Chemicals Division
Bay City Plant

Celanese Ltd.
Highway 3057
PO Box 509
Bay City, TX 77404-0509

Celanese

April 21, 1998
IOC-011-98

CERTIFIED MAIL

Mr. Hong Guo, Permits Section
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Section
Texas Natural Resource Conservation Commission.
P. O. Box 13087
Austin, TX 78711-3087

SUBJECT: CONSENT OF REVOCATION OF TEXAS NATURAL RESOURCE CONSERVATION COMMISSION (TNRCC)PERMIT FORM TNRCC INJECTION WELL PERMIT NUMBER, WDW-110 CELANESE LTD., BAY CITY PLANT, BAY CITY, TEXAS

Dear Mr. Guo:

Enclosed herewith is the completed subject form for our Injection Well Permit, WDW-110. This form is provided pursuant to the provisions of 30 TAC Section 305.67 (b).

Please contact me at 409/241-4197 if you have questions.

Very truly yours,

I. O. Coleman, Jr./cjs

I. O. Coleman, Jr.

6WQ-SG
APR 27 1998

IOC/cjs
attachment

Hoechst

Celanese
A member of the Hoechst Group

cc: Ms. Alice Hamilton Rogers, PE, Manager
Underground Injection Control Unit
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Division
Texas Natural Resource Conservation Commission
P. O. Box 13087 – MC 131
Austin, Texas 78711-3087

Mr. Charles J. Green, Geologist
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
Industrial And Hazardous Waste Section
Texas Natural Resource Conservation Commission
P. O. Box 13087
Austin, Texas 78711-3087

Mr. Phil Dellinger
Underground Injection Control Program
U. S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

6WQ-SG
APR 27 1998

CONSENT TO REVOCATION OF

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

I, C.R. Pennington, Site Director, acting on behalf of
(Name & Title)

Celanese Ltd., do hereby consent to
(Name of Permittee)

the revocation of Texas Natural Resource Conservation Commission Permit

No. WDW-110, pursuant to the provisions of 30 TAC Section 305.67(b).

The activities regulated by the permit were:

( ) Never begun (Wastewater treatment facility was not constructed).

(X) Terminated on or about (date) January 21, 1998 (Waste Disposal Well plugged and abandoned)

Facility dismantled ( ); Facility will be dismantled ( ); Facility will be sold and relocated ( ).

( ) Diverted to another permitted wastewater treatment system. Please identify the facility to which flow has been diverted _____ and the approximate date the diversion occurred _____.

I also certify that there are no materials remaining at the permitted site which endanger ground or surface water quality.

C.R. Pennington
(Signature)

(409) 241-4000
(Telephone No.)

April 21, 1998
(Date)

6WQ-SG
APR 27 1998

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

April 22, 1996

Mr. I. O. Coleman, Jr.
Staff Environmental Chemist
Hoechst Celanese Corporation
P.O. Box 509
Bay City, TX 77404-0509

RE: Approval of Mechanical Integrity Testing, TNRCC Permit No. WDW-49

Dear Mr. Coleman:

This is to acknowledge our receipt of the report on April 17, 1996, on the mechanical integrity (MI) test conducted on March 7, 1996 of the above referenced well. TNRCC staff was not present during the MI test; however, from our review of the MI report, it has been determined that MI of the well was confirmed by the APT and RAT on the above referenced date in accordance with 31 TAC §331.43. Please keep a copy of this letter with the well records so that it may be reviewed by well inspectors.

We also acknowledge receipt of the report on the pressure fall-off testing of the subject well. You may be contacted by our staff, or EPA, if there are any questions or comments on the pressure fall-off test.

Questions regarding this matter should be directed to me at (512) 239-6221, correspondence can be sent to Mail Code MC 131.

Sincerely,

Bob Vondran

Bob Vondran, Geologist
Underground Injection Control Team
UIC, Uranium, & Radioactive Waste Section
Industrial & Hazardous Waste Division

RLV/jm

cc: Brian Graves, EPA Region 6

WDW-5
96 APR 31 PM 3:17
RECEIVED
SOURCE WATER
PROTECTION BRANCH

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

AN ORDER affirming the Executive Director's approval of the Applications of Hoechst Celanese Chemical Group, Ltd. for transfer of ownership of Class I UIC Permit Nos. WDW-244, 245, 246, 33, 45, 283, 14, 32, 49, 110 and 277

DOCKET NO. 96-0174-UIC

On December 29, 1995, the Executive Director of the Texas Natural Resource Conservation Commission approved, pursuant to 30 Texas Administrative Code Chapter 263, the applications of Hoechst Celanese Chemical Ltd. to transfer the ownership of eleven Class I Underground Injection Control Permits. These Permits are Nos. WDW-244, 245 and 246, in Pampa, Gray County, Texas, which were transferred from Celanese Chemical Company, Inc. to Hoechst Celanese Chemical Group, Ltd. ; Nos. WDW-33, 45, and 283, in Houston, Harris County, Texas, which were transferred from Hoechst Celanese Chemical Group, Inc. to Hoechst Celanese Chemical Group, Ltd.; and Nos. WDW-14, 32, 49, 110 and 277, in Bay City, Matagorda County, Texas, which were transferred from Hoechst Celanese Chemical Group, Inc. to Hoechst Celanese Chemical Group, Ltd. Copies of these approvals issued by the Executive Director are attached to this Order as Exhibit "A."

On January 10, 1996, the Texas Natural Resource Conservation Commission considered these transfers and affirmed the Executive Director's actions in approving the transfers of ownership in the approvals attached as Exhibit "A."

NOW, THEREFORE, BE IT ORDERED BY THE TEXAS NATURAL RESOURCE CONSERVATION COMMISSION THAT the applications of Hoechst Celanese Chemical Group, Ltd. for transfer of ownership of Class I Underground Injection Control Permit Nos. WDW-244, 245, 246, 33, 45, 283, 14, 32, 49, 110 and 277 are affirmed. The Chief Clerk of the Texas Natural Resource Conservation Commission forward a copy of this Order to all parties. If any provision, sentence, clause, or phrase of this Order is for any reason held to be invalid, the invalidity of any portion shall not affect the validity of the remaining portion of the Order.

Date Issued: JAN 17 1996

ATTEST:

Gloria A. Vasquez, Chief Clerk

Texas Natural Resource Conservation Commission

Barry R. McBee, Chairman

ATTACHMENT A

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-14

ISSUED ON MAY 13, 1991

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-14 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 509
Bay City, Texas 77414

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 509
Bay City, Texas 77414

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-32

ISSUED ON MAY 13, 1991

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-32 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 509
Bay City, Texas 77414

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 509
Bay City, Texas 77414

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-49

ISSUED ON MAY 13, 1991

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-49 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 509
Bay City, Texas 77414

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 509
Bay City, Texas 77414

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-110

ISSUED ON MAY 13, 1991

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-110 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 509
Bay City, Texas 77414

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 509
Bay City, Texas 77414

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-277

ISSUED ON JULY 7, 1991

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-277 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 509
Bay City, Texas 77414

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 509
Bay City, Texas 77414

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-245

ISSUED ON SEPTEMBER 14, 1987

TO CELANESE CHEMICAL COMPANY, INC.

Class I UIC Permit No. WDW-245 is hereby changed:

Provision I, Page 1

Permittee:

Celanese Chemical Company, Inc.
P.O. Box 937
Pampa, Texas 79065

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 937
Pampa, Texas 79065

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-244

ISSUED ON SEPTEMBER 14, 1987

TO CELANESE CHEMICAL COMPANY, INC.

Class I UIC Permit No. WDW-244 is hereby changed:

Provision I, Page 1

Permittee:

Celanese Chemical Company, Inc.
P.O. Box 937
Pampa, Texas 79065

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 937
Pampa, Texas 79065

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-246

ISSUED ON SEPTEMBER 14, 1987

TO CELANESE CHEMICAL COMPANY, INC.

Class I UIC Permit No. WDW-246 is hereby changed:

Provision I, Page 1

Permittee:

Celanese Chemical Company, Inc.
P.O. Box 937
Pampa, Texas 79065

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 937
Pampa, Texas 79065

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-33

ISSUED ON NOVEMBER 2, 1990

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-33 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 58190
Houston, Texas 77258-8190

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 58190
Houston, Texas 77258-8190

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-45

ISSUED ON NOVEMBER 2, 1990

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-45 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 58190
Houston, Texas 77258-8190

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 58190
Houston, Texas 77258-8190

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT TRANSFER OF CLASS I UIC PERMIT NO. WDW-283

ISSUED ON JANUARY 24, 1991

TO HOECHST CELANESE CHEMICAL GROUP, INC.

Class I UIC Permit No. WDW-283 is hereby changed:

Provision I, Page 1

Permittee:

Hoechst Celanese Chemical Group, Inc.
P.O. Box 58190
Houston, Texas 77258-8190

shall be replaced with

Permittee:

Hoechst Celanese Chemical Group, Ltd.
P.O. Box 58190
Houston, Texas 77258-8190

This document is part of the permit and should be attached thereto.

APPROVED, ISSUED AND EFFECTIVE this 29th day of December, 1995 in accordance with 30 Texas Administrative Code §305.64.

ATTEST: Gloria A. Vasquez

For The Commission

Hoechst Celanese

(2)

Chemical Group
Hoechst Celanese Corporation
Bay City Plant
PO Box 509
Highway 3057
Bay City, TX 77404-0509

April 12, 1996
IOC-022-96

FEDERAL EXPRESS MAIL

Mr. Ben Knape, Chief
Underground Injection Control Unit
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Division
TX Natl Resource Conservation Commission
12100 Park 35 Circle
Austin, TX 78753

Subject: **Final Closure Report**
Injection Well, WDW-14
(Plant Well No.2)
Hoechst Celanese Chemical Group, Ltd.
Bay City Plant, Bay City, Texas

Dear Mr. Knape:

Enclosed herewith are two copies of the "Final Closure Report" for the subject Injection Well, WDW-14, for your review and approval.

Please do not hesitate to contact our Mr. H. R. Horton at 409/241-4076, Mr. B. S. Barrington at 409/241-4413 or me at 409/241-4197 if you have questions concerning the report.

Very truly yours,

I. O. Coleman, Jr.
Staff Environmental Chemist

RECEIVED
APR 15

Enclosures (2)

cc:
Mr. Charles J. Green, Geologist - w/o enclosures
TX Natl Resource Conservation Comm.
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Division
P. O. Box 13087
Austin, TX 78711-3087

Mr. Jim L. Boswell, Permit Coordinator - w/o enclosures
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
TX Natl Resource Conservation Commission
P. O. Box 13087
Austin, TX 78711-3087

Mr. Phil Dellinger
Underground Injection Control Program
Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202-2733

Mr. Guy Grossman
District Director
Texas Rail Road Commission
13201 Northwest Freeway
Houston, TX 77040

bcc:
D. Peters - w/o enclosures
C. J. Griffith - w/o enclosures
C. R. Pennington - w/o enclosures
W. E. Dentler - w/o enclosures
B. R. Hightower - w/o enclosures
R. O. Neal - w/o enclosures
H. R. Horton w/o enclosures
B. S. Barrington w/o enclosures
R. J. Johnston - w/o enclosures
A. Conley-Pitchell -w/o enclosures - Bridgewater
Environmental File No. 203.22

Tom Jones - w/o enclosures
ECO Solutions
10333 Richmond Avenue, Ste. 250
Houston, TX 77042

Hoechst Celanese

April 1, 1996
IOC-020-96

Chemical Group
Hoechst Celanese Corporation
Bay City Plant
PO Box 509
Highway 3057
Bay City, TX 77404-0509

Ms. Sarah Vaughn, County Clerk
Matagorda County Courthouse
1700 7th Street
Bay City , Texas 77414

Re: DEED RECORDATION OF CLOSURE (PLUG AND ABANDONMENT) OF CLASS I HAZARDOUS WASTE INJECTION WELL, WDW-14
HOECHST CELANESE CHEMICAL GROUP, LTD.
BAY CITY PLANT, BAY CITY, TEXAS

Dear Ms. Vaughn:

Enclosed are the following documents: (1) Attachment I - A Copy of the Texas Natural Resource Conservation Commission (formally, the Texas Water Commission) Waste Disposal Well Permit, WDW-14. and (2) Attachment II - Required Information Associated with the Closure of WDW-14.

Section IV of the permit is a general description and location of the injection activity. Also enclosed is a check in the amount of $15.00 to cover the filing fee ($7.00 for the first page and $2.00 per page for each additional page) to record these documents (5 pages).

Please deed record these instruments.

We would appreciate receiving acknowledgment of receipt and recordation.

Very truly yours,

I. O. Coleman, Jr.
I. O. Coleman, Jr.
Staff Environmental Chemist

RECEIVED
APR - 8 1996
6 W-S

Sworn to and subscribed before me by the said I. O. Coleman, Jr. on this 3rd day of April, 1996. My commission expires on the 9th day of January, ~~19~~ 2000.

BETTY M. GALLEY
MY COMMISSION EXPIRES
January 9, 2000

Betty M. Galley
Notary Public in and for
Matagorda County, Texas

Hoechst

cc: Mr. Ben Knape, Chief
Underground Injection Control Unit (MC-131)
UIC. Uranium & Radioactive Waste Section
Industrial and hazardous Waste Division
Texas Natural Resource Conservation Commission
P. O. Box 13087
Austin, Texas 78711-3087

Mr. Phil Dellinger
Underground Injection Control Program
United States Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

HOECHST CELANESE CHEMICAL GROUP
P.O. BOX 509
BAY CITY, TX 77414

CHECK IS VOID IF COLORED BACKGROUND IS ABSENT

Hoechst Celanese

Hoechst

62-20
311

CITIBANK Delaware
A SUBSIDIARY OF CITICORP
ONE PENN'S WAY
NEW CASTLE, DE 19720

CHECK NUMBER 43004299

DATE 4/02/96

Fifteen 00/100 dollars **********

AMOUNT $15.00

PAY TO THE ORDER OF

MATAGORDA COUNTY
1700 7TH STREET
BAY CITY, TX 774145094

HOECHST CELANESE CORPORATION

AUDITED

⑈43004299⑈ ⑆031600209⑆ 38727758⑈

VENDOR # 10018088 MATAGORDA COUNTY

CHECK # 43004299

INVOICE NUMBER	INVOICE DATE	NET AMOUNT		INVOICE NUMBER	INVOICE DATE	NET AMOUNT
DEED RECORDATIO	4/02/96	15.00				

THIS CHECK IS IMPRINTED WITH THE HOECHST CELANESE OFFICIAL CHECK SIGNATURE

ATTACHMENT I

Permit No. WDW-14

This permit supersedes and replaces TWC Permit No. WDW-14 issued January 13, 1987

TEXAS WATER COMMISSION
Stephen F. Austin State Office Building
Austin, Texas

PERMIT to conduct Class I underground injection under provisions of Chapter 26 & 27, Texas Water Code

I. Name of Permittee:

A. Name Hoechst - Celanese Chemical Group, Inc.

B. Address P. O. Box 509
Bay City, Texas 77404-0509

II. Type of Permit: Regular_____ Amended___X___
Commercial_____ Non-commercial__X__
Hazardous__X__ Non-hazardous_____

III. Nature of Business: Petrochemical Plant

IV. General Description and Location of Injection Activity:

The disposal well is used to dispose of industrial waste from the Bay City Plant. The well is located approximately 5,230 feet south and 2,220 feet west of the most northerly northwest corner of the company property, which is located on the James Moore League, Abstract No. 62, Matagorda County, Texas, approximately 10 miles southwest of Bay City, Texas; 28°52'19" north latitude, 96°01'15" west longitude. The injection zone will be the Upper Miocene Formation in the approximate subsurface depth of 2900 and

CONTINUED on Pages 2 through 5.

The permittee is authorized to conduct injection activity in accordance with limitations, requirements, and other conditions set forth herein. This permit is granted subject to the rules and orders of the Commission, and the laws of the State of Texas. This permit expires at midnight, January 13, 1997, unless renewed or revoked by the Commission.

APPROVED, ISSUED, AND EFFECTIVE this 13th day of May 1991

ATTEST: Gloria A. Vasquez

For the Commission

TWC-0076C (Rev.10-22-86)

3,700 feet below ground level. The authorized injection interval will be at the approximate subsurface depth of 3,350 to 3,600 feet.

V. Construction History

A. Permit No. WDW-14 for the drilling and operation of this disposal well was issued on September 28, 1964. The permittee set and cemented surface casing to a depth of 1,369 feet, and long string casing from the surface into the injection zone to 3,750 feet to properly protect each USDW or freshwater aquifer. Cement was circulated outside both casings back to the surface. Any changes to the plans and specifications in the original application were certified in writing by the executive director that said changes provided equivalent or greater protection than the original design criteria and standards.

VI. Character of the Waste Streams

A. Industrial waste authorized to be injected by this permit shall consist solely of the following waste streams:

1. Wastes generated during closure of the well and associated facilities that are compatible with permitted wastes and the reservoir.

2. Wastes generated from the manufacture of acetaldehyde, acetic acid, n-butyl alcohol, n-propyl alcohol, isobutyl alcohol and vinyl acetate. Injection of hazardous wastes shall be limited to the following E.P.A. waste codes: K009, K010, D001, D002, U001, U002, U031, U112, U123, U140, U154, U197, U226, F001, F002 and Hexavalent Chromimum.

3. Other associated wastes such as ground water and rainfall contaminated by the above authorized wastes, spills of the above authorized wastes, and wash waters and solutions used in cleaning and servicing the waste disposal well system equipment which are compatible with the permitted waste streams and reservoir.

B. The specific gravity of injected fluids shall remain a range of from 1.00 to 1.10, inclusive (measured at approximately 68° F).

C. No discharge of wastes is authorized by this permit from this facility into water in the State other than those waste streams authorized above in Paragraph VI.A. injected into the Miocene Formation within the injection intervals between 3,350 to 3,600 feet.

D. Waste prohibited from injection in 40 CFR Part 148, Subpart B, are specifically prohibited from injection by this permit, unless an exemption from prohibition has been granted pursuant to 40 CFR Part 148, Subpart C.

E. Wastes regulated by the Texas Department of Health are not authorized for injection by this permit.

VII. Operating Parameters

A. The operating surface injection pressure shall not exceed 775 psig.

B. The maximum rate of injection shall not exceed 750 gallons per minute (cumulative with WDW-32, WDW-49 and WDW-110) for injection into the Upper Miocene injection interval.

C. The volume of wastewater injected shall not exceed 33,480,000 gallons per month, based on a 31 day month (calculated by multiplying 750 gallons per minute x 1440 minutes per day x the number of days in a given month), or 394,200,000 gallons per year (based on a 365 day year at 750 gallons per minute). Above volume totals are cumulative with WDW-32, WDW-49 and WDW-110 for injection into the Upper Miocene injection interval.

D. A positive pressure differential of at least 100 psig over tubing injection pressures shall be maintained in the tubing-casing annulus for the purpose of leak detection. Temporary deviations from this requirement which are a part of normal well operations are authorized but may not exceed 15 minutes in duration.

E. The specific gravity of the injected wastes shall be monitored on a batch basis, or by grab samples taken once every shift.

F. In accordance with 31 TAC § 305.153 the permittee shall secure and maintain in full force financial security in the amount of $115,000.00. The amount of the financial security may, at the discretion of the Executive Director, be altered at a future date to provide for adequate closure subject to the then prevailing economic conditions. The injection of fluids is not authorized until the permittee has received approval of the above financial security from the Executive Director.

VIII. Record Keeping Requirements

In addition to the record keeping requirements of 31 TAC § 331.67, the permittee shall also keep complete and accurate records of:

ATTACHMENT II

REQUIRED INFORMATION ASSOCIATED WITH THE CLOSURE OF WASTE DISPOSAL WELL, WDW-14

I. LAND HAD BEEN USED TO MANAGE HAZARDOUS WASTE: YES NO

II. NAME OF STATE AGENCY OR LOCAL AUTHORITY WITH WHICH THE PLAT WAS FILED: Ms. Sarah Vaughn,
County Clerk
County Courthouse
Matagorda County
1700 7th Street
Bay City, Texas 77414

III. NAME OF THE REGIONAL ENVIRONMENTAL PROTECTION AGENCY OFFICE: United States Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

IV. TYPE AND VOLUME OF WASTE INJECTED, THE INJECTED INTERVAL AND THE PERIOD OVER WHICH INJECTION OCCURRED:

TYPE OF WASTED INJECTED: Industrial waste water

VOLUME OF WASTE INJECTED: 1,722.6 X 10^6 Million Gallons (Based On An Average Flow Rate 125 Gallons/Minute For 330 Days/ Year For 29 Years Estimate)

INJECTION INTERVAL: Upper Miocene Injection Sand Interval Between 3,350-3610 Feet (Measured Depths Based On Well Log)

INJECTION PERIOD: April, 1965- April, 1994

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

(5)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

November 28, 1995

RECEIVED
DEC - 4 1995
6 W-S

Mr. Ray Horton
Hoechst Celanese Chemical Group, Inc.
P.O. Box 509
Bay City, TX 77404-509

RE: Approval of Mechanical Integrity Testing for WDW-32, Bay City, Texas

Dear Mr. Horton:

This is to acknowledge our receipt of the report dated November 13, 1995 on the mechanical integrity (MI) test, bottom hole pressure survey, and fall-off test of the above referenced well which was conducted on October 24-26, 1995. TNRCC staff was not present during the MI test but it has been determined from the report that MI of the well was confirmed on the above referenced dates in accordance with 30 TAC §331.4 and 30 TAC §331.65(b)(4). Please keep a copy of this letter with the well records so that it may be reviewed by well inspectors.

In a meeting with I. O. Coleman, Hoechst-Celanese and Thomas Jones, ECO Solutions on November 14, 1995, it was indicated that it was the intent of Hoechst-Celanese to formally present a closure plan for this well to be closed in early 1996 with these tests serving as the final MIT.

If you have any questions, or if we may be of further assistance, please contact Jim Boswell at (512) 239-6196, Mail Code, MC-131.

Sincerely,

Jim L. Boswell

Jim L. Boswell, Permit Coordinator
Underground Injection Control
UIC, Uranium, and Radioactive Waste Section
Industrial & Hazardous Waste Division

cc: Brian Graves, EPA Region 6, Dallas

John Hall, *Chairman*
Pam Reed, *Commissioner*
Peggy Garner, *Commissioner*
Dan Pearson, *Executive Director*

(5)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

April 25, 1995

Mr. I. O. Coleman, Jr.
Hoechst Celanese, Chemical Group
P.O. Box 509
Bay City, Texas 77404-0509

Re: Approval of Mechanical Integrity Testing for WDW-49

Dear Mr. Coleman:

This is to acknowledge our receipt of the report on April 12, 1995, on the mechanical integrity (MI) test conducted on March 9, 1995, of the above referenced well. TNRCC staff was present during the MI test and it has been determined that MI of the well was confirmed on the above referenced dates in accordance with 31 TAC §331.4. Please keep a copy of this letter with the well records so that it may be reviewed by well inspectors.

We also acknowledge receipt of the report on the pressure fall-off testing of the subject well. You may be contacted by our staff, or EPA, if there are any questions or comments on the pressure fall-off test.

If you have any questions, or if we may be of further assistance, please contact me at (512) 239-6604, or at Mail Code 131 at the above address.

Sincerely,

Larry Walker

Larry Walker, Geologist
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
Industrial & Hazardous Waste Division

cc: Brian Graves, EPA Region 6
TNRCC Region 12, Houston
ECO Solutions, Consultant

RECEIVED
MAY 1 1995
8 W-S

John Hall, *Chairman*
Pam Reed, *Commissioner*
Peggy Garner, *Commissioner*
Dan Pearson, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

April 10, 1995

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APR 1 4
6 W-S

Mr. I.O. Coleman, Jr.
Chemical Group
Hoechst Celanese Corporation
Bay City Plant
P.O. Box 509
Highway 3057
Bay City, Texas 77404-0509

Re: Approval of 1995 Mechanical Integrity Testing Report for WDW-32 and WDW-110

Dear Mr. Coleman:

This is to acknowledge our receipt of the reports dated March 23, 1995, on the mechanical integrity test of the above referenced wells which was conducted between January 18 through 26, 1995. From our review of the submitted logs and charts, it has been determined that mechanical integrity of the wells was confirmed on the above referenced dates in accordance with 30 TAC §331.4. Please keep a copy of this letter with the well records so that it may be reviewed by well inspectors.

We also acknowledge receipt of the reports on the pressure fall-off testing of the subject wells. You may be contacted by our staff or by EPA Region 6 if there are any questions or comments on the pressure fall-off test.

If you have any questions, or if we may be of further assistance, Please contact me at 512/239-6635 Mail Code MC 131.

Sincerely,

Hong Guo

Hong Guo, P.E.
Underground Injection Control Team
UIC, Uranium and Radioactive Waste Section
Industrial and Hazardous Waste Division

cc: Brian Graves, EPA Region VI
TNRCC Region 12 Office

John Hall, *Chairman*
Pam Reed, *Commissioner*
Peggy Garner, *Commissioner*
Dan Pearson, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

February 22, 1995

Mr. I. O. Coleman, Jr.
Hoechst Celanese, Chemical Group
Bay City Plant
P.O. Box 509
Highway 3057
Bay City, Texas 77404-0509

Re: Approval of Mechanical Integrity Testing for WDW-32

Dear Mr. Coleman:

This is to acknowledge our receipt of the report dated January 31, 1995, on the mechanical integrity (MI) test of the above referenced well which was conducted on January 18-20, 1995. TNRCC staff was present during the MI test and it has been determined that MI of the well was confirmed on the above referenced dates in accordance with 30 TAC §331.4. Please keep a copy of this letter with the well records so that it may be reviewed by well inspectors.

If you have any questions, or if we may be of further assistance, please call me at (512) 239-6196, Mail Code MC-131.

Sincerely,

Jim L. Boswell

Jim L. Boswell, Permit Coordinator
Underground Injection Control Team
UIC, Uranium and Radioactive Waste Section
Industrial and Hazardous Waste Division

cc: ~~Brian Graves, EPA Region VI, Dallas~~
TNRCC Region 12, Houston
ECO Solutions, Inc., 10333 Richmond, Suite 250, Houston, 77042

RECEIVED
MAR 1 1995
6 W-S

SOLUTIONS, INC.

Final Report

Hoechst Celanese Chemical Group, Ltd.
Bay City, Texas
Closure Report
Injection Well WDW-14 (Well No. 2)

RECEIVED
APR 15 1996
6 WQ-SU

March 1996

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, Texas 77042
(713) 780-1955
FAX (713) 780-0870

ECO Solutions, Inc.

HOECHST CELANESE CHEMICAL GROUP, LTD

Bay City Plant

Final Closure Report for WDW-14 (Well #2)

RECEIVED
APR 15 1996
6 W-SU

Prepared by:

ECO Solutions, Inc.
9800 Richmond, Suite 320
Houston, Texas 77042

March 1996

Job No. 95043

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APPENDIX C HALLIBURTON SERVICE AND WESTERN ATLAS WIRELINE FIELD TICKETS

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PLUG & ABANDON CERTIFICATION

The undersigned has reviewed all pertinent information concerning the plugging and abandonment of Hoechst Celanese Chemical Group, LTD's (HCCG) Waste Disposal Well No. 14 (WDW-14) with regards to the plans and specifications set forth in Texas Natural Resource Conservation Commission (TNRCC), Underground Injection Control (UIC) Program and the current Federal and TNRCC requirements for the plugging and abandonment of a Class I hazardous waste disposal well located in the State of Texas.

In accordance with TNRCC/UIC Program, 31TAC 331.46, closure standards of HCCG's Permit No. HW-50153-000, I certify that WDW-14 was plugged and abandoned in compliance with the permit and applicable TNRCC regulations in effect at the time of plugging and abandonment of WDW-14.

This certification is not valid unless the engineer's original signature and raised seal are present.

4/12/96
DATE

(SEAL)

Wesley W. Smith, P.E.
Texas Professional Engineer
No. 29398

9800 Richmond Avenue - Suite 320 - Houston, Texas 77042 - Phone (713) 780-1955 - FAX (713) 780-0870

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.1 INTRODUCTION

Hoechst Celanese Chemical Group, Ltd. (HCCG) contracted ECO Solutions, Inc. (ECO) to perform the plugging and abandonment (P&A) of their Class I ~~nonhazardous~~ hazardous injection well, WDW-14 (Well No. 2), located at their Bay City facility. A schematic drawings of WDW-14 prior to and following P&A operations are included as Figure 1 and Figure 2, respectively. The attached report details the data associated with the P&A field work.

The following provides an overview of the key elements of the P&A on WDW-14 (Well No. 2).

- Submitted details of placement of cement plugs with premium cement and cement retainer to satisfy the P&A requirements of the Texas Natural Resource Conservation Commission's (TNRCC), Underground Injection Control (UIC) Program, 31 TAC 331.46.

- Milled a 50' section of the 9-5/8" long string casing string and underreamed formation and cement out to a 15" radial diameter and cemented the confinement system interval.

- Squeeze cemented perforated section of 9+5/8" casing immediately below 13+3/8" surface casing shoe depth.

  Placed pertinent P & A data on top welded steel plate at the surface.

- Submitted an executed copy of the Consent To Revocation Of Texas Natural Resource Conservation Commission Permit No. WDW-14 form and a copy of the recorded deed was submitted to the TNRCC under a separate cover.

HCCG or ECO personnel contacted the TNRCC Austin office prior to commencing and during field operations to allow TNRCC personnel to witness cementing events during the P&A field operations. Mr. Jim Boswell with the TNRCC witnessed the placement and tagging of cement plug No. 2.

1.2 EXECUTIVE SUMMARY

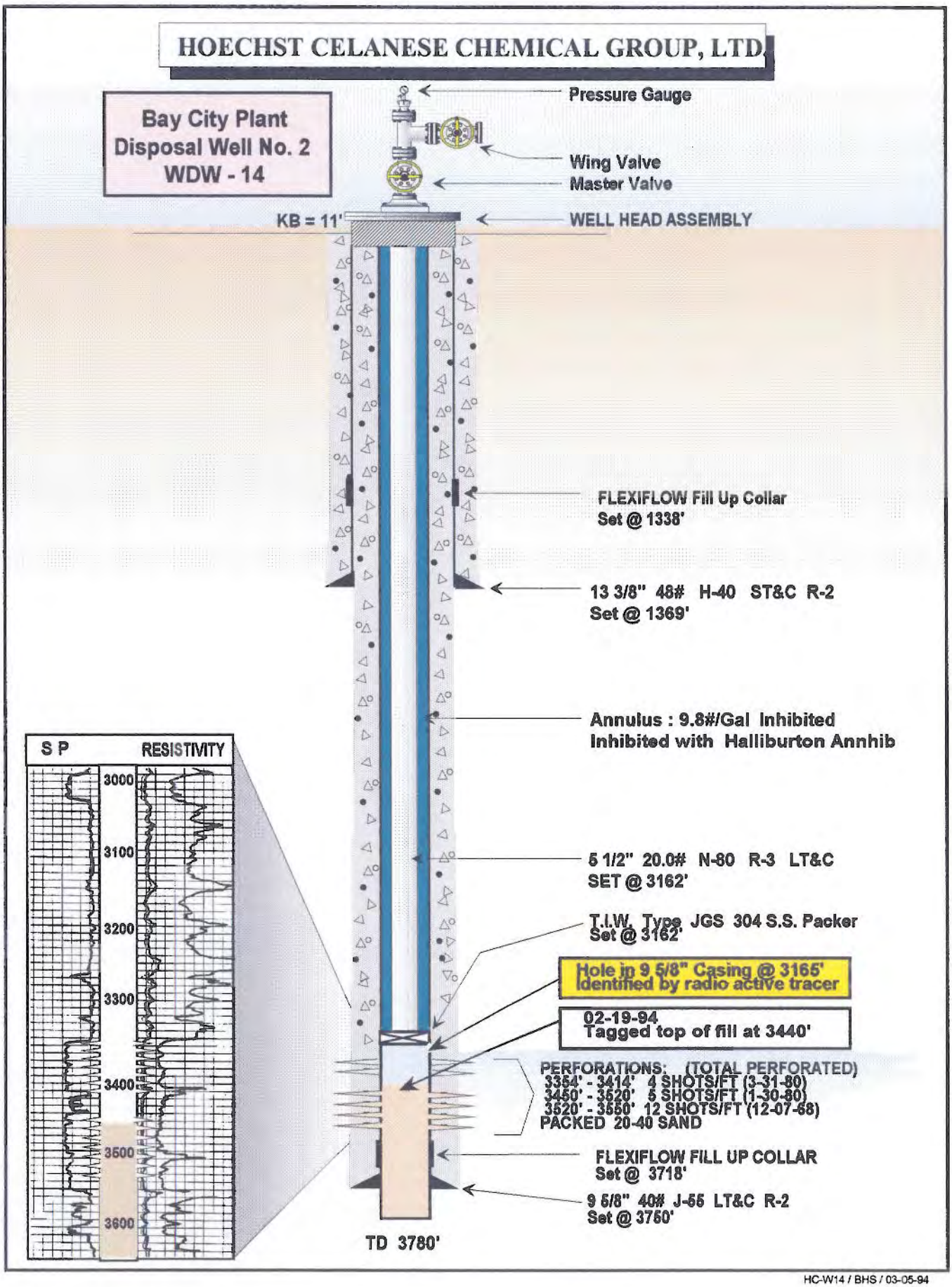
HCCG and ECO personnel met with TNRCC personnel in Austin, Texas and presented a revised plugging and abandonment procedure on WDW-14, WDW-32, WDW-49 and

WDW-110. The new procedure allowed for: (1) milling out a section of the casing string in the confinement interval and underreaming the cement and formation to a radial diameter of +/-15" and (2) perforating the casing string immediately below the 13+3/8" O.D. surface casing shoe depth. On WDW-14, the milled section and underreaming was performed in an interval from 3050' to 3100'. By approval from the TNRCC, this specialized field work substituted for running downhole logs and conducting a final mechanical integrity test.

An extra large workover rig was rigged up on WDW-14 to safely handle the milling and underreaming operations on the 9+5/8" O. D. casing string. A Halliburton wireline set "EZ-SV" cement retainer was set at 3140'. Cement plug No. 1 consisting of 260 sacks of Class "H" neat cement was placed below and above the cement retainer from an estimated depth of 3350' up to 3116'. The 9+5/8" casing was milled from 3050' to 3100' in the confinement interval and then the cement and formation was underreamed from 3050' to 3066' and 3076' to 3100' to a radial diameter of 15". Cement plug No 2 consisting of 280 sacks of Class "H" cement was placed from 3100' to 2420'. Cement plug No. 3 consisting of 390 sacks of Class "H" cement was placed from 2420' to 1500'. The 9+5/8" O.D. long string casing was perforated from 1377' to 1379' with 4 shots per foot. Cement No.4 consisting of 575 sacks of Class "H" cement was placed from 1500' to 10' (below ground level). A 1/2" thick steel plate with pertinent data inscribed on top, was welded to 9+5/8" O.D. casing extending up to grade and surrounded by cement at the surface.

The plugging and abandonment of HCCG's WDW-14 field work was officially completed on March 13, 1996.

FIGURE 1



HC-W14 / BHS / 03-05-94

HOECHST CELANESE CHEMICAL GROUP, LTD.

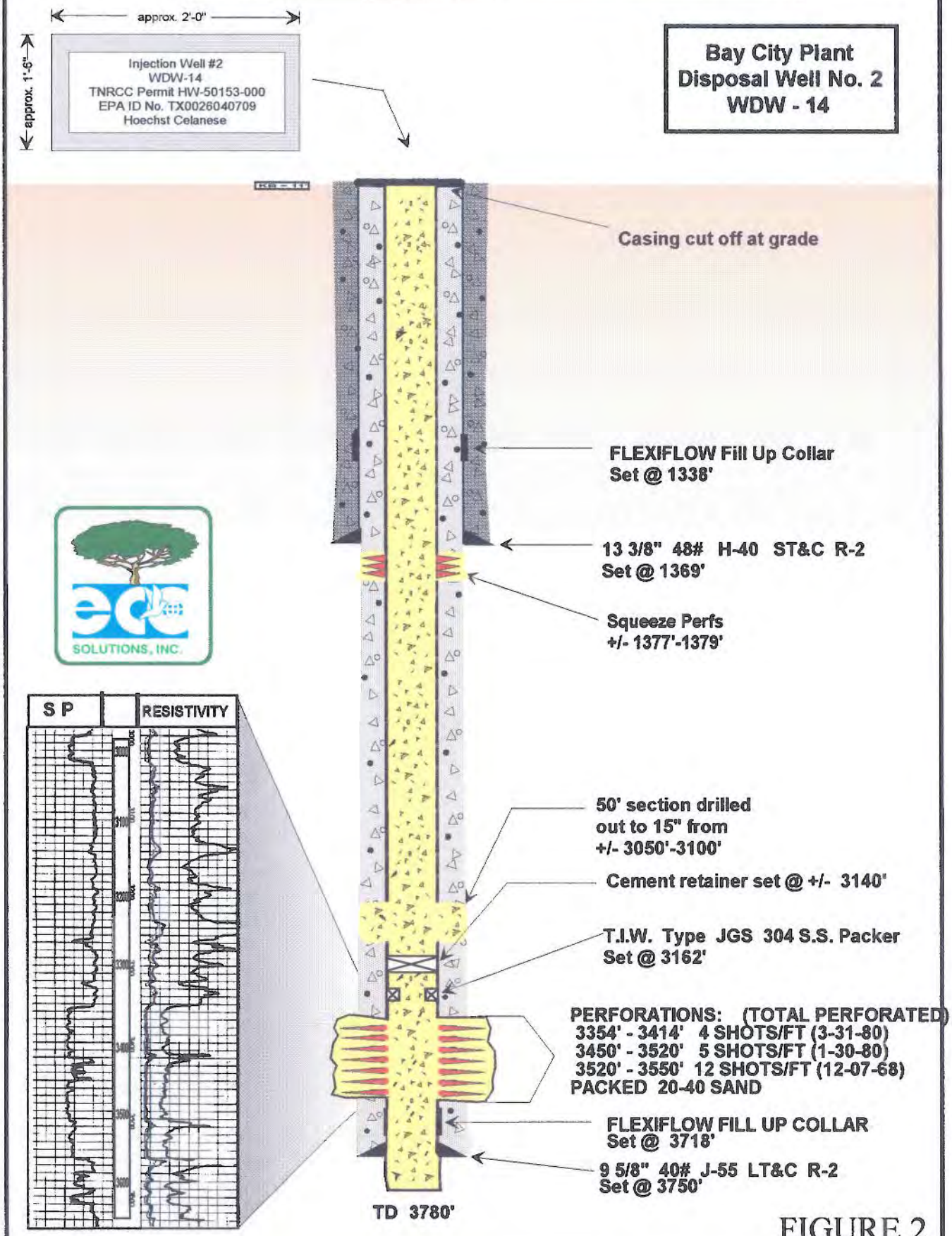


FIGURE 2

2.0 SUMMARY DAILY REPORTS

Monday, March 4, 1996
(Daylight Operations)

Dawson Well Service began "bobtailing" workover rig #179 and peripheral equipment from Mundy parking lot to WDW-14 wellsite this A.M. (Equipment had been stacked at HCCG's front parking lot over the weekend). Conducted safety orientation for Dawson's rig crews. HCCG personnel laid down "plastic liner" prior to setting substructure, pipe racks, rig carrier, pumps, racks and generator house. HCCG personnel began diking around the South and West sides of the location. Installed four permanent anchors for rig guy lines.

Dawson began rigging up workover rig, #1 and #2 mud pumps, mud mixing system, generator house and peripheral equipment. Spotted substructure. Unable to raise derrick this afternoon due to high winds. Will raise rig tomorrow.

Unscrewed hammer nut on top wellhead to identify the size and type threads for a flange adapter required to install below out preventor (BOP) tomorrow. Closed well in for the night (CWIFT) @9:00 P.M.

NOTE: Dawson power tongs to makeup the 3+1/2" drill pipe are not yet available. Weatherford will provide this service. All depths within this report are referenced to rotary drive bushing (RKB) at 11' above ground level (GL).

Tuesday, March 5, 1996
(Daylight Operations)

Finished moving in Dawson Rig #179 this A.M. Completed rigging up rig, substructure and peripheral equipment - raised derrick. Opened 5+1/2" O.D. valve on injection tubing - well on vacuum. Pumped 240 barrels (bbls) of 9.8 pounds per gallon (ppg) brine down injection string to triple rinse same.

Utilized HCCG "cherry picker" to set mat under the pipe racks and unload Weatherford-Enterra's rental tools including 8 - 6+3/4" O. D. drill collars, 117 joints of 3+1/2" I.F. drill pipe , 11" 3000# Hydril annular BOP, etc. and Weatherford Pipe Services' skid-mounted casing tong units.

HCCG "cold cut" 5+1/2" injection tubing string exposed above wellhead to remove 5+1/2" master valve and welded flange - significant scale present on I.D. of recovered piece. Picked up casing spear, spear packoff plus stop and engaged

injection string. Picked up injection string - seals free to travel. Removed casing slips suspending injection string. Stripped over threaded flange and Hydril BOP. Nippled up same. Pulled injection string out of packer and laid down first joint. Installed TIW valve on injection string. CWIFN @ 7:00 P.M.

NOTE: Pipe racks settled significantly after drill pipe and collars were unloaded on same.

Wednesday, March 6, 1996
(Daylight Operations)

HCCG "cherry picker" assisted to stabilize pipe racks this A.M. Railroad ties were added to current matting beneath racks to slow settling process. Rigged up Weatherford laydown machine and casing tongs to remove/laydown injection string. (HCCG finished diking location). Pulled out of the hole laying down 5+1/2" 20 pounds per foot (ppf), N-80 injection tubing string and TIW seal assembly. Rigged down 5+1/2" Weatherford casing tongs. Picked up 1 joint of 3+1/2" drill pipe and TIW valve and placed in the BOP. CWIFN @ 5:00 P.M.

NOTE:

1) Discussed rack problems (& safety) with HCCG personnel. A decision made to utilize Weatherford's laydown machine to minimize the time required to pickup the 3+1/2" 13.3 ppf drill pipe off the racks and run in the hole.

2) HCCG removed the 5+1/2" O.D. 20 ppf injection string from the racks as it was laid down to eliminate pipe rack settling problems. Pipe was taken offsite for waterblasting inside plant.

3) Injection string in "fair to good" condition w/heavy scale (approx. 1/4" thick radially) and general corrosion present on string I.D.

4) Notified Mr. Jim Boswell of the TNRCC of intent to squeeze cement the injection zone on Friday afternoon. Mr. Boswell asked that we proceed without a TNRCC representative on site. Mr. Boswell requested a Sunday update in order to be on location for the setting of the second cement plug (across the sectioned interval).

Thursday, March 7, 1996
(Daylight Operations)

Rigged up Weatherford power tongs for 3+1/2" drill pipe this A.M. Picked up 8+3/4" Smith rock bit and 9+5/8" casing scrapper and went in hole with same by picking up 3+1/2" drill pipe off the racks w/laydown machine. Tagged the top of the TIW 'S" packer at 3,162' (brine on gravity feed and regulated by casing valve during trip in the hole). Rigged down laydown machine. Pulled out of the hole with drill pipe, bit and casing scrapper. Placed 1 joint of drill pipe and a TIW valve in the BOP. CWIFN 6:00 P.M.

NOTE: Sent in underreamer and section mill into Houston to be made up (proper torque) on 1 6+3/4" drill collar (torque-30,000 ft/lbs.). Drill collar joint weight - 3000 lbs. Difficult to safety handle this equipment on the ground. Will have both pieces back on location tomorrow afternoon.

Friday, March 8, 1996
(24-Hour Operations)

Moved in and rigged up Western Atlas this A.M. Went in hole with 7.65" O.D. gauge ring and junk basket to the top of the 'S" packer. Pulled out of the hole with same. Picked up wireline-set Halliburton 'EZ-SV" cement retainer and went in the hole with same. Set 9+5/8" retainer at 3,140'. Pulled out of the hole and rigged down Western Atlas.

Picked up Halliburton 'star guide" for cement retainer and went in the hole with same on 3+1/2" drill pipe. Engaged cement retainer at 3,140' w/star guide. Pressure tested cement retainer to 500 pounds per square inch (psi) for 15 minutes - O.K.

Rigged up Halliburton Services to cement squeeze the injection zone. Halliburton pumped in a total of 260 sacks premium neat Class 'H" cement (59 bbls), 15.2 pounds per gallon (ppg) neat cement slurry (Cement plug No. 1). Displaced cement down drill pipe with brine water.

Pulled out of retainer and picked up to 3,100' leaving a total of 5 bbls. of cement slurry above cement retainer. Reverse circulated drill pipe clean (several bbls excess cement in returns). Picked up to 3,070' - reverse circulated brine water out of well. Will wait on cement (WOC) 12 hours prior to tagging cement top.

During WOC time, displaced entire circulating system (surface and subsurface) with a low water-loss mud system from SBM Drilling Fluids. Circulated and

conditioned mud. After 12-hours, lowered drill pipe back down and tagged the top of cement at 3,116' (soft tag - hard cement top appears to be about 3,105'). Pulled out of the hole with drill pipe and star guide. Set back 3+1/2" drill pipe tongs. Picked up 90K Foster Tongs from Weatherford. Picked up 9+5/8" section mill and 4-6+3/4" drill collars and started in hole.

NOTE: Will continue to utilize power drill pipe tongs - 90K Foster tongs are for make-up/breakout of 6+3/4" drill collars, underreamer and section mill.

Saturday, March 9, 1996

(24-Hour Operations)

Continued in hole with section mill this A.M. Began milling 9+5/8" casing at 3,050'. Continued milling section of 9+5/8" casing down to 3,078'.

Sunday, March 10, 1996

(24-Hour Operations)

Continued milling section of 9+5/8" casing this A.M. Completed the milled portion down to a depth of 3,100'. Milled section extends from 3,050' - 3,100'. Worked section mill cutters back up inside 9+5/8" casing. Pulled out of the hole and laid down section mill.

Picked up 15" underreamer and 4 - 6+3/4" drill collars and went in hole with same on drill pipe down to the top of the milled section at 3,050'. Began underreaming sectioned interval out to 15" diameter - formation (shale) cuttings and cement cuttings in fluid returns at surface. Stopped underreaming at 3,066' due to high rotary torque and 'hopping" drill stem. Circulated and conditioned the drilling mud (drilled cement from behind the 9+5/8" casing, flocculated the mud system and treated out same prior to continuing underreaming operations).

NOTE: Called Mr. Jim Boswell with the TNRCC at 3:00 P.M. and left message on his voice mail that the second cement plug (across the milled section) would be set at approximately 4:00 P.M. tomorrow.

Monday, March 11, 1996

(24-Hour Operations - Reverting to Daylight Operations Today)

Decision made to close underreamer and attempt to pass down through obstruction (possible centralizer on outside of 9+5/8" casing string) and then begin

underreaming again at approximately 3,076' (If obstruction is a centralizer, leave same cemented in borehole wall). Began underreaming again at 3,075' out to 15". Continued underreaming down to a final depth of 3,100'.

Reviewed previous 24-hour milling/underreaming operations and subsequent difficulties with HCCG personnel. ECO recommended and HCCG concurred to leave the centralizer cemented to the borehole wall (shale section) to minimize potential downhole risk. Circulated and conditioned mud for cement contamination. Pulled out of the hole and laid down underreamer.

Picked up 3' long mule shoe and went in the hole with same on drill pipe. Lowered drill pipe and tagged bottom at 3,103' - apparently pushing metal shavings in front of mule shoe.

Rigged up Halliburton to cement sectioned/underreamed interval from 3,100' - 3,050' with Class 'H' cement. Halliburton set balanced cement plug No. 2 with 280 sacks premium Class 'H' cement mixed at 16.2 ppg. Estimated top of cement plug approximately 2,478'. Pulled drill pipe to 2,400' and reversed circulated excess cement out of borehole. Rigged down and released Halliburton. Will WOC 12 hours prior to tagging same tomorrow A.M.

Pulled out of the hole with drill pipe and mule shoe. CWIFN @ P.M. Note: Rig now on daylight operations for the remainder of the project.

NOTE: Mr. Jim Boswell of the TNRCC on location and witnessed the cementing of the sectioned interval. Also, Mr. Boswell plans to be on location to witness the tagging of cement plug No. 2 tomorrow at 9:30 A.M.

Tuesday, March 12, 1996

(Daylight Operations)

Went in hole with mule shoe this A.M. Tagged top of cement plug at 2,420'. Picked up to 2,050'. Cleaned drilling mud out of all surface holding tanks in preparation of displacing the system with fresh water. Displaced 10.3 ppg rental drilling mud out of wellbore into vacuum trucks for transport to Victoria. Lowered drill pipe to 2,420' and reversed circulated the balance of the drilling mud out of the hole. Prepared to set cement plug No. 3.

Rigged up Halliburton to set cement plug No. 3. Set balanced cement plug with 390 sacks premium Class 'H' cement mixed at 16.2 ppg. Estimated top of cement is 1,325'. Pulled out of the hole to 1450' - reversed circulated excess cement out

of well. Rigged down and released Halliburton. Pulled out of the hole with drill pipe. CWIFN @ 7:00 P.M.

NOTE:

1) Mr. Jim Boswell of the TNRCC on location this A.M. to witness tagging of cement plug No. 3.
2) Will wait approximately 12-hours prior to tagging cement plug No. 3.
3) Rigged down and released Foster 90K tongs this A.M.

Wednesday, March 13, 1996
(Daylight Operations)

Rigged up Western Atlas this A.M. to perforate the 9+5/8" casing to squeeze cement same. Western Atlas went in the hole with 5" casing gun and tagged the top of cement at 1,508' (wireline measurement). Perforated 1377' - 1379', 4 shots per foot, 90 degree phasing. Pulled out of the hole and rigged down Western Atlas.

Picked up 8+3/4" drill bit and ran about one half of the 3+1/2" drill pipe racked in the derrick. Tagged top of cement at 1,500'. Rigged up Weatherford laydown machine. Pulled out of hole laying down 8+3/4" bit and that portion of the 3+1/2" drill pipe run in the hole. Picked up mule shoe and ran the balance of the 3+1/2" drill pipe from the derrick. Tagged top of cement again at 1,500'.

Rigged up Halliburton to set cement plug No. 4. Set balanced cement plug from 1,500' to surface using 575 sacks premium Class 'H" cement mixed at 16.2 ppg. Estimated squeeze pressure at perforations due to full column of 16.2 ppg cement - 515 psig. Pulled out of the hole laying down remaining drill pipe. Note: HCCG personnel on location washing cement out of drill pipe as each joint is laid down and Halliburton filling 9+5/8" casing (drill pipe displacement volume) with 16.2 ppg cement slurry. Will WOC 12-hours prior to confirming final cement top. Rigged down and released Halliburton. Removed BOP and washed cement out of same. CWIFN @ 7:00 P.M.

Note: Will rig down Weatherford tomorrow.

Thursday, March 14, 1996
(Daylight Operations)

Tagged top of cement at 10' below GL this A.M. Rigged down and loaded out Weatherford tong unit and laydown machine. HCCG 'cherry picker" and

personnel assisted the loading out of rental equipment. All rental equipment released.

Lowered derrick and began rigging down Dawson Rig #179 and stacking same outside the HCCG front gate.

Friday, March 15, 1996

Completed removal of Dawson rig equipment this A.M.

NOTE: Telecom to Mr. Jim Boswell of the TNRCC - left voice mail which provided detailed update and advise TNRCC of the successful completion of closure field activities on WDW-14.

Thursday, April 11, 1996

HCCG personnel cut off the 9+5/8" casing at grade and welded a 1/2" thick stainless steel plate on top the casing stub with the following data inscribed on top.

