INDIANA MICHIGAN POWER

Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106
aep.com

December 16, 2008

AEP-NRC-2008-52
10 CFR Part 50.46

Docket No.: 50-315

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: Donald C. Cook Nuclear Plant Unit 1
Response to Request for Additional Information, Second Round, Regarding Re-analysis of Small-Break Loss-of-Coolant Accident (TAC No. MD5297)

References:

1. Letter from Joseph N. Jensen, Indiana Michigan Power Company (I&M), to Nuclear Regulatory Commission (NRC) Document Control Desk, "Small Break Loss-of-Coolant Accident Evaluation Model Re-analysis," AEP:NRC:7046, dated March 29, 2007 (ML071000431).
2. Letter from Peter S. Tam, NRC, to Mano K. Nazar, I&M, "D.C. Cook Nuclear Plant, Unit 1 (DCCNP-1) – Request for Additional Information Regarding Re-analysis of Small-Break Loss-of-Coolant Accident (TAC No. MD5297)," dated August 10, 2007 (ML072050570).
3. Letter from Mark A. Peifer, I&M, to NRC Document Control Desk, "Response to Request for Additional Information Regarding the Reanalysis of Unit 1 Small Break Loss-of-Coolant Accident," dated February 29, 2008 (ML080740053).
4. Letter from Joseph N. Jensen, I&M, to NRC Document Control Desk, "Completion of Commitment Regarding Small Break Loss-of-Coolant Accident Analysis 8.75-inch Case (TAC No. MD5297)," dated July 24, 2008 (ML082170376).
5. Letter from Terry A. Beltz, NRC, to Michael W. Rencheck, I&M, "Donald C. Cook Nuclear Plant, Unit 1 (DCCNP-1) – Request for Additional Information, Second Round, Regarding Re-analysis of Small-Break Loss-of-Coolant Accident (TAC. No. MD5297)," dated October 31, 2008 (ML081560332).

A001
NRR

Dear Sir or Madam,

By Reference 1, Indiana Michigan Power Company (I&M), the licensee for the Donald C. Cook Nuclear Plant Unit 1, provided the Nuclear Regulatory Commission (NRC) with the re-analyzed small-break loss-of coolant accident (SBLOCA) analysis to meet commitments made in accordance with 10 CFR 50.46(a)(3)(ii). This analysis used the NRC-approved Westinghouse NOTRUMP SBLOCA Emergency Core Cooling System (ECCS) Evaluation Model methodology.

By Reference 2, the NRC transmitted an initial request for additional information (RAI). I&M responded to this request via Reference 3. Reference 3 also included descriptions of erroneously high ECCS flow rate assumptions in the analysis, which I&M committed to update. By Reference 4, I&M provided a new Unit 1 SBLOCA analysis report. The NRC transmitted a second RAI to I&M via Reference 5. This letter provides I&M's response to the second RAI.

Enclosure 1 to this letter provides the information requested in Reference 5. The question from Reference 5 is included in italics at the top of Enclosure 1 and Enclosure 2. The proprietary information in Enclosure 1 is supported by an affidavit signed by Westinghouse Electric Company LLC, the owner of the proprietary information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the NRC and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the NRC's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR 2.390 of the NRC's regulations.

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse affidavit should reference CAW-08-2504 and should be addressed to:

J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing
Westinghouse Electric Company LLC
P.O. Box 355
Pittsburgh, PA, 15230-0355

Enclosure 2 contains a non-proprietary version of Enclosure 1. Enclosure 3 contains Westinghouse authorization letter CAW-08-2504, accompanying affidavit, Proprietary Information Notice, and Copyright Notice for Enclosure 1.

This letter contains no new or revised commitments.

Should you have any questions, please contact John A. Zwolinski, Manager of Regulatory Affairs at (269) 466-2478.

Sincerely,

Joseph N. Jensen
Site Support Services Vice President

MCS/rdw

Enclosures:
1. SBLOCA Reanalysis – Response to the Second Round NRC Requests for Additional Information Question 1 (Proprietary).
2. SBLOCA Reanalysis – Response to the Second Round NRC Requests for Additional Information Question 1 (Non-proprietary).
3. Westinghouse Authorization Letter CAW-08-2504, Accompanying Affidavit, Proprietary Information Notice, and Copyright Notice for Enclosure 1.

c: T. A. Beltz - NRC Washington, DC
J. L. Caldwell - NRC Region III
K. D. Curry - AEP Ft. Wayne
J. T. King - MPSC
MDEQ - WHMD/RPS
NRC Resident Inspector

Enclosure 2 to AEP-NRC-2008-52

SBLOCA Reanalysis – Response to the Second Round NRC Requests for Additional Information Question 1 (Non-proprietary)

SBLOCA Reanalysis – Response to the Second Round NRC Requests for Additional Information Question 1

December, 2008

Westinghouse Electric Company LLC
P.O. Box 355
Pittsburgh, PA 15230-0355

Please provide an explanation, with appropriate supporting information, to understand the non-physical core mixture level behavior exhibited by the two-phase mixture level plots for the evaluated break spectrum contained in the small-break loss-of-coolant accident evaluation model re-analysis applicable to the Donald C. Cook Nuclear Plant, Unit 1.

Similar two-phase core mixture level behavior is observed for the 2, 2.5, 2.75, 3, 3.25 and 3.5-inch break cases of the Cook Nuclear Plant (CNP) Unit 1 Small Break Loss-of-Coolant Accident (SBLOCA) analysis. The following response utilizes the 2.5-inch break case to explain the behavior. Figure 1 provides the core mixture level response for the 2.5-inch break. At approximately 1200 seconds, it is observed that the mixture level begins to "hang" (i.e., the level stops decreasing) until approximately 1600 seconds. This behavior is attributed to the relaxation of a developed differential pressure between the upper plenum (UP) and the downcomer (DC) whose onset occurs after loop seal clearing.

Figure 2 presents the core mixture level on the left axis and the differential pressure between the UP and DC on the right axis between 500 and 2500 seconds. The decreasing trend of the core mixture level stops when the differential pressure begins to relieve, creating a level "hang." The decreasing trend resumes when the differential pressure becomes relatively constant. The differential pressure between the UP and DC during that time is driven by the inventory hold-up in the faulted loop (broken loop) steam generator (SG). This is illustrated by Figure 3, which presents the mixture level in the uphill side (i.e., hot leg side) of the broken loop (BL) SG on the left axis and the differential pressure between the UP and the DC on the right axis. As the SG uphill side drains and the mixture level reaches an elevation below the top of the hot leg (28.5547 ft), the differential pressure becomes relatively constant. This corresponds to the time when the core mixture level resumes its decreasing trend.

Figures 4A to 8A present the core mixture level and the differential pressure between the UP and DC, and Figures 4B to 8B present the mixture level in the uphill side of the BL SG and the differential pressure between the UP and the DC for the 2, 2.75, 3, 3.25 and 3.5-inch breaks, respectively. These figures show that the core mixture level and corresponding differential pressure and BL SG mixture level for each break size behave in a similar manner to the 2.5-inch break case, but at various times and with varying degrees. Note that the duration of the core mixture level "hang" decreases with increasing break size.

The two-phase core mixture level behavior described above is considered to be a result of UP and DC differential pressure caused by liquid hold-up in the BL SG tube model. There are several possible contributing factors to this behavior. These include [

]^{a,c} See pages [ ]^{a,c} of Reference 1 for related information.) Also, the model that [ ]^{a,c} can influence the liquid hold-up (and consequently the core mixture level) behavior, as can [ ]^{a,c}. The main point is that the liquid hold-up in the SG tubes increases loop resistance which in turn increases back-pressure effects on the core mixture level. Since the core mixture level response is based on water column heads on the order of several feet, this resistance need not be very large to have an observable effect. [ ]^{a,c} this resistance will be minimized. Thus, the time rate of change on core mixture level would be more reflective of a mass loss deficit due to core boiling and ECCS shortfall. Further complicating this is the fact that for the break size range of interest here, the NOTRUMP Evaluation Model (EM) implements [

]$^{a, c}$

In order to demonstrate the conservative nature of the core mixture level behavior observed for these break sizes, an undocumented run was performed for the 2.5-inch break with a [

]$^{a, c}$ alleviate the back-pressure effect felt on the core mixture surface.

Figures 9 to 11 present a comparison of the core mixture level, differential pressure and BL SG mixture level, respectively, for the original 2.5-inch case and the new case (i.e., [

]$^{a, c}$). These figures show that during the period of mixture level "hang" for the original case, the differential pressure (Figure 10) is reduced and there is minimal inventory holdup in the BL SG (Figure 11) for the new case compared to the original case. As a result, the mixture level "hang" is eliminated for the new case (Figure 9) and the overall core mixture level response for the new case is less limiting than that calculated in the original case.

References:

1. WCAP-10054-P-A, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," August 1985.
2. WCAP-14807, Revision 5, "NOTRUMP Final Validation Report for AP600," August 1998.

