BSC	**Design Calculation or Analysis Cover Sheet** *Complete only applicable items.*	1. QA: QA 2. Page: 1 of 33

3. System Subsurface Ventilation System	4. Document Identifier 800-KVC-VUE0-00700-000-00A
5. Title Preclosure Emplacement Drift Temperature Calculation for the 2.0 kW/m Thermal Load	
6. Group Subsurface Project / Mining / Ventilation	
7. Document Status Designation ☐ Preliminary ☒ Committed ☐ Confirmed ☐ Cancelled/Superseded	
8. Notes/Comments **This document has color figures** E. Thomas checked the documentation part of this calculation, and H. Chen checked the electronic spreadsheet calculations (Attachment II)	

Attachments	Total Number of Pages
Attachment I. Results of Emplacement Drift Temperatures at 2.0 kW/m Line Load	10
Attachment II. Spreadsheets for Analytical Calculation of Emplacement Drift Ventilation	1

RECORD OF REVISIONS

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DISCLAIMER

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ACRONYMS

BSC	Bechtel SAIC Company, LLC
BOD	Basic of Design
IED	Interface Exchange Drawings
LA	License Application
PDC	Project Design Criteria
QA	Quality Assurance
WP	Waste Package

ABBREVIATIONS AND CONVERSIONS

ºC	degree Celsius
ft	length, feet (1 foot = 0.3048 m)
m	length, meters (1 m = 3.2808 ft)
m^3/s	cubic meters per second (1 m^3/s = 2119 ft^3/min)
s	time, second
W	Watt (J/s)

1. PURPOSE

The purpose of this calculation is to determine the temperatures of drift wall, waste package (WP) surface, and ventilation air in an emplacement drift during the repository preclosure ventilation.

The scope of this calculation includes analysis of the preclosure temperatures for emplacement drifts loaded with waste packages for an equivalent thermal load of 2.0 kW per linear meter (kW/m) of drift length. The calculation uses both 600-meter and 800-meter long emplacement drifts, and ventilation duration of 100 years. The objective of this calculation is to provide profiles of temperature variation *within* the emplacement drift and the efficiency of heat removal by ventilation flow rate of 15 cubic meters per second (m^3/s). This calculation is *not* intended to perform a comprehensive modeling of the thermal responses in the repository.

The output of this calculation are tabulated data and plots the temperatures of drift wall, waste package surface, and ventilation air in an emplacement drift as function of ventilation time and locations along the emplacement drift axis. The results can be used to assist the calculations of the exhaust air volume flow rates for the subsurface ventilation system during the repository preclosure ventilation. The results can also be used as one of the boundary conditions for waste package modeling. This document is intended to support the development of the repository License Application (LA).

2. REFERENCES

The following design inputs and references support this analysis. The information represents current design details and supports the science and engineering interfaces.

2.1 PROCEDURES/DIRECTIVES

2.1.1 BSC (Bechtel SAIC Company) 2007. *Calculations and Analyses*. EG-PRO-3DP-G04B-00037, Rev 10, Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20071018.0001.

2.1.2 BSC 2007. *Software Management*. IT-PRO-0011, Rev 007. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20070905.0007.

2.2 DESIGN INPUTS

2.2.1 BSC (Bechtel SAIC Company) 2007. *Underground Layout Configuration for LA*. 800-KMC-SS00-00200-000-00B. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070727.0004; ENG.20071214.0002.

2.2.2 BSC 2007. *Basis of Design for the TAD Canister-Based Repository Design Concept.* 000-3DR-MGR0-00300-000-001. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20071002.0042;ENG.20071026.0033; ENG.20071108.0002; ENG.20071109.0001; ENG.20071120.0023;ENG.20071126.0049; ENG.20071214.0009; ENG.20071213.0005; ENG.20071227.0018.

2.2.3 SNL (Sandia National Laboratories) 2007. *Thermal Management Flexibility Analysis.* ANL-EBS-MD-000075 REV 01. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20070207.0001. [DIRS 179196]

2.2.4 BSC 2007. *IED Emplacement Drift Configuration and Environment.* 800-IED-MGR0-00501-000 REV 00B. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070716.0006.

2.2.5 BSC 2004. *Ventilation Model and Analysis Report*. ANL-EBS-MD-000030 REV 04. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20041025.0002. [DIRS 169862]

2.2.6 BSC 2007. *IED Waste Package Decay Heat Generation-Basis Reference Case.* 800-IED-WIS0-00701-000 REV 00B. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20071005.0023.

2.2.7 BSC 2007. *Project Design Criteria Document.* 000-3DR-MGR0-00100-000-007. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20071016.0005; ENG.20071108.0001;ENG.20071220.0003; ENG.20080107.0001; ENG.20080107.0002; ENG.20080107.0016; ENG.20080107.0017.

2.2.8 MO0701VENTCALC.000. *Analytical Ventilation Calculation for the Base Case Analysis with a 1.45 KW/M Initial Line Load.* Submittal date: 01/23/2007. [DIRS 179085]

2.3 CONSTRAINTS

None.

2.4 DESIGN OUTPUTS

This calculation is performed to support the development of the repository License Application (LA) in the following areas:

1) Calculating the exhaust air volume flow rates for the subsurface ventilation system during the repository preclosure ventilation period

2) Defining boundary conditions for waste package modeling.

3. ASSUMPTIONS

This section contains assumptions used in this analysis and the rationale for use.

3.1 ASSUMPTIONS REQUIRING VERIFICATION

None.

3.2 ASSUMPTIONS NOT REQUIRING VERIFICATION

3.2.1 Waste Package Thermal Load

The waste package heat load in emplacement drifts is equivalent to an initial thermal line load of 2.0 kW per linear meter (kW/m) of emplacement drift length.

Rationale: The purpose of this calculation is to evaluate the effect of limiting thermal line load with 2.0 kW/m on the waste emplacement drift (Reference 2.2.2, Section 11.2.1.3). This assumption does not need to be verified.

This assumption is used in Section 6.2 and Attachment II.

3.2.2 Overall Thermal Decay of Waste Packages

The waste package thermal decay for the 2.0 kW/m line load is assumed to be in the same rate as that for the 1.45 kW/m (Reference 2.2.2, Section 14.2.2.3) (Reference 2.2.6) (Attachment II, Spreadsheet "WP Decay"). The thermal decay function for the 2.0 kW/m is obtained by proportionally scaling up the decay curve for the1.45 kW/m case by a factor of 2.0/1.45. The details for the scaled thermal load decay are provided in Table 1.

Rationale: Higher initial WP heat output is normally associated with younger fuel and faster decay rate. Using the decay rate of 1.45-kW/m initial heat to represent the decay of 2.0-kW/m fuels will put extra heat loads into the emplacement drifts. Using this assumption will provide conservative results of temperatures for the emplacement drift. The justification for the use of the increased heat load is that modification of thermal input does not change any of the physical or mathematical bases of the model, including the thermal pulse response calculation.

This assumption is used in Section 6.2 and Attachment II.

3.2.3 Emplacement Drift Length

The maximum emplacement drift length considered in this calculation is taken as 800 meters.

Rationale: According to the layout of the repository emplacement drift (Ref 2.2.1, Attachment IV), the average emplacement drift length is approximately 600 m, and the longest emplacement drift is approximately 800 m. When the ventilation air travels through the emplacement drift, it will pick up heat as it passes over the waste packages. Using the longest drift for the calculation will give the highest air temperature and other temperatures in the emplacement drift. This is conservative for calculating thermal responses in the loaded emplacement drifts.

This assumption is used in Section 6.2 and Attachment II.

Table 1. Overall Thermal Decay for the First 100 Years

Years	1.45 kW/m Thermal Decay (Note 1)	**2.0 kW/m Thermal Decay** (Note 2)	Years	1.45 kW/m Thermal Decay (Note 1)	**2.0 kW/m Thermal Decay** (Note 2)
0	1.450	**2.000**	51	0.584	**0.805**
1	1.399	**1.929**	52	0.576	**0.794**
2	1.357	**1.871**	53	0.568	**0.783**
3	1.321	**1.822**	54	0.560	**0.773**
4	1.289	**1.777**	55	0.553	**0.763**
5	1.259	**1.737**	56	0.546	**0.753**
6	1.232	**1.699**	57	0.538	**0.743**
7	1.206	**1.663**	58	0.531	**0.733**
8	1.181	**1.629**	59	0.525	**0.724**
9	1.157	**1.596**	60	0.518	**0.715**
10	1.135	**1.565**	61	0.511	**0.706**
11	1.110	**1.531**	62	0.505	**0.697**
12	1.088	**1.501**	63	0.499	**0.688**
13	1.068	**1.473**	64	0.493	**0.679**
14	1.049	**1.448**	65	0.487	**0.671**
15	1.033	**1.424**	66	0.481	**0.663**
16	1.012	**1.396**	67	0.475	**0.655**
17	0.993	**1.370**	68	0.469	**0.647**
18	0.976	**1.346**	69	0.464	**0.640**
19	0.960	**1.324**	70	0.459	**0.633**
20	0.944	**1.302**	71	0.453	**0.625**
21	0.927	**1.278**	72	0.448	**0.618**
22	0.910	**1.256**	73	0.443	**0.611**
23	0.895	**1.234**	74	0.438	**0.604**
24	0.881	**1.214**	75	0.433	**0.598**
25	0.867	**1.195**	76	0.429	**0.591**
26	0.853	**1.176**	77	0.424	**0.585**
27	0.838	**1.156**	78	0.419	**0.578**
28	0.824	**1.137**	79	0.415	**0.572**
29	0.811	**1.119**	80	0.410	**0.566**
30	0.799	**1.102**	81	0.406	**0.560**
31	0.786	**1.084**	82	0.402	**0.554**
32	0.773	**1.066**	83	0.398	**0.549**
33	0.761	**1.050**	84	0.394	**0.543**
34	0.749	**1.034**	85	0.390	**0.538**
35	0.738	**1.018**	86	0.386	**0.532**
36	0.726	**1.002**	87	0.382	**0.527**
37	0.715	**0.986**	88	0.378	**0.522**
38	0.704	**0.971**	89	0.375	**0.517**
39	0.694	**0.957**	90	0.371	**0.512**
40	0.684	**0.943**	91	0.368	**0.507**
41	0.673	**0.929**	92	0.364	**0.503**
42	0.663	**0.915**	93	0.361	**0.498**
43	0.653	**0.901**	94	0.358	**0.494**
44	0.644	**0.888**	95	0.355	**0.489**
45	0.635	**0.876**	96	0.351	**0.485**
46	0.626	**0.863**	97	0.348	**0.481**
47	0.617	**0.851**	98	0.345	**0.476**
48	0.608	**0.839**	99	0.343	**0.472**
49	0.600	**0.828**	100	0.340	**0.468**
50	0.592	**0.816**			