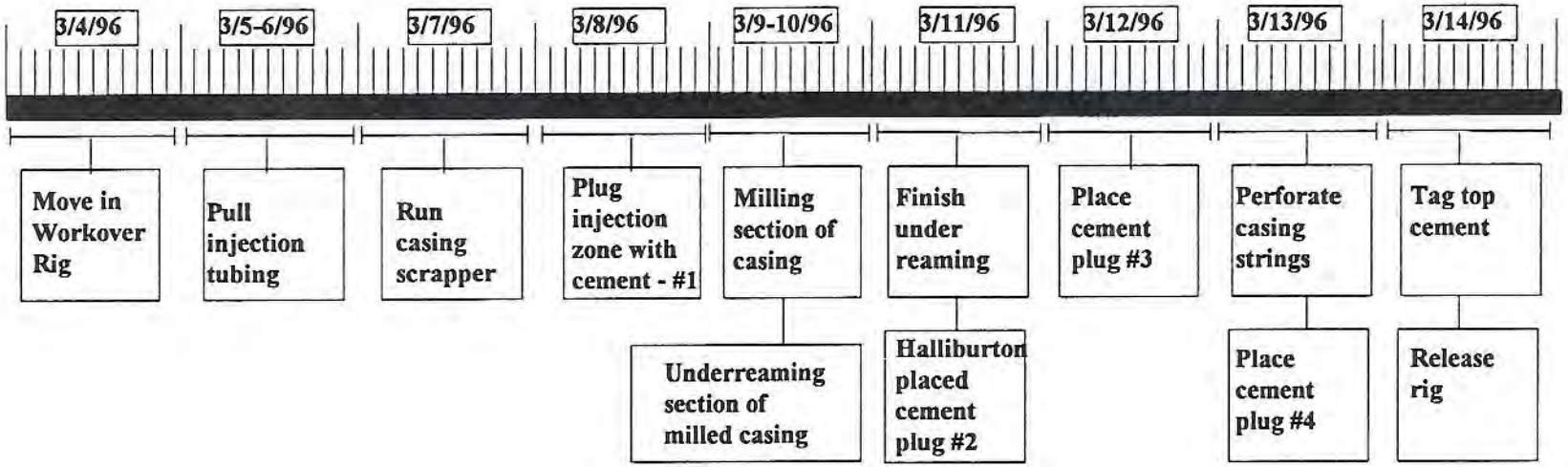
INJECTION WELL #2
WDW-14
TNRCC Permit HW-50153-000
EPA ID No. TX0026040709
Hoechst Celanese

A 6" deep 2'x1+1/2' cement slab was poured at the surface and surrounded the welded surface plate. The surrounded ground was filled in with soil to grade.

FIELD OPERATIONS COMPLETE.

HOECHST CELANESE CHEMICAL GROUP, LTD.

Event Timeline

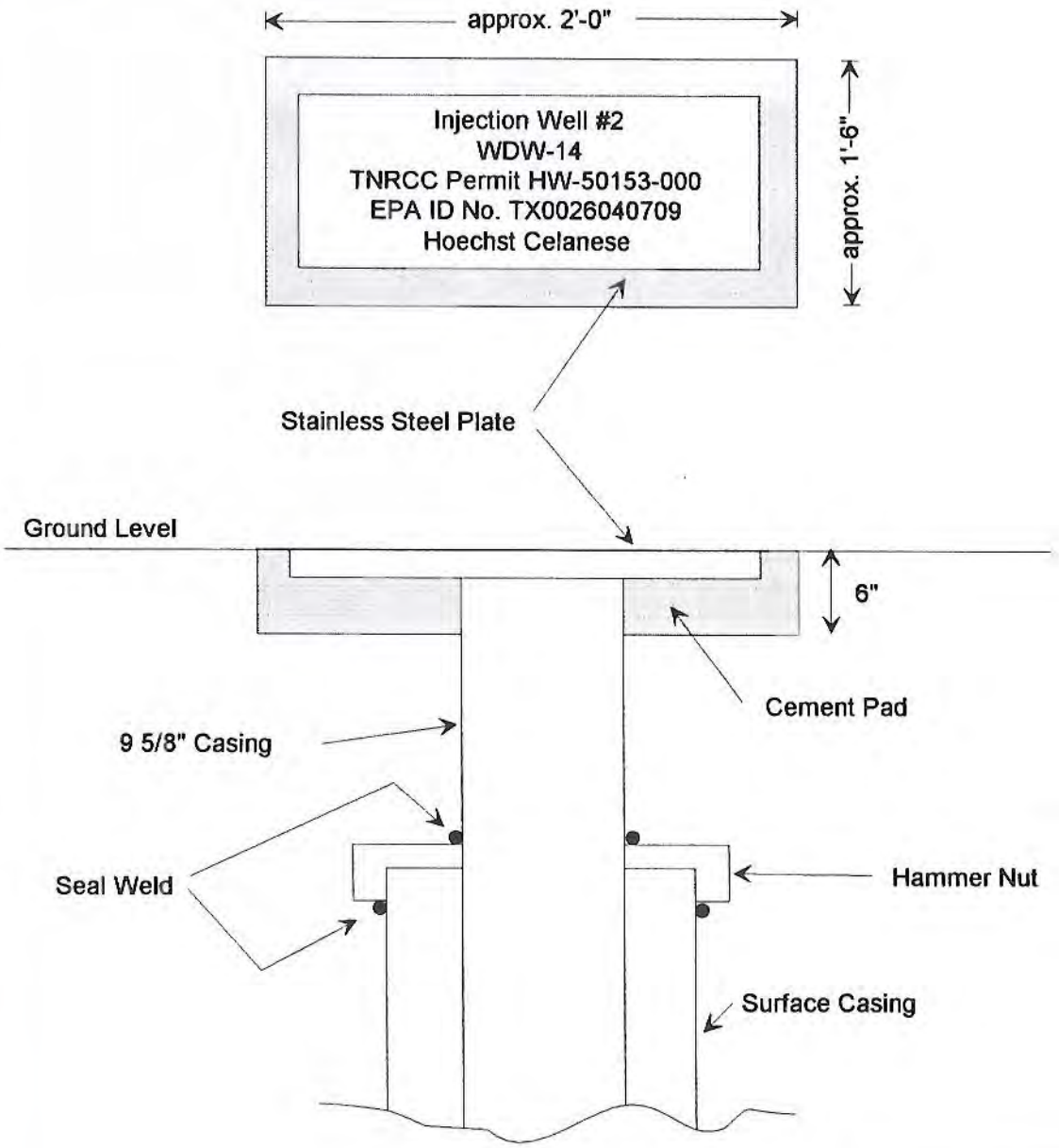


Daily Activities

3/4/96	3/5-6/96	3/7/96	3/8/96	3/9-10/96	3/11/96	3/12/96	3/13/96	3/14/96
Move in Workover Rig Pump in 9.8 ppg brine to triple rinse tubing & kill well	Pull injection tubing	Run in hole with casing scrapper	Plug injection zone with cement - #1	Milling and start under-reaming milled casing	Finish under reaming Halliburton placed cement plug #2 - WOC	Place cement plug #3 - WOC	Place cement Plug #4 - WOC	Tag top cement Released rig Job complete

ECO Solutions, Inc.

HOECHST CELANESE CHEMICAL GROUP, LTD.
BAY CITY PLANT
INJECTION WELL WDW-14
SURFACE MONUMENT SCHEMATIC



SOLUTIONS, INC.

APPENDIX A

CONSENT TO REVOCATION OF TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

Hoechst Celanese

April 1, 1996
IOC-020-96

Chemical Group
Hoechst Celanese Corporation
Bay City Plant
PO Box 509
Highway 3057
Bay City, TX 77404-0509

Ms. Sarah Vaughn, County Clerk
Matagorda County Courthouse
1700 7th Street
Bay City , Texas 77414

Re: DEED RECORDATION OF CLOSURE (PLUG AND ABANDONMENT) OF CLASS I HAZARDOUS WASTE INJECTION WELL, WDW-14
HOECHST CELANESE CHEMICAL GROUP, LTD.
BAY CITY PLANT, BAY CITY, TEXAS

Dear Ms. Vaughn:

Enclosed are the following documents: (1) Attachment I - A Copy of the Texas Natural Resource Conservation Commission (formally, the Texas Water Commission) Waste Disposal Well Permit, WDW-14. and (2) Attachment II - Required Information Associated with the Closure of WDW-14.

Section IV of the permit is a general description and location of the injection activity. Also enclosed is a check in the amount of $15.00 to cover the filing fee ($7.00 for the first page and $2.00 per page for each additional page) to record these documents (5 pages).

Please deed record these instruments.

We would appreciate receiving acknowledgment of receipt and recordation.

Very truly yours,

I. O. Coleman, Jr.
I. O. Coleman, Jr.
Staff Environmental Chemist

RECEIVED
6 W-SU

Sworn to and subscribed before me by the said I. O. Coleman, Jr. on this 3rd day of April, 1996. My commission expires on the 9th day of January, ~~19~~ 2000.

Betty M. Galley
Notary Public in and for
Matagorda County, Texas

BETTY M. GALLEY
MY COMMISSION EXPIRES
January 9, 2000

Hoechst

cc: Mr. Ben Knape, Chief
Underground Injection Control Unit (MC-131)
UIC. Uranium & Radioactive Waste Section
Industrial and hazardous Waste Division
Texas Natural Resource Conservation Commission
P. O. Box 13087
Austin, Texas 78711-3087

Mr. Phil Dellinger
Underground Injection Control Program
United States Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

US-M 9

bcc: W. E. Dentler - w/o Attachments
C. J. Griffith - " "
R. S. O'Neal - " "
R. E. Van Wie - " "
P. H. Richardson - " "
R. J. Johnston - " "
R. E. Tower - " "
M. D. Garcia - " "
L. J. Wenk - " "
H. R. Horton - " "
B. S. Barrington - " "
G. J. McCarthy - " "
A. Conley- Pitchell - Bridgewater
Environmental File Nos. 203.21 and 403.2A

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HOECHST CELANESE CHEMICAL GROUP
P.O. BOX 509
BAY CITY, TX 77414

CHECK IS VOID IF COLORED BACKGROUND IS ABSENT

Hoechst Celanese

Hoechst

CITIBANK Delaware
A SUBSIDIARY OF CITICORP
ONE PENN'S WAY
NEW CASTLE, DE 19720

52-20
311

CHECK NUMBER 43004299

DATE 4/02/96

Fifteen 00/100 dollars **********

AMOUNT $15.00

PAY TO THE ORDER OF

MATAGORDA COUNTY
1700 7TH STREET
BAY CITY, TX 774145094

HOECHST CELANESE CORPORATION

AUDITED

⑈43004299⑈ ⑆031600209⑆ 38727758⑈

VENDOR # 10018088 MATAGORDA COUNTY

CHECK # 43004299

INVOICE NUMBER	INVOICE DATE	NET AMOUNT	INVOICE NUMBER	INVOICE DATE	NET AMOUNT
DEED RECORDATIO	4/02/96	15.00			

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APR 15 1996
G. VASU

HIS CHECK IS IMPRINTED WITH THE HOECHST
ELANESE OFFICIAL CHECK SIGNATURE

ATTACHMENT I

Permit No. WDW-14

This permit supersedes and replaces TWC Permit No. WDW-14 issued January 13, 1987

TEXAS WATER COMMISSION
Stephen F. Austin State Office Building
Austin, Texas

PERMIT to conduct Class I underground injection under provisions of Chapter 26 & 27, Texas Water Code

I. Name of Permittee:

A. Name Hoechst - Celanese Chemical Group, Inc.

B. Address P. O. Box 509
Bay City, Texas 77404-0509

II. Type of Permit: Regular____ Amended X
Commercial____ Non-commercial X
Hazardous X Non-hazardous____

III. Nature of Business: Petrochemical Plant

IV. General Description and Location of Injection Activity:

The disposal well is used to dispose of industrial waste from the Bay City Plant. The well is located approximately 5,230 feet south and 2,220 feet west of the most northerly northwest corner of the company property, which is located on the James Moore League, Abstract No. 62, Matagorda County, Texas, approximately 10 miles southwest of Bay City, Texas; 28°52'19" north latitude, 96°01'15" west longitude. The injection zone will be the Upper Miocene Formation in the approximate subsurface depth of 2900 and

CONTINUED on Pages 2 through 5.

The permittee is authorized to conduct injection activity in accordance with limitations, requirements, and other conditions set forth herein. This permit is granted subject to the rules and orders of the Commission, and the laws of the State of Texas. This permit expires at midnight, January 13, 1997, unless renewed or revoked by the Commission.

APPROVED, ISSUED, AND EFFECTIVE this 13th day of May 1991

ATTEST: Gloria A. Vasquez

For the Commission

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3,700 feet below ground level. The authorized injection interval will be at the approximate subsurface depth of 3,350 to 3,600 feet.

V. Construction History

A. Permit No. WDW-14 for the drilling and operation of this disposal well was issued on September 28, 1964. The permittee set and cemented surface casing to a depth of 1,369 feet, and long string casing from the surface into the injection zone to 3,750 feet to properly protect each USDW or freshwater aquifer. Cement was circulated outside both casings back to the surface. Any changes to the plans and specifications in the original application were certified in writing by the executive director that said changes provided equivalent or greater protection than the original design criteria and standards.

VI. Character of the Waste Streams

A. Industrial waste authorized to be injected by this permit shall consist solely of the following waste streams:

1. Wastes generated during closure of the well and associated facilities that are compatible with permitted wastes and the reservoir.

2. Wastes generated from the manufacture of acetaldehyde, acetic acid, n-butyl alcohol, n-propyl alcohol, isobutyl alcohol and vinyl acetate. Injection of hazardous wastes shall be limited to the following E.P.A. waste codes: K009, K010, D001, D002, U001, U002, U031, U112, U123, U140, U154, U197, U226, F001, F002 and Hexavalent Chromimum.

3. Other associated wastes such as ground water and rainfall contaminated by the above authorized wastes, spills of the above authorized wastes, and wash waters and solutions used in cleaning and servicing the waste disposal well system equipment which are compatible with the permitted waste streams and reservoir.

B. The specific gravity of injected fluids shall remain a range of from 1.00 to 1.10, inclusive (measured at approximately 68° F).

C. No discharge of wastes is authorized by this permit from this facility into water in the State other than those waste streams authorized above in Paragraph VI.A. injected into the Miocene Formation within the injection intervals between 3,350 to 3,600 feet.

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ATTACHMENT II

REQUIRED INFORMATION ASSOCIATED WITH THE CLOSURE OF WASTE DISPOSAL WELL, WDW-14

I. LAND HAD BEEN USED TO MANAGE HAZARDOUS WASTE: YES NO

II. NAME OF STATE AGENCY OR LOCAL AUTHORITY WITH WHICH THE PLAT WAS FILED: Ms. Sarah Vaughn,
County Clerk
County Courthouse
Matagorda County
1700 7th Street
Bay City, Texas 77414

III. NAME OF THE REGIONAL ENVIRONMENTAL PROTECTION AGENCY OFFICE: United States Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

IV. TYPE AND VOLUME OF WASTE INJECTED, THE INJECTED INTERVAL AND THE PERIOD OVER WHICH INJECTION OCCURRED:

TYPE OF WASTED INJECTED: Industrial waste water

VOLUME OF WASTE INJECTED: 1,722.6 X 10^6 Million Gallons (Based On An Average Flow Rate 125 Gallons/Minute For 330 Days/ Year For 29 Years Estimate)

INJECTION INTERVAL: Upper Miocene Injection Sand Interval Between 3,350-3610 Feet (Measured Depths Based On Well Log)

INJECTION PERIOD: April, 1965- April, 1994

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APPENDIX B

FINAL MECHANICAL INTEGRITY TESTING REPORT - WDW-14

ECO Solutions, Inc.

HOECHST CELANESE CHEMICAL GROUP, INC.
Bay City Plant

PRESSURE FALLOFF AND MECHANICAL INTEGRITY TESTING FOR WDW-14 (Well #2)

Prepared by:

ECO Solutions, Inc.
10333 Richmond, Suite 250
Houston, Texas 77042

March 1994

Job No. 94-004

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1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.1 INTRODUCTION

Hoechst Celanese Chemical Group, Inc. (HCCG) contracted ECO Solutions, Inc. (ECO) to conduct bottom hole pressure falloff and mechanical integrity testing on WDW-14, HCCG's Class I injection well located at the Bay City, Texas facility. The attached report details the data and test results associated with that testing.

The following list provides an overview of the key elements of the testing:

* A bottom hole pressure (BHP) falloff test was conducted to satisfy the annual mechanical integrity test requirements of the U.S. Environmental Protection Agency (EPA) and the Texas Natural Resource Conservation Commission (TNRCC).

* An annulus pressure test was conducted to satisfy the annual mechanical integrity test requirements of the EPA and TNRCC.

* A differential temperature survey was recorded to satisfy that portion of the 5-year mechanical integrity test requirement of the TNRCC.

* A radioactive tracer survey was conducted to satisfy the annual requirements of the EPA and TNRCC.

The field operations were initiated on Wednesday, February 16th, 1994 and were completed on Tuesday, February 22nd, 1994. Mssrs. Reuben Alaniz and Robert Hall of ECO Solutions supervised the testing.

1.2 EXECUTIVE SUMMARY

WDW-14 was indefinitely taken out of service on February 22nd, 1994. The radioactive tracer survey conducted that day indicated a hole in the 9+5/8" protection casing 188' above the top of the permitted injection interval. Larry Walker of the TNRCC was on location while the survey was being conducted. The TNRCC and EPA, Region 6 were notified via

telecommunications on February 23rd, and via written notification on February 25th (see Appendix J).

It should be noted that, with the exception of the hole in the casing, WDW-14 still has mechanical integrity in a conventional sense and is not an environmental risk. A review of the test and surveys conducted are listed below.

Radioactive Tracer Survey

The analysis of the radioactive tracer (RAT) survey demonstrated that no upward migration from the injection zone is occurring. However, the RAT did indicate a hole in the 9+5/8" protection casing at 3,168'. The hole is beneath the injection packer (see wellbore schematic) yet 188' above the top of the permitted injection interval at 3,350'.

The RAT survey indicated slight downward movement of fluids outside of the 9+5/8" protection casing from 3,168' - 3,212'. It does not appear that a significant amount of fluid has been injected out through the hole. This interpretation is also supported by the temperature survey that was conducted.

The RAT was witnessed by Mr. Larry Walker of the TNRCC and Robert Hall of ECO.

Differential Temperature Survey

The analysis of the differential temperature survey indicated no interformational transfer of fluids occurring behind the cemented protection casing from the top of the permitted interval back to the surface.

The differential temperature survey supports the RAT in regard to fluid movement through the hole. The differential temperature survey does not identify any thermal anomalies in the area of the hole in the protection casing at 3,168' that could be attributed to significant movements of fluid through the hole.

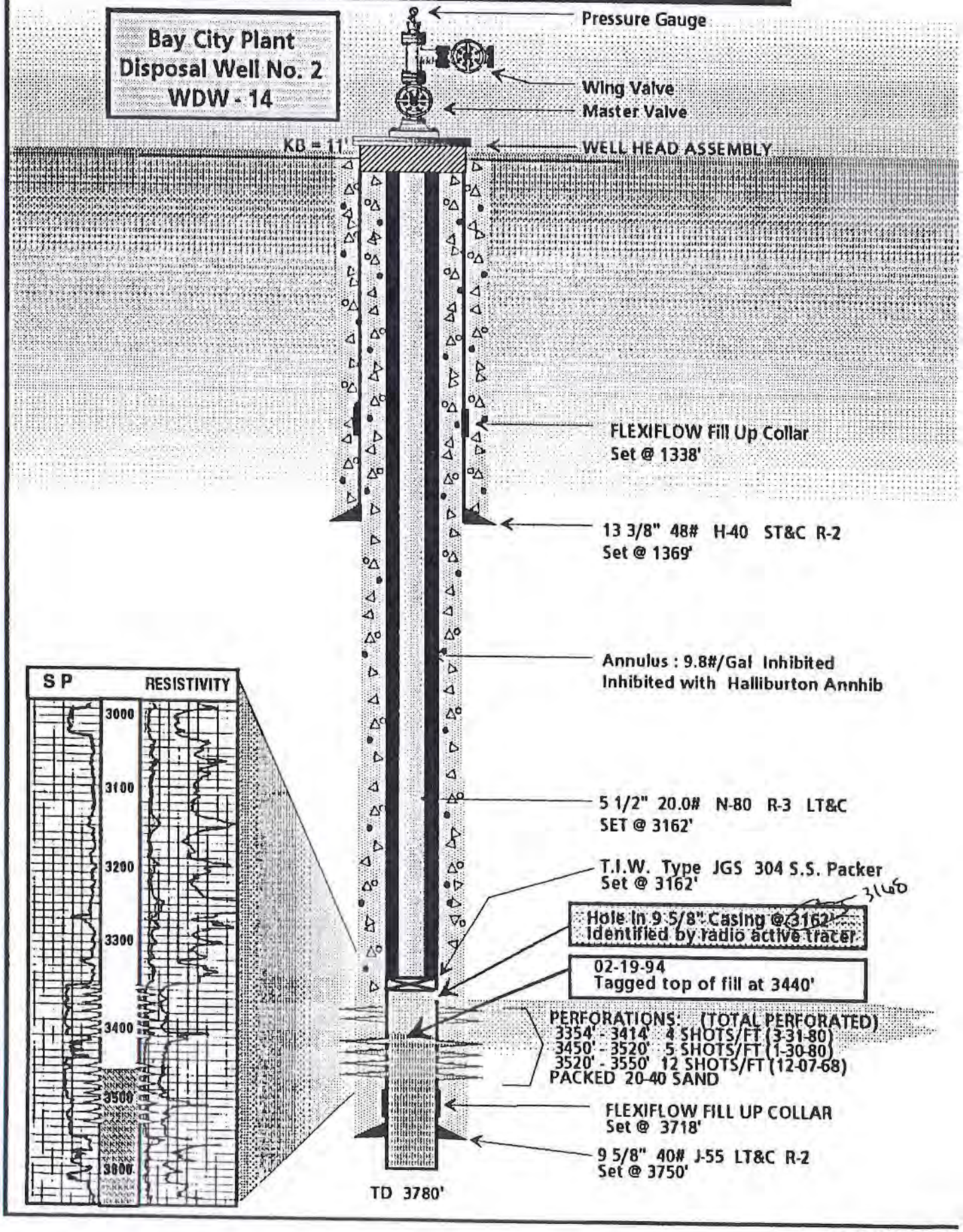
Annulus Pressure Test

A demonstration of a leak-free annulus was supported by an annulus pressure test (APT). The annulus was pressurized to 892.4 psig on February 21, 1994 for a one (1) hour test. The corresponding shut-in tubing pressure was 75.5 psig at the beginning of the test.

At the end of the test the annulus pressure had decreased to 886.6 psig with a corresponding shut-in tubing pressure of 75.8 psig. The total pressure loss of 5.8 psi is within the 5% pressure loss criteria set by the TNRCC.

FIGURE 1

HOECHST CELANESE CHEMICAL GROUP, INC.



HC-W14 / BHS / 03-05-94

HOECHST CELANESE CHEMICAL GROUP, INC. - WDW-14 (Well #2)

EVENT TIMELINE

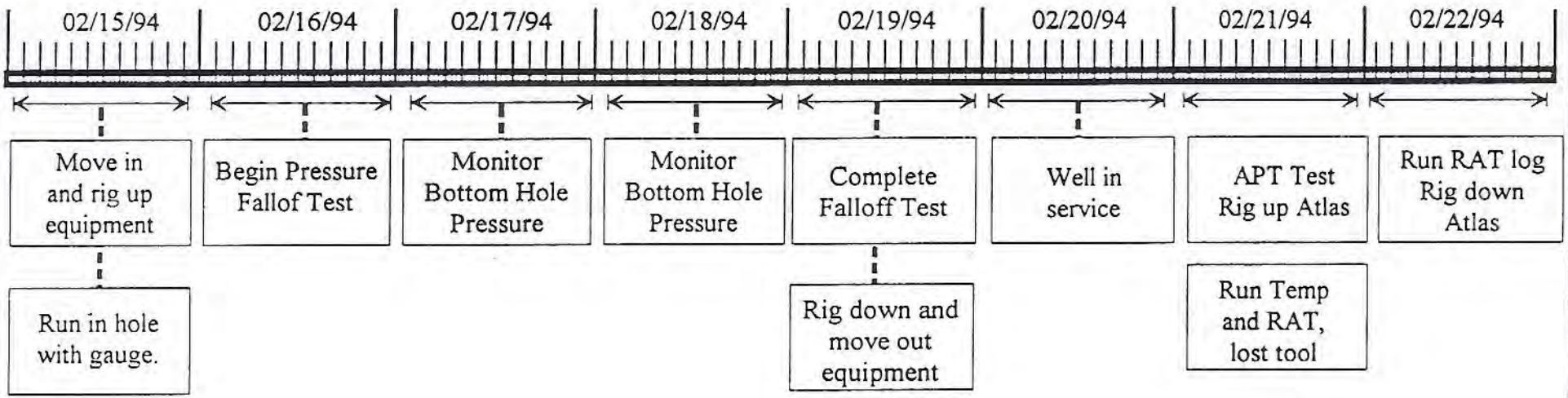


TABLE OF EVENTS

Feb. 15, 1994	Feb. 16, 1994	Feb. 17, 1994	Feb. 18, 1994	Feb. 19, 1994	Feb. 20, 1994	Feb. 21, 1994	Feb. 22, 1994
Move in and rig up equipment.	Begin Pressure Falloff Test.	Monitor Bottom Hole Pressure.	Monitor Bottom Hole Pressure.	Complete Falloff Test.	No field operations.	Perform Annulus pressure test.	Run RAT log.
Run in hole with Panex gauge.				Rig down and move out equipment.		Run Temp. log. Run RAT, lost tool in hole.	Rig down Atlas

FIGURE 2

ECO Solutions, Inc.
Houston, Texas

2.0 SUMMARY OF FIELD OPERATIONS

Monday, February 14, 1994

A meeting was held with Ray Horton (Maintenance Engineer) to discuss and prepare for the fall-off test scheduled for February 16, 1994. Mr. Reuben Alaniz met with group leaders at the Utilities Department and discussed preparation for fall-off test. The subjects discussed were as follows:

- The shut-down of WDW-32 (Well #3) and WDW-110 (Well #1-A) prior to February 16.
- Shut-in points of Well #3 and Well 1-A, concerning pressure monitoring.
- Blind flange or slip flange injection line going into Well #2.
- Annulus Pressure test on Well #2 following fall-off.

Wednesday, February 16, 1994

Milton Cooke Wireline on location and began spotting equipment.

Reuben Alaniz met with Ray Horton and reviewed the proposed test procedures. Started rigging up on Well #2.

WDW-110 Well #1A out of service	-	Monday, February 16, 1994.
WDW- 14 Well #2 maintain constant rate	-	Monday, February 16, 1994.
WDW- 32 Well #3 out of service	-	Monday, February 16, 1994.
WDW- 49 Well #4 out of service	-	July, 1993.

Begin GRC Data Acquisition System with GRC EPG-520 gauge (S/N 69491).

Pressured up lubricator with Surface Read Out and Memory Gauge back-up tool string. Adjusting wireline counter, prepared to go in hole.

Injection Rate WDW-14 (Well #2)	169 gpm
Surface Injection Pressure	480 psig
Surface Injection Temperature	92 Deg.F

Going in hole with well injecting.

Injection Rate	169 gpm
Surface Injection Pressure	485 psig

Gauge lowered to test depth of 3,440 feet. Begin monitoring bottom hole injection pressure and temperature. A plant operator blocked valve by mistake and a corresponding pressure decrease was observed. The valve position was immediately corrected.

Monitoring WDW-14 (Well #14) injection period.

Injection Rate	169 gpm
Down hole Injection Pressure	1789 psia @ 3,440'
Surface Injection Pressure	480 psig

<u>Thursday, February 17, 1994</u>

Continue monitoring WDW-14 injection period.

Injection Rate	170 gpm
Down hole Injection Pressure	1788 psia @ 3,440'
Surface Injection Pressure	480 psig

Generate Cartesian curve to evaluate pressure stability.

Continue monitoring injection period.

Injection Rate	170 gpm
Down hole Injection Pressure	1789 psig @ 3,440'
Surface Injection Pressure	480 psig

Generate Cartesian curve to evaluate pressure stability.

Friday, February 18, 1994

Continue monitoring WDW-14 injection period.

Injection Rate	169 gpm
Down hole Injection Pressure	1791 psia @ 3,440'
Surface Injection Pressure	485 psig

Generate Cartesian curve to evaluate pressure stability. Contact plant personal at Utilities control room to prepare for fall-off test.

Shut down Injection pump at Control room 1 and begin fall-off test.

Final Injection Rate	169 gpm
Final Down hole Injection Pressure	1790 psia @ 3,440'
Surface Injection Pressure	485 psig

Monitor fall-off period.

Down hole Shut-in Pressure	1580 psia @ 3,440'
Surface Shut-in Pressure	0 psig

Continue to monitor fall-off period.

Down hole Shut-in Pressure	1577 psia @ 3,440'
Surface Shut-in Pressure	78 psig

Generate semi-log and log-log curves for observation.

Saturday, February 19, 1994

Continue monitoring WDW-14 fall-off period.

Down hole Shut-in Pressure	1575 psia @ 3,440'
Surface Shut-in Pressure	74 psig

Generate semi-log and log-log curves for observation. Prepare to end fall-off test.

End of WDW-14 fall-off test.

Down hole Shut-in Pressure	1575 psia @ 3,440'
Surface Shut-in Pressure	74 psig

Move tool downhole to tag bottom. Tagged fill at 3,440 ft. Began pulling out of hole making static gradient stops.

Gauges at surface, end of static gradient survey. Bleed down lubricator and rig down wireline.

Sunday, February 20, 1994

Well in service. No field operations.

Monday, February 21, 1994

All contractors went through the HCCG orientation at Plant Protection and then again down at the well. Larry Walker of the TNRCC on location to witness mechanical integrity testing.

HCCG personnel pressurized the annulus to 892.4 psig on February 21, 1994 for a one (1) hour test. The corresponding shut-in tubing pressure was 75.5 psig at the beginning of the one (1) hour test. At the end of the test the annulus pressure had decreased to 886.6 psig with a corresponding shut-in tubing pressure of 75.8 psig. Pressure test successful.

Atlas Wireline Services was rigged up to run temperature and radioactive tracer survey. Unable to get 1+11/16" logging tools through upper portion of wellhead. HCCG personnel removed same and bored out welded area extending into the inner diameter of wellhead.

Atlas logged differential wellbore temperatures from surface down to the top of fill at 3,443'. Atlas ran the API gamma-ray base log tie in log and two (2) gamma-ray base logs. The logging tools became lodged in the perforated interval and were pulled off the electric line before the Atlas operator could react to the situation (see Appendix K for logging tools left in hole). Pulled out of the hole. Closed well in for night (CWIFN).

Tuesday, February 22, 1994

Western Atlas picked up additional logging tools this A.M. Atlas conducted the RAT as follows.

1. Ran API gamma-ray tie in strip.
2. Ran #1 base log from 3,348' to 2,776'.
3. Ran #2 base log from 3,348' to 2,776'.
4. Made multiple pass survey #1 with a radioactive slug ejected at 2,900' and a pump rate of 20 gpm.
5. Made multiple pass survey #2 with a radioactive slug ejected at 2,900' and a pump rate of 20 gpm.
6. Ran a stationary survey #1 at 3,342'. Watched slug pass tool and ran check for 15 minutes more. Pump rate was 50 gpm.
7. Ran a stationary survey #2 at 3,342'. Watched slug pass tool and ran check for 15 minutes more. Pump rate at 50 gpm.
8. Ran Gamma Ray base log after survey- repeated passes over "hot" spot at 3,168'.

"Hot" spot, apparent hole in protection casing, downward fluid movement indicated on log.

Pulled out of the hole and rigged down Western Atlas. Discussed same with Mr. Larry Walker of the TNRCC, decision made to close well in. CWIFN.

Wednesday, February 23, 1994

Tom Jones and Robert Hall of ECO met with HCCG personnel to discuss log analysis. Discussed same with Larry Walker of the TNRCC. Made additional notifications to TNRCC and USEPA Region 6 of HCCG's intent to take the well out of service for as yet an undefined time period.

Rigged down and released Western Atlas.

Thursday, March 3, 1994

Move in and rig up B & G pump truck. Brined in WDW-14, 120 bbls of 9.8 ppg brine inhibited with Halliburton Anhib. Rigged down and released B & G.

3.0 PRESSURE FALLOFF TESTING AND ANALYSIS

3.1 PRESSURE FALLOFF TESTING

Pressure falloff testing commenced on February 16, 1994 and concluded on February 19, 1994. The flowing bottomhole pressure was monitored for a total of 49.38 hours followed by a twenty-four (24) hours shut-in period. The period of last shut-in was October 23 - 26, 1993 and a graphic presentation of injection versus days for this 115 day period is included as Figure 3. Plots and data for the test are included in Appendices A and B, respectively.

3.2 PRESSURE FALLOFF ANALYSIS

Method Of Interpretation: The following analysis was performed by utilizing both Semi-Log and Log-Log analysis. A) The *Semi-Log* curve was generated by plotting pressure vs the superposition time function utilizing the given rate history. The semi-log straight line was then calculated by linear regression through the infinite acting flow period of the falloff curve. The semi-log slope and P_{1hr} values were obtained from the semi-log straight line and utilized for the final permeability and skin calculations. B) The *Log-Log* curves were generated by plotting Delta-P/Delta-Q and Pressure derivative vs the Agarwal Equivalent time function. The Log-Log curves were simultaneously positioned over $[T_D/C_D]$ wellbore storage type-curves until a solution match was obtained. Permeability and skin values were calculated from this match and then compared with those obtained from the Semi-Log analysis.

A. *Semi-Log (Superposition)*: The straight line area of the semi-log curve was identified by first using the 1-1/2 log cycle rule to estimate the end of wellbore storage effects. Secondly, the time of the flat portion from the pressure derivative curve was used in determining the area of the semi-log curve in which the straight line was drawn. The semi-log straight line yielded a slope value of 5.0024 psi/cycle and a P_{1hr} of 1582 psi. The pressure difference between P_{1hr} and the injection pressure followed with the calculated slope would give indications of positive skin damage and high permeability.

B. *Log-Log ($[T_D/C_D]$ Wellbore storage Type-curves)*: The high maximum of the derivative curve illustrates wellbore storage and positive skin effects. The flattening portion of the derivative indicating the infinite acting flow period of the curve was observed

approximately 1.8 hours following the start time of the falloff period. The flat portion of the derivative curve was the main factor used to obtain a type curve match yielding similar results to the semi-log analysis.

Conclusions: The system was diagnosed as a homogeneous reservoir with a calculated permeability of 1335 (md) and skin damage of +40.6 utilizing an h_{net} value of 210 feet. The flow efficiency of 21.5% suggests that the near wellbore conditions has large affects on the injection volume limitations and that the total pressure drop is primarily due to conditions within a small radius from the well.

The Following Table is provided to give comparative results with the previous test. The primary variables affecting the calculated results are included.

Date MM/YY	Rate GPM	h_{net} feet	Uw cp	Slope psi/cyl	kh/u md-ft	k md	S -
10/92	197	210	0.71	6.2000	177940	601.6	+ 23.7
02/94	169	210	1.49	5.0024	188184	1335.2	+ 40.6

The calculated results indicate a difference in transmissibility, (kh/u) of 5.4% and a difference in skin of 41.6% between the two tests. The increase in skin is most likely caused by the covering of the two bottom set of perforations (3450' - 3520' and 3520' - 3550'). The difference in the permeability values is due to the different viscosity values used in the calculations. The time to exit the waste front exceeded the start time of the infinite acting flow period, therefore the viscosity of the injection fluid was used for the analysis resulting in a much higher permeability value. However the transmissibility values are consistent between the two tests.

A homogeneous simulator was utilized to confirm the calculated results mentioned above. The main assumptions were as follows: a single well with infinite acting and radial flow conditions being injected at a constant rate with constant reservoir conditions such as porosity, permeability, and compressibility. Based on this particular reservoir the simulated data matched the actual data with a reasonable degree of accuracy.

The program used for final analysis and well simulation was "PanSystem 2.1", marketed by Edinburgh Petroleum Services. Plots of the analysis using the "PanSystem 21" are included as Figures 4 - 8.

Table 3.1
Falloff Test Data - WDW-14 (Well #2)

1. *General Test Information*

Date of Test	February 16 - 19, 1994
Time since stabilized pressure (hrs.)	2721
Cumulative injection (gals.)	2402.35×10^6 gallons
Wellbore radius (ft.)	0.45
Gross completed interval (ft.)	160'
Type of completion	Perforated
Depth to fill	3,440'
Justified interval thickness (ft.)	210'
Average historical waste fluid viscosity (cps)	1.49
Formation fluid viscosity (cps)	0.71
Porosity (%)	33
Total compressibility (psi^{-1})	5.0×10^{-6}
Formation volume factor	1.0
Initial formation bottomhole pressure (psia)	1501 (1968) @ 3,300'

2. *Injection Period*

Time of injection period (hrs.)	49.38
Injection rate (gallons per minute)	169
Test fluid	Waste Fluid
Pumps used for test	P61 Byron Jackson - Centrifugal
Injection fluid viscosity (cps)	1.49
Final injection pressure (psia)	1790.27
Final injection temperature (°F)	106.47
Gauge type	GRC EPG-520 Serial # 69491
Gauge resolution and calibration	0.01
Gauge depth (feet)	3,440

3. *Falloff Period*

Total Shut-in Time (hrs.)	24.42
Final Shut-in Pressure (psia)	1574.65
Final Shut-in Temperature °F	106.79
Final Shut-in Tubing Pressure (psia)	89

Table 3.2
Results of Analysis of Pressure Falloff Test
WDW-14 (Well #2)

	Semi-Log Superposition	Log-Log Type Curve	Semi-Log Synthesis
kh/μ (md-ft/cp)	188,184	188,154	188,154
Flow capacity (md-ft)	280,394	280,350	280,350
Permeability (mds)	1335.93	1335.0	1335.0
Skin effect	40.58	41.0	40.6
Dimensionless storage coefficient			Cs = 0.108
p* (psia)	1564.32		

3.3 COMPARISON TO PETITION MODEL DATA

The reservoir properties (pressure, permeability, etc.) of the upper Miocene injection interval were determined through falloff testing conducted on WDW-14. The flowing or operational formation pressures from the tests can be compared with the modeled operational pressures by converting the measured pressures to a depth of 3440' below ground level and removing the pressure increase due to skin effect. The formation pressures predicted by the model assume no formation damage effects or other near-bore conditions. The measured flowing pressures corrected for skin effects and maximum predicted operational pressures are presented in the Table below:

Formation Pressures WDW-14

Well Name	Flowing Formation Pressures, psi	Skin Pressure Loss, psi	Revised Formation Pressure, psi	Maximum Modeled Pressure, psi
WDW-14 (well 2)	1789	176	1613	1641

The measured flowing pressure is below the maximum modeled operational pressure by more than 28 psi for WDW-14. A graph of the modeled pressures for WDW-14 is included. The graph shows the yearly predicted modeled injection rates (250 gpm for each well). All predicted operational pressures correspond to a depth of 3440' below ground level and an original estimated formation pressure for the upper Miocene injection interval of 1555 psi.

The measured static formation pressures from the well tests, corrected to a depth of 3440' below ground level, show a formation pressure increase of 19 psi. This illustrates that injection operations at the plant have had limited impact on formation pressures and should continue to have limited impact on formation pressures in the future.

Static Formation Pressures From WDW-14 Well Test

Well Name	Static Formation Pressure at 3440'	Formation Pressure Increase, psi
WDW-14 (Well 2)	1574	+19

A comparison of the test permeability and transmissivity values with the modeled values of permeability and transmissivity for WDW-14 are given below:

Well Name	Test Permeability, mds	Petition Permeability, mds	Test Transmissivity, md-ft/cp	Petition Transmissivity, mf-ft/cp
WDW-14 (well 2)	1335	1350	188,184	313,700

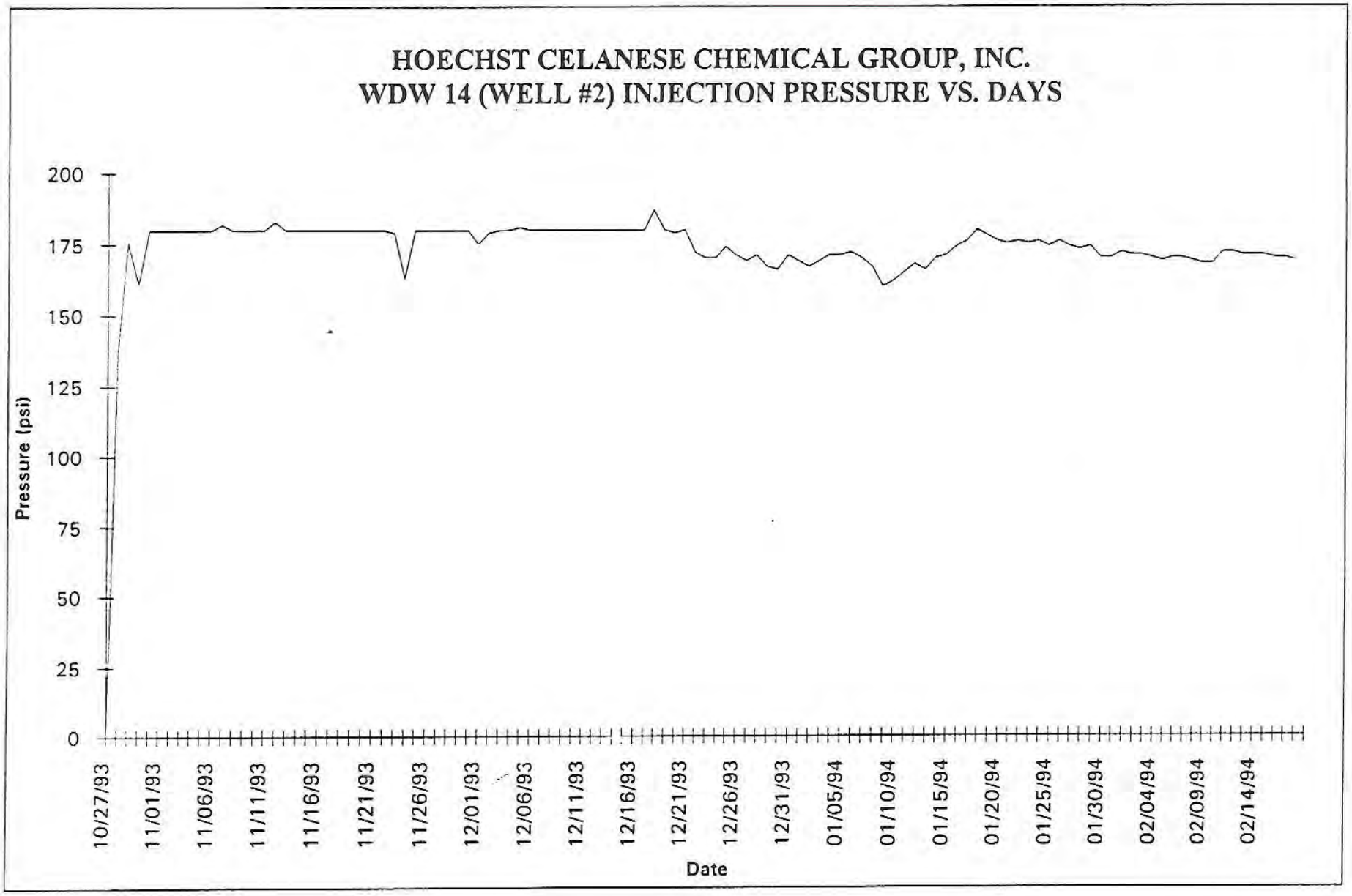
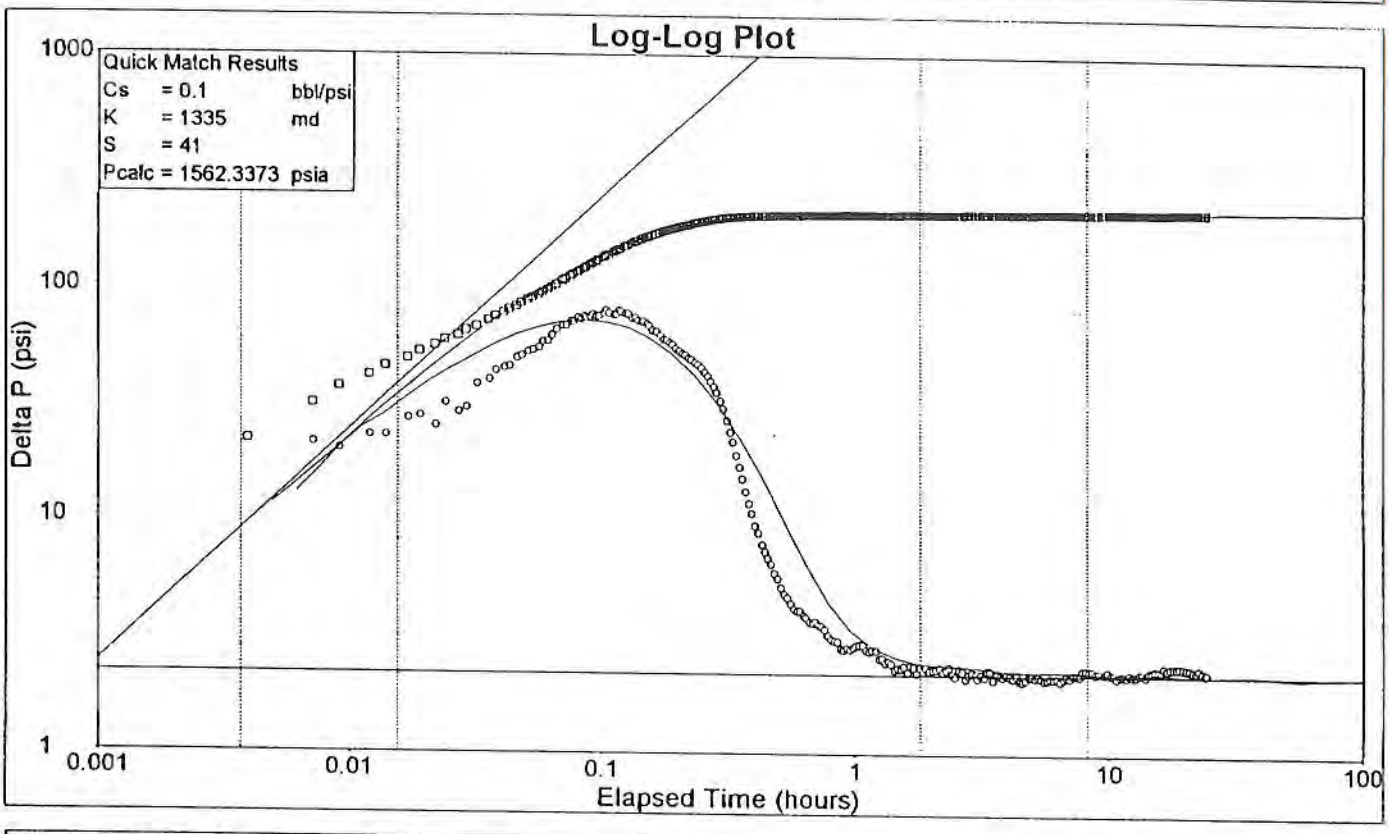


FIGURE 3

ECO SOLUTIONS, INC.

ECO Solutions, Inc.		Report File:	WDW14#2.PAN
MECHANICAL INTEGRITY TEST		Analysis Date:	4/04/94
Fall-Off Test Analysis			



HOECHST CELANESE
CHEMICAL GROUP, INC.
WDW-14 Well #2
Bay City Facility, Texas

02/16-19/1994

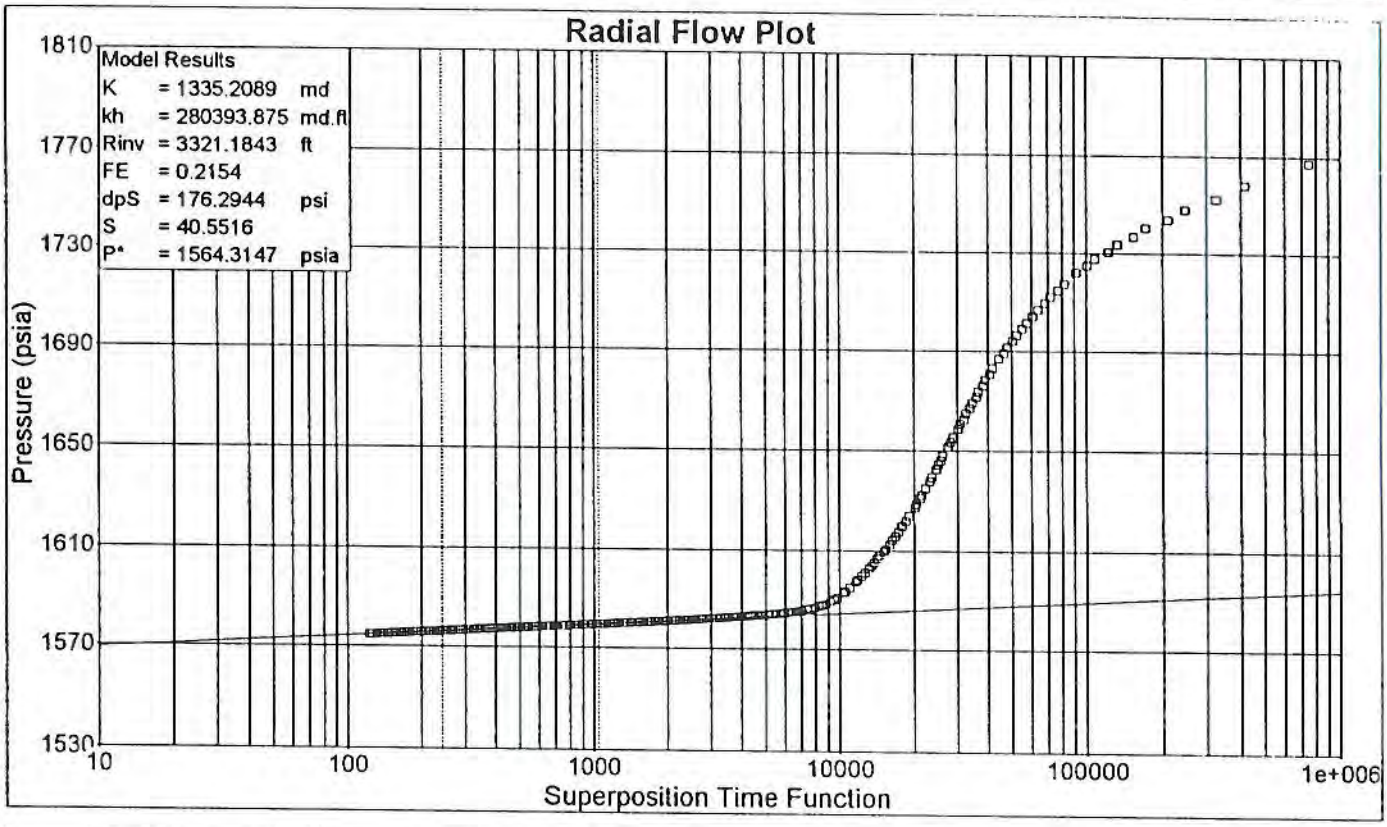
Log-Log plot used to identify flow regimes.

End of unit slope:	Approximately 0.015 hours
Start of infinite acting flow period:	Approximately 1.8 hours
Time to exit waste front:	Approximately 2.6 hours

FIGURE 4

PanSystem - Copyright (C) 1993 Edinburgh Petroleum Services Ltd.

ECO Solutions, Inc.		Report File:	WDW14#2.PAN
MECHANICAL INTEGRITY TEST		Analysis Date:	4/04/94
Fall-Off Test Analysis			



HOECHST CELANESE
CHEMICAL GROUP, INC.
WDW-14 Well #2
Bay City Facility, Texas

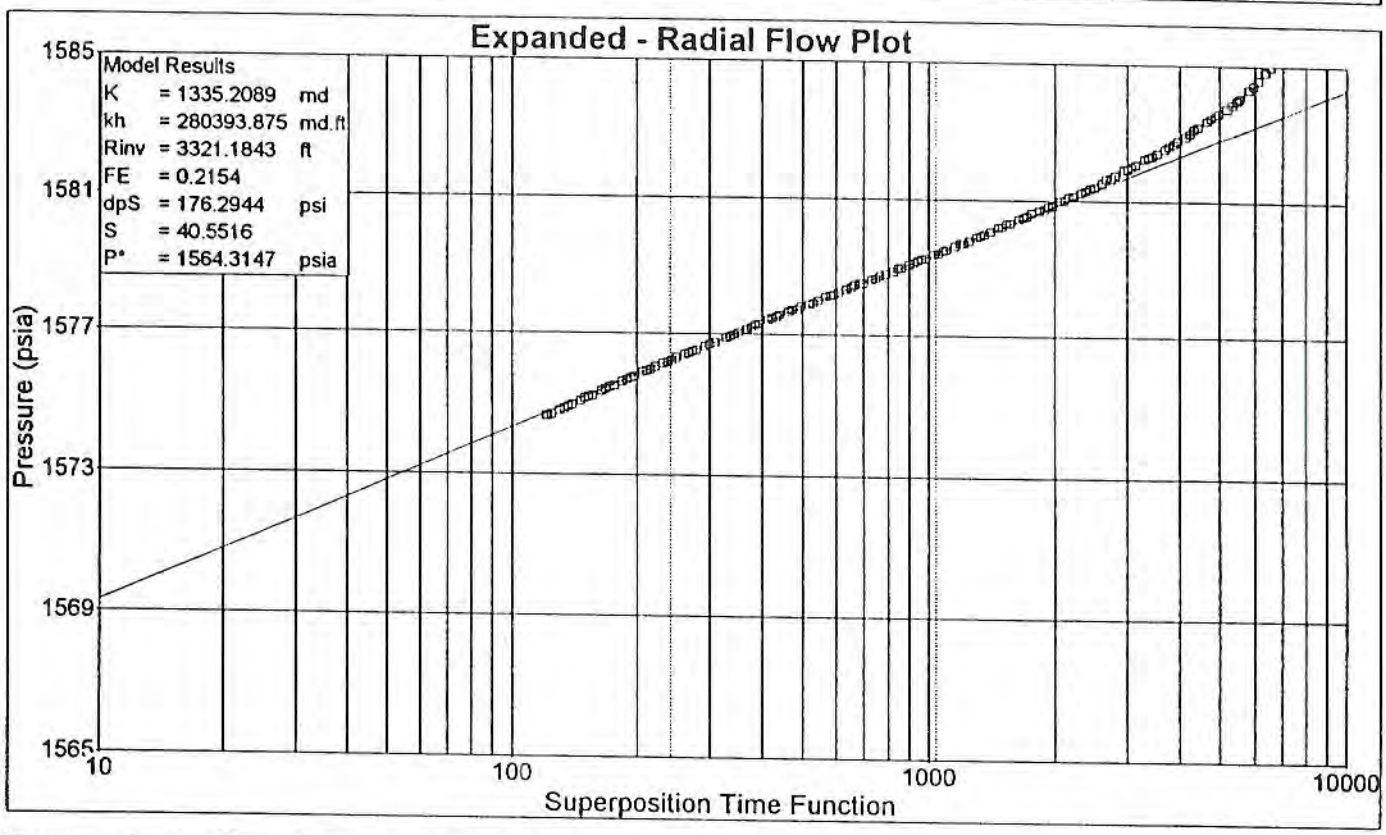
02/16 - 19/1994

Semi-Log analysis utilizing Superposition Time Function.