Figure 1

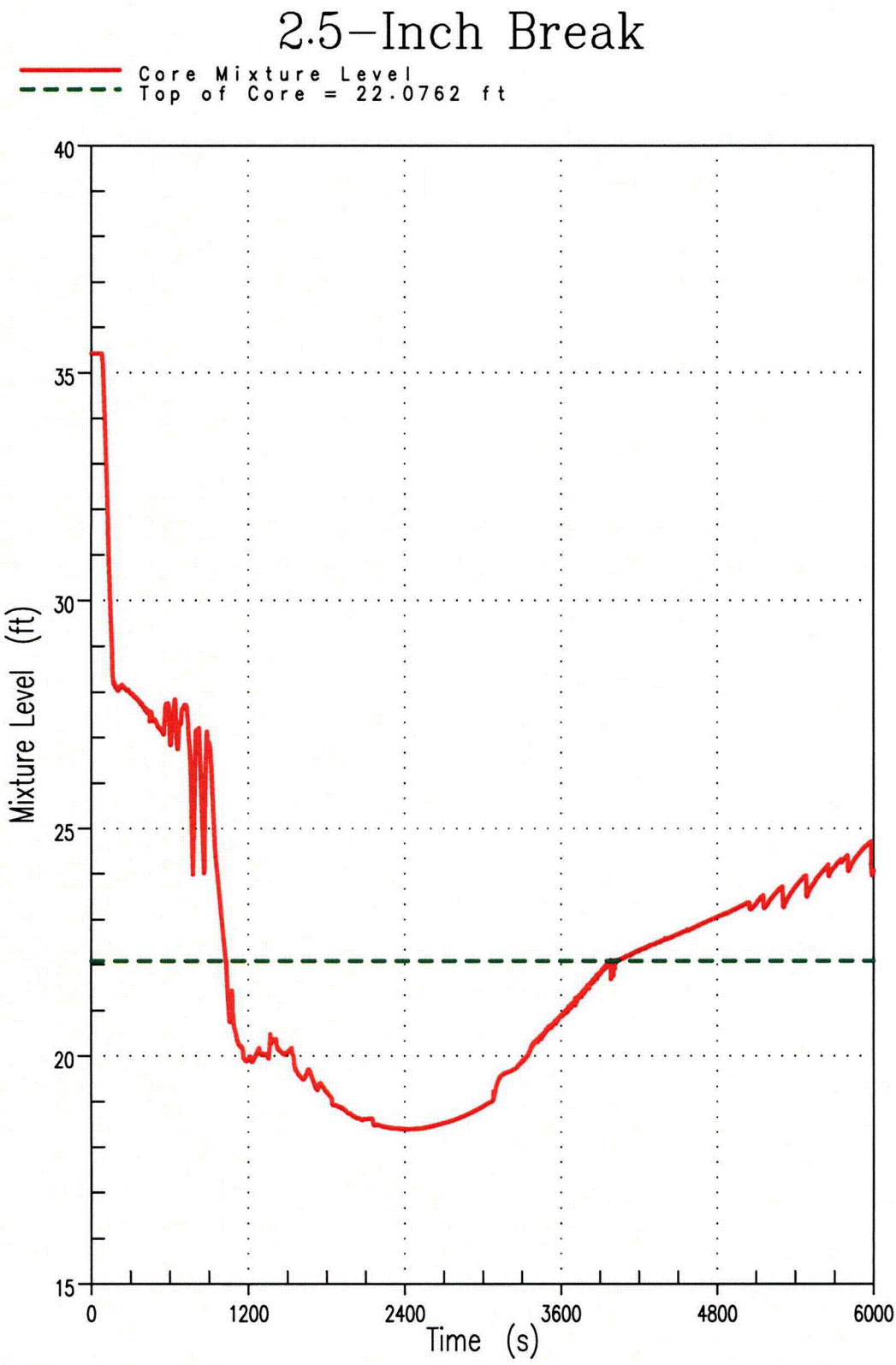

2.5-Inch Break
Core Mixture Level
Top of Core = 22.0762 ft
Mixture Level (ft)
40
35
30
25
20
15
0
1200
2400
3600
4800
6000
Time (s)

Figure 2

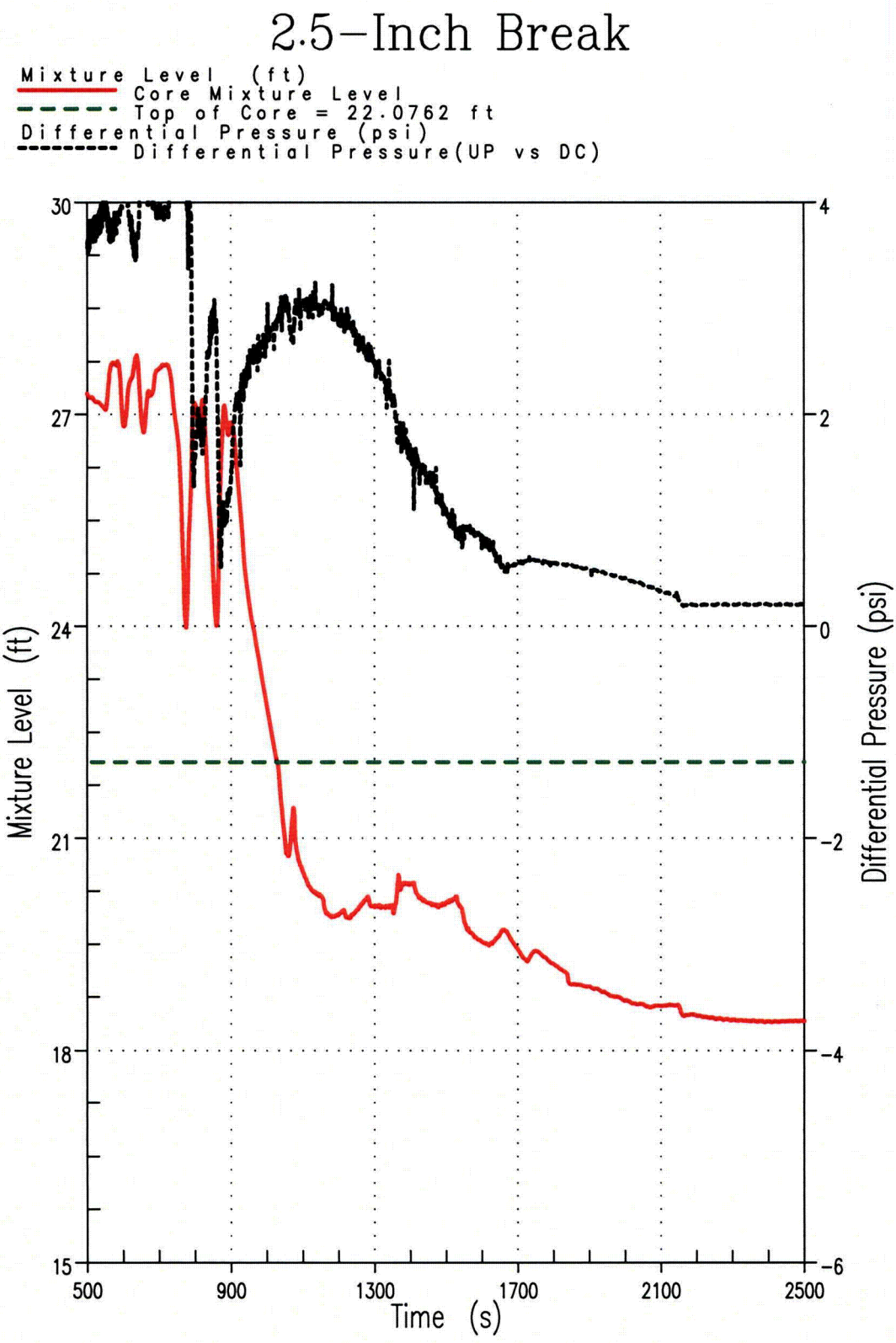

2.5-Inch Break
Mixture Level (ft)
Core Mixture Level
Top of Core = 22.0762 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
30
27
24
21
18
15
4
2
0
-2
-4
-6
500
900
1300
1700
2100
2500
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 3

