @ | -2.0 |
| ICV peak off-gas generation rate | = | 290 | @ | -3.0 |

3.0 BACKGROUND

The Demonstration Bulk Vitrification System is a treatment technology that is currently being used domestically and internationally for radioactive, hazardous, and mixed waste treatment. Bulk Vitrification can be conducted in large containers (e.g., 20 to 30 cubic meters) resulting in waste forms with small surface area to volume ratio, and thereby minimizing the potential for waste form leaching. The melter used to vitrify the waste is also the waste container and is, therefore, disposed with the waste upon completion of treatment.

Bulk Vitrification is performed by mixing the waste with glass-forming materials of appropriate chemical composition in the process vessel. Vitrification is achieved by inserting electrodes into the process vessel and applying electrical power. Additional waste handling considerations are obviated by using the process vessel as the immobilized waste form disposal container.

Full scale testing was performed in 2007 to demonstrate the technology and to determine design inputs such as melter inleakage and off-gas generation rate.

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Input data used in the calculation was collected during a full scale test called the Integrated Dryer Melt Test also called the 38D test. Off-gas data was recorded by a subcontractor and quoted in the calculation below. Excerpts from the data are attached in Appendix A.

Flow, temperature, and pressure data collected early in the melt is considered to be valid. Later in the melt, instrumentation down stream of the ICV was exposed to dirty and corrosive gases which may have compromised data quality. To ensure validity of the data, where possible, different instrument readings were correlated such as box ICV vacuum and ICV inleakage.

The following input data was used in the calculations.

One 60% dryer batch (initial charge to ICV) = 9776 pounds SVF-1319

One 20% dryer batch = 3331 pounds SVF-1319

One 20% dryer batched contains 231 pounds cellulose SVF-1319

One 20% dryer batch contains 1135# dry simulant SVF-1319

0.85 # nitrates/nitrites / # dry simulant SVF-1319

Sufficient cellulose added to react with 75% of the nitrates/nitrites SVF-1319

1 pound mole of gas at Standard Pressure and Temperature = 378 standard ft³ at 60 °F

5.0 ASSUMPTIONS

Cellulose reaction: $2C_6H_{10}O_5 + 8NO_3 \Rightarrow 4N_2 + 12CO_2 + 10H_2O$

Moles of gas generated per mole of cellulose = $26 / 2 = 13$ moles

6.0 METHOD OF ANALYSIS

Hand calculations were performed to estimate ICV inleakage and off-gas generation rates. Inleakage was estimated before the melt was initiated, at one point during the melt,

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and at the end of the melt. Maximum off-gas generation rates were calculated during the initial phases of the melt when there was the greatest quantity of reactant in the ICV.

6.1 INLEAKAGE CALCULATION BEFORE THE MELT

Input data from AMEC log book data from 8/7/07 (see Appendix):

ICV Off-Gas Treatment System (OGTS) was balanced at 10:30

Inlet valve (V-029) was 40% open

S1 (ICV inlet air flow) = 180 acfm

ICV Vacuum was -2.9" water

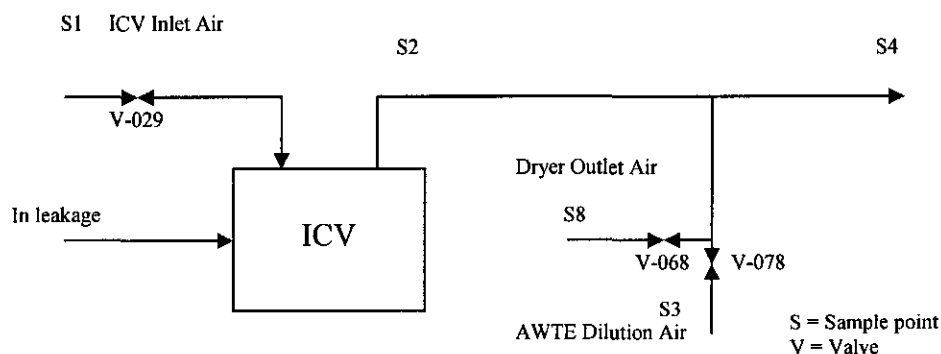
S2 (ICV outlet air flow) = 430 acfm

S3 (see below) = 500 acfm

Inlet valve (V-068) was 20% open

Inlet valve (V-078) was 20% open

S4 (see Figure 6-1 below) = 1280 acfm

6-1 SIMPLIFIED IDMT ICV OGTS FLOWSHEET**Calculate Inleakage**

$$S2 - S1 = 430 - 180 = 250 \text{ scfm (acfm and scfm are equal at time of balancing)}$$

6.2 INLEAKAGE CALCULATION AT ONE POINT DURING THE MELT**IDMT Data:**

From 8:09 to 8:39 on 8/14/07 1838# dried product was transferred to the melter at 3% moisture

TRC Data (see Appendix):

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From 8:40 to 8:50 on 8/14/07 S1 (ICV Inlet air) = 11 acfm

From 8:40 to 8:50 on 8/14/07 S2 (ICV Outlet air) = 300 acfm at 183 °F

At 9:11 on 8/14/07 S2 (ICV Outlet air) = 358 acfm at 209 °F (peak)

From 8:40 to 8:50 on 8/14/07 S3 (AWTE dilution air) = 340 acfm at 72 °F

From 8:40 to 8:50 on 8/14/07, the flow at S8 was 0 acfm.