FIGURE 5

PanSystem - Copyright (C) 1993 Edinburgh Petroleum Services Ltd.

ECO Solutions, Inc.	Report File:	WDW14#2.PAN
MECHANICAL INTEGRITY TEST	Analysis Date:	4/04/94
Fall-Off Test Analysis		



HOECHST CELANESE
CHEMICAL GROUP, INC.
WDW-14 Well #2
Bay City Facility, Texas

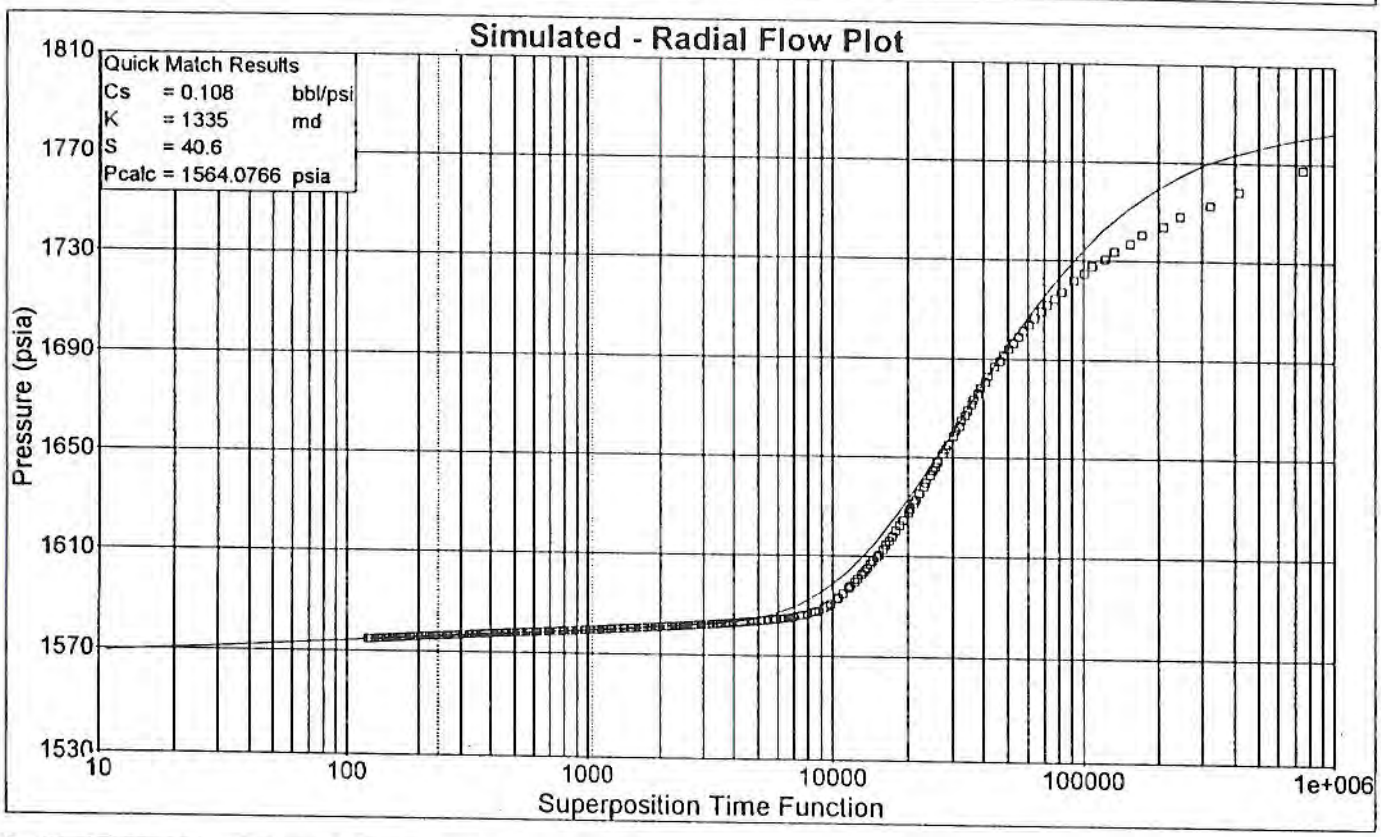
02/16 - 19/1994

Semi-Log analysis utilizing Superposition Time Function.

FIGURE 6

PanSystem - Copyright (C) 1993 Edinburgh Petroleum Services Ltd.

ECO Solutions, Inc.		Report File:	WDW14#2.PAN
MECHANICAL INTEGRITY TEST		Analysis Date:	4/04/94
Fall-Off Test Analysis			



HOECHST CELANESE
CHEMICAL GROUP, INC.
WDW-14 Well #2
Bay City Facility, Texas

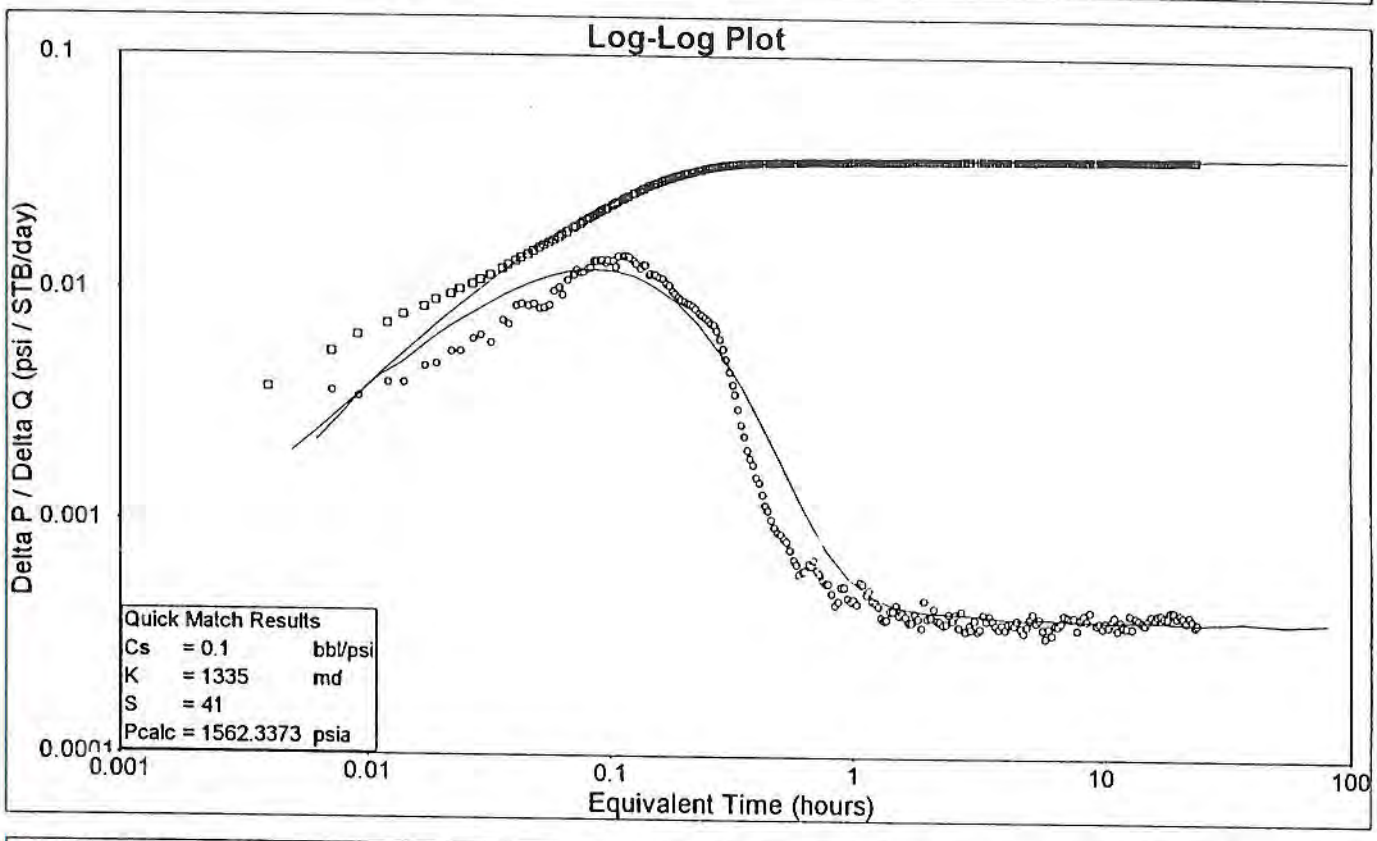
02/16 - 19/1994

Semi-Log analysis utilizing Superposition Time Function.

FIGURE 7

PanSystem - Copyright (C) 1993 Edinburgh Petroleum Services Ltd.

ECO Solutions, Inc.		Report File:	WDW14#2.PAN
MECHANICAL INTEGRITY TEST		Analysis Date:	4/04/94
Fall-Off Test Analysis			



HOECHST CELANESE
CHEMICAL GROUP, INC.
WDW-14 Well #2
Bay City Facility, Texas

02/16-19/1994

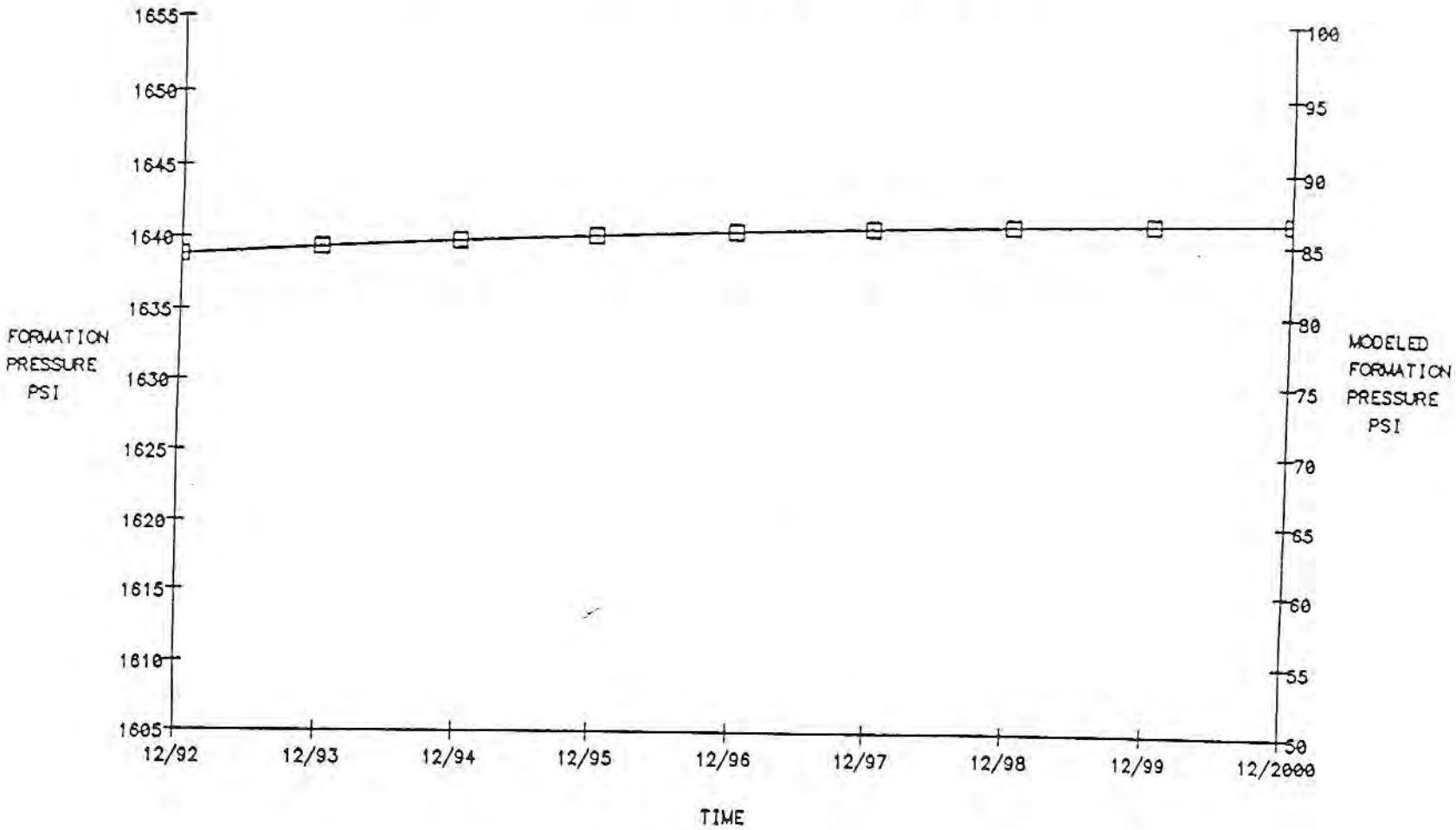
Log-Log analysis utilizing Equivalent time function.

FIGURE 8

PanSystem - Copyright (C) 1993 Edinburgh Petroleum Services Ltd.

FIGURE 9

UPPER MIOCENE INJECTION SAND - WDW-14



—□— MODELED FORMATION PRESSURES

MODELED OPERATIONAL FORMATION PRESSURES IN WDW-14 (1992 - 2000)

4.0 EVALUATION OF RADIOACTIVE TRACER SURVEY INJECTION WELL NO. 2 WDW-14

LOG DATA

Date Run:	February 22, 1994
Logging Service Company	Western Atlas International
Tubing Size and Depth Set	5 1/2" @ 3162'
Casing Size and Depth:	9 5/8" set @ 3650

BASELINE GAMMA-RAY LOG

This baseline gamma-ray log was run from 3348' to 2800'. The purpose of the initial baseline G/R log is to demonstrate repeatability of the logging tools. A comparison of both baseline G/R runs shows good repeatability between the two runs. A gamma ray spike is clearly seen at 3170' which is immediately below the packer. The tracer material was previously ejected from a malfunctioning tool which was subsequently replaced. As is discussed later, the hot spot is determined from additional logging runs to be a casing leak.

BEFORE SURVEY BASELINE GAMMA-RAY LOG 2

A baseline gamma-ray (G/R) was run from 3348' to 2776' to provide a repeat section used in a calibration check. The log is also useful for the following comparisons against additional RAT logging runs.

1. The G/R curves are used as depth control points against other runs during the RAT.
2. The baseline G/R is compared against the final G/R log to check for anomaly areas that could indicate upward migration along a cement channel.

The hot spot beneath the packer at 3170' is again clearly evident.

CHASE SURVEY 1

The multiple passes or chase survey portion of the RAT provides a check for fluid movement. In this instance, one slug was ejected at a depth of 2900' and it was tracked as it was pumped down the tubing. The pumping rate for this test was 20 gpm and eleven (11) individual passes (files 17 through 24) were made with two detectors as the slug moved from 2900' to 3046'. Both curves are illustrated on the multiple passes portion of the log. The relatively low flow rate of 20 gpm was necessary to allow sufficient time for the logging tools to be lowered to make multiple passes and record the progress of the radioactive slug. A flow rate higher than 20 gpm would have caused the slug to move so fast that only a few passes could be made resulting in incomplete coverage of the movement. A summary of the individual passes is given below:

a. Pass 1 *(file 17)* - The slug was ejected at 2900' and the logging tool was lowered below the tracer material and logged upward. The slug was recorded inside the tubing with its primary peak at 2962'. The logging pass is from 2998' up to 2888'.

b. Pass 2 *(file 18)* - The slug was recorded inside the tubing with its peak at 3080'. The slug has moved downward 118' since pass 1. The radioactive slug has spread out slightly by the passes of the logging tool. This is seen by the shape of the G/R response. The peak intensity is lower than pass 1 and the base of the curve is wider.

c. Pass 3 *(file 19)* - The slug was recorded in the 9 5/8" protection casing immediately below the packer which is seen on the casing collar log at 3160'. Twin peaks are observed. The main peak is at 3182' and a smaller one is at 3158'. The main slug has moved downward 102' since pass 2 and 220' since pass 1. The smaller peak observed in the baseline runs appears to have increased in intensity but remained at the same depth. The preliminary indication is a hole in the 9 5/8" casing with no apparent movement. The radioactive slug has spread out slightly by the passes of the logging tool.

d. Pass 4 *(file 20)* - The main slug continues to move downward with its peak at 3214'. The slug has moved downward 32' since pass 3 and 252' since pass 1. In the larger casing diameter, the fluid movement is slower. The secondary peak is unchanged and recorded at 3168'.

e. Pass 5 *(file 21)* - The slug was recorded in the 9 5/8" long string casing (below the packer) with its peak at 3248'. The slug has moved downward 34' since pass 4 and 286' since pass 1. The slug shape appears more compacted due to the lower velocity in the larger diameter. No upward migration is indicated on the secondary peak or hot spot at 3168'.

f. Pass 6 *(file 22)* - The main body of the radioactive slug is in the 9 5/8" casing. The slug was recorded with its peak at 3281'. The slug has moved downward 33' since pass 5 and 319' since pass 1. The secondary peak is not observed on this pass since the run was completed at a deeper depth.

g. Pass 7 *(file 23)* - The main body of the radioactive slug is in the 9 5/8" casing. The slug was recorded with its peak at 3314'. The slug has moved downward 33' since pass 6 and 352' since pass 1. The radioactive slug has spread slightly and its intensity diminished since it is being injected. The secondary peak is not observed on this pass since the run was completed at a deeper depth.

h. Pass 8 *(file 24)* - The main body of the radioactive slug is in the 9 5/8" casing. The slug was recorded with its peak at 3344'. The slug has moved downward 30' since pass 7 and 382' since pass 1. No upward migration is noted. The slug is passing downward past the tool as it is injected. The peak is much smaller in amplitude.

i. Pass 9 *(file 25)* - No distinctive peak is observed although the residual of the tracer slug is still observable. A majority of the tracer material has been injected and no upward fluid movement from the injection interval is indicated. The secondary peak is not observed on this pass since the run was completed at a deeper depth.

j. Pass 10 *(file 26)* - No distinctive peak is observed although a small residual of the tracer slug is still observable. The log reading is near the original baseline. A majority of the tracer material has been injected and no upward fluid movement from the injection interval is indicated. The secondary peak is not observed on this pass since the run was completed at a deeper depth.

k. Pass 11 *(file 27)* - This is a final pass from 3048' up past the packer to a depth of 3082'. A baseline reading is recorded with the exception of the hot spot at 3068'. No movement in the anomaly area is indicated.

CHASE SURVEY 2

The second multiple passes or chase survey portion of the RAT provides a redundant check for fluid movement and verifies the findings from the first chase survey. In this instance, one slug was ejected at a depth of 2900' and it was tracked as it was pumped down the tubing. The pumping rate for this test was 20 gpm and nine (9) individual passes (files 28 through 36) were made with two detectors as the slug moved from 2900' to 3046'. Both curves are illustrated on the multiple passes portion of the log. The flow rate of 20 gpm is used which is identical to chase survey no. 1. A summary of the individual passes is given below:

a. Pass 1A *(file 28)* - The slug was released at 2900' and the tool lowered below the tracer material and logged upward. The slug was recorded inside the tubing with its primary peak at 2971'. The logging pass is from 3000' up to 2900'.

b. Pass 2A *(file 29)* - The slug was recorded inside the tubing above the packer which is at 3160'. The slug peak is at 3120'. The slug has moved downward 149' since pass 1A. The radioactive slug has spread out which created a loss in amplitude. This shape is normal and is seen by the shape of the G/R response. In other words, the peak intensity is lower than pass 1A and the base of the curve is wider.

c. Pass 3A *(file 30)* - The slug was recorded in the 9 5/8" protection casing below the packer which is seen on the casing collar log at 3160'. As in chase survey 1, twin peaks are observed. The slug peak is at 3211'. The main slug has moved downward 91' since pass 2A and 240' since pass 1A. The smaller peak observed above the main slug body appears to have increased in intensity but remained at the same depth of 3167'. The preliminary indication is a hole in the 9 5/8" casing with no apparent fluid movement. The lower radioactive slug has spread out slightly by the passes of the logging tool.

d. Pass 4A *(file 31)* - The main body of the radioactive slug is in the 9 5/8" casing. The slug was recorded with its peak at 3261'. The slug has moved downward 104' since pass 3A and 344' since pass 1A. The secondary peak is not observed on this pass since the run was completed at a deeper depth. With the exception of the anomaly at 3167', no additional slug separation is observed.

e. Pass 5A *(file 32)* -The main body of the radioactive slug is in the 9 5/8" casing. The slug was recorded with its peak at 3300'. The slug has moved downward 39' since pass 4A and 383' since pass 1A. No upward migration is noted. The slug is passing downward past the tool as it is injected. The peak is much smaller in amplitude.

f. Pass 6A *(file 33)* - No sharp peak is observed although the tracer slug is still easily observable. Much of the tracer material has been injected and no upward fluid movement from the injection interval is indicated. The secondary peak is not observed on this pass since the run was completed at a deeper depth

g. Pass 7A & 8A *(files 34 & 35)* - No distinctive peak is observed although a small residual of the tracer slug is still observable. The log reading on pass 8A (file 35) is near the original baseline. A majority of the tracer material has been injected and no upward fluid movement from the injection interval is indicated. The secondary peak is not observed on this pass since the run was completed at a deeper depth.

j. Pass 9A *(file 36)* - This is a final pass from 3050' up past the packer to a depth of 3116'. A baseline reading is recorded with the exception of the hot spot at 3068'. No movement in the anomaly area is indicated.

FIRST STATIONARY READING ON TIME DRIVE

The stationary survey checks for upward migration under a high flow rate condition. In this case, a radioactive slug was released above 3342' and the recording done on a time drive basis. Fluid was pumped into the well at 50 gallons per minute (gpm) while recording the background radioactivity at a stationary point (3342') for 30 minutes. Since the slug was released above the detector, its passage is indicated on the log. Pumping is continued for the remainder of the 30 minute period while recording. No second G/R peak was detected and as such no upward migration from the injection interval was detected.

SECOND STATIONARY READING ON TIME DRIVE

This pass is identical to the previous pass but serves as a double check of the equipment and the presence of upward migration. The flow rate and tool position are the same as the previous pass.

A radioactive slug was released at 3342' and the recording done on a time drive basis. Fluid is pumped into the well at 50 gallons per minute (gpm) while recording the background radioactivity at a stationary point (3342') for 30 minutes. Since the slug is released above the detector, its passage is indicated on the log. Pumping is continued for the remainder of the 30 minute period while recording. No second G/R peak was detected and as such no upward migration from the injection interval was detected.

AFTER SURVEY BASELINE GAMMA-RAY LOG

Immediately after the secondary stationary survey, the logging tool was lowered to 3350'. An after survey baseline G/R log was recorded (file 41). The purpose of this log is to compare it with the before survey baseline G/R log to look for anomaly areas. These areas would appear as "hot spots" or areas in which the G/R readings have been elevated above background levels. A comparison between the before and after baseline G/R logs indicates the following:

1. The spike indicated at 3168' is residual tracer indicating a hole in the casing at that depth.

2. Two additional peaks not previously observed are indicated below the anomaly at 3168'. One is at 3179' and the other is at 3189'. The interpretation is that fluid movement downward occurred from the casing hole at 3168' in response to the increase in flow rate from 20 gpm to 50 gpm for the stationary surveys.

SECOND AFTER SURVEY BASELINE GAMMA-RAY LOG

A second baseline survey (file 42) was run to further record the downward movement observed from the anomaly area at 3168'. A comparison between the first and second after baseline G/R logs indicates the following:

1. The spike indicated at 3168' allowing fluid to exit the casing and move downward.

2. The two additional peaks not previously observed appear to be moving downward although the initial anomaly at 3168' has not moved.

MULTIPLE AFTER SURVEY BASELINE GAMMA-RAY LOG PASSES

Six additional baseline survey (files 43-48) were run to further record the downward movement observed from the anomaly area at 3168'. The overall result was to :

1. They supported the previous logging passes that there is a hole in the 9 5/8" casing at 3168' allowing fluid to exit the casing.

2. Fluid movement downward from 3168' is occurring.

4.1 RADIOACTIVE TRACER SURVEY CONCLUSIONS

1. A hole in the 9 5/8" casing is indicated at 3168' which is located immediately below the packer.

2. A small volume of fluid is exiting the casing at 3168' with the majority being injected through the perforations.

3. Fluid movement is indicated in a downward direction from 3168', however it does not extend to the top of the injection interval.

4. No upward fluid movement is observed from the casing leak at 3168' nor from the injection interval.

5. Fluid movement into the casing hole at 3168' was not observed at the lower flow rate of 20 gpm. Only when the flow rate was increased to 50 gpm was downward fluid movement initiated.

6. Since no anomaly in the area surrounding 3168' was observed on the temperature log, it is concluded that significant volumes of fluid have not entered the casing hole.

APPENDIX C

HALLIBURTON CEMENTING AND WESTERN ATLAS WIRELINE FIELD TICKETS

HALLIBURTON

JOB SUMMARY

HALLIBURTON DIVISION: South Tx

HALLIBURTON LOCATION: Freeno

BILLED ON TICKET NO.: 883798

WELL DATA

FIELD: Bay City SEC. ____ TWP. ____ RNG. ____ COUNTY: Matagorda STATE: TX

FORMATION NAME ____ TYPE ____

FORMATION THICKNESS ____ FROM ____ TO ____

INITIAL PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

PRESENT PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

COMPLETION DATE ____ MUD TYPE ____ ~~MUD WT.~~ 9.7 ppg

PACKER TYPE ____ SET AT ____

BOTTOM HOLE TEMP. ____ PRESSURE ____

MISC. DATA ____ TOTAL DEPTH ____

	NEW USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING		4.9	7 7/8	0	—	
LINER						
TUBING		12.6	2 7/8	0	7442	
OPEN HOLE						SHOTS/FT.
PERFORATIONS				7224	7350	
PERFORATIONS						
PERFORATIONS						

JOB DATA

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED
DATE 2-8-96	DATE 2-8-96	DATE 2-8-96	DATE 2-8-96
TIME 1600	TIME 1700	TIME 1800	TIME 1730

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLOAT COLLAR		
FLOAT SHOE		
GUIDE SHOE		
CENTRALIZERS		
BOTTOM PLUG		
TOP PLUG		
HEAD		
PACKER		
OTHER		

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
M Scott 76171	4667 Pump AC	15530
R Nguyen 112432		
C Huffee 76177	4434 Bulk	"

MATERIALS

TREAT. FLUID ____ DENSITY ____ LB/GAL. °API

DISPL. FLUID ____ DENSITY ____ LB/GAL. °API

PROP. TYPE ____ SIZE ____ LB. ____

PROP. TYPE ____ SIZE ____ LB. ____

ACID TYPE ____ GAL. ____ % ____

ACID TYPE ____ GAL. ____ % ____

ACID TYPE ____ GAL. ____ % ____

SURFACTANT TYPE ____ GAL. ____ IN ____

NE AGENT TYPE ____ GAL. ____ IN ____

FLUID LOSS ADD. TYPE ____ GAL.-LB. ____ IN ____

GELLING AGENT TYPE ____ GAL.-LB. ____ IN ____

FRIC. RED. AGENT TYPE ____ GAL.-LB. ____ IN ____

BREAKER TYPE ____ GAL.-LB. ____ IN ____

BLOCKING AGENT TYPE ____ GAL.-LB. ____

PERFPAC BALLS TYPE ____ QTY. ____

OTHER ____

OTHER ____

DEPARTMENT: Cmt

DESCRIPTION OF JOB ____

JOB DONE THRU: TUBING ☑ CASING ☐ ANNULUS ☐ TBG./ANN. ☐

CUSTOMER REPRESENTATIVE X ____

HALLIBURTON OPERATOR: Mike Scott COPIES REQUESTED ____

CEMENT DATA

STAGE	NUMBER OF SACKS	CEMENT	BRAND	BULK SACKED	ADDITIVES	YIELD CU.FT./SK.	MIXED LBS./GAL.
	760	Pozz		B	NEAT	1.09	16.2

SUMMARY

PRESSURES IN PSI

CIRCULATING ____ DISPLACEMENT ____

BREAKDOWN ____ MAXIMUM ____

AVERAGE ____ FRACTURE GRADIENT ____

SHUT-IN: INSTANT ____ 5-MIN ____ 15-MIN ____

HYDRAULIC HORSEPOWER

ORDERED ____ AVAILABLE ____ USED ____

AVERAGE RATES IN BPM

TREATING ____ DISPL. ____ OVERALL ____

CEMENT LEFT IN PIPE

FEET ____ REASON ____

VOLUMES

PRESLUSH: BBL.-GAL. ____ TYPE ____

LOAD & BKDN: BBL.-GAL. ____ PAD: BBL.-GAL. ____

TREATMENT: BBL.-GAL. ____ DISPL.: BBL.-GAL. ____

CEMENT SLURRY: BBL.-GAL. ____

TOTAL VOLUME: BBL.-GAL. ____

REMARKS

CUSTOMER: ECO Solutions

LEASE: Chinese Tuscan

WELL NO.: 1-FLL

JOB TYPE: 4-4A

DATE: 2-8-96

CUSTOMER

HALLIBURTON SERVICES

JOB SUMMARY

HALLIBURTON DIVISION: South Texas

HALLIBURTON LOCATION: Freeport

BILLED ON TICKET NO. 883976

WELL DATA

FIELD: Bay City SEC. ____ TWP. ____ RNG. ____ COUNTY: Matagorda STATE: Texas

FORMATION NAME ____ TYPE ____

FORMATION THICKNESS ____ FROM ____ TO ____

INITIAL PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

PRESENT PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

COMPLETION DATE ____ MUD TYPE ____ MUD WT. ____

PACKER TYPE: EZSV SET AT: 3150

BOTTOM HOLE TEMP. ____ PRESSURE ____

MISC. DATA ____ TOTAL DEPTH ____

	NEW USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING		53.5	9 5/8	0	3150	
LINER						
TUBING		13.3	3 1/2	0	3150	
OPEN HOLE						SHOTS/FT.
PERFORATIONS						
PERFORATIONS						
PERFORATIONS						

JOB DATA

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED
DATE 3-7-96	DATE 3-7-96	DATE 3-8-96	DATE 3-8-96
TIME 1100	TIME 1330	TIME 1023	TIME 1730

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLOAT COLLAR		
FLOAT SHOE		
GUIDE SHOE		
CENTRALIZERS		
BOTTOM PLUG		
TOP PLUG		
HEAD		
PACKER EZSV 9 5/8	1	Halliburton
OTHER		

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
E. Jackson 418015	41352 Tow	15530

MATERIALS

TREAT. FLUID ____ DENSITY ____ LB/GAL. °API

DISPL. FLUID ____ DENSITY ____ LB/GAL. °API

PROP. TYPE ____ SIZE ____ LB. ____

PROP. TYPE ____ SIZE ____ LB. ____

ACID TYPE ____ GAL. ____ %

ACID TYPE ____ GAL. ____ %

ACID TYPE ____ GAL. ____ %

SURFACTANT TYPE ____ GAL. ____ IN ____

NE AGENT TYPE ____ GAL. ____ IN ____

FLUID LOSS ADD. TYPE ____ GAL.-LB. ____ IN ____

GELLING AGENT TYPE ____ GAL.-LB. ____ IN ____

FRIC. RED. AGENT TYPE ____ GAL.-LB. ____ IN ____

BREAKER TYPE ____ GAL.-LB. ____ IN ____

BLOCKING AGENT TYPE ____ GAL.-LB. ____

PERFPAC BALLS TYPE ____ QTY. ____

OTHER ____

OTHER ____

DEPARTMENT: 5002

DESCRIPTION OF JOB: PTA EZSV

JOB DONE THRU: TUBING ☑ CASING ☐ ANNULUS ☐ TBG./ANN. ☐

CUSTOMER REPRESENTATIVE X ____

HALLIBURTON OPERATOR: J.R. Jackson COPIES REQUESTED ____

CEMENT DATA

STAGE	NUMBER OF SACKS	TYPE	API CLASS	BRAND	BULK SACKED	ADDITIVES	YIELD CU.FT./SK.	MIXED LBS./GAL.
	260	Poz				None	1.09	16.2

PRESSURES IN PSI

CIRCULATING ____ DISPLACEMENT ____

BREAKDOWN ____ MAXIMUM ____

AVERAGE ____ FRACTURE GRADIENT ____

SHUT-IN: INSTANT ____ 5-MIN. ____ 15-MIN. ____

HYDRAULIC HORSEPOWER

ORDERED ____ AVAILABLE ____ USED ____

AVERAGE RATES IN BPM

TREATING ____ DISPL. ____ OVERALL ____

CEMENT LEFT IN PIPE

FEET ____ REASON ____

SUMMARY

VOLUMES

PRESLUSH: BBL.-GAL. 5 TYPE F

LOAD & BKDN: BBL.-GAL. ____ PAD: BBL.-GAL. 3

TREATMENT: BBL.-GAL. ____ DISPL: BBL.-GAL. 23.3

CEMENT SLURRY: BBL.-GAL. 56

TOTAL VOLUME: BBL.-GAL. ____

REMARKS

CUSTOMER: Tri South Oil

LEASE: Mann

WELL NO.: 8

JOB TYPE: PTA EZSV

DATE: 3-8-96

FORM 2025 R1

CUSTOMER

HALLIBURTON

JOB LOG HAL-2013-C

DATE	PAGE NO.
3-8-96	

CUSTOMER	WELL NO.	LEASE	JOB TYPE	TICKET NO.
ECO SOLUTIONS	CELANESE	DISPOSAL WELL	PTA	

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE(PSI) TUBING	PRESSURE(PSI) CASING	DESCRIPTION OF OPERATION AND MATERIALS
	1600							CALLED OUT
	1300							ON LOC / TAIL GATE SAFETY MEETING
	1620		2 BPM @ 60#					RIG UP - WAIT - EST INT
		5						FW AHEAD
	1625	5.8	4			250		MIX CMT @ 15.6
		3						FW BEHIND
		15						BRINE
	1650							PULL OUT EZSV
								Rig Down Washup
								Thanks
								Mike S

CUSTOMER

HALLIBURTON

JOB LOG HAL-2013-C

DATE	PAGE NO.
3-7-96	1

CUSTOMER	WELL NO.	LEASE	JOB TYPE	TICKET NO.
Eco Solutions	#2	W Dw	EZSV	883976

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE (PSI) TUBING	PRESSURE (PSI) CASING	DESCRIPTION OF OPERATION AND MATERIALS
	1330							On Location
								Safety Film
								Discuss Job w/ Co Rep.
	1600							Left Location
3-8-96	0600							Return To Location
	1023							Start EZSV in hole
	1100							Set EZSV 3182'
								Start in hole w/ Stab Guide
	1545							TAG EZSV
	1605				✓		500	test EZSV
	1625	2				40		Tk Injection Rate
	1630		50					Start Cmt 260 sk Premium cmt
								mix 16.2 PPG
	1700							Displace 3 Fw 15 Bbl Bine
								Pull EZSV
								5 Bbls Top EZSV
								POOH

FIELD OFFICE

HALLIBURTON

HALLIBURTON ENERGY SERVICES

HAL-1906-N

RGE TO: ECO SOLUTIONS

ADDRESS:

CITY, STATE, ZIP CODE:

CUS ER (..CKE.

No. 883798 - 3

PAGE 1 OF

SERVICE LOCATIONS	WELL/PROJECT NO	LEASE	COUNTY/PARISH	STATE	CITY/OFFSHORE LOCATION	DATE	OWNER
1. [illegible]	CELANESE	[illegible]	MATAGORDA	TX	Bay City	5-8-96	
2.	TICKET TYPE: ☑ SERVICE ☐ SALES	NITROGEN JOB? ☐ YES ☑ NO	CONTRACTOR: Dawson Wellsh	RIG NAME/NO.	SHIPPED VIA: GV	DELIVERED TO: WC	ORDER NO.
3.	WELL TYPE: 03	WELL CATEGORY: 02	JOB PURPOSE: 100		WELL PERMIT NO.	WELL LOCATION: Bay City	
4.							

REFERRAL LOCATION:

INVOICE INSTRUCTIONS:

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
000-117					MILEAGE	120	mi			2 [illegible]	342 00
[illegible] 119						120	mi			1 [illegible]	180 00
009-124					Depth 246	3550	ft				1680 00
					Vacuum Tek (H2O)						923 75

LEGAL TERMS: Customer hereby acknowledges and agrees to the terms and conditions on the reverse side hereof which include, but are not limited to, **PAYMENT, RELEASE, INDEMNITY,** and **LIMITED WARRANTY** provisions.

MUST BE SIGNED BY CUSTOMER OR CUSTOMER'S AGENT PRIOR TO START OF WORK OR DELIVERY OF GOODS

X [signature]

DATE SIGNED: | TIME SIGNED: ☐ A.M. ☐ P.M.

I ☐ do ☐ do not require IPC (Instrument Protection). ☐ Not offered

SUB SURFACE SAFETY VALVE WAS: ☐ PULLED & RETURN ☐ PULLED ☐ RUN

TYPE LOCK	DEPTH
BEAN SIZE	SPACERS
TYPE OF EQUALIZING SUB	CASING PRESSURE
TUBING SIZE	TUBING PRESSURE / WELL DEPTH
TREE CONNECTION	TYPE VALVE

SURVEY	AGREE	UN-DECIDED	DIS-AGREE
OUR EQUIPMENT PERFORMED WITHOUT BREAKDOWN?	—		
WE UNDERSTOOD AND MET YOUR NEEDS?	—		
OUR SERVICE WAS PERFORMED WITHOUT DELAY?	—		
WE OPERATED THE EQUIPMENT AND PERFORMED JOB CALCULATIONS SATISFACTORILY?	—		

ARE YOU SATISFIED WITH OUR SERVICE? ☐ YES ☐ NO

☐ CUSTOMER DID NOT WISH TO RESPOND

PAGE TOTAL	3125 75
FROM CONTINUATION PAGE(S)	3881 54
SUB-TOTAL APPLICABLE TAXES WILL BE ADDED ON INVOICE	7007 29

CUSTOMER ACCEPTANCE OF MATERIALS AND SERVICES The customer hereby acknowleges receipt of the materials and services listed on this ticket.

CUSTOMER OR CUSTOMER'S AGENT (PLEASE PRINT)	CUSTOMER OR CUSTOMER'S AGENT (SIGNATURE)	HALLIBURTON OPERATOR/ENGINEER	EMP #	HALLIBURTON APPROVAL
[signature]	X [signature]	Mike Supak	75071	

HALLIBURTON

HALLIBURTON ENERGY SERVICES

CHARGE TO: ECO Solutions

ADDRESS

CITY, STATE, ZIP CODE

TICKET No. 883976 - 5

PAGE 1 OF 1

SERVICE LOCATIONS	WELL PROJECT NO	LEASE	COUNTY/PARISH	STATE	CITY/OFFSHORE LOCATION	DATE	OWNER
1 Fresno 15530	2	W DW	Matagorda	TX		3-8-96	Same

TICKET TYPE	NITROGEN	CONTRACTOR	RIG NAME/NO.	SHIPPED VIA	DELIVERED TO	ORDER NO
☑ SERVICE ☐ SALES	JOB? ☐ YES ☑ NO	DAWSON		PU	BAY City	

WELL TYPE	WELL CATEGORY	JOB PURPOSE	WELL PERMIT NO.	WELL LOCATION
11	06	667		LAND

REFERRAL LOCATION | INVOICE INSTRUCTIONS

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
116-115					MILEAGE Tools Truck	240	mi			1 50	360 00
102-012					Operator	12	hr.			45 00	540 00
94	802.354				EZSV	1	9 5/8			2125 00	2125 00
128-401					STAR Guide	8	hr.			102 00	102 00
128-451					Wireline Kit	1	Job			71 00	71 00
117-000					X over	1	3½			50 00	50 00

LEGAL TERMS: Customer hereby acknowledges and agrees to the terms and conditions on the reverse side hereof which include, but are not limited to **PAYMENT, RELEASE, INDEMNITY,** and **LIMITED WARRANTY** provisions.

MUST BE SIGNED BY CUSTOMER OR CUSTOMER'S AGENT PRIOR TO START OF WORK OR DELIVERY OF GOODS

X

DATE SIGNED 3-8-96 | TIME SIGNED 0700 ☑ A.M. ☐ P.M.

☐ do ☐ do not require IPC (Instrument Protection) ☐ Not offered

SUB SURFACE SAFETY VALVE WAS: ☐ PULLED & RETURN ☐ PULLED ☐ RUN

TYPE LOCK	DEPTH
BEAN SIZE	SPACERS
TYPE OF EQUALIZING SUB	CASING PRESSURE
TUBING SIZE	TUBING PRESSURE / WELL DEPTH
TREE CONNECTION	TYPE VALVE

SURVEY	AGREE	UN-DECIDED	DIS-AGREE
OUR EQUIPMENT PERFORMED WITHOUT BREAKDOWN?	✓		
WE UNDERSTOOD AND MET YOUR NEEDS?	✓		
OUR SERVICE WAS PERFORMED WITHOUT DELAY?	✓		
WE OPERATED THE EQUIPMENT AND PERFORMED JOB CALCULATIONS SATISFACTORILY?	✓		

ARE YOU SATISFIED WITH OUR SERVICE? ☑ YES ☐ NO

☐ CUSTOMER DID NOT WISH TO RESPOND

PAGE TOTAL	3248 00
FROM CONTINUATION PAGE(S)	-649 60
SUB-TOTAL APPLICABLE TAXES WILL BE ADDED ON INVOICE	

CUSTOMER ACCEPTANCE OF MATERIALS AND SERVICES The customer hereby acknowleges receipt of the materials and services listed on this ticket.

CUSTOMER OR CUSTOMER'S AGENT (PLEASE PRINT)	CUSTOMER OR CUSTOMER'S AGENT (SIGNATURE)	HALLIBURTON OPERATOR/ENGINEER	EMP #	HALLIBURTON APPROVAL
Ed Hill	X	F.R. Jackson	48085	

HALLIBURTON

HALLIBURTON ENERGY SERVICES

CHARGE TO: ECO SOLUTIONS

ADDRESS:

CITY STATE ZIP CODE:

ORIGINAL TICKET

No. 883798 - 3

PAGE 1 OF 2

SERVICE LOCATIONS	WELL PROJECT NO	LEASE	COUNTY/PARISH	STATE	CITY/OFFSHORE LOCATION	DATE	OWNER
1 FRESNO 15530	CELANESE	DISP WELL	MATAGORDA	TX	BAY CITY	3-8-96	

2	TICKET TYPE	NITROGEN JOB?	CONTRACTOR	RIG NAME/NO.	SHIPPED	DELIVERED TO	ORDER NO
3	☑ SERVICE ☐ SALES	☐ YES ☑ NO	DAWSON WELL SERV		GV	LOC	

4 REFERRAL LOCATION	WELL TYPE	WELL CATEGORY	JOB PURPOSE	WELL PERMIT NO.	WELL LOCATION
	03	02	100		BAY CITY

INVOICE INSTRUCTIONS

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
000-117				20	MILEAGE	120	MI			2 85	342
000-119				20		120	MI			1 50	180
009-134				20	DEPTH CHG	3550	FT				1680
019-000				0	VACUUM TRK (H2O)						923

LEGAL TERMS: Customer hereby acknowledges and agrees to the terms and conditions on the reverse side hereof which include, but are not limited to. **PAYMENT, RELEASE, INDEMNITY,** and **LIMITED WARRANTY** provisions.

MUST BE SIGNED BY CUSTOMER OR CUSTOMER'S AGENT PRIOR TO START OF WORK OR DELIVERY OF GOODS

X

DATE SIGNED / TIME SIGNED ☐ A.M. ☐ P.M.

☐ do ☐ do not require IPC (Instrument Protection) ☐ Not offered

SUB SURFACE SAFETY VALVE WAS: ☐ PULLED & RETURN ☐ PULLED ☐ RUN

TYPE LOCK	DEPTH
BEAN SIZE	SPACERS
TYPE OF EQUALIZING SUB.	CASING PRESSURE
TUBING SIZE	TUBING PRESSURE / WELL DEPTH
TREE CONNECTION	TYPE VALVE

SURVEY	AGREE	UN-DECIDED	DIS-AGREE
OUR EQUIPMENT PERFORMED WITHOUT BREAKDOWN?	✓		
WE UNDERSTOOD AND MET YOUR NEEDS?	✓		
OUR SERVICE WAS PERFORMED WITHOUT DELAY?	✓		
WE OPERATED THE EQUIPMENT AND PERFORMED JOB CALCULATIONS SATISFACTORILY?	✓		

ARE YOU SATISFIED WITH OUR SERVICE? ☐ YES ☐ NO

☐ CUSTOMER DID NOT WISH TO RESPOND

PAGE TOTAL	3125 7
FROM CONTINUATION PAGE(S)	3881 5
SUB-TOTAL APPLICABLE TAXES WILL BE ADDED ON INVOICE	7007 2

CUSTOMER ACCEPTANCE OF MATERIALS AND SERVICES The customer hereby acknowleges receipt of the materials and services listed on this ticket.

X

CUSTOMER OR CUSTOMER'S AGENT SIGNATURE

HALLIBURTON OPERATOR ENGINEER: Mike Supak EMP # 75071

HALLIBURTON APPROVAL

HALLIBURTON

HALLIBURTON ENERGY SERVICES

FORM 1911 R-10

TICKET CONTINUATION

GIN

TICKET No. 883798

CUSTOMER	WELL	DATE	PAGE	OF
ECO SOLUTIONS	CELANESE DISP.	3-8-96		

FRESNO TEXAS

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
504-043	516.00272				PREMIUM CEMENT	260	SK			10.90	2834.00
					(SPLIT BETWEEN POTS #4934)						
					CEMENT ORDER & B-TICKET HAVE BEEN REVIEWED WITH COMPANY REPRESENTATIVE						
					SIGNED:						
						MSDS PROVIDED TO CUSTOMER.					
500-207					SERVICE CHARGE	CUBIC FEET		260		1.35	351.00
500-306					MILEAGE CHARGE / TOTAL WEIGHT 24,440 / LOADED MILES 60	TON MILES		733.20		.95	696.54
										CONTINUATION TOTAL	3881.54

No. B 289841

HALLIBURTON

HALLIBURTON ENERGY SERVICES

HAL-1906-N

CHARGE TO: ECO Solutions

ADDRESS

CITY, STATE, ZIP CODE

DUNCAN COPY — TICKET No. 883976 - 5

PAGE 1 OF 1

SERVICE LOCATIONS	WELL/PROJECT NO.	LEASE	COUNTY/PARISH	STATE	CITY/OFFSHORE LOCATION	DATE	OWNER
1. Freeport 15530	2	WDW	Matagorda	TX		3-7-96	Same

2.	TICKET TYPE: ☑ SERVICE ☐ SALES	NITROGEN JOB? ☐ YES ☑ NO	CONTRACTOR: DAWSON	RIG NAME/NO.	SHIPPED VIA: PU	DELIVERED TO: BAY CITY	ORDER NO.
3.	WELL TYPE: 11	WELL CATEGORY: 06	JOB PURPOSE: 667			WELL PERMIT NO.	WELL LOCATION: LAND
4.							

REFERRAL LOCATION | INVOICE INSTRUCTIONS

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
100-115					MILEAGE Tools Truck	240	mi			1.50	360.00
102-012					Operator	12	hr			45.00	540.00
94	802 354				EZSV	1	9 5/8			2125.00	2125.00
128-401					STAR Guide	8	ea			100.00	100.00
128-451					Wireline Kit	1	Job			70.00	70.00
117-000					X over	1	3½			50.00	50.00

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MUST BE SIGNED BY CUSTOMER OR CUSTOMER'S AGENT PRIOR TO START OF WORK OR DELIVERY OF GOODS

X

DATE SIGNED | TIME SIGNED ☐ A.M. ☐ P.M.

I ☐ do ☐ do not require IPC (Instrument Protection). ☐ Not offered

SUB SURFACE SAFETY VALVE WAS ☐ PULLED & RETURN ☐ PULLED ☐ RUN

TYPE LOCK	DEPTH
BEAN SIZE	SPACERS
TYPE OF EQUALIZING SUB.	CASING PRESSURE
TUBING SIZE	TUBING PRESSURE / WELL DEPTH
TREE CONNECTION	TYPE VALVE

SURVEY	AGREE	UN-DECIDED	DIS-AGREE
OUR EQUIPMENT PERFORMED WITHOUT BREAKDOWN?			
WE UNDERSTOOD AND MET YOUR NEEDS?			
OUR SERVICE WAS PERFORMED WITHOUT DELAY?			
WE OPERATED THE EQUIPMENT AND PERFORMED JOB CALCULATIONS SATISFACTORILY?			

ARE YOU SATISFIED WITH OUR SERVICE? ☐ YES ☐ NO

☐ CUSTOMER DID NOT WISH TO RESPOND

PAGE TOTAL	3245.00
FROM CONTINUATION PAGE(S)	
SUB-TOTAL APPLICABLE TAXES WILL BE ADDED ON INVOICE	

CUSTOMER ACCEPTANCE OF MATERIALS AND SERVICES The customer hereby acknowleges receipt of the materials and services listed on this ticket.

CUSTOMER OR CUSTOMER'S AGENT (PLEASE PRINT)	CUSTOMER OR CUSTOMER'S AGENT (SIGNATURE)	HALLIBURTON OPERATOR/ENGINEER	EMP #	HALLIBURTON APPROVAL
	X	F.R. Jackson	418085	

HALLIBURTON

HALLIBURTON ENERGY SERVICES

HAL 1906-N

GE TO: ECO SOLUTIONS

ADDRESS

CITY STATE, ZIP CODE

ORIGINAL TICKET No. 883799 - 4

PAGE 1 OF

SERVICE LOCATIONS	WELL/PROJECT NO	LEASE	COUNTY/PARISH	STATE	CITY/OFFSHORE LOCATION	DATE	OWNER
1 FRESNO 15530	WDW 14	CELANESE DISP WELL	MATAGORDA	TX	Bay City	3-11-96	
2.	TICKET TYPE ☑ SERVICE ☐ SALES / NITROGEN JOB? ☐ YES ☑ NO	CONTRACTOR DAWSON WELL SRV	RIG NAME/NO.	SHIPPED VIA CV	DELIVERED TO LOC	ORDER NO.	
3.	WELL TYPE 03	WELL CATEGORY 02	JOB PURPOSE 115		WELL PERMIT NO.	WELL LOCATION Bay City	
4.							
REFERRAL LOCATION	INVOICE INSTRUCTIONS						

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
000-117				20	MILEAGE	120	MI			2 85	342 00
000-119				20	CREW MILEAGE	120	MI			1 50	180 0
009-019				20	Depth CHG	3100	FT				1540 0
019-000				0	VACUUM TRK (H2O)						636

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MUST BE SIGNED BY CUSTOMER OR CUSTOMER'S AGENT PRIOR TO START OF WORK OR DELIVERY OF GOODS

X

DATE SIGNED | TIME SIGNED ☐ A.M. ☐ P.M.