Note 1: Reference 2.2.2, Section 14.2.2.3; Reference 2.2.6; and Attachment II, Spreadsheet "WP Decay".

Note 2: Assumption 3.2.2, where 2.0 kW/m = 1.45 kW/m (2.0/1.45)

4. METHODOLOGY

4.1 QUALITY ASSURANCE

This calculation was prepared in accordance with EG-PRO-3DP-G04B-00037, *Calculations and Analyses* (Ref. 2.1.1). Part of the output from this calculation is developed to support the waste package thermal modeling and design. The waste packages are classified as Safety Category items (important to safety and important to waste isolation) in the *Basis of Design for the TAD Canister-Based Repository Design Concept* (BOD) (Reference 2.2.2, Section 11.1.2). Therefore, the approved record version of this calculation is designated as "QA: QA."

4.2 USE OF SOFTWARE

Project standard office computer software, Microsoft Excel (Version 2000), which is considered Level 2 usage software in accordance with IT-PRO-0011, *Software Management* (Reference 2.1.2), was used in this document. The calculations were prepared on Dell personnel computer with CRWMS – M&O Tag Number 150424. The operating system for this computer is Windows 2000. No routines or macros were utilized. All inputs and outputs are provided in Attachment I. Computations were verified by hand calculations or visual inspection. Figures were verified by visual inspection.

4.3 ANALYSIS METHOD

The methodology used in the calculations for the temperatures in the emplacement drift during the preclosure ventilation includes the following steps.

- Establish the initial conditions, such as initial thermal line-load and associated thermal decay functions for an equivalent thermal load of 2.0 kW per linear meter of drift length.

- Use the updated thermal line-load to calculate the preclosure temperatures for 600-meter and 800-meter long emplacement drifts, respectively, for ventilation duration of 100 years. The temperatures of waste package surface, drift wall, and ventilation air are determined using the thermal calculation spreadsheets documented in DTN: MO0701VENTCALC.000 (Reference 2.2.8). This DTN file has been qualified and was used recently by the developer for calculating the temperatures of waste package surface, drift wall, and ventilation air at 1.45 kW/m line load (Reference 2.2.8). The only input modified within the DTN spreadsheets was the line load. The use of the spreadsheets for an increased heat load (2.0 kW/m) for this calculation is valid because the modification of thermal input does not change any of the physical or mathematical bases in the spreadsheets, including the thermal pulse response calculation.

- Develop figures and tables for the temperatures results for drift wall, waste package surface, and ventilation air.

- Compile the overall ventilation efficiencies of heat removal for the analyzed cases.

5. LIST OF ATTACHMENTS

ATTACHMENT I - Results of Emplacement Drift Temperatures at 2.0 kW/m Line Load.

ATTACHMENT II - Spreadsheets for Analytical Ventilation Calculation of Emplacement Drift Ventilation.

6. BODY OF ANALYSIS

6.1 ANALYTICAL VENTILATION CALCULATION SPREADSHEETS

The results presented in Section 6.3 are based on the analytical calculation using spreadsheets from DTN: MO0701VENTCALC.000 (Reference 2.2.8). The qualified DTN is obtained from the *IED Emplacement Drift Configuration and Environment* (Reference 2.2.4), and, therefore, applicable for use. Though not considered an input to this calculation, this spreadsheet method was originally developed in the *Ventilation Model and Analysis Report* (Reference 2.2.5, Section 6.4.2.2 and Attachment VI). The purpose of the spreadsheet method is to calculate ventilation efficiencies for heat removal and waste package, drift wall, and drift air temperatures during the preclosure period for up to an 800-meter long emplacement drift. The analytical calculation as obtained from Reference 2.2.8 was based on an initial thermal line-load of 1.45 kW/m. As discussed in Section 6.3, this thermal loading value has been extended to 2.0 kW/m for this calculation. This spreadsheet was recently used in *Thermal Management Flexibility Analysis* (Reference 2.2.3, Section 7.2) for calculating preclosure temperatures in the emplacement drifts (Reference 2.2.8, particularly *Analytical Ventilation Calculation for the Base Case Analysis with a 1.45 KW/M Initial Line Load*). The use of the spreadsheets for an increased heat load (2.0 kW/m) for this calculation is valid because the modification of thermal input does not change any of the physical or mathematical bases in the spreadsheets, including the thermal pulse response calculation.

6.2 PRECLOSURE VENTILATION ANALYSIS

The analytical ventilation calculation was exercised using the current repository design parameters obtained from the *Basis of Design for the TAD Canister-Based Repository Design Concept* (BOD) (Reference 2.2.2), *Underground Layout Configuration for LA* (Reference 2.2.1), *Project Design Criteria Document* (PDC) (Reference 2.2.7), *IED Emplacement Drift Configuration and Environment* (Reference 2.2.4), and *IED Waste Package Decay Heat Generation-Basis Reference Case* (Reference 2.2.6).

The space between the emplacement drift axial centerline is 81 meters or 266 feet with a nominal diameter of the circular emplacement drift of 5.5 meters or 18 feet (Reference 2.2.2, Section 8.2.1.8). The preclosure ventilation duration used in this calculation is 100 years (Reference 2.2.2, Section 8.2.2.1; Reference 2.2.7, Section 7.3.4).

During the preclosure phase, the nominal inlet airflow rate per emplacement drift is 15 m^3/sec. The waste package heat load in emplacement drifts is equivalent to an initial thermal line load of 2.0 kW per linear meter of emplacement drift length (Assumption 3.2.1). The thermal decay function for the 2.0 kW/m is obtained by proportionally scaling up the decay curve for the1.45 kW/m case by a factor of 2.0/1.45 (Assumption 3.2.2).

The maximum emplacement drift length considered in this calculation is taken as 800 meters. According to the layout of the repository emplacement drift (Assumption 3.2.3) (Reference 2.2.1, Attachment IV), the average emplacement drift length is approximately 600 m, and the longest emplacement drift is approximately 800 m. When the ventilation air travels through the emplacement drift, it will pick up heat as it passes over the waste packages. Using the longest drift for the calculation will give the highest air temperature and other temperatures in the emplacement drift. This is conservative for calculating thermal responses in the loaded emplacement drifts.

The analytical ventilation spreadsheets consist of a calculation of the thermal “pulse response” for an instantaneous heat source in a homogeneous medium, which is convolved with the heat loss history for segments of a repository drift, and integrated with a network model that represents heat and convective mass transfer within the drift. The property values listed in Attachment II were used to produce thermal pulse response for calculating preclosure ventilation efficiency. The thermal conduction-only line-source analytical solution (Reference 2.2.3, Section 6.4) was also exercised using these property values. The output includes emplacement drifts' near-field behavior including ventilation efficiencies; drift-wall heat transfer rates; and waste-package, drift-wall, and drift-air temperatures during the preclosure ventilation period.

6.3 CALCULATION RESULTS

The preclosure temperatures of the waste package, the drift wall, and the ventilation air for a thermal line-load of 2.0 kW/m are plotted in Figures 1 through 8. The figures show the temperature profiles at several locations with axial distances of 100 m, 200 m, 300 m, 400 m, 500 m, 600 m, 700 m, and 800 m from the emplacement drift entrance. For all drift locations evaluated, the maximum preclosure temperatures (waste package, the drift wall, and the ventilation air) occurs within the first three years of the 100-year ventilation duration. Detailed numerical values for the figures are listed in Attachment I, and an electronic file is provided as Attachment II.

As shown in Figure 6, for a 600-m long emplacement drift, the maximum waste package surface temperature of 113.6 °C occurs approximately 1 year after waste emplacement. The waste package surface temperature at the air-exhaust end of the emplacement drift is 68.6 °C in year 50, and 50.8 °C in year 100. The maximum emplacement drift wall temperature of 90.5 °C occurs approximately 2 years after waste emplacement. The emplacement drift wall temperature at the air-exhaust end of the drift is 56.8 °C in year 50, and 43.3 °C in year 100. The maximum ventilation air temperature of 83.0 °C occurs approximately 2 years after waste emplacement. The ventilation air temperature at the air-exhaust end of the emplacement drift is 51.9 °C in year 50, and 40.0 °C in year 100. Detailed numerical values for the Figure 6 are listed in Table 7 of Attachment I.