From 8:40 to 8:50 on 8/14/07 S4 (ICV Outlet plus AWTE Dilution air) = 670 acfm

ICV Outlet plus AWTE dilution air temperature is not available but is calculated as a mass weighted temperature average as follows:

$$((358 \times (60 + 459) / (209 + 459)) \times 209 + 340 \times 72) / ((358 \times (60 + 459) / (209 + 459) + 340) = 134 \text{ °F}$$

Check flow sum for S2, S3, S8, and S4 to Validate Flow Measurement

$$S2 \quad 300 \text{ acfm} \times (60 + 459) / (183 + 459) = 240 \text{ scfm}$$

$$S3 \quad 340 \text{ acfm} \times (60 + 459) / (72 + 459) = 330 \text{ scfm}$$

$$S8 \quad 0 \text{ acfm} = 0$$

$$\text{Sum} = 570 \text{ scfm}$$

$$S4 \quad 670 \text{ acfm} \times (60 + 459) / (134 + 459) = 590 \text{ scfm}$$

This is a good match and indicates valid flow measurement

Calculate Steam generation:

$$1838 \text{ \# dried product} \times 3 \text{ wt\% moisture} = 55 \text{ \# water}$$

$$55 \text{ \# water} / 18 \text{ \#/mole} \times 378 \text{ scf/mole} = 1160 \text{ scf}$$

Calculate theoretical gas evolution:

1838 \# dried product \times 231 \# cellulose per 20% batch / 3331 \# dried product per 20% batch = 127 \# cellulose (see table "IDMT DRYER TO ICV TRANSFER DATA" contained in appendix)

$$127 \text{ \#cellulose} / 162 \text{ \#/mole} \times 13 \text{ \#moles gas/mole} \times 378 \text{ ft}^3 \text{ /mole gas} = 3870 \text{ scf}$$

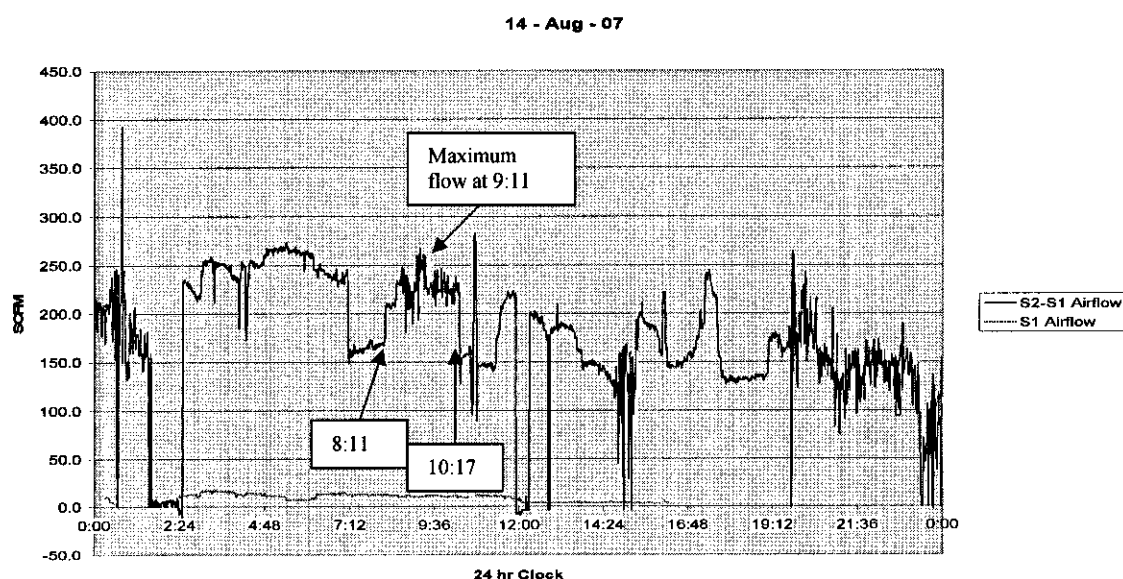
$$1838 \text{ \# dried product} \times (1135 \text{ \# simulant solids} / 3331 \text{ \# dried product}) \times 0.85 \text{ \# nitrates/nitrites per \# simulant solids} \times 0.25 \text{ fraction unreacted nitrates/nitrites} / 46 \text{ \#/mole} \times 378 \text{ scf/mole} = 1090 \text{ scf from unreacted nitrates/nitrites.}$$

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$$1160 \text{ scf} + 3870 \text{ scf} + 1090 = 6120 \text{ scf}$$

Off-Gas Evolution Duration

At 8:40 on 8/14/07, 3525 # dried product was added to melt. Assume that gas evolution begins at 8:40 and continues until ICV outlet flow (minus ICV inlet flow) drops back to the same flow rate as the flow rate at 8:40. From Figure 6-2 below, the flow rate drops back to the same flow at 10:17. This duration is 1 hour and 37 minutes.