☐ do ☐ do not require IPC (Instrument Protection). ☐ Not offered

SUB SURFACE SAFETY VALVE WAS: ☐ PULLED & RETURN ☐ PULLED ☐ RUN

TYPE LOCK | DEPTH

BEAN SIZE | SPACERS

TYPE OF EQUALIZING SUB. | CASING PRESSURE

TUBING SIZE | TUBING PRESSURE | WELL DEPTH

TREE CONNECTION | TYPE VALVE

SURVEY	AGREE	UN-DECIDED	DIS-AGREE
OUR EQUIPMENT PERFORMED WITHOUT BREAKDOWN?	✓		
WE UNDERSTOOD AND MET YOUR NEEDS?	✓		
OUR SERVICE WAS PERFORMED WITHOUT DELAY?	✓		
WE OPERATED THE EQUIPMENT AND PERFORMED JOB CALCULATIONS SATISFACTORILY?	✓		

ARE YOU SATISFIED WITH OUR SERVICE? ☐ YES ☐ NO

☐ CUSTOMER DID NOT WISH TO RESPOND

PAGE TOTAL	2748 2
FROM CONTINUATION PAGE(S)	4180 1
SUB-TOTAL APPLICABLE TAXES WILL BE ADDED ON INVOICE	6928 3

CUSTOMER ACCEPTANCE OF MATERIALS AND SERVICES The customer hereby acknowleges receipt of the materials and services listed on this ticket.

CUSTOMER OR CUSTOMER'S AGENT (PLEASE PRINT) | CUSTOMER OR CUSTOMER'S AGENT (SIGNATURE) X | HALLIBURTON OPERATOR/ENGINEER Mike Supak | EMP # 75071 | HALLIBURTON APPROVAL

HALLIBURTON

JOB LOG HAL-2013-C

DATE	PAGE NO.
3-11-96	

CUSTOMER	WELL NO.	LEASE	JOB TYPE	TICKET NO.
ECO SOLUTIONS	CELANESE	DISP WELL	PTA	883799

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE(PSI) TUBING	PRESSURE(PSI) CASING	DESCRIPTION OF OPERATION AND MATERIALS
	1100							CALLED OUT /
	1500							ON LOC / TAIL GATE SAFETY MEETING
								Rig up
	2100		20					~~FW~~ AHEAD (MUD FLUSH)
			54.3					MIX CMT @ 16.2
			2					FW Behind
			16					MUD
								WASH UP - THROUGH FOR DAY
								THANKS

HALLIBURTON

HALLIBURTON ENERGY SERVICES

FORM 1911 R-10

FRESNO TEXAS

TICKET CONTINUATION

ORIGINAL

TICKET No. 883799

CUSTOMER	WELL	DATE	PAGE	OF
ECO SOLUTIONS	CELANESE DISPOSAL	3-11-96		

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCOUNTING ACCT	ACCOUNTING DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
504-043	516.00272			20	PREMIUM CEMENT	280	SK			10.90	3052.00
					(SPLIT BETWEEN POTS TRUCK #53421						
					CEMENT ORDER & B-TICKET HAVE BEEN REVIEWED W/COMPANY REPRESENTATIVE SIGNED: _____						
					MSDS PROVIDED TO CUSTOMER.						
500-207				20	SERVICE CHARGE	CUBIC FEET 280				1.35	378.00
500-306				20	MILEAGE CHARGE — TOTAL WEIGHT 26,320 — LOADED MILES 60	TON MILES 789.60				.95	750.12
										CONTINUATION TOTAL	4,180.12

No. B 289845

HALLIBURTON

HALLIBURTON ENERGY SERVICES

HAL-1906-N

CHARGE TO: ECO - SOLUTIONS

ADDRESS

CITY, STATE, ZIP CODE

ORIGINAL

TICKET No. 883800 - 5

PAGE 1 OF

SERVICE LOCATIONS	WELL/PROJECT NO.	LEASE	COUNTY/PARISH	STATE	CITY/OFFSHORE LOCATION	DATE	OWNER
1. FRESNO 15530	WDW 14	CELANESE DISP WELL	MATAGORDA	TX	Bay City	3-12-96	

2.	TICKET TYPE	NITROGEN JOB?	CONTRACTOR	RIG NAME/NO.	SHIPPED	DELIVERED TO	ORDER NO.
	☑ SERVICE ☐ SALES	☐ YES ☑ NO	DAWSON WELL SERV		COV	LOC	

3.	WELL TYPE	WELL CATEGORY	JOB PURPOSE	WELL PERMIT NO.	WELL LOCATION
4.	03	02	115		Bay City

REFERRAL LOCATION | INVOICE INSTRUCTIONS

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
000-119				20	MILEAGE (CREW)	120	MI			1.50	180.00
009-019				20	DEPTH CHG	2425	FT				1455.00
019-000				0	VACUUM TRK (H_2O)						700.00
					3-13-96						
000-119				20	CREW MILEAGE	120	MI			1.50	180.00
019-000				0	VACUUM TRK (H_2O)	17	MI				891.25
009-019				20	DEPTH CHG	1520	FT				1520.00
018-315				20	MUD FLUSH (3-11)	840	GAL			.65	546.00

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MUST BE SIGNED BY CUSTOMER OR CUSTOMER'S AGENT PRIOR TO START OF WORK OR DELIVERY OF GOODS

X

DATE SIGNED | TIME SIGNED ☐ A.M. ☐ P.M.

☐ do ☐ do not require IPC (Instrument Protection). ☐ Not offered

SUB SURFACE SAFETY VALVE WAS: ☐ PULLED & RETURN ☐ PULLED ☐ RUN

TYPE LOCK	DEPTH
BEAN SIZE	SPACERS
TYPE OF EQUALIZING SUB.	CASING PRESSURE
TUBING SIZE	TUBING PRESSURE / WELL DEPTH
TREE CONNECTION	TYPE VALVE

SURVEY	AGREE	UN-DECIDED	DIS-AGREE
OUR EQUIPMENT PERFORMED WITHOUT BREAKDOWN?			
WE UNDERSTOOD AND MET YOUR NEEDS?			
OUR SERVICE WAS PERFORMED WITHOUT DELAY?			
WE OPERATED THE EQUIPMENT AND PERFORMED JOB CALCULATIONS SATISFACTORILY?			

ARE YOU SATISFIED WITH OUR SERVICE? ☐ YES ☐ NO

☐ CUSTOMER DID NOT WISH TO RESPOND

PAGE TOTAL	5407.12
FROM CONTINUATION PAGE(S)	7876.25 / 7968.4
SUB-TOTAL APPLICABLE TAXES WILL BE ADDED ON INVOICE	21251.9

CUSTOMER ACCEPTANCE OF MATERIALS AND SERVICES The customer hereby acknowleges receipt of the materials and services listed on this ticket.

CUSTOMER OR CUSTOMER'S AGENT (PLEASE PRINT) | CUSTOMER OR CUSTOMER'S AGENT (SIGNATURE) X | HALLIBURTON OPERATOR/ENGINEER Mike Spak | EMP # 75071 | HALLIBURTON APPROVAL

HALLIBURTON

HALLIBURTON ENERGY SERVICES

FORM 1911 R-10

FRESNO TEXAS

TICKET CONTINUATION

DUNCAN COPY

TICKET No. 88380

CUSTOMER	WELL	DATE	PAGE	OF
ECO SOLUTIONS	CELANESE DISP.	3-12-96		

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCOUNTING ACCT	ACCOUNTING DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
504-043	516.00272				PREMIUM CEMENT	490	SK			10.00	5341.00
507-153	516.00161				0.25% CFR-3	115	LB			4.35	557.75
					TRUCKS 53421 & 1609						
500-207					SERVICE CHARGE	CUBIC FEET		490		1.35	661.50
500-306					MILEAGE CHARGE — TOTAL WEIGHT 46,175 — LOADED MILES 60	TON MILES		1385.25		.95	1315.99

CONTINUATION TOTAL 7876.24

No. B 289846

HALLIBURTON

JOB LOG HAL-2013-C

DATE	PAGE NO.
3-12-96	

CUSTOMER	WELL NO.	LEASE	JOB TYPE	TICKET NO.
ECO SOLUTIONS	WDW 14	CELANESE Dispwell	PTA	883800

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE(PSI) TUBING	PRESSURE(PSI) CASING	DESCRIPTION OF OPERATION AND MATERIALS
	1030							CALLED OUT
	1300							ON LOC / TAIL GATE SAFETY MEETING
								Rig up
	1620	4	10					FW AHEAD
		1	76					MIX Cmt @ 16.2# — 3 Sks
			7					7 FW Behind
	1645							SHUTDOWN
								WASH up - Through Fin Day
3-13	1300							ON LOC / Rig up
	1600	4	5 FW					FW AHEAD
		1	108					MIX Cmt @ 16.2
			7 FW					7 FW Behind
								- COME OUT, Laying Down
								Pull OFF Hydril
	1840							# FILL Hole w/ Cmt
								Rig Down
								Wash up
								Thanks
								Mike S

CUSTOMER

HALLIBURTON

JOB SUMMARY

HALLIBURTON DIVISION: S. TEXAS

HALLIBURTON LOCATION: FREEPORT

BILLED ON TICKET NO.: 883800

CUSTOMER

WELL DATA

FIELD: Bay City SEC. ____ TWP. ____ RNG. ____ COUNTY: Matagorda STATE: TX

FORMATION NAME ____ TYPE ____

FORMATION THICKNESS ____ FROM ____ TO ____

INITIAL PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

PRESENT PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

COMPLETION DATE ____ MUD TYPE ____ MUD WT. 10.2

PACKER TYPE ____ SET AT ____

BOTTOM HOLE TEMP. ____ PRESSURE ____

MISC. DATA ____ TOTAL DEPTH ____

	NEW USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING		40	5 1/2	0	—	
LINER						
TUBING				0		
OPEN HOLE						SHOTS/FT.
PERFORATIONS						
PERFORATIONS						
PERFORATIONS						

JOB DATA

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED
DATE 3-13-11	DATE 3-13-11	DATE 3-13-11	DATE 3-13-11
TIME 10:30	TIME [illegible]	TIME [illegible]	TIME

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLOAT COLLAR		
FLOAT SHOE		
GUIDE SHOE		
CENTRALIZERS		
BOTTOM PLUG		
TOP PLUG		
HEAD		
PACKER		
OTHER		

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
M. Sugal 74071	90157	1557
J. McGuen 417722	Com 11 + Aux.	
Crowe 7077	52121 7021	"
Tapia 417115	11.5 7021	"

MATERIALS

TREAT. FLUID ____ DENSITY ____ LB/GAL. °API

DISPL. FLUID ____ DENSITY ____ LB/GAL. °API

PROP. TYPE ____ SIZE ____ LB. ____

PROP. TYPE ____ SIZE ____ LB. ____

ACID TYPE ____ GAL. ____ % ____

ACID TYPE ____ GAL. ____ % ____

ACID TYPE ____ GAL. ____ % ____

SURFACTANT TYPE ____ GAL. ____ IN ____

NE AGENT TYPE ____ GAL. ____ IN ____

FLUID LOSS ADD. TYPE ____ GAL.-LB. ____ IN ____

GELLING AGENT TYPE ____ GAL.-LB. ____ IN ____

FRIC. RED. AGENT TYPE ____ GAL.-LB. ____ IN ____

BREAKER TYPE ____ GAL.-LB. ____ IN ____

BLOCKING AGENT TYPE ____ GAL.-LB. ____

PERFPAC BALLS TYPE ____ QTY. ____

OTHER ____

OTHER ____

DEPARTMENT: Cmt

DESCRIPTION OF JOB: TTA

JOB DONE THRU: TUBING ☒ TP CASING ☐ ANNULUS ☐ TBG./ANN. ☐

CUSTOMER REPRESENTATIVE X ____

HALLIBURTON OPERATOR: Allie Sugal COPIES REQUESTED ____

CEMENT DATA

STAGE	NUMBER OF SACKS	CEMENT	BRAND	BULK SACKED	ADDITIVES	YIELD CU.FT./SK.	MIXED LBS./GAL.
	190	Tiem		B	.25% CFR-3	1.67	11.2#

SUMMARY

PRESSURES IN PSI

CIRCULATING ____ DISPLACEMENT ____

BREAKDOWN ____ MAXIMUM ____

AVERAGE ____ FRACTURE GRADIENT ____

SHUT-IN: INSTANT ____ 5-MIN ____ 15-MIN ____

HYDRAULIC HORSEPOWER

ORDERED ____ AVAILABLE ____ USED ____

AVERAGE RATES IN BPM

TREATING ____ DISPL. ____ OVERALL ____

CEMENT LEFT IN PIPE

FEET ____ REASON ____

VOLUMES

PRESLUSH: BBL.-GAL. ____ TYPE ____

LOAD & BKDN: BBL.-GAL. ____ PAD: BBL.-GAL. ____

TREATMENT: BBL.-GAL. ____ DISPL.: BBL.-GAL. ____

CEMENT SLURRY: BBL.-GAL. ____

TOTAL VOLUME: BBL.-GAL. ____

REMARKS

CUSTOMER

HALLIBURTON

HALLIBURTON ENERGY SERVICES
FRESNO TEXAS

FORM 1911 R-10

TICKET CONTINUATION

ORIGINAL

TICKET No. 883800

CUSTOMER	WELL	DATE	PAGE	OF
ECO SOLUTIONS	CELANESE DISP.	3-13-96		

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCT	DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
504-043	516.00272			20	PREMIUM CEMENT	480	SK			10.90	5232.00
507-153	516.00161			20	0.25% CFR-3	113	LB			4.85	548.05
					LOADED IN TRUCKS #53421 & 1609						
					CEMENT ORDER & B-TICKET HAVE BEEN REVIEWED W/COMPANY REPRESENTATIVE SIGNED: [redacted]						
					MSDS PROVIDED TO CUSTOMER.						
500-207				20	SERVICE CHARGE	CUBIC FEET		480		1.35	648.00
500-306				20	MILEAGE CHARGE — TOTAL WEIGHT 54,050 — LOADED MILES 60	TON MILES		1621.50		.95	1540.43

CONTINUATION TOTAL 7,968.48

No. B 289847

HALLIBURTON

HALLIBURTON ENERGY SERVICES

FORM 1911 R-10

FRESNO TEXAS

TICKET CONTINUATION

ORIGINAL

TICKET No. 883800

CUSTOMER	WELL	DATE	PAGE	OF
ECO. SOLUTIONS	CELANESE DISP.	3-12-96		

PRICE REFERENCE	SECONDARY REFERENCE/ PART NUMBER	ACCOUNTING LOC	ACCOUNTING ACCT	ACCOUNTING DF	DESCRIPTION	QTY.	U/M	QTY.	U/M	UNIT PRICE	AMOUNT
504-043	516.00272			20	PREMIUM CEMENT	490	SK			10.90	5341.00
507-153	516.00161			20	0.25% CFR-3	115	LB			4.85	557.75
					TRUCKS 53421 & 1609						
					CEMENT ORDER & B-TICKET HAVE BEEN REVIEWED W/COMPANY REPRESENTATIVE						
					SIGNED: [redacted]						
					[redacted]						
500-207				20	SERVICE CHARGE	CUBIC FEET		490		1.35	661.50
500-306				20	MILEAGE CHARGE — TOTAL WEIGHT 46,175 — LOADED MILES 60	TON MILES		1385.25		.95	1315.99
										CONTINUATION TOTAL	7876.24

MSDS PROVIDED TO CUSTOMER

No. B 289846

ATLAS WIRELINE SERVICES
Western Atlas International

Service Order

PAGE ____ OF ____

CUSTOMER ORDER NO.

SERVICE ORDER NO. 134700

CUSTOMER ABBREV.

CUSTOMER NAME: ECO SOLUTIONS, INC

LOCATION CODE: 20022

LOCATION NAME: VICTORIA

d d m o n y y: 08 MAR 96

ATTENTION / INVOICE ADDRESS: 9800 RICHMOND AVENUE Suite 320, HOUSTON TEXAS 77042

BC | TC | AC

PRICE SCHEDULE: 079545L

CUSTOMER CODE

JOB TIME	DATE	TIME
JOB SCHEDULED	08 MAR 96	0700
ARRIVE LOCATION	08 MAR 96	0700
WELL TO AWS	08 MAR 96	0730
WELL TO CLIENT	08 MAR 96	1100
DEPART LOCATION	08 MAR 96	1200
STANDBY TIME - EQUIP. (HOURS)		Ø
STANDBY TIME - CREW (HOURS)		Ø
TOTAL TRAVEL TIME (HOURS)		

WELL ID: EFFLUENT WELL #2

FIELD: BAY CITY PLANT

SC: 42

CC

CITY: MATAGORDA

COUNTY

STATE / PROVINCE: TEXAS

UNIT ID: 3885TA004111

TOTAL DEPTH (F/M): 3164

WELL NO.: 42-

RIG: DAWSON

MARKETING CODE: DELF

RUN: F

LEGAL DESCRIPTION

Atlas Wireline Services is hereby instructed to deliver the equipment or perform the services ordered, or as orally directed, under the Terms and Conditions printed on the reverse side of this order and which I accept as Customer or as Customer's Authorized Agent, pursuant to the terms stated herein.

INSTRUMENT PROTECTION: ☐ YES ☐ NO ☐ NOT AVAILABLE

CUSTOMER SIGNATURE ✓ DATE 08-MAR-96 TIME 0730

OP NO. 1 START 0730 E.C. 1

1 ITEM	QUANTITY	UNIT CHARGE	AMOUNT
.001	3164	.32	1012 48
.002	1000 ~~MIN~~	.32	320 00

PROD. GR CODE 133248

OP NO. 1 START 0730 E.C. 1

2 ITEM	QUANTITY	UNIT CHARGE	AMOUNT
.001	3164	.15	474 60
.002	OPER	300.00	300 00

PROD. JC/GR CODE 774.60

OP NO. 2 START 1000 E.C.

3 ITEM	QUANTITY	UNIT CHARGE	AMOUNT
.001	3142	.25	785 50
.002	OPER	500.00	500 00

PROD. CRET CODE 1285.50

OP NO. START E.C. / 4 ITEM QUANTITY UNIT CHARGE AMOUNT / 5 ITEM QUANTITY UNIT CHARGE AMOUNT / 6 ITEM QUANTITY UNIT CHARGE AMOUNT / 7 ITEM QUANTITY UNIT CHARGE AMOUNT / 8 ITEM QUANTITY UNIT CHARGE AMOUNT / 9 ITEM QUANTITY UNIT CHARGE AMOUNT

EST COST: $ 4217.58

OP	PRODUCT	CODE	ITEM	PERFORATING / GENERAL	E.C.	SPF	QTY	UNIT CHARGE	AMOUNT
1	SCCH		.000	SERVICE CHARGE	1		6000'	.13	780 00
1	ENUP			Enviromental Prot	1			45.00	45 00
	DPE			Price Exception <.35> 4172.58					<1460.41>

TOTAL RIG TIME	3.5
NON-AWS LOST TIME	Ø
AWS OPERATING TIME	3.5
AWS LOST TIME	Ø
RECEIVED AT WELL	INITIALS
TAPE / FLOPPY	
FILM	
FIELD PRINTS	DRC

COMMENTS Hill #70726

I certify that the above services, materials and/or products have been received.

SUB TOTAL <635.41>

CUSTOMER SIGNATURE ____ DATE 08 MAR-96

ESTIMATED TOTAL 2757.17

AWS ENG. SIGNATURE D. R. Curtis DATE 08-MAR-96

PRICES SUBJECT TO CORRECTION. TAX NOT INCLUDED

AWS APPROVAL

APPENDIX D

TNRCC PLUG & ABANDON REGULATIONS

(D) the anticipated maximum wellhead and casing seat pressures and flow rates at which the well will operate during cavern development and cavern waste filling;
(E) results of the salt cavern injection zone and salt cavern confining zone testing program as required in §331.163(e)(3) of this title (relating to salt cavern solid waste disposal wells).
(F) the injection and production procedures for cavern development and cavern waste filling;
(G) the compatibility of injected materials with the contents of the salt cavern injection zone and the salt cavern confining zone, and with the materials of well construction;
(H) land subsidence monitoring data and groundwater quality monitoring data, including determinations of baseline conditions for such monitoring throughout the area of review;
(I) the status of corrective action required for defective wells in the area of review;
(J) actual as-built specifications of the well's surface support and monitoring equipment; and
(K) conformity of the constructed well system with the plans and specifications of the permit application.

(3) for Class III wells:
(A) logging and testing data on the well;
(B) a satisfactory demonstration of mechanical integrity for all new wells, excluding monitor wells;
(C) anticipated operating data;
(D) the results of the formation testing program;
(E) the injection procedures; and
(F) the status of corrective action required for defective wells in the area of review.

§331.46. Closure Standards.

(a) For Class I wells, other than salt cavern disposal wells, prior to closing the well, the owner or operator shall observe and record the pressure decay for a time specified by the executive director. The executive director shall analyze the pressure decay and the transient pressure observations conducted pursuant to §331.64 of this title (relating to Class I Wells) and determine whether the injection activity has conformed with predicted values.

(b) For all Class I wells, including salt cavern disposal wells, prior to well closure appropriate mechanical integrity testing shall be conducted to ensure the integrity of that portion of the long string casing and cement that will be left in the ground after closure. Testing methods may include:
(1) Pressure tests with liquid or gas;
(2) Radioactive tracer surveys for wells other than

saltcavern disposal wells;

(3) Noise logs, temperature logs, pipe evaluation logs, cement bond logs, or oxygen activation logs; and

(4) Any other test required by the executive director.

(c) For Class I wells, other than salt cavern disposal wells, prior to well closure the well shall be flushed with a non-hazardous buffer fluid.

(d) In closure of all Class I wells, including salt cavern disposal wells, and Class III wells, a well shall be plugged in a manner which will not allow the movement of fluids through the well, out of the injection zone either into or between USDWs or freshwater aquifers or to the land surface. Well plugs shall consist of cement or other materials approved in writing by the executive director, which provide protection equivalent to or greater than that provided by cement.

(e) The permittee shall notify the executive director before commencing closure according to an approved plan. For Class I wells this notice shall be given at least 60 days before commencement. The executive director will review any revised, updated or additional closure plans.

(f) Placement of the plugs in the wellbore shall be accomplished by an approved method that may include one of the following:

(1) the Balance Plug Method;

(2) the Dump Bailer Method;

(3) the Two-Plug Method; or

(4) an alternate method, approved by the executive director, that will reliably provide a comparable level of protection.

(g) Prior to closure, the well shall be in a state of static equilibrium with the mud or nonhazardous fluid weight equalized top to bottom, either by circulating the mud or fluid in the well at least once or by a comparable method prescribed by the executive director.

(h) Each plug used shall be appropriately tagged and tested for seal and stability before closure is completed.

(i) The closure plan shall, in the case of a Class III production zone which underlies or is in an exempted aquifer, also demonstrate that no movement of contaminants that will cause pollution from the production zone into a USDW or freshwater aquifer will occur. The commission shall prescribe aquifer cleanup and monitoring where deemed necessary and feasible to ensure that no migration of contaminants that will cause pollution from the production zone into a USDW or freshwater aquifer will occur.

(j) The following shall be considered in determining the adequacy of a plugging and abandonment plan for Class I and III wells:

(1) the type and number of plugs to be used;

(2) the placement of each plug including the elevation of the top and bottom;

(3) the type, grade and quantity of plugging material to be used;

(4) the method of placement of the plugs;
(5) the procedure used to plug and abandon the well;
(6) any newly constructed or discovered wells, or information, including existing well data, within the area of review;
(7) geologic or economic conditions;
(8) the amount, size and location by depth of casings and any other materials left in the well;
(9) the method and location where casing is to be parted if applicable;
(10) the estimated cost of the plugging procedure; and,
(11) such other factors that may affect the adequacy of the plan.

(k) For Class I wells only, a monument or other permanent marker shall be placed at or attached to the plugged well prior to abandonment. The monument shall state the TWC permit number, date of abandonment, and company name.

(l) Each owner of a Class I hazardous waste injection well, and the owner of the surface or subsurface property on or in which a Class I hazardous waste injection well is located, must record, within 60 days after approval by the executive director of the closure operations, a notation on the deed to the facility property or on some other instrument which is normally examined during a title search that will, in perpetuity, provide any potential purchaser of the property the following information:
(1) the fact that land has been used to manage hazardous waste;
(2) the name of the state agency or local authority with which the plat was filed, as well as the Austin address of the Underground Injection Control (UIC) staff of the TWC to which it was submitted; and
(3) the type and volume of waste injected, the injection interval or intervals, and for salt cavern wells, the maximum cavern radius into which it was injected, and the period over which injection occurred.

(m) Within 30 days after completion of closure, the permittee shall file with the executive director a closure report on forms provided by the commission. The report shall be certified as accurate by the owner or operator and by the person who performed the closure operation (if other than the owner or operator). Such report shall consist of a statement that the well was closed in accordance with the closure plan previously submitted and approved by the executive director.

(n) For salt cavern disposal wells, prior to sealing the cavern and plugging the well, the owner or operator shall complete any pre-closure monitoring of the cavern and its contents required by rule or permit.

(o) For salt cavern disposal wells, the cavern shall be closed according to Section 331.170 of this title (relating to Cavern Closure).

§331.47. Pond Lining. All holding ponds, emergency overflow ponds, emergency storage ponds, or other impoundments associated with, or part of the surface facilities associated with, underground injection wells shall be lined with clay or an artificial liner as approved by the executive director and as required by permit, and, shall in addition, conform to any applicable requirements of Chapter 335 of this title (relating to Industrial Solid Waste and Municipal Hazardous Waste).

§331.48. Waiver of Requirements. For Class III and Class V Wells Only.

(a) When injection does not occur into, through or above an underground source of drinking water, the commission by permit may authorize a well with less stringent requirements than those required in this chapter to the extent that the less stringent requirements will not result in an increased likelihood of movement of fluid that may pollute USDWs, and fresh or surface water.

(b) When injection occurs and a cone of depression centered at the well or well field is maintained for the injection zone, the commission by permit may authorize a well with less stringent requirements for operation, monitoring, and reporting than those required in this chapter to the extent that the less stringent requirements will not result in an increased likelihood of movement of fluid that may pollute USDWs, and fresh or surface water.

(c) When requirements are reduced under subsection (a) or (b) of this section, a technical summary will be prepared setting forth the basis for the action.

Amendment to: §331.43
Date Adopted: December 7, 1994
Date Filed with the Secretary of State: December 12, 1994
Date Effective: January 2, 1995

Amendment to: §331.44
Date Adopted: December 7, 1994
Date Filed with the Secretary of State: December 12, 1994
Date Effective: January 2, 1995

Amendment to: §331.45
Date Adopted: December 7, 1994
Date Filed with the Secretary of State: December 12, 1994
Date Effective: January 2, 1995

APPENDIX E

TRRC PLUGGING RECORD (FORMS W-3 & W-15)

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W-3
Rev. 10/78

API NO. (if available) ---

1. RRC District: N/A

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id. Number: WDW-14

2. FIELD NAME (as per RRC Records): N/A

3. Lease Name: Class I Injection Well

5. Well Number: 2

6. OPERATOR: Hoechst Celanese Chemical Group, Ltd.

6a. Original Form W-1 Filed in Name of: N/A

10. County: Matagorda

7. ADDRESS: P.O.Box 509, Bay City, TX 77414-0509

6b. Any Subsequent W-1's Filed in Name of: N/A

11. Date Drilling Permit Issued: N/A

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is Located: 5230 Feet From North Line and 2220 Feet From West Line of the Company property Lease

12. Permit Number: N/A

9a. SECTION, BLOCK, AND SURVEY: James Moore League, abstract 62

9b. Distance and Direction From Nearest Town in this County: 10 miles - SW of Bay City, TX

13. Date Drilling Commenced: ---

16. Type Well (Oil, Gas, Dry): N/A

Total Depth: 3780

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No.'s: N/A

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #
---	---	---

14. Date Drilling Completed: ---

18. If Gas, Amt. of Cond. on Hand at time of Plugging: N/A

15. Date Well Plugged: 3/13/96

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	3-8-96							
20. Size of Hole or Pipe in which Plug Placed (inches)	9 5/8							
21. Depth to Bottom of Tubing or Drill Pipe (ft.)	3142							
*22. Sacks of Cement Used (each plug)	260							
*23. Slurry Volume Pumped (cu. ft.)	307							
*24. Calculated Top of Plug (ft.)	3092							
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.	15.6							
*27. Type Cement	H neat							

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)
13 3/8	---	1338	1338	17
9 5/8	40	3750	3750	12 1/4
5 1/2	20	3162	0	---

29. Was any Non-Drillable Material (Other than Casing) Left in This Well: [X] Yes [ ] No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non-drillable material. (Use Reverse Side of Form if more space is needed.)

A cement retainer set at 3140'

30. LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS

FROM 3354	TO 3414	(4 SPF)	FROM	TO	
FROM 3450	TO 3520	(5 SPF)	FROM	TO	
FROM 3520	TO 3550	(12 SPF)	FROM	TO	
FROM	TO		FROM	TO	
FROM	TO		FROM	TO	

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.

* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SERVICES

Name of Cementing Company

CERTIFICATE:

I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

REPRESENTATIVE OF COMPANY | TITLE | DATE | Phone A/C NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISSION

Cementer: Fill in shaded areas.
Operator: Fill in other items.

Form W-15
Cementing Report
Rev. 4/1/83
483-045

RAILROAD COMMISSION OF TEXAS
Oil and Gas Division

1. Operator's Name (As shown on Form P-5, Organization Report)	2. RRC Operator No.	3. RRC District No.	4. County of Well Site
Hoechst Celanese Chemical Group, Ltd.	N/A	----	Matagorda

5. Field Name (Wildcat or exactly as shown on RRC records)	6. API No.	7. Drilling Permit No.
N/A	42- N/A	N/A

8. Lease Name	9. Rule 37 Case No.	10. Oil Lease/Gas ID No.	11. Well No.
WDW-14	N/A	N/A	2

CASING CEMENTING DATA:	SURFACE CASING	INTER-MEDIATE CASING	PRODUCTION CASING		MULTI-STAGE CEMENTING PROCESS	
			Single String	Multiple Parallel Strings	Tool	Shoe
12. Cementing Date	N/A	N/A	N/A	N/A	N/A	N/A
13. •Drilled hole size						
•Est. % wash or hole enlargement	(SEE OTHER SIDE)					
14. Size of casing (in. O.D.)						
15. Top of liner (ft.)						
16. Setting depth (ft.)						
17. Number of centralizers used						
18. Hrs. waiting on cement before drill-out						
1st Slurry — 19. API cement used: No. of sacks ▶						
1st Slurry — Class ▶						
1st Slurry — Additives ▶						
2nd Slurry — No. of sacks ▶						
2nd Slurry — Class ▶						
2nd Slurry — Additives ▶						
3rd Slurry — No. of sacks ▶						
3rd Slurry — Class ▶						
3rd Slurry — Additives ▶						
1st — 20. Slurry pumped: Volume (cu. ft.) ▶						
1st — Height (ft.) ▶						
2nd — Volume (cu. ft.) ▶						
2nd — Height (ft.) ▶						
3rd — Volume (cu. ft.) ▶						
3rd — Height (ft.) ▶						
Total — Volume (cu. ft.) ▶						
Total — Height (ft.) ▶						
21. Was cement circulated to ground surface (or bottom of cellar) outside casing?						

22. Remarks

ECO SOLUTIONS INC.
CELANESE DISPOSAL WELL #2
MATAGORDA COUNTY, TX.
TK# 883798

OVER ▶

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W-3
Rev. 10/78

API NO. (if available) ---

1. RRC District: N/A

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id. Number: WDW-14

2. FIELD NAME (as per RRC Records): N/A

3. Lease Name: Class I Injection well

5. Well Number: 2

6. OPERATOR: Hoechst Celanese Chemical Group, Ltd.

6a. Original Form W-1 Filed in Name of: N/A

10. County: Matagorda

7. ADDRESS: P.O.Box 509, Bay City, TX 77414-0509

6b. Any Subsequent W-1's Filed in Name of: N/A

11. Date Drilling Permit Issued: N/A

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is Located: 5230 Feet From North Line and 2220 Feet From West Line of the Company property Lease

12. Permit Number: N/A

9a. SECTION, BLOCK, AND SURVEY: James Moore League, abstract 62

9b. Distance and Direction From Nearest Town in this County: 10 miles - SW of Bay City, Tx

13. Date Drilling Commenced: ---

16. Type Well (Oil, Gas, Dry): N/A

Total Depth: 3780

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No.'s: N/A

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #
---	---	---

14. Date Drilling Completed: ---

18. If Gas, Amt. of Cond. on Hand at time of Plugging: N/A

15. Date Well Plugged: 3/13/96

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date		3-11-96						
20. Size of Hole or Pipe in which Plug Placed (inches)		15"						
21. Depth to Bottom of Tubing or Drill Pipe (ft.)		3100'						
*22. Sacks of Cement Used (each plug)		280						
*23. Slurry Volume Pumped (cu. ft.)		305						
*24. Calculated Top of Plug (ft.)		2478						
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.		16.2						
*27. Type Cement		H neat						

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)
13 3/8	---	1338	1338	17
9 5/8	40	3750	3750	12 1/4
5 1/2	20	3162	0	---

29. Was any Non-Drillable Material (Other then Casing) Left in This Well: [X] Yes [ ] No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non-drillable material. (Use Reverse Side of Form if more space is needed.)

A cement retainer set at 3140'

30. LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS

FROM	3354	TO	3414 (4 SPF)	FROM	TO
FROM	3450	TO	3520 (5 SPF)	FROM	TO
FROM	3520	TO	3550 (12 SPF)	FROM	TO
FROM		TO		FROM	TO
FROM		TO		FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.

* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SERVICS

Name of Cementing Company

CERTIFICATE:

I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

REPRESENTATIVE OF COMPANY | TITLE | DATE | Phone A/C NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISSION

Cementer: Fill in shaded areas.
Operator: Fill in other items.

Form W-15
Cementing Report
Rev. 4/1/83
483-045

RAILROAD COMMISSION OF TEXAS
Oil and Gas Division

1. Operator's Name (As shown on Form P-5, Organization Report)	2. RRC Operator No.	3. RRC District No.	4. County of Well Site
Hoechst Celanese Chemical Group, Ltd.	N/A	-----	Matagorda

5. Field Name (Wildcat or exactly as shown on RRC records)	6. API No.	7. Drilling Permit No.
N/A	42- N/A	N/A

8. Lease Name	9. Rule 37 Case No.	10. Oil Lease/Gas ID No.	11. Well No.
WDW-14	N/A	N/A	2

CASING CEMENTING DATA:	SURFACE CASING	INTER-MEDIATE CASING	PRODUCTION CASING		MULTI-STAGE CEMENTING PROCESS	
			Single String	Multiple Parallel Strings	Tool	Shoe
12. Cementing Date	N/A	N/A	N/A	N/A	N/A	N/A
13. •Drilled hole size						
•Est. % wash or hole enlargement	(SEE OTHER SIDE)					
14. Size of casing (in. O.D.)						
15. Top of liner (ft.)						
16. Setting depth (ft.)						
17. Number of centralizers used						
18. Hrs. waiting on cement before drill-out						
1st Slurry — 19. API cement used: No. of sacks ▶						
1st Slurry — Class ▶						
1st Slurry — Additives ▶						
2nd Slurry — No. of sacks ▶						
2nd Slurry — Class ▶						
2nd Slurry — Additives ▶						
3rd Slurry — No. of sacks ▶						
3rd Slurry — Class ▶						
3rd Slurry — Additives ▶						
1st — 20. Slurry pumped: Volume (cu. ft.) ▶						
1st — Height (ft.) ▶						
2nd — Volume (cu. ft.) ▶						
2nd — Height (ft.) ▶						
3rd — Volume (cu. ft.) ▶						
3rd — Height (ft.) ▶						
Total — Volume (cu. ft.) ▶						
Total — Height (ft.) ▶						
21. Was cement circulated to ground surface (or bottom of cellar) outside casing?						

22. Remarks

ECO SOLUTIONS INC
CELANESE DISPOSAL WELL WDW 24
MATAGORDA COUNTY, TX.
TK# 883799

OVER ▶

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W-3
Rev. 10/78

API NO. (if available) ---

1. RRC District: N/A

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id. Number: WDW-14

2. FIELD NAME (as per RRC Records): N/A

3. Lease Name: Class I Injection well

5. Well Number: 2

6. OPERATOR: Hoechst Celanese Chemical Group, Ltd.

6a. Original Form W-1 Filed in Name of: N/A

10. County: Matagorda

7. ADDRESS: P.O.Box 509 Bay City, TX 77414-0509

6b. Any Subsequent W-1's Filed in Name of: N/A

11. Date Drilling Permit Issued: N/A

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is Located: 5230 Feet From North Line and 2220 Feet From West Line of the Company Property ~~Lease~~

12. Permit Number: N/A

9a. SECTION, BLOCK, AND SURVEY: James Moore League, abstract 62

9b. Distance and Direction From Nearest Town in this County: 10 miles - SW Bay City, TX

13. Date Drilling Commenced: ---

16. Type Well (Oil, Gas, Dry): N/A

Total Depth: 3780

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No.'s: N/A

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #
---	---	---

14. Date Drilling Completed: ---

18. If Gas, Amt. of Cond. on Hand at time of Plugging: N/A

15. Date Well Plugged: 3/13/96

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date			3-12	3-13-96				
20. Size of Hole or Pipe in which Plug Placed (inches)			9 5/8	9 5/8				
21. Depth to Bottom of Tubing or Drill Pipe (ft.)			2425	1520				
*22. Sacks of Cement Used (each plug)			390	575				
*23. Slurry Volume Pumped (cu. ft.)			425	626				
*24. Calculated Top of Plug (ft.)			1325	1525				
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.			16.2#	16.2#				
*27. Type Cement			H	.25%CFR-3				

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)
13 3/8	---	1338	1338	17
9 5/8	40	3750	3750	12 1/4
5 1/2	20	3162	0	---

29. Was any Non-Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non-drillable material. (Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS

FROM 3354	TO 3414 (4 SPF)	FROM	TO
FROM 3450	TO 3520 (5 SPF)	FROM	TO
FROM 3520	TO 3550 (12 SPF)	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.
* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SERVICES
Name of Cementing Company

CERTIFICATE:
I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

REPRESENTATIVE OF COMPANY | TITLE | DATE | Phone A/C NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISSION

Cementer: Fill in shaded areas.
Operator: Fill in other items.

Form W-15
Cementing Report
Rev. 4/1/83
483-045

RAILROAD COMMISSION OF TEXAS
Oil and Gas Division

1. Operator's Name (As shown on Form P-5, Organization Report)	2. RRC Operator No.	3. RRC District No.	4. County of Well Site
Hoechst Celanese Chemical Group, Ltd.	N/A	-----	Matagorda

5. Field Name (Wildcat or exactly as shown on RRC records)	6. API No.	7. Drilling Permit No.
N/A	42- N/A	N/A

8. Lease Name	9. Rule 37 Case No.	10. Oil Lease/Gas ID No.	11. Well No.
WDW-14	N/A	N/A	2

CASING CEMENTING DATA:	SURFACE CASING	INTER-MEDIATE CASING	PRODUCTION CASING		MULTI-STAGE CEMENTING PROCESS	
			Single String	Multiple Parallel Strings	Tool	Shoe
12. Cementing Date	N/A	N/A	N/A	N/A	N/A	N/A
13. •Drilled hole size						
•Est. % wash or hole enlargement	(SEE OTHER SIDE)					
14. Size of casing (in. O.D.)						
15. Top of liner (ft.)						
16. Setting depth (ft.)						
17. Number of centralizers used						
18. Hrs. waiting on cement before drill-out						
1st Slurry — 19. API cement used: No. of sacks ▶						
1st Slurry — Class ▶						
1st Slurry — Additives ▶						
2nd Slurry — No. of sacks ▶						
2nd Slurry — Class ▶						
2nd Slurry — Additives ▶						
3rd Slurry — No. of sacks ▶						
3rd Slurry — Class ▶						
3rd Slurry — Additives ▶						
1st — 20. Slurry pumped: Volume (cu. ft.) ▶						
1st — Height (ft.) ▶						
2nd — Volume (cu. ft.) ▶						
2nd — Height (ft.) ▶						
3rd — Volume (cu. ft.) ▶						
3rd — Height (ft.) ▶						
Total — Volume (cu. ft.) ▶						
Total — Height (ft.) ▶						
21. Was cement circulated to ground surface (or bottom of cellar) outside casing?						

22. Remarks

ECO SOLUTIONS INC
CELANESE DISPOSAL WELL WDW # 14
MATAGORDA COUNTY, TX.
TK# 883800

OVER ▶

APPENDIX F

CORRESPONDENCE

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

January 8, 1996

I. O. Coleman, Jr.
Hoechst Celanese, Chemical Group
Bay City Plant
P. O. Box 509
Highway 3057
Bay City, TX 77404-0509

RE: Approval of Closure Plans, TNRCC Permits No. WDW-14, 32, 49, and 110, Bay City, Texas.

Dear Mr. Coleman, Jr.:

The staff has reviewed your proposed closure plans of the above referenced wells and finds that it meets the requirements outlined in 30 TAC §331.46 (Closure Standards). Please submit the Closure Report as required by §331.46(m) within 30 days of completion of closure. Please also provide evidence of the deed recording as required by §331.46(l) prior to a request of revocation of the permit.

In a meeting with I.O. Coleman, Hoechst-Celanese and Thomas Jones, ECO Solutions on November 14, 1995, it was indicated that WDW-14 had not been operated since the last MIT (2-21-94) and staff agreed that would suffice as final MIT testing prior to closure.

It is also requested that we be kept up-dated on the exact date of closure operations so that a staff member may schedule to be present. If wells WDW-32, 49, or 110 have been in operation since the last MIT or if an extended period of time has elapsed since the last MIT, at the time of closure, a review by staff to ascertain the MIT requirements prior to closing will be necessary.

If you have any questions, please contact Jim Boswell at 512/239-6196, Mail Code MC-131.

Sincerely,

Jim L. Boswell, Permit Coordinator
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
Industrial & Hazardous Waste Division

JLB/jlb/jm

cc: Brian Graves, EPA Region 6
Tom Jones, Eco Solutions, Inc.

December 5, 1995
IOC - ___ 95

CERTIFIED MAIL

Mr. Ben K. Knape - Head
UIC Team
UIC, Uranium and Radioactive Waste Section
Industrial and Hazardous Waste Division
Texas Natural Resource Conservation Commission
Post Office Box 13087
Austin, Texas 78711-3087

Subject: WDW-14, WDW-32, WDW-49 and WDW-110
PROPOSED CLOSURE PROCEDURES
HOECHST CELANESE CHEMICAL GROUP, INC.
BAY CITY PLANT, BAY CITY, TEXAS

Dear Mr. Knape:

Enclosed herewith are the proposed Closure Procedures to plug and abandon WDW-14 (Well No. 2), WDW-32 (Well No. 3), WDW-49 (Well No. 4) and WDW-110 (Well No. 1-A) which are provided for agency review and approval. WDW-14 is scheduled to commence closure during the first quarter, 1996. The closure schedules for WDW-32, WDW-49 and WDW-110 will be submitted to the Texas Natural Resource Conservation Commission as soon as they are finalized.

We hope that the presentation at your Austin office on November 14, 1995, will help advance the review process. We would appreciate your consideration, review and approval of the above requests.

Please do not hesitate to contact me at our Bay City Plant at (409)241-4197 or Mr. H. R. Horton at (409)241-4076 if you have any questions concerning this matter.

Very truly yours,

I. O. Coleman, Jr.
Staff Environmental Chemist

IOC/cjs
attachment

SOLUTIONS, INC.

Hoechst Celanese Chemical Group, Inc.
Bay City Plant, Texas

Closure Plan For Class I Injection Wells
WDW-14, WDW-32, WDW-49 & WDW-110

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, Texas 77042
(713) 780-1955
FAX (713) 780-0870

CLOSURE PLAN

SUMMARY

The following class I injection well closure plan was prepared for Hoechst Celanese Chemical Group's (HCCG's) facility located at Bay City, Texas. The proposed closure plan incorporates procedures to maximize the long term protection of the environment and significantly exceeds the minimum closure standards set by the TNRCC. These procedures include secondary cementing of the protection casing to insure zonal isolation of the injected waste and formation waters from USDWs.

Similar procedures are proposed for wells WDW-14, WDW-32, WDW-49 and WDW-110. Well schematics are included to illustrate the proposed plugging procedures. The schematics indicate section milling above the injection packers and perforating/squeeze cementing at the base of the surface casing(s).

A high compressive strength cement slurry is placed in the annular area in selected intervals *behind* the protection casing. These areas are 1) the area above the injection interval or packer and 2) the area immediately beneath the surface casing.

There are two (2) common techniques of placing cement in these areas:

a) *Squeeze perforations* - "shoot" holes in the protection casing at specified depths and then force high compressive strength cement through the perforations into the annular space, i.e. "squeeze cementing technique".

b) *Section milling/underreaming* - physically remove a portion of the protection casing in key sections in the wellbore using a downhole mill. The cement behind the milled section is then underreamed out to the formation face. Finally, a column of high compressive strength cement is placed in the underreamed portion of the wellbore. The net result is a +/-50' continuous "block" of solid, high compressive strength cement is left where the protection casing had been.

The inside of the protection casing is then filled back to the surface with high compressive strength cement. Proper sequencing of this portion of the closure plan depends upon the technique implemented.

Closure on WDW-14 is scheduled to be completed by the end of the first quarter, 1996. The closure schedules of WDW-32, WDW-49 and WDW-110 will be submitted to the TNRCC as soon as they are finalized.

WELL CLOSURE PROCEDURES

SEQUENTIAL PROCEDURES

1) Submit closure plan to TNRCC for approval. Meet with the TNRCC if there are any questions or comments.

2) Prepare well location for field operations. Line and dike surface area surrounding wellsite- specifically in the area where the workover rig, pumps, tanks and pipe racks will rig up.

3) Move in and rig up workover rig and peripheral equipment.

4) Rig up slick line unit and go in hole with pressure recording memory tool. Set tool immediately above packer and measure stabilized bottom hole pressure.

5) Triple rinse injection string and flush annular area with 9.8 ppg brine.

6) Pull out of the hole laying down injection string and TIW seal assembly on pipe racks. HCCG personnel will remove injection string and TIW seal assembly from wellsite.

7) Pick up casing scraper and 2+7/8" drill pipe work string. Go in hole with casing scraper to the top of the injection packer. Pull out of the hole with same.

8) Move in and rig up wireline unit to set cement retainer. Pick up junk basket and gauge ring and go in the hole to the top of the injection packer. Pull out of the hole with the junk basket and gauge ring. Go in the hole with wireline cast iron cement retainer and set same at approximately 10' above the top of the injection packer. Pull out of the hole and rig down wireline unit.

9) Pick-up cement retainer shifting assembly with work string and go in the hole with same. Engage cement retainer with shifting assembly and test annulus to 500 psi to confirm that the cement retainer is properly set.

10) Rig up Halliburton, or equivalent service company, to squeeze cement (permanently abandon) the injection zone. Pumping through retainer fill injection interval with high compressive strength cement slurry. Close cement retainer and disengage from same. Leave a 50' column of cement above cement retainer and pull out of the hole with shifting assembly.

11) Pick up section mill and drill collars on work string and go in the hole with same. Mill out approximately 50' section above the top of the cement column. Pull out of the hole and remove section mill.

12. Pick up underreamer and drill collars and go in the hole with same. Underream sectioned interval out to approximately 14" diameter borehole. Pull out of the hole with underreamer.

13. Go in the hole open-ended to set cement plug #2. The plug will extend up across the sectioned interval and an additional 300' - 400' above the section. Rig up Halliburton, or equivalent, and set balanced cement plug with high compressive strength cement. Pull out of the hole and wait on cement plug #2 to cure (approximately 12 hours).

14. Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of the column of cement. "Dress off" top of plug #2 to confirm cement has had sufficient time to properly cure.

15. Rig up Halliburton, or equivalent, and set cement plug #3 with high compressive strength cement. Set balanced cement plug. Cement column to extend from the previous plug up to approximately 200' beneath the base of surface casing. Pull out of the hole and wait on cement plug #3 to cure (approximately 12 hours).

16. Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #3 to confirm that cement has had sufficient time to properly cure. Pull out of the hole.

17. Move in and rig up wireline truck to perforate for squeeze job at the base of the surface casing. Perforate the protection casing 2' at 4 shots per foot (8 shots) approximately 10' beneath the surface casing seat. Pull out of the hole and rig down wireline unit.

18. Rig up Halliburton, or equivalent, and set cement plug #4 with high compressive strength cement. Set balanced cement plug. Cement column will extend from the top of plug #3 back to the surface. Pull out of the hole. Apply pressure to cement column to squeeze cement out through the perforations. Wait on cement plug #4 to cure (approximately 12 hours).

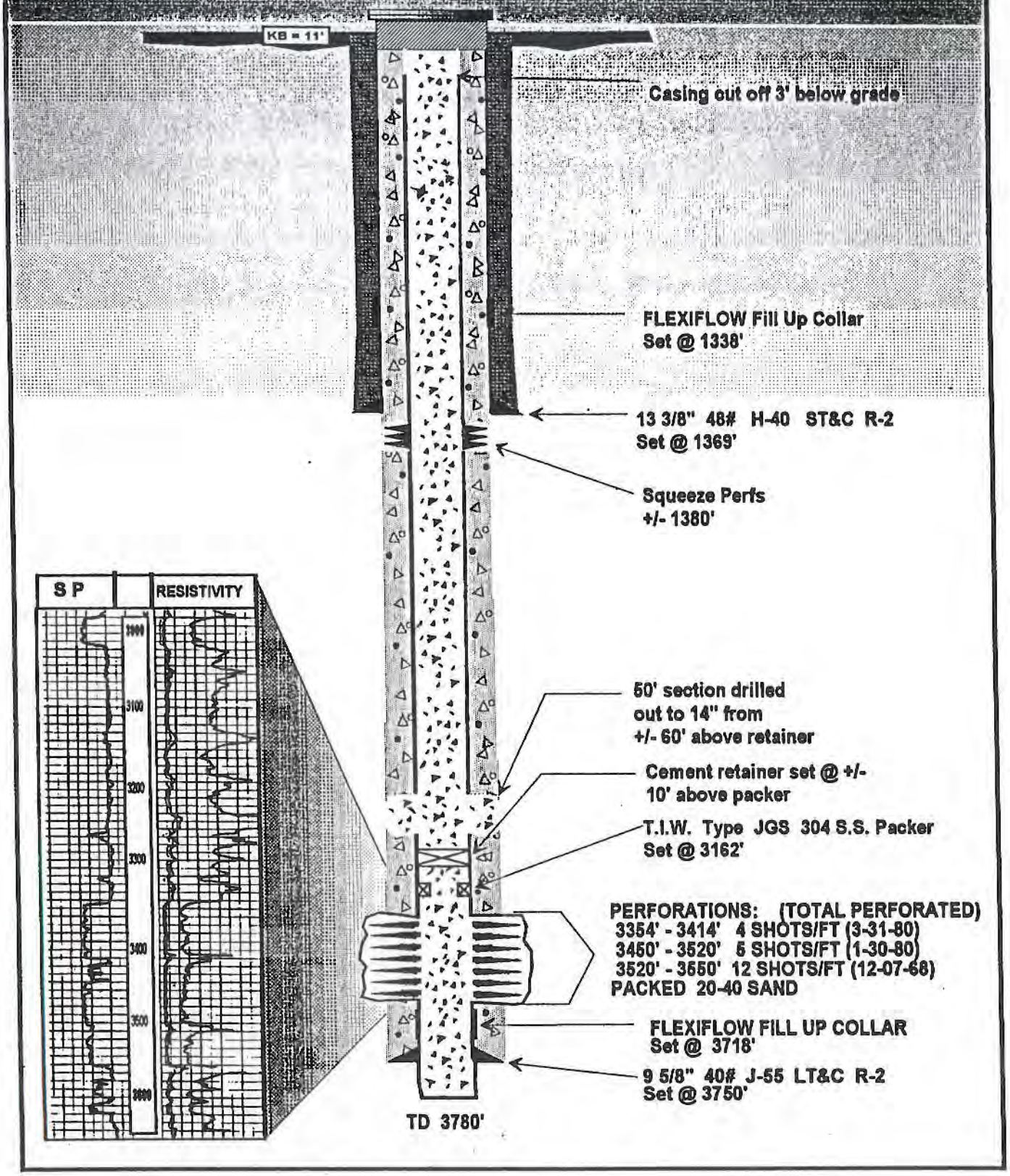
19. Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #4 to confirm that cement has had sufficient time to properly cure. Fill balance of protection casing with high compressive strength cement as required. Pull out of the hole. Wash out blowout preventors.

20. Rig down and release workover rig. Cut off casings 3' below grade and weld 1/2" steel plate over all casing strings. Inscribe plate with well identification and other pertinent data as required.

