

ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Wednesday, June 10, 2009 2:10 PM
To: Tesfaye, Getachew
Cc: BEELMAN Ronald J (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 4
Attachments: RAI 82 Supplement 4 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided responses to 3 of the 8 questions of RAI No. 82 on November 3, 2008. AREVA NP submitted Supplement 1 to the response on December 18, 2008 to address portions of 4 of the remaining questions. AREVA NP submitted Supplement 2 to the response on January 28, 2009 to address portions of 2 of the remaining questions. AREVA NP submitted Supplement 3 to the response on May 22, 2009 to address 2 of the remaining questions. The attached file, "RAI 82 Supplement 4 Response US EPR DC.pdf" provides technically correct and complete responses to 1 of the remaining 3 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 82 Supplement 4 Response US EPR DC.pdf" that contain AREVA NP's response to the subject portions of RAI 82, Question 06.02.01.05-1.

Question #	Start Page	End Page
RAI 82 — 06.02.01.05-1a	2	4
RAI 82 — 06.02.01.05-1f	2	22
RAI 82 — 06.02.01.05-1h	2	26

The schedule for technically correct and complete responses to the remaining 2 questions is unchanged and provided below:

Question #	Response Date
RAI 82 — 06.02.01-12	December 18, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009

Sincerely,

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

AREVA NP Inc.

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3315 Old Forest Road

Lynchburg, VA 24506-0935

Phone: 434-832-3694

Cell: 434-841-8788

From: WELLS Russell D (AREVA NP INC)

Sent: Friday, May 22, 2009 5:07 PM

To: 'Getachew Tesfaye'

Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); DUNCAN Leslie E (AREVA NP INC)

Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 3

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 82, Supplement 3 are submitted via AREVA NP Inc. letter, "Response Supplement 3 to U.S. EPR Design Certification Application RAI No. 82" NRC 09:060, dated May 22, 2009. The enclosure to that letter provides technically correct and complete responses to 2 of the 5 remaining questions in RAI No. 82. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The following table indicates the respective pages in the response document, "RAI 82 Supplement 3 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 82 — 06.02.01-12a.1	2	9
RAI 82 — 06.02.01-12a.2	2	9
RAI 82 — 06.02.01-12a.3	2	9
RAI 82 — 06.02.01-12c.1	2	10
RAI 82 — 06.02.01-12c.3	2	10
RAI 82 — 06.02.01-12c.3-1	2	11
RAI 82 — 06.02.01-12c.3-2	2	11
RAI 82 — 06.02.01-12c.3-3	2	14
RAI 82 — 06.02.01-12d.1	2	20
RAI 82 — 06.02.01-12d.2	2	15
RAI 82 — 06.02.01-12d.3	2	21
RAI 82 — 06.02.01.02-1a.2	22	24
RAI 82 — 06.02.01.02-1a.10	22	25
RAI 82 — 06.02.01.03-1c	26	32
RAI 82 — 06.02.01.03-1g	26	38
RAI 82 — 06.02.01.03-1h	26	42
RAI 82 — 06.02.01.04-1i	44	46
RAI 82 — 06.02.01.04-1j	44	46
RAI 82 — 06.02.01.05-1b	47	49
RAI 82 — 06.02.01.05-1c	47	50
RAI 82 — 06.02.01.05-1d	47	61
RAI 82 — 06.02.01.05-1e	47	62
RAI 82 — 06.02.01.05-1g	47	64

The schedule for the technically correct and complete response to the remaining questions in RAI No. 82 has been changed and is provided below:

Question #	Response Date
RAI 82 — 06.02.01-12	December 18, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009
RAI 82 — 06.02.01.05-1	June 12, 2009

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

New Plants Deployment

AREVA NP, Inc.

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Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)

Sent: Wednesday, January 28, 2009 7:34 PM

To: Getachew Tesfaye

Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); BEELMAN Ronald J (AREVA NP INC)

Subject: Response to U.S. EPR Design Certification Application RAI No. 82, Supplement 2

Getachew,

AREVA NP Inc. provided responses to 3 of the 8 questions of RAI No. 82 on November 3, 2008. Supplement 1 response to RAI No. 82 was sent on December 18, 2008 to address portions of 4 of the remaining 5 questions.

The proprietary and non-proprietary versions of technical report, ANP-10299, are submitted via AREVA NP, Inc. letter, "Submittal of ANP-10299P, 'Applicability of AREVA NP Containment Response Evaluation Methodology to the U.S. EPR™ for Large Break LOCA Analysis Technical Report'," NRC:09:006, dated January 28, 2009.

The following table indicates the RAI No. 82 questions that are answered in the subject technical report.

Question #
RAI 82 — 06.02.01-12.c.2
RAI 82 — 06.02.01.03-1.d
RAI 82 — 06.02.01.03-1.f
RAI 82 — 06.02.01.03-1.i
RAI 82 — 06.02.01.03-1.j
RAI 82 — 06.02.01.03-1.k
RAI 82 — 06.02.01.03-1.l
RAI 82 — 06.02.01.03-1.m
RAI 82 — 06.02.01.03-1.n
RAI 82 — 06.02.01.03-1.o

The schedule for technically correct and complete responses to the remaining questions has been revised as provided below:

Question #	Response Date
RAI 82 — 06.02.01-12	May 22, 2009
RAI 82 — 06.02.01-12.c.1	May 22, 2009
RAI 82 — 06.02.01-12.c.3	May 22, 2009
RAI 82 — 06.02.01-12.c.3-3	May 22, 2009
RAI 82 — 06.02.01.02-1	May 22, 2009
RAI 82 — 06.02.01.03-1	June 23, 2009

RAI 82 — 06.02.01.03-1.c	June 23, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009
RAI 82 — 06.02.01.05-1	June 12, 2009

Sincerely,

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

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3315 Old Forest Road

Lynchburg, VA 24506-0935

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From: WELLS Russell D (AREVA NP INC)

Sent: Thursday, December 18, 2008 2:49 PM

To: 'Getachew Tesfaye'

Cc: Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US); SLIVA Dana (EXT); 'John Rycyna'

Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 1

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 82, Supplement 1 are submitted via AREVA NP Inc. letter, "Response Supplement 1 to U.S. EPR Design Certification Application RAI No. 82," NRC 08:098, dated December 17, 2008. The enclosure to that letter provides technically correct and complete responses to portions of 4 of the 5 remaining questions in RAI No. 82. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The schedule for technically correct and complete responses to the remaining RAI No. 82 questions, is provided below and remains unchanged.

Question #	Response Date
RAI 82 — 06.02.01-12	May 22, 2009
RAI 82 — 06.02.01.02-1	May 22, 2009
RAI 82 — 06.02.01.03-1	May 22, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009
RAI 82 — 06.02.01.05-1	June 12, 2009

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

New Plants Deployment

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From: WELLS Russell D (AREVA NP INC)
Sent: Monday, November 03, 2008 8:48 PM
To: 'Getachew Tesfaye'
Cc: 'John Rycyna'; Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US)
Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 82 are submitted via AREVA NP Inc. letter, "Response to U.S. EPR Design Certification Application RAI No. 82" NRC 08:085, dated November 3, 2008. The enclosure to that letter provides technically correct and complete responses to 3 of the 8 questions in RAI No. 82. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The schedule for technically correct and complete responses to the remaining 5 questions in RAI No. 82 is provided below:

Question #	Response Date
RAI 82—06.02.01-12	May 22, 2009
RAI 82—06.02.01.02-1	May 22, 2009
RAI 82—06.02.01.03-1	May 22, 2009
RAI 82—06.02.01.04-1	June 23, 2008
RAI 82—06.02.01.05-1	June 23, 2008

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson

ronda.pederson@areva.com

Licensing Manager, U.S. EPR Design Certification

New Plants Deployment

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From: Getachew Tesfaye [<mailto:Getachew.Tesfaye@nrc.gov>]
Sent: Friday, October 03, 2008 3:29 PM
To: ZZ-DL-A-USEPR-DL
Cc: Walton Jensen; Anne-Marie Grady; Michael Miernicki; Joseph Colaccino; John Rycyna
Subject: U.S. EPR Design Certification Application RAI No. 82(1082,1096,1107,1113,1125,1151,1098,1097), FSAR Ch 6

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on September 15, 2008, and discussed with your staff on October 2, 2008. Draft RAI Questions 06.02.01-12 (a)(3) and 06.02.01.03-1(a) were modified as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this

information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 560

Mail Envelope Properties (5CEC4184E98FFE49A383961FAD402D31FC5723)

Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 4
Sent Date: 6/10/2009 2:10:10 PM
Received Date: 6/10/2009 2:10:20 PM
From: Pederson Ronda M (AREVA NP INC)

Created By: Ronda.Pederson@areva.com

Recipients:

"BEELMAN Ronald J (AREVA NP INC)" <Ronald.Beelman@areva.com>

Tracking Status: None

"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>

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Tracking Status: None

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Files	Size	Date & Time
MESSAGE	10852	6/10/2009 2:10:20 PM
RAI 82 Supplement 4 Response US EPR DC.pdf		396391

Options

Priority: Standard

Return Notification: No

Reply Requested: No

Sensitivity: Normal

Expiration Date:

Recipients Received:

Response to

**Request for Additional Information No. 82
(1082, 1096, 1107, 1113, 1125, 1151, 1098, 1097), Supplement 4**

10/03/2008

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 06.02.01 - Containment Functional Design

SRP Section: 06.02.01.02 - Subcompartment Analysis

**SRP Section: 06.02.01.03 - Mass and Energy Release Analysis for Postulated
Loss-of-Coolant Accidents (LOCAs)**

**SRP Section: 06.02.01.04 - Mass and Energy Release Analysis for Postulated
Secondary System Pipe Ruptures**

**SRP Section: 06.02.01.05 - Minimum Containment Pressure Analysis for
Emergency Core Cooling System Performance Capability Studies**

SRP Section: 06.02.02 - Containment Heat Removal Systems

SRP Section: 06.02.04 - Containment Isolation System

SRP Section: 06.02.06 - Containment Leakage Testing

Application Section: FSAR Ch. 6

SPCV Branch

Question 06.02.01.05-1:

- a. Instead of the conservative heat transfer coefficients recommended by BTP 6-2 the minimum containment pressure analysis for the US-EPR realistic LOCA used heat transfer coefficients that were 1.7 times the Uchida correlation which were benchmarked against 1.0 times the Tagami correlation and then 1.2 times the Uchida correlation. These were described as best estimate. Provide: 1. Justification that the heat transfer correlations selected for the EPR minimum containment pressure analysis are indeed best estimate and 2. Provide the basis for the uncertainty in these coefficients so that these uncertainties may be applied in the realistic LOCA calculations.
- f. Regulatory Guide 1.206 C.1.6.2.1.5(1) requests that for the minimum containment pressure analysis that applicants provide for the most severe break, the mass and energy release data used for the minimum containment pressure analysis. The mass and energy of safety injection fluid that is assumed to spill from the break directly to the containment floor should be included. The purpose this request is so that the staff may make independent containment pressure assessments. This information was provided in response to RAI 6.2.1-09a. The staff cannot use the mass and energy release data in a containment analysis computer code since the nitrogen accumulator gas release is lumped with the steam and water. Provide separate tables one containing the steam and water and the other containing the nitrogen release. Provide justification that input to the ICECON model in S-RELAP5 is properly accounting for the separate entry of steam and water as well as nitrogen.
- h. Minimum containment pressure is calculated by the ICECON module embedded in S-RELAP5. Provide a noding diagram of the ICECON containment model and justify that the noding is conservative for calculating minimum containment pressure. In a presentation to the NRC staff January 29, 2008, Areva presented a sensitivity study showing that a multi-node GOTHIC model of the EPR produced containment pressure several psi lower than the single node model. Perform a similar noding sensitivity study using ICECON to show that noding detail is being conservatively accounted for.