As shown in Figure 8, for an 800-m long emplacement drift, the maximum waste package surface temperature of 127.2 °C occurs in approximately 1 year after waste emplacement. The waste package surface temperature at the air-exhaust end of the emplacement drift is 77.1 °C in year 50, and 56.1 °C in year 100. The maximum emplacement drift wall temperature of 106.7 °C occurs approximately 3 years after waste emplacement. The emplacement drift wall temperature at the air-exhaust end of the drift is 65.7 °C in year 50, and 48.8 °C in year 100. The maximum ventilation air of temperature 99.8 °C occurs approximately 2 years after waste emplacement. The ventilation air temperature at the air-exhaust end of the emplacement drift is

61.0 °C in year 50, and 45.5 °C in year 100. Detailed numerical values for the Figure 8 are listed in Table 9 of Attachment I.

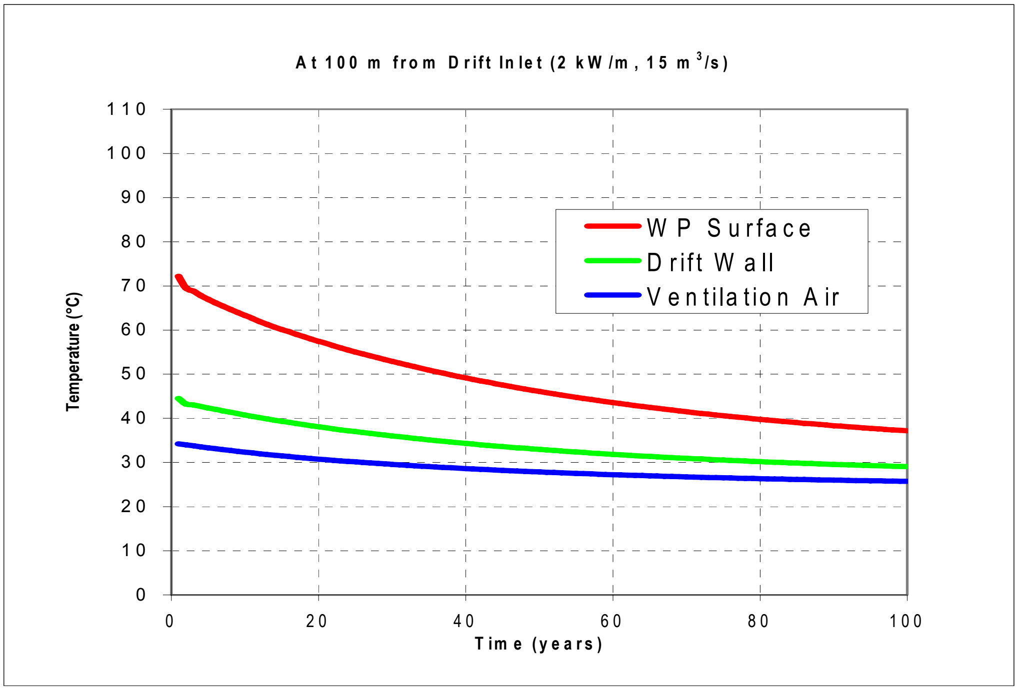

Figure 1. Temperatures at 100 m from Emplacement Drift Inlet

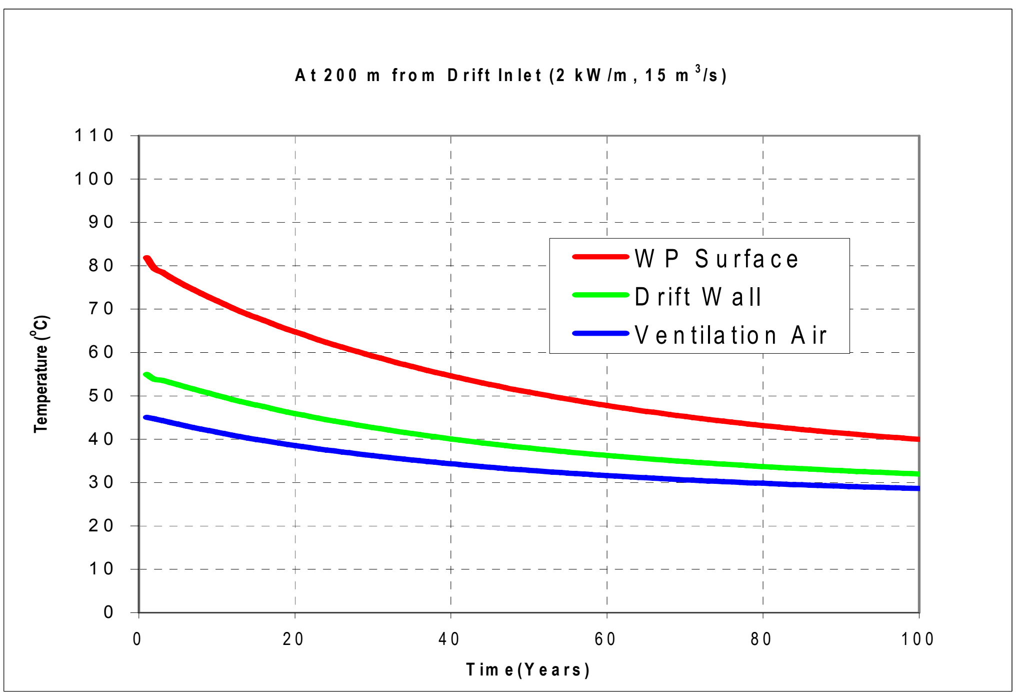

Figure 2. Temperatures at 200 m from Emplacement Drift Inlet

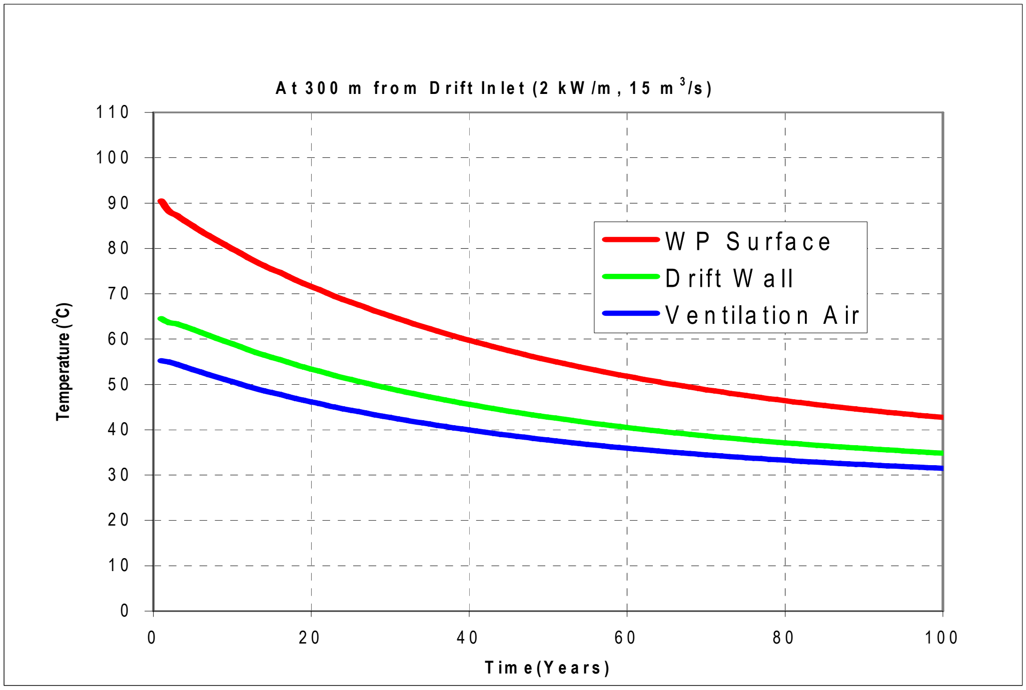

Figure 3. Temperatures at 300 m from Emplacement Drift Inlet

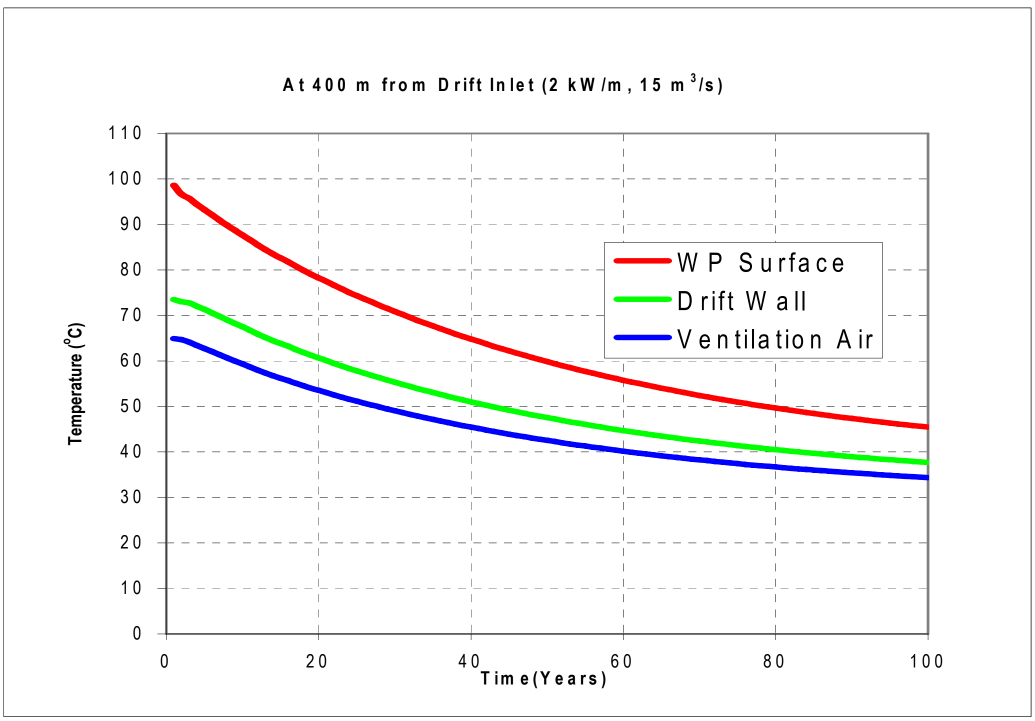

Figure 4. Temperatures at 400 m from Emplacement Drift Inlet

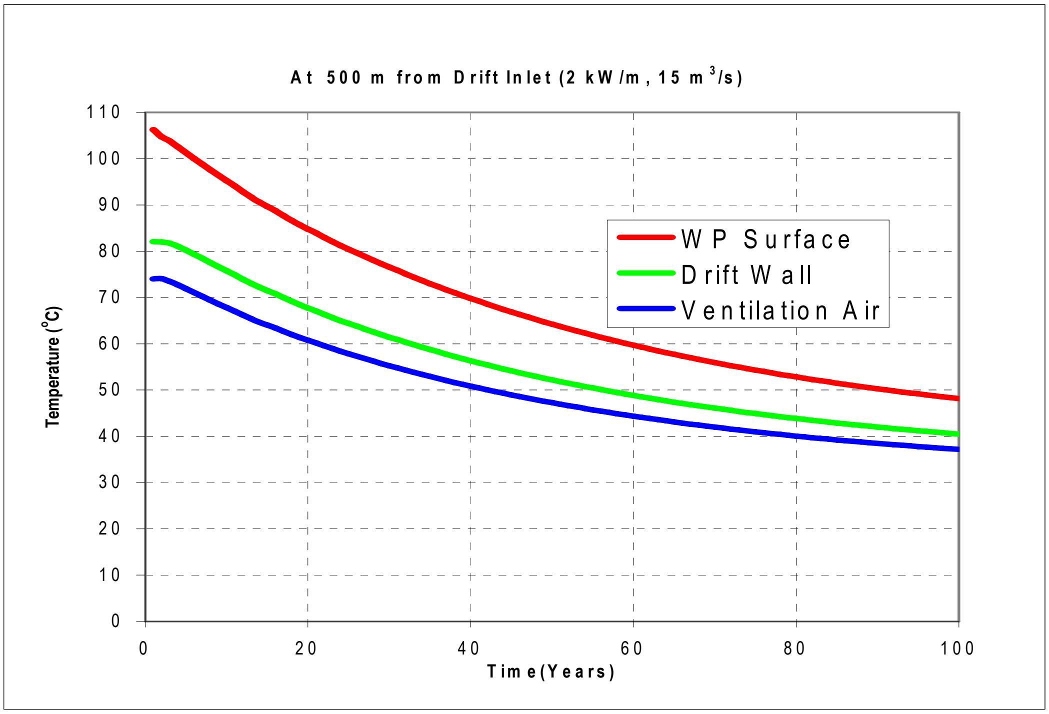

Figure 5. Temperatures at 500 m from Emplacement Drift Inlet

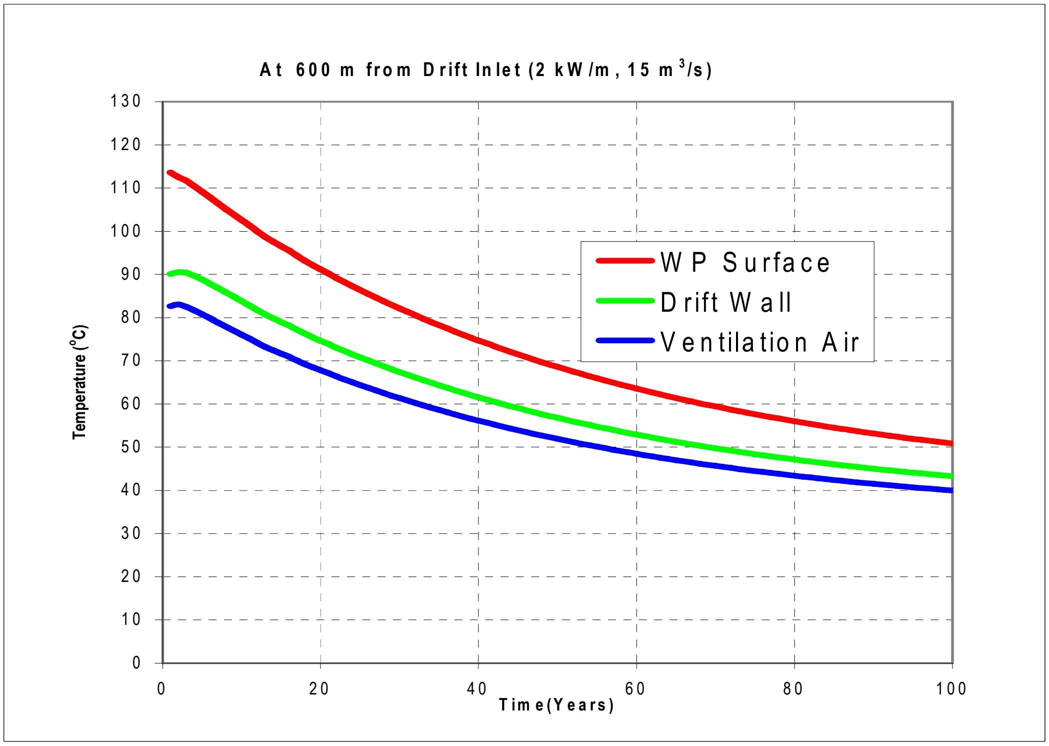

Figure 6. Temperatures at 600 m from Emplacement Drift Inlet

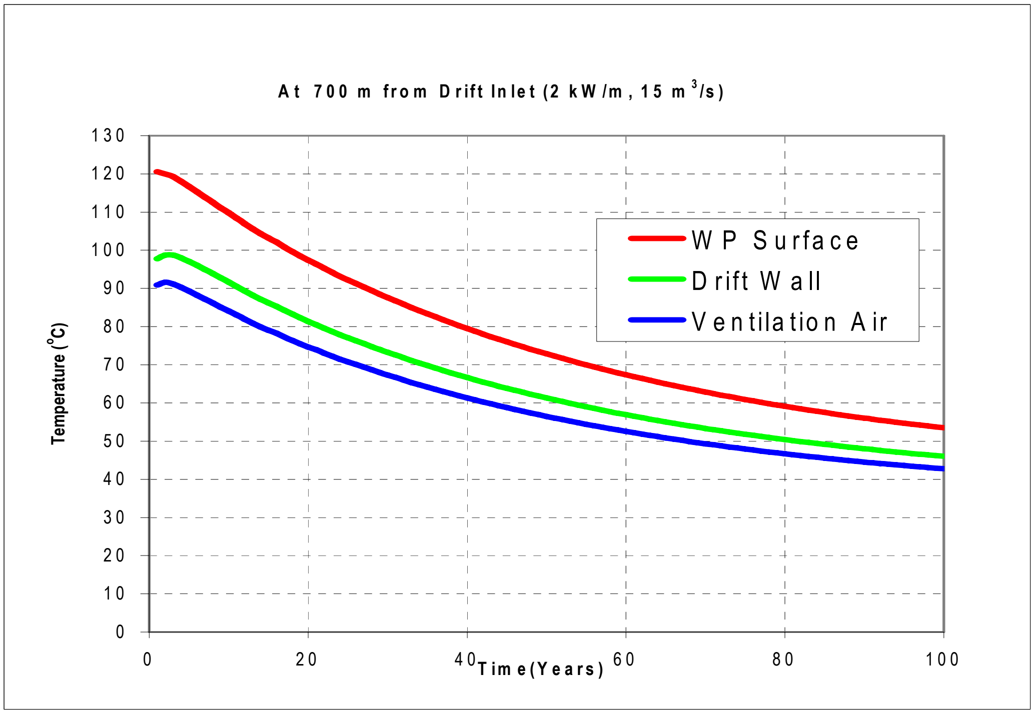

Figure 7. Temperatures at 700 m from Emplacement Drift Inlet

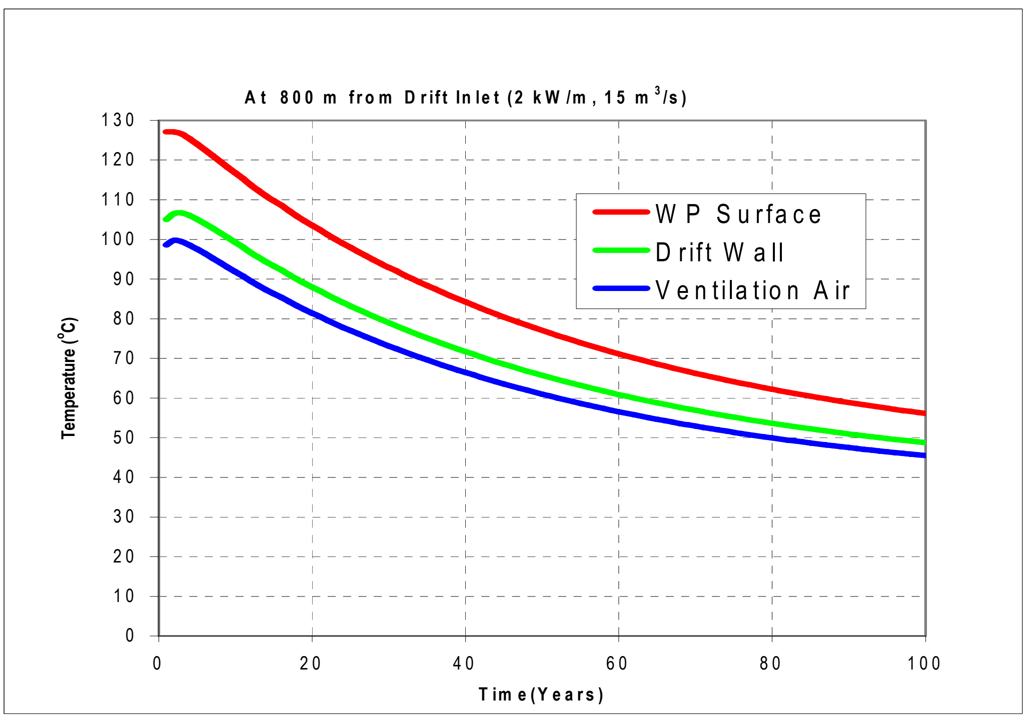

Figure 8. Temperatures at 800 m from Emplacement Drift Inlet