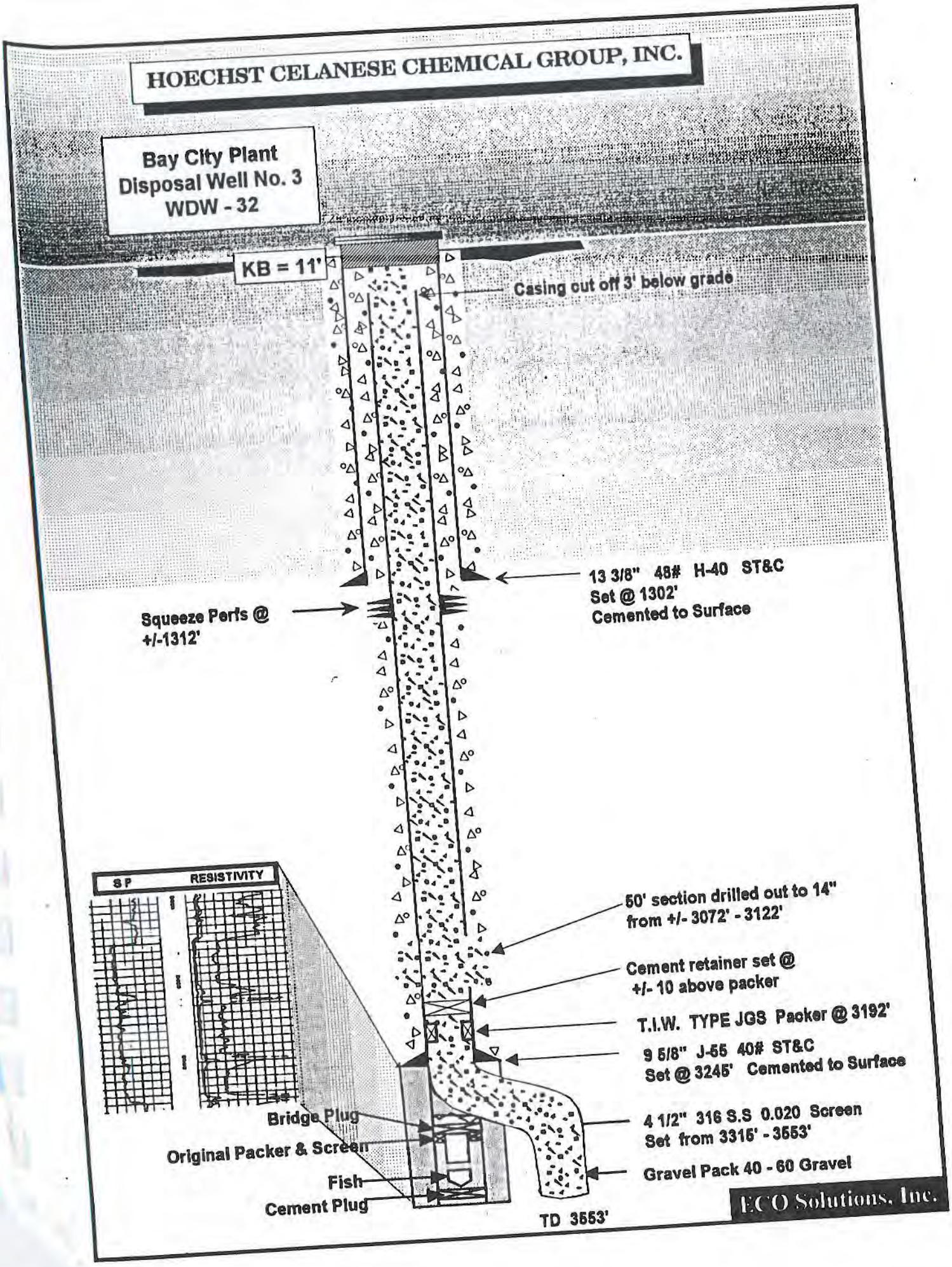
21. Prepare summary report for submittal to TNRCC and USEPA Region 6. *Project Complete.*

HOECHST CELANESE CHEMICAL GROUP, INC.

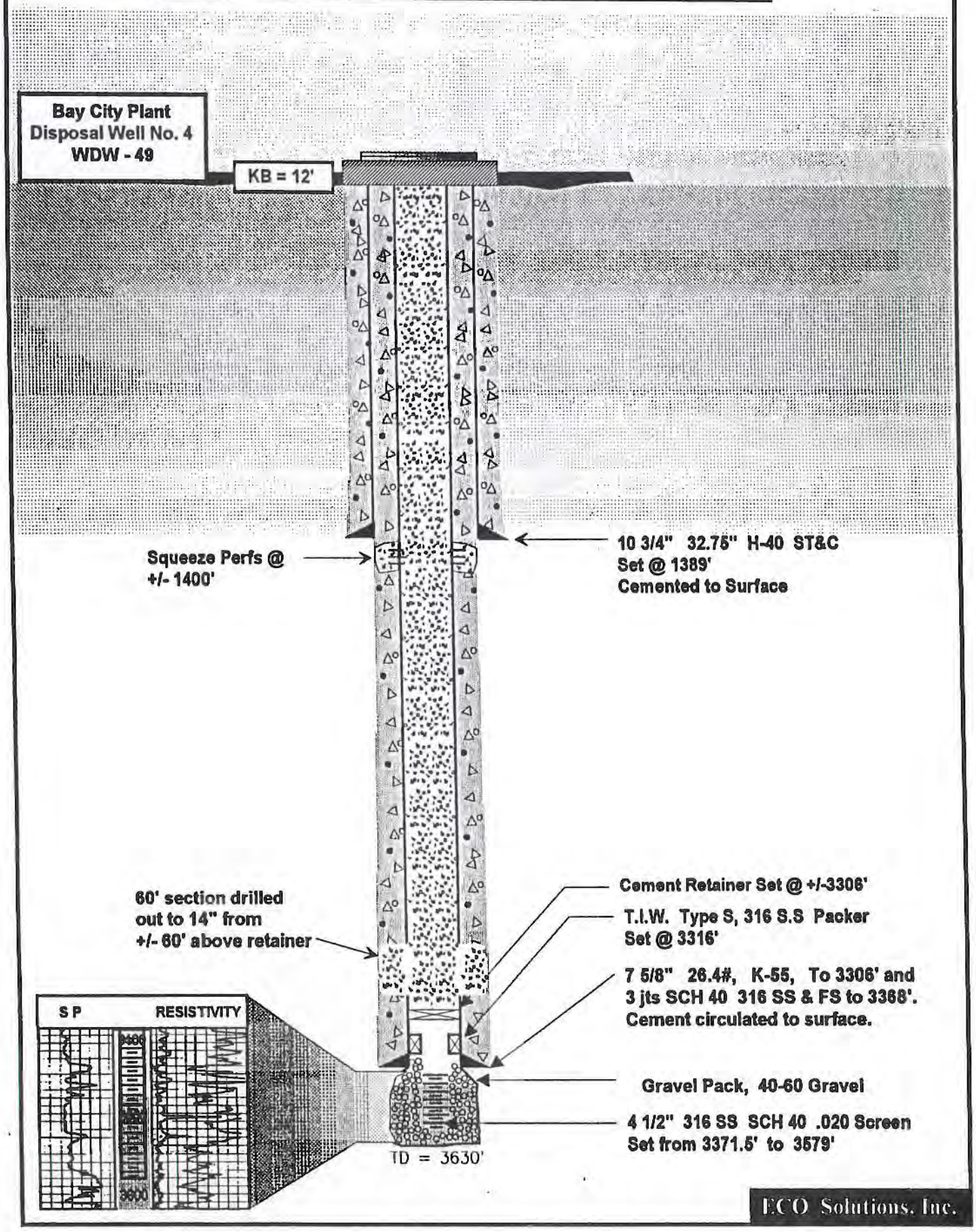
Bay City Plant
Disposal Well No. 2
WDW - 14



HOECHST CELANESE CHEMICAL GROUP, INC.

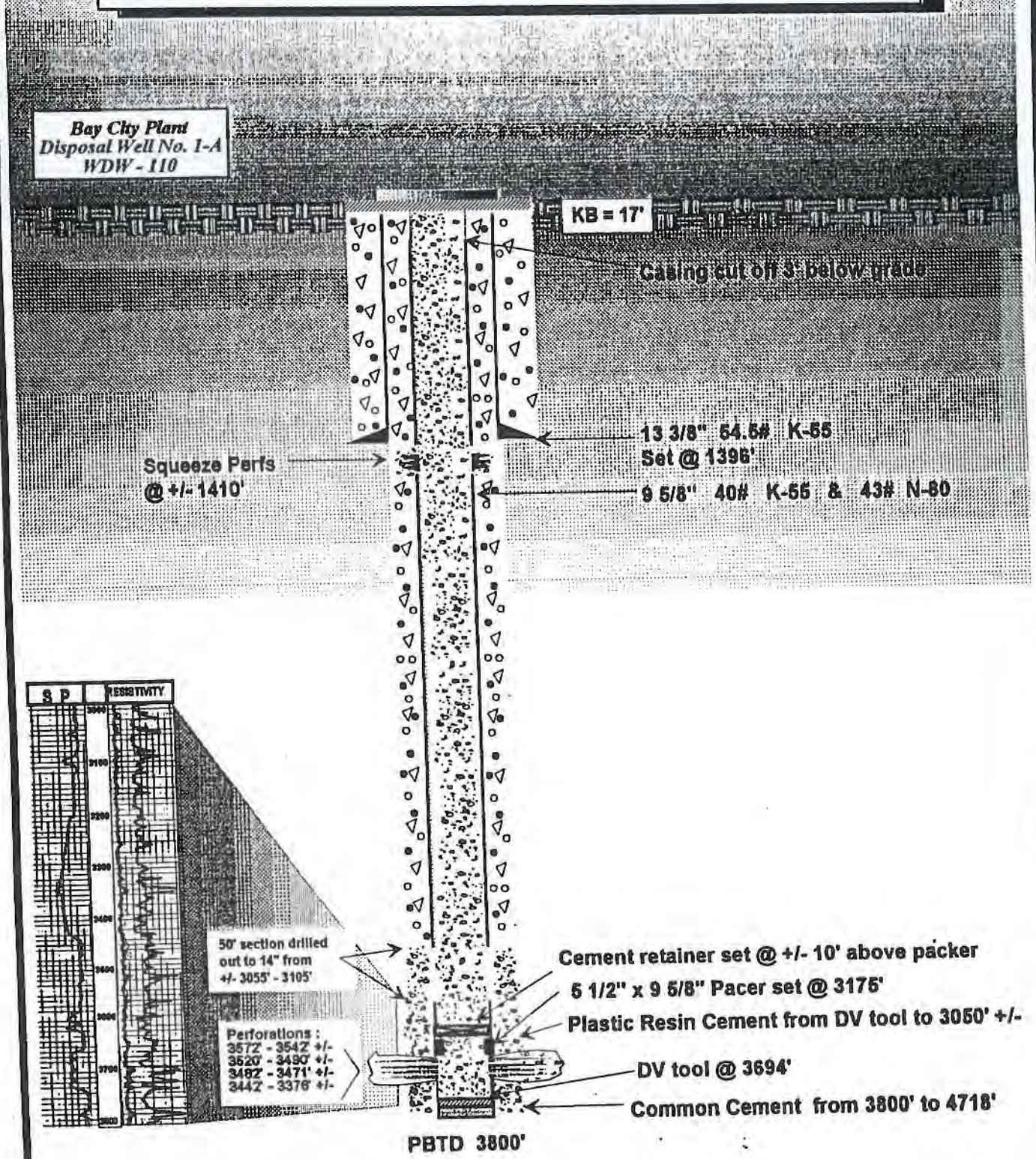


HOECHST CELANESE CHEMICAL GROUP, INC.



ECO Solutions, Inc.

HOECHST CELANESE CHEMICAL GROUP, INC.

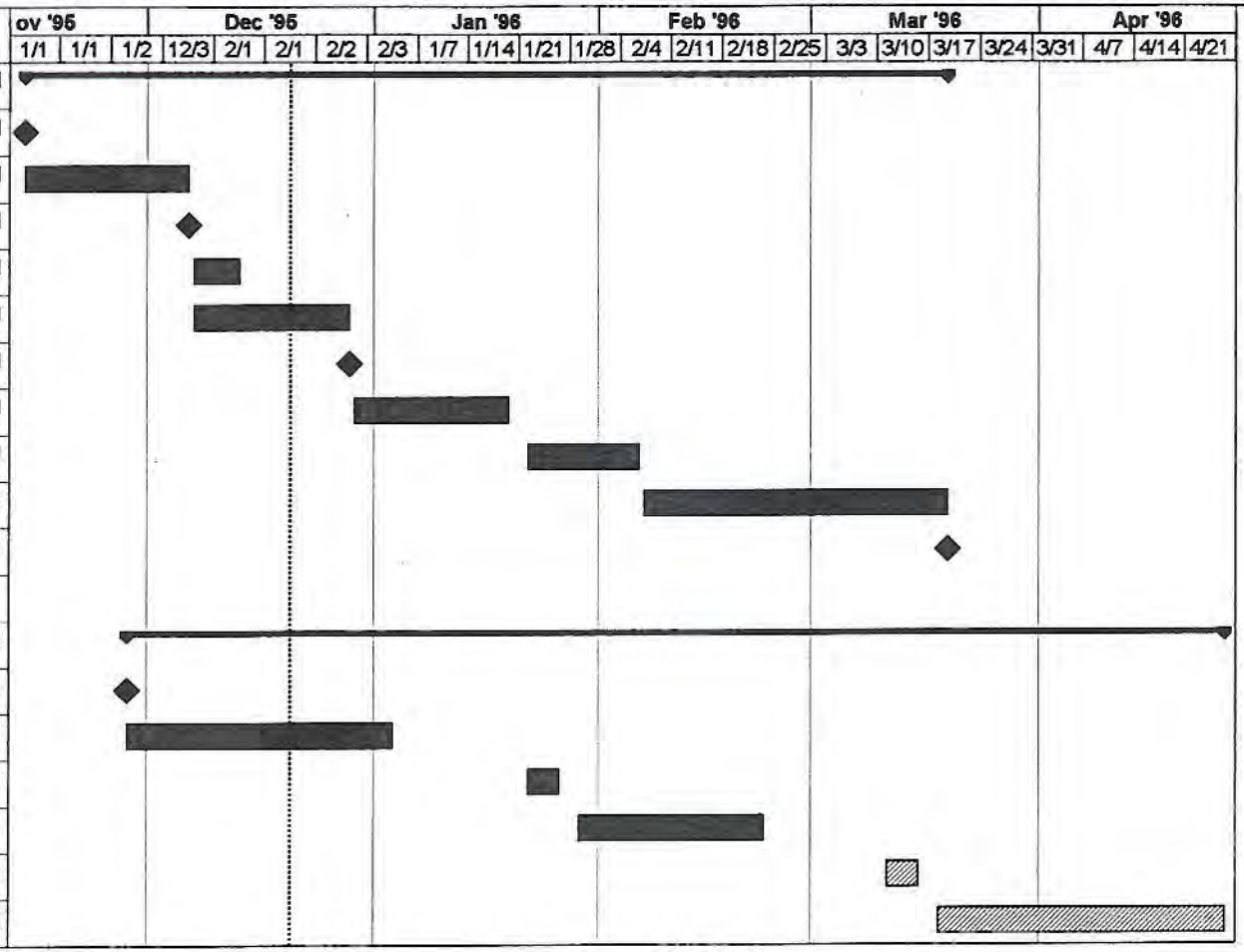


ECO Solutions, Inc.

DESIGNER / DB / PA-110A4 / 10-05-95

HOECHST CELANESE CHEMICAL GROUP - BAY CITY PLANT
SCHEDULE FOR WORK ACTIVITIES ASSOCIATED WITH WDW-14 CLOSURE
AND MECHANICAL INTEGRITY TESTING ON WDW-110 AND WDW-49

NO.	Name	Duration
1	CLOSURE OPERATIONS WDW-14	87d
2	Meeting with TNRCC On Closure Plan	0d
3	Finalize Closure Plan per TNRCC Comments	15d
4	Submmit Final Closure Plan & Schedule	0d
5	Solicit Vendor Quotes	5d
6	Obtain Vendor Quotes - Prepare Bid Tabs	15d
7	Obtain TNRCC Approval On Closure Plan	0d
8	Final Preparations For Field Operations	15d
9	Field Operations To Close WDW-14	12d
10	Prepare Final Closure Report	30d
11	Submit Final Closure Report To TNRCC	0d
12		
13	MIT ACTIVITIES WDW-110 & WDW-49	107d
14	Sumbit Procedures To TNRCC	0d
15	TNRCC Review & Approval	25d
16	Field Operations MIT WDW-110	5d
17	Prepare MIT Report	20d
18	Field Operations MIT WDW-49	5d
19	Prepare MIT Report	30d



ECO SOLUTIONS, INC.

Critical — Normal — Summary
Noncritical — Milestone

SOLUTIONS, INC.

Final Report

Hoechst Celanese Chemical Group, Ltd.
Bay City, Texas
Closure Report
Injection Well WDW-32 (Well No. 3)

ECO Job 96015

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, Texas 77042
(713) 780-1955
FAX (713) 780-0870

RECEIVED
NOV 22 1996
6 WQSD

HOECHST CELANESE CHEMICAL GROUP, LTD.
BAY CITY TEXAS PLANT

CLOSURE OF CLASS I INJECTION WELL
WDW-32 (WELL #3)

RECEIVED
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6 VI-SU

SOLUTIONS, INC.

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SATURDAY 9/21/96 7
SUNDAY 9/22/96 7
MONDAY 9/23/96 7
TUESDAY 9/24/96 7
WEDNESDAY 9/25/96 8
THURSDAY 9/26/96 8
FRIDAY 9/27/96 8
SATURDAY 9/28/96 9
SUNDAY 9/29/96 9
MONDAY 9/30/96 9
TUESDAY 10/1/96 9
WEDNESDAY 10/2/96 10

APPENDIX A - CONSENT TO REVOCATION OF TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

APPENDIX B - CEMENTING INFORMATION

APPENDIX C - CORRESPONDENCE

APPENDIX D - COPY OF FINAL MECHANICAL INTEGRITY TEST REPORT

NOV 22 1996

PLUG AND ABANDON CERTIFICATION

The undersigned has reviewed all pertinent information concerning the plugging and abandonment of the Hoechst Celanese Chemical Group, Ltd. (HCCG) Class I injection well WDW-32 (Well #3) with regards to the plans and specifications set forth in Texas Natural Resource Conservation Commission (TNRCC), Underground Injection Control (UIC) Program and the current Federal and TNRCC requirements for the plugging and abandonment of a Class I injection well located in the State of Texas.

In accordance with TNRCC/UIC Program, 31 TAC 331.46 and the closure standards of HCCG's UIC Permit, I certify that WDW-32 (Well #3) was plugged and abandoned in compliance with the permit and applicable TNRCC regulations in effect at the time of closure

This certification is not valid unless the engineer's original signature and raised seal are present.

11/15/96
DATE

(SEAL)

Wesley W. Smith, P.E.
Texas Professional Engineer
No. 29398

1.0 INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

Hoechst Celanese Chemical Group, Ltd. (HCCG) contracted with ECO Solutions, Inc. (ECO) to perform the plugging and abandonment (P&A) of their Class I injection well, WDW-32 (Well No. 3), located at their Bay City plant. A schematic drawing of WDW-32 prior to and following P&A operations are included as Figure 1 and Figure 2, respectively. The attached report details the field activities and data associated with project.

The following provides an overview of the key elements of the P&A on WDW-32 (Well No. 3).

- Hoechst Celanese submitted and received approval for a closure plan as required by the Texas Natural Resource Conservation Commission (TNRCC), Underground Injection Control (UIC) Program, and the regulations contained within 31 TAC 331.46.

- A 50' section of the 9-5/8" long string casing string above the injection interval was removed by milling and underreamed out to a 15" radial diameter. Subsequent cementing operations re-established a secure cement plug between the 9 5/8" casing confining shales.

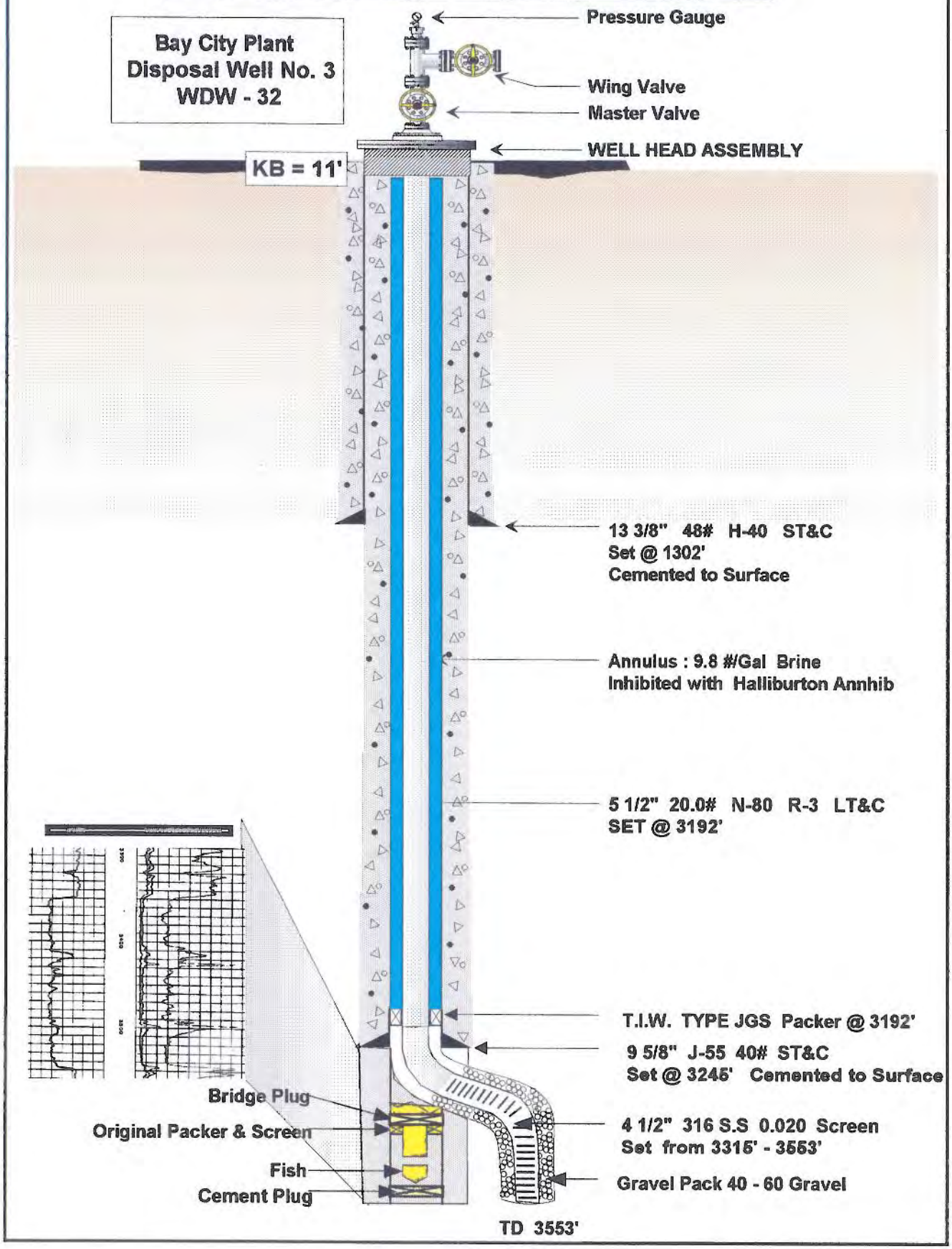
- Squeeze cementing was accomplished through a perforated section of 9+5/8" casing below 13+3/8" surface casing shoe depth. This action improved the cement seal below the lowermost underground source of drinking water (USDW).

- Pertinent P & A data was placed on welded steel plate installed at the surface.

- Contained within the closure report is an executed copy of the Consent To Revocation Of Texas Natural Resource Conservation Commission Permit WDW- 32 form and a copy of the recorded deed was submitted to the TNRCC under a separate cover.

HCCG and/or ECO personnel contacted the TNRCC Austin office prior to commencing and during field operations to allow TNRCC personnel to witness cementing events during the P&A field operations.

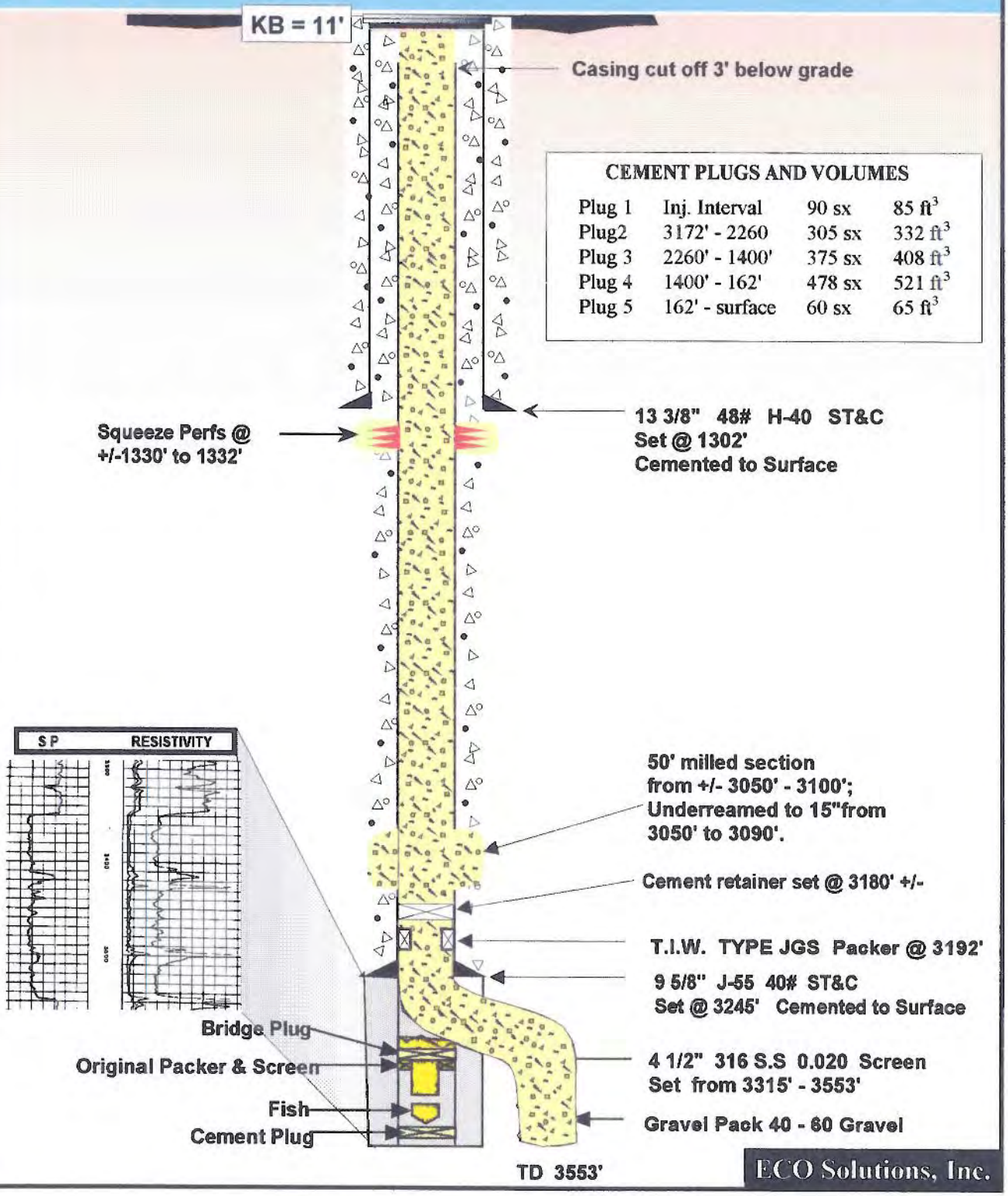
FIGURE 1
HOECHST CELANESE CHEMICAL GROUP, LTD.



HOECHST CELANESE CHEMICAL GROUP, LTD.

Bay City Plant
Disposal Well No. 3
WDW - 32

FIGURE 2



CEMENT PLUGS AND VOLUMES

Plug 1	Inj. Interval	90 sx	85 ft^3
Plug2	3172' - 2260	305 sx	332 ft^3
Plug 3	2260' - 1400'	375 sx	408 ft^3
Plug 4	1400' - 162'	478 sx	521 ft^3
Plug 5	162' - surface	60 sx	65 ft^3

ECO Solutions, Inc.

1.2 SUMMARY OF CLOSURE ACTIVITIES

Dawson workover rig no. 356 was rigged up on WDW-32 (Well #3) to perform the milling and underreaming operations on the 9+5/8" 0. D. casing string. A Halliburton wireline set "EZ-SV" cement retainer was set at 3180' ± . Cement plug No. 1 consisting of 90 sacks (85 ft^3) of Halliburton premium cement was placed into the injection interval and 10' above the cement retainer. The 9+5/8" casing was milled from 3050' to 3100' in the confinement interval and then the cement and formation was underreamed from 3050' to 3090' to a radial diameter of 15". Cement plug No 2 consisting of 305 sacks (332 ft^3) of Halliburton premium cement was placed from 3172' to 2260'. Cement plug No. 3 consisting of 375 sacks (408 ft^3) of Halliburton premium cement was placed from 2260' to 1400'. The 9+5/8" O.D. long string casing was perforated from 1330' to 1332' with 4 shots per foot. Cement No. 4 consisting of 478 sacks(521 ft^3) of Halliburton premium cement was placed from 1400 to 162'. A final cement plug no. 5 consisting of 60 sacks (65 ft^3) was placed from 162' to the surface. A 1/2" thick stainless steel plate with pertinent data inscribed on top, was welded to 9+5/8" casing extending up to grade and surrounded by cement at the surface.

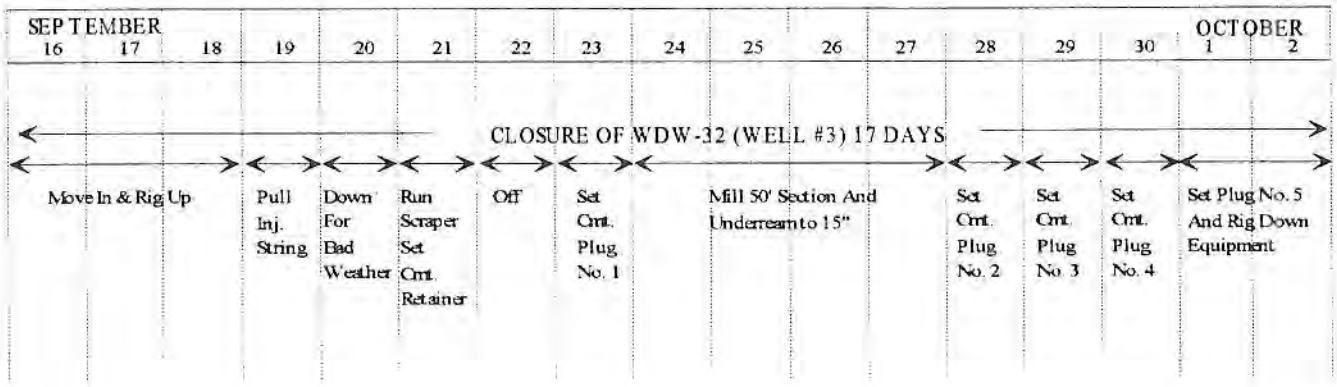
The plugging and abandonment of HCCG's WDW-32 field work was completed on October 2, 1996.

1.3 PROJECT TIMELINE

Figure 3 below is a project timeline that illustrates the key closure events versus the date. The field activities started on September 16, 1996 and ended on October 2, 1996. The total number of field days was 17.

Figure 3

CLOSURE OF WDW-32 (WELL #3) TIMELINE



2.0 SUMMARY OF FIELD ACTIVITIES

MONDAY 9/16/96

Start of field operations. Move in and rig up equipment for well closure. Conduct safety orientations for the service company personnel. The equipment included the open top mud tank and PZ-7 pump. After spotting the pump and tanks, the rig tank was filled with 200 bbls of brine. The Dawson rig arrived on location for move in tomorrow.

A meeting between ECO site personnel and Merrick Saucier, Bryan Barrington and Ray Horton with Hoechst Celanese was rescheduled to Tuesday.

TUESDAY 9/17/96

Continue to move in and rig up equipment for well closure. The equipment included the drilling rig, substructure, blow out preventors, rig pumps and other rental tools. Rig up Dawson rig and pump 200 bbls of brine into well to flush well and eliminate any back pressure. Remove existing Larkin well head and pick up on 5 1/2" tubing. The packer seal assembly was freed from the packer with no problems.

A meeting was held between ECO on site personnel and Merrick Saucier, Bryan Barrington and Ray Horton with Hoechst Celanese. The purpose of the meeting was to discuss project cost and ways to improve cost control out of scope changes and possible contingencies.

WEDNESDAY 9/18/96

Nipple up blow out preventors and Hydril stack. Install substructure to workover rig utilizing HCCG's Grove crane and cherry picker. Rig up and adjust rig control equipment to substructure. Set up pipe racks. Franks Casing Crew arrived on location and rigged up their tongs and lay down machine in preparation for removal of the injection string from WDW-32 (Well #3). Pull of the hole and lay down 5 ½ " injection string. The external condition of injection string was visually observed to be in excellent condition. Used Hoechst Celanese cherry pickers and riggers to move injection string to wash racks and move work string to well site. After the substructure was installed, measurements could then be taken for the flow line. A meeting was held with Halliburton to confirm the cementing specifications for the first cement plug.

THURSDAY 9/20/96

Finish reconfiguring rig controls to accommodate substructure. Complete modifications to bell nipple and install same on top of Hydril. Complete connections to mud circulating system. Finish picking up 3 1/2" drill pipe. Make up casing scraper and bottom hole assembly equipment. Go into the hole with several joints before shutting down for the night.

FRIDAY 9/20/96

A meeting was held with ECO and Hoechst Celanese project personnel and a decision was made to halt the field operations for this day due to severe weather. Thomas Jones contacted Mr. Jim Boswell with the TNRCC to update him on the delay. Mr. Boswell informed ECO that the TNRCC does not intend to be on location for the setting of the first cement plug. He would like to verify the setting of the next cement plug across the interval which has been milled and underreamed.

SATURDAY 9/21/96

Finish going into the hole with 3 1/2" drill pipe and scraper. Pull scraper from the well and remove from bottom hole assembly. Rig up wireline unit and make a run with the gauge ring and junk basket. Make up cement retainer and run into the hole using the wireline unit. Set the cement retainer approximately 10' above the packer was left in the hole.

SUNDAY 9/22/96

A decision was made by ECO, and approved by Hoechst Celanese to shut down the field activities for this day. The shut down was accomplished without incurring daily cost and allowed ECO to improve coordination for the upcoming section milling operations and the change to 24 hour per day operations.

MONDAY 9/23/96

Unload drilling mud from transports into tanks. Go into the hole with the 3 1/2" drill pipe with seal assembly to top of retainer. Displace brine in well with mud. Sting into the cement retainer and confirm that it is open to the injection interval. Pump brine pre-flush ahead of the cement. Cement the injection interval using 90 sx of Halliburton premium cement (plug no. 1). Maximum pressure during cementing is 500 psig. The drill string was picked up 60' and reversed out the brine with mud. The retainer was closed and approximately 10' of cement was left on top. Pull out of the hole with the 3 1/2" drill pipe. The TNRCC was notified prior to the cementing and they informed ECO that a representative would not be on location to verify the pumping of the first plug.

TUESDAY 9/24/96

Start 24 hour operations. Wes Smith arrive on location to work the night shift. Wait on cement. Unload drill collars, section milling and underreaming equipment. Rig up power swivel. Rig up power tongs. Pick up drill collars and section milling bottom hole assembly. The drilling mud

that arrived on location did not have proper viscosity and water loss properties. The viscosity of the mud was too low to provide sufficient cleaning capacity of the well bore during milling operations. *Note: A viscous mud is required to clean the hole of metal cuttings.* Elevating the mud viscosity was needed since the mud arrived at the location with the lower viscosity and high water loss condition. Approximately eight (8) hours of circulating time was needed to raise the mud viscosity and lower the water loss to the required levels. Go in hole with section mill, drill collars and drill pipe.

WEDNESDAY 9-25-96

Prepare to start milling 9-5/8" casing from 3050' to 3100'. Rig up power and swivel and break circulation. Unable to circulate through shale shaker. Changed out screen (60 mesh in place of 40 mesh) - circulation OK. Milling 3050' - 3059 ' with 2,000 - 5,000 lb. on mill and 100 RPM. *Note: The workover rig is secured to a beam and not tied down with anchors due to location restrictions.* Due to heavy bit weight and torque due to milling, rig is moving considerably. Lessen weight and milling continued slowly with no problems. Plan to set deadmen stakes to physically stabilize rig. Recommended to HCCG and they concurred to allow Dawson to install rig anchors. Replaced centrifugal pump drive belts on P2-7 pump. Milling 3059' to 3061' in 2 hours. Shut down due to damaged valve/seat assembly in large triplex pump (PZ-7). Attempted to pull section mill inside casing. Pull 50,000 lb. above string weight and unable to collapse cutters on mill. Made decision to 1) leave section mill in sectioned open hole and 2) put no. 2 pump no. 2 on hole to circulate drilling fluid around section mill while waiting on pump parts. Shut down waiting on new pump parts.

THURSDAY 9/26/96

Install pump parts. Milling 3061' to 3070' (4-1/2 hr.) using 5,000 lb. weight on mill and 85 RPM with 6 barrels per minute pump rate. Good metal cutting recovery. Mud: 10.3 pounds per gallon with a viscosity of 65 sec/qt. Milling operations continued from 3070' to 3100'.

FRIDAY 9/27/96

Finish removing section mill and bottom hole assembly from well. Remove mill and make up underreamer . Mill has been damaged due to efforts to close blades so that it could be removed. Go into the hole and start underreaming section from 3050' to 3100'. The underreaming will remove old cement from the well bore out to a diameter of 15". At approximately 3090' underreamer became stuck in the hole. *Note: The most likely cause is the presence of casing centralizers and/or wire scratchers placed on the casing during original installation.* The underreamer was freed after pulling 200,000 lb. above string weight. A decision was made not to underream the last 10' (3090' - 3100') due to the risk of becoming stuck again. Tom Jones

contacted Bryan Barrington and he agreed with this decision. Start out of the hole with the underreamer.

SATURDAY 9/28/96

Continue out of the hole with the underreamer. Kathryn Herzog with the TNRCC arrived on location to witness the upcoming cementing operations. Rig up Halliburton. Start in the hole with open ended drill pipe. Spot a balanced plug no. 2 using 305 sx (332 ft^3) premium cement across the milled interval up to a depth of 2260'. Pull out of the hole with the drill pipe and wait on cement.

End of 24 hour operations. Wes Smith returned to Houston.

SUNDAY 9/29/96

Go into the hole open ended and tag the top of the cement plug at 2260'. Rig up Halliburton and cement interval from 2260' to 1400' (plug no. 3). Volume of cement was 375 sk (408 ft^3) of premium neat. Pull drill string up hole to 1480' and reverse out. Pull out of hole and wait on cement. Rig down tongs, lay down drill collars. Wait on cement.

MONDAY 9/30/96

Go in hole with 8 3/4" bit and tag top of cement at 1380'. Reverse circulate mud out of hole and replace with brine. Pull out of the hole laying down drill pipe. Rig up Western Atlas and go into hole with 5" perforating gun. Perforate from 1330' - 1332' with 4 shots per foot. Pull out of the hole with the perforating gun. Rig up Halliburton and go into hole open ended. Cement 9 5/8" casing with 478 sacks (521 ft^3) of premium cement (plug no. 4). It appears that the perforations are taking and unknown quantity of cement. A decision was made to tag the top of cement in the morning and cement as required.

TUESDAY 10/1/96

Go in hole and tag top of cement at 162'. Pull out of the hole. Rig down substructure and pipe racks. Nipple down blow out preventers and Hydril. Go in hole open ended with drill pipe to 162'. Rig up Halliburton. Pick up on blow out preventers and hydril stack to prevent cement from entering this equipment. Fill remaining 9 5/8" casing with 65 ft^3 (60 sx) cement (plug no. 5). Rig down and release Halliburton. Start rigging down Dawson workover rig for move to WDW-49 (well #4). Remove anchors and reinstall at the WDW-49 (well #5) location. Begin moving other equipment to WDW-49 (well #4). Thomas Jones contacted Jim Boswell and Kathryn Herzog with the TNRCC to notify them about the end of operations on WDW-32 (well #3) and

the anticipated schedule for WDW-49 (well #4).

WEDNESDAY 10/2/96

Rig down substructure and move to WDW-49 (well #4) location. Rig down and move rig to other well location. Continue to rig down and clean up area around WDW-32 (well #3).

APPENDIX A

CONSENT TO REVOCATION OF TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

CONSENT TO REVOCATION OF

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

I, C.R. Pennington, Facility Manager, acting on behalf of
(Name & Title)
Hoechst Celanese Chemical Group, Ltd., do hereby consent to
(Name of Permittee)

the revocation of Texas Natural Resource Conservation Commission Permit No. WDW-32, pursuant to the provisions of 30 TAC Section 305.67 (b).

The activities regulated by the permit were:

( ) Never begun (Wastewater treatment facility was not constructed)

(X) Terminated on or about (Date) October 2, 1996 (Waste Disposal Well plugged and abandoned)

Facility dismantled ( ); Facility will be dismantled ( ); Facility will be sold and relocated ( ).

( ) Diverted to another permitted wastewater treatment system
Please identify the facility to which flow has been diverted _____ and the approximate date the diversion occurred _____.

I also certify that there are no materials remaining at the permitted site which endanger ground or surface water quality.

C.R. P

(Signature)

(409) 241-4000
(Telephone No.)

November 13, 1996
(Date)

APPENDIX B

CEMENTING INFORMATION

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W-3
Rev. 10/78

API NO. (if available)

1. RRC District

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or I.D. Number

2. FIELD NAME (as per RRC Records): Bay City

3. Lease Name: Celanese WDW-32

5. Well Number: 3

6. OPERATOR: ECO Solutions

6a. Original Form W-1 Filed in Name of:

10. County: Matagorda

7. ADDRESS

6b. Any Subsequent W-1's Filed in Name of:

11. Date Drilling Permit Issued

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is Located: Feet From Line and Feet From Line of the Lease

12. Permit Number

9a. SECTION, BLOCK, AND SURVEY

9b. Distance and Direction From Nearest Town in this County

13. Date Drilling Commenced

16. Type Well (Oil, Gas, Dry)

Total Depth

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No.'s

GAS ID or OIL LEASE #	Oil-O Gas-G	WELL #

14. Date Drilling Completed

18. If Gas, Amt. of Cond. on Hand at time of Plugging

15. Date Well Plugged

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	9/28/96							
20. Size of Hole or Pipe in which Plug Placed (inches)								
21. Depth to Bottom of Tubing or Drill Pipe (ft.)								
*22. Sacks of Cement Used (each plug)	305							
*23. Slurry Volume Pumped (cu. ft.)	332							
*24. Calculated Top of Plug (ft.)	2453							
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.	16.2							
*27. Type Cement	Prem/Neat							

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT.#/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)

29. Was any Non-Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non-drillable material. (Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS

FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.
* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SVCS.
Name of Cementing Company

CERTIFICATE:
I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

Michael Supak — REPRESENTATIVE OF COMPANY
Service Supervisor — TITLE
9/28/96 — DATE
Phone 800 — A/C
223-0898 — NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISSION

Cementer: Fill in shaded areas.
Operator: Fill in other items.

Form W-15
Cementing Report
Rev. 4/1/83
483-045

RAILROAD COMMISSION OF TEXAS
Oil and Gas Division

1. Operator's Name (As shown on Form P-5, Organization Report)	2. RRC Operator No.	3. RRC District No.	4. County of Well Site

5. Field Name (Wildcat or exactly as shown on RRC records)	6. API No. 42-	7. Drilling Permit No.

8. Lease Name	9. Rule 37 Case No.	10. Oil Lease/Gas ID No.	11. Well No.

CASING CEMENTING DATA:	SURFACE CASING	INTER-MEDIATE CASING	PRODUCTION CASING		MULTI-STAGE CEMENTING PROCESS	
			Single String	Multiple Parallel Strings	Tool	Shoe
12. Cementing Date						
13. •Drilled hole size						
•Est. % wash or hole enlargement						
14. Size of casing (in. O.D.)						
15. Top of liner (ft.)						
16. Setting depth (ft.)						
17. Number of centralizers used						
18. Hrs. waiting on cement before drill-out						
1st Slurry — 19. API cement used: No. of sacks ▶						
1st Slurry — Class ▶						
1st Slurry — Additives ▶						
2nd Slurry — No. of sacks ▶						
2nd Slurry — Class ▶						
2nd Slurry — Additives ▶						
3rd Slurry — No. of sacks ▶						
3rd Slurry — Class ▶						
3rd Slurry — Additives ▶						
1st — 20. Slurry pumped: Volume (cu. ft.) ▶						
1st — Height (ft.) ▶						
2nd — Volume (cu. ft.) ▶						
2nd — Height (ft.) ▶						
3rd — Volume (cu. ft.) ▶						
3rd — Height (ft.) ▶						
Total — Volume (cu. ft.) ▶						
Total — Height (ft.) ▶						
21. Was cement circulated to ground surface (or bottom of cellar) outside casing?						

22. Remarks

OVER ▶

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W - 3
Rev. 12/92

API NO. (if available)

1. RRC District

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id Number

2. FIELD NAME (as per RRC Records)

3. Lease Name

5. Well Number

6. OPERATOR

6a. Original Form W-1 Filed in Name of:

10. County

7. ADDRESS

6b. Any Subsequent W-1's Filed in Name of:

11. Date Drilling Permit Issued

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is located

Feet From Line and Feet From
Line of the Lease

12. Permit Number

9a. SECTION, BLOCK, AND SURVEY

9b. Distance and Direction From Nearest Town in this County

13. Date Drilling Commenced

16. TYPE WELL (OIL,GAS,DRY)

Total Depth

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No's

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #

14. Date Drilling Completed

18. If Gas, Amt. of Cond. on Hand at time of Plugging

15. Date Well Plugged

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	9/29/96							
20. Size of Hole or Pipe in which Plug Placed (inches)								
21. Depth to Bottom of Tubing or Drill Pipe (ft.)								
*22. Sacks of Cement Used (each plug)	375							
*23. Slurry Volume Plumped (cu. ft.)	407.66							
*24. Calculated Top of Plug (ft.)	1299.37							
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.	16.2							
*27. Type Cement	H							

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)

29. Was any Non - Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non - drillable material (Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLD AND/OR PERFORATED INTERVALS

FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.

* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

BILLY F. YANDELL B.F. Yandell
Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SERVICES 10/7/96
Name of Cementing Company

CERTIFICATE

I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

REPRESENTATIVE OF COMPANY | TITLE | DATE | Phone A/C NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISION

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W - 3
Rev. 12/92

API NO. (if available)

1. RRC District

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id Number

2. FIELD NAME (as per RRC Records)

3. Lease Name

5. Well Number

6. OPERATOR

6a. Original Form W-1 Filed in Name of:

10. County

7. ADDRESS

6b. Any Subsequent W-1's Filed in Name of:

11. Date Drilling Permit Issued

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is located

Feet From Line and Feet From
Line of the Lease

12. Permit Number

9a. SECTION, BLOCK, AND SURVEY

9b. Distance and Direction From Nearest Town in this County

13. Date Drilling Commenced

16. TYPE WELL (OIL GAS DRY)

Total Depth

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No's

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #

14. Date Drilling Completed

18. If Gas, Amt. of Cond. on Hand at time of Plugging

15. Date Well Plugged

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	9/30/96							
20. Size of Hole or Pipe in which Plug Placed (inches)								
21. Depth to Bottom of Tubing or Drill Pipe (ft.)								
*22. Sacks of Cement Used (each plug)	478							
*23. Slurry Volume Plumped (cu. ft.)	521.02							
*24. Calculated Top of Plug (ft.)	0							
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.	16.2							
*27. Type Cement	H							

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)

29. Was any Non - Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non - drillable material.
(Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLD AND/OR PERFORATED INTERVALS

FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.

* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

BILLY F. YANDELL B.F. Yandell
Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SERVICES 10/7/96
Name of Cementing Company

CERTIFICATE

I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

REPRESENTATIVE OF COMPANY | TITLE | DATE | Phone A/C NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISION

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W - 3
Rev. 12/92

API NO. (if avaliable)

1. RRC District

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id Number

2. FIELD NAME (as per RRC Records)

3. Lease Name

5. Well Number

6. OPERATOR

6a. Original Form W-1 Filed in Name of:

10. County

ADDRESS

6b. Any Subsequent W-1's Filed in Name of:

11. Date Drilling Permit Issued

7. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is located

Feet From Line and Feet From Line of the Lease

12. Permit Number

9a. SECTION, BLOCK AND SURVEY

9b. Distance and Direction From Nearest Town in this County

13. Date Drilling Commenced

16. TYPE WELL (OIL,GAS,DRY)

Total Depth

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No's

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #

14. Date Drilling Completed

18. If Gas, Amt. of Cond. on Hand at time of Plugging

15. Date Well Plugged

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	10/1/96							
20. Size of Hole or Pipe in which Plug Placed (inches)								
21. Depth to Bottom of Tubing or Drill Pipe (ft.)								
*22. Sacks of Cement Used (each plug)	60							
*23. Slurry Volume Plumped (cu. ft.)	65.4							
*24. Calculated Top of Plug (ft.)	0							
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.	16.2							
*27. Type Cement	H							

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)

29. Was any Non - Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non - drillable material.

(Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLD AND/OR PERFORATED INTERVALS

FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.

* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

BILLY F. YANDELL B.F. Yandell
Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SERVICES 10/7/96
Name of Cementing Company

CERTIFICATE

I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

REPRESENTATIVE OF COMPANY | TITLE | DATE | Phone A/C NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISION

APPENDIX C

CORRESPONDENCE

File ECO Job 96-14

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

June 28, 1996

I. O. Coleman, Jr.
Hoechst Celanese, Chemical Group
Bay City Plant
P. O. Box 509
Highway 3057
Bay City, TX 77404-0509

Re: Approval of Closure Procedures, Permits No. WDW-32 and WDW-49, Bay City, Texas

Dear Mr. Coleman, Jr.:

The staff has reviewed your letter of June 10 detailing the closure procedures previously approved January 8, 1996 of the above referenced wells and finds that it meets the requirements outlined in 30 TAC §331.46 (Closure Standards). Please submit the Closure Report as required by §331.46(m) within 30 days of completion of closure of the final well since both wells will be closed during the continuous series using the same equipment. Please also provide evidence of the deed recording as required by §331.46(l) prior to a request of revocation of the permit.

Your letter also certifies that neither well had been operated since the last MIT in October, 1995 for WDW-32 and in March, 1996 for WDW-49, and staff agrees that will suffice as final MIT testing prior to closure.

It is also requested that we be kept up-dated on the exact date of closure operations so that a staff member may schedule to be present. Questions regarding this matter should be directed to me at (512) 239-6196, correspondence may be sent to me at Mail Code, MC-131 at the TNRCC address.

Sincerely,

Jim L Boswell

Jim L. Boswell, Permit Coordinator
Underground Injection Control Team
UIC, Uranium, & Radioactive Waste Section
Industrial & Hazardous Waste Division

cc: Brian Graves, EPA Region 6

960 14

Hoechst Celanese

Chemical Group
Hoechst Celanese Corporation
Bay City Plant
PO Box 509
Highway 3057
Bay City, TX 77404-0509

June 10, 1996
IOC-033-96

FEDERAL EXPRESS

Mr. Jim L. Boswell, Permit Coordinator
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
TX Natl Resource Conservation Commission
12100 Park 35 Circle
Austin, TX 78753

RE: Closure Procedures for Class I Injection Wells
WDW-32 (Plant Well #2) and WDW-49 (Plant Well #4)
Hoechst Celanese Chemical Group, Ltd.
Bay City Plant, Bay City, TX

Dear Mr. Boswell:

Hoechst Celanese Chemical Group, Ltd. hereby submits the attached closure procedures (2 copies) for Class I Injection Wells WDW-32 (Well #3) and WDW-49 Well #4) located at the Bay City Plant. The attached information is intended to update the closure plans previously approved by the TNRCC on January 8, 1996.

We propose to conduct field operations in a continuous series of events with a minimal delay as equipment is moved from Injection Well WDW-32 to Injection Well WDW-49. As documented in the attached schedule, field operations should start early in September, 1996.

You will be advised as the work plans and schedule are finalized. If you have any questions, please call me at 409-241-4197.