Response to Question 06.02.01.05-1:**a. Heat Transfer Coefficients**

AREVA NP compared the containment pressure response using 1.0 x Tagami plus 1.0 x Uchida, and then 1.7 x Uchida alone. For the U.S. EPR, Figure 06.02.01.05-1a-1 shows that using the 1.7 x Uchida correlation for condensation heat transfer produces a lower containment pressure than 1.0 x Tagami (COEFT = 72.5 in the figure) plus 1.0 x Uchida (COEFU = 1.0).

As shown in Figure 06.02.01.05-1a-2, the 1.7 coefficient on the Uchida correlation is conservative with respect to experimental data. The 1.7 x Uchida correlation is used to calculate the minimum containment pressure for the operating plants licensed with the approved AREVA realistic large break loss of coolant accident methodology (AREVA NP Document EMF-2103(P)(A), Revision 0, "Realistic Large Break LOCA Methodology for Pressurized Water Reactors," April 2003).

Figure 06.02.01.05-1a-1—U.S. EPR Containment Pressure Comparison with Different Heat Transfer Coefficients

Containment Pressure, p-498010000

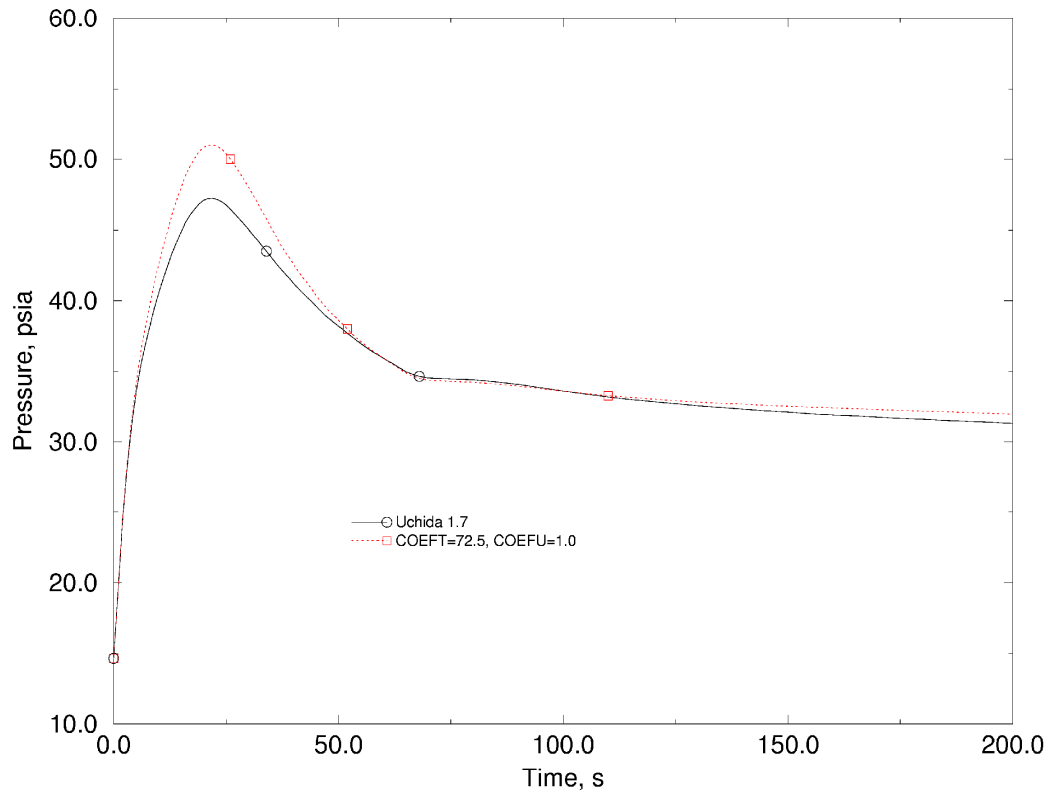
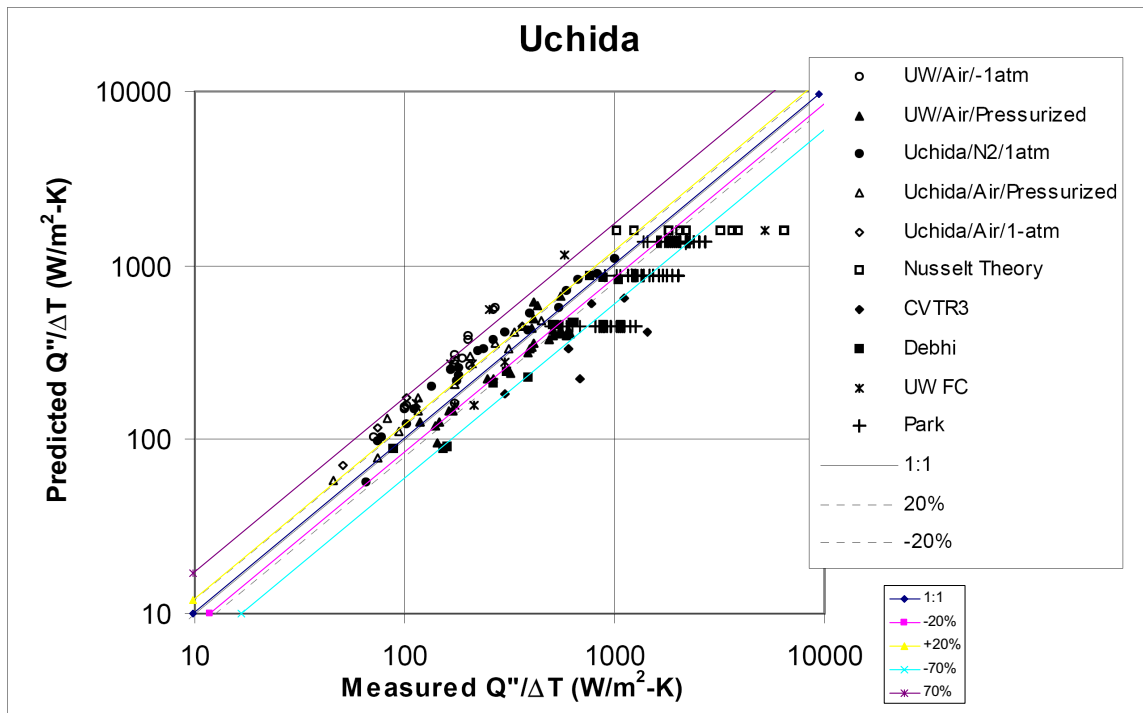


Figure 06.02.01.05-1a-2—Uchida Uncertainty Benchmarks



FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

f. Mass and Energy Release Data

AREVA NP’s response to RAI 001, question 6.2.1-09a provided the mass and energy release input used to produce the containment pressure response as a function of time in U.S. EPR FSAR, Tier 2, Figure 15.6-50. This mass and energy release input is resubmitted with one table containing the steam and water mass and energy release and another containing the non-condensable mass and energy release.

The non-condensable component of the two-phase mixture in S-RELAP5 is assumed to be in thermal and mechanical equilibrium with the vapor phase. The properties for the vapor phase are calculated assuming a Gibbs-Dalton mixture of steam and an ideal non-condensable gas.

ICECON’s treatment of a two-component, two-phase mixture of liquid water, water vapor, and non-condensable gas is also based on the assumptions of the Gibbs-Dalton law.

The requested data are provided below in Table 06.02.01.05-1f. Nitrogen is assumed to be the non-condensable gas. The S-RELAP5 mass and energy release does not communicate the

presence of non-condensables to the ICECON model. However, the non-condensable contribution is a small fraction (<1%) of both the total mass and the total energy releases.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Time (s)	Not Accounting for Presence of Non-Condensable				Accounting for Presence of Non-Condensable						
	Steam and Water				Nitrogen Temp (°F) (Pump Side + Vessel Side)/2	Nitrogen				Steam	
	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
0	0	0	0.0000E+00	0.0000E+00	621	0	0	0.0000E+00	0.0000E+00	0	0
0.5	45360731	79958.25	2.2680E+07	3.9979E+04	579	0	0	0.0000E+00	0.0000E+00	45360731	79958.25
1	43720018	76951.7	4.4540E+07	7.8455E+04	578	0	0	0.0000E+00	0.0000E+00	43720018	76951.7
1.5	40566164	71133.67	6.4823E+07	1.1402E+05	577	0	0	0.0000E+00	0.0000E+00	40566164	71133.67
2	37325208	65138.91	8.3486E+07	1.4659E+05	576	0	0	0.0000E+00	0.0000E+00	37325208	65138.91
2.5	34186054	59367.35	1.0058E+08	1.7627E+05	576	0	0	0.0000E+00	0.0000E+00	34186054	59367.35
3	31829328	54992.63	1.1649E+08	2.0377E+05	575	0	0	0.0000E+00	0.0000E+00	31829328	54992.63
3.5	29249443	50297.29	1.3112E+08	2.2892E+05	572	0	0	0.0000E+00	0.0000E+00	29249443	50297.29
4	27059159	46241.9	1.4465E+08	2.5204E+05	569	0	0	0.0000E+00	0.0000E+00	27059159	46241.9
4.5	25024965	42393.48	1.5716E+08	2.7324E+05	566	0	0	0.0000E+00	0.0000E+00	25024965	42393.48
5	22067353	36824.66	1.6819E+08	2.9165E+05	564	0	0	0.0000E+00	0.0000E+00	22067353	36824.66
5.5	19133952	31553.25	1.7776E+08	3.0743E+05	563	0	0	0.0000E+00	0.0000E+00	19133952	31553.25
6	18252232	29668.75	1.8689E+08	3.2226E+05	561	0	0	0.0000E+00	0.0000E+00	18252232	29668.75
6.5	17509166	28065.87	1.9564E+08	3.3629E+05	559	0	0	0.0000E+00	0.0000E+00	17509166	28065.87
7	16919851	26776.36	2.0410E+08	3.4968E+05	558	0	0	0.0000E+00	0.0000E+00	16919851	26776.36
7.5	16280292	25390.84	2.1224E+08	3.6238E+05	557	0	0	0.0000E+00	0.0000E+00	16280292	25390.84
8	15829817	24425.3	2.2016E+08	3.7459E+05	556	0	0	0.0000E+00	0.0000E+00	15829817	24425.3
8.5	15508132	23794.5	2.2791E+08	3.8649E+05	555	0	0	0.0000E+00	0.0000E+00	15508132	23794.5
9	15219886	23224.57	2.3552E+08	3.9810E+05	554	0	0	0.0000E+00	0.0000E+00	15219886	23224.57
9.5	14936670	22665.35	2.4299E+08	4.0943E+05	553	0	0	0.0000E+00	0.0000E+00	14936670	22665.35
10	14607711	21972.92	2.5029E+08	4.2042E+05	552	0	0	0.0000E+00	0.0000E+00	14607711	21972.92
10.5	14249719	21210.02	2.5742E+08	4.3102E+05	551	0	0	0.0000E+00	0.0000E+00	14249719	21210.02
11	13910247	20537.58	2.6437E+08	4.4129E+05	549	0	0	0.0000E+00	0.0000E+00	13910247	20537.58
11.5	13529983	19708.8	2.7114E+08	4.5115E+05	548	0	0	0.0000E+00	0.0000E+00	13529983	19708.8