6-2 ICV INLET AND MELT GAS PLUS INLEAKAGE FLOW 8/14/07**Calculate Off-Gas Evolution Rate on 8/14/07**

$$6120 \text{ scf} \times (3525 \text{ # dried product} / 1838 \text{ # dried product}) / 97 \text{ min} = 121 \text{ scfm}$$

Calculate Nominal Difference between ICV inlet flow and outlet flow

$$S2 - S1 = 240 \text{ scfm} - 11 \text{ scfm} = 230 \text{ scfm}$$

Calculate Nominal Inleakage

$$230 \text{ scfm} - 121 \text{ scfm} = 109 \text{ scfm} \implies \text{round up to 110 scfm nominal}$$

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INLEAKAGE AND OFF-GAS GENERATION RATE**

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 ORGANIZATIONAL MANAGER: D.H. SHUFORD

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Calculate Peak Difference between ICV inlet flow and outlet flow

$$S2 - S1 = 358 \text{ acfm} \times (60 + 459) / (209 + 459) - 11 \text{ scfm} = 270 \text{ scfm}$$

Calculate Peak Inleakage

$$270 \text{ scfm} - 121 \text{ scfm} = 150 \text{ scfm} @ -1.5 \text{ "water}$$

Peak inleakage on 8/14/07 is lower than that measured during the pre-melt HVAC balancing because the vacuum is only -1.5 "water versus the pre-melt vacuum of -2.9" water.

6.3 INLEAKAGE CALCULATION AT THE END OF THE MELT

Feed while melt was terminated at 4:16 and power was turned off to the melt at 6:17 on 8/17/07. Four hours later, the melt gas generation rate is near zero. TRC data available at 10:37 on 8/17/07 indicates an S2 flow rate of 311.9 acfm at 444.7 °F and an S1 flow rate of 38 acfm at 76.2 °F.

$$S2 \text{ flow} = 311.9 \times (60 + 459) / (444.7 + 459) = 179 \text{ scfm}$$

$$S1 \text{ flow} = 38 \times (60 + 459) / (76.2 + 459) = 37 \text{ scfm}$$

$$\text{Difference (inleakage)} = 140 \text{ scfm} @ -2.0 \text{ "water}$$

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CHECKER: M.W. LEONARD

M.W.L.

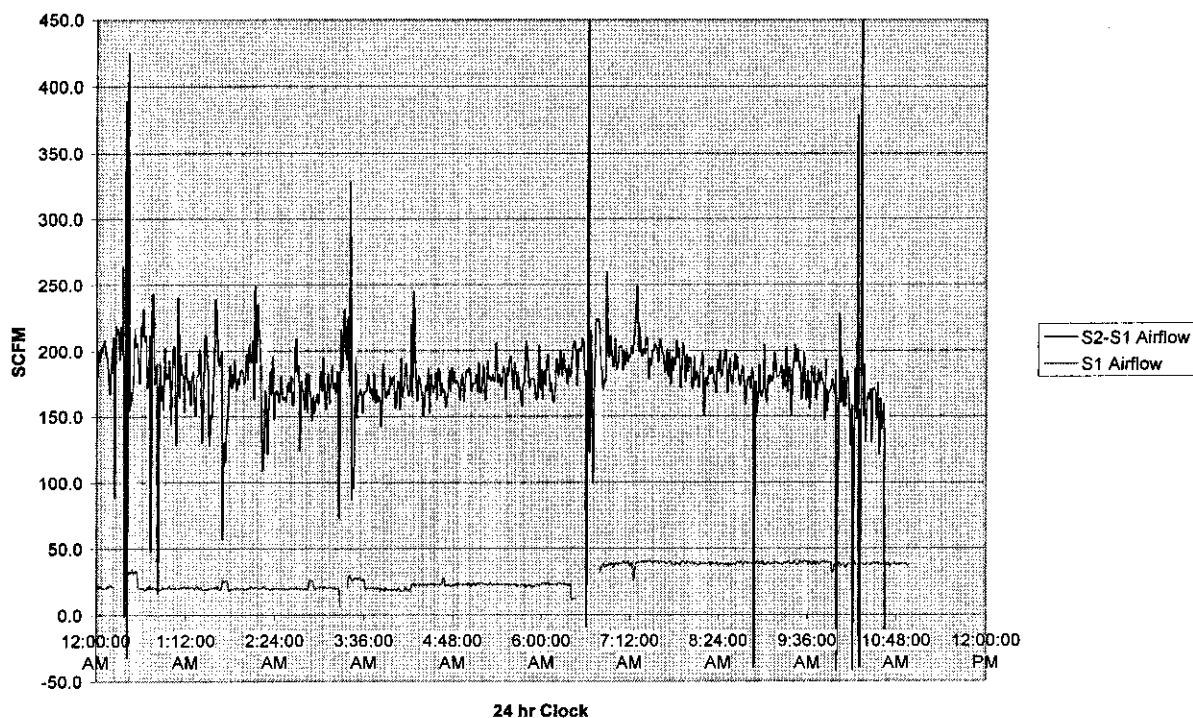
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ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08