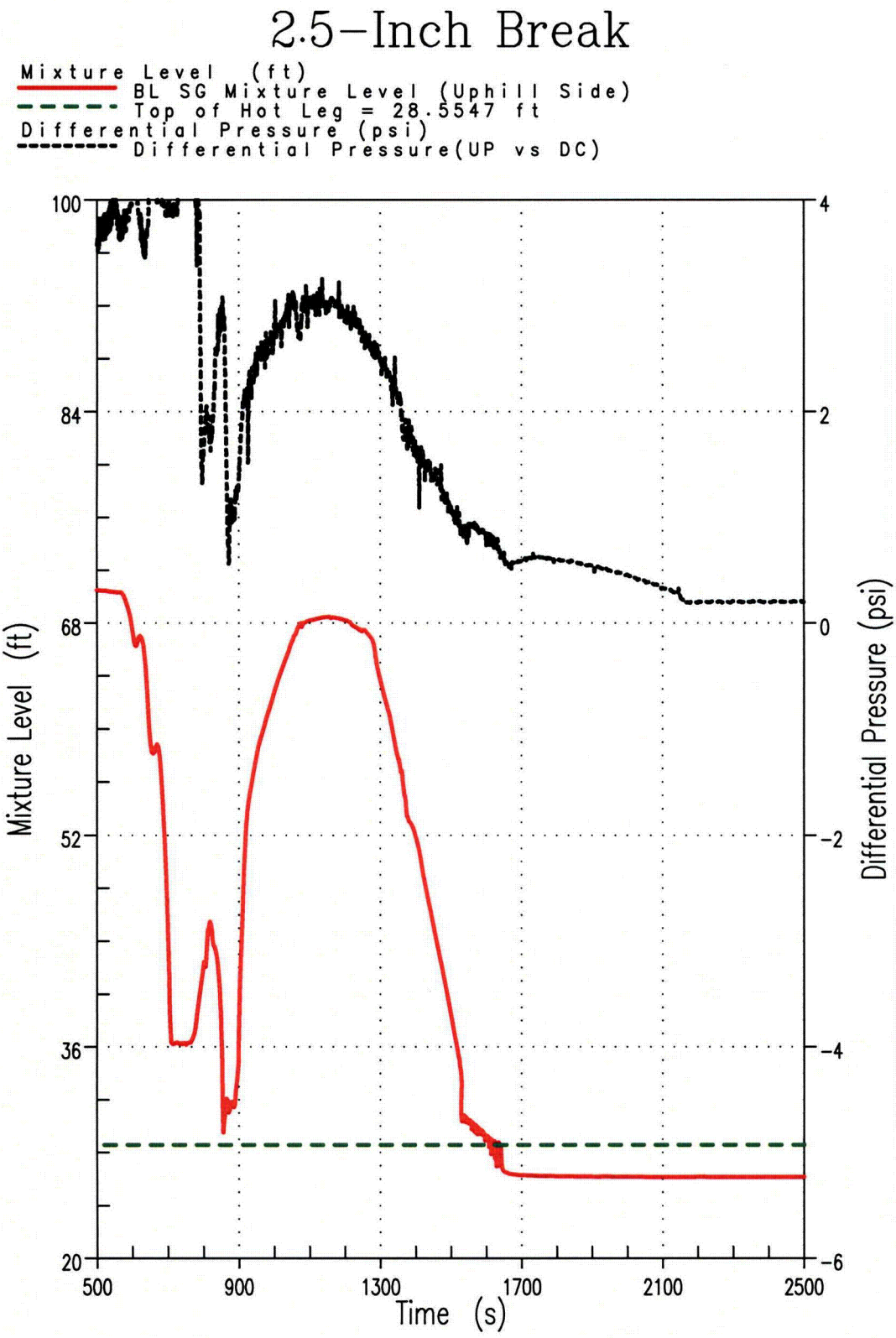

2.5-Inch Break
Mixture Level (ft)
BL SG Mixture Level (Uphill Side)
Top of Hot Leg = 28.5547 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
100
84
68
52
36
20
4
2
0
-2
-4
-6
500
900
1300
1700
2100
2500
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 4A

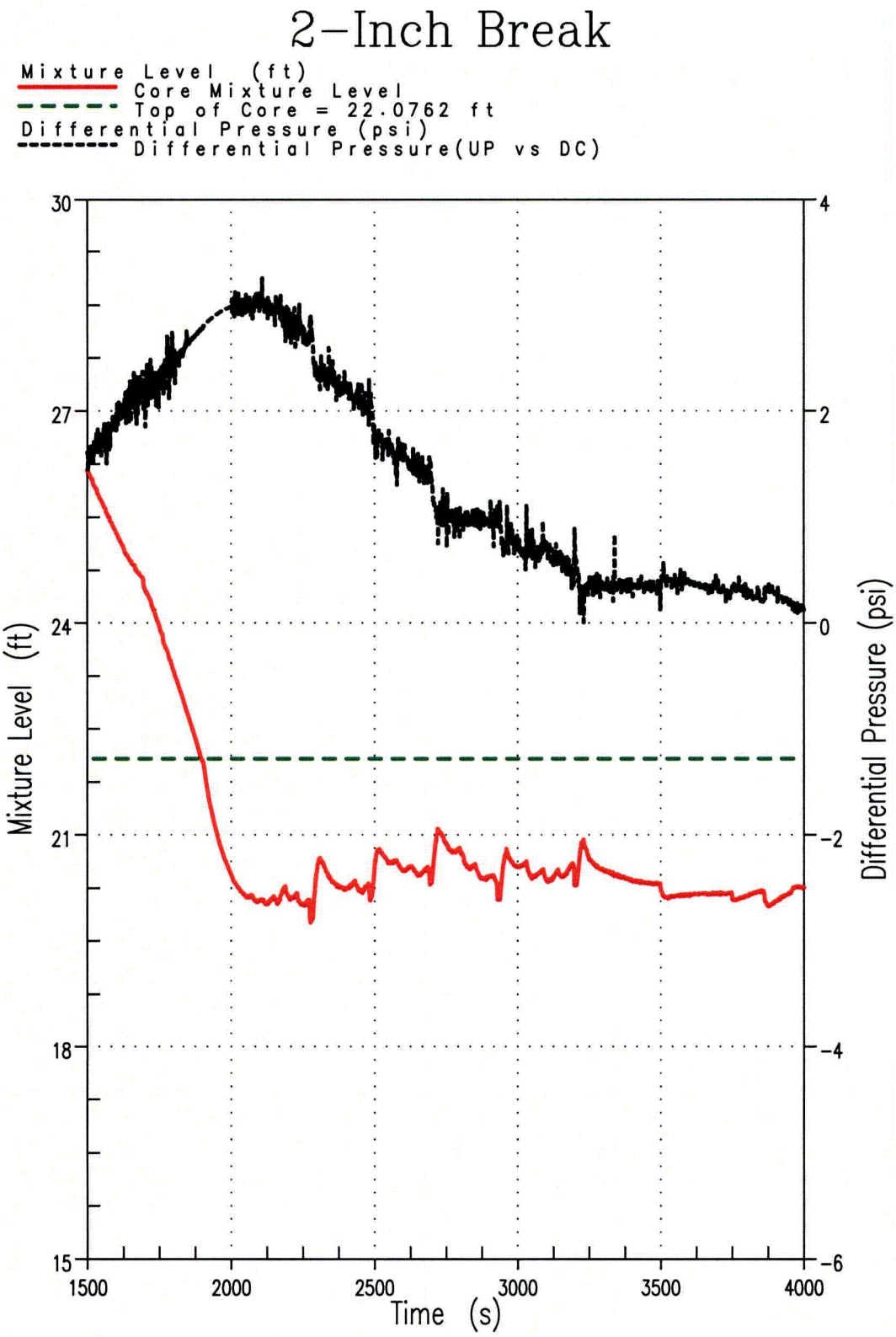

2-Inch Break
Mixture Level (ft)
Core Mixture Level
Top of Core = 22.0762 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
30
27
24
21
18
15
4
2
0
-2
-4
-6
1500
2000
2500
3000
3500
4000
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 4B

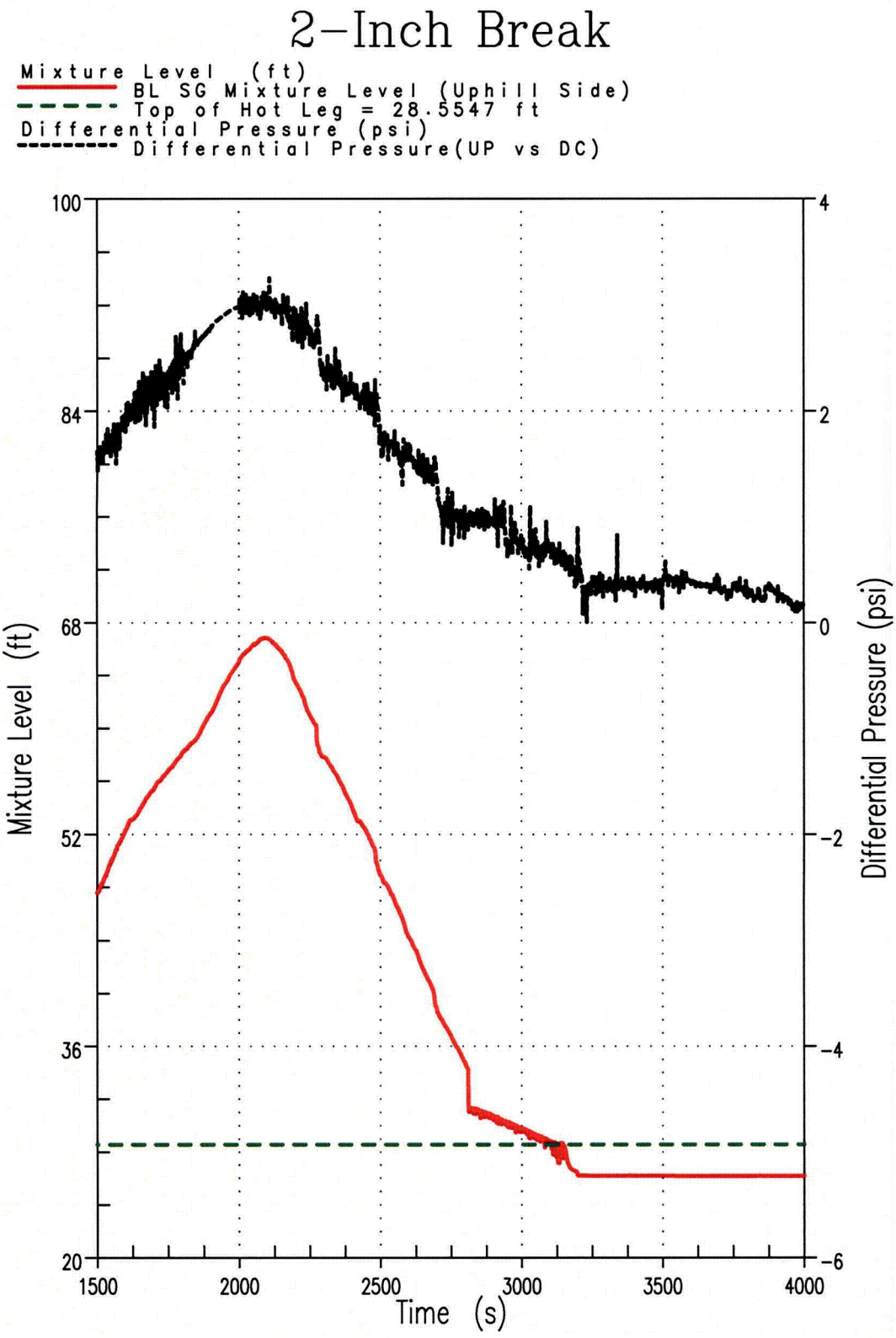

2-Inch Break
Mixture Level (ft)
BL SG Mixture Level (Uphill Side)
Top of Hot Leg = 28.5547 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
Mixture Level (ft)
Differential Pressure (psi)
Time (s)
100
84
68
52
36
20
4
2
0
-2
-4
-6
1500
2000
2500
3000
3500
4000