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Time (s)	Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
	Steam and Water				Nitrogen Temp (°F)	Nitrogen				Steam		
	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	
12	13145142	18856.54	2.7771E+08	4.6058E+05	546	0	0	0.0000E+00	0.0000E+00	13145142	18856.54	
12.5	12788069	18135.96	2.8410E+08	4.6964E+05	545	0	0	0.0000E+00	0.0000E+00	12788069	18135.96	
13	12404969	17207.6	2.9031E+08	4.7825E+05	543	0	0	0.0000E+00	0.0000E+00	12404969	17207.6	
13.5	12029690	16312.87	2.9632E+08	4.8640E+05	541	0	0	0.0000E+00	0.0000E+00	12029690	16312.87	
14	11637003	15317.49	3.0214E+08	4.9406E+05	540	0	0	0.0000E+00	0.0000E+00	11637003	15317.49	
14.5	11265200	14325.8	3.0777E+08	5.0123E+05	537	0	0	0.0000E+00	0.0000E+00	11265200	14325.8	
15	10908067	13354.58	3.1323E+08	5.0790E+05	535	0	0	0.0000E+00	0.0000E+00	10908067	13354.58	
15.5	10529052	12513.56	3.1849E+08	5.1416E+05	532	0	0	0.0000E+00	0.0000E+00	10529052	12513.56	
16	10172781	12837.87	3.2358E+08	5.2058E+05	530	0	0	0.0000E+00	0.0000E+00	10172781	12837.87	
16.5	9593122	12295.3	3.2837E+08	5.2673E+05	527	0	0	0.0000E+00	0.0000E+00	9593122	12295.3	
17	9241970	12266.86	3.3300E+08	5.3286E+05	525	0	0	0.0000E+00	0.0000E+00	9241970	12266.86	
17.5	8945145	11939.64	3.3747E+08	5.3883E+05	524	0	0	0.0000E+00	0.0000E+00	8945145	11939.64	
18	8608562	11456.75	3.4177E+08	5.4456E+05	522	0	0	0.0000E+00	0.0000E+00	8608562	11456.75	
18.5	8200722	10509.73	3.4587E+08	5.4981E+05	519	0	0	0.0000E+00	0.0000E+00	8200722	10509.73	
19	7767801	9944.46	3.4976E+08	5.5478E+05	515	0	0	0.0000E+00	0.0000E+00	7767801	9944.46	
19.5	7177240	9359.52	3.5335E+08	5.5946E+05	511	0	0	0.0000E+00	0.0000E+00	7177240	9359.52	
20	6656238	8318.79	3.5667E+08	5.6362E+05	509	0	0	0.0000E+00	0.0000E+00	6656238	8318.79	
20.5	6209227	9157.62	3.5978E+08	5.6820E+05	508	0	0	0.0000E+00	0.0000E+00	6209227	9157.62	
21	5967128	9669.42	3.6276E+08	5.7304E+05	504	0	0	0.0000E+00	0.0000E+00	5967128	9669.42	
21.5	5666072	9766.52	3.6559E+08	5.7792E+05	502	0	0	0.0000E+00	0.0000E+00	5666072	9766.52	
22	5297181	9656.15	3.6824E+08	5.8275E+05	499	0	0	0.0000E+00	0.0000E+00	5297181	9656.15	
22.5	4762520	8935.77	3.7062E+08	5.8722E+05	495	0	0	0.0000E+00	0.0000E+00	4762520	8935.77	
23	4275188	8309.85	3.7276E+08	5.9137E+05	491	0	0	0.0000E+00	0.0000E+00	4275188	8309.85	
23.5	3892395	8024.4	3.7471E+08	5.9538E+05	488	0	0	0.0000E+00	0.0000E+00	3892395	8024.4	
24	3533321	7665.45	3.7647E+08	5.9922E+05	484	0	0	0.0000E+00	0.0000E+00	3533321	7665.45	

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water				Nitrogen Temp (°F)	Nitrogen				Steam		
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$		$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
24.5	3175733	7262.58	3.7806E+08	6.0285E+05	480	0	0	0.0000E+00	0.0000E+00	3175733	7262.58
25	2994282	7322.3	3.7956E+08	6.0651E+05	478	0	0	0.0000E+00	0.0000E+00	2994282	7322.3
25.5	3027711	8359.89	3.8107E+08	6.1069E+05	473	0	0	0.0000E+00	0.0000E+00	3027711	8359.89
26	2440432	7254.37	3.8229E+08	6.1432E+05	473	0	0	0.0000E+00	0.0000E+00	2440432	7254.37
26.5	2297765	7213.03	3.8344E+08	6.1792E+05	460	0	0	0.0000E+00	0.0000E+00	2297765	7213.03
27	3155290	11713.74	3.8502E+08	6.2378E+05	455	0	0	0.0000E+00	0.0000E+00	3155290	11713.74
27.5	2886523	11223.19	3.8646E+08	6.2939E+05	456	0	0	0.0000E+00	0.0000E+00	2886523	11223.19
28	2532731	9172.41	3.8773E+08	6.3398E+05	456	0	0	0.0000E+00	0.0000E+00	2532731	9172.41
28.5	2428284	9819.96	3.8894E+08	6.3889E+05	453	0	0	0.0000E+00	0.0000E+00	2428284	9819.96
29	1961635	8225.51	3.8993E+08	6.4300E+05	451	0	0	0.0000E+00	0.0000E+00	1961635	8225.51
29.5	1772439	7788.47	3.9081E+08	6.4689E+05	453	0	0	0.0000E+00	0.0000E+00	1772439	7788.47
30	1517606	7112.64	3.9157E+08	6.5045E+05	451	0	0	0.0000E+00	0.0000E+00	1517606	7112.64
30.5	1335753	6655.95	3.9224E+08	6.5378E+05	454	0	0	0.0000E+00	0.0000E+00	1335753	6655.95
31	1123083	5793.27	3.9280E+08	6.5667E+05	456	0	0	0.0000E+00	0.0000E+00	1123083	5793.27
31.5	313117	2469.28	3.9296E+08	6.5791E+05	452	428	1.5	2.1400E+02	7.5000E-01	312689	2467.78
32	598499	4198.55	3.9326E+08	6.6001E+05	451	869	3.52	6.4850E+02	2.5100E+00	597630	4195.03
32.5	0	0	3.9326E+08	6.6001E+05	457	0	0	6.4850E+02	2.5100E+00	0	0
33	208463	2312.51	3.9336E+08	6.6117E+05	462	655	2.17	9.7600E+02	3.5950E+00	207808	2310.33
33.5	251520	2334.86	3.9349E+08	6.6233E+05	456	1935	6.52	1.9435E+03	6.8550E+00	249585	2328.34
34	246057	2308.38	3.9361E+08	6.6349E+05	459	1276	4.26	2.5815E+03	8.9850E+00	244780	2304.12
34.5	297693	2349.82	3.9376E+08	6.6466E+05	461	3617	14.02	4.3900E+03	1.5995E+01	294077	2335.79
35	272107	2305.13	3.9389E+08	6.6581E+05	458	977	3.28	4.8785E+03	1.7635E+01	271130	2301.83
35.5	264614	2284.72	3.9403E+08	6.6696E+05	460	1876	6.27	5.8165E+03	2.0770E+01	262738	2278.44
36	262664	2267.58	3.9416E+08	6.6809E+05	457	1077	3.63	6.3550E+03	2.2585E+01	261587	2263.99
36.5	271367	2258.01	3.9429E+08	6.6922E+05	461	1105	3.69	6.9075E+03	2.4430E+01	270261	2254.33

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Time (s)	Not Accounting for Presence of Non-Condensable				Accounting for Presence of Non-Condensable						
	Steam and Water				Nitrogen Temp (°F)	Nitrogen				Steam	
	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
37	307522	2284.65	3.9445E+08	6.7036E+05	455	3599	14.26	8.7070E+03	3.1560E+01	303923	2270.35
37.5	351121	2412.63	3.9462E+08	6.7157E+05	439	6134	24.73	1.1774E+04	4.3925E+01	344987	2387.9
38	935479	5798.92	3.9509E+08	6.7447E+05	432	11667	46.87	1.7608E+04	6.7360E+01	923812	5752.05
38.5	970975	6109.22	3.9558E+08	6.7752E+05	426	9636	38.6	2.2426E+04	8.6660E+01	961340	6070.62
39	1136423	7489.09	3.9614E+08	6.8127E+05	423	5083	20.16	2.4967E+04	9.6740E+01	1131340	7468.93
39.5	918025	6310.89	3.9660E+08	6.8442E+05	419	1956	7.74	2.5945E+04	1.0061E+02	916069	6303.15
40	950820	6705.63	3.9708E+08	6.8777E+05	418	1746	7.07	2.6818E+04	1.0415E+02	949073	6698.56
40.5	754667	5492.74	3.9746E+08	6.9052E+05	419	1401	5.73	2.7519E+04	1.0701E+02	753266	5487.0
41	596175	4426.66	3.9775E+08	6.9273E+05	419	770	3.12	2.7904E+04	1.0857E+02	595405	4423.5
41.5	486767	3613.6	3.9800E+08	6.9454E+05	420	2062	8.52	2.8935E+04	1.1283E+02	484705	3605.0
42	397899	3053.78	3.9820E+08	6.9607E+05	418	531	2.12	2.9200E+04	1.1389E+02	397368	3051.6
42.5	459933	3364.45	3.9843E+08	6.9775E+05	414	2254	9.19	3.0327E+04	1.1849E+02	457679	3355.2
43	573783	4159.55	3.9871E+08	6.9983E+05	411	2933	11.67	3.1794E+04	1.2432E+02	570851	4147.8
43.5	856769	6189.37	3.9914E+08	7.0292E+05	409	3991	15.73	3.3789E+04	1.3219E+02	852778	6173.6
44	1120483	8156.23	3.9970E+08	7.0700E+05	403	5262	20.9	3.6420E+04	1.4264E+02	1115221	8135.3
44.5	1057589	7716.99	4.0023E+08	7.1086E+05	397	5564	22.16	3.9202E+04	1.5372E+02	1052025	7694.8
45	1139363	8447.2	4.0080E+08	7.1509E+05	398	4601	18.26	4.1503E+04	1.6285E+02	1134762	8428.9
45.5	717592	5286.13	4.0116E+08	7.1773E+05	405	3241	12.95	4.3123E+04	1.6932E+02	714351	5273.1
46	700472	5219.56	4.0151E+08	7.2034E+05	405	2514	9.93	4.4380E+04	1.7429E+02	697957	5209.6
46.5	715437	5411.88	4.0187E+08	7.2304E+05	403	2090	8.29	4.5425E+04	1.7843E+02	713347	5403.5
47	278552	2093.79	4.0201E+08	7.2409E+05	408	1087	4.18	4.5969E+04	1.8052E+02	277465	2089.6
47.5	276447	2082.18	4.0214E+08	7.2513E+05	410	1313	5.03	4.6625E+04	1.8304E+02	275134	2077.1
48	554333	4063.54	4.0242E+08	7.2716E+05	404	3680	14.65	4.8465E+04	1.9036E+02	550654	4048.8
48.5	819161	6025.68	4.0283E+08	7.3018E+05	397	4233	16.65	5.0582E+04	1.9869E+02	814928	6009.0
49	1145364	8383.26	4.0340E+08	7.3437E+05	398	5820	22.92	5.3492E+04	2.1015E+02	1139544	8360.3