The integrated ventilation efficiencies for heat removal from a thermal line-load of 2.0 kW/m are presented in Figure 9. The analysis shows that for the first few years of ventilation, the ventilation efficiencies are between 70% and 80%. With increased preclosure ventilation time, the ventilation efficiencies increase to values that are close to 90% after 100 years. Calculation results in Attachment I (Table 10) indicate that the ventilation efficiencies of heat removal for 100 years are approximately 90% for a 600-m long emplacement drift, and 88% for an 800-m long emplacement drift. The ventilation efficiencies of heat removal for 50 years of ventilation are approximately 88% for a 600-m long emplacement drift, and 86% for an 800-m long emplacement drift.

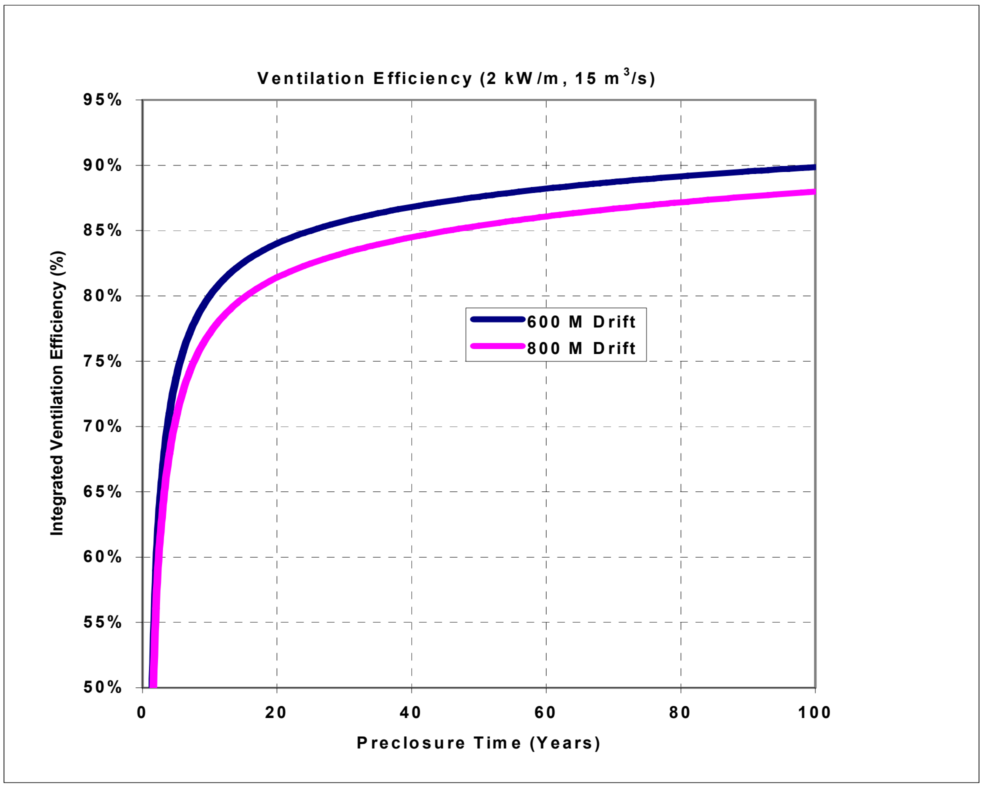

Figure 9. Integrated Ventilation Efficiency as a Function of the Preclosure Period

7. CONCLUSIONS

The preclosure temperatures for both 600-m and 800-m long emplacement drifts loaded with 2.0 kW/m waste package heat are calculated for 100-year ventilation with an airflow rate of 15 m^3/s. The resulting temperatures of waste package surface, drift wall, and ventilation air are plotted as functions of ventilation time and locations along the emplacement drift axis in Figures 1 through 8. Details of the temperature output data are tabulated in Attachment I. Electronic files are provided as Attachment II.

For a 600-m long emplacement drift, the maximum preclosure temperatures are 113.6 °C for waste package surface, 90.5 °C for drift wall, and 83.0 °C for ventilation air (Table 7).

For an 800-m long emplacement drift, the maximum preclosure temperatures are 127.2 °C for waste package surface, 106.7 °C for drift wall, and 99.8 °C for ventilation air (Table 9).

The overall heat removal efficiencies for 100 years of ventilation are approximately 90% for a 600-m long emplacement drift, and 88% for an 800-m long emplacement drift. The overall heat removal efficiencies for 50 years of ventilation are approximately 88% for a 600-m long emplacement drift, and 86% for an 800-m long emplacement drift (Table 10).

ATTACHMENT I - RESULTS OF EMPLACEMENT DRIFT TEMPERATURES AT 2.0 KW/M LINE LOAD