6-3 ICV INLET AND MELT GAS PLUS INLEAKAGE FLOW 8/17/07

17 - Aug - 07



6.4 CALCULATE MAXIMUM OFF-GAS GENERATION RATE

The maximum off-gas generation rate occurred during startup of the melt when 9776 # of dried product was contained in the ICV (SVF-1319). As melt off-gas generation rate increased, the box negative pressure decayed to less than -1" water gage at 18:06. As can be seen from the graph of 8/8/07 data below, at 18:06 the ICV air inlet dropped to 0 acfm. This may have been caused by an instrument failure or if the ICV inlet air valve was closed in order to preserve vacuum during the peak generation rate. The ICV off-gas exhaust line was not occluded at this time. Off-Gas generation rates are calculated below for three time periods.

The ICV outlet flow rate (S2) peaked at approximately 16:37 at 847 acfm at 235 °F. S1 flow rate at 16:37 was reported as 160 acfm. Hood vacuum at 16:37 was -2.2" water which is assumed to result in 250 scfm air inleakage similar to the value calculated in section 6.1.

The ICV outlet flow rate (S2) at approximately 22:47 was 823 acfm at 248 °F. S1 flow rate at 22:47 was reported as 0 acfm but this appears to be an instrument problem. It was

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assumed that the S1 flow rate was actually 70 cfm. Hood vacuum at 22:47 was -3.0" water which is assumed to result in 250 scfm air inleakage similar to the value calculated in section 6.1.

The ICV outlet flow rate (S2) at approximately 22:14 was 790 acfm at 216 °F. S1 flow rate at 22:14 was reported as 0 acfm but this appears to be an instrument problem. It was assumed that the S1 flow rate was actually 70 cfm. Hood vacuum at 22:14 was -3.0" water which is assumed to result in 250 scfm air inleakage similar to the value calculated in section 6.1.

Calculate Off-Gas Generation Rate for 16:37

$$847 \text{ acfm} \times (60 + 459) / (235 + 459) = 633 \text{ scfm S2 flow}$$

$$633 \text{ scfm S2 flow} - 160 \text{ scfm S1 flow} = 473 \text{ scfm S2-S1 flow}$$

$$473 \text{ scfm} - 250 \text{ scfm air inleakage} = 223 \text{ scfm off-gas generation rate}$$

Calculate Off-Gas Generation Rate for 22:47

$$823 \text{ acfm} \times (60 + 459) / (248 + 459) = 604 \text{ scfm S2 flow}$$

$$604 \text{ scfm S2 flow} - 70 \text{ scfm S1 flow} = 534 \text{ scfm S2-S1 flow}$$

$$534 \text{ scfm} - 250 \text{ scfm air inleakage} = 284 \text{ scfm off-gas generation rate}$$

Calculate Off-Gas Generation Rate for 22:14

$$790 \text{ acfm} \times (60 + 459) / (215 + 459) = 607 \text{ scfm S2 flow}$$

$$607 \text{ scfm S2 flow} - 70 \text{ scfm S1 flow} = 537 \text{ scfm S2-S1 flow}$$

$$537 \text{ scfm} - 250 \text{ scfm air inleakage} = 287 \text{ scfm off-gas generation rate}$$