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
49.5	1053424	7611.95	4.0393E+08	7.3817E+05	399	6508	25.63	5.6746E+04	2.2296E+02	1046915	7586.32
50	1109350	7945.71	4.0448E+08	7.4215E+05	400	7687	30.24	6.0589E+04	2.3808E+02	1101663	7915.47
50.5	1272894	9182.98	4.0512E+08	7.4674E+05	401	7318	28.79	6.4248E+04	2.5248E+02	1265576	9154.19
51	1044605	7454.94	4.0564E+08	7.5047E+05	398	6994	27.6	6.7745E+04	2.6628E+02	1037612	7427.34
51.5	1004196	7234.33	4.0615E+08	7.5408E+05	399	4922	19.51	7.0206E+04	2.7603E+02	999274	7214.83
52	783608	5682.11	4.0654E+08	7.5692E+05	404	2601	10.3	7.1507E+04	2.8118E+02	781007	5671.81
52.5	644300	4751.9	4.0686E+08	7.5930E+05	409	1155	4.57	7.2084E+04	2.8347E+02	643145	4747.32
53	543572	4049.11	4.0713E+08	7.6132E+05	415	672	2.59	7.2420E+04	2.8476E+02	542900	4046.52
53.5	481778	3581.49	4.0737E+08	7.6312E+05	415	933	3.61	7.2887E+04	2.8657E+02	480845	3577.86
54	519451	3795.32	4.0763E+08	7.6501E+05	414	1581	6.18	7.3677E+04	2.8966E+02	517870	3789.13
54.5	656555	4715.66	4.0796E+08	7.6737E+05	412	2460	9.65	7.4907E+04	2.9448E+02	654095	4706.07
55	991463	6985.66	4.0846E+08	7.7086E+05	405	4221	16.56	7.7018E+04	3.0276E+02	987243	6969.11
55.5	1109633	7786.77	4.0901E+08	7.7476E+05	401	5566	21.92	7.9801E+04	3.1372E+02	1104066	7764.83
56	1050582	7294.82	4.0954E+08	7.7840E+05	402	6598	25.98	8.3100E+04	3.2671E+02	1043984	7268.84
56.5	1237324	8684.21	4.1015E+08	7.8275E+05	403	6100	24.03	8.6150E+04	3.3873E+02	1231225	8660.19
57	997074	6980.33	4.1065E+08	7.8624E+05	407	4632	18.26	8.8466E+04	3.4786E+02	992442	6962.06
57.5	933337	6552.79	4.1112E+08	7.8951E+05	407	3785	14.92	9.0358E+04	3.5532E+02	929551	6537.81
58	936574	6580.56	4.1159E+08	7.9280E+05	407	3369	13.3	9.2043E+04	3.6197E+02	933206	6567.21
58.5	810859	5697.42	4.1199E+08	7.9565E+05	408	2813	11.1	9.3449E+04	3.6752E+02	808045	5686.32
59	714807	5056.08	4.1235E+08	7.9818E+05	411	1893	7.45	9.4396E+04	3.7124E+02	712914	5048.63
59.5	592160	4214.21	4.1265E+08	8.0029E+05	414	1270	4.96	9.5031E+04	3.7372E+02	590891	4209.21
60	543086	3875.31	4.1292E+08	8.0222E+05	415	1019	3.95	9.5540E+04	3.7570E+02	542066	3871.36
60.5	260757	1869.39	4.1305E+08	8.0316E+05	414	1281	4.95	9.6181E+04	3.7817E+02	259475	1864.43
61	566366	4025.55	4.1333E+08	8.0517E+05	412	1723	6.79	9.7042E+04	3.8157E+02	564643	4018.76
61.5	530187	3777.66	4.1360E+08	8.0706E+05	412	1507	5.83	9.7796E+04	3.8448E+02	528680	3771.83

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water				Nitrogen Temp (°F)	Nitrogen				Steam		
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$		$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
62	725236	5056.6	4.1396E+08	8.0959E+05	409	3058	12.09	9.9325E+04	3.9053E+02	722178	5044.5
62.5	852866	5873.37	4.1439E+08	8.1253E+05	407	3530	13.9	1.0109E+05	3.9748E+02	849336	5859.4
63	838079	5753.57	4.1481E+08	8.1540E+05	408	4067	16.07	1.0312E+05	4.0551E+02	834012	5737.5
63.5	1124579	7737.88	4.1537E+08	8.1927E+05	407	5057	19.93	1.0565E+05	4.1548E+02	1119522	7717.9
64	1424466	9789.92	4.1608E+08	8.2417E+05	403	7054	27.92	1.0918E+05	4.2944E+02	1417412	9762
64.5	1418359	9741.15	4.1679E+08	8.2904E+05	406	6772	26.93	1.1256E+05	4.4290E+02	1411587	9714.2
65	1466550	9885.89	4.1752E+08	8.3398E+05	410	6478	25.92	1.1580E+05	4.5586E+02	1460072	9859.9
65.5	1059572	6222.91	4.1805E+08	8.3709E+05	433	10918	42.53	1.2126E+05	4.7713E+02	1048654	6180.3
66	645638	2634.28	4.1837E+08	8.3841E+05	426	13672	53.81	1.2810E+05	5.0403E+02	631966	2580.4
66.5	835798	4677.32	4.1879E+08	8.4075E+05	425	12199	48.15	1.3420E+05	5.2811E+02	823599	4629.1
67	919971	5268.96	4.1925E+08	8.4338E+05	418	30574	122.15	1.4949E+05	5.8918E+02	889396	5146.8
67.5	705185	2780.72	4.1961E+08	8.4477E+05	411	55747	227.3	1.7736E+05	7.0283E+02	649438	2553.4
68	934417	4338.76	4.2007E+08	8.4694E+05	419	46902	187.39	2.0081E+05	7.9653E+02	887515	4151.3
68.5	1242680	5711.54	4.2069E+08	8.4980E+05	442	68471	262.19	2.3505E+05	9.2762E+02	1174210	5449.3
69	1019065	3991.22	4.2120E+08	8.5179E+05	433	82654	322.3	2.7637E+05	1.0888E+03	936411	3668.9
69.5	1011309	3505.72	4.2171E+08	8.5355E+05	437	77399	299.26	3.1507E+05	1.2384E+03	933910	3206.4
70	1201766	4626.95	4.2231E+08	8.5586E+05	438	85380	329.41	3.5776E+05	1.4031E+03	1116386	4297.5
70.5	1198909	3765.33	4.2291E+08	8.5774E+05	443	88680	339.9	4.0210E+05	1.5731E+03	1110228	3425.4
71	1278869	3593.98	4.2355E+08	8.5954E+05	453	77319	290.59	4.4076E+05	1.7184E+03	1201551	3303.3
71.5	1251864	3589.15	4.2417E+08	8.6133E+05	445	65536	249.87	4.7353E+05	1.8433E+03	1186328	3339.2
72	1053591	2242.68	4.2470E+08	8.6246E+05	443	65420	250.37	5.0624E+05	1.9685E+03	988171	1992.3
72.5	1090706	2208.37	4.2525E+08	8.6356E+05	447	64620	245.6	5.3855E+05	2.0913E+03	1026086	1962.7
73	1020766	1943.25	4.2576E+08	8.6453E+05	444	61834	236.34	5.6947E+05	2.2094E+03	958932	1706.9
73.5	992444	1905.95	4.2625E+08	8.6548E+05	442	61240	234.99	6.0009E+05	2.3269E+03	931204	1670.9
74	981669	1854.78	4.2674E+08	8.6641E+05	441	60653	233.16	6.3041E+05	2.4435E+03	921017	1621.6

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
74.5	965676	1807.28	4.2723E+08	8.6732E+05	442	60140	230.44	6.6048E+05	2.5587E+03	905536	1576.84
75	939590	1778.26	4.2770E+08	8.6820E+05	443	57597	220.39	6.8928E+05	2.6689E+03	881993	1557.87
75.5	901375	1695.75	4.2815E+08	8.6905E+05	444	56974	217.9	7.1777E+05	2.7779E+03	844401	1477.84
76	892210	1451.27	4.2859E+08	8.6978E+05	443	59503	228.37	7.4752E+05	2.8921E+03	832707	1222.9
76.5	882721	1406.83	4.2904E+08	8.7048E+05	443	57105	218.61	7.7607E+05	3.0014E+03	825616	1188.22
77	832838	1474.34	4.2945E+08	8.7122E+05	442	55757	213.75	8.0395E+05	3.1082E+03	777080	1260.5
77.5	798522	1861.6	4.2985E+08	8.7215E+05	446	52802	200.85	8.3035E+05	3.2087E+03	745720	1660.7
78	770432	1467	4.3024E+08	8.7288E+05	443	60993	233.28	8.6085E+05	3.3253E+03	709439	1233.7
78.5	662491	1126.62	4.3057E+08	8.7345E+05	452	42805	160.93	8.8225E+05	3.4058E+03	619686	965.7
79	732828	1438.81	4.3093E+08	8.7417E+05	458	49362	183.99	9.0693E+05	3.4978E+03	683466	1254.8
79.5	721299	1381.23	4.3129E+08	8.7486E+05	474	52729	191.44	9.3330E+05	3.5935E+03	668570	1189.7
80	698180	1395.62	4.3164E+08	8.7555E+05	474	50043	182.32	9.5832E+05	3.6847E+03	648137	1213.3
80.5	639348	1409.79	4.3196E+08	8.7626E+05	477	47027	169.9	9.8183E+05	3.7696E+03	592321	1239.8
81	647331	1642.44	4.3229E+08	8.7708E+05	463	47013	173.95	1.0053E+06	3.8566E+03	600319	1468.4
81.5	564976	1135.98	4.3257E+08	8.7765E+05	449	40985	155.1	1.0258E+06	3.9341E+03	523991	980.88
82	569631	1108.46	4.3285E+08	8.7820E+05	444	39049	148.76	1.0454E+06	4.0085E+03	530582	959.7
82.5	590405	1139.45	4.3315E+08	8.7877E+05	440	40651	155.66	1.0657E+06	4.0863E+03	549754	983.79
83	579136	1026.37	4.3344E+08	8.7928E+05	441	43893	167.44	1.0876E+06	4.1701E+03	535243	858.92
83.5	639830	1699.11	4.3376E+08	8.8013E+05	439	40851	156.52	1.1081E+06	4.2483E+03	598979	1542.5
84	480010	1107.65	4.3400E+08	8.8069E+05	434	42505	164.71	1.1293E+06	4.3307E+03	437505	942.94
84.5	498051	829.56	4.3425E+08	8.8110E+05	431	38978	151.98	1.1488E+06	4.4067E+03	459074	677.58
85	485518	835.09	4.3449E+08	8.8152E+05	431	38648	150.39	1.1681E+06	4.4819E+03	446870	684.71
85.5	497116	957.38	4.3474E+08	8.8200E+05	437	38965	149.62	1.1876E+06	4.5567E+03	458151	807.76
86	425076	1001.09	4.3495E+08	8.8250E+05	434	35974	139.49	1.2056E+06	4.6264E+03	389103	861.6
86.5	417426	796.71	4.3516E+08	8.8290E+05	437	38771	149.17	1.2250E+06	4.7010E+03	378655	647.55