Sincerely,

I. O. Coleman, Jr./cjs

I. O. Coleman, Jr.
Staff Environmental Chemist

IOC/cjs
attachment

cc: w/o attachment

Mr. Ben Knape, Chief
Underground Injection Control Unit
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Division
TX Natl Resource Conservation Commission
P. O. Box 13087ircle
Austin, TX 78711-3087

Mr. Charles J. Green, Geologist
TX Natl Resource Conservation Comm.
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Division
P. O. Box 13087
Austin, TX 78711-3087

bcc: w/o attachment
Via e-mail

C. R. Pennington
W.G. Cornman
D. Peters
B. L. Fritz
B. R. Hightower
J. V. Anderson
C. J. Griffith
R. S. O'Neal

Mr. Tom Jones
ECO Solutions, Inc.
9800 Richmond Ave. , Ste 320
Houston, TX 77042-4519

bcc: w/attachment

W. E. Dentler → P. H. Richardson → R. J. Johnston → G. J. McCarthy
H. R. Horton → B. S. Barrington
A. Conley-Pitchell - Bridgewater
Environmental File No.: 203.20

SOLUTIONS, INC.

HOECHST CELANESE CHEMICAL GROUP, LTD.

CLOSURE PROCEDURES AND SCHEDULE

INJECTION WELLS

WDW-32 (WELL #3) AND WDW-49 (WELL #4)

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, TX 77042
(713) 780-1955
Fax (713) 780-1955

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ATTACHMENT 1 - CLOSURE SCHEDULE

HOECHST CELANESE CHEMICAL GROUP, LTD.
CLOSURE PLAN FOR INJECTION WELLS
WDW-32 (WELL #3) AND WDW-49 (WELL #4)

BACKGROUND

In a letter to Hoechst Celanese Chemical Group, Ltd. (Hoechst Celanese) dated January 8, 1996, the Texas Natural Resource Conservation Commission (TNRCC) granted approval to the closure plans for Class I injection wells WDW-14, WDW-32, WDW-49 and WDW-110 located at the Bay City Plant. Field operations to close injection well WDW-14 (well #2) were completed on March 13, 1996.

Hoechst Celanese plans to properly close two (2) of the remaining three (3) Class I injection wells starting in September, 1996. Injection well WDW-32 (well #3) will be closed first and injection well WDW-49 (well #4) closed second. It is planned that the field operations associated with these two well closures will be accomplished as a single continuous sequence of events with little delay as the equipment is moved from one well location to the next.

Two (2) closure plans are attached which follow the procedures previously approved by the TNRCC. The only changes reflect the site specific conditions and depths unique to each well. Although no additional regulatory approvals are required, the attached plans are submitted for your information. A preliminary closure schedule is also attached. Well schematics were included with the original closure plan submitted to the TNRCC and have not changed.

MECHANICAL INTEGRITY TESTING

As stated in the January 8, 1996 TNRCC approval letter, WDW-14 (well #2) required no additional mechanical integrity testing since the well had not operated following its last successful mechanical integrity demonstration. Hoechst Celanese requests that the TNRCC confirm that no additional mechanical integrity testing will be required on WDW-32 (well #3) and WDW-49 (well #4). The last mechanical integrity and falloff testing was completed on WDW-32 (well #3) in October, 1995 and on WDW-49 (well #4) in March, 1996. Both injection wells were brined in and the flowlines disconnected following the testing. No waste injection has occurred since those dates.

SUBMITTAL OF CLOSURE REPORT

As required by 30 TAC §331.46(m), the closure report must be submitted within 30 days of completion of closure. A clarification is requested on the timing of the closure report. Since injection wells WDW-32 (well #3) and WDW-49 (well #4) are to be closed in a continuous sequence of field operations, it is requested that the closure reports for both wells be submitted 30 days following the completion of closure of the second well, or WDW-49 (well #4). This schedule will allow the field certification information to be obtained and integrated into the respective reports in a timely manner.

INJECTION WELL WDW-32 (WELL # 3)
CLOSURE PROCEDURES

1) Prepare well location for field operations. Remove flow lines, monitoring equipment, and instrumentation. Line and dike surface area surrounding wellsite in the area where the workover rig, pumps, tanks and pipe racks will be placed.

2) Notify TNRCC representative of anticipated start of field operations.

3) Move in and rig up workover rig and peripheral equipment.

4) Pull seal assembly out of packer and triple rinse injection string and flush annular area with 9.8 ppg brine.

5) Pull out of the hole laying down injection string and TIW seal assembly on pipe racks. HCCG personnel will remove injection string and TIW seal assembly from wellsite.

6) Pick up casing scraper and work string. Go in hole with casing scraper to the top of the injection packer at 3192' ±. Pull out of the hole with same.

7) Move in and rig up wireline unit to set cement retainer. Pick up junk basket and gauge ring and go in the hole to the top of the injection packer. Pull out of the hole with the junk basket and gauge ring. Go in the hole with wireline set cast iron cement retainer and set inside the 9+5/8" casing at 3182' ±, or approximately 10' above the top of the injection packer. Pull out of the hole and rig down wireline unit.

8) Notify TNRCC representative 24 hours prior to start of cementing operations to witness placement of cement plugs.

9) Pick-up cement retainer shifting assembly with work string and go in the hole with same. Engage cement retainer with shifting assembly and test annulus to 500 psi to confirm that the cement retainer is properly set.

10) Rig up Halliburton, or equivalent service company, to squeeze cement (permanently abandon) the injection zone. Pumping through retainer fill injection interval with high compressive strength cement slurry. Close cement retainer and disengage from same. Leave a 50' ± column of cement above cement retainer and pull out of the hole with shifting assembly.

11) Pick up section mill and drill collars on work string and go in the hole with same. Mill out approximately 50' section of 9+5/8" casing above the top of the cement column. Pull out of the hole and remove section mill.

12) Pick up underreamer and drill collars and go in the hole with same. Underream sectioned interval out to approximately 14" diameter borehole. Pull out of the hole with underreamer.

13) Go in the hole open-ended to set cement plug #2. The plug will extend up across the sectioned interval and an additional 300' - 400' above the section. Rig up Halliburton, or equivalent, and set balanced cement plug with high compressive strength cement. Pull out of the hole and wait on cement plug #2 to cure (approximately 12 hours).

14) Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of the cement. "Dress off" top of plug #2 to confirm cement has had sufficient time to properly cure.

15) Rig up Halliburton, or equivalent, and set cement plug #3 with high compressive strength cement. Set balanced cement plug. Cement column to extend from the previous plug up to 1500' ± or approximately 200' beneath the base of surface casing. Pull out of the hole and wait on cement plug #3 to cure (approximately 12 hours).

16) Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #3 to confirm that cement has had sufficient time to properly cure. Pull out of the hole.

17) Move in and rig up wireline truck to perforate for squeeze job at the base of the surface casing. Perforate the protection casing 2' at 4 shots per foot (8 shots) with top at 1312' ±, or approximately 10' beneath the surface casing seat at 1302' ±. Pull out of the hole and rig down wireline unit.

18) Rig up Halliburton, or equivalent, and set cement plug #4 with high compressive strength cement. Set balanced cement plug. Cement column will extend from the top of plug #3 back to the surface. Pull out of the hole. Apply pressure to cement column to squeeze cement out through the perforations. Wait on cement plug #4 to cure (approximately 12 hours).

19) Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #4 to confirm that cement has had sufficient time to properly cure. Fill balance of protection casing with high compressive strength cement as required. Pull out of the hole and lay down work string. Wash out blowout preventors.

20) Rig down and release workover rig. Cut off casings at grade and weld 1/2" steel plate over all casing strings. Inscribe plate with well identification and other pertinent data as required.

21) Prepare summary report for submittal to TNRCC and USEPA Region 6.

INJECTION WELL WDW-49 (WELL # 4)
CLOSURE PROCEDURES

1) Prepare well location for field operations. Remove flow lines, monitoring equipment, and instrumentation. Line and dike surface area surrounding wellsite in the area where the workover rig, pumps, tanks and pipe racks will be placed.

2) Notify TNRCC representative of anticipated start of field operations.

3) Move workover rig and peripheral equipment from WDW-32 (well #3) to WDW-49 (well #4)

4) Pull seal assembly out of packer and triple rinse injection string and flush annular area with 9.8 ppg brine.

5) Pull out of the hole laying down injection string and TIW seal assembly on pipe racks. HCCG personnel will remove injection string and TIW seal assembly from wellsite.

6) Pick up casing scraper and work string. Go in hole with casing scraper to the top of the injection packer at 3316' ±. Pull out of the hole with same.

7) Move in and rig up wireline unit to set cement retainer. Pick up junk basket and gauge ring and go in the hole to the top of the injection packer. Pull out of the hole with the junk basket and gauge ring. Go in the hole with wireline-set cast iron cement retainer and set inside the 7+5/8" casing at 3306' ±, or approximately 10' above the top of the injection packer. Pull out of the hole and rig down wireline unit.

8) Notify TNRCC representative 24 hours prior to start of cementing operations to witness placement of cement plugs.

9) Pick-up cement retainer shifting assembly with work string and go in the hole with same. Engage cement retainer with shifting assembly and test annulus to 500 psi to confirm that the cement retainer is properly set.

10) Rig up Halliburton, or equivalent service company, to squeeze cement (permanently abandon) the injection zone. Pumping through retainer fill injection interval with high compressive strength cement slurry. Close cement retainer and disengage from same. Leave a 50' ± column of cement above cement retainer and pull out of the hole with shifting assembly.

11) Pick up section mill and drill collars on work string and go in the hole with same. Mill out approximately 50' section of 7+5/8" casing above the top of the cement column. Pull out of the hole and remove section mill.

12) Pick up underreamer and drill collars and go in the hole with same. Underream sectioned interval out to approximately 10" diameter borehole. Pull out of the hole with underreamer.

13) Go in the hole open-ended to set cement plug #2. The plug will extend up across the sectioned interval and an additional 300' - 400' above the section. Rig up Halliburton, or equivalent, and set balanced cement plug with high compressive strength cement. Pull out of the hole and wait on cement plug #2 to cure (approximately 12 hours).

14) Go in the hole with 6 ¾" drill bit and drill pipe to confirm the top of the column of cement. "Dress off "top of plug #2 to confirm cement has had sufficient time to properly cure.

15) Rig up Halliburton, or equivalent, and set cement plug #3 with high compressive strength cement. Set balanced cement plug. Cement column to extend from the previous plug up to 1500' ±, or approximately 200' beneath the base of surface casing. Pull out of the hole and wait on cement plug #3 to cure (approximately 12 hours).

16) Go in the hole with 6+¾" drill bit and drill pipe to confirm the top of cement column. "Dress off " the top of plug #3 to confirm that cement has had sufficient time to properly cure. Pull out of the hole.

17) Move in and rig up wireline truck to perforate for squeeze job at the base of the surface casing. Perforate the protection casing 2' at 4 shots per foot (8 shots) with top at 1400' ± or approximately 10' beneath the surface casing seat at 1389' ±. Pull out of the hole and rig down wireline unit.

18) Rig up Halliburton, or equivalent, and set cement plug #4 with high compressive strength cement. Set balanced cement plug. Cement column will extend from the top of plug #3 back to the surface. Pull out of the hole. Apply pressure to cement column to squeeze cement out through the perforations. Wait on cement plug #4 to cure (approximately 12 hours).

19) Go in the hole with 6 ¾" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #4 to confirm that cement has had sufficient time to properly cure. Fill balance of protection casing with high compressive strength cement as required. Pull out of the hole and lay down work string. Wash out blowout preventors.

20) Rig down and release workover rig. Cut off casings at grade and weld 1/2" steel plate over all casing strings. Inscribe plate with well identification and other pertinent data as required.

21) Prepare summary report for submittal to TNRCC and USEPA Region 6.

22) Project Complete

ATTACHMENT 1

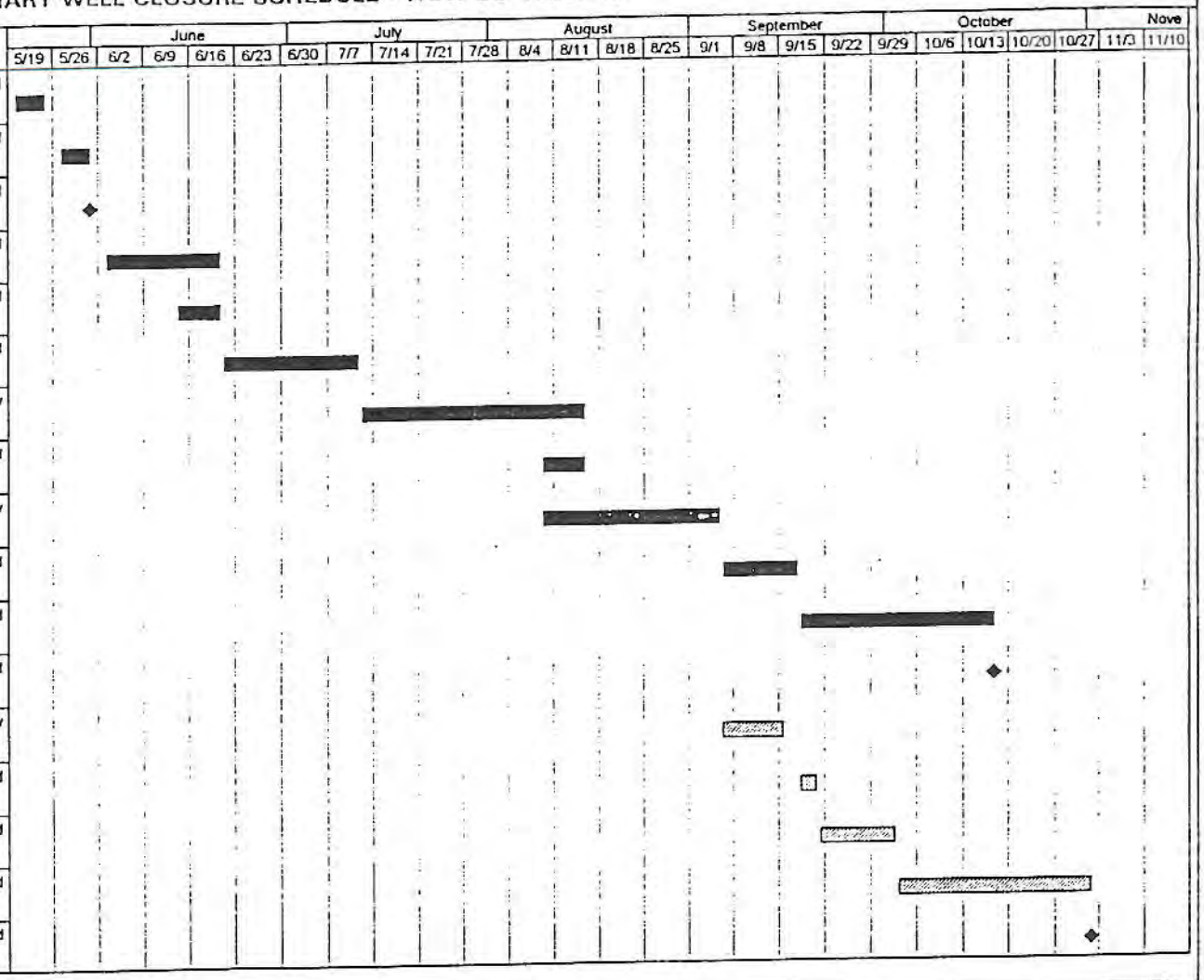
CLOSURE SCHEDULE

WDW-32 (WELL #3)

WDW-49 (WELL #4)

HOECHST CELANESE CHEMICAL GROUP, LTD
BAY CITY, TEXAS PLANT
PRELIMINARY WELL CLOSURE SCHEDULE - WDW-32 WDW-49

NO.	Name	Work Days
1	Prepare updated closure procedures for TNRCC	5d
2	Review by HCCG & finalize by ECO	5d
3	Submit Procedures To TNRCC	0d
4	TNRCC Review and approval	14d
5	Solicit Vendor Quotes	5d
6	Obtain Vendor Quotes - Prepare final recommendations	15d
7	Identify rig availability & schedule	5w
8	Finalize procedures cost & schedule	5d
9	Site Preparations For Field Operations	4w
10	Field Operations To Close WDW-32	12d
11	Prepare Final Closure Report	30d
12	Submit Final Closure Report To TNRCC	0d
13	Prepare location for closure operations	2w
14	Move rig & equipment to WDW-49	3d
15	Field Operations To Close WDW-49	12d
16	Prepare Final Closure Report	30d
17	Submit Final Closure Report To TNRCC	0d



APPENDIX D
FINAL MECHANICAL INTEGRITY TESTING REPORT (TEXT ONLY)
WDW-32 (WELL #3)

SOLUTIONS, INC.

Final Report

Hoechst Celanese Chemical Group, Inc.
Bay City, Texas
MIT/Fall-off Report
Injection Well WDW-32 (Well No. 3)
October 24 - 26, 1995

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, Texas 77042
(713) 780-1955
FAX (713) 780-0870

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1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.1 INTRODUCTION

Hoechst Celanese Chemical Group, Inc. (HCCG) contracted ECO Solutions, Inc. (ECO) to perform the annual mechanical integrity testing on their Class I nonhazardous injection well, WDW-32 (Well No. 3), located at their Bay City facility. A schematic drawing of WDW-32 is included as Figure 1. The attached report details the data and test results associated with the mechanical integrity testing.

The following provides an overview of the key elements of the testing on WDW-32 (Well No. 3).

- An Annulus Pressure Test (APT) was conducted to satisfy the annual mechanical integrity test (MIT) requirements of the Texas Natural Resource Conservation Commission's (TNRCC), Underground Injection Control (UIC) Program.
- A Radioactive Tracer (RAT) survey was conducted to satisfy the annual MIT requirements of the TNRCC.
- Bottom Hole Pressure (BHP) falloff testing was conducted to satisfy the annual ambient monitoring requirements of the U.S. Environmental Protection Agency (EPA) and the TNRCC

HCCG personnel contacted the TNRCC personnel to inform them of the MIT schedule on WDW-32 and whether a field inspector would be present. TNRCC personnel informed HCCG that no field inspector would be present for this particular MIT.

The APT on WDW-32 (Well No.3) was conducted on Thursday, October 26, 1995, and was witnessed by Mr. Wesley Smith of ECO and Mr. Ray Horton of HCCG. The RAT was conducted on Thursday, October 26, 1995, and was witnessed by Mr. Wesley Smith of ECO and Mr. Ray Horton of HCCG.

The BHP/falloff test was conducted on Tuesday, October 24, 1995 through Thursday, October 26, 1995 and was witnessed by Mr. Wes Smith of ECO and Mr. Ray Horton of HCCG.

1.2 EXECUTIVE SUMMARY

Based on the successful results of the MIT conducted on October 26, 1995 on WDW-32, HCCG is able to return WDW-32 to injection service if required. Also, based on a decision by HCCG's Bay City management WDW-32 was brined in on October 27, 1995 using 150 barrels (42 gallons/barrel) of 10 pound per gallon (ppg) brine and left shut-in until closure operations are commenced. A summary of the results of the MIT and BHP/Falloff survey are as follows:

Radioactive Tracer Survey

The analysis of the RAT survey performed on October 26, 1995 demonstrated that no upward fluid movement from the injection interval is occurring. Additionally, this determination can be made as a result of (1) the favorable comparison of the before and after base gamma ray surveys, (2) the two multiple pass tracer surveys and the two stationary surveys conducted 20' above the packer path. All four tests showed no evidence of upward migration. This interpretation was supported by an independent evaluation provided by Atlas Wireline Services (Atlas) and is included in Appendix A together with the RAT log.

Annulus Pressure Test

A demonstration of internal mechanical integrity was supported by an APT conducted on October 26, 1995. The annulus was pressurized to a maximum of 1109 pounds per square inch gauge (psig). The APT was monitored for eighty minutes. During the final 30 minutes the pressure loss was measured from 1102 to 1101 psig, or 1 pound per square inch (psi) (0.1%), which is well within the 5% pressure loss criteria set by the TNRCC. The APT plot is included in Appendix B.

Bottom Hole Pressure Falloff Survey

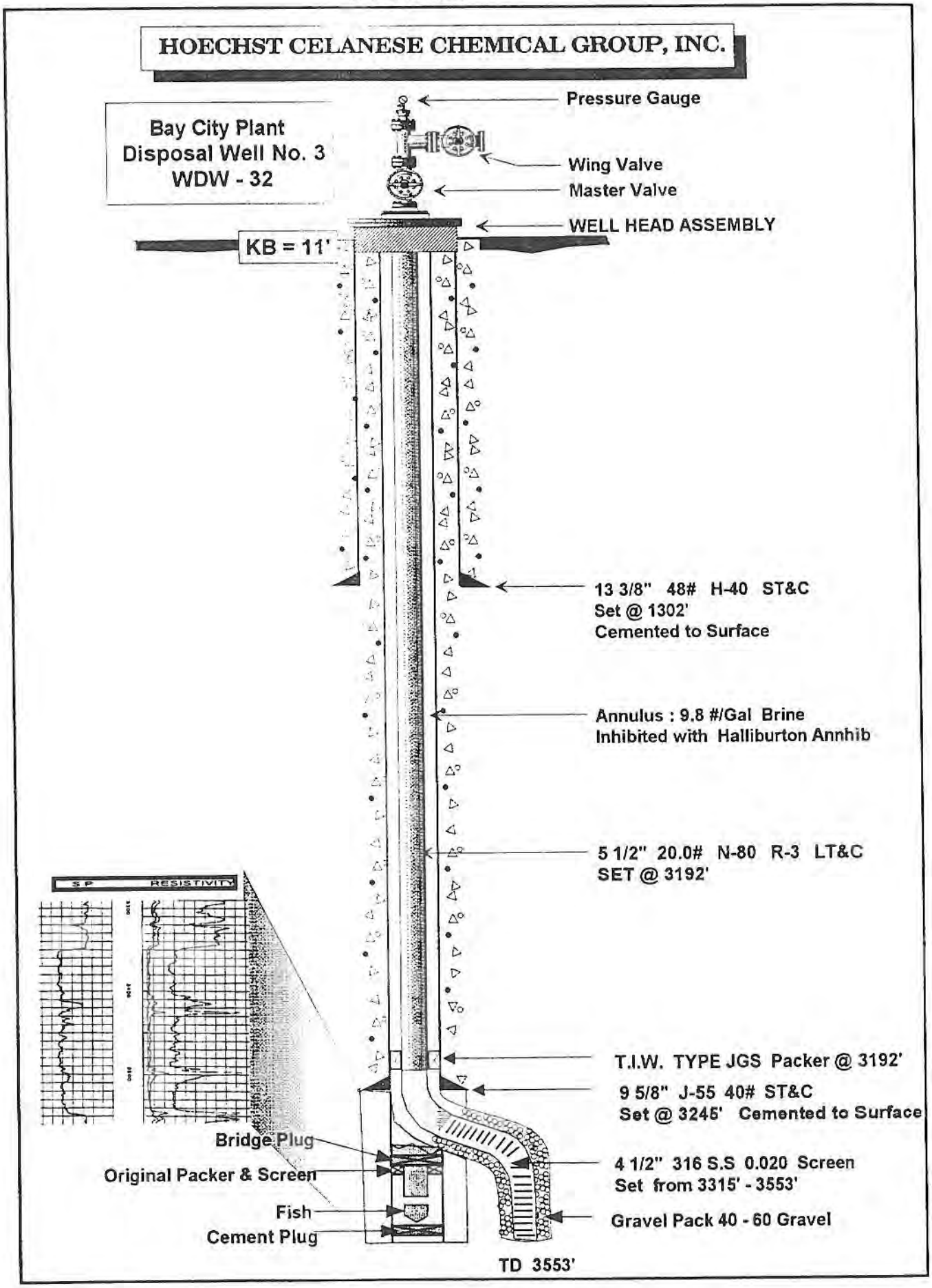
Waste stream fluid was injected into WDW-32 at a steady rate of 150 gpm for 96 hours and was shut-in for a total of 34 hours. The shape of both the pressure and pressure derivative curves on a log-log plot at early times are reasonable, but are similar to the test conducted in January 1995. A full discussion of the falloff analyses is presented in Section 4.0.

Overall Field Work Conclusion

All field work associated with the MIT/BHP/Falloff survey on HCCG's WDW-32 at the Bay City Plant conducted from October 24 through 27, 1995 was successfully completed. WDW-32 is considered to be mechanically sound at this time and is suitable for further use as a Class I waste injection well.

In accordance with the TNRCC/UIC Program, 31TAC, 331.4 and 331.43, the mechanical integrity test conducted on WDW-32 demonstrated that (1) 'there is no significant leak in the casing, tubing or packer" and (2) 'there is no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the injection borehole."

FIGURE 1


HOECHST CELANESE CHEMICAL GROUP, INC.
Bay City Plant
Disposal Well No. 3
WDW - 32
Pressure Gauge
Wing Valve
Master Valve
WELL HEAD ASSEMBLY
KB = 11'
13 3/8" 48# H-40 ST&C
Set @ 1302'
Cemented to Surface
Annulus : 9.8 #/Gal Brine
Inhibited with Halliburton Annhib
5 1/2" 20.0# N-80 R-3 LT&C
SET @ 3192'
SP
RESISTIVITY
T.I.W. TYPE JGS Packer @ 3192'
9 5/8" J-55 40# ST&C
Set @ 3245' Cemented to Surface
Bridge Plug
Original Packer & Screen
Fish
Cement Plug
4 1/2" 316 S.S 0.020 Screen
Set from 3315' - 3553'
Gravel Pack 40 - 60 Gravel
TD 3553'

2.0 FIELD OPERATIONS SUMMARY

2.1 BOTTOM HOLE PRESSURE FALLOFF SURVEY

Friday, October 20, 1995

Brought injection up to 150 gallons per minute (gpm) at 1800 hours.

Saturday, October 21 - Monday, October 23, 1995

Continued injecting at steady rate of 150 gpm.

Tuesday, October 24, 1995

Arrived at plant location at 0700, checked in with front gate. After meeting with Mr. Paul Richardson and Mr. Ray Horton, went to site of WDW-32 at 0740 hours. Effluent was being injected at well head pressure (WHP) = 610 pounds per square inch gauge (psig). At 0830 hours Mr. Ray Horton processed Wes Smith (ECO), Doug Beall and Mike Staley Milton M. Cooke Company (Cooke) through HCCG's contractor safety orientation check list. Cooke wireline rigged up on well. NOTE: All depths are referenced to rotary drive bushing (RKB) at 11' above ground level.

WDW-110 (Well No. 1-A)	out of service
WDW-14 (Well No. 2)	out of service
WDW-32 (Well No. 3)	active/injecting
WDW-49 (Well No. 4)	out of service

Checked with Paul Richardson @ control room. WDW-32 injecting approximately 150 gpm. At 0840 made run through gauge calibrations:

EPG 520 Serial # 85954 (Surface ReadOut) - Range 0 - 2500 psia.
EMS 725 Serial # 79993 (Back-up, Memory gauge)

Met with Ray Horton at 0900 hours to review test procedures and current condition of well. At 0910 hours placed tool string in lubricator (18 ft. length) as follows:

Length	Description
0.5'	Cable head
1'	Collar locator
1-1/2'	EPG 520 (SRO gauge)
4-1/2'	EPG 725 (memory gauge)
5'	weight bar
5'	weight bar

At 1045 hours opened master valve, pressured up lubricator, and prepared to go in hole. At 1056 hours check SRO gauge (WHP = 613.66 pounds per square inch absolute (psia)), going in hole. Prepare to tie into packer (RAT survey) with casing collar locator (CCL). Turned on CCL, making passes correlating strip chart. At 1200 hours tool @ 3204 ft., begin logging up hole.

Finished CCL log at 1140 hours, set gauges @ 3192 feet. Monitor injection bottom hole pressure and temperature.

At 1244 hours began monitoring injection period of test.

Injection rate	150 gpm
Down hole injection pressure	1843 psia
Surface injection pressure	610 psig

Continue monitoring injection period of test. Readings at 1600 hours:

Injection rate	150 gpm
Down hole injection pressure	1843 psia
Surface injection pressure	610 psig

Met with shift supervisor, prepared to shut-down injection operations. Stop injection pumps at 1800 hours and begin fall-off test. Double block @ injection line manifold.

Final injection conditions:

Injection rate	150 gpm
Down hole injection pressure	1842.22 psia
Surface injection pressure	610 psig

Continue monitoring fall-off period of test at 2200 hours.

Shut-in down hole pressure	1472.16 psia
Surface	72 psig

Wednesday, October 25, 1995

Continue monitoring fall-off period of test (0800 hours).

Shut-in down hole pressure	1469.80 psia
Surface shut-in pressure	69 psig

2200 hours continue monitoring fall-off period of test.

Shut-in down hole pressure	1469 psia
Surface shut-in pressure	68 psig

Thursday, October 26, 1995

0200 hours continue monitoring fall-off period of test.

Shut-in down hole pressure	1468 psia
Surface shut-in pressure	67 psig

At 0400 hours stop recording downhole pressures, download ASCII data file, and perform preliminary analysis. Pull out of hole with tool, making static gradient stops (15 minutes/stop) at 3000', 2500', 2000', 1500', 1000', 500' and surface.

Final shut-in pressures/temperature

Shut-in down hole pressure	1468 psia
Shut-in down hole temperature	104 Deg. F
Surface shut-in pressure	67 psig

At 0700 hours gauges in lubricator and end of pressure falloff survey. Begin rigging down wireline equipment. Cooke crew leaving location at 0930 hours.

2.2 MECHANICAL INTEGRITY TEST

Thursday, October 26, 1995

At 0730 hours Wes Smith of ECO and Ray Horton of HCCG met at the front entrance to the Bay City plant and traveled to WDW-32 and met with Mr. Wilson Cupples with HCCG's instrument group. WDW-32 was shut-in with 200 psig on the tubing gauge and 67 psig on the annulus. Also, HCCG's site recorder was operational. A certified calibrated pressure instrument, Eaton Pressure Sensor, Type UPC 5000 BACB with

ranges from zero to 400, zero to 1,000 and zero to 2,000 psig, was installed onto the annulus outlet. NOTE: The zero to 2,000 psig range was utilized for this test. HCCG personnel pressurized the annulus system using nitrogen. The annulus was tested to a maximum pressure of 1109 psig. The annulus was monitored for 80 minutes. During the final 30 minute period, the pressure loss on the annulus was measured from 1102 to 1101 psig, or 1 psi (0.1%). After completion of the APT, the nitrogen gas was bled off and the annulus pressure lowered to 175 psig. WDW-32 was left shut-in.

At 1030 hours Atlas Wireline Service (Atlas) personnel arrived at HCCG's Bay City plant, checked through security and Atlas' personnel went through safety orientation. Moved in and rigged up Atlas' wireline unit including radioactive (RA) tools on WDW-32. At 1350 hours started the RAT survey as witnessed by Mr. Ray Horton of HCCG and Mr. Wes Smith of ECO. Ran tool to a maximum depth of 3250', or slightly above the disposal interval, due to damaged tubulars located immediately below this depth. Ran base gamma ray (GR) log, a short repeat section and one statistical check. Ran multiple pass survey from 3250' to 2900' with an injection rate of 50 gpm, depicting that all injected fluid was entering the lower injection interval. Repeated multiple pass survey and obtained similar positive results. Set the RAT tool at 3172' for a stationary survey, injected a RA at the same injection rate and monitored for 20 minutes with no upward flow indicated. Repeated stationary log with same results. Ran the final baseline GR log from 3250' to 2900' with no hot spots indicated. Completed the RAT survey at 1720 hours and pulled the tool out of the hole. Rigged down Atlas and moved the unit off site. WDW-32 was left shut-in. Note: Plan to brine in WDW-32 on October 27, 1995.

3.0 MECHANICAL INTEGRITY TESTING

3.1 ANNULUS PRESSURE TEST

An APT was conducted on Thursday, October 26, 1995 in order to demonstrate internal mechanical integrity. The APT was witnessed by Mr. Ray Horton of HCCG and Mr. Wesley Smith of ECO. The annulus was pressurized to a maximum pressure of 1109 psig with 67 psig on the tubing. The APT was monitored for eighty (80) minutes using a certified calibrated pressure gauge and facility recorder. During the final 30 minutes the pressure loss was measured from 1102 to 1101 psig, or 1 psi (0.1%), which was well within the 5% pressure loss criteria set by the TNRCC. An APT plot is included in Appendix B.

3.2 RADIOACTIVE TRACER SURVEY

On Thursday, October 26, 1995 a RAT survey was conducted by Atlas to insure that all fluids are entering the injection interval. Analysis of the RAT showed no upward fluid movement. Atlas and ECO conducted the RAT as follows:

1. Ran API gamma-ray (GR) tie-in strip.
2. Ran initial baseline GR log from 3250' to 2900'.
3. Ran repeat gamma-ray log from 3250' to 3000' to confirm tool repeatability.
4. Ran 5-minute statistical check at 3172'.
5. Made multiple pass survey #1 with RA slug ejected at 2900' and a pump rate of 50 gpm.
6. Made multiple pass survey #2 with a RA slug ejected at 2800' and a pump rate of 50 gpm.
7. Ran stationary survey #1 at 3172'. Watched RA slug pass tool and monitored for 20 minutes. Pump rate 50 gpm.
8. Ran stationary survey #2 at 3172'. Watched RA slug pass tool and monitored for 20 minutes. Pump rate 50 gpm.
9. Ran after survey base log from 3250' to 2900'.

3.3 ESTIMATED TIME TO RUN STATIONARY SEQUENCE

The purpose of the estimate is to calculate the 'worst case" time for the radioactive slug to move from the GR tool (1) down the tubing, (2) into the screen, and (3) up the liner/casing/borehole annulus to the tool depth.

Basic Data:

Capacities:	5-1/2" tubing	-	0.9314 gal/ft.
	4-1/2" screen	-	0.653 gal/ft.
	4-1/2" screen x 12-1/4" borehole	-	5.296 gal/ft.
	9-5/8" casing x 12-1/4" borehole	-	2.343 gal/ft.
Pump Rate:	50 gpm		

Note: RAT detection tool was held stationary at 3172 feet, or 143 feet above the top of the screened liner.

Worst Case Calculations:

Volumes:	Tubing	- 20 ft. x 0.9134 gal/ft.	=	18.6
	Screen	- 123 ft. x 0.653 gal/ft.	=	80.3
	Screen/borehole	- 123 ft. x 5.296 gal/ft.	=	651.4
	Casing/borehole	- 20 ft. x 2.343 gal/ft.	=	46.9
		TOTAL		797.2 gallons

Calculated time to circulate RA slug around the end of the tubing and screen liner strings:

= 797.2 gal / 50 gpm

= 15.9 minutes

Note: Actual time surveys were run = 20 and 21 minutes

4.0 BOTTOM HOLE PRESSURE FALLOFF

Purpose Of Test: Required annual Reservoir Evaluation Test for year **1995**. Calculate the following reservoir characteristics: permeability, skin damage, pressure drop due to skin and flow efficiency.

4.1 FALLOFF TEST SUMMARY OF RESULTS

Method Of Interpretation: The following analysis was performed by utilizing both Semi-Log and Log-Log analysis. **A)** The Semi-Log curve was generated by plotting the standard Horner plot, **Pressure vs** $[(t_p+\Delta t)/\Delta t]$, using an injection time (t_p) of 96 hours. The semi-log straight line was calculated by linear regression through the infinite acting flow period of the curve. The slope **m**, P_{1hr}, and **P*** values were obtained from this curve and utilized for permeability and skin calculations. **B)** The Log-Log curves were generated by plotting **ΔP** and **Pressure derivative** vs the Agarwal Equivalent time function, $[t_p\ \Delta t/(t_p+\Delta t)]$. The Log-Log curves were simultaneously positioned over Gringarten type curves until a solution match was obtained. Permeability and skin values were calculated from this match and then compared with those obtained from the Semi-Log analysis.

A. Semi-Log (Horner) The straight line area of the semi-log curve was identified by first using the 1-1/2 log cycle rule to estimate the end of wellbore storage effects. Secondly, the time of the plat portion from the Pressure Derivative curve was used in determining the area of the semi-log curve in which the straight line was drawn. The semi-log straight line yielded a slope value of **4.876 psi/cycle** and a P_{1hr} of **1475.9 psi**. The pressure difference between P_{1hr} and the injection pressure, P_{inj} of **1843.2** psi followed with the calculated slope would give indications of positive skin damage and high permeability.

B. Non-Linear Regression Using a homogeneous storage-skin-boundaries model, a non-linear regression routine was accessed to estimate the permeability, skin effect, and storage capacity that best fit the pressure data. The results of these computations are shown in the accompanying tables and are in excellent agreement with the results of the Horner plot.

C. Log-Log (Pressure and Pressure Derivative Plots) Figure 4 is a type-curve plot of the measured pressure data. Because of the high skin-effect and the high permeability of the formation, the pressure data lie above the existing type curves; consequently, type-curve analysis was not possible. However, the derivative plot shows that the middle time flow regime had been reached.

Conclusions This particular well was diagnosed to be injecting into a homogeneous reservoir with a calculated permeability of **737.5 (md)** and skin damage of **79.8** utilizing an h_{net} value of **165** feet. The flow efficiency of **19%** suggests that the near wellbore properties have a large affect on the injection volume limitations. The total pressure drop is primarily due to formation damage within a small radius from the well.

The following Table is provided to give comparative results with the previous tests and calculations. The primary variables affecting the calculated results are included.

Table 4.1

Summary of Results

Date MM/YY	Rate gpm	h_{net} ft	μ_w cp	slope psi/cycle	kh/μ	kh md-ft	k md	Skin
10/95	150	165	0.7100	4.876	171387	121685	738	+80
01/95	144	165	0.7100	3.848	208622	148122	897	+99
10/93	133	165	0.7017	4.558	163594	114789	696	+83

The calculated results indicate a difference in transmissibility, (kh/μ) of **17.8%** coupled with a **19.2%** difference in skin values between January and October 1995. In addition, the results calculated from non-linear regression analysis compare favorably to those calculated from the semi-log straight line analysis thus supporting the integrity of the calculated results. This compares to the petition transmissivity of 313,700 md-ft/cp.

The start time of the infinite acting flow period exceeded the time to exit the waste front, therefore the viscosity of the original reservoir fluid was used for the final analysis. The program used for final analysis and well simulation was "FAST", marketed by Fekete.

The formation pressures predicted by the model assume no formation damage effects or other near-bore well conditions. The measured flowing pressures corrected for skin effects and maximum predicted operational pressures are presented in the Table below:

Table 4.2

Formation Pressures

Well Name	Flowing Formation Pressures, psia	Skin Pressure Loss, psia	Revised Formation Pressure, psia	Maximum Modeled Pressure, psia
WDW-32 (Well No. 3)	1950.27 @ 3440'	338	1612	1641

The measured flowing pressure is below the maximum modeled operational pressure by more than 29 psi for WDW-32. A graph of the modeled pressures for WDW-32 is included as Appendix E. The graph shows the yearly predicted operations formation pressure (1991 through the end of 2000) using maximum modeled injection rates (250 gpm in each well). All predicted operational pressures correspond to a depth of 3440 feet below ground level and an original estimated formation pressure for the upper Miocene injection interval of 1555 psia.

The measured static formation pressures from the well tests, corrected to a depth of 3440 feet below ground level, show a formation pressure increase of 21 psi. This illustrates that injection operations at the plant have had limited impact on formation pressures and should continue to have limited impact on formation pressures in the future.

Table 4.3

Static Formation Pressure

Well	Static Formation Pressure, psia @ 3440'	Formation Pressure Increase, psia
WDW-32 (Well No. 3)	1576	+21

Table 4.4
Well Information

Well Type - INJECTION
Perforations: 3315' - 3553' (Gravel Pack Screen)

Gauge Depth 3192 feet

[Input Parameters]

Reservoir Pressure	psia	P	1469
Reservoir Temperature	Deg F	T	98
Final Static Pressure	psia	P_{si}	1469
Final Injection Pressure	psia	Pinj	1843.2
Water Flow Rate	gal/min	qw	150
Sand Thickness	feet	h_{net}	165
Wellbore Radius	feet	r_w	0.5830
Formation Porosity	%	ϕ	33.0
Extrapolated Pressure	psia	P*	1466.2
Extrapolated Press @ 1hr	psia	P_{1hr}	1475.9
Semi-Log Slope	psi/cycle	M	4.876
Production Time	hrs	t_p	96
Shut-in Time	hrs	t_{si}	34

[Fluid Properties]

Fluid Viscosity	cp	μw	7.1000E-01
Formation Volume Factor	RB/STB	βw	1.0
Fluid Compressibility	1/psi	Cw	3.0E-06
Total Compressibility	1/psi	Ct	6.0E-06

Table 4.5
Calculated Results

[Semi-Log Analysis - Horner Method]

Transmissibility	md-ft/cp	kh/u	171,387
Flow Capacity	md-ft	kh	121,685
Permeability	md	k	737.5
Skin Damage	total	S	+79.8
Pressure Drop due to Skin	psi	dP	+338
Flow Efficiency	%	FE	+19
Drainage Radius	feet	r_d	1179

Figure 2 Semi-Log (Horner)

Figure 3 Semi-Log (Horner Expanded View)

Figure 4 Semi-Log (Horner Simulated Data)

Figure 5 Dimensionless (Type Curve)

Figure 6 Derivative (Type Curve)

FIGURE 2

HORNER
PRESSURE FALLOFF PLOT

HOECHST CELANESE
WDW-32 NO.3

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

$[k_1/u]_t$=1038.71 k_1=737.49 md s=79.8 p*=1466.2

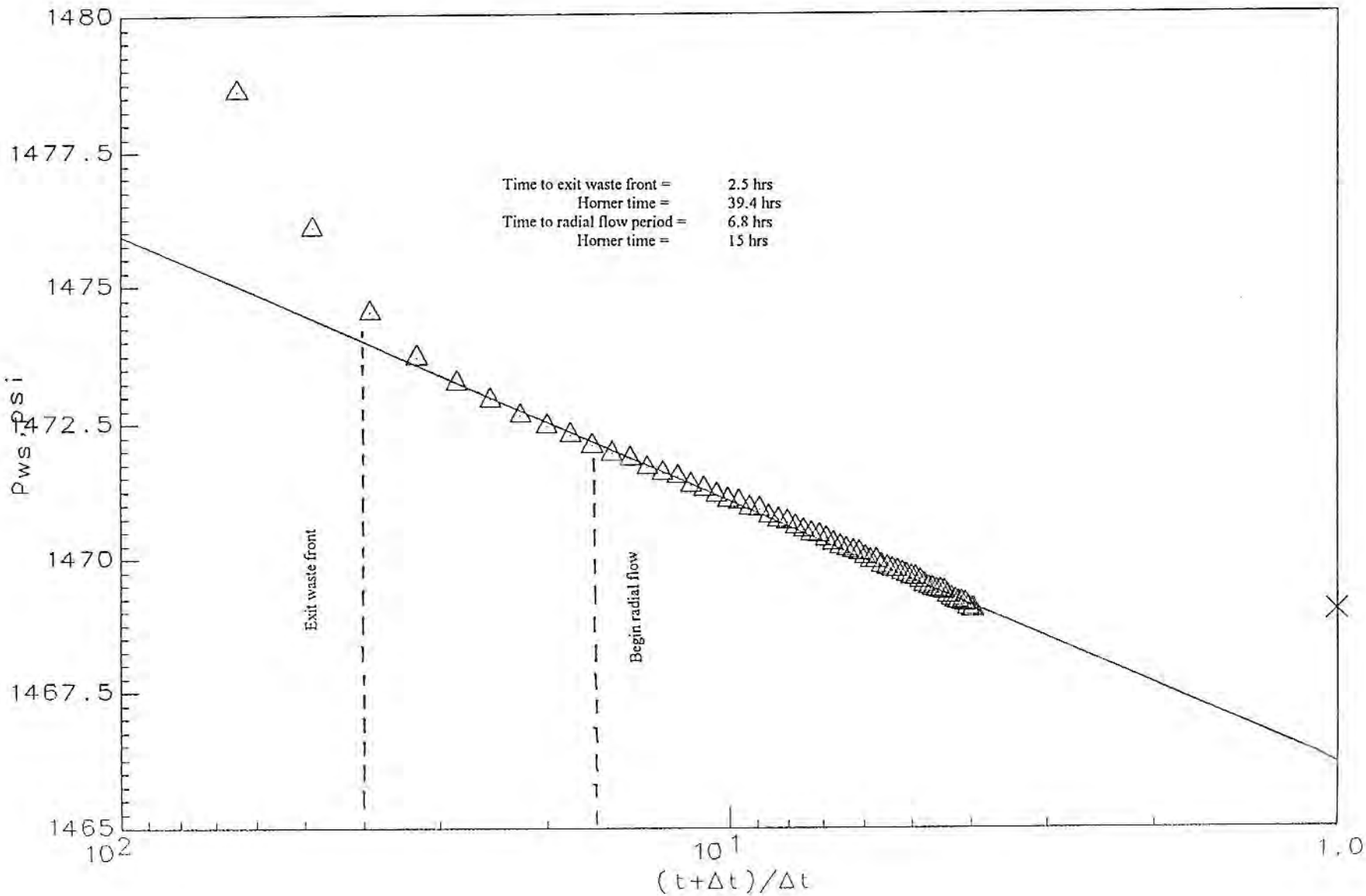


FIGURE 3

HORNER
PRESSURE FALLOFF PLOT

HOECHST CELANESE
WDW-32 NO.3

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

$[k_1/u]_t$=1038.71 k_1=737.49 md s=79.8 p*=1466.2

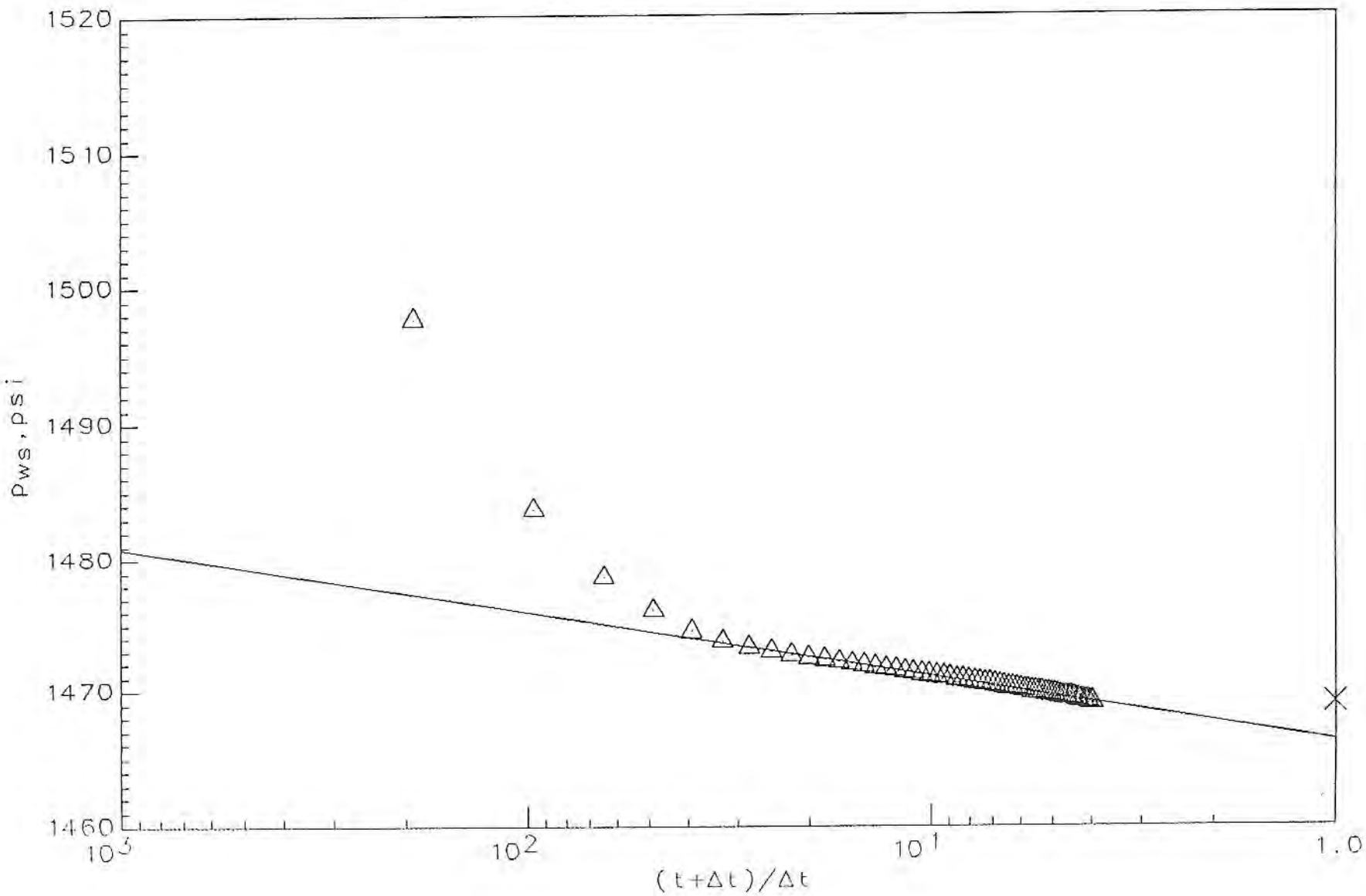


FIGURE 4

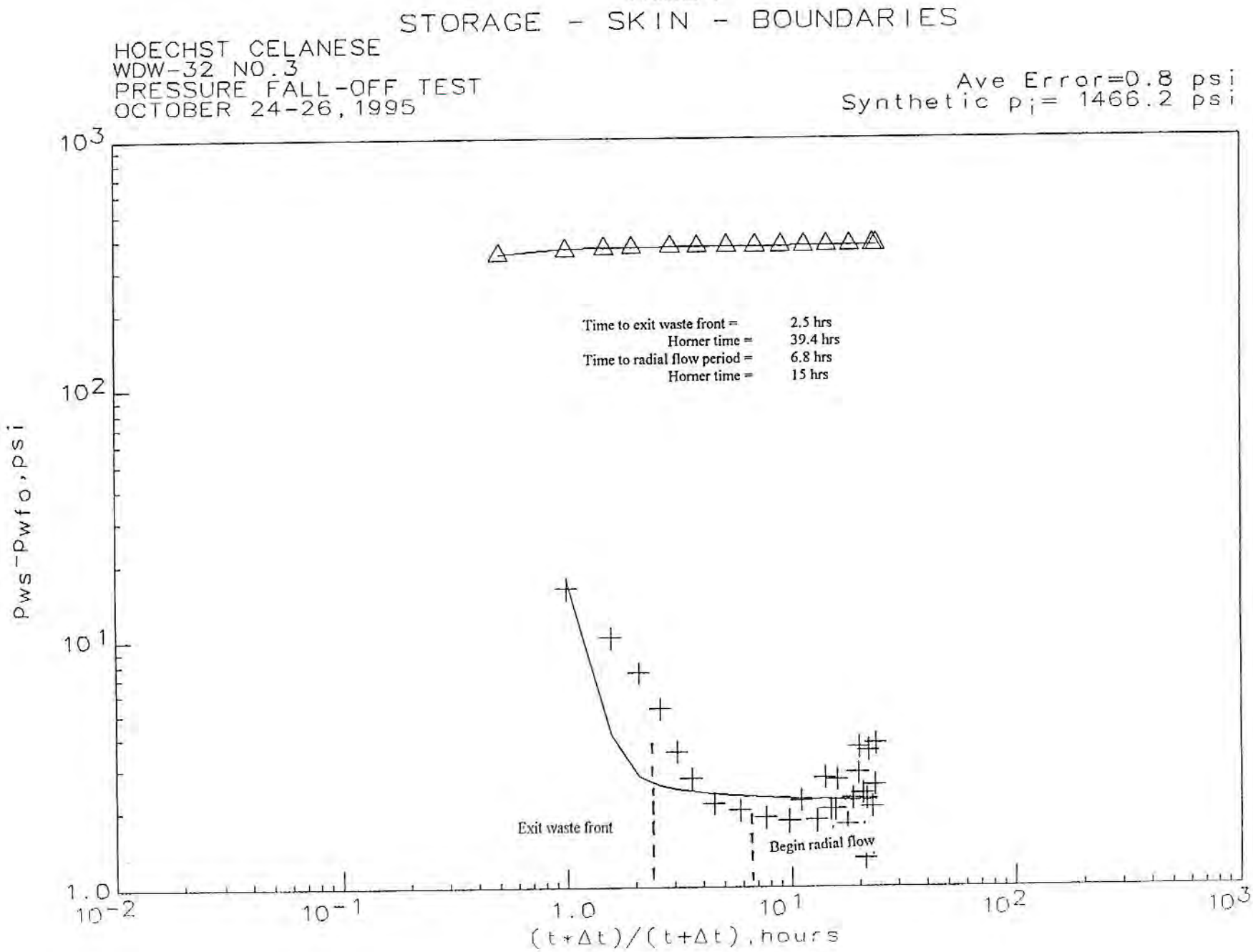

STORAGE - SKIN - BOUNDARIES
HOECHST CELANESE
WDW-32 NO.3
PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995
Ave Error=0.8 psi
Synthetic pi= 1466.2 psi
Time to exit waste front = 2.5 hrs
Horner time = 39.4 hrs
Time to radial flow period = 6.8 hrs
Horner time = 15 hrs
Exit waste front
Begin radial flow
pws-pwfo, psi
(t+Δt)/(t+Δt), hours
10^3
10^2
10^1
1.0
10^-2
10^-1
1.0
10^1
10^2
10^3