Maximum Off-Gas Generation Rate

Round 287 scfm up to 290 scfm

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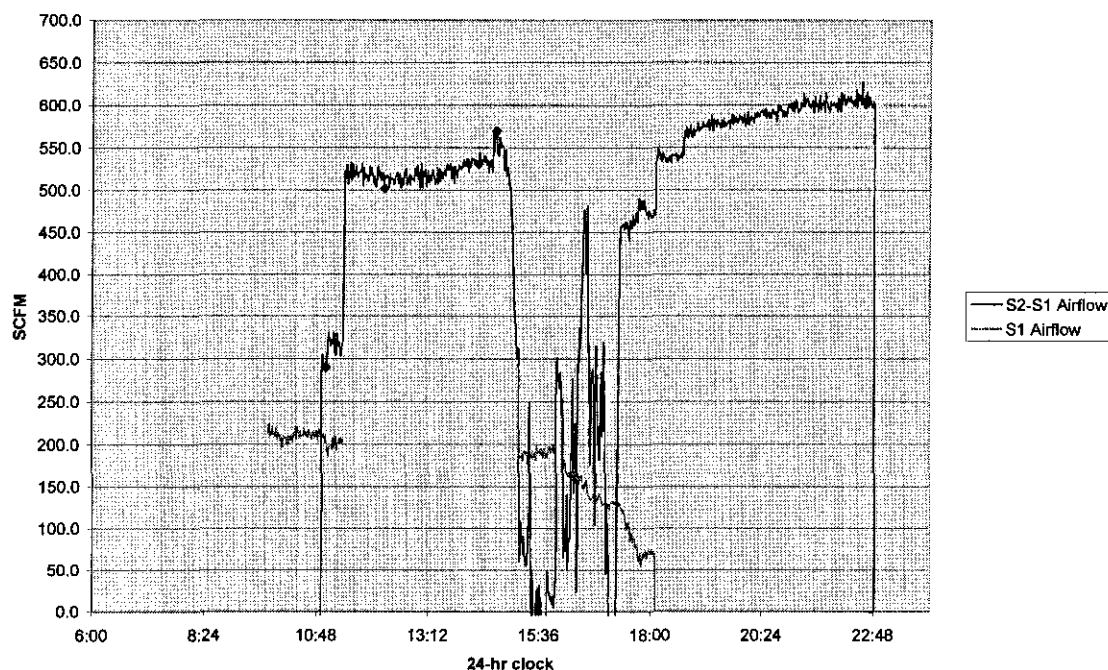
DATE: 4/15/08

ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08

6-4 ICV INLET AND MELT GAS PLUS INLEAKAGE FLOW 8/8/07

8 - Aug - 07



7.0 USE OF COMPUTER SOFTWARE

No computer software was used in this calculation.

8.0 RESULTS

| | | scfm | | inches water |
|----------------------------------|---|------|---|--------------|
| ICV inleakage before melt | = | 250 | @ | -2.9 |
| ICV inleakage during melt | = | 150 | @ | -1.5 |
| ICV inleakage post melt | = | 140 | @ | -2.0 |
| ICV peak off-gas generation rate | = | 290 | @ | -3.0 |

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These results will provide input to DBVS design calculations. There are no conclusions from this calculation.

10.0 REFERENCES

SVF-1319, "*DBVS 38D Recipe*", Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington

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APPENDIX A

ICV FLOW AND TEMPERATURE DATA

THM

DATE: 4/15/08

new

DATE: 4/15/08

Date. 07 August 2007

Start Time: 0745

Operator Staff: KW, PW, TB, ER, GL, TEC, JM, TD

Circle One:

SMF Only / **BH Only** / **BH in Series with SMF**

| Box Inlet | | Plenum | Box Outlet | | Prime Dilut | | Pre SMF Filtr | SMF | Sub. Out | Prim HEPA | N2x Scrub. | BAU Dilution | Backup Filter | Vermin Scrubers | BRT Dilution | Backhaus | BH Dilution | Notes | |
|-----------|--------|----------|------------|------|-------------|---------|---------------|----------|----------|------------|------------|--------------|---------------|-----------------|--------------|----------|-------------|-------|---|
| PK-101 | PK-101 | DPIT-001 | SP2 | SP3 | V-Chk | V-Gra | GEM | DPIT-002 | FM-006 | DPIT-004/5 | PF-124 | SP7 | HV-012 | DP-1203 | DPIT-201 | V-005 | DPIT-003 | | SP8 |
| % Open | ACFM | Inch W/C | ACFM | ACFM | % Open | % Clean | ACFM | Inch W/C | % Output | Inch W/C | Inch W/C | ACFM | % Open | W/C | % Output | % Open | Inch W/C | ACFM | |
| | | | | | 20 | | | | 49.8 | | 15 | 1356 | 20 | 435 | 60 | | | | 1. Check for air flow on all lines. 2. Check for any leaks in the system. 3. Check for any blockages in the lines. 4. Check for any unusual noises or vibrations. 5. Check for any unusual odors or tastes. 6. Check for any unusual colors or textures. 7. Check for any unusual temperatures. 8. Check for any unusual pressures. 9. Check for any unusual flow rates. 10. Check for any unusual levels. 11. Check for any unusual times. 12. Check for any unusual dates. 13. Check for any unusual times of day. 14. Check for any unusual days of the week. 15. Check for any unusual months of the year. 16. Check for any unusual years. 17. Check for any unusual centuries. 18. Check for any unusual millennia. 19. Check for any unusual eons. 20. Check for any unusual eras. 21. Check for any unusual epochs. 22. Check for any unusual periods. 23. Check for any unusual ages. 24. Check for any unusual stages. 25. 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Check for any unusual videos. 923. Check for any unusual recordings. 924. Check for any unusual documents. 925. Check for any unusual books. 926. Check for any unusual papers. 927. Check for any unusual letters. 928. Check for any unusual words. 929. Check for any unusual sentences. 930. Check for any unusual paragraphs. 931. Check for any unusual pages. 932. Check for any unusual chapters. 933. Check for any unusual volumes. 934. Check for any unusual series. 935. Check for any unusual collections. 936. Check for any unusual sets. 937. Check for any unusual groups. 938. Check for any unusual teams. 939. Check for any unusual organizations. 940. Check for any unusual institutions. 941. Check for any unusual associations. 942. Check for any unusual societies. 943. Check for any unusual clubs. 944. Check for any unusual groups of people. 945. Check for any unusual communities. 946. Check for any unusual neighborhoods. 947. Check for any unusual towns. 948. Check for any unusual cities. 949. Check for any unusual states. 950. Check for any unusual countries. 951. Check for any unusual continents. 952. Check for any unusual planets. 953. Check for any unusual galaxies. 954. Check for any unusual universes. 955. Check for any unusual realities. 956. Check for any unusual dimensions. 957. Check for any unusual spaces. 958. Check for any unusual times. 959. Check for any unusual durations. 960. Check for any unusual periods of time. 961. Check for any unusual intervals. 962. Check for any unusual gaps. 963. Check for any unusual pauses. 964. Check for any unusual stops. 965. Check for any unusual breaks. 966. Check for any unusual interruptions. 967. Check for any unusual delays. 968. Check for any unusual setbacks. 969. Check for any unusual reversals. 970. Check for any unusual turn of events. 971. Check for any unusual twists of fate. 972. Check for any unusual coincidences. 97 |