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
87	415854	710.65	4.3537E+08	8.8325E+05	442	34100	129.78	1.2420E+06	4.7659E+03	381754	580.87
87.5	425825	705.73	4.3558E+08	8.8361E+05	444	32761	124.1	1.2584E+06	4.8279E+03	393064	581.63
88	409770	701.07	4.3579E+08	8.8396E+05	448	31620	119.22	1.2742E+06	4.8875E+03	378151	581.86
88.5	398432	695.86	4.3599E+08	8.8430E+05	447	29755	112.65	1.2891E+06	4.9439E+03	368676	583.21
89	388551	671.25	4.3618E+08	8.8464E+05	445	27681	105.78	1.3029E+06	4.9968E+03	360870	565.47
89.5	375890	641.16	4.3637E+08	8.8496E+05	449	26152	99.92	1.3160E+06	5.0467E+03	349737	541.25
90	362591	623.69	4.3655E+08	8.8527E+05	455	24840	94.42	1.3284E+06	5.0939E+03	337751	529.27
90.5	358742	620.55	4.3673E+08	8.8558E+05	460	24402	92.23	1.3406E+06	5.1400E+03	334340	528.32
91	358967	618.4	4.3691E+08	8.8589E+05	463	23044	86.79	1.3522E+06	5.1834E+03	335923	531.61
91.4	353753	613.02	4.3705E+08	8.8614E+05	463	22032	82.93	1.3610E+06	5.2166E+03	331720	530.09
91.9	353856	614.9	4.3723E+08	8.8645E+05	447	22584	86.22	1.3723E+06	5.2597E+03	331272	528.67
92.4	366781	626.79	4.3741E+08	8.8676E+05	429	20642	80.22	1.3826E+06	5.2998E+03	346139	546.57
92.9	359577	618.25	4.3759E+08	8.8707E+05	425	18977	74.01	1.3921E+06	5.3368E+03	340600	544.24
93.4	349218	608.27	4.3776E+08	8.8737E+05	423	17833	69.85	1.4010E+06	5.3718E+03	331385	538.42
93.9	341708	600.64	4.3793E+08	8.8767E+05	422	16851	66.05	1.4094E+06	5.4048E+03	324857	534.59
94.4	331832	589.53	4.3810E+08	8.8797E+05	422	15562	60.97	1.4172E+06	5.4353E+03	316270	528.56
94.9	321229	579.55	4.3826E+08	8.8826E+05	421	15161	59.45	1.4248E+06	5.4650E+03	306068	520.11
95.4	330921	591.81	4.3843E+08	8.8855E+05	428	16405	63.2	1.4330E+06	5.4966E+03	314516	528.61
95.9	323864	580.07	4.3859E+08	8.8884E+05	435	14940	56.66	1.4404E+06	5.5249E+03	308923	523.41
96.4	316445	576.38	4.3875E+08	8.8913E+05	433	14698	56.01	1.4478E+06	5.5529E+03	301747	520.37
96.9	349152	610.34	4.3892E+08	8.8944E+05	436	14700	55.63	1.4551E+06	5.5807E+03	334452	554.71
97.4	333139	592.35	4.3909E+08	8.8973E+05	437	11863	44.83	1.4611E+06	5.6032E+03	321276	547.52
97.9	326043	586.8	4.3925E+08	8.9003E+05	439	12027	45.27	1.4671E+06	5.6258E+03	314016	541.52
98.4	323791	603.84	4.3941E+08	8.9033E+05	444	11838	44.15	1.4730E+06	5.6479E+03	311954	559.69
98.9	333809	601.7	4.3958E+08	8.9063E+05	445	10984	40.81	1.4785E+06	5.6683E+03	322825	560.88

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
99.4	335979	610.11	4.3975E+08	8.9093E+05	446	10045	37.23	1.4835E+06	5.6869E+03	325934	572.88
99.9	329055	610.87	4.3991E+08	8.9124E+05	456	10111	36.61	1.4886E+06	5.7052E+03	318944	574.26
100.4	358520	734.25	4.4009E+08	8.9161E+05	457	11184	40.65	1.4942E+06	5.7255E+03	347336	693.6
100.9	449849	1063.69	4.4032E+08	8.9214E+05	460	9307	33.37	1.4988E+06	5.7422E+03	440541	1030.32
101.4	397457	987.29	4.4052E+08	8.9263E+05	461	6151	21.49	1.5019E+06	5.7530E+03	391306	965.8
101.9	488833	1429.07	4.4076E+08	8.9335E+05	493	6544	22.53	1.5052E+06	5.7642E+03	482288	1406.5
102.4	406860	972.29	4.4096E+08	8.9383E+05	506	7615	26.02	1.5090E+06	5.7772E+03	399245	946.27
102.9	339984	669.49	4.4113E+08	8.9417E+05	505	8118	27.81	1.5130E+06	5.7911E+03	331866	641.68
103.4	321352	580.22	4.4129E+08	8.9446E+05	508	9308	31.87	1.5177E+06	5.8071E+03	312044	548.35
103.9	321172	562.95	4.4145E+08	8.9474E+05	514	10269	34.89	1.5228E+06	5.8245E+03	310903	528.05
104.4	312372	548.07	4.4161E+08	8.9501E+05	517	9399	31.86	1.5275E+06	5.8404E+03	302973	516.21
104.9	308491	542.11	4.4176E+08	8.9528E+05	519	9805	33.17	1.5324E+06	5.8570E+03	298686	508.94
105.4	344426	571.23	4.4194E+08	8.9557E+05	523	9801	32.95	1.5373E+06	5.8735E+03	334625	538.27
105.9	324722	549.11	4.4210E+08	8.9584E+05	523	6310	21.2	1.5405E+06	5.8841E+03	318412	527.9
106.4	309174	539.8	4.4225E+08	8.9611E+05	523	6810	22.9	1.5439E+06	5.8956E+03	302364	516.9
106.9	309741	546.3	4.4241E+08	8.9639E+05	523	8435	28.38	1.5481E+06	5.9097E+03	301306	517.92
107.4	299751	538.11	4.4256E+08	8.9666E+05	522	8522	28.7	1.5524E+06	5.9241E+03	291229	509.4
107.9	286356	527.6	4.4270E+08	8.9692E+05	521	8845	29.88	1.5568E+06	5.9390E+03	277511	497.72
108.4	284299	530.45	4.4284E+08	8.9718E+05	521	9561	32.31	1.5616E+06	5.9552E+03	274738	498.14
108.9	274517	521.97	4.4298E+08	8.9745E+05	521	9082	30.7	1.5661E+06	5.9705E+03	265435	491.27
109.4	284041	531.15	4.4312E+08	8.9771E+05	521	9158	30.97	1.5707E+06	5.9860E+03	274882	500.19
109.9	287731	533.73	4.4327E+08	8.9798E+05	521	7975	26.91	1.5747E+06	5.9995E+03	279757	506.82
110.4	304068	547.75	4.4342E+08	8.9825E+05	523	7321	24.6	1.5783E+06	6.0118E+03	296747	523.15
110.9	308137	551.57	4.4357E+08	8.9853E+05	514	5436	18.6	1.5811E+06	6.0211E+03	302701	532.97
111.4	309933	553.15	4.4373E+08	8.9880E+05	504	4415	15.46	1.5833E+06	6.0288E+03	305518	537.7

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
111.9	306415	550.07	4.4388E+08	8.9908E+05	504	4423	15.48	1.5855E+06	6.0365E+03	301992	534.6
112.4	315075	559.1	4.4404E+08	8.9936E+05	503	5603	19.64	1.5883E+06	6.0464E+03	309472	539.45
112.9	306570	554.23	4.4419E+08	8.9964E+05	502	5545	19.47	1.5910E+06	6.0561E+03	301025	534.76
113.4	299176	550.75	4.4434E+08	8.9991E+05	501	5960	20.99	1.5940E+06	6.0666E+03	293216	529.77
113.9	299292	554.32	4.4449E+08	9.0019E+05	501	6528	22.99	1.5973E+06	6.0781E+03	292763	531.33
114.4	321278	576.6	4.4465E+08	9.0048E+05	478	6770	24.34	1.6007E+06	6.0903E+03	314508	552.26
114.9	330349	582.51	4.4482E+08	9.0077E+05	451	4352	16.07	1.6028E+06	6.0983E+03	325997	566.44
115.4	320016	574.03	4.4498E+08	9.0106E+05	447	3939	14.63	1.6048E+06	6.1056E+03	316077	559.4
115.9	309895	566.95	4.4513E+08	9.0134E+05	445	4080	15.16	1.6069E+06	6.1132E+03	305815	551.79
116.4	307421	568.07	4.4529E+08	9.0162E+05	444	4949	18.43	1.6093E+06	6.1224E+03	302472	549.64
116.9	304826	568	4.4544E+08	9.0191E+05	444	5676	21.15	1.6122E+06	6.1330E+03	299149	546.85
117.4	296333	560.72	4.4559E+08	9.0219E+05	444	5721	21.31	1.6150E+06	6.1436E+03	290612	539.41
117.9	284889	551.42	4.4573E+08	9.0246E+05	443	6039	22.55	1.6181E+06	6.1549E+03	278849	528.87
118.4	277958	548.28	4.4587E+08	9.0274E+05	442	6622	24.77	1.6214E+06	6.1673E+03	271336	523.52
118.9	274323	545.79	4.4601E+08	9.0301E+05	441	7043	26.38	1.6249E+06	6.1805E+03	267280	519.42
119.4	282861	559.42	4.4615E+08	9.0329E+05	441	6999	26.24	1.6284E+06	6.1936E+03	275862	533.18
119.9	294740	565.53	4.4629E+08	9.0357E+05	442	5730	21.42	1.6312E+06	6.2043E+03	289010	544.1
120.4	298527	566.37	4.4644E+08	9.0386E+05	443	3715	13.85	1.6331E+06	6.2112E+03	294812	552.52
120.9	310684	572.43	4.4660E+08	9.0414E+05	445	3004	11.16	1.6346E+06	6.2168E+03	307680	561.28
121.4	306063	567.59	4.4675E+08	9.0443E+05	445	3011	11.18	1.6361E+06	6.2224E+03	303052	556.4
121.9	297183	562.28	4.4690E+08	9.0471E+05	444	3329	12.38	1.6378E+06	6.2286E+03	293855	549.9
122.4	290245	560.66	4.4705E+08	9.0499E+05	443	4440	16.54	1.6400E+06	6.2369E+03	285805	544.12
122.9	288448	565.97	4.4719E+08	9.0527E+05	443	5361	20	1.6427E+06	6.2469E+03	283087	545.97
123.4	282769	560.83	4.4733E+08	9.0555E+05	442	5272	19.69	1.6453E+06	6.2567E+03	277496	541.14
123.9	329938	610.32	4.4750E+08	9.0586E+05	444	5376	19.98	1.6480E+06	6.2667E+03	324562	590.34