Table 2. Temperatures at 100 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	72.2	44.5	34.2		51	45.8	32.8	27.8
2	69.6	43.2	34.0		52	45.6	32.7	27.7
3	68.8	43.0	33.8		53	45.3	32.6	27.7
4	67.8	42.7	33.5		54	45.0	32.5	27.6
5	67.0	42.4	33.3		55	44.8	32.4	27.5
6	66.2	42.0	33.1		56	44.5	32.3	27.5
7	65.4	41.7	32.9		57	44.3	32.2	27.4
8	64.7	41.4	32.7		58	44.0	32.1	27.4
9	64.0	41.1	32.5		59	43.8	32.0	27.3
10	63.3	40.8	32.3		60	43.6	31.9	27.2
11	62.6	40.5	32.2		61	43.4	31.8	27.2
12	61.9	40.1	32.0		62	43.1	31.7	27.1
13	61.3	39.9	31.8		63	42.9	31.6	27.1
14	60.7	39.6	31.6		64	42.7	31.5	27.0
15	60.1	39.3	31.5		65	42.5	31.4	27.0
16	59.7	39.1	31.4		66	42.3	31.3	26.9
17	59.0	38.8	31.2		67	42.1	31.2	26.9
18	58.5	38.6	31.1		68	41.9	31.1	26.8
19	57.9	38.3	30.9		69	41.7	31.0	26.8
20	57.5	38.1	30.8		70	41.5	30.9	26.7
21	57.0	37.9	30.7		71	41.3	30.9	26.7
22	56.5	37.6	30.5		72	41.1	30.8	26.7
23	56.0	37.4	30.4		73	40.9	30.7	26.6
24	55.5	37.2	30.3		74	40.8	30.6	26.6
25	55.0	37.0	30.1		75	40.6	30.6	26.5
26	54.6	36.8	30.0		76	40.4	30.5	26.5
27	54.2	36.6	29.9		77	40.3	30.4	26.5
28	53.7	36.4	29.8		78	40.1	30.3	26.4
29	53.3	36.2	29.7		79	39.9	30.3	26.4
30	52.9	36.0	29.6		80	39.8	30.2	26.3
31	52.5	35.8	29.5		81	39.6	30.1	26.3
32	52.1	35.6	29.4		82	39.5	30.1	26.3
33	51.7	35.5	29.3		83	39.3	30.0	26.2
34	51.3	35.3	29.2		84	39.2	29.9	26.2
35	50.9	35.1	29.1		85	39.0	29.9	26.2
36	50.6	35.0	29.0		86	38.9	29.8	26.1
37	50.2	34.8	28.9		87	38.8	29.8	26.1
38	49.8	34.6	28.8		88	38.6	29.7	26.1
39	49.5	34.5	28.7		89	38.5	29.6	26.0
40	49.2	34.3	28.6		90	38.4	29.6	26.0
41	48.8	34.2	28.6		91	38.2	29.5	26.0
42	48.5	34.0	28.5		92	38.1	29.5	26.0
43	48.2	33.9	28.4		93	38.0	29.4	25.9
44	47.9	33.7	28.3		94	37.9	29.4	25.9
45	47.5	33.6	28.2		95	37.7	29.3	25.9
46	47.3	33.5	28.2		96	37.6	29.3	25.8
47	46.9	33.3	28.1		97	37.5	29.2	25.8
48	46.7	33.2	28.0		98	37.4	29.2	25.8
49	46.4	33.1	27.9		99	37.3	29.1	25.8
50	46.1	33.0	27.9		100	37.2	29.1	25.7