TITLE: CALCULATION OF DEMONSTRATION BULK VITRIFICATION SYSTEM MELTER INLEAKAGE AND OFF-GAS GENERATION RATE

ORIGINATOR: T.H. MAY *THM*
CHECKER: M.W. LEONARD *MWL*
ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08

DATE: 4/15/08

DATE: 4/15/08

| TRC DATA | | | | | | | | | | | | |
|-------------------|--------------------|-------------------|------|-------------------|--------------------|-------------------|-------------------|---------|---------|-------------------|---------|------|
| Unit 38D - Site 1 | | | | Unit 38D - Site 2 | | | Unit 38D - Site 3 | | | Unit 38D - Site 4 | | |
| Stack Temp | Stack Gas Velocity | Stack Gas Airflow | Time | Stack Temp | Stack Gas Velocity | Stack Gas Airflow | Inlet Gas Temp | Airflow | Airflow | Inlet Gas Temp | Airflow | |
| August 14, 2007 | | | | | | | | | | | | |
| (° F) | (fm) | (acfm) | time | (° F) | (ft/sec) | (acfm) | (° F) | (fpm) | (acfm) | (° F) | (acfm) | time |
| 75.8 | 53.63 | 10.5 | 8:40 | 181.40 | 38.84 | 317.77 | 71 | 1240.0 | 243.5 | | 561.2 | 8:40 |
| 75.4 | 53.63 | 10.5 | 8:41 | 181.70 | 38.98 | 318.87 | 71 | 2238.0 | 439.4 | | 758.3 | 8:41 |
| 75.5 | 52.09 | 10.2 | 8:42 | 181.84 | 34.90 | 285.53 | 71.36 | 2252.0 | 442.2 | | 727.7 | 8:42 |
| 76.0 | 51.32 | 10.1 | 8:43 | 182.11 | 38.62 | 315.93 | 71 | 2201.0 | 432.2 | | 748.1 | 8:43 |
| 76.2 | 52.09 | 10.2 | 8:44 | 182.51 | 36.00 | 294.52 | 71.36 | 2130.0 | 418.2 | | 712.7 | 8:44 |
| 76.0 | 51.7 | 10.2 | 8:45 | 182.75 | 35.85 | 293.34 | 72.08 | 2242.0 | 440.2 | | 733.6 | 8:45 |
| 76.3 | 50.93 | 10.0 | 8:46 | 182.94 | 37.55 | 307.18 | 71 | | 0.0 | | 307.2 | 8:46 |
| 76.2 | 50.93 | 10.0 | 8:47 | 183.37 | 28.88 | 236.24 | 72.08 | 2130.0 | 418.2 | | 654.5 | 8:47 |
| 76.3 | 59.42 | 11.7 | 8:48 | 183.81 | 33.82 | 276.68 | 71.72 | 2163.0 | 424.7 | | 701.4 | 8:48 |
| 76.5 | 60.58 | 11.9 | 8:49 | 184.53 | 38.07 | 311.49 | 72.8 | 2157.0 | 423.5 | | 735.0 | 8:49 |
| 76.7 | 59.8 | 11.7 | 8:50 | 185.27 | 35.23 | 288.24 | 72.8 | 2285.0 | 448.7 | | 736.9 | 8:50 |
| 76.9 | 59.42 | 11.7 | 8:51 | 186.25 | 37.58 | 307.46 | 72.8 | 2157.0 | 423.5 | | 731.0 | 8:51 |
| 77.1 | 59.03 | 11.6 | 8:52 | 187.22 | 32.80 | 268.32 | 73.5 | 2075.0 | 407.4 | | 675.7 | 8:52 |
| 77.3 | 57.1 | 11.2 | 8:53 | 188.01 | 36.72 | 300.41 | 73.5 | 2023.0 | 397.2 | | 697.6 | 8:53 |
| 77.7 | 55.95 | 11.0 | 8:54 | 188.87 | 34.43 | 281.72 | 72.8 | 2141.0 | 420.4 | | 702.1 | 8:54 |
| 77.8 | 54.79 | 10.8 | 8:55 | 189.84 | 33.10 | 270.82 | 72.44 | 2185.0 | 429.0 | | 699.8 | 8:55 |
| 77.8 | 53.24 | 10.5 | 8:56 | 190.89 | 35.29 | 288.68 | 73.14 | 2315.0 | 454.5 | | 743.2 | 8:56 |
| 77.9 | 51.7 | 10.2 | 8:57 | 192.05 | 35.70 | 292.07 | 73.5 | 1913.0 | 375.6 | | 667.7 | 8:57 |
| 78.1 | 51.7 | 10.2 | 8:58 | 193.58 | 31.28 | 255.92 | 72.8 | 1925.0 | 378.0 | | 633.9 | 8:58 |
| 78.6 | 51.7 | 10.2 | 8:59 | 194.85 | 30.78 | 251.78 | 73.86 | 1941.0 | 381.1 | | 632.9 | 8:59 |
| 78.9 | 48.61 | 9.5 | 9:00 | 196.00 | 35.38 | 289.44 | 73.5 | 1799.0 | 353.2 | | 642.7 | 9:00 |
| 79.4 | 48.61 | 9.5 | 9:01 | 197.63 | 37.48 | 306.66 | 73.14 | 1805.0 | 354.4 | | 661.1 | 9:01 |
| 79.2 | 54.02 | 10.6 | 9:02 | 199.07 | 36.16 | 295.82 | 74.22 | 1958.0 | 384.5 | | 680.3 | 9:02 |