FIGURE 5

STORAGE - SKIN - BOUNDARIES

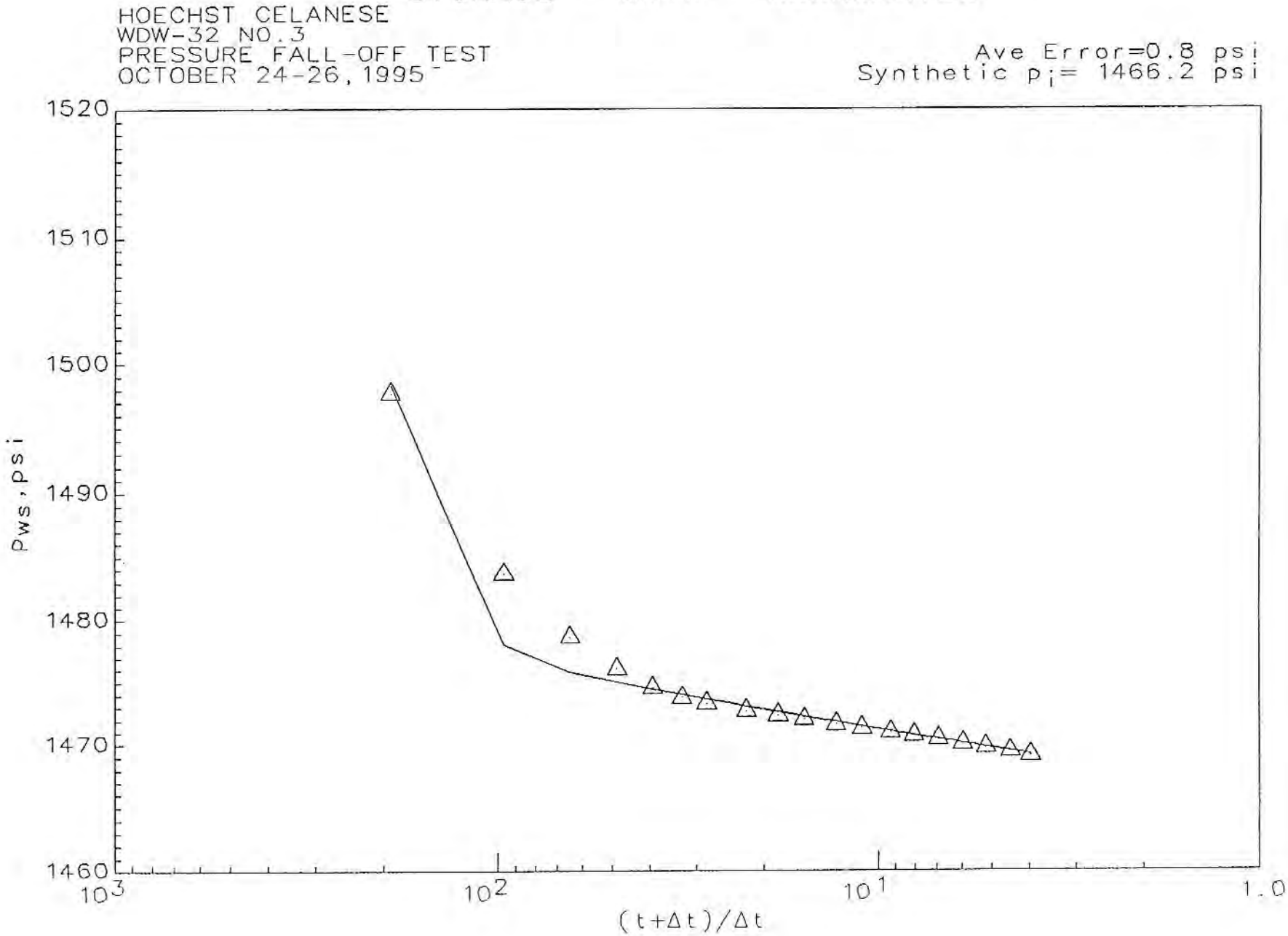


FIGURE 6

STORAGE AND SKIN TYPECURVE (Bourdet et al)

PRESSURE FALLOFF PLOT

HOECHST CELANESE
WDW-32 NO.3

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

$[k_1/u]_t$=744.09 k_1=528.30 C_D=1900 s= -

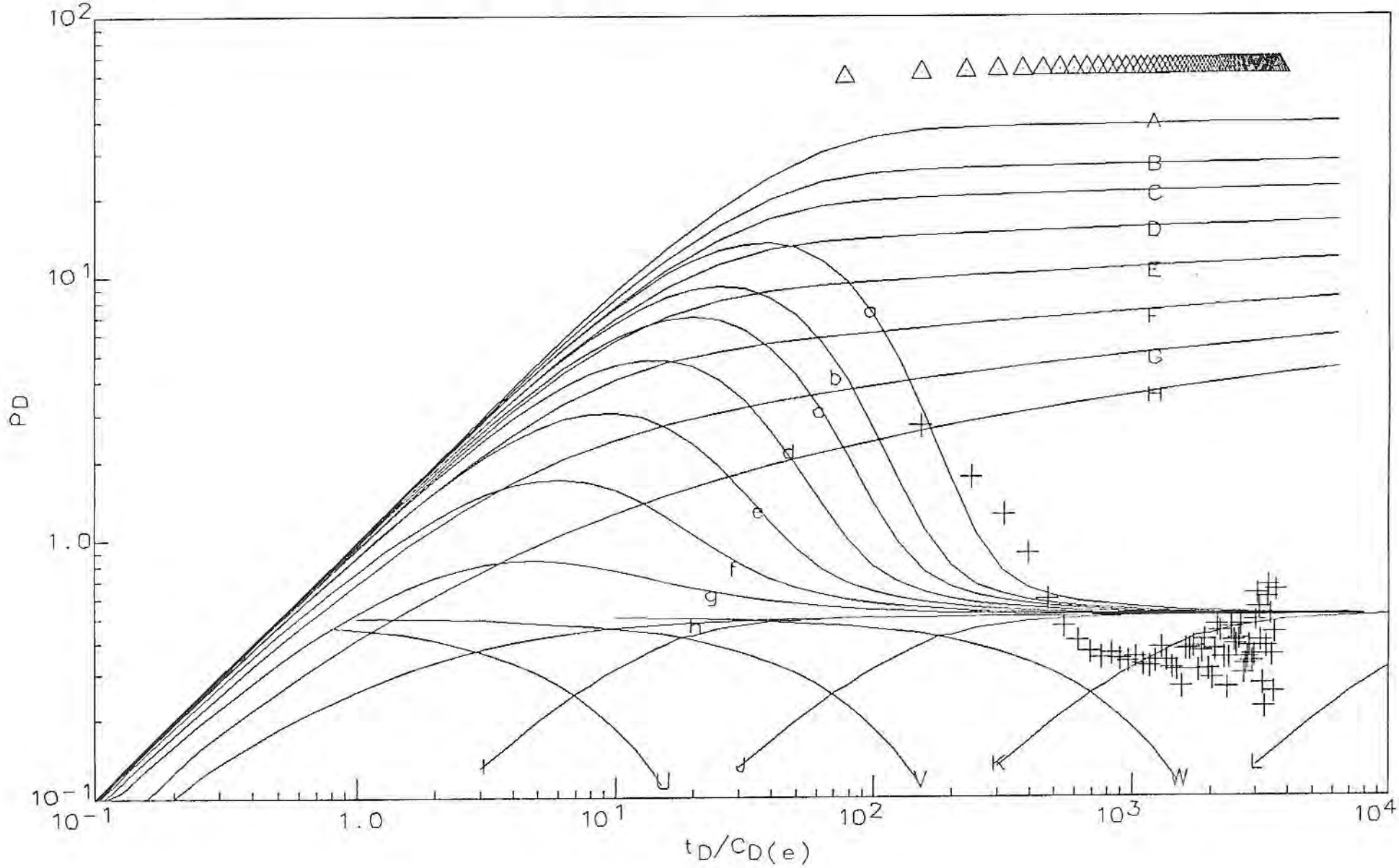


Table 4.6
FALLOFF TEST

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE
WDW-32 (WELL NO. 3)

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

Reservoir Parameters

Net Pay	h =	165.00	ft	
Total Porosity	phit =	33.00	%	
Water Saturation	Sw =	0.00	%	
Wellbore Radius	r_w =	0.58	ft	
Formation Temperature	T =	98.00	deg F	
Formation Compressibility	c_f =	3.000×10^{-06}	psi^{-1}	
Total Compressibility	c_t =	6.000×10^{-06}	psi^{-1}	<DEF>

Table 4.6 (Continued)

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE
WDW-32 (WELL NO. 3)

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

Zone 1

Pressures

Initial Pressure	pi =	1469.0	psi
Extrapolated Pressure	p* =	1466.2	psi
Average Reservoir Pressure	pR =	-	psi
Final Flowing Pressure	pwfo =	1843.2	psi

Straight Line Results

Total Sandface Rate	QTBT =	5143.00	bbl/d
Semilog Slope	msl =	4.9	psi/cycle
Transmissivity (Total)	kh/mu =	171387.54	md.ft/cp
Mobility (Total)	k/mu =	1038.712	md/cp
Flow Capacity (Oil)	kh =	121685.15	md.ft
Permeability (Oil)	k =	737.49	md
Skin Effect (Total)	s =	79.813	
Pressure Drop Due To Skin	delps =	338.2	psi
Flow Efficiency	FE =	0.19	
Damage Ratio	DR =	5.18	
Radius Of Investigation	r(inv) =	-	ft
@ Time Of Investigation	t(inv) =	-	hr

Table 4.6 (Continued)

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE
WDW-32 (WELL NO. 3)

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

Zone 1

Extended Rates

3 - Month Constant Rate	=	-	bbl/d
6 - Month Constant Rate	=	-	bbl/d

Stabilized Rate

Time To Stabilize	ts =	5.038	hr
Stabilized Rate @ Current Skin	qs =	-5811.16	bbl/d
Stabilized Rate @ Skin Of 0	qs =	-65862.12	bbl/d
Stabilized Rate @ Skin Of -4	qs =	-136615.27	bbl/d

Table 4.7

Model Parameters

Storage - Skin - Boundaries Model

HOECHST CELANESE
WDW-32 (WELL NO. 3)

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

Synthetic Initial Pressure	=	1466.2	psi

Formation Parameters

Transmissivity (Total)	kh/mu =	168683.15	md.ft/cp
Mobility (Total)	k/mu =	1022.322	md/cp
Flow Capacity	kh =	119765.03	md.ft
Permeability	k =	725.85	md
Skin	s =	78.434	
Wellbore Storage Constant (dim.)	CD =	810.75	
Inter Porosity Coeff	Lambda =	-	
Storativity Ratio	Omega =	-	

N.B. Origin At Lower Left Corner

Reservoir Length	(xe) =	100000	ft
Reservoir Width	(ye) =	100000	ft
Active Well At	xw =	50000	ft
Active Well At	yw =	50000	ft

Table 4.8
SYNTHESIZER

Storage - Skin - Boundaries Model

HOECHST CELANESE
WDW-32 (WELL NO. 3)

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

Injection Pressure			
Final Injection Rate	qo =	-5143.00	bbl/d
Final Flowing Pressure	Pwfo =	1843.2	psi
Fluid Properties			
Reference Pressure	pRef =	500.0	psi
Solution Gas Oil Ratio	Rso =	1.0	scf/bbl
Reservoir Parameters			
Net Pay	h =	165.00	ft
Total porosity	phit =	33.00	%
Water Saturation	Sw =	0.00	%
Wellbore Radius	rw =	0.58	ft
Formation Temperature	T =	98.00	deg F
Formation Compressibility	cf =	$3.000 \times 10^{-06} psi^{-1}$	
Total Compressibility	ct =	$6.000 \times 10^{-06} psi^{-1}$	<DEF>

Table 4.8 (Continued)
SYNTHESIZER

Storage - Skin - Boundaries Model

HOECHST CELANESE
WDW-32 (WELL NO. 3)

PRESSURE FALL-OFF TEST
OCTOBER 24-26, 1995

Synthesis Results

Average Error	=	0.8	psi
Initial Pressure	pi =	1469.0	psi
Average Reservoir Pressure	pR =	1466.2	psi
Pressure Drop Due To Skin	delps =	-	psi
Flow Efficiency	FE =	1.90	
Damage ratio	DR =	0.53	

Extended Rates

3 - Month Constant Rate	=	-5052.60	bbl/d
6 - Month Constant rate	=	-5032.69	bbl/d
1 - Year Constant Rate	=	-5008.53	bbl/d
1 - Year Constant Rate @ Skin Of 0	=	-39209.68	bbl/d
1 - Year Constant Rate @ Skin Of -4	=	-60160.14	bbl/d

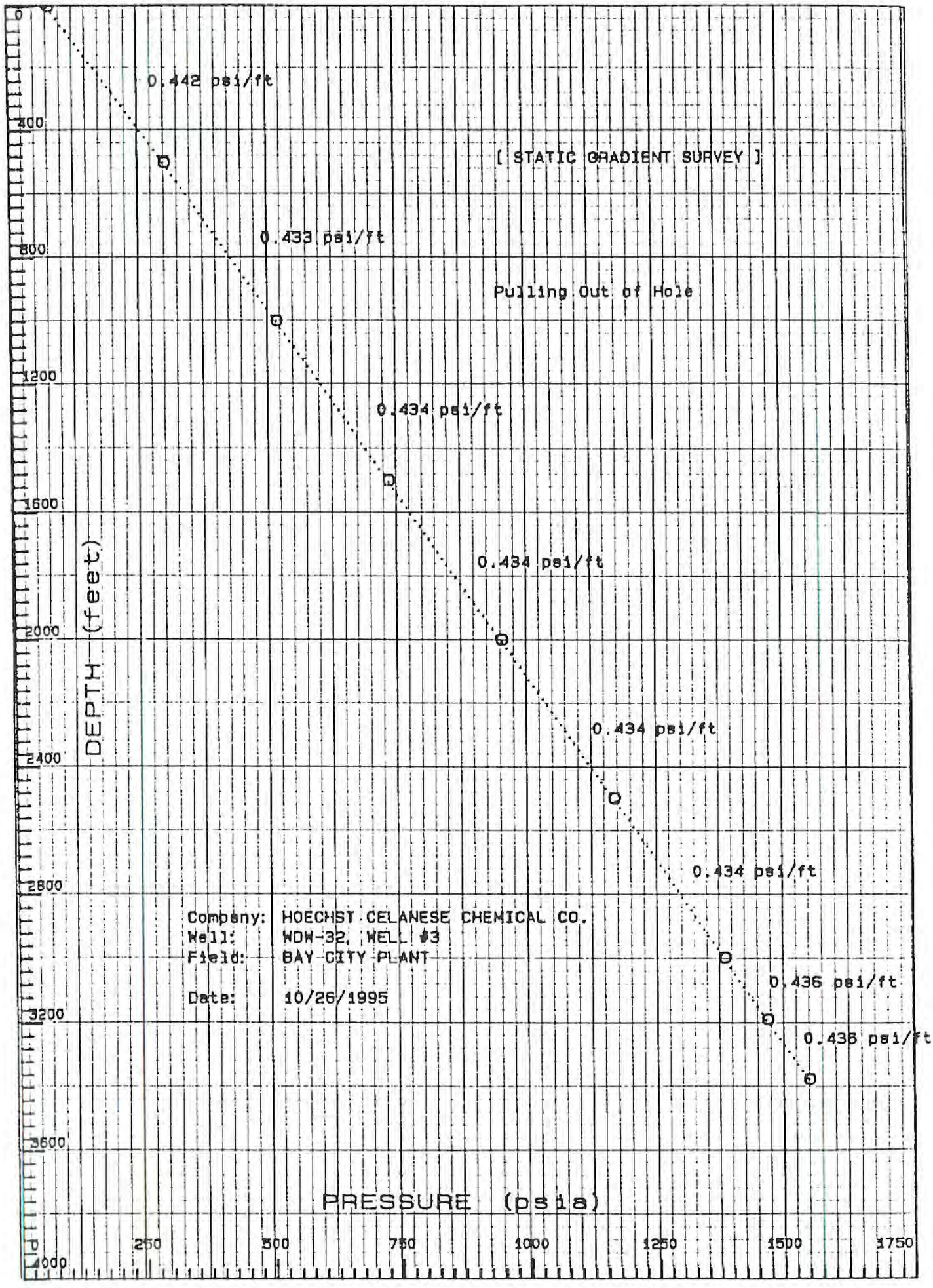
4.2 STATIC GRADIENT SURVEY

A static gradient survey was conducted while pulling out of the hole immediately following the bottom hole pressure falloff test. Stops were made at 3000', 2500', 1500', 1000', 500' and surface. Data collected during the static gradient survey is included in Appendix G and presented graphically in Figure 7. Data collected at each stop were as follows:

Table 4.9
Static Gradient Survey Results

Depth (ft)	Pressure (psia)	PSI/ft
0	78.16	
500	299.23	0.442
1000	515.91	0.433
1500	732.94	0.434
2000	950.13	0.434
2500	1167.31	0.434
3000	1384.43	0.434
3192	1468.15	0.436
3440*	1576.28	0.436

* Pressure extrapolated to mid-point perforations.


0.442 psi/ft
[STATIC GRADIENT SURVEY]
0.433 psi/ft
Pulling Out of Hole
0.434 psi/ft
0.434 psi/ft
0.434 psi/ft
0.434 psi/ft
0.436 psi/ft
0.436 psi/ft
Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-32, WELL #3
Field: BAY CITY PLANT
Date: 10/26/1995
DEPTH (feet)
0
400
800
1200
1600
2000
2400
2800
3200
3600
4000
PRESSURE (psia)
0
250
500
750
1000
1250
1500
1750

SOLUTIONS, INC.

Final Report

Hoechst Celanese Chemical Group, Ltd.
Bay City, Texas
Closure Report
Injection Well WDW-49 (Well No. 4)

ECO Job 96015A

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, Texas 77042
(713) 780-1955
FAX (713) 780-0870

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HOECHST CELANESE CHEMICAL GROUP, LTD.
BAY CITY TEXAS PLANT

CLOSURE OF CLASS I INJECTION WELL
WDW-49 (WELL #4)

RECEIVED
NOV 2 2 1996

SOLUTIONS, INC.

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- FRIDAY 10/11/96 8
- SATURDAY 10/12/96 8
- SUNDAY 10/13/96 8
- MONDAY 10/14/96 8
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- WEDNESDAY 10/16/96 9
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APPENDIX A - CONSENT TO REVOCATION OF TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

APPENDIX B - CEMENTING INFORMATION

APPENDIX C - CORRESPONDENCE

APPENDIX D - COPY OF FINAL MECHANICAL INTEGRITY TEST REPORT

PLUG AND ABANDON CERTIFICATION

The undersigned has reviewed all pertinent information concerning the plugging and abandonment of the Hoechst Celanese Chemical Group, Ltd. (HCCG) Class I injection well WDW-49 (Well #4) with regards to the plans and specifications set forth in Texas Natural Resource Conservation Commission (TNRCC), Underground Injection Control (UIC) Program and the current Federal and TNRCC requirements for the plugging and abandonment of a Class I injection well located in the State of Texas.

In accordance with TNRCC/UIC Program, 31 TAC 331.46 and the closure standards of HCCG's UIC Permit, I certify that WDW-49 (Well #4) was plugged and abandoned in compliance with the permit and applicable TNRCC regulations in effect at the time of closure

This certification is not valid unless the engineer's original signature and raised seal are present.

11/15/96
DATE

(SEAL)

Wesley W. Smith, P.E.
Texas Professional Engineer
No. 29398

1.0 INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

Hoechst Celanese Chemical Group, Ltd. (HCCG) contracted with ECO Solutions, Inc. (ECO) to perform the plugging and abandonment (P&A) of Class I injection well, WDW-49 (Well No. 4), located at their Bay City plant. A schematic drawing of WDW-49 prior to and following P&A operations are included as Figures 1 and Figure 2, respectively. The attached report details the field activities and data associated with project.

The following provides an overview of the key elements of the P&A on WDW-49 (Well No. 4).

- Hoechst Celanese submitted and received approval for a closure plan as required by the Texas Natural Resource Conservation Commission (TNRCC), Underground Injection Control (UIC) Program, and the regulations contained within 31 TAC 331.46.

- A 50' section of the 7-5/8" long string casing string above the injection interval was removed by milling and underreamed out to a 15" radial diameter. Subsequent cementing operations re-established a secure cement plug between the 7 5/8" casing and confining shales.

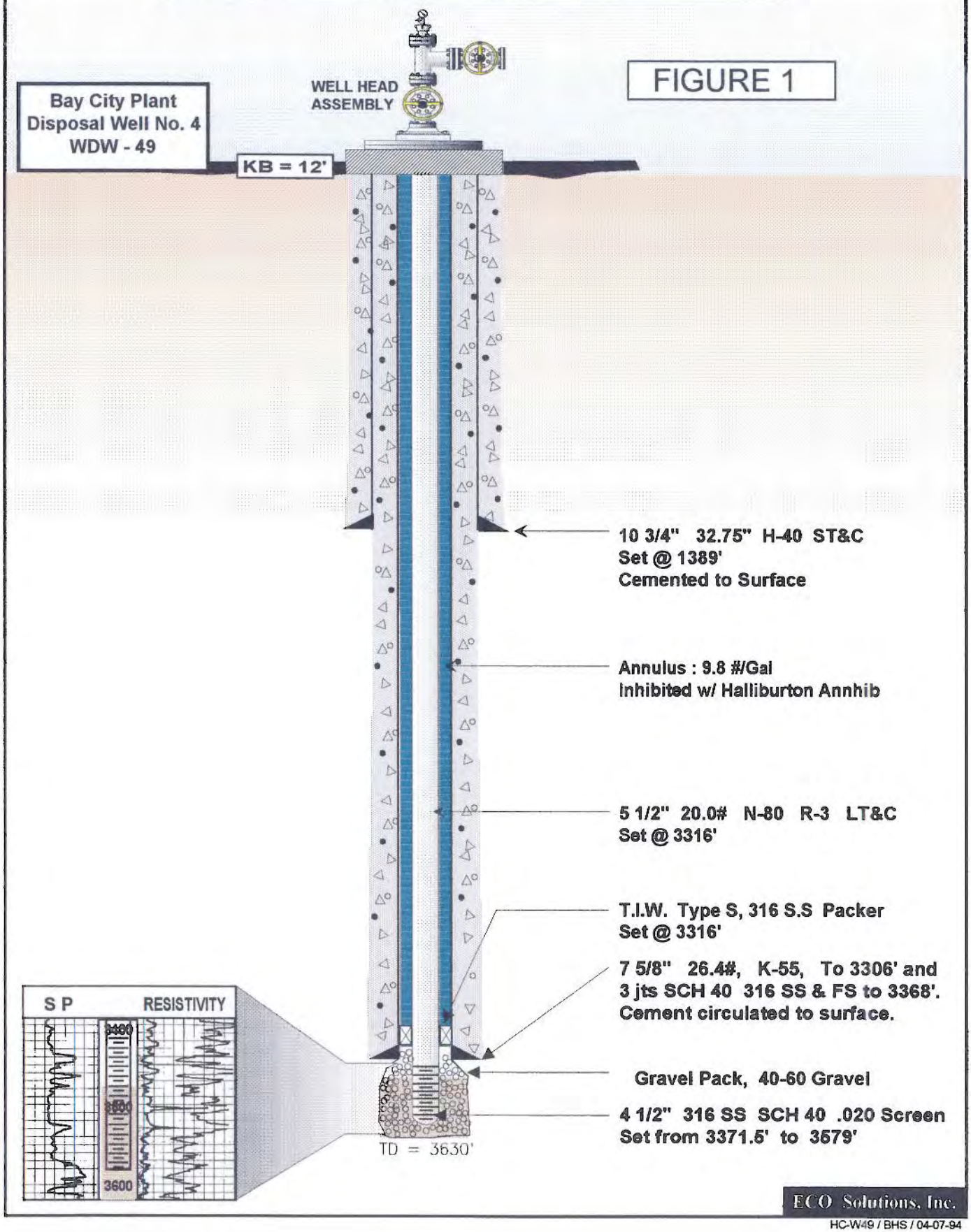
- Squeeze cementing was accomplished through a perforated section of 7+5/8" casing below 10 3/4" surface casing shoe depth. This action improved the cement seal below the lowermost underground source of drinking water (USDW).

- Pertinent P & A data was placed on welded steel plate installed at the surface.

- Contained within the closure report is an executed copy of the Consent To Revocation Of Texas Natural Resource Conservation Commission Permit WDW- 49 form and a copy of the recorded deed was submitted to the TNRCC under a separate cover.

HCCG and/or ECO personnel contacted the TNRCC Austin office prior to commencing and during field operations to allow TNRCC personnel to witness cementing events during the P&A field operations.

HOECHST CELANESE CHEMICAL GROUP, Ltd.

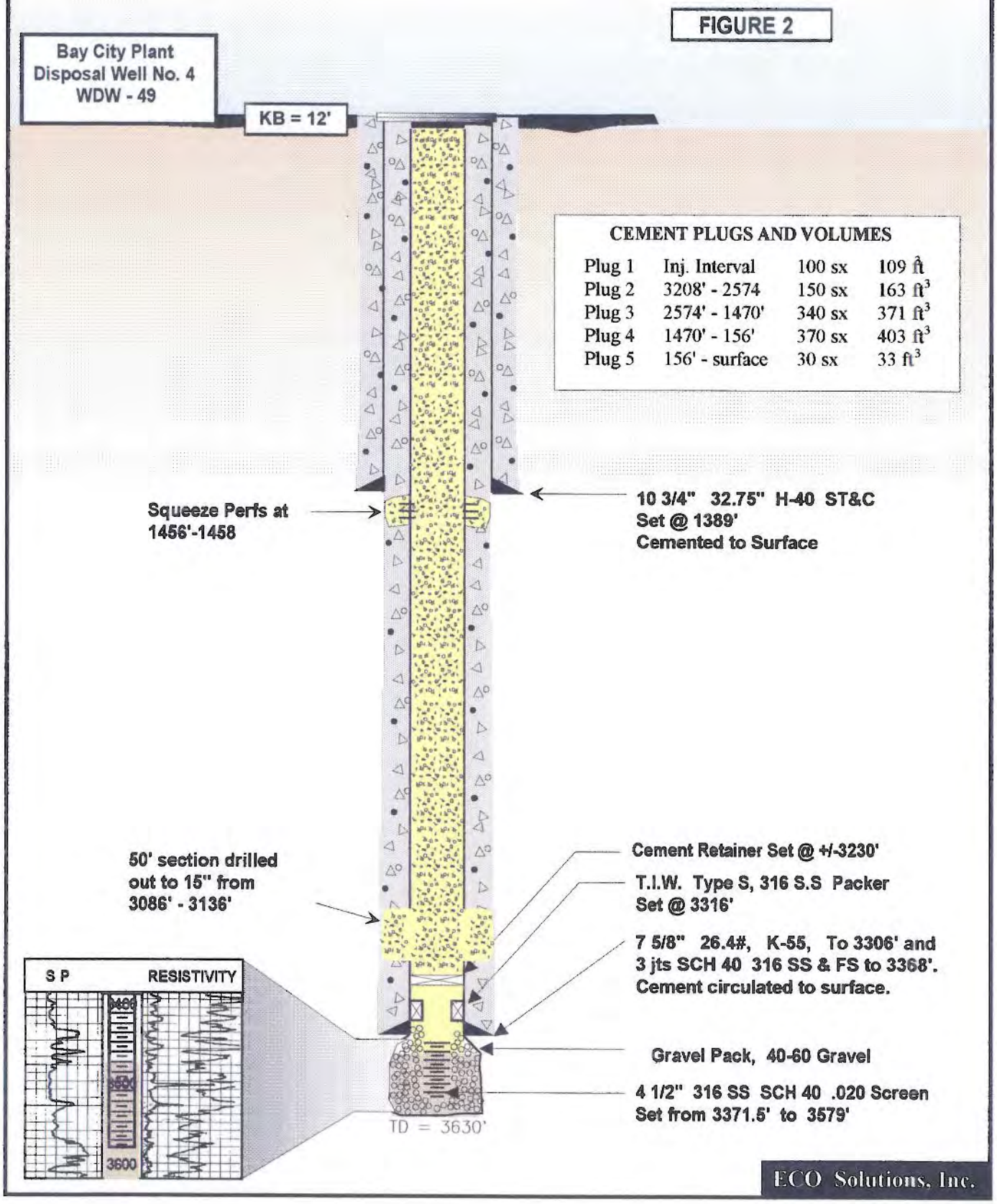


ECO Solutions, Inc.

HC-W49 / BHS / 04-07-94

HOECHST CELANESE CHEMICAL GROUP, INC.

FIGURE 2



CEMENT PLUGS AND VOLUMES

Plug 1	Inj. Interval	100 sx	109 ft
Plug 2	3208' - 2574	150 sx	163 ft^3
Plug 3	2574' - 1470'	340 sx	371 ft^3
Plug 4	1470' - 156'	370 sx	403 ft^3
Plug 5	156' - surface	30 sx	33 ft^3

ECO Solutions, Inc.

1.2 SUMMARY OF CLOSURE ACTIVITIES

Dawson workover rig no. 356 was rigged up on WDW-49 (Well #4) to perform the milling and underreaming operations on the 7+5/8" 0. D. casing string. The 5 ½ " injection tubing was removed and a Halliburton wireline set "EZ-SV" cement retainer was set at 3230' ± . Cement plug No. 1 consisting of 100 sacks (109 ft^3) of Halliburton premium cement was placed into the injection interval and 22' above the cement retainer. The 7+5/8" casing was milled in the confinement interval from 3086' to 3136' and then the original cement was underreamed from 3050' to 3140' to a radial diameter of 15". Cement plug No 2 consisting of 150 sacks (163 ft^3) of Halliburton premium cement was placed from 3208' to 2574'. Cement plug No. 3 consisting of 340 sacks (371 ft^3) of Halliburton premium cement was placed from 2574' to 1470'. The 7+5/8" O.D. long string casing was perforated from 1456' to 1458' with 4 shots per foot. Cement No. 4 consisting of 370 sacks (403 ft^3) of Halliburton premium cement was placed from 1470 to 156'. A final cement plug no. 5 consisting of 30 sacks (33 ft^3) was placed from 156' to the surface. A 1/2" thick stainless steel plate with pertinent data inscribed on top, was welded to 7+5/8" casing extending up to grade and surrounded by cement at the surface.

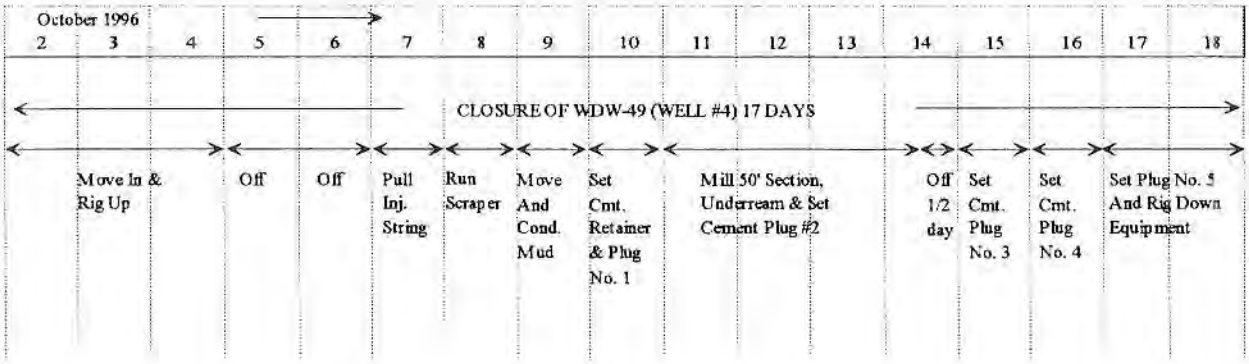
The plugging and abandonment of HCCG's WDW-49 field work was completed on October 18, 1996.

1.3 PROJECT TIMELINE

Figure 3 below is a project timeline that illustrates the key closure events versus the date. The field activities started on October 2, 1996 and ended on October 18, 1996. The total number of field days was 17.

Figure 3

CLOSURE OF WDW-49 (WELL #4) TIMELINE



2.0 SUMMARY OF FIELD ACTIVITIES

WEDNESDAY 10/2/96

Set rig anchors for support cables. Move in substructure. Moving tanks and equipment.

THURSDAY 10/3/96

Finish setting up rig. Continue to move in tanks, racks and other equipment from WDW-32 (well #3) to WDW-49 (well #4) location.

FRIDAY 10/4/96

Finish moving equipment and rigging up on WDW-49. Pump 250 bbls to triple rinse injection string. Pick up on injection string in release seal assembly. Remove wellhead. Nipple up blow out preventers and hydril. Prepare to remove injection string. Thomas Jones contacted Kathryn Herzog with the TNRCC to update her on the schedule the following week.

SATURDAY AND SUNDAY 10/5-6/96

Shut down with no cost. Field operations will resume on Monday 10/7/96

MONDAY 10/7/96

Continue rigging up equipment and preparing location. Franks Casing Crew arrived on location and rigged up their tongs and lay down machine in preparation for removal of the injection string from WDW-49 (Well #4). Pull of the hole and lay down 75 joints of pipe. The injection string was visually observed to be in excellent condition. Used Hoechst Celanese cherry pickers and riggers to move injection string to wash racks and move work string to well site. Bob Hall had a telephone conversation with Jim Boswell with the TNRCC to update him on the upcoming cementing schedule.

TUESDAY 10/8/96

Finish pulling remaining 4 joints of injection tubing from WDW-49. The total number of joints removed was 79. The injection tubing was transferred to the Hoechst Celanese wash area using plant cherry pickers and riggers. Rig down Franks equipment and lay down machine. Pick up 3 ½ " work string from racks and make up bit and scraper. Go in hole with bit and scraper to 3725'. No obstructions encountered. Pull out of the hole with the work string.

WEDNESDAY 10/9/96

Finish cleaning mud and mud mixing tank and use CAT to remove from WDW-32 (Well #3) location. Move mud and mixing tank to WDW-49 (Well #4) location. Move frac tanks to new location. Transfer drilling mud to tanks at WDW-49 (Well #4) location using super sucker truck. Condition mud in tanks in preparation for first cement plug and section milling. Rig up no. 1 and no. 2 PA-H mud mixing pumps. Finish setting up of equipment prior to start of 24 hour operations.

THURSDAY 10/10/96

Jim Boswell, TNRCC on Location

Move in and rig up Halliburton Logging Services to set EZ-SV cement retainer. Ran junk basket and gauge ring with GR/CCL. Ran correlation log from 3,316' - 2,500' and then again from 1700' - 1000'. Pulled out of the hole.

Closed blind rams and pump 200 bbls of clean brine down 7+5/8" casing. Brine intended to flush wellbore of annulus corrosion inhibitor and confirm well did not sand over while pulling the 5+1/2" injection string. No sand fill-up problems.

Picked up 7-5/8" EZ-SV cement retainer and went in hole with same on wireline. Set same at 3,230'. Pulled out of the hole with wireline and rigged down logging unit.

Closed blind rams and pressure tested casing and retainer to 500 psig for 15 minutes to confirm proper set- O.K. Picked up Halliburton Star Guide and went in hole with same on 3+1/2" drill pipe and stung into retainer and applied 20,000# compression on retainer. Pressure tested drill pipe/casing annulus to 500 psig for 2 minutes. OK. Pulled Star Guide out of retainer. Rigged up Halliburton pump truck and pumped 10 bbl fresh water spacer followed with 158 bbl 9.9#/gal mud followed with 20 bbl fresh water spacer down drill pipe. Stung back into retainer using 20,000# compression and pressure test annulus to 500 psig for 2 minutes - OK. Pumped 350 bbl fresh water into formation. Bleed pressure back from 865 to 390 psig and maintain same pressure during cementing operations.

Performed cement plug #1 using 100 sacks premium neat cement (1.09 cu. ft./sx yield). Displaced cement with 1 bbl fresh water, 22 bbl mud and pulled stinger (Star Guide) out of retainer. Pulled end of drill pipe up to 3180' & reversed circulated about 20 bbl mud. Rigged down Halliburton. Cement plug #1 set & completed at 1900 hours. Commenced circulating and conditioning mud at 1930 hours. Will circulate and condition mud while waiting on the cement column to cure. At 2030 hours Mud: 10.0 wt., 43 vis. Mr. Boswell (TNRCC) left location and plans to return to well site tomorrow AM.

FRIDAY OCTOBER 11, 1996

Continued circulating and conditioning mud system- gradually increasing yield point and fluid viscosity (desired yield point 8 - 10, currently 2 - 4; viscosity 60 - 70 seconds, currently 43 seconds. At 0100 hours mud started foaming. Ordered out mud defoaming chemical at 0130. Continued conditioning mud system. Treated mud system w/aluminum stereate (defoamer). Circulated treatment 2 full circulations.

Tagged top of cement at 3208', 22' of cement above retainer. Notified Jim Boswell , TNRCC of tagged depth. Jim was pleased with closure operations and stated that a TNRCC representative would not be present to witness the remaining cementing jobs. However, Mr. Boswell requested an update on rig activities next Thursday (10/17/96).

Started out of the hole with drill pipe at 12:00 p.m. - drill pipe pulling wet. Rigged up mud bucket to catch overflow. Rigging up to run section mill & drill collars 1500 to 2100 hours. Continued to circulate to clean up solids in mud system 2100 to 2200 hours. Commenced milling at 3086' at 2200 hours while circulating at a rate of 3-1/4 BPM, 80 RPM and 2-6,000 WOB. Milled from 3086' to 3098' in 9 hours with milling rate varying from 0.5 to 3 ft/hr.

SATURDAY OCTOBER 12, 1996

Mud Conditions: 9.5 - wt., 55 viscosity and recovering considerable iron and cement. At 0700 hours drilling at 3098'. Adding gel & additives to mud system to raise weight and viscosity. Milled from 3098' to 3109' from 0700 to 1900 hours (12) hours using 5-6,000 WOB, 4.8 BPM and 100 RPM. Continuing to mill ahead from 1900 to 2400 hours from 3109' to 3130'.

SUNDAY OCTOBER 13, 1996

Milling from 3130' to 3136' from 0000 to 0200 hours with same drilling conditions. Continued to circulate hole to remove solids from mud system from 0200 to 0330 hours. Also, transferred liquid mud from diked area through shale shaker back into mud storage system. Pulled out of hole and lay down mill. Picked up underreamer and ran into hole with drill collars on drill pipe and commenced opening hole to 15" from 3095' to 3140. Picked up underreamer and enlarged hole from 3090' to 3093'. Pull out of the hole and rack back drill collars. Lay down underreamer. Rig up Halliburton. Go into the hole open ended to top of last plug. Pump 20 bbl. Mud flush followed by 150 sack , 29 bbl premium cement. Pull out of the hole and close rams. Rig down Halliburton and wait on cement. Field operations will continue on a daylight basis on Tuesday. The estimated top of cement is 2580'.

MONDAY 10/14/96

Continue to wait on cement to set. The minimum cement curing time extended until noon on Monday. A decision was made to postpone resumption of closure operations until Tuesday morning. The decision to postpone operations due to the shortened day and the resumption of daylight operations.

Tuesday 10/15/96

Go in the hole open-ended with 3 ½ " drill pipe. Tag top of cement at 2574' and calculate cement requirements for plug #3. Cement plug #3 will extend from top of cement plug #2 up to 1450' ± (base of surface casing is at 1385'). Circulate rental drilling mud from wellbore with freshwater in Dawson open top 200 bbl. water tank. Circulate mud back to mud tanks. Utilize portable trash pump to pump mud from mud tanks to vacuum trucks. Francis will provide 5 vacuum trucks to transport mud from Hoechst Celanese plant to Francis storage in Galveston. Utilize AB Clean super sucker to empty volume of mud, metal and miscellaneous solids in lined portion of ditch. Utilize super sucker to clean both Dawson and Francis mud mixing tanks. Muddy water remaining from clean effort is stored in frac tanks for disposal by Hoechst Celanese.

Move in and rig up Halliburton to set premium cement plug #3. Set balanced cement plug using 340 sx (371 ft^3). Plug will extend from the top of cement plug #2 up to 1400'. Pull base of drill pipe up to 1475' and reverse circulate excess cement out of wellbore into lined ditch. Pull out of the hole and wait on cement overnight.

Wednesday 10/16/96

Open up with zero (0) psig. Remove 6" flowline and bell nipple and rig up Atlas wireline unit. Go into the hole with 5" perforating gun and tag top of cement at 1470'. Perforate from 1456' to 1458 with four shots per foot (4 spf). Go into the hole with work string to 1460' and rig up Halliburton. Set balanced plug extending from 1460' to 156'. Pull out of the hole laying down 46 joints of 3 1/2" drill pipe.

Thursday 10/17/96

Go into the hole and tag cement at 156'. Rig down substructure and stack using Hoechst Celanese cherry picker and rigger. Go into hole with work string and pump cement to surface. Lay down work string. Rig down Halliburton. Rig down pumps, generator and other equipment.

Friday 10/18/96

Continue to rig down and remove equipment.

APPENDIX A

CONSENT TO REVOCATION OF TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

CONSENT TO REVOCATION OF

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT

I, C.R. Pennington, Facility Manager, acting on behalf of
(Name & Title)
Hoechst Celanese Chemical Group, Ltd., do hereby consent to
(Name of Permittee)

the revocation of Texas Natural Resource Conservation Commission Permit No. WDW-49, pursuant to the provisions of 30 TAC Section 305.67 (b).

The activities regulated by the permit were:

( ) Never begun (Wastewater treatment facility was not constructed)

(x) Terminated on or about (Date) October 18, 1996 (Waste Disposal Well plugged and abandoned)

Facility dismantled ( ); Facility will be dismantled ( ); Facility will be sold and relocated ( ).

( ) Diverted to another permitted wastewater treatment system
Please identify the facility to which flow has been diverted _____ and the approximate date the diversion occurred _____.

I also certify that there are no materials remaining at the permitted site which endanger ground or surface water quality.

(Signature)

(409) 241-4000
(Telephone No.)

November 13, 1996
(Date)

APPENDIX B

CEMENTING INFORMATION

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W - 3
Rev. 12/92

API NO. (if available)

1. RRC District

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id. Number

2. FIELD NAME (as per RRC Records)

3. Lease Name

5. Well Number

. OPERATOR

6a. Original Form W-1 Filed in Name of:

10. County

. ADDRESS

6b. Any Subsequent W-1's Filed in Name of:

11. Date Drilling Permit Issued

. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is located

Feet From Line and Feet From Line of the Lease

12. Permit Number

9a. SECTION, BLOCK, AND SURVEY

9b. Distance and Direction From Nearest Town in this County

13. Date Drilling Commenced

6. TYPE WELL (OIL,GAS,DRY)

Total Depth

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No's

GAS ID or OIL LEASE #

Oil - O Gas - G

WELL #

14. Date Drilling Completed

18. If Gas, Amt. of Cond. on Hand at time of Plugging

15. Date Well Plugged

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	10/10/96							
20. Size of Hole or Pipe in which Plug Placed (inches)								
21. Depth to Bottom of Tubing or Drill Pipe (ft.)								
*22. Sacks of Cement Used (each plug)	100							
*23. Slurry Volume Plumped (cu. ft.)	109							
*24. Calculated Top of Plug (ft.)	3210							
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.	16.2							
*27. Type Cement	H							

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)

29. Was any Non - Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non - drillable material.

(Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLD AND/OR PERFORATED INTERVALS

FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such imformation.

* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

BILLY F. YANDELL 11/2/96 B.F. Yandell

Signature of Cementer or Authorized Representative

HALLIBURTON ENERGY SERVICES

Name of Cementing Company

CERTIFICATE

I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

REPRESENTATIVE OF COMPANY | TITLE | DATE | Phone A/C NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISSION

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W-3
Rev. 12/92

API NO. (if available)

1. RRC District

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id. Number

2. FIELD NAME (as per RRC Records)

3. Lease Name: Hoechst Celanese

5. Well Number: 4

6. OPERATOR

6a. Original Form W-1 Filed in Name of:

10. County

7. ADDRESS

6b. Any Subsequent W-1's Filed in Name of:

11. Date Drilling Permit Issued

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is Located: Feet From Line and Feet From Line of the Lease

12. Permit Number

9a. SECTION, BLOCK, AND SURVEY

9b. Distance and Direction From Nearest Town in this County

13. Date Drilling Commenced

16. Type Well (Oil, Gas, Dry)

Total Depth

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No.'s

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #

14. Date Drilling Completed

18. If Gas, Amt. of Cond. on Hand at time of Plugging

15. Date Well Plugged

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	10/13/96							
20. Size of Hole or Pipe in which Plug Placed (inches)								
21. Depth to Bottom of Tubing or Drill Pipe (ft.)								
*22. Sacks of Cement Used (each plug)	150							
*23. Slurry Volume Pumped (cu. ft.)	163.5							
*24. Calculated Top of Plug (ft.)	2531							
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. # /Gal.	16.2							
*27. Type Cement PREMIUM	NEAT							

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)

29. Was any Non-Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non-drillable material. (Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS

FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.

* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

Michael Patek

Signature of Cementer or Authorized Representative

Halliburton Energy Services

Name of Cementing Company

CERTIFICATE

I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

Michael Patek	Service Supervisor	10/13/96	Phone 800	223-0898
REPRESENTATIVE OF COMPANY	TITLE	DATE	A/C	NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISSION

CEMENTING TO PLUG AND ABANDON	PLUG # 1	PLUG # 2	PLUG # 3	PLUG # 4	PLUG # 5	PLUG # 6	PLUG # 7	PLUG # 8
23. Cementing date	10/13/96							
24. Size of hole or pipe plugged (in.)								
25. Depth to bottom of tubing or drill pipe (ft.)								
26. Sacks of cement used (each plug)	150							
27. Slurry volume pumped (cu. ft.)	163.5							
28. Calculated top of plug (ft.)	2531							
29. Measured top of plug, if tagged (ft.)								
30. Slurry wt. (lbs/gal)	16.2							
31. Type cement	Prem-Neat							

CEMENTER'S CERTIFICATE: I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this certification, that the cementing of casing and/or the placing of cement plugs in this well as shown in the report was performed by me or under my supervision, and that the cementing data and facts presented on both sides of this form are true, correct, and complete, to the best of my knowledge. This certification covers cementing data only.

Michael Patek Service Supervisor Halliburton Energy Services Michael Patek

Name and title of cementer's representative | Cementing Company | Signature

P.O. BOX 1172 Fresno , TX 77545 | 800 223-0898 | 10/13/96

Address | City, State, Zip Code | Tel.: Area Code Number | Date: mo. day yr.

OPERATOR'S CERTIFICATE: I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this certification, that I have knowledge of the well data and information presented in this report, and that data and facts presented on both sides of this form are true, correct, and complete, to the best of my knowledge. This certification covers all well data.

Typed or printed name of operator's representative | Title | Signature

Address | City, State, Zip Code | Tel.: Area Code Number | Date: mo. day yr.

Instructions to Form W-15, Cementing Report

IMPORTANT: Operators and cementing companies must comply with the requirements of the Commission's Statewide Rules 8 (Water Protection), 13 (Casing, Cementing, Drilling, and Completion), and 14 (Well Plugging). For **offshore** operations, see the requirements of Rule 13 (c).

A. **What to file.** An operator should file an original and one copy of the completed Form W-15 for each cementing company used on a well. The cementing of different casing strings on a well by one cementing company may be reported on one form. Form W-15 should be filed with the following:

- An initial oil or gas completion report, **Form W-2 or G-1**, as required by Statewide or special field rules;
- Form **W-4**, Application for Multiple Completion, if the well is a multiple parallel casing completion; and
- Form **W-3**, Plugging Record, unless the W-3 is signed by the cementing company representative. When reporting **dry** holes, operators must complete Form **W-15, in addition to Form W-3, to show any casing cemented in the hole.**

B. **Where to file.** The appropriate Commission District Office for the county in which the well is located.

C. **Surface casing.** An operator must set and cement sufficient surface casing to protect all usable-quality water strata, as defined by the Texas Department of Water Resources, Austin. Before drilling a well in any field or area in which no field rules are in effect or in which surface casing requirements are not specified in the applicable rules, an operator must obtain a letter from the Department of Water Resources stating the protection depth. Surface casing should not be set deeper than 200 feet below the specified depth without prior approval from the Commission.

D. **Centralizers.** Surface casing must be centralized at the shoe, above and below a stage collar or diverting tool, if run, and through usable-quality water zones. In nondeviated holes, a centralizer must be placed every fourth joint from the cement shoe to the ground surface or to the bottom of the cellar. All centralizers must meet API specifications.

E. **Exceptions and alternative casing programs.** The District Director may grant an exception to the requirements of Statewide Rule 13. In a written application, an operator must state the reason for the requested exception and outline an alternate program for casing and cementing through the protection depth for strata containing usable-quality water. The District Director may approve, modify, or reject a proposed program. **An operator must obtain approval of any exception before beginning casing and cementing operations.**

F. **Intermediate and production casing.** For specific technical requirements, operators should consult Statewide Rule 13 (b) (3) and (4).

G. **Plugging and abandoning.** Cement plugs must be placed in the wellbore as required by Statewide Rule 14. The District Director may require additional cement plugs. For onshore or inland wells, a 10-foot cement plug must be placed in the top of the well, and the casing must be cut off three feet below the ground surface. All cement plugs, except the top plug, must have sufficient slurry volume to fill 100 feet of hole, plus ten percent for each 1,000 feet of depth from the ground surface to the bottom of the plug.

To plug and abandon a well, operators must use only cementers approved by the Director of Field Operations. Cementing companies, service companies, or operators can qualify as approved cementers by demonstrating that they are able to mix and pump cement in compliance with Commission rules and regulations.

Plugging Record

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

FORM W-3
Rev. 12/92

API NO. (if available)

1. RRC District

FILE IN DUPLICATE WITH DISTRICT OFFICE OF DISTRICT IN WHICH WELL IS LOCATED WITHIN THIRTY DAYS AFTER PLUGGING

4. RRC Lease or Id. Number

2. FIELD NAME (as per RRC Records): Bay City

3. Lease Name: Hoechst Celanese

5. Well Number: 49-4

6. OPERATOR: ECO Solutions

6a. Original Form W-1 Filed in Name of:

10. County: Matagorda

7. ADDRESS

6b. Any Subsequent W-1's Filed in Name of:

11. Date Drilling Permit Issued

8. Location of Well, Relative to Nearest Lease Boundaries of Lease on which this Well is Located: Feet From ____ Line and ____ Feet From ____ Line of the ____ Lease

12. Permit Number

9a. SECTION, BLOCK, AND SURVEY

9b. Distance and Direction From Nearest Town in this County

13. Date Drilling Commenced

16. Type Well (Oil, Gas, Dry)

Total Depth

17. If Multiple Completion List All Field Names and Oil Lease or Gas ID No.'s

GAS ID or OIL LEASE #	Oil - O Gas - G	WELL #

14. Date Drilling Completed

18. If Gas, Amt. of Cond. on Hand at time of Plugging

15. Date Well Plugged

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7	PLUG #8
*19. Cementing Date	10/16	10/17/96						
20. Size of Hole or Pipe in which Plug Placed (inches)								
21. Depth to Bottom of Tubing or Drill Pipe (ft.)								
*22. Sacks of Cement Used (each plug)	370	30						
*23. Slurry Volume Pumped (cu. ft.)	403	32.7						
*24. Calculated Top of Plug (ft.)	Surface	Surface						
25. Measured Top of Plug (if tagged) (ft.)								
*26. Slurry Wt. #/Gal.	16.2	16.2						
*27. Type Cement 1/4#/SK Flocele	Prem	Neat						

28. CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT. #/FT.	PUT IN WELL (ft.)	LEFT IN WELL (ft.)	HOLE SIZE (in.)

29. Was any Non-Drillable Material (Other than Casing) Left in This Well ☐ Yes ☐ No

29a. If answer to above is "Yes" state depth to top of "junk" left in hole and briefly describe non-drillable material. (Use Reverse Side of Form if more space is needed.)

30. LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS

FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO
FROM	TO	FROM	TO

I have knowledge that the cementing operations, as reflected by the information found on this form, were performed as indicated by such information.
* Designates items to be completed by Cementing Company. Items not so designated shall be completed by Operator.