Table 3. Temperatures at 200 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	81.9	54.9	45.0		51	50.5	37.8	32.7
2	79.4	53.8	44.7		52	50.2	37.6	32.6
3	78.5	53.6	44.3		53	49.9	37.4	32.4
4	77.4	53.1	43.9		54	49.5	37.2	32.3
5	76.4	52.6	43.5		55	49.2	37.1	32.2
6	75.4	52.1	43.1		56	48.9	36.9	32.1
7	74.5	51.6	42.7		57	48.6	36.7	32.0
8	73.6	51.1	42.3		58	48.3	36.6	31.8
9	72.7	50.6	42.0		59	48.0	36.4	31.7
10	71.9	50.1	41.6		60	47.8	36.2	31.6
11	71.1	49.7	41.3		61	47.5	36.1	31.5
12	70.2	49.1	40.9		62	47.2	35.9	31.4
13	69.5	48.7	40.5		63	47.0	35.8	31.3
14	68.7	48.3	40.2		64	46.7	35.6	31.2
15	68.1	47.9	40.0		65	46.4	35.5	31.1
16	67.4	47.5	39.7		66	46.2	35.4	31.0
17	66.7	47.1	39.4		67	45.9	35.2	30.9
18	66.0	46.7	39.1		68	45.7	35.1	30.8
19	65.4	46.3	38.8		69	45.5	35.0	30.7
20	64.7	45.9	38.5		70	45.2	34.8	30.6
21	64.2	45.6	38.3		71	45.0	34.7	30.5
22	63.5	45.2	38.0		72	44.8	34.6	30.5
23	62.9	44.8	37.8		73	44.6	34.5	30.4
24	62.3	44.5	37.5		74	44.4	34.4	30.3
25	61.8	44.2	37.3		75	44.1	34.2	30.2
26	61.3	43.9	37.1		76	43.9	34.1	30.1
27	60.7	43.6	36.9		77	43.7	34.0	30.0
28	60.2	43.3	36.6		78	43.5	33.9	30.0
29	59.7	43.0	36.4		79	43.3	33.8	29.9
30	59.2	42.7	36.2		80	43.1	33.7	29.8
31	58.7	42.4	36.0		81	43.0	33.6	29.8
32	58.2	42.1	35.8		82	42.8	33.5	29.7
33	57.7	41.8	35.6		83	42.6	33.4	29.6
34	57.2	41.6	35.4		84	42.4	33.3	29.5
35	56.8	41.3	35.2		85	42.2	33.2	29.5
36	56.3	41.1	35.0		86	42.1	33.1	29.4
37	55.9	40.8	34.9		87	41.9	33.0	29.4
38	55.4	40.5	34.7		88	41.7	32.9	29.3
39	55.0	40.3	34.5		89	41.6	32.8	29.2
40	54.6	40.1	34.3		90	41.4	32.8	29.2
41	54.2	39.8	34.2		91	41.3	32.7	29.1
42	53.8	39.6	34.0		92	41.1	32.6	29.1
43	53.4	39.4	33.8		93	41.0	32.5	29.0
44	53.0	39.2	33.7		94	40.8	32.4	28.9
45	52.6	39.0	33.5		95	40.7	32.4	28.9
46	52.3	38.7	33.4		96	40.5	32.3	28.8
47	51.9	38.5	33.2		97	40.4	32.2	28.8
48	51.5	38.3	33.1		98	40.3	32.1	28.7
49	51.2	38.1	33.0		99	40.1	32.1	28.7
50	50.8	38.0	32.8		100	40.0	32.0	28.6

Table 4. Temperatures at 300 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	90.4	64.5	55.2		51	55.0	42.5	37.5
2	88.2	63.6	54.9		52	54.6	42.3	37.3
3	87.2	63.3	54.4		53	54.2	42.0	37.1
4	86.1	62.8	53.8		54	53.9	41.8	37.0
5	84.9	62.1	53.3		55	53.5	41.6	36.8
6	83.9	61.5	52.7		56	53.2	41.4	36.6
7	82.8	60.8	52.2		57	52.8	41.1	36.4
8	81.8	60.2	51.6		58	52.5	40.9	36.3
9	80.8	59.6	51.1		59	52.1	40.7	36.1
10	79.9	58.9	50.6		60	51.8	40.5	35.9
11	79.0	58.3	50.1		61	51.5	40.3	35.8
12	78.0	57.7	49.6		62	51.2	40.1	35.6
13	77.0	57.0	49.1		63	50.8	39.9	35.5
14	76.2	56.5	48.6		64	50.5	39.7	35.3
15	75.4	56.0	48.2		65	50.2	39.5	35.2
16	74.7	55.5	47.8		66	50.0	39.3	35.0
17	73.8	54.9	47.3		67	49.7	39.2	34.9
18	73.0	54.4	46.9		68	49.4	39.0	34.7
19	72.3	53.8	46.5		69	49.1	38.8	34.6
20	71.6	53.4	46.1		70	48.8	38.6	34.5
21	70.9	52.9	45.8		71	48.6	38.5	34.3
22	70.1	52.4	45.4		72	48.3	38.3	34.2
23	69.4	51.9	45.0		73	48.1	38.2	34.1
24	68.8	51.5	44.6		74	47.8	38.0	34.0
25	68.1	51.1	44.3		75	47.6	37.8	33.8
26	67.5	50.7	44.0		76	47.3	37.7	33.7
27	66.9	50.3	43.7		77	47.1	37.5	33.6
28	66.3	49.8	43.3		78	46.9	37.4	33.5
29	65.7	49.4	43.0		79	46.6	37.3	33.4
30	65.1	49.1	42.7		80	46.4	37.1	33.3
31	64.5	48.7	42.4		81	46.2	37.0	33.2
32	63.9	48.3	42.1		82	46.0	36.8	33.1
33	63.3	47.9	41.8		83	45.8	36.7	33.0
34	62.8	47.6	41.5		84	45.6	36.6	32.9
35	62.3	47.2	41.2		85	45.4	36.5	32.8
36	61.8	46.9	41.0		86	45.2	36.3	32.7
37	61.2	46.6	40.7		87	45.0	36.2	32.6
38	60.7	46.2	40.4		88	44.8	36.1	32.5
39	60.2	45.9	40.2		89	44.6	36.0	32.4
40	59.7	45.6	39.9		90	44.4	35.9	32.3
41	59.3	45.3	39.7		91	44.2	35.8	32.2
42	58.8	45.0	39.5		92	44.0	35.7	32.1
43	58.3	44.7	39.2		93	43.9	35.5	32.0
44	57.9	44.4	39.0		94	43.7	35.4	32.0
45	57.4	44.1	38.8		95	43.5	35.3	31.9
46	57.0	43.8	38.6		96	43.4	35.2	31.8
47	56.6	43.6	38.3		97	43.2	35.1	31.7
48	56.2	43.3	38.1		98	43.0	35.0	31.7
49	55.8	43.0	37.9		99	42.9	34.9	31.6
50	55.4	42.8	37.7		100	42.7	34.8	31.5

Table 5. Temperatures at 400 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	98.6	73.5	64.9		51	59.4	47.2	42.3
2	96.6	73.0	64.7		52	59.0	46.9	42.0
3	95.7	72.7	64.1		53	58.5	46.6	41.8
4	94.5	72.1	63.5		54	58.1	46.3	41.5
5	93.3	71.3	62.7		55	57.7	46.0	41.3
6	92.1	70.6	62.0		56	57.3	45.8	41.1
7	90.9	69.8	61.3		57	56.9	45.5	40.8
8	89.8	69.0	60.6		58	56.5	45.2	40.6
9	88.7	68.2	60.0		59	56.1	45.0	40.4
10	87.7	67.5	59.3		60	55.8	44.7	40.2
11	86.6	66.7	58.7		61	55.4	44.5	40.0
12	85.5	65.9	58.0		62	55.0	44.2	39.8
13	84.4	65.2	57.3		63	54.7	44.0	39.5
14	83.5	64.5	56.8		64	54.3	43.7	39.3
15	82.6	63.8	56.2		65	54.0	43.5	39.2
16	81.8	63.2	55.7		66	53.7	43.3	39.0
17	80.8	62.5	55.1		67	53.4	43.0	38.8
18	79.9	61.9	54.5		68	53.0	42.8	38.6
19	79.1	61.2	54.0		69	52.7	42.6	38.4
20	78.3	60.6	53.5		70	52.4	42.4	38.2
21	77.5	60.1	53.1		71	52.1	42.2	38.1
22	76.6	59.5	52.5		72	51.8	42.0	37.9
23	75.8	58.9	52.0		73	51.5	41.8	37.7
24	75.1	58.3	51.6		74	51.2	41.6	37.6
25	74.3	57.8	51.1		75	51.0	41.4	37.4
26	73.7	57.3	50.7		76	50.7	41.2	37.3
27	72.9	56.8	50.3		77	50.4	41.0	37.1
28	72.2	56.3	49.9		78	50.2	40.9	37.0
29	71.5	55.8	49.4		79	49.9	40.7	36.8
30	70.9	55.3	49.0		80	49.6	40.5	36.7
31	70.2	54.9	48.7		81	49.4	40.3	36.5
32	69.6	54.4	48.3		82	49.1	40.2	36.4
33	68.9	53.9	47.9		83	48.9	40.0	36.3
34	68.3	53.5	47.5		84	48.7	39.8	36.1
35	67.7	53.0	47.1		85	48.4	39.7	36.0
36	67.1	52.6	46.8		86	48.2	39.5	35.9
37	66.5	52.2	46.4		87	48.0	39.4	35.8
38	65.9	51.8	46.1		88	47.8	39.2	35.6
39	65.4	51.4	45.8		89	47.6	39.1	35.5
40	64.8	51.0	45.4		90	47.4	39.0	35.4
41	64.3	50.6	45.1		91	47.1	38.8	35.3
42	63.7	50.3	44.8		92	46.9	38.7	35.2
43	63.2	49.9	44.5		93	46.7	38.5	35.1
44	62.7	49.5	44.2		94	46.5	38.4	35.0
45	62.2	49.2	43.9		95	46.4	38.3	34.9
46	61.7	48.8	43.6		96	46.2	38.2	34.8
47	61.2	48.5	43.3		97	46.0	38.0	34.7
48	60.8	48.2	43.1		98	45.8	37.9	34.6
49	60.3	47.8	42.8		99	45.6	37.8	34.5
50	59.9	47.5	42.5		100	45.5	37.7	34.4