Figure 5A

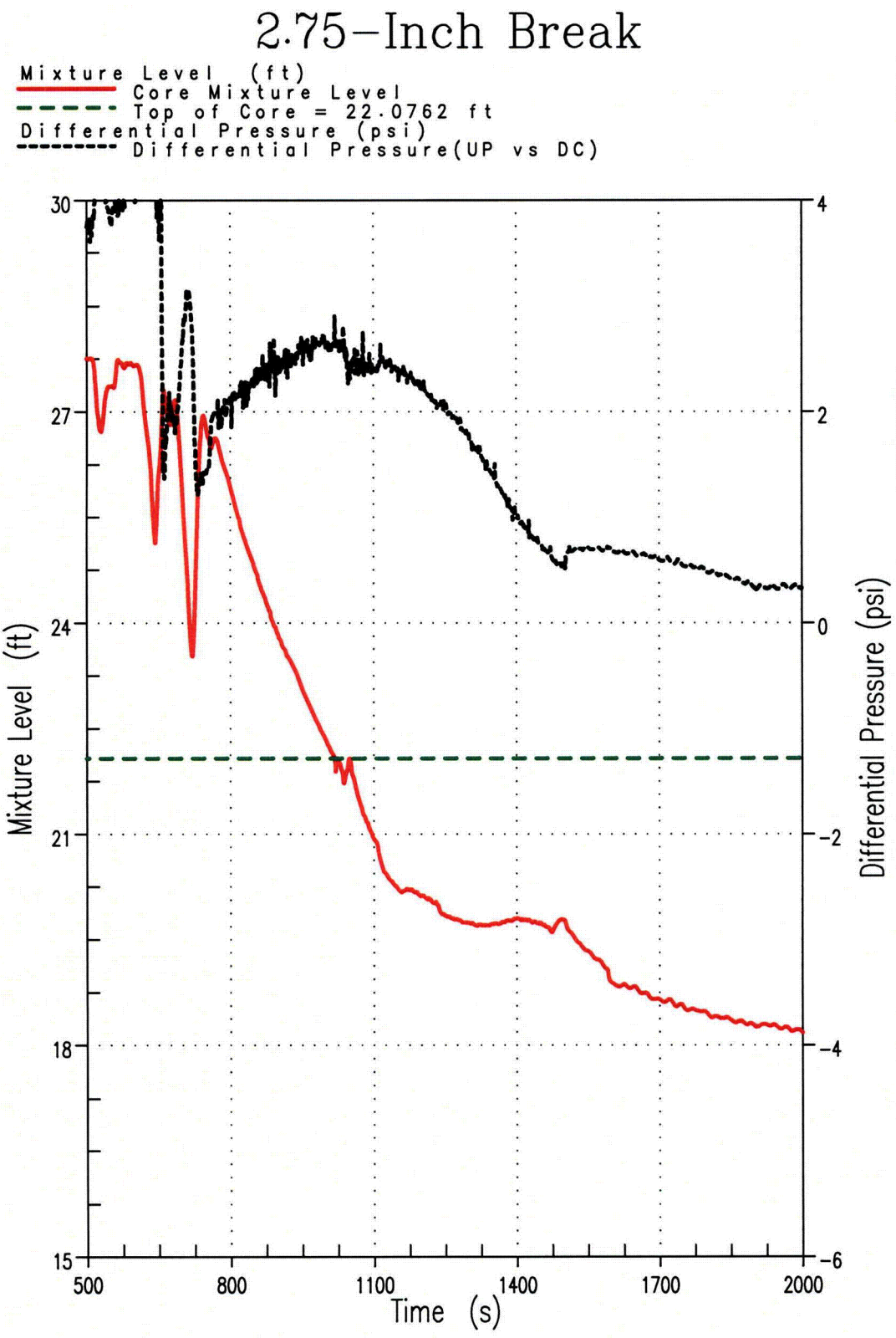

2.75-Inch Break
Mixture Level (ft)
Core Mixture Level
Top of Core = 22.0762 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
30
27
24
21
18
15
4
2
0
-2
-4
-6
500
800
1100
1400
1700
2000
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 5B

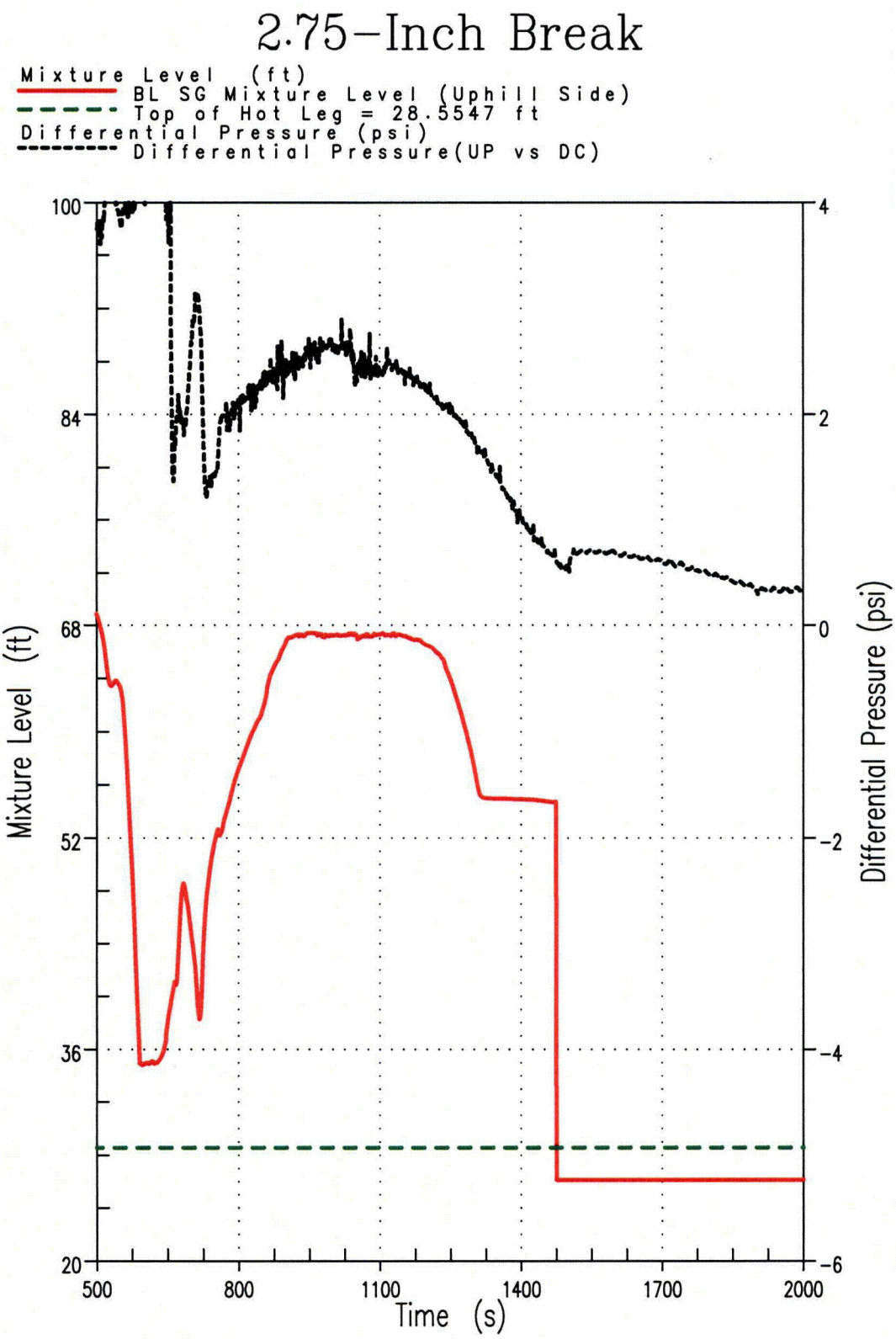

2.75-Inch Break
Mixture Level (ft)
BL SG Mixture Level (Uphill Side)
Top of Hot Leg = 28.5547 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
100
84
68
52
36
20
4
2
0
-2
-4
-6
500
800
1100
1400
1700
2000
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 6A