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
124.4	311580	588.63	4.4765E+08	9.0615E+05	444	2738	10.19	1.6494E+06	6.2718E+03	308841	578.43
124.9	303611	581.61	4.4780E+08	9.0644E+05	444	2835	10.55	1.6508E+06	6.2771E+03	300776	571.05
125.4	301074	580.12	4.4795E+08	9.0673E+05	444	3078	11.45	1.6523E+06	6.2828E+03	297996	568.67
125.9	298419	581.9	4.4810E+08	9.0702E+05	444	3739	13.89	1.6542E+06	6.2897E+03	294680	568.01
126.4	296969	583.4	4.4825E+08	9.0731E+05	444	4247	15.78	1.6563E+06	6.2976E+03	292721	567.62
126.9	291045	579.98	4.4840E+08	9.0760E+05	444	4470	16.62	1.6586E+06	6.3059E+03	286575	563.37
127.4	292467	586.05	4.4854E+08	9.0790E+05	444	4812	17.89	1.6610E+06	6.3149E+03	287655	568.15
127.9	309387	600.94	4.4870E+08	9.0820E+05	444	4334	16.09	1.6631E+06	6.3229E+03	305053	584.85
128.4	301227	592.06	4.4885E+08	9.0849E+05	445	2674	9.93	1.6645E+06	6.3279E+03	298553	582.13
128.9	296393	587.62	4.4900E+08	9.0879E+05	444	2822	10.48	1.6659E+06	6.3331E+03	293571	577.14
129.4	292794	586.39	4.4914E+08	9.0908E+05	444	3686	13.69	1.6677E+06	6.3400E+03	289108	572.7
129.9	289168	586.34	4.4929E+08	9.0937E+05	444	4413	16.41	1.6699E+06	6.3482E+03	284756	569.93
130.4	288023	586.41	4.4943E+08	9.0967E+05	443	4626	17.21	1.6722E+06	6.3568E+03	283396	569.2
130.9	287377	586.2	4.4958E+08	9.0996E+05	444	4560	16.95	1.6745E+06	6.3653E+03	282816	569.25
131.4	284323	583.29	4.4972E+08	9.1025E+05	443	4329	16.11	1.6767E+06	6.3733E+03	279994	567.19
131.9	285715	588.2	4.4986E+08	9.1055E+05	443	4180	15.54	1.6788E+06	6.3811E+03	281535	572.67
132.4	283305	568.28	4.5000E+08	9.1083E+05	443	3957	14.72	1.6808E+06	6.3885E+03	279348	553.56
132.9	282176	549.28	4.5014E+08	9.1110E+05	443	3877	14.42	1.6827E+06	6.3957E+03	278299	534.86
133.4	274816	534.11	4.5028E+08	9.1137E+05	443	3705	13.8	1.6845E+06	6.4026E+03	271111	520.31
133.9	275626	535.31	4.5042E+08	9.1164E+05	444	3878	14.42	1.6865E+06	6.4098E+03	271748	520.89
134.4	273033	543.26	4.5056E+08	9.1191E+05	444	4010	14.92	1.6885E+06	6.4172E+03	269022	528.35
134.9	271111	551.44	4.5069E+08	9.1219E+05	443	4064	15.12	1.6905E+06	6.4248E+03	267047	536.32
135.4	269076	553.77	4.5083E+08	9.1246E+05	443	4129	15.37	1.6926E+06	6.4325E+03	264946	538.4
135.9	267807	550.35	4.5096E+08	9.1274E+05	443	4103	15.27	1.6946E+06	6.4401E+03	263704	535.08
136.4	266017	547.43	4.5109E+08	9.1301E+05	443	4081	15.19	1.6967E+06	6.4477E+03	261936	532.25

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F) (Pump Side + Vessel Side)/2	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
136.9	262771	544.63	4.5122E+08	9.1328E+05	443	4003	14.9	1.6987E+06	6.4552E+03	258769	529.74
137.4	262279	547.47	4.5135E+08	9.1356E+05	443	3829	14.25	1.7006E+06	6.4623E+03	258450	533.23
137.9	259095	548.4	4.5148E+08	9.1383E+05	443	3596	13.38	1.7024E+06	6.4690E+03	255499	535.02
138.4	259409	551.82	4.5161E+08	9.1411E+05	443	3620	13.47	1.7042E+06	6.4757E+03	255789	538.35
138.9	261069	553.31	4.5174E+08	9.1438E+05	444	3542	13.15	1.7060E+06	6.4823E+03	257527	540.15
139.4	259676	552.01	4.5187E+08	9.1466E+05	443	3455	12.84	1.7077E+06	6.4887E+03	256221	539.17
139.9	255698	548.82	4.5200E+08	9.1493E+05	443	3433	12.77	1.7094E+06	6.4951E+03	252265	536.05
140.4	255628	549.18	4.5213E+08	9.1521E+05	443	3332	12.39	1.7111E+06	6.5013E+03	252297	536.8
140.9	252141	547.9	4.5226E+08	9.1548E+05	443	3064	11.37	1.7126E+06	6.5070E+03	249077	536.53
141.4	254427	552.49	4.5238E+08	9.1576E+05	444	2868	10.63	1.7140E+06	6.5123E+03	251559	541.87
141.9	258159	555.67	4.5251E+08	9.1604E+05	445	2781	10.3	1.7154E+06	6.5174E+03	255378	545.36
142.4	259051	557.57	4.5264E+08	9.1632E+05	445	2706	10.02	1.7168E+06	6.5224E+03	256345	547.54
142.9	255244	553.55	4.5277E+08	9.1659E+05	445	2676	9.91	1.7181E+06	6.5274E+03	252568	543.63
143.4	253761	551.44	4.5290E+08	9.1687E+05	445	2879	10.67	1.7196E+06	6.5327E+03	250881	540.76
143.9	252461	551.43	4.5302E+08	9.1714E+05	444	3023	11.21	1.7211E+06	6.5383E+03	249438	540.22
144.4	255538	555.31	4.5315E+08	9.1742E+05	444	3068	11.38	1.7226E+06	6.5440E+03	252470	543.93
144.9	255004	557.5	4.5328E+08	9.1770E+05	444	2985	11.07	1.7241E+06	6.5496E+03	252019	546.43
145.4	256790	560.02	4.5341E+08	9.1798E+05	444	2919	10.82	1.7256E+06	6.5550E+03	253872	549.21
145.9	257542	561.73	4.5354E+08	9.1826E+05	445	2679	9.91	1.7269E+06	6.5599E+03	254863	551.82
146.4	256921	559.68	4.5366E+08	9.1854E+05	445	2485	9.2	1.7281E+06	6.5645E+03	254436	550.48
146.9	257789	561.01	4.5379E+08	9.1882E+05	445	2533	9.37	1.7294E+06	6.5692E+03	255256	551.64
147.4	255590	559.25	4.5392E+08	9.1910E+05	445	2698	9.99	1.7308E+06	6.5742E+03	252892	549.27
147.9	254613	560.19	4.5405E+08	9.1938E+05	444	2793	10.34	1.7322E+06	6.5794E+03	251820	549.84
148.4	253957	560.58	4.5417E+08	9.1966E+05	444	2711	10.05	1.7335E+06	6.5844E+03	251246	550.53
148.9	254536	562.13	4.5430E+08	9.1994E+05	445	2523	9.35	1.7348E+06	6.5891E+03	252013	552.78

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
149.4	254469	562.82	4.5443E+08	9.2022E+05	445	2448	9.07	1.7360E+06	6.5936E+03	252021	553.74
149.9	253534	561.69	4.5456E+08	9.2051E+05	445	2470	9.15	1.7372E+06	6.5982E+03	251064	552.54
150.4	252860	560.99	4.5468E+08	9.2079E+05	445	2604	9.64	1.7385E+06	6.6030E+03	250256	551.35
150.9	255576	564.58	4.5481E+08	9.2107E+05	445	2735	10.12	1.7399E+06	6.6081E+03	252841	554.45
151.4	258479	566.58	4.5494E+08	9.2135E+05	445	2584	9.56	1.7412E+06	6.6129E+03	255894	557.03
151.9	258269	567.01	4.5507E+08	9.2164E+05	446	2182	8.06	1.7423E+06	6.6169E+03	256088	558.95
152.4	257401	565.1	4.5520E+08	9.2192E+05	446	1982	7.32	1.7433E+06	6.6205E+03	255419	557.78
152.9	256526	566.3	4.5533E+08	9.2220E+05	446	2200	8.13	1.7444E+06	6.6246E+03	254326	558.16
153.4	252399	563.12	4.5545E+08	9.2248E+05	445	2506	9.29	1.7456E+06	6.6293E+03	249893	553.84
153.8	252074	563.37	4.5555E+08	9.2271E+05	444	2609	9.68	1.7467E+06	6.6331E+03	249464	553.69
154.3	249410	562.26	4.5568E+08	9.2299E+05	444	2576	9.57	1.7480E+06	6.6379E+03	246834	552.69
154.8	252237	566.87	4.5580E+08	9.2327E+05	444	2638	9.78	1.7493E+06	6.6428E+03	249599	557.09
155.3	245871	548.37	4.5593E+08	9.2355E+05	445	2363	8.75	1.7505E+06	6.6472E+03	243508	539.62
155.8	244476	546.86	4.5605E+08	9.2382E+05	445	2084	7.71	1.7515E+06	6.6510E+03	242392	539.15
156.3	248622	568.22	4.5617E+08	9.2410E+05	445	2202	8.16	1.7526E+06	6.6551E+03	246420	560.06
156.8	249578	574.78	4.5630E+08	9.2439E+05	445	2503	9.29	1.7539E+06	6.6598E+03	247075	565.49
157.3	260921	643.01	4.5643E+08	9.2471E+05	445	2481	9.23	1.7551E+06	6.6644E+03	258440	633.79
157.8	269864	686.05	4.5656E+08	9.2506E+05	445	2207	8.18	1.7562E+06	6.6685E+03	267657	677.87
158.3	272033	712.44	4.5670E+08	9.2541E+05	446	1954	7.24	1.7572E+06	6.6721E+03	270079	705.2
158.8	269661	708.9	4.5683E+08	9.2577E+05	446	1895	7.02	1.7581E+06	6.6756E+03	267766	701.88
159.3	271586	694.87	4.5697E+08	9.2611E+05	446	1970	7.3	1.7591E+06	6.6792E+03	269616	687.57
159.8	270803	677.26	4.5710E+08	9.2645E+05	446	1782	6.6	1.7600E+06	6.6825E+03	269021	670.66
160	269929	672.98	4.5716E+08	9.2659E+05	446	1641	6.07	1.7603E+06	6.6838E+03	268288	666.9
160.5	264488	656.33	4.5729E+08	9.2692E+05	447	1278	4.73	1.7610E+06	6.6861E+03	263210	651.6
161	266988	649.68	4.5742E+08	9.2724E+05	446	1453	5.38	1.7617E+06	6.6888E+03	265534	644.3