ORIGINATOR: T.H. MAY THM
CHECKER: M.W. LEONARD MWL
ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08

August 17, 2007

TITLE: CALCULATION OF DEMONSTRATION BULK VITRIFICATION SYSTEM MELTER INLEAKAGE AND OFF-GAS GENERATION RATE

ORIGINATOR: T.H. MAY THM
 CHECKER: M.W. LEONARD MWL
 ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08

DATE: 4/15/08

DATE: 4/15/08

| TRC DATA | | | | | | | | | | | | |
|-------------------|--------------------|-------------------|-------|-------------------|--------------------|-------------------|-------------------|---------|---------|-------------------|---------|--|
| Unit 38D - Site 1 | | | | Unit 38D - Site 2 | | | Unit 38D - Site 3 | | | Unit 38D - Site 4 | | |
| Stack Temp | Stack Gas Velocity | Stack Gas Airflow | Time | Stack Temp | Stack Gas Velocity | Stack Gas Airflow | Inlet Gas Temp | Airflow | Airflow | Inlet Gas Temp | Airflow | |
| August 8, 2007 | | | | | | | | | | | | |
| Unit 38D - Site 1 | | | | Unit 38D - Site 2 | | | | | | | | |
| | 753.9 | 148.0 | 16:31 | 228.2 | 90.8 | 742.7 | | | | | | |
| | 778.5 | 152.9 | 16:32 | 229.5 | 99.0 | 809.7 | | | | | | |
| | 744.7 | 146.2 | 16:33 | 230.8 | 101.1 | 827.3 | | | | | | |
| | 784.6 | 154.1 | 16:34 | 229.4 | 100.7 | 823.8 | | | | | | |
| | 766.2 | 150.4 | 16:35 | 230.4 | 94.8 | 775.6 | | | | | | |
| | 803 | 157.7 | 16:36 | 233.8 | 91.3 | 747.3 | | | | | | |
| | 773.9 | 152.0 | 16:37 | 235.1 | 103.5 | 846.5 | | | | | | |
| | 715.5 | 140.5 | 16:38 | 237.6 | 86.9 | 711.1 | | | | | | |
| | 706.3 | 138.7 | 16:39 | 235.5 | 73.2 | 598.7 | | | | | | |
| | 698.6 | 137.2 | 16:40 | 235.6 | 73.7 | 602.7 | | | | | | |
| | | | | | | | | | | | | |
| | | | 22:13 | 214.4 | 96.9 | 792.5 | | | | | | |
| | | | 22:14 | 215.5 | 96.6 | 790.2 | | | | | | |
| | | | 22:15 | 216.8 | 96.3 | 788.1 | | | | | | |
| | | | 22:16 | 218.8 | 96.5 | 789.2 | | | | | | |
| | | | 22:17 | 219.0 | 97.5 | 797.9 | | | | | | |
| | | | 22:18 | 220.6 | 96.6 | 790.3 | | | | | | |
| | | | 22:19 | 220.8 | 97.0 | 793.3 | | | | | | |
| | | | 22:20 | 221.1 | 95.9 | 784.9 | | | | | | |
| | | | 22:21 | 221.1 | 97.0 | 793.5 | | | | | | |
| | | | 22:22 | 220.9 | 95.9 | 784.7 | | | | | | |
| | | | | | | | | | | | | |
| | | | 22:39 | 236.2 | 100.8 | 825.0 | | | | | | |
| | | | 22:40 | 238.6 | 98.2 | 803.6 | | | | | | |