Table 6. Temperatures at 500 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	106.3	82.1	74.0		51	63.8	51.8	46.9
2	104.7	82.0	74.1		52	63.3	51.5	46.6
3	103.9	81.7	73.5		53	62.8	51.1	46.3
4	102.6	81.0	72.7		54	62.3	50.8	46.0
5	101.3	80.2	71.9		55	61.9	50.4	45.7
6	100.1	79.3	71.1		56	61.4	50.1	45.5
7	98.8	78.5	70.2		57	61.0	49.8	45.2
8	97.6	77.6	69.4		58	60.5	49.5	44.9
9	96.4	76.7	68.6		59	60.1	49.1	44.6
10	95.2	75.8	67.8		60	59.7	48.8	44.4
11	94.1	74.9	67.0		61	59.3	48.5	44.1
12	92.8	73.9	66.2		62	58.9	48.2	43.8
13	91.7	73.1	65.4		63	58.5	48.0	43.6
14	90.6	72.2	64.7		64	58.1	47.7	43.3
15	89.6	71.5	64.0		65	57.7	47.4	43.1
16	88.7	70.8	63.4		66	57.4	47.1	42.9
17	87.7	70.0	62.7		67	57.0	46.9	42.6
18	86.6	69.2	62.0		68	56.6	46.6	42.4
19	85.7	68.4	61.4		69	56.3	46.3	42.2
20	84.8	67.7	60.8		70	55.9	46.1	42.0
21	83.9	67.1	60.2		71	55.6	45.8	41.8
22	83.0	66.3	59.5		72	55.3	45.6	41.6
23	82.1	65.6	58.9		73	54.9	45.4	41.4
24	81.2	65.0	58.4		74	54.6	45.1	41.2
25	80.4	64.4	57.8		75	54.3	44.9	41.0
26	79.7	63.8	57.3		76	54.0	44.7	40.8
27	78.9	63.2	56.8		77	53.7	44.5	40.6
28	78.1	62.6	56.3		78	53.4	44.3	40.4
29	77.3	62.0	55.8		79	53.1	44.1	40.2
30	76.6	61.4	55.3		80	52.8	43.8	40.1
31	75.9	60.9	54.8		81	52.6	43.6	39.9
32	75.1	60.3	54.3		82	52.3	43.4	39.7
33	74.4	59.8	53.8		83	52.0	43.3	39.5
34	73.7	59.3	53.4		84	51.8	43.1	39.4
35	73.0	58.7	52.9		85	51.5	42.9	39.2
36	72.4	58.3	52.5		86	51.2	42.7	39.1
37	71.7	57.7	52.1		87	51.0	42.5	38.9
38	71.0	57.3	51.6		88	50.7	42.3	38.8
39	70.4	56.8	51.2		89	50.5	42.2	38.6
40	69.8	56.3	50.8		90	50.3	42.0	38.5
41	69.2	55.9	50.5		91	50.0	41.8	38.3
42	68.6	55.4	50.1		92	49.8	41.7	38.2
43	68.0	55.0	49.7		93	49.6	41.5	38.1
44	67.4	54.6	49.3		94	49.4	41.4	37.9
45	66.9	54.1	48.9		95	49.2	41.2	37.8
46	66.3	53.7	48.6		96	49.0	41.1	37.7
47	65.8	53.3	48.2		97	48.7	40.9	37.5
48	65.3	52.9	47.9		98	48.5	40.8	37.4
49	64.8	52.6	47.6		99	48.4	40.6	37.3
50	64.3	52.2	47.3		100	48.2	40.5	37.2

Table 7. Temperatures at 600 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	113.6	90.1	82.7		51	68.1	56.4	51.5
2	112.5	90.5	83.0		52	67.5	56.0	51.2
3	111.7	90.4	82.5		53	67.0	55.5	50.8
4	110.4	89.7	81.7		54	66.5	55.1	50.5
5	109.1	88.8	80.7		55	66.0	54.8	50.1
6	107.8	87.8	79.8		56	65.5	54.4	49.8
7	106.5	86.8	78.8		57	65.0	54.0	49.4
8	105.1	85.8	77.9		58	64.5	53.6	49.1
9	103.9	84.8	77.0		59	64.0	53.3	48.8
10	102.6	83.8	76.1		60	63.6	52.9	48.5
11	101.4	82.9	75.2		61	63.1	52.6	48.2
12	100.0	81.8	74.2		62	62.7	52.2	47.9
13	98.7	80.7	73.3		63	62.2	51.9	47.6
14	97.6	79.8	72.4		64	61.8	51.6	47.3
15	96.5	79.0	71.6		65	61.4	51.2	47.0
16	95.5	78.2	70.9		66	61.0	50.9	46.7
17	94.3	77.2	70.1		67	60.6	50.6	46.5
18	93.2	76.3	69.3		68	60.2	50.3	46.2
19	92.2	75.4	68.5		69	59.8	50.0	45.9
20	91.2	74.6	67.8		70	59.4	49.7	45.7
21	90.3	73.9	67.1		71	59.0	49.5	45.4
22	89.2	73.0	66.4		72	58.7	49.2	45.2
23	88.2	72.3	65.7		73	58.3	48.9	44.9
24	87.3	71.5	65.0		74	58.0	48.6	44.7
25	86.4	70.8	64.4		75	57.6	48.4	44.5
26	85.5	70.1	63.8		76	57.3	48.1	44.3
27	84.7	69.4	63.2		77	57.0	47.9	44.0
28	83.8	68.7	62.5		78	56.6	47.6	43.8
29	82.9	68.1	61.9		79	56.3	47.4	43.6
30	82.1	67.4	61.4		80	56.0	47.2	43.4
31	81.4	66.8	60.8		81	55.7	46.9	43.2
32	80.5	66.1	60.2		82	55.4	46.7	43.0
33	79.7	65.5	59.7		83	55.1	46.5	42.8
34	79.0	64.9	59.1		84	54.8	46.2	42.6
35	78.2	64.3	58.6		85	54.5	46.0	42.4
36	77.5	63.8	58.1		86	54.2	45.8	42.2
37	76.8	63.2	57.6		87	54.0	45.6	42.0
38	76.0	62.6	57.1		88	53.7	45.4	41.9
39	75.4	62.1	56.6		89	53.4	45.2	41.7
40	74.7	61.5	56.1		90	53.2	45.0	41.5
41	74.0	61.0	55.7		91	52.9	44.8	41.3
42	73.4	60.5	55.2		92	52.7	44.6	41.2
43	72.7	60.0	54.8		93	52.4	44.5	41.0
44	72.1	59.5	54.3		94	52.2	44.3	40.9
45	71.5	59.0	53.9		95	51.9	44.1	40.7
46	70.9	58.6	53.5		96	51.7	43.9	40.6
47	70.3	58.1	53.1		97	51.5	43.8	40.4
48	69.7	57.7	52.7		98	51.3	43.6	40.3
49	69.1	57.2	52.3		99	51.0	43.4	40.1
50	68.6	56.8	51.9		100	50.8	43.3	40.0