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
161.5	263931	640.63	4.5756E+08	9.2756E+05	446	1707	6.33	1.7626E+06	6.6920E+03	262224	634.3
162	263839	633.73	4.5769E+08	9.2788E+05	446	1834	6.8	1.7635E+06	6.6954E+03	262006	626.93
162.5	266702	600.44	4.5782E+08	9.2818E+05	446	1813	6.7	1.7644E+06	6.6987E+03	264889	593.74
163	261970	588.71	4.5795E+08	9.2847E+05	446	1849	6.83	1.7653E+06	6.7021E+03	260121	581.88
163.5	257742	567.33	4.5808E+08	9.2876E+05	446	2154	7.97	1.7664E+06	6.7061E+03	255588	559.36
164	254605	562.52	4.5821E+08	9.2904E+05	446	2401	8.88	1.7676E+06	6.7106E+03	252204	553.64
164.5	250109	553.64	4.5833E+08	9.2931E+05	445	2482	9.19	1.7688E+06	6.7152E+03	247628	544.45
165	250303	553.89	4.5846E+08	9.2959E+05	445	2481	9.19	1.7701E+06	6.7198E+03	247822	544.71
165.5	247538	550.16	4.5858E+08	9.2987E+05	445	2371	8.77	1.7712E+06	6.7241E+03	245167	541.38
166	246224	547.76	4.5871E+08	9.3014E+05	445	2437	9.03	1.7725E+06	6.7287E+03	243787	538.73
166.6	243198	543.32	4.5885E+08	9.3047E+05	445	2561	9.5	1.7740E+06	6.7344E+03	240637	533.81
167.1	240708	540.99	4.5897E+08	9.3074E+05	444	2586	9.62	1.7753E+06	6.7392E+03	238122	531.37
167.6	241159	539.8	4.5909E+08	9.3101E+05	444	2644	9.84	1.7766E+06	6.7441E+03	238515	529.96
168.1	237708	535.31	4.5921E+08	9.3127E+05	443	2661	9.91	1.7779E+06	6.7490E+03	235046	525.4
168.6	239082	536.23	4.5933E+08	9.3154E+05	443	2642	9.85	1.7793E+06	6.7540E+03	236440	526.38
169.1	242234	535.72	4.5945E+08	9.3181E+05	442	2409	9.01	1.7805E+06	6.7585E+03	239825	526.71
169.6	244652	538.48	4.5957E+08	9.3208E+05	443	2137	7.97	1.7815E+06	6.7625E+03	242514	530.5
170.1	248756	539.8	4.5970E+08	9.3235E+05	445	1702	6.32	1.7824E+06	6.7656E+03	247054	533.48
170.6	252342	540.89	4.5983E+08	9.3262E+05	446	1130	4.18	1.7830E+06	6.7677E+03	251212	536.71
171.1	246313	536.12	4.5995E+08	9.3289E+05	446	1006	3.72	1.7835E+06	6.7696E+03	245307	532.39
171.6	242843	533.76	4.6007E+08	9.3315E+05	446	1078	3.98	1.7840E+06	6.7716E+03	241765	529.78
172.1	238673	533.34	4.6019E+08	9.3342E+05	445	1673	6.2	1.7848E+06	6.7747E+03	237000	527.14
172.6	238558	537.04	4.6031E+08	9.3369E+05	444	2421	8.99	1.7860E+06	6.7791E+03	236137	528.06
173.1	240198	534.82	4.6043E+08	9.3396E+05	443	2654	9.88	1.7874E+06	6.7841E+03	237543	524.94
173.6	239287	525.29	4.6055E+08	9.3422E+05	443	2302	8.57	1.7885E+06	6.7884E+03	236985	516.72

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$		(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)
174.1	236313	511.08	4.6067E+08	9.3447E+05	444	2124	7.91	1.7896E+06	6.7923E+03	234189	503.18
174.6	234450	491.83	4.6078E+08	9.3472E+05	444	2274	8.46	1.7907E+06	6.7966E+03	232177	483.36
175.1	232617	470.28	4.6090E+08	9.3496E+05	444	2253	8.4	1.7918E+06	6.8008E+03	230364	461.87
175.6	233666	459.87	4.6102E+08	9.3519E+05	445	2195	8.16	1.7929E+06	6.8048E+03	231471	451.71
176.1	231812	470.78	4.6113E+08	9.3542E+05	446	1922	7.14	1.7939E+06	6.8084E+03	229889	463.65
176.6	232643	489.88	4.6125E+08	9.3567E+05	446	1782	6.62	1.7948E+06	6.8117E+03	230862	483.27
177.1	231320	504.7	4.6136E+08	9.3592E+05	445	1901	7.06	1.7957E+06	6.8152E+03	229419	497.64
177.6	232513	510.51	4.6148E+08	9.3617E+05	445	2021	7.5	1.7968E+06	6.8190E+03	230491	503.02
178.1	231617	507.49	4.6160E+08	9.3643E+05	446	1842	6.83	1.7977E+06	6.8224E+03	229774	500.66
178.6	230932	505.72	4.6171E+08	9.3668E+05	446	1635	6.06	1.7985E+06	6.8254E+03	229297	499.67
179.2	231677	510.34	4.6185E+08	9.3699E+05	446	1617	5.99	1.7995E+06	6.8290E+03	230060	504.35
179.7	233439	520	4.6197E+08	9.3725E+05	446	1745	6.47	1.8003E+06	6.8323E+03	231694	513.53
180.2	235908	529.18	4.6209E+08	9.3751E+05	446	1872	6.93	1.8013E+06	6.8357E+03	234037	522.25
180.7	235561	534.66	4.6220E+08	9.3778E+05	446	1697	6.28	1.8021E+06	6.8389E+03	233864	528.38
181.2	236321	537.62	4.6232E+08	9.3805E+05	446	1545	5.71	1.8029E+06	6.8417E+03	234776	531.91
181.7	235510	539.02	4.6244E+08	9.3832E+05	446	1740	6.44	1.8038E+06	6.8450E+03	233770	532.58
182.2	236092	542.91	4.6256E+08	9.3859E+05	445	2079	7.71	1.8048E+06	6.8488E+03	234013	535.2
182.7	238941	548.86	4.6268E+08	9.3886E+05	445	2175	8.06	1.8059E+06	6.8528E+03	236766	540.8
183.2	239213	562.17	4.6280E+08	9.3914E+05	446	2012	7.47	1.8069E+06	6.8566E+03	237200	554.7
183.7	242569	598.49	4.6292E+08	9.3944E+05	446	1714	6.35	1.8078E+06	6.8597E+03	240856	592.14
184.2	253164	636.79	4.6304E+08	9.3976E+05	446	1441	5.33	1.8085E+06	6.8624E+03	251723	631.46
184.7	255119	664.61	4.6317E+08	9.4009E+05	447	1241	4.58	1.8091E+06	6.8647E+03	253879	660.03
185.2	254743	670.59	4.6330E+08	9.4043E+05	447	1185	4.36	1.8097E+06	6.8669E+03	253559	666.22
185.7	252166	660.39	4.6343E+08	9.4076E+05	446	1354	5	1.8104E+06	6.8694E+03	250812	655.39
186.2	249269	643.95	4.6355E+08	9.4108E+05	445	1669	6.18	1.8112E+06	6.8725E+03	247601	637.77

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
186.7	246909	631.47	4.6367E+08	9.4140E+05	445	1863	6.9	1.8121E+06	6.8759E+03	245046	624.57
187.2	244329	621.4	4.6380E+08	9.4171E+05	446	1933	7.16	1.8131E+06	6.8795E+03	242396	614.24
187.7	248818	600.86	4.6392E+08	9.4201E+05	445	1921	7.1	1.8141E+06	6.8831E+03	246897	593.77
188.2	245697	587.88	4.6404E+08	9.4230E+05	445	1896	7.01	1.8150E+06	6.8866E+03	243800	580.87
188.7	242345	567.59	4.6416E+08	9.4259E+05	445	1846	6.83	1.8159E+06	6.8900E+03	240499	560.76
189.2	241234	565.56	4.6428E+08	9.4287E+05	445	1950	7.22	1.8169E+06	6.8936E+03	239283	558.34
189.7	238335	562.8	4.6440E+08	9.4315E+05	445	2058	7.62	1.8179E+06	6.8974E+03	236277	555.18
190.2	237935	564.35	4.6452E+08	9.4343E+05	445	2063	7.63	1.8190E+06	6.9012E+03	235872	556.72
190.7	239063	559.44	4.6464E+08	9.4371E+05	445	2049	7.58	1.8200E+06	6.9050E+03	237014	551.86
191.2	236539	551.49	4.6476E+08	9.4399E+05	445	1928	7.14	1.8210E+06	6.9086E+03	234611	544.35
191.8	236130	541.8	4.6490E+08	9.4431E+05	445	1880	6.97	1.8221E+06	6.9127E+03	234251	534.84
192.3	233754	529.03	4.6502E+08	9.4458E+05	445	1950	7.24	1.8231E+06	6.9164E+03	231803	521.8
192.8	229313	514.49	4.6513E+08	9.4483E+05	444	2070	7.69	1.8241E+06	6.9202E+03	227243	506.79
193.3	227067	510.75	4.6525E+08	9.4509E+05	444	2205	8.19	1.8252E+06	6.9243E+03	224861	502.56
193.8	225926	514.21	4.6536E+08	9.4535E+05	444	2398	8.92	1.8264E+06	6.9288E+03	223528	505.29
194.3	227906	523.68	4.6547E+08	9.4561E+05	444	2572	9.58	1.8277E+06	6.9336E+03	225334	514.1
194.8	237447	536.22	4.6559E+08	9.4588E+05	444	2632	9.78	1.8290E+06	6.9384E+03	234815	526.44
195.3	240829	541.17	4.6571E+08	9.4615E+05	445	1891	7.01	1.8299E+06	6.9420E+03	238938	534.16
195.8	240950	538.09	4.6583E+08	9.4642E+05	446	1391	5.15	1.8306E+06	6.9445E+03	239558	532.94
196.3	238896	535.7	4.6595E+08	9.4668E+05	447	1266	4.68	1.8313E+06	6.9469E+03	237630	531.02
196.8	234690	533.23	4.6607E+08	9.4695E+05	446	1220	4.51	1.8319E+06	6.9491E+03	233470	528.71
197.3	235154	539.61	4.6619E+08	9.4722E+05	445	1673	6.21	1.8327E+06	6.9522E+03	233481	533.4
197.8	234746	542.77	4.6631E+08	9.4749E+05	444	2260	8.41	1.8338E+06	6.9564E+03	232487	534.36
198.3	237225	549.13	4.6642E+08	9.4777E+05	443	2463	9.19	1.8351E+06	6.9610E+03	234762	539.95
198.8	238044	549.11	4.6654E+08	9.4804E+05	443	1813	6.75	1.8360E+06	6.9644E+03	236231	542.36

Table 06.02.01.05-1f—Requested Mass and Energy Release Input

Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Steam and Water					Nitrogen Temp (°F)	Nitrogen				Steam	
Time (s)	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	(Pump Side + Vessel Side)/2	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)	$\Sigma(\text{Btu/s}) \cdot \Delta t$	$\Sigma(\text{lbm/s}) \cdot \Delta t$	Enthalpy Flowrate (Btu/s)	Mass Flowrate (lbm/s)
199.3	238681	548.17	4.6666E+08	9.4832E+05	444	1069	3.97	1.8365E+06	6.9664E+03	237612	544.21
199.8	240530	549.83	4.6678E+08	9.4859E+05	448	818	3.01	1.8369E+06	6.9679E+03	239712	546.82
200	235022	546.72	4.6683E+08	9.4870E+05	445	873	3.23	1.8371E+06	6.9685E+03	234149	543.49
Cumulative Results at 200 Seconds											
Not Accounting for Presence of Non-Condensable					Accounting for Presence of Non-Condensable						
Total Mass of Steam and Water Released (lbm)					Total Mass of Nitrogen Released (A) (lbm)		Total Mass of Steam-Water _{Adjusted} Released (B) (lbm)		Total Mass Released (A + B) (lbm)	Contribution of Nitrogen to Total Mass Released ((A / B) x 100)	
9.4870E+05					6.9685E+03	+	9.4173E+05	=	9.4870E+05	0.73%	
Total Energy of Steam and Water Released (Btu)					Total Energy of Nitrogen Released (C) (Btu)		Total Energy of Steam-Water _{Adjusted} Released (D) (Btu)		Total Energy Released (C + D) (Btu)	Contribution of Nitrogen to Total Energy Released ((C / D) x 100)	
4.6683E+08					1.8371E+06	+	4.6499E+08	=	4.6683E+08	0.39%	