TITLE: CALCULATION OF DEMONSTRATION BULK VITRIFICATION SYSTEM MELTER INLEAKAGE AND OFF-GAS GENERATION RATE

ORIGINATOR: T.H. MAY *THM*

DATE: 4/15/08

CHECKER: M.W. LEONARD *MWL*

DATE: 4/15/08

ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08

| TRC DATA | | | | | | | | | | | | |
|-------------------|--------------------|-------------------|-------|-------------------|--------------------|-------------------|-------------------|---------|---------|-------------------|---------|--|
| Unit 38D - Site 1 | | | | Unit 38D - Site 2 | | | Unit 38D - Site 3 | | | Unit 38D - Site 4 | | |
| Stack Temp | Stack Gas Velocity | Stack Gas Airflow | Time | Stack Temp | Stack Gas Velocity | Stack Gas Airflow | Inlet Gas Temp | Airflow | Airflow | Inlet Gas Temp | Airflow | |
| | | | 22:41 | 241.0 | 99.5 | 813.7 | | | | | | |
| | | | 22:42 | 241.5 | 100.5 | 822.5 | | | | | | |
| | | | 22:43 | 241.4 | 100.2 | 819.6 | | | | | | |
| | | | 22:44 | 241.8 | 98.8 | 808.4 | | | | | | |
| | | | 22:45 | 242.7 | 98.9 | 808.9 | | | | | | |
| | | | 22:46 | 244.5 | 99.0 | 810.0 | | | | | | |
| | | | 22:47 | 247.8 | 100.6 | 823.3 | | | | | | |
| | | | 22:48 | 248.3 | 98.9 | 809.2 | | | | | | |

IDMT DRYER TO ICV TRANSFER DATA

| DATE/TIME | DRYER LOAD CELL WEIGHT | UNITS | NOTES | DRYER RPM | ROTARY VALVE RPM |
|---------------|------------------------|-------|-------------------|-----------|------------------|
| | 58370 | # | end simulant feed | | |
| 8/14/07 4:09 | 60900 | # | open AOV-013 | 30 | 15 |
| 8/14/07 4:19 | 60200 | # | close AOV-013 | | |
| delta | 700 | # | | | |
| divided by .8 | 875 | # | | | |
| | | # | end simulant feed | | |
| 8/14/07 4:25 | 60100 | # | open AOV-013 | 30 | 15 |
| 8/14/07 4:35 | 59450 | # | close AOV-013 | | |
| delta | 650 | # | | | |

TITLE: CALCULATION OF DEMONSTRATION BULK VITRIFICATION SYSTEM MELTER INLEAKAGE AND OFF-GAS GENERATION RATE

ORIGINATOR: T.H. MAY *THM*
 CHECKER: M.W. LEONARD *MWL*
 ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08DATE: 4/15/08DATE: 4/15/08

divided by .8 813 #

end simulant feed

8/14/07 8:09 58770

open AOV-013 30 14

8/14/07 8:21 58000

close AOV-013

delta 770 #

divided by .8 963 #

end simulant feed

8/14/07 8:25 57950

open AOV-013 30 13

8/14/07 8:38 57250

close AOV-013

delta 700 #

divided by .8 875 #

Total # 3525 #

Added batch 6-2 to melter

TITLE: CALCULATION OF DEMONSTRATION BULK VITRIFICATION SYSTEM MELTER INLEAKAGE AND OFF-GAS GENERATION RATE

ORIGINATOR: T.H. MAY T4M
CHECKER: M.W. LEONARD MWL
ORGANIZATIONAL MANAGER: D.H. SHUFORD

DATE: 4/15/08

DATE: 4/15/08

DATE: 4/15/08