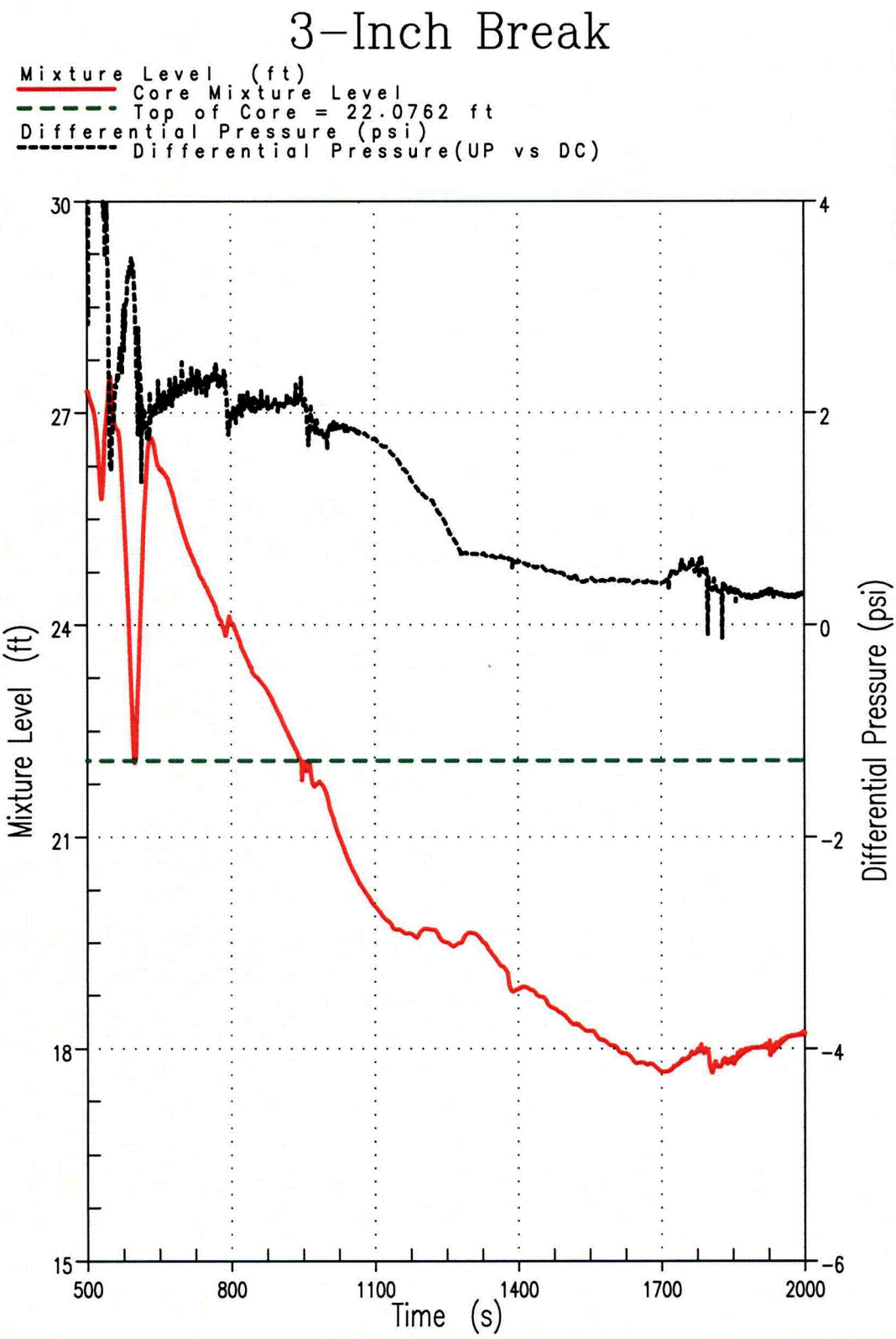

3-Inch Break
Mixture Level (ft)
Core Mixture Level
Top of Core = 22.0762 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
Mixture Level (ft)
Differential Pressure (psi)
Time (s)
30
27
24
21
18
15
4
2
0
-2
-4
-6
500
800
1100
1400
1700
2000

Figure 6B

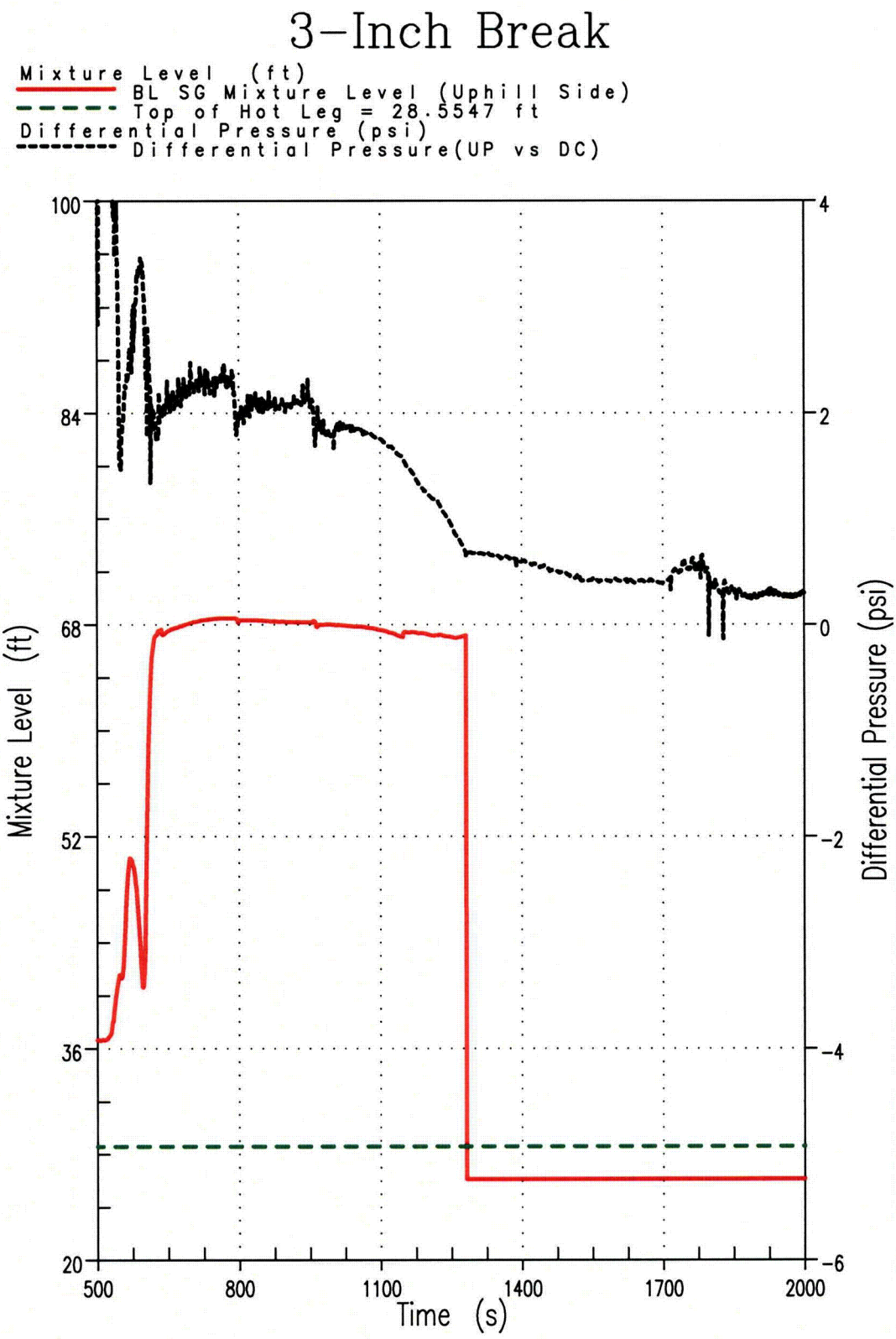

3-Inch Break
Mixture Level (ft)
BL SG Mixture Level (Uphill Side)
Top of Hot Leg = 28.5547 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
100
84
68
52
36
20
4
2
0
-2
-4
-6
500
800
1100
1400
1700
2000
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 7A