h. ICECON Noding

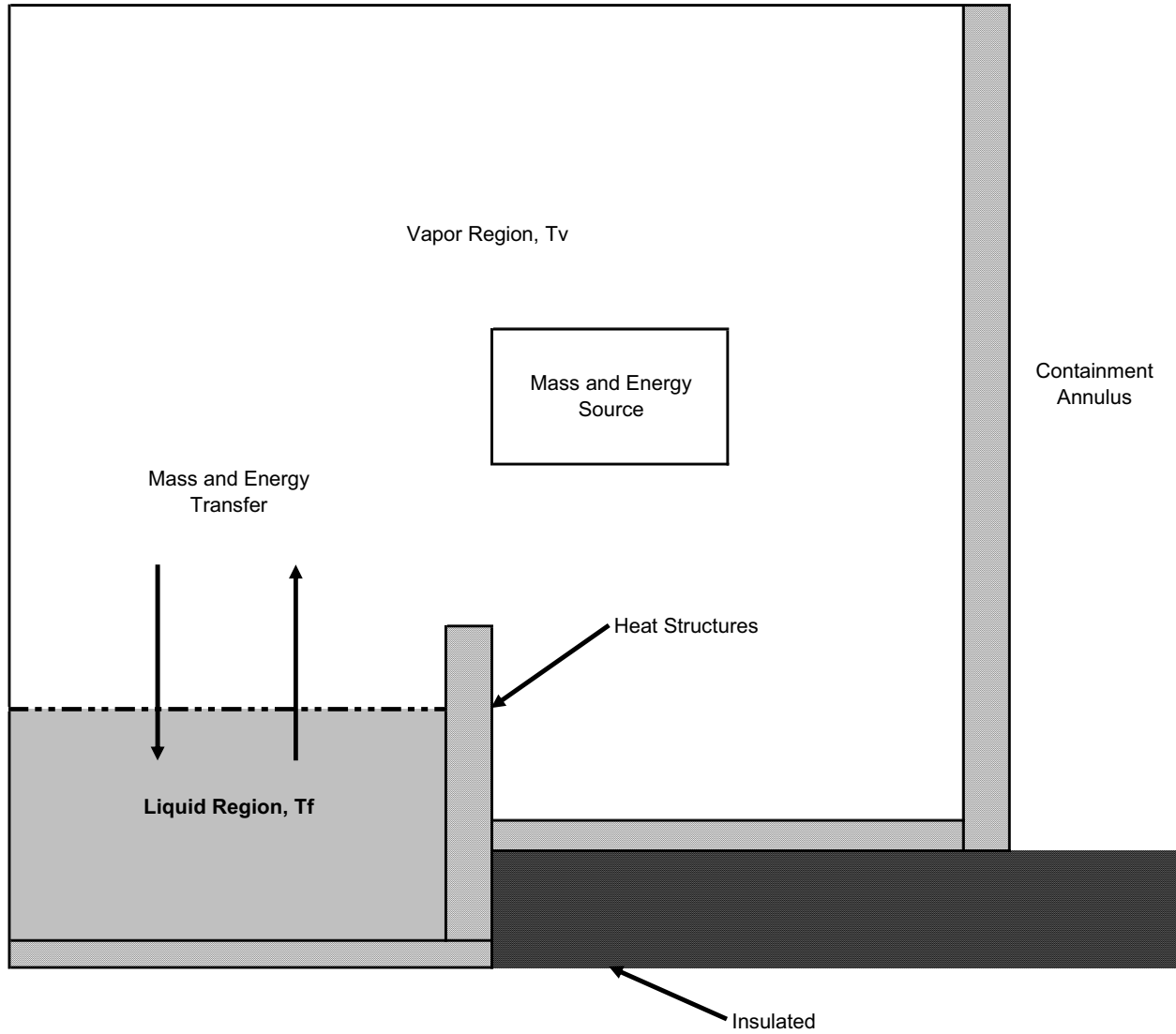
For the realistic large break loss of coolant accident (RLBLOCA), AREVA NP models the U.S. EPR containment in ICECON as a dry containment with only one compartment, the drywell. The ICECON computer code is based on the CONTEMPT/LT-022 code and cannot model a multi-node drywell compartment.

Figure 06.02.01.05-1h-1 is a schematic of the U.S. EPR ICECON containment model showing the reactor vessel and containment volumes. The reactor vessel and primary system are represented as a mass and energy source to the containment volume. The containment building is modeled as being in contact with the containment annulus on the exterior side.

Figure 06.02.01.05-1h-2 shows a sensitivity study comparing the containment pressure predictions between a single-node GOTHIC model, using Tagami/Uchida, and a subdivided, multi-node GOTHIC model, using DLM. The models are biased to maximize containment pressure. Over the first 100 seconds of a cold leg pump suction (CLPS) LOCA, the subdivided GOTHIC model calculates a containment pressure approximately 2 psi lower than the single-node model.

AREVA NP compared the U.S. EPR ICECON containment model with a nominal containment temperature and best-estimate containment volume, to an equivalent single-node GOTHIC model. These models were biased to minimize the increase in containment pressure. In the comparison, the integrated mass and energy release (MER) from an S-RELAP5 analysis of a cold leg pump discharge break was used to provide the mass flow rate and enthalpy inputs to both the GOTHIC and ICECON calculations. Figure 06.02.01.05-1h-3 shows that ICECON predicts a lower containment pressure response than GOTHIC by approximately 4 psi, which bounds the 2 psi reduction due to a multi-node model. Therefore, the ICECON model is appropriate for calculating the minimum containment pressure for RLBLOCA.

Figure 06.02.01.05-1h-1—U.S. EPR ICECON Containment Model



**Figure 06.02.01.05-1h-2—U.S. EPR Cold Leg Pump Suction LOCA –
Containment Pressures (GOTHIC 1-Node versus subdivided GOTHIC)**

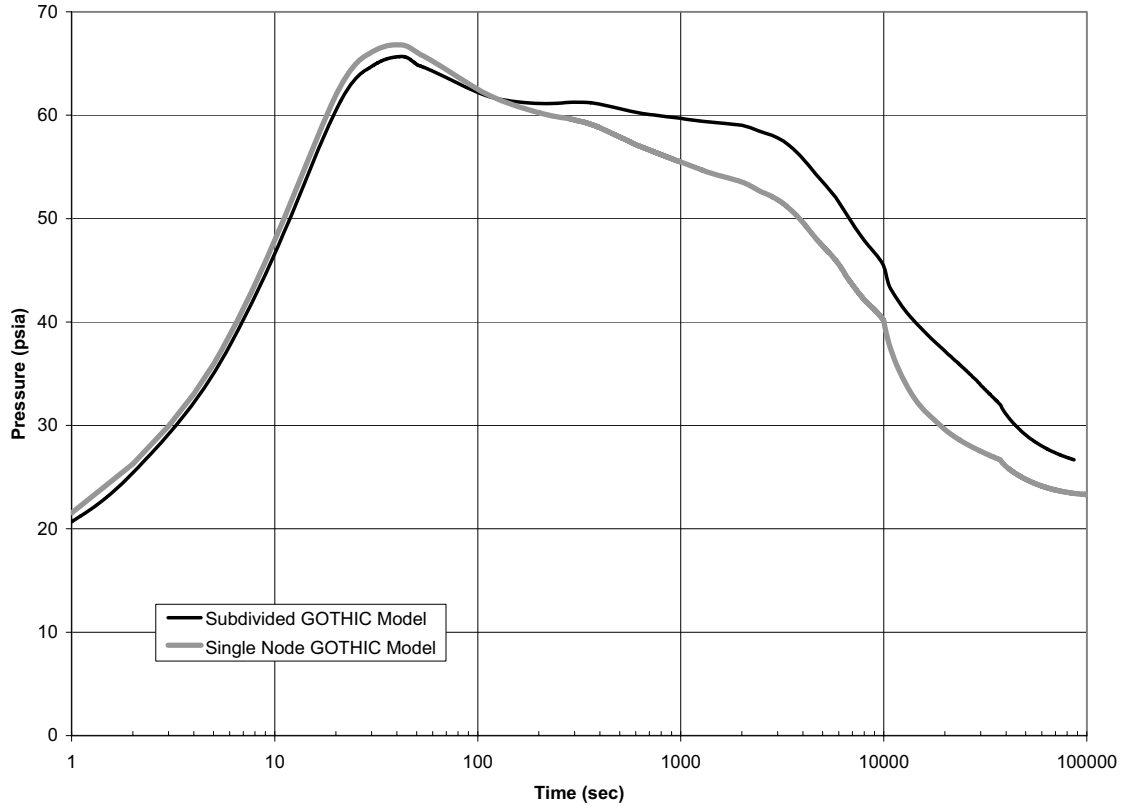
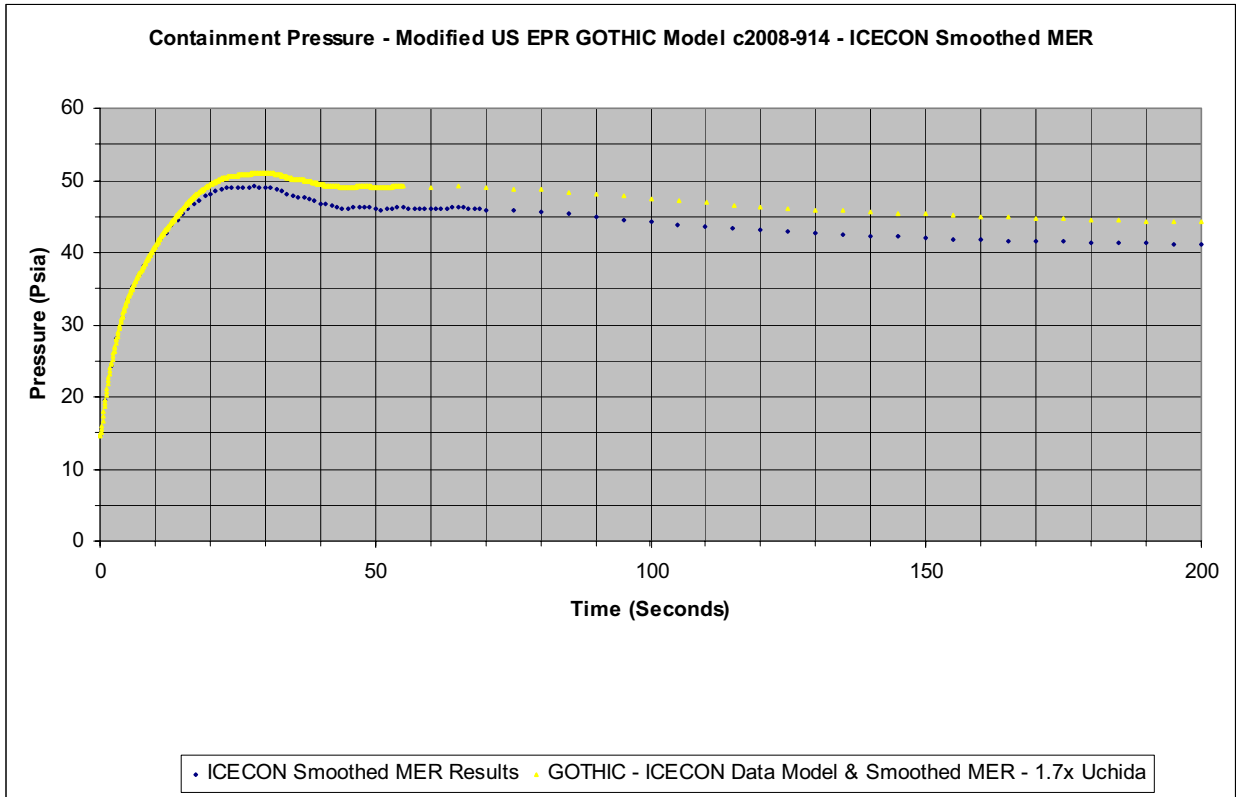


Figure 06.02.01.05-1h-3—Comparison of GOTHIC and ICECON Cold Leg Pump Discharge LOCA Containment Pressure Histories



FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.