Table 8. Temperatures at 700 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	120.6	97.8	90.9		51	72.3	60.8	56.1
2	120.0	98.7	91.6		52	71.7	60.4	55.6
3	119.3	98.7	91.1		53	71.1	59.9	55.2
4	118.0	98.0	90.3		54	70.5	59.4	54.8
5	116.7	97.1	89.3		55	70.0	59.0	54.4
6	115.3	96.1	88.3		56	69.5	58.6	54.0
7	113.9	95.0	87.2		57	68.9	58.2	53.7
8	112.5	93.9	86.1		58	68.4	57.7	53.3
9	111.1	92.8	85.1		59	67.9	57.3	52.9
10	109.8	91.7	84.1		60	67.4	56.9	52.5
11	108.4	90.6	83.1		61	66.9	56.5	52.2
12	107.0	89.3	81.9		62	66.4	56.2	51.8
13	105.6	88.2	80.9		63	65.9	55.8	51.5
14	104.4	87.2	79.9		64	65.5	55.4	51.2
15	103.2	86.2	79.1		65	65.0	55.0	50.9
16	102.1	85.3	78.3		66	64.6	54.7	50.5
17	100.8	84.2	77.3		67	64.1	54.3	50.2
18	99.6	83.2	76.4		68	63.7	54.0	49.9
19	98.5	82.3	75.5		69	63.3	53.7	49.6
20	97.4	81.4	74.7		70	62.9	53.3	49.3
21	96.4	80.5	73.9		71	62.4	53.0	49.0
22	95.3	79.6	73.1		72	62.1	52.7	48.8
23	94.2	78.7	72.3		73	61.7	52.4	48.5
24	93.2	77.9	71.5		74	61.3	52.1	48.2
25	92.2	77.1	70.8		75	60.9	51.8	47.9
26	91.3	76.3	70.1		76	60.5	51.5	47.7
27	90.3	75.5	69.4		77	60.2	51.2	47.4
28	89.4	74.7	68.7		78	59.8	51.0	47.2
29	88.5	74.0	68.0		79	59.5	50.7	46.9
30	87.6	73.3	67.3		80	59.1	50.4	46.7
31	86.8	72.6	66.7		81	58.8	50.2	46.5
32	85.8	71.8	66.0		82	58.5	49.9	46.2
33	85.0	71.1	65.4		83	58.1	49.6	46.0
34	84.2	70.4	64.8		84	57.8	49.4	45.8
35	83.4	69.8	64.2		85	57.5	49.2	45.6
36	82.6	69.2	63.6		86	57.2	48.9	45.3
37	81.8	68.5	63.0		87	56.9	48.7	45.1
38	81.0	67.9	62.4		88	56.6	48.5	44.9
39	80.2	67.3	61.9		89	56.3	48.2	44.7
40	79.5	66.7	61.3		90	56.0	48.0	44.5
41	78.8	66.1	60.8		91	55.8	47.8	44.3
42	78.1	65.5	60.3		92	55.5	47.6	44.1
43	77.4	64.9	59.8		93	55.2	47.4	44.0
44	76.7	64.4	59.3		94	55.0	47.2	43.8
45	76.0	63.8	58.8		95	54.7	47.0	43.6
46	75.4	63.3	58.3		96	54.4	46.8	43.4
47	74.7	62.8	57.8		97	54.2	46.6	43.3
48	74.1	62.3	57.4		98	54.0	46.4	43.1
49	73.5	61.8	56.9		99	53.7	46.2	42.9
50	72.9	61.3	56.5		100	53.5	46.0	42.8

Table 9. Temperatures at 800 m from Emplacement Inlet

Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)		Time (yr)	WP Surface Temperature (°C)	Drift Wall Temperature (°C)	Vent Air Temperature (°C)
1	127.2	105.0	98.6		51	76.4	65.2	60.5
2	127.1	106.5	99.8		52	75.8	64.7	60.0
3	126.6	106.7	99.4		53	75.2	64.2	59.6
4	125.4	106.0	98.6		54	74.5	63.7	59.1
5	124.0	105.1	97.5		55	74.0	63.2	58.7
6	122.6	104.0	96.4		56	73.4	62.7	58.2
7	121.1	102.8	95.3		57	72.8	62.2	57.8
8	119.6	101.6	94.1		58	72.2	61.8	57.4
9	118.2	100.4	93.0		59	71.7	61.3	57.0
10	116.7	99.2	91.9		60	71.1	60.9	56.6
11	115.3	98.1	90.7		61	70.6	60.5	56.2
12	113.8	96.7	89.5		62	70.1	60.0	55.8
13	112.3	95.5	88.3		63	69.6	59.6	55.4
14	111.0	94.3	87.3		64	69.1	59.2	55.0
15	109.7	93.3	86.3		65	68.6	58.8	54.6
16	108.6	92.3	85.4		66	68.1	58.4	54.3
17	107.2	91.1	84.3		67	67.6	58.0	53.9
18	105.9	90.0	83.3		68	67.1	57.6	53.6
19	104.7	88.9	82.3		69	66.7	57.3	53.3
20	103.5	88.0	81.4		70	66.2	56.9	52.9
21	102.4	87.0	80.5		71	65.8	56.6	52.6
22	101.2	86.0	79.6		72	65.4	56.2	52.3
23	100.0	85.0	78.7		73	65.0	55.9	52.0
24	99.0	84.1	77.8		74	64.5	55.5	51.7
25	97.9	83.2	77.0		75	64.1	55.2	51.4
26	96.9	82.4	76.2		76	63.7	54.9	51.1
27	95.9	81.5	75.5		77	63.3	54.6	50.8
28	94.9	80.6	74.7		78	63.0	54.2	50.5
29	93.9	79.8	73.9		79	62.6	53.9	50.2
30	92.9	79.0	73.1		80	62.2	53.6	50.0
31	92.0	78.2	72.5		81	61.9	53.4	49.7
32	91.1	77.4	71.7		82	61.5	53.1	49.4
33	90.1	76.6	71.0		83	61.1	52.8	49.2
34	89.2	75.9	70.3		84	60.8	52.5	48.9
35	88.4	75.2	69.6		85	60.5	52.2	48.7
36	87.5	74.4	69.0		86	60.1	52.0	48.4
37	86.7	73.7	68.3		87	59.8	51.7	48.2
38	85.8	73.0	67.7		88	59.5	51.5	48.0
39	85.0	72.3	67.0		89	59.2	51.2	47.7
40	84.2	71.7	66.4		90	58.9	51.0	47.5
41	83.5	71.0	65.9		91	58.6	50.7	47.3
42	82.7	70.4	65.3		92	58.3	50.5	47.1
43	81.9	69.8	64.7		93	58.0	50.3	46.9
44	81.2	69.1	64.1		94	57.7	50.0	46.7
45	80.5	68.5	63.6		95	57.4	49.8	46.5
46	79.8	68.0	63.0		96	57.2	49.6	46.3
47	79.0	67.4	62.5		97	56.9	49.4	46.1
48	78.4	66.8	62.0		98	56.6	49.2	45.9
49	77.7	66.3	61.5		99	56.4	49.0	45.7
50	77.1	65.7	61.0		100	56.1	48.8	45.5

Table 10. Integrated Ventilation Efficiency

Time (yr)	Integrated Ventilation Efficiency 600 m	Integrated Ventilation Efficiency 800 m		Time (yr)	Integrated Ventilation Efficiency 600 m	Integrated Ventilation Efficiency 800 m
0	0	0				
1	38.5%	36.5%		51	87.7%	85.5%
2	59.0%	56.1%		52	87.7%	85.5%
3	66.7%	63.7%		53	87.8%	85.6%
4	71.0%	67.9%		54	87.9%	85.7%
5	73.7%	70.7%		55	87.9%	85.7%
6	75.7%	72.7%		56	88.0%	85.8%
7	77.1%	74.2%		57	88.0%	85.9%
8	78.3%	75.4%		58	88.1%	86.0%
9	79.2%	76.3%		59	88.2%	86.0%
10	80.0%	77.1%		60	88.2%	86.1%
11	80.7%	77.8%		61	88.3%	86.1%
12	81.2%	78.4%		62	88.3%	86.2%
13	81.7%	79.0%		63	88.4%	86.3%
14	82.2%	79.4%		64	88.4%	86.3%
15	82.5%	79.8%		65	88.5%	86.4%
16	82.9%	80.2%		66	88.5%	86.4%
17	83.2%	80.5%		67	88.6%	86.5%
18	83.5%	80.9%		68	88.6%	86.6%
19	83.8%	81.1%		69	88.7%	86.6%
20	84.0%	81.4%		70	88.7%	86.7%
21	84.2%	81.6%		71	88.8%	86.7%
22	84.4%	81.9%		72	88.8%	86.8%
23	84.6%	82.1%		73	88.9%	86.8%
24	84.8%	82.3%		74	88.9%	86.9%
25	85.0%	82.5%		75	88.9%	86.9%
26	85.2%	82.7%		76	89.0%	87.0%
27	85.3%	82.8%		77	89.0%	87.0%
28	85.5%	83.0%		78	89.1%	87.1%
29	85.6%	83.1%		79	89.1%	87.1%
30	85.7%	83.3%		80	89.2%	87.2%
31	85.9%	83.4%		81	89.2%	87.2%
32	86.0%	83.6%		82	89.2%	87.3%
33	86.1%	83.7%		83	89.3%	87.3%
34	86.2%	83.8%		84	89.3%	87.3%
35	86.3%	83.9%		85	89.3%	87.4%
36	86.4%	84.1%		86	89.4%	87.4%
37	86.5%	84.2%		87	89.4%	87.5%
38	86.6%	84.3%		88	89.5%	87.5%
39	86.7%	84.4%		89	89.5%	87.6%
40	86.8%	84.5%		90	89.5%	87.6%
41	86.9%	84.6%		91	89.6%	87.6%
42	87.0%	84.7%		92	89.6%	87.7%
43	87.1%	84.8%		93	89.6%	87.7%
44	87.1%	84.9%		94	89.7%	87.8%
45	87.2%	85.0%		95	89.7%	87.8%
46	87.3%	85.0%		96	89.7%	87.8%
47	87.4%	85.1%		97	89.8%	87.9%
48	87.5%	85.2%		98	89.8%	87.9%
49	87.5%	85.3%		99	89.8%	88.0%
50	**87.6%**	**85.4%**		**100**	**89.9%**	**88.0%**

ATTACHMENT II - SPREADSHEETS FOR ANALYTICAL CALCULATION OF EMPLACEMENT DRIFT VENTILATION

One Data CD Attached. The CD contains the following files:

“Final_Analysis_2000W.xls”

Excel spreadsheets for temperature calculations listed as Attachment II of the QER Final Review Copy of this document.

<u>Note for Viewing the Excel file on the CD:</u>

1. Open the Excel Spreadsheets
2. Turn on the analysis functions: Within the Excel file, go to “Tools”, then “Add-Ins…”; click to check all boxes to turn on all Add-Ins available, then click OK.