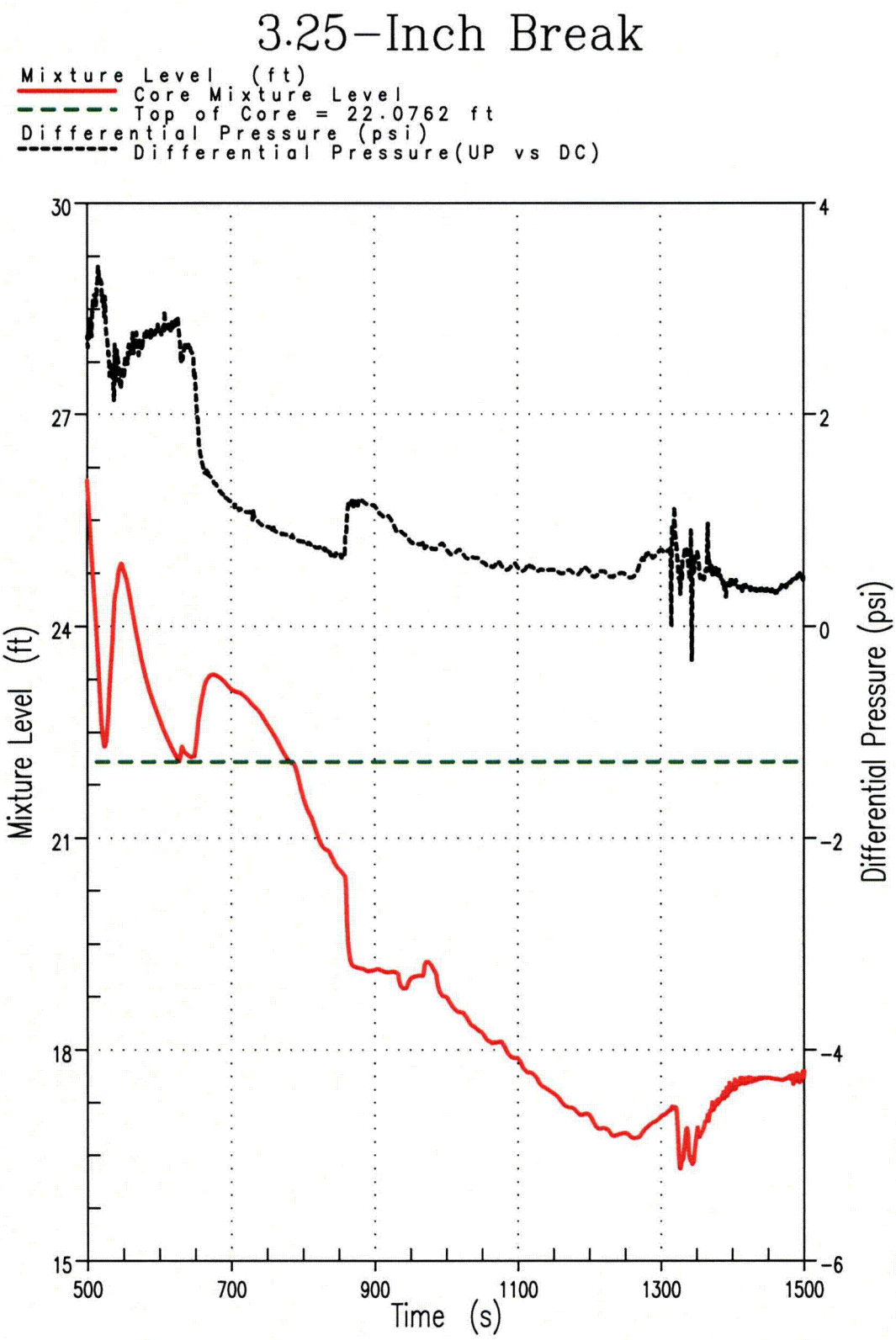

3.25-Inch Break
Mixture Level (ft)
Core Mixture Level
Top of Core = 22.0762 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
Mixture Level (ft)
Differential Pressure (psi)
Time (s)
30
27
24
21
18
15
4
2
0
-2
-4
-6
500
700
900
1100
1300
1500

Figure 7B

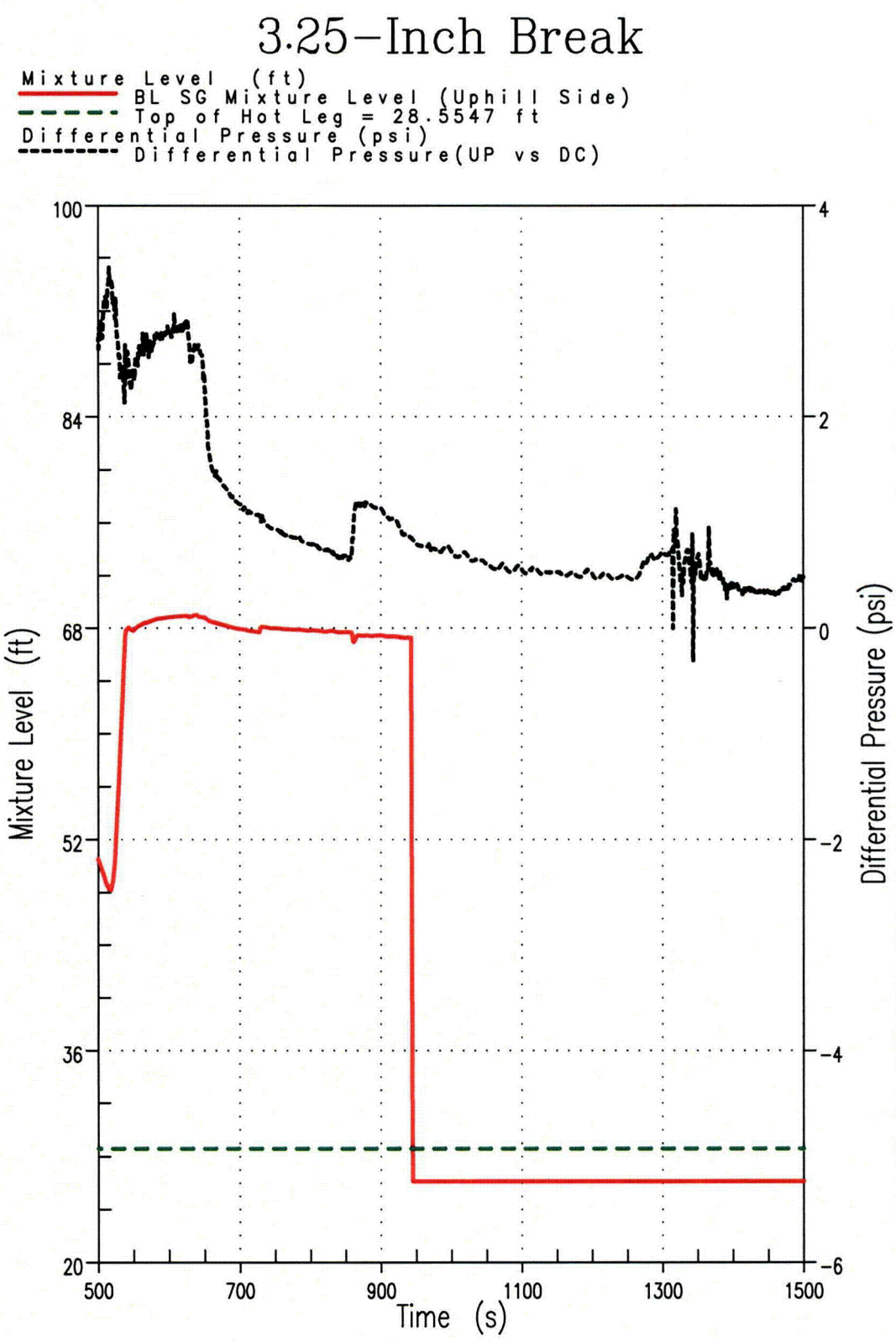

3.25-Inch Break
Mixture Level (ft)
BL SG Mixture Level (Uphill Side)
Top of Hot Leg = 28.5547 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
100
84
68
52
36
20
4
2
0
-2
-4
-6
500
700
900
1100
1300
1500
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 8A

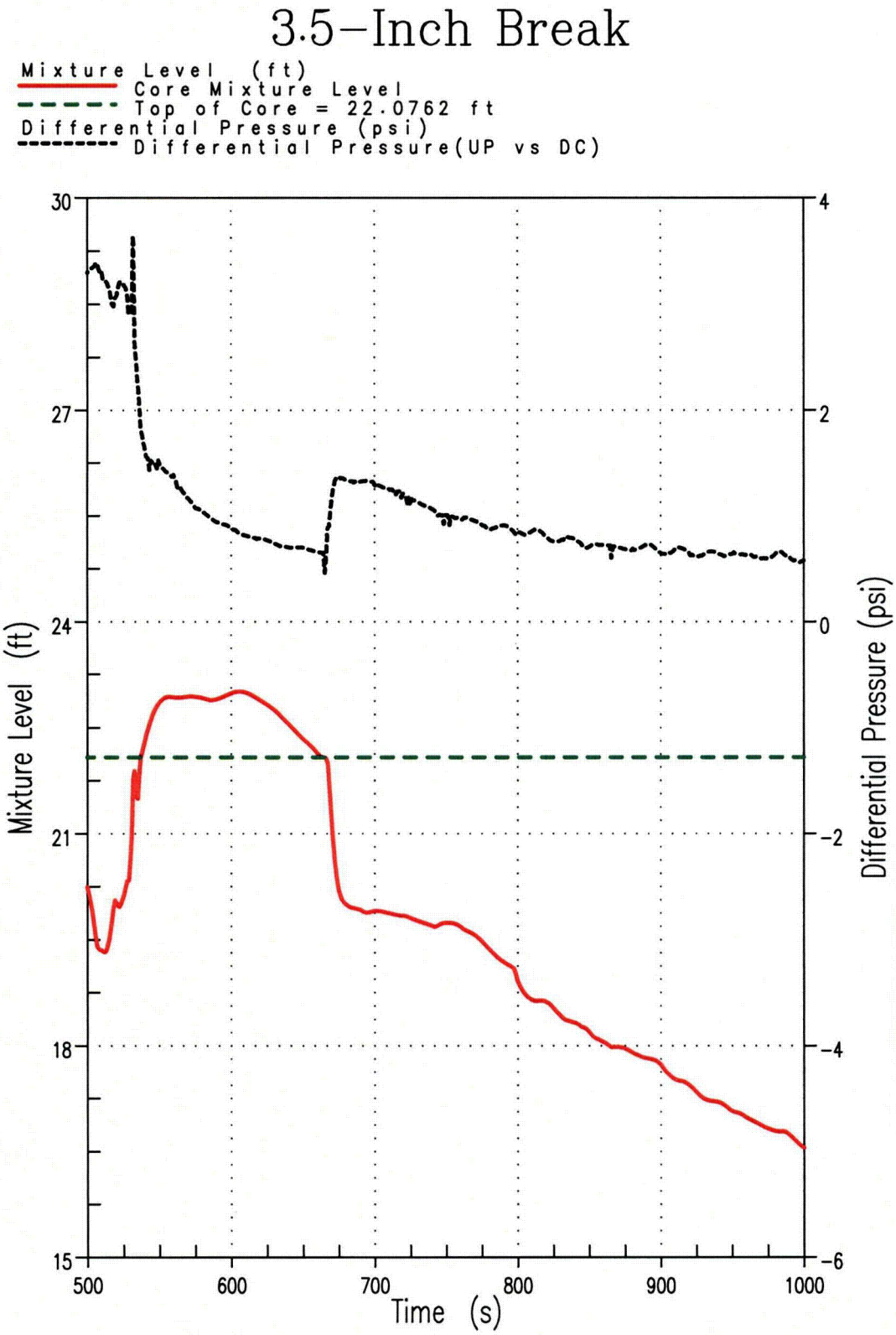

3.5-Inch Break
Mixture Level (ft)
Core Mixture Level
Top of Core = 22.0762 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
Mixture Level (ft)
Differential Pressure (psi)
Time (s)
30
27
24
21
18
15
4
2
0
-2
-4
-6
500
600
700
800
900
1000

Figure 8B

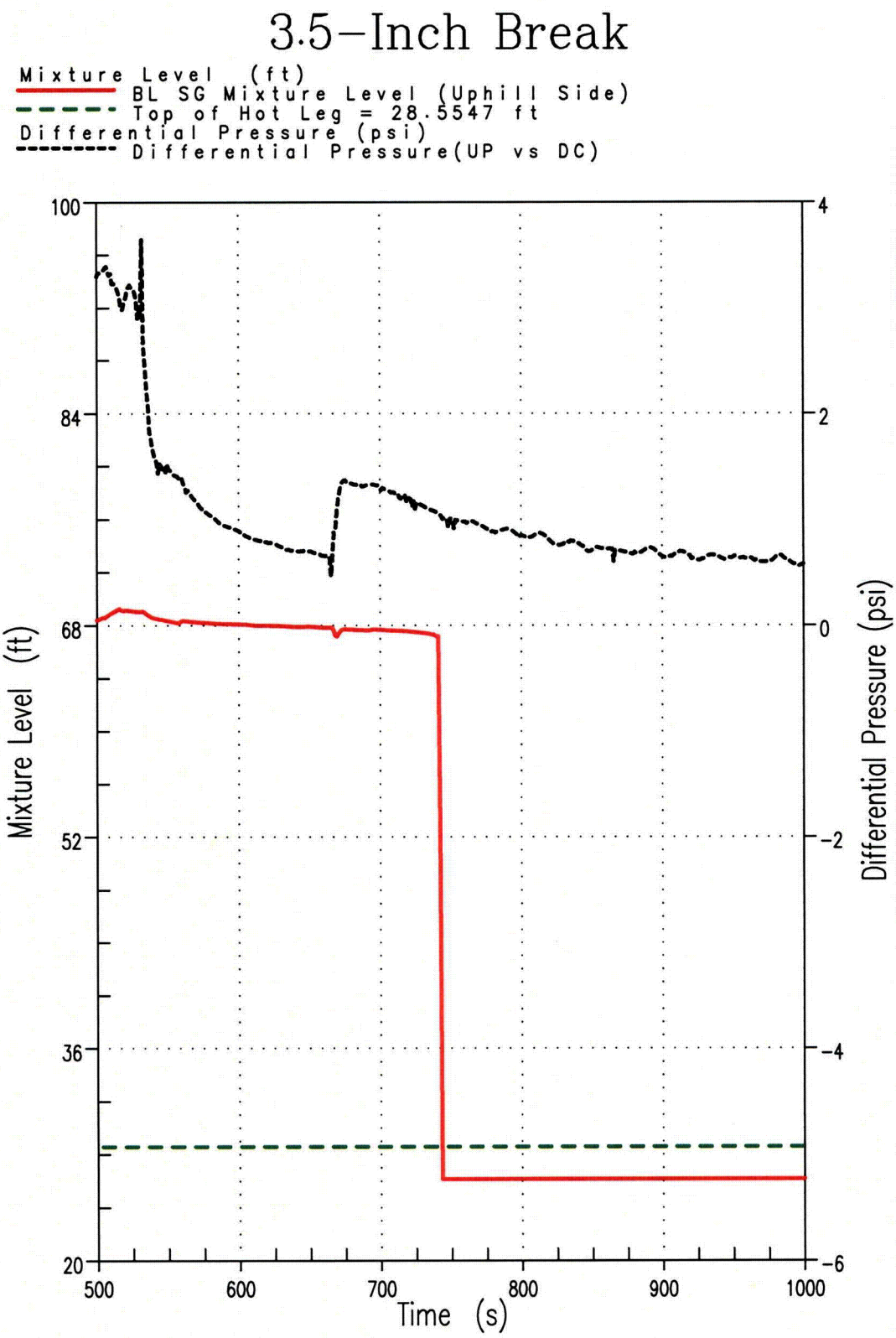

3.5-Inch Break
Mixture Level (ft)
BL SG Mixture Level (Uphill Side)
Top of Hot Leg = 28.5547 ft
Differential Pressure (psi)
Differential Pressure(UP vs DC)
100
84
68
52
36
20
4
2
0
-2
-4
-6
500
600
700
800
900
1000
Time (s)
Mixture Level (ft)
Differential Pressure (psi)

Figure 9

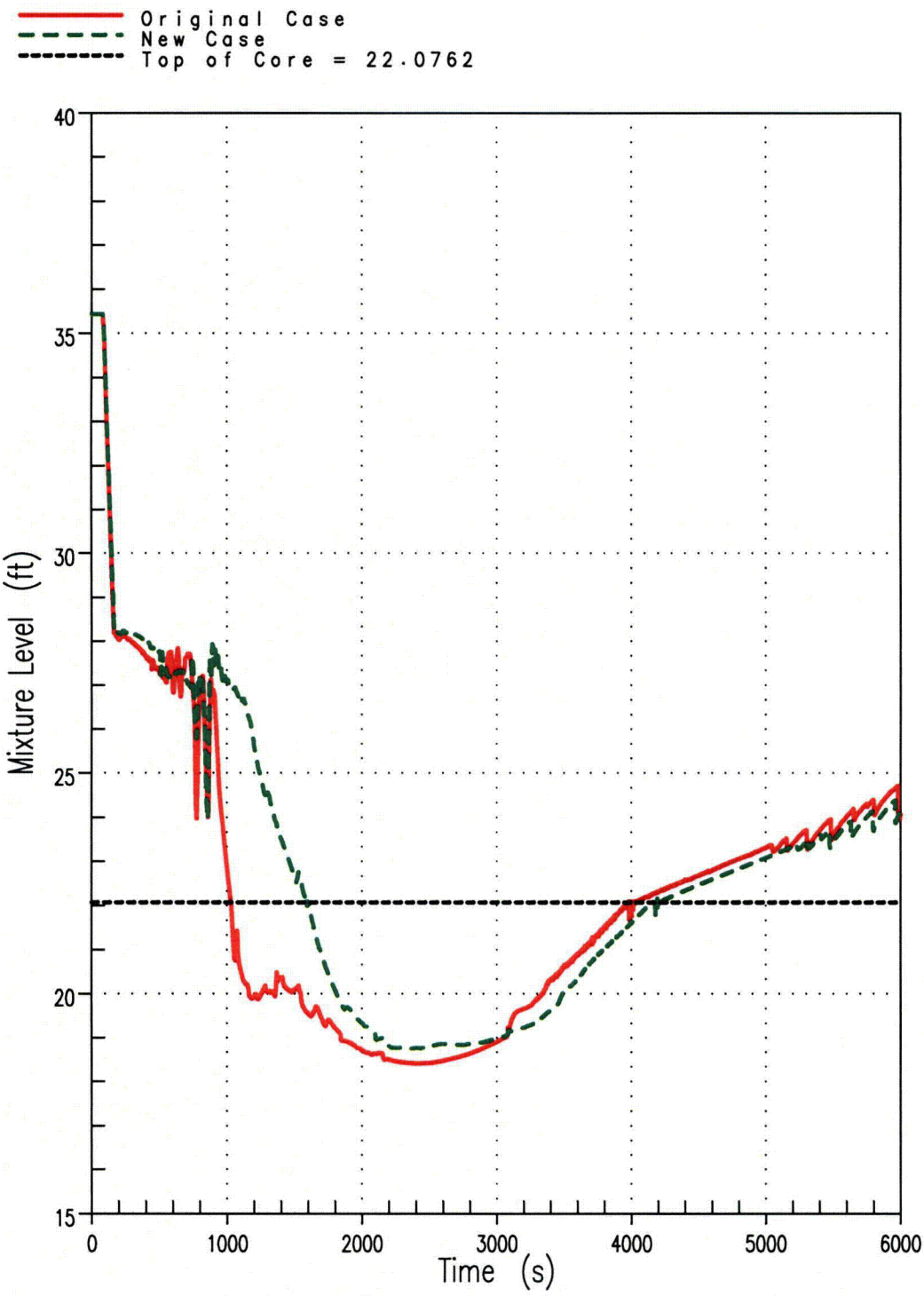

2.5-Inch Break
Core Mixture Level
Original Case
New Case
Top of Core = 22.0762
Mixture Level (ft)
Time (s)
40
35
30
25
20
15
0
1000
2000
3000
4000
5000
6000

Figure 10

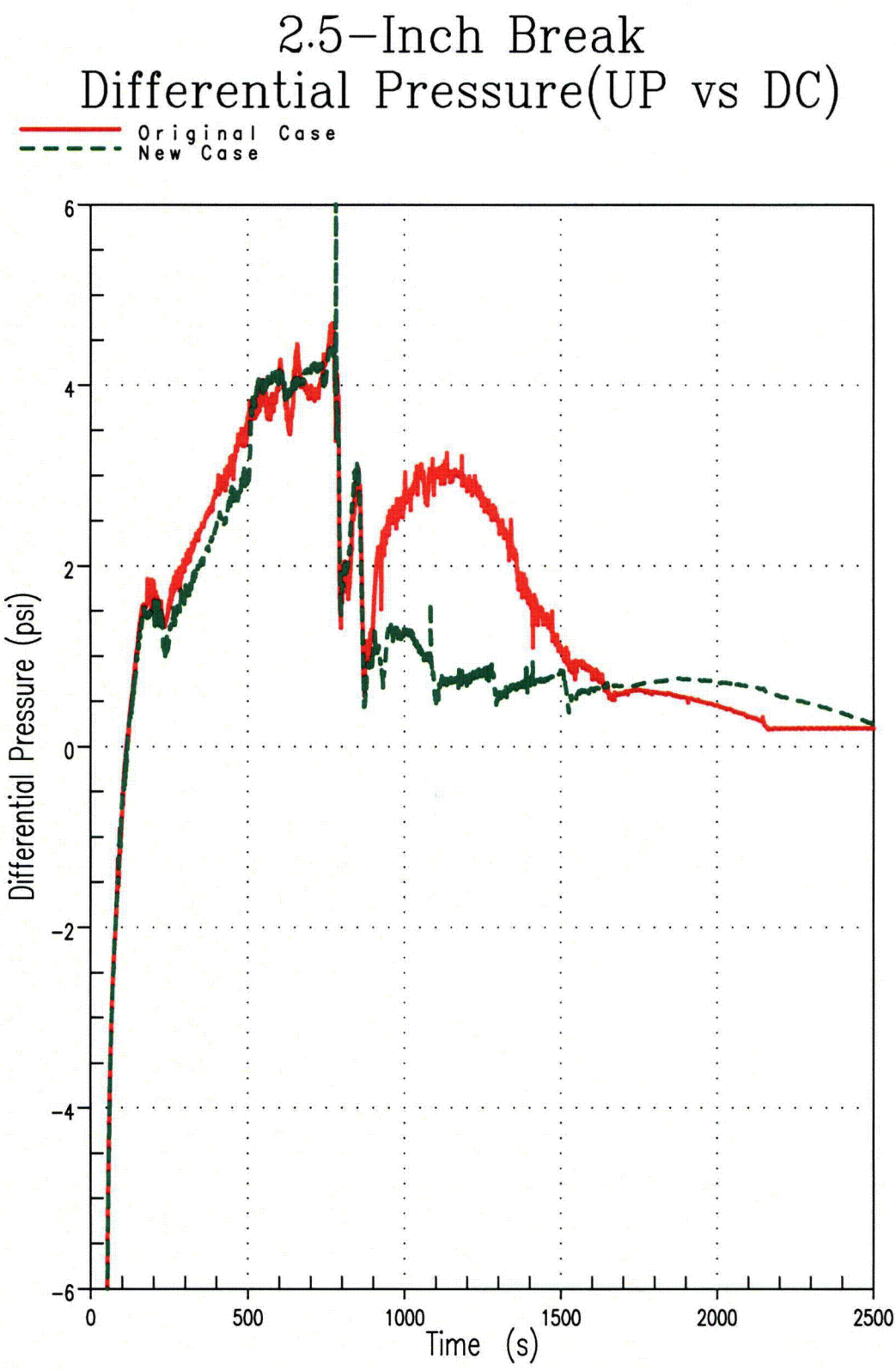
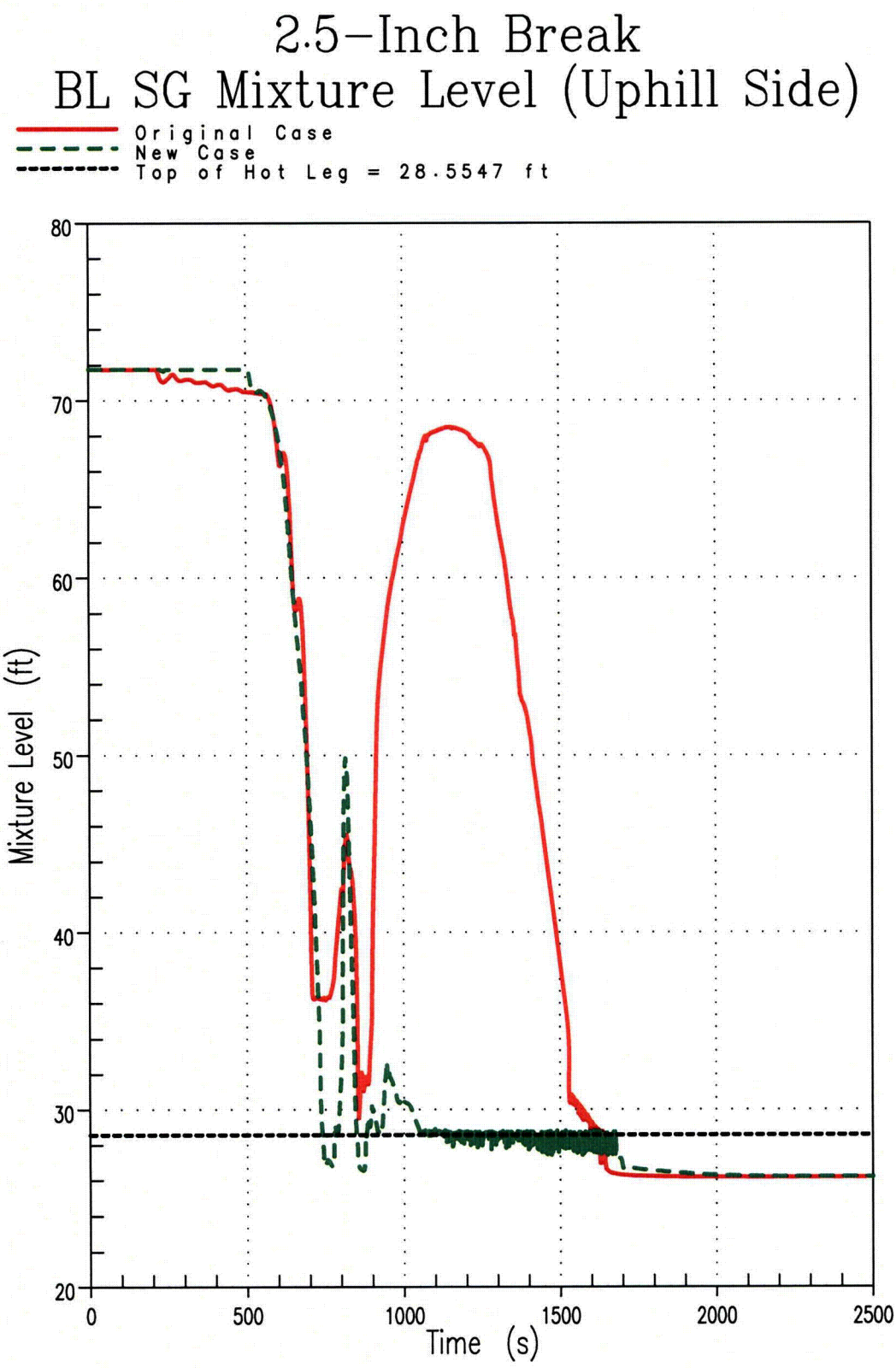

2.5-Inch Break
Differential Pressure(UP vs DC)
Original Case
New Case
Differential Pressure (psi)
Time (s)
6
4
2
0
-2
-4
-6
0
500
1000
1500
2000
2500

Figure 11


2.5-Inch Break
BL SG Mixture Level (Uphill Side)
Original Case
New Case
Top of Hot Leg = 28.5547 ft
Mixture Level (ft)
Time (s)
80
70
60
50
40
30
20
0
500
1000
1500
2000
2500

Enclosure 3 to AEP-NRC-2008-52

Westinghouse Authorization Letter CAW-08-2504, Accompanying Affidavit, Proprietary Information Notice, and Copyright Notice for Enclosure 1

Westinghouse Electric Company
Nuclear Services
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Direct tel: (412) 374-4643
Direct fax: (412) 374-3846
e-mail: greshaja@westinghouse.com

Proj letter ref NF-AE-08-149

Our ref: CAW-08-2504

December 5, 2008

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: "SBLOCA Reanalysis – Response to the Second Round NRC Requests for Additional Information Question 1" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-08-2504 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by American Electric Power.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-08-2504 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

G. Bacuta (NRC OWFN 12E-1)

Enclosures

bcc: J. A. Gresham (ECE 4-7A) 1L
R. Bastien, 1L (Nivelles, Belgium)
C. Brinkman, 1L (Westinghouse Electric Co., 12300 Twinbrook Parkway, Suite 330, Rockville, MD 20852)
RCPL Administrative Aide (ECE 4-7A) 1L (letter and affidavit only)

CAW-08-2504

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared J. A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before me
this 5th day of December, 2008

Sharon L. Markle
Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Sharon L. Markle, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Jan. 29, 2011
Member, Pennsylvania Association of Notaries

(1) I am Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's

competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in "SBLOCA Reanalysis – Response to the Second Round NRC Requests for Additional Information Question 1" (Proprietary) for submittal to the Commission, being transmitted by American Electric Power letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the NRC review of the D. C. Cook Unit 1 Small Break LOCA Reanalysis.

This information is part of that which will enable Westinghouse to:

(a) Assist the customer in obtaining NRC review of the D. C. Cook Unit 1 Small Break LOCA Reanalysis.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of this information to its customers for purposes of plant specific LOCA analysis for licensing basis applications

(b) Its use by a competitor would improve their competitive position in the design and licensing of a similar product for SBLOCA analyses.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar calculations and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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