Signature of Cementer or Authorized Representative

Halliburton Energy Services
Name of Cementing Company

CERTIFICATE:
I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct, and complete, to the best of my knowledge.

Michael Supak	Service Supervisor	10/17/96	Phone 800	223-0898
REPRESENTATIVE OF COMPANY	TITLE	DATE	A/C	NUMBER

SIGNATURE: REPRESENTATIVE OF RAILROAD COMMISSION

Cementer: Fill in shaded areas.
Operator: Fill in other items.

Form W-15
Cementing Report
Rev. 4/1/83
483-045

RAILROAD COMMISSION OF TEXAS
Oil and Gas Division

1. Operator's Name (As shown on Form P-5, Organization Report)	2. RRC Operator No.	3. RRC District No.	4. County of Well Site
ECO Solutions			Matagorda

5. Field Name (Wildcat or exactly as shown on RRC records)	6. API No.	7. Drilling Permit No.
Bay City	42-	

8. Lease Name	9. Rule 37 Case No.	10. Oil Lease/Gas ID No.	11. Well No.
Hoechst Celanese			49-4

CASING CEMENTING DATA:	SURFACE CASING	INTER-MEDIATE CASING	PRODUCTION CASING		MULTI-STAGE CEMENTING PROCESS	
			Single String	Multiple Parallel Strings	Tool	Shoe
12. Cementing Date						
13. •Drilled hole size						
•Est. % wash or hole enlargement						
14. Size of casing (in. O.D.)						
15. Top of liner (ft.)						
16. Setting depth (ft.)						
17. Number of centralizers used						
18. Hrs. waiting on cement before drill-out						
1st Slurry — 19. API cement used: No. of sacks ▶						
1st Slurry — Class ▶						
1st Slurry — Additives ▶						
2nd Slurry — No. of sacks ▶						
2nd Slurry — Class ▶						
2nd Slurry — Additives ▶						
3rd Slurry — No. of sacks ▶						
3rd Slurry — Class ▶						
3rd Slurry — Additives ▶						
1st — 20. Slurry pumped: Volume (cu. ft.) ▶						
1st — Height (ft.) ▶						
2nd — Volume (cu. ft.) ▶						
2nd — Height (ft.) ▶						
3rd — Volume (cu. ft.) ▶						
3rd — Height (ft.) ▶						
Total — Volume (cu. ft.) ▶						
Total — Height (ft.) ▶						
21. Was cement circulated to ground surface (or bottom of cellar) outside casing?						

22. Remarks

OVER ▶

CEMENTING TO PLUG AND ABANDON	PLUG # 1	PLUG # 2	PLUG # 3	PLUG # 4	PLUG # 5	PLUG # 6	PLUG # 7	PLUG # 8
23. Cementing date	10/16/96	10/17/96						
24. Size of hole or pipe plugged (in.)								
25. Depth to bottom of tubing or drill pipe (ft.)								
26. Sacks of cement used (each plug)	370	30						
27. Slurry volume pumped (cu. ft.)	403	32.7						
28. Calculated top of plug (ft.)	Surface	Surface						
29. Measured top of plug, if tagged (ft.)								
30. Slurry wt. (lbs/gal)	16.2	16.2						
31. Type cement	Prem 1/4 Flocele/SK)	Neat						

CEMENTER'S CERTIFICATE: I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this certification, that the cementing of casing and/or the placing of cement plugs in this well as shown in the report was performed by me or under my supervision, and that the cementing data and facts presented on both sides of this form are true, correct, and complete, to the best of my knowledge. This certification covers cementing data only.

Michael Supak Service Supervisor Halliburton Energy Services

Name and title of cementer's representative | Cementing Company | Signature

P.O. Box 1172 Fresno, Tx 77545 | 800 223-0898 | 10/17/96

Address | City, State, Zip Code | Tel.: Area Code Number | Date: mo. day yr.

OPERATOR'S CERTIFICATE: I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this certification, that I have knowledge of the well data and information presented in this report, and that data and facts presented on both sides of this form are true, correct, and complete, to the best of my knowledge. This certification covers all well data.

Typed or printed name of operator's representative | Title | Signature

Address | City, State, Zip Code | Tel.: Area Code Number | Date: mo. day yr.

Instructions to Form W-15, Cementing Report

MPORTANT: Operators and cementing companies must comply with the requirements of the Commission's Statewide Rules 8 (Water Protection), 13 (Casing, Cementing, Drilling, and Completion), and 14 (Well Plugging). For **offshore** operations, see the requirements of Rule 13 (c).

A. **What to file.** An operator should file an original and one copy of the completed Form W-15 for each cementing company used on a well. The cementing of different casing strings on a well by one cementing company may be reported on one form. Form W-15 should be filed with the following:

- An initial oil or gas completion report, **Form W-2 or G-1**, as required by Statewide or special field rules;
- Form W-4, Application for Multiple Completion, if the well is a multiple parallel casing completion; and
- Form W-3, Plugging Record, unless the W-3 is signed by the cementing company representative. When reporting **dry** holes, operators must complete Form **W-15, in addition to Form W-3, to show any casing cemented in the hole.**

3. **Where to file.** The appropriate Commission District Office for the county in which the well is located.

C. **Surface casing.** An operator must set and cement sufficient surface casing to protect all usable-quality water strata, as defined by the Texas Department of Water Resources, Austin. Before drilling a well in any field or area in which no field rules are in effect or in which surface casing requirements are not specified in the applicable rules, an operator must obtain a letter from the Department of Water Resources stating the protection depth. Surface casing should not be set deeper than 200 feet below the specified depth without prior approval from the Commission.

D. **Centralizers.** Surface casing must be centralized at the shoe, above and below a stage collar or diverting tool, if run, and through usable-quality water zones. In nondeviated holes, a centralizer must be placed every fourth joint from the cement shoe to the ground surface or to the bottom of the cellar. All centralizers must meet API specifications.

E. **Exceptions and alternative casing programs.** The District Director may grant an exception to the requirements of Statewide Rule 13. In a written application, an operator must state the reason for the requested exception and outline an alternate program for casing and cementing through the protection depth for strata containing usable-quality water. The District Director may approve, modify, or reject a proposed program. **An operator must obtain approval of any exception before beginning casing and cementing operations.**

F. **Intermediate and production casing.** For specific technical requirements, operators should consult Statewide Rule 13 (b) (3) and (4).

G. **Plugging and abandoning.** Cement plugs must be placed in the wellbore as required by Statewide Rule 14. The District Director may require additional cement plugs. For onshore or inland wells, a 10-foot cement plug must be placed in the top of the well, and the casing must be cut off three feet below the ground surface. All cement plugs, except the top plug, must have sufficient slurry volume to fill 100 feet of hole, plus ten percent for each 1,000 feet of depth from the ground surface to the bottom of the plug.

To plug and abandon a well, operators must use only cementers approved by the Director of Field Operations. Cementing companies, service companies, or operators can qualify as approved cementers by demonstrating that they are able to mix and pump cement in compliance with Commission rules and regulations.

APPENDIX C

CORRESPONDENCE

File ECC Jun 96 14

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

June 28, 1996

I. O. Coleman, Jr.
Hoechst Celanese, Chemical Group
Bay City Plant
P. O. Box 509
Highway 3057
Bay City, TX 77404-0509

Re: Approval of Closure Procedures, Permits No. WDW-32 and WDW-49, Bay City, Texas

Dear Mr. Coleman, Jr.:

The staff has reviewed your letter of June 10 detailing the closure procedures previously approved January 8, 1996 of the above referenced wells and finds that it meets the requirements outlined in 30 TAC §331.46 (Closure Standards). Please submit the Closure Report as required by §331.46(m) within 30 days of completion of closure of the final well since both wells will be closed during the continuous series using the same equipment. Please also provide evidence of the deed recording as required by §331.46(l) prior to a request of revocation of the permit.

Your letter also certifies that neither well had been operated since the last MIT in October, 1995 for WDW-32 and in March, 1996 for WDW-49, and staff agrees that will suffice as final MIT testing prior to closure.

It is also requested that we be kept up-dated on the exact date of closure operations so that a staff member may schedule to be present. Questions regarding this matter should be directed to me at (512) 239-6196, correspondence may be sent to me at Mail Code, MC-131 at the TNRCC address.

Sincerely,

Jim L Boswell

Jim L. Boswell, Permit Coordinator
Underground Injection Control Team
UIC, Uranium, & Radioactive Waste Section
Industrial & Hazardous Waste Division

cc: Brian Graves, EPA Region 6

960 14

Hoechst Celanese

Chemical Group
Hoechst Celanese Corporation
Bay City Plant
PO Box 509
Highway 3057
Bay City, TX 77404-0509

June 10, 1996
IOC-033-96

FEDERAL EXPRESS

Mr. Jim L. Boswell, Permit Coordinator
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
TX Natl Resource Conservation Commission
12100 Park 35 Circle
Austin, TX 78753

RE: Closure Procedures for Class I Injection Wells
WDW-32 (Plant Well #2) and WDW-49 (Plant Well #4)
Hoechst Celanese Chemical Group, Ltd.
Bay City Plant, Bay City, TX

Dear Mr. Boswell:

Hoechst Celanese Chemical Group, Ltd. hereby submits the attached closure procedures (2 copies) for Class I Injection Wells WDW-32 (Well #3) and WDW-49 Well #4) located at the Bay City Plant. The attached information is intended to update the closure plans previously approved by the TNRCC on January 8, 1996.

We propose to conduct field operations in a continuous series of events with a minimal delay as equipment is moved from Injection Well WDW-32 to Injection Well WDW-49. As documented in the attached schedule, field operations should start early in September, 1996.

You will be advised as the work plans and schedule are finalized. If you have any questions, please call me at 409-241-4197.

Sincerely,

I. O. Coleman, Jr.

I. O. Coleman, Jr.
Staff Environmental Chemist

IOC/cjs
attachment

cc: w/o attachment

Mr. Ben Knape, Chief
Underground Injection Control Unit
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Division
TX Natl Resource Conservation Commission
P. O. Box 13087ircle
Austin, TX 78711-3087

Mr. Charles J. Green, Geologist
TX Natl Resource Conservation Comm.
Underground Injection Control Team
UIC, Uranium & Radioactive Waste Section
Industrial and Hazardous Waste Division
P. O. Box 13087
Austin, TX 78711-3087

bcc: w/o attachment
Via e-mail

C. R. Pennington
W.G. Cornman
D. Peters
B. L. Fritz
B. R. Hightower
J. V. Anderson
C. J. Griffith
R. S. O'Neal

Mr. Tom Jones
ECO Solutions, Inc.
9800 Richmond Ave. , Ste 320
Houston, TX 77042-4519

bcc: w/attachment

W. E. Dentler → P. H. Richardson → R. J. Johnston → G. J. McCarthy
H. R. Horton → B. S. Barrington
A. Conley-Pitchell - Bridgewater
Environmental File No.: 203.20

SOLUTIONS, INC.

HOECHST CELANESE CHEMICAL GROUP, LTD.

CLOSURE PROCEDURES AND SCHEDULE

INJECTION WELLS

WDW-32 (WELL #3) AND WDW-49 (WELL #4)

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, TX 77042
(713) 780-1955
Fax (713) 780-1955

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ATTACHMENT 1 - CLOSURE SCHEDULE

HOECHST CELANESE CHEMICAL GROUP, LTD.
CLOSURE PLAN FOR INJECTION WELLS
WDW-32 (WELL #3) AND WDW-49 (WELL #4)

BACKGROUND

In a letter to Hoechst Celanese Chemical Group, Ltd. (Hoechst Celanese) dated January 8, 1996, the Texas Natural Resource Conservation Commission (TNRCC) granted approval to the closure plans for Class I injection wells WDW-14, WDW-32, WDW-49 and WDW-110 located at the Bay City Plant. Field operations to close injection well WDW-14 (well #2) were completed on March 13, 1996.

Hoechst Celanese plans to properly close two (2) of the remaining three (3) Class I injection wells starting in September, 1996. Injection well WDW-32 (well #3) will be closed first and injection well WDW-49 (well #4) closed second. It is planned that the field operations associated with these two well closures will be accomplished as a single continuous sequence of events with little delay as the equipment is moved from one well location to the next.

Two (2) closure plans are attached which follow the procedures previously approved by the TNRCC. The only changes reflect the site specific conditions and depths unique to each well. Although no additional regulatory approvals are required, the attached plans are submitted for your information. A preliminary closure schedule is also attached. Well schematics were included with the original closure plan submitted to the TNRCC and have not changed.

MECHANICAL INTEGRITY TESTING

As stated in the January 8, 1996 TNRCC approval letter, WDW-14 (well #2) required no additional mechanical integrity testing since the well had not operated following its last successful mechanical integrity demonstration. Hoechst Celanese requests that the TNRCC confirm that no additional mechanical integrity testing will be required on WDW-32 (well #3) and WDW-49 (well #4). The last mechanical integrity and falloff testing was completed on WDW-32 (well #3) in October, 1995 and on WDW-49 (well #4) in March, 1996. Both injection wells were brined in and the flowlines disconnected following the testing. No waste injection has occurred since those dates.

SUBMITTAL OF CLOSURE REPORT

As required by 30 TAC §331.46(m), the closure report must be submitted within 30 days of completion of closure. A clarification is requested on the timing of the closure report. Since injection wells WDW-32 (well #3) and WDW-49 (well #4) are to be closed in a continuous sequence of field operations, it is requested that the closure reports for both wells be submitted 30 days following the completion of closure of the second well, or WDW-49 (well #4). This schedule will allow the field certification information to be obtained and integrated into the respective reports in a timely manner.

INJECTION WELL WDW-32 (WELL # 3)
CLOSURE PROCEDURES

1) Prepare well location for field operations. Remove flow lines, monitoring equipment, and instrumentation. Line and dike surface area surrounding wellsite in the area where the workover rig, pumps, tanks and pipe racks will be placed.

2) Notify TNRCC representative of anticipated start of field operations.

3) Move in and rig up workover rig and peripheral equipment.

4) Pull seal assembly out of packer and triple rinse injection string and flush annular area with 9.8 ppg brine.

5) Pull out of the hole laying down injection string and TIW seal assembly on pipe racks. HCCG personnel will remove injection string and TIW seal assembly from wellsite.

6) Pick up casing scraper and work string. Go in hole with casing scraper to the top of the injection packer at 3192' ±. Pull out of the hole with same.

7) Move in and rig up wireline unit to set cement retainer. Pick up junk basket and gauge ring and go in the hole to the top of the injection packer. Pull out of the hole with the junk basket and gauge ring. Go in the hole with wireline set cast iron cement retainer and set inside the 9+5/8" casing at 3182' ±, or approximately 10' above the top of the injection packer. Pull out of the hole and rig down wireline unit.

8) Notify TNRCC representative 24 hours prior to start of cementing operations to witness placement of cement plugs.

9) Pick-up cement retainer shifting assembly with work string and go in the hole with same. Engage cement retainer with shifting assembly and test annulus to 500 psi to confirm that the cement retainer is properly set.

10) Rig up Halliburton, or equivalent service company, to squeeze cement (permanently abandon) the injection zone. Pumping through retainer fill injection interval with high compressive strength cement slurry. Close cement retainer and disengage from same. Leave a 50' ± column of cement above cement retainer and pull out of the hole with shifting assembly.

11) Pick up section mill and drill collars on work string and go in the hole with same. Mill out approximately 50' section of 9+5/8" casing above the top of the cement column. Pull out of the hole and remove section mill.

12) Pick up underreamer and drill collars and go in the hole with same. Underream sectioned interval out to approximately 14" diameter borehole. Pull out of the hole with underreamer.

13) Go in the hole open-ended to set cement plug #2. The plug will extend up across the sectioned interval and an additional 300' - 400' above the section. Rig up Halliburton, or equivalent, and set balanced cement plug with high compressive strength cement. Pull out of the hole and wait on cement plug #2 to cure (approximately 12 hours).

14) Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of the cement. "Dress off" top of plug #2 to confirm cement has had sufficient time to properly cure.

15) Rig up Halliburton, or equivalent, and set cement plug #3 with high compressive strength cement. Set balanced cement plug. Cement column to extend from the previous plug up to 1500' ± or approximately 200' beneath the base of surface casing. Pull out of the hole and wait on cement plug #3 to cure (approximately 12 hours).

16) Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #3 to confirm that cement has had sufficient time to properly cure. Pull out of the hole.

17) Move in and rig up wireline truck to perforate for squeeze job at the base of the surface casing. Perforate the protection casing 2' at 4 shots per foot (8 shots) with top at 1312' ±, or approximately 10' beneath the surface casing seat at 1302' ±. Pull out of the hole and rig down wireline unit.

18) Rig up Halliburton, or equivalent, and set cement plug #4 with high compressive strength cement. Set balanced cement plug. Cement column will extend from the top of plug #3 back to the surface. Pull out of the hole. Apply pressure to cement column to squeeze cement out through the perforations. Wait on cement plug #4 to cure (approximately 12 hours).

19) Go in the hole with 8+3/4" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #4 to confirm that cement has had sufficient time to properly cure. Fill balance of protection casing with high compressive strength cement as required. Pull out of the hole and lay down work string. Wash out blowout preventors.

20) Rig down and release workover rig. Cut off casings at grade and weld 1/2" steel plate over all casing strings. Inscribe plate with well identification and other pertinent data as required.

21) Prepare summary report for submittal to TNRCC and USEPA Region 6.

INJECTION WELL WDW-49 (WELL # 4)
CLOSURE PROCEDURES

1) Prepare well location for field operations. Remove flow lines, monitoring equipment, and instrumentation. Line and dike surface area surrounding wellsite in the area where the workover rig, pumps, tanks and pipe racks will be placed.

2) Notify TNRCC representative of anticipated start of field operations.

3) Move workover rig and peripheral equipment from WDW-32 (well #3) to WDW-49 (well #4)

4) Pull seal assembly out of packer and triple rinse injection string and flush annular area with 9.8 ppg brine.

5) Pull out of the hole laying down injection string and TIW seal assembly on pipe racks. HCCG personnel will remove injection string and TIW seal assembly from wellsite.

6) Pick up casing scraper and work string. Go in hole with casing scraper to the top of the injection packer at 3316' ±. Pull out of the hole with same.

7) Move in and rig up wireline unit to set cement retainer. Pick up junk basket and gauge ring and go in the hole to the top of the injection packer. Pull out of the hole with the junk basket and gauge ring. Go in the hole with wireline-set cast iron cement retainer and set inside the 7+5/8" casing at 3306' ±, or approximately 10' above the top of the injection packer. Pull out of the hole and rig down wireline unit.

8) Notify TNRCC representative 24 hours prior to start of cementing operations to witness placement of cement plugs.

9) Pick-up cement retainer shifting assembly with work string and go in the hole with same. Engage cement retainer with shifting assembly and test annulus to 500 psi to confirm that the cement retainer is properly set.

10) Rig up Halliburton, or equivalent service company, to squeeze cement (permanently abandon) the injection zone. Pumping through retainer fill injection interval with high compressive strength cement slurry. Close cement retainer and disengage from same. Leave a 50' ± column of cement above cement retainer and pull out of the hole with shifting assembly.

11) Pick up section mill and drill collars on work string and go in the hole with same. Mill out approximately 50' section of 7+5/8" casing above the top of the cement column. Pull out of the hole and remove section mill.

12) Pick up underreamer and drill collars and go in the hole with same. Underream sectioned interval out to approximately 10" diameter borehole. Pull out of the hole with underreamer.

13) Go in the hole open-ended to set cement plug #2. The plug will extend up across the sectioned interval and an additional 300' - 400' above the section. Rig up Halliburton, or equivalent, and set balanced cement plug with high compressive strength cement. Pull out of the hole and wait on cement plug #2 to cure (approximately 12 hours).

14) Go in the hole with 6 ¾" drill bit and drill pipe to confirm the top of the column of cement. "Dress off "top of plug #2 to confirm cement has had sufficient time to properly cure.

15) Rig up Halliburton, or equivalent, and set cement plug #3 with high compressive strength cement. Set balanced cement plug. Cement column to extend from the previous plug up to 1500' ±, or approximately 200' beneath the base of surface casing. Pull out of the hole and wait on cement plug #3 to cure (approximately 12 hours).

16) Go in the hole with 6+¾" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #3 to confirm that cement has had sufficient time to properly cure. Pull out of the hole.

17) Move in and rig up wireline truck to perforate for squeeze job at the base of the surface casing. Perforate the protection casing 2' at 4 shots per foot (8 shots) with top at 1400' ± or approximately 10' beneath the surface casing seat at 1389' ±. Pull out of the hole and rig down wireline unit.

18) Rig up Halliburton, or equivalent, and set cement plug #4 with high compressive strength cement. Set balanced cement plug. Cement column will extend from the top of plug #3 back to the surface. Pull out of the hole. Apply pressure to cement column to squeeze cement out through the perforations. Wait on cement plug #4 to cure (approximately 12 hours).

19) Go in the hole with 6 ¾" drill bit and drill pipe to confirm the top of cement column. "Dress off" the top of plug #4 to confirm that cement has had sufficient time to properly cure. Fill balance of protection casing with high compressive strength cement as required. Pull out of the hole and lay down work string. Wash out blowout preventors.

20) Rig down and release workover rig. Cut off casings at grade and weld 1/2" steel plate over all casing strings. Inscribe plate with well identification and other pertinent data as required.

21) Prepare summary report for submittal to TNRCC and USEPA Region 6.

22) Project Complete

ATTACHMENT 1

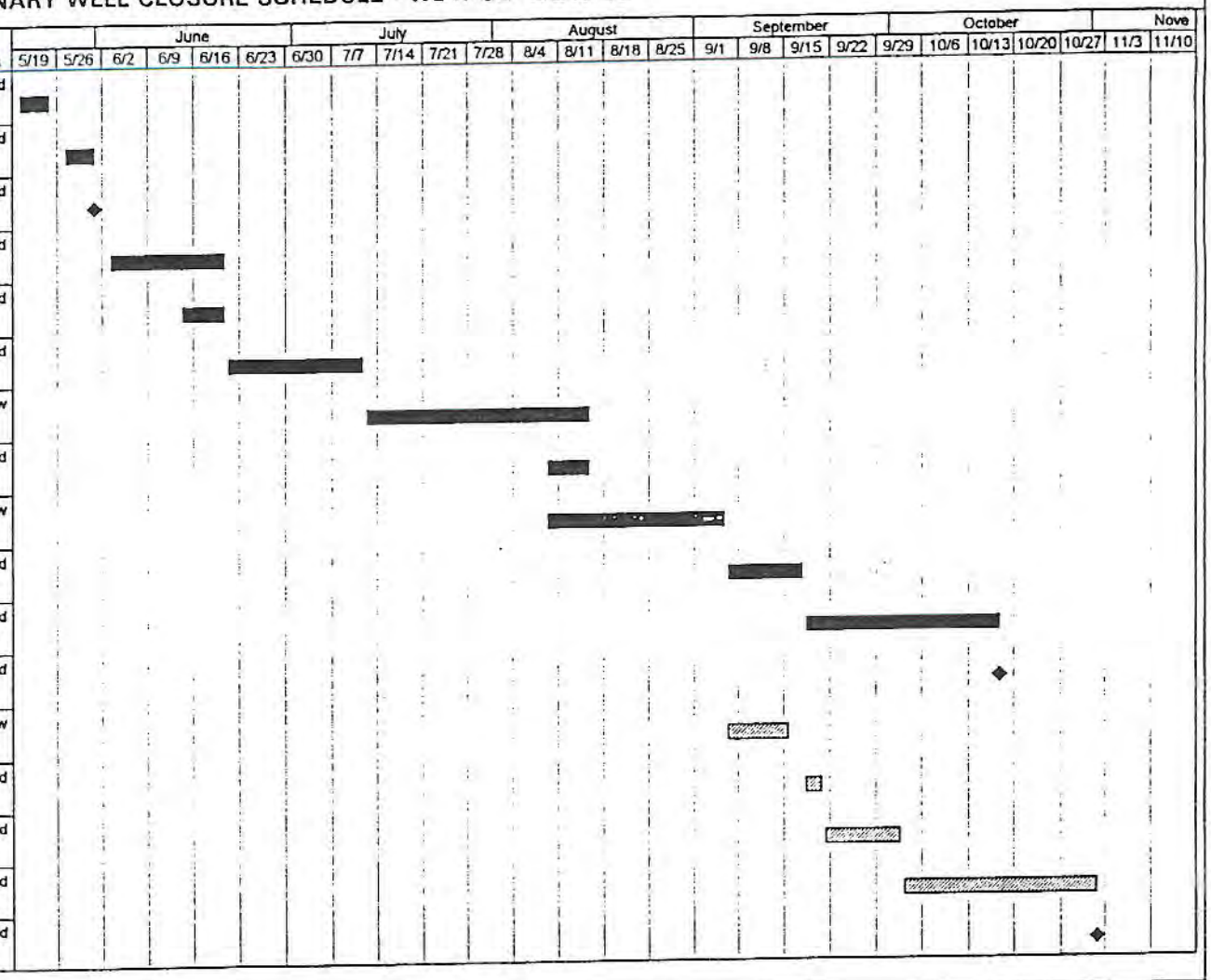
CLOSURE SCHEDULE

WDW-32 (WELL #3)

WDW-49 (WELL #4)

HOECHST CELANESE CHEMICAL GROUP, LTD
BAY CITY, TEXAS PLANT
PRELIMINARY WELL CLOSURE SCHEDULE - WDW-32 WDW-49

NO.	Name	Work Days
1	Prepare updated closure procedures for TNRCC	5d
2	Review by HCCG & finalize by ECO	5d
3	Submit Procedures To TNRCC	0d
4	TNRCC Review and approval	14d
5	Solicit Vendor Quotes	5d
6	Obtain Vendor Quotes - Prepare final recommendations	15d
7	Identify rig availability & schedule	5w
8	Finalize procedures cost & schedule	5d
9	Site Preparations For Field Operations	4w
10	Field Operations To Close WDW-32	12d
11	Prepare Final Closure Report	30d
12	Submit Final Closure Report To TNRCC	0d
13	Prepare location for closure operations	2w
14	Move rig & equipment to WDW-49	3d
15	Field Operations To Close WDW-49	12d
16	Prepare Final Closure Report	30d
17	Submit Final Closure Report To TNRCC	0d



APPENDIX D
FINAL MECHANICAL INTEGRITY TESTING REPORT (TEXT ONLY)
WDW-32 (WELL #3)

ECO SOLUTIONS, INC.

Hoechst Celanese Chemical Group, Inc.
Bay City Plant
Mechanical Integrity Testing
For WDW-49 (Well No. 4)

ECO Solutions, Inc
10333 Richmond
Suite 250
Houston, Texas 77042
(713) 780-1955

January 1995

ECO Job No. 95016

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1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.0 INTRODUCTION

Hoechst Celanese Chemical Group, Inc. (HCCG) contracted ECO Solutions, Inc. (ECO) to perform the annual mechanical integrity testing on their Class I nonhazardous waste disposal well, WDW-49 (Plant Well No. 4), located at their Bay City facility. A schematic drawing of the well is included as Figure 1. The attached report details the data and test results associated with the tests.

The following provides an overview of the key elements of the testing on WDW-49 (Well No. 4).

- An Annulus pressure test (APT) was conducted to satisfy the annual mechanical integrity test (MIT) requirements of the Texas Natural Resource Conservation Commission (TNRCC).
- A Radioactive tracer (RAT) survey was conducted to satisfy the annual MIT requirements of the TNRCC.
- A pressure falloff test was conducted to satisfy the annual ambient monitoring requirements of the U.S. Environmental Protection Agency (EPA) and the TNRCC.

The APT and RAT on WDW-49 (Well No. 4) were conducted on Thursday, March 9, 1995, and witnessed by Mr. Wesley Smith of ECO and Mr. Ray Horton of HCCG.

1.2 EXECUTIVE SUMMARY

WDW-49 (Well No. 4) successfully passed the 1995 MIT conducted between March 6 and 9, 1995.

Radioactive Tracer Survey

The analysis of the RAT survey performed on March 9, 1995 demonstrated that no upward fluid movement from the injection interval is occurring. The RAT checked for upward fluid movement using three separate methods. All three tests showed no evidence of upward migration. This interpretation was supported by an independent evaluation provided by Western Atlas Logging Services (Atlas) and is included in Appendix A together with the RAT log.

The results of the radioactive tracer survey run on 3/9/95 were analyzed by ECO and Atlas. No anomalies were detected on any of the logging runs which would indicate a loss of mechanical integrity. Each part of the survey is discussed in detail in Section 3.0.

Annulus Pressure Test

A demonstration of internal mechanical integrity was supported by an APT conducted on March 9, 1995. The annulus was pressurized to a maximum of 1100 pounds per square inch gauge (psig). The APT was monitored for thirty minutes. During the 30 minutes the pressure loss was measured from 1098 to 1094 psig, or 4 pounds per square inch (psi) (0.37%), which is well within the 5% pressure loss criteria set by the TNRCC. The APT data and plot is included in Appendix B.

Bottom Hole Pressure Falloff Testing

The pressure fall-off test on WDW-49 was conducted on Wednesday and Thursday, March 8 and 9, 1995. The testing was supervised by Mr. Reuben Alaniz of ECO and witnessed by Mr. Ray Horton of HCCG. WDW-49 (Well No. 4) was diagnosed to be injecting into a homogeneous reservoir with a calculated permeability of **1531.08 md** and skin damage of **+48.95** utilizing an h_{net} value of **85 feet**. The flow efficiency of 15.57% suggests that the near wellbore conditions have a large affect on the injection volume limitations and that the total pressure drop is primarily due to formation damage within a small radius from the well.

2.0 FIELD OPERATIONS SUMMARY

Monday, March 6,1995

Mr. Rueben Alaniz of ECO arrived at HCCG Bay City Plant and met with Milton Cooke Electric Line crew. Checked in with security and moved out to well site. Well injecting at 198 gpm with 460 psig surface pressure. Unable to rig up due to problems with crown valve on tree. Met with Mr. Billy Campbell (shift supervisor) to discuss getting a HCCG crew to change out the valve. Shut well in to change out valve, double block injection line and close master valve. Rigged up Milton Cooke. Began injection into well, bring up to previous injection rate. Run in hole with casing collar locator (CCL), surface readout (SRO) and memory gauge. Ran CCL log and tied into packer at 3316', pulled up and set tool string at 3,000'. Begin monitoring bottom hole injection pressure. All depths herein are measured from rotary drive bushing at twelve (12) feet above ground level.

Tuesday, March 7, 1995

Continue monitoring bottom hole injection pressure. At 0800 hours generated cartesian plot of pressure and temperature. Observed stability of pressure prior to shut-in. Met with HCCG crew to determine time of shut-in. Shift supervisor discussed tank fluid level, rain fall and shut-in period. The quantity of rainfall combined with the tank fluid level and the shut-in period could cause some problems. Met with project manager, Mr. Ray Horton, and the shift supervisor and decided to extend the injection period at an increased injection rate. Brought injection rate up to 285 gpm.

Wednesday, March 8, 1995

Continued to monitor bottom hole injection pressure. Generated cartesian graph of pressure and temperature to check for stability. Pressure and injection rate shown to be stabilized enough to begin fall-off test.

Shut down injection pumps and begin monitoring bottom hole pressure fall-off.

Thursday, March 9, 1995

Continued to monitor bottom hole pressure fall-off until 0800 hours. Downloaded data and generated Semi-Log and Log-Log graphs to determine if enough data had been collected to complete fall-off test. Adequate data had been collected, ended fall-off test. Performed static gradient survey while pulling out of hole. Stops were made at 3745',

3300', 3,000', 2,000', 1,000', 500' and surface. Rigged down Milton Cooke and moved off location.

Mr. Larry Walker and Ms. Kathryn Herzog with the TNRCC arrived onsite at 1000 hours to witness APT and RAT. The annulus was pressured up to 1102 psig at 1030 hours. The APT was monitored for thirty (30) minutes. The pressure loss was measured from 1098 to 1094 psig, or 4 psi (0.37%). At 1300 hours Atlas moved in and rigged up. Ran RAT tool into WDW-49 and tagged bottom at 3433'. Ran base line gamma ray (GR) log, a short GR repeat section to confirm tool repeatability and two statistical checks at 3296' and 3351'. Ran first tracer survey from 2900' to 3431' depicting all injected fluid entering the liner interval. Repeated the tracer survey. Set the RAT tool at 3351' for the first stationary survey, ejected a radioactive (RA) slug and monitored for 15 minutes with no indicated upward flow. Repeated an identical stationary survey with the same results. Ran the final baseline GR survey from 3431' to 2900' to confirm that all injected fluid was moving into the disposal interval. Mr. Larry Walker and Ms. Kathryn Herzog left the wellsite. Pulled the tool out of the hole, rigged down and moved off the location. Returned WDW-49 to HCCG for injection service. Mr. Smith returned to Houston.

3.0 MECHANICAL INTEGRITY TESTING

3.1 ANNULUS PRESSURE TEST

An APT was conducted on Thursday, March 9, 1995 in order to demonstrate internal mechanical integrity. The APT was witnessed by Mr. Ray Horton of HCCG, Mr. Wesley Smith of ECO and Mr. Larry Walker and Ms. Kathryn Herzog of the TNRCC. The annulus was pressurized to a maximum pressure of 1102 psig. The APT was monitored for thirty (30) minutes using a certified calibrated pressure gauge. Calibration certificates are included in Appendix C. The gauge was precalibrated and later checked using a dead weight tester. During the 30 minute APT the pressure loss was measured from 1098 to 1094 psig, or 4 psi (0.37%), which was well within the 5% pressure loss criteria set by the TNRCC. The APT data and a plot is included in Appendix B.

3.2 RADIOACTIVE TRACER SURVEY

On Thursday, March 9, 1995 a RAT survey was conducted by Atlas Logging Services to insure that all fluids are entering the injection interval. Analysis of the RAT showed no upward fluid movement. Atlas and ECO conducted the RAT as follows:

1. Ran initial baseline GR log from 3431' to 3000'.
2. Ran repeat GR log from 3431' to 3300' to confirm tool repeatability.
3. Ran 5-minute statistical checks at 3296' and 3351'.
4. Made multiple pass survey #1 with a RA slug ejected at 2900' and a pump rate of 50 gpm.
5. Made multiple pass survey #2 with a RA slug ejected at 2900' and a pump rate of 50 gpm.
6. Ran stationary survey #1 at 3351'. Watched RA slug pass tool and monitored for 15 minutes. Pump rate 120 gpm.
7. Ran stationary survey #2 at 3351'. Watched RA slug pass tool and monitored for 15 minutes. Pump rate 120 gpm.
8. Ran after survey base log from 3431' to 2900'.

Summary

The results of the radioactive tracer survey conducted on 3/9/95 were analyzed by ECO Solutions, Inc. (ECO) and by Atlas. No anomalies were detected on any of the logging runs which would indicate a loss of mechanical integrity. Each part of the log is discussed in detail below.

Profile Survey

Two (2) separate profile runs were made across the packer and perforated interval within WDW-49 (Well No. 4). Each profile run included five (5) to six (6) separate overlapping passes extending from 2900 ± ft. to 3431 ± ft while pumping at 50 gpm. On the profile runs made below the packer all tracer material moves downward as it is injected into the liner interval.

Time Drive Survey

Two (2) time drives or stationary checks were made on WDW-49 (Well No. 4). This type of survey is the best indicator to determine whether or not upward fluid movement can be observed in the well. The flow rate for the time drive portion of the testing was 120 gpm. The two 15 minute checks were each made at 3351' which is approximately 20' above the top of the screen. No upward movement was observed on any of the time drive surveys. The results of the time drive surveys indicate that WDW-49 (Well No. 4) has external mechanical integrity.

Before and After Baseline Gamma Ray Logs

A comparison of the before and after gamma ray logs were quite similar and no indication of upward movement was depicted.

4.0 BOTTOM HOLE PRESSURE FALL-OFF TEST

4.1 BOTTOM HOLE PRESSURE FALL-OFF ANALYSIS

Purpose of Test: Bottom hole pressure fall-off testing is required annually. The purpose of the test is to calculate the following reservoir characteristics: permeability, skin damage, pressure drop due to skin and flow efficiency.

Analysis Description - Fall-off Test

Method of Interpretation: The following analysis was performed by utilizing both Semi-Log and Log-Log analysis. The Semi-Log curve was generated by plotting the Pressure vs the Superposition time function, utilizing the given rate history. The semi-log straight line was calculated by linear regression through the infinite acting flow period of the curve. The slope **m**, and $\mathbf{P_{1hr}}$ values were obtained from this curve and utilized for permeability and skin calculations. The Log-Log curves were generated by plotting ΔP and Pressure derivative vs the Agarwal Equivalent time function, $[t_p\ \Delta t\ /\ (t_p + \Delta t)]$. The log-log curves were simultaneously positioned over Gringarten type curves until a solution match was obtained. Permeability and skin values were calculated from this match and then compared with those obtained from the semi-log analysis.

Semi-Log (Horner): The straight line area of the semi-log curve was identified by first using the 1-1/2 log cycle rule to estimate the end of wellbore storage effects. Secondly, the time of the flat portion from the pressure derivative curve was used in determining the area of the semi-log curve in which the straight line was drawn. The semi-log yielded a slope value of **8.486 psi/cycle** and a P_{1hr} of **1519 psi**. The pressure difference between P_{1hr} and the injection pressure, P_{inj} of **1936 psi** followed with the calculated slope would give indications of positive skin damage and high permeability.

Log Log (Gringarten Type Curves): Development of the unit slope line in the early portion of the derivative curve coupled with the high maximum of the derivative is indicative of a damaged well with wellbore storage. The flattening portion of the derivative curve at 0.5 p_d/p_d' indicated the beginning of the radial flow regime and was observed approximately 9.64 hours into the falloff test. The flat portion of the derivative curve was the main factor used to obtain a tuype curve match yielding similar results to the semi-log analysis.

Conclusions: WDW-49 (Well No. 4) was diagnosed to be injecting into a homogeneous reservoir with a calculated permeability of **1531.08 md** and skin damage of **+48.95**

utilizing and h_{net} value of **85 feet**. The flow efficiency of 15.57% suggests that the near wellbore conditions have a large affect on the injection volume limitations and that the total pressure drop is primarily due to conditions within a small radius from the well.

The following table provides comparative results with previous years tests and calculations. The primary variables affecting the calculated results are included.

Table 4.1
SUMMARY OF RESULTS

Date	Rate (gpm)	h_{net} (ft)	μ_w cp	slope psi/cycle	kh/μ	kh md-ft	k md	Skin
03/95	279	85	0.7100	8.486	183299	130142	1531	+49
03/94	168	85	0.7100	5.517	169620	120430	1417	+70
09/92	79.5	85	0.7000	2.710	163584	116145	1366	+117

The calculated results indicate a difference in transmissibility, (kh/μ) of 7.5% coupled with a 30% difference inskin values between 1994 and 1995. In addition, the results calculated from type curve analysis compare favorably to those calculated from the semi-log straight line analysis, thus supporting the integrity of the calculated results. The decrease in skin is possibly due to the continuous injection into WDW-49 (Well No. 4) following an extended shut-in period and a workover performed 5 days prior to the 1994 fall-off test.

Note: The start time of the infinite acting flow period exceeded the time to exit the waste front, therefore the viscosity of the original reservoir fluid was used for the final analysis.

A homogeneous simulator was utilized to confirm the calculated results mentioned above. The main assumptions were as follows: a single well with infinite acting and radial flow conditions being injected at a constant rate with constant reservoir conditions, such as porosity, permeability and compressibility. Based on this particular reservoir, the simulated data matched the actual data with a reasonable degree of accuracy.

The program used for final analysis and will simulation was 'KHS 5.0", marketed by Computer Aided Technical Services

See Table 4.2 and 4.3 for well information and calculated results, detailing input parameters and calculations.

Table 4.2
WELL INFORMAION

Well Type: Injection
Perforations: 3371.5' - 3579' (Gravel Pack Screen)

Gauge Depth: 3300 feet

[Input Parameters]

Reservoir Pressure	psia	P	1508
Reservoir Temperature	Deg. F	T	96
Final Static Pressure	psia	P_{si}	1508
Final Injection Pressure	psia	P_{inj}	1936
Water Flow Rate	gal/min	q_w	279
Sand Thickness	feet	h_{net}	85
Wellbore Radius	feet	r_w	0.4580
Formation Porosity	%	ϕ	33.0
Extrapolated Pressure	psia	P*	1498
Extrapolated Pressure @ 1 hr	psia	P_{1hr}	1519
Semi=Log Slope	psi/cycle	M	8.486
Production Time	hrs	t_p	801.00
Shut-in Time	hrs	t_{si}	23.92

[Fluid Properties]

Fluid Viscosity	cp	μ_w	7.1000E-01
Formation Volume Factor	RB/STB	β_w	1.0000E+00
Fluid Compressibility	1/psi	C_w	3.0547E-06
Total Compressibility	1/psi	Ct	5.0000E-06

[Type Curve Match Points]

ΔP	419.621			Pd	64.778
Δt	10.564	$C_d e^{2S}$	1E+50	t_D/C_d	8030.864

Table 4.3
Calculated Results

[Semi-Log Analysis - Multi-Rate Method]

Transmissibility	md-ft/cp	kh/u	183298.516
Flow Capacity	md-ft	kh	130141.938
Permeability	md	k	1531.082
Skin Damage	total	S	+48.95
Pressure Drop Due to Skin	psi	dP	+360.67
Flow Efficiency	%	FE	+15.57
Drainage Radius	feet	r_d	5136

[Type Curve (Log-Log) Analysis]

Transmissibility	md-ft/cp	kh/u	208507.813
Flow Capacity	md-ft	kh	148040.547
Permeability	md	k	1741.653
Skin Damage	total	S	+53.66
Pressure Drop Due to Skin	psi	dP	+347.61
Flow Efficiency	%	FE	+18.64

ECO Solutions, Inc.

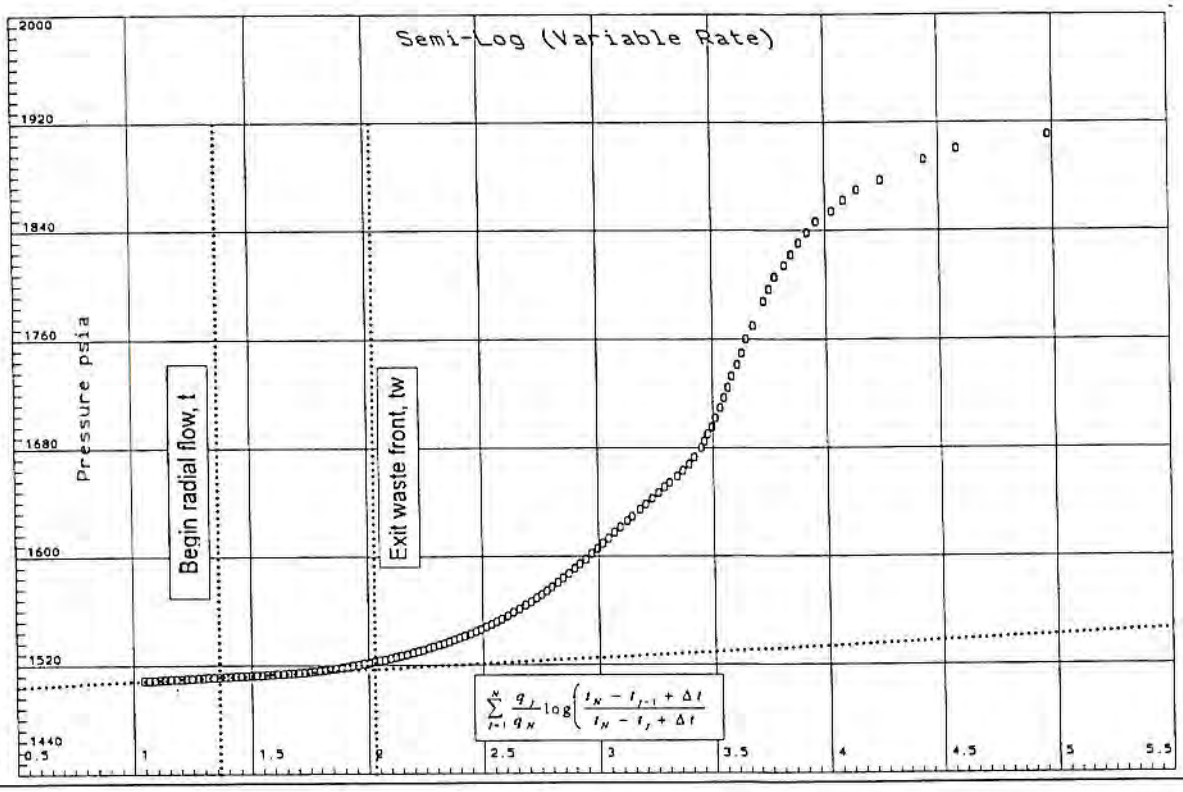
MECHANICAL INTEGRITY TEST

Fall-Off Test Data

Report File: 2008.KHS

Analysis Date: 03/27/1995

Semi-Log Radial Flow Plot



HOECHST CELANESE CHEMICAL COMPANY
WDW - 49 Well #4
Bay City Facility, Texas

03/06/1995 - through - 03/09/1995

Time to begin radial flow, $t = 9.6$ hours ($t_\Sigma = 1.36$)
Time to exit waste front, $t_w = 1.8$ hours ($t_\Sigma = 2.03$)

Graphical Results

Semi-Log Slope	psi/cycle	M	8.486
Extrapolated Pressure @ 1hr	psia	P_{1hr}	1519

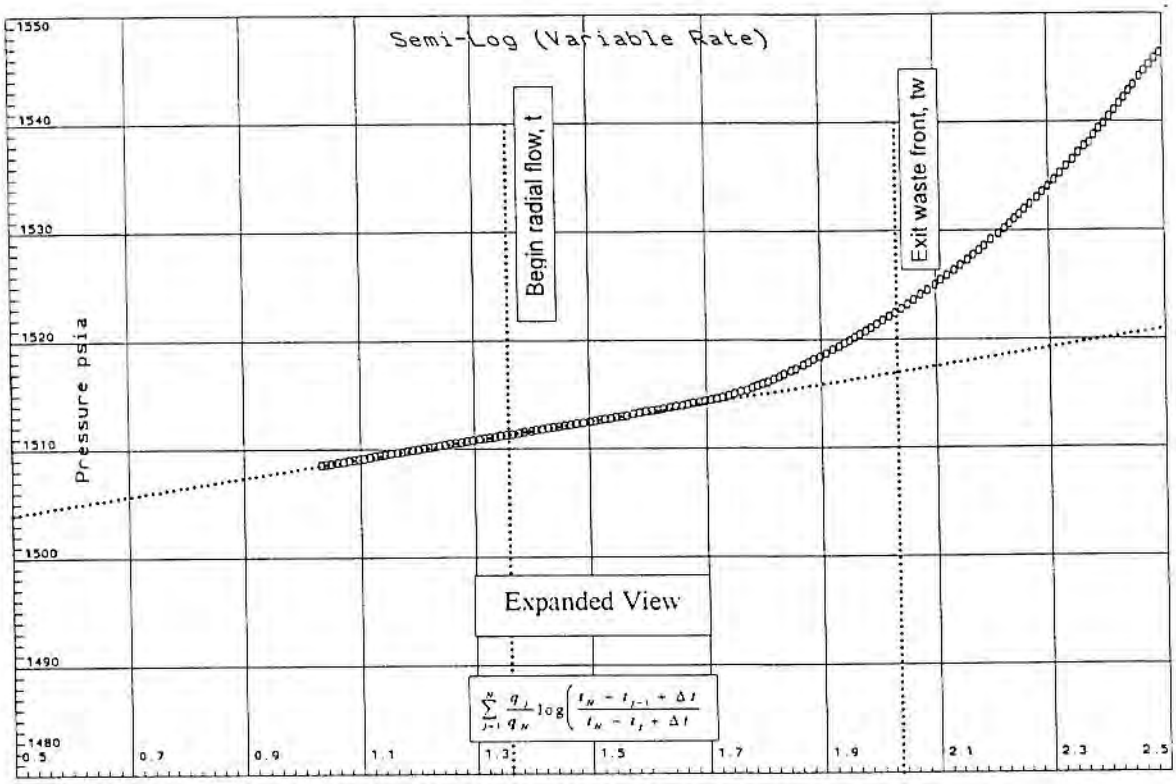
Model Results

Transmissibility	md-ft/cp	kh/u	183298.516
Flow Capacity	md-ft	kh	130141.938
Permeability	md	k	1531.082
Skin Damage	total	S	+48.95
Pressure Drop due to Skin	psi	ΔP	360.67
Flow Efficiency	%	FE	15.57
Drainage Radius	feet	r_d	5136

FIGURE 2

ECO Solutions, Inc.		Report File:	2008.KHS
MECHANICAL INTEGRITY TEST		Analysis Date:	03/27/1995
Fall-Off Test Data			

Semi-Log Radial Flow Plot



HOECHST CELANESE CHEMICAL COMPANY
WDW - 49 Well #4
Bay City Facility, Texas

03/06/1995 - through - 03/09/1995

Time to begin radial flow, $t = 9.6$ hours ($t_\Sigma = 1.36$)
Time to exit waste front, $t_w = 1.8$ hours ($t_\Sigma = 2.03$)

Graphical Results			
Semi-Log Slope	psi/cycle	M	8.486
Extrapolated Pressure @ 1hr	psia	P_{1hr}	1519
Model Results			
Transmissibility	md-ft/cp	kh/u	183298.516
Flow Capacity	md-ft	kh	130141.938
Permeability	md	k	1531.082
Skin Damage	total	S	+48.95
Pressure Drop due to Skin	psi	ΔP	360.67
Flow Efficiency	%	FE	15.57
Drainage Radius	feet	r_d	5136

FIGURE 3

ECO Solutions, Inc.

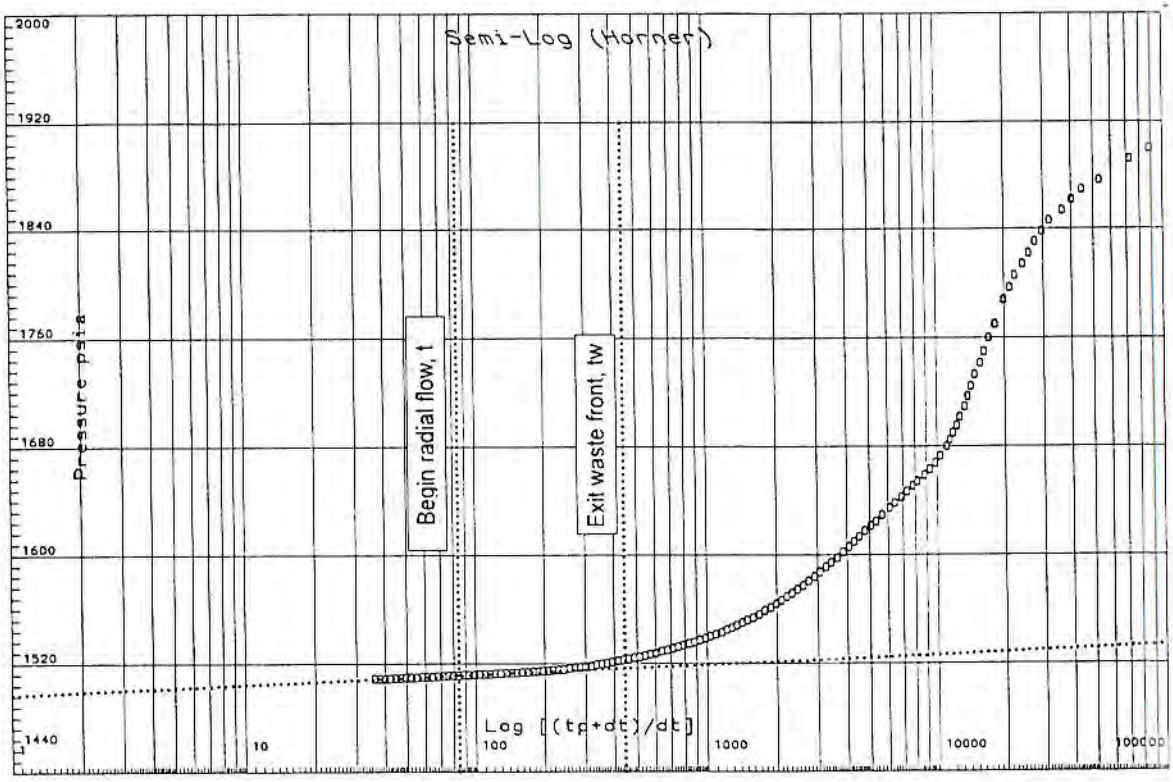
MECHANICAL INTEGRITY TEST

Fall-Off Test Data

Report File: 2008.KHS

Analysis Date: 03/27/1995

Semi-Log Radial Flow Plot



HOECHST CELANESE CHEMICAL COMPANY
WDW - 49 Well #4
Bay City Facility, Texas

03/06/1995 - through - 03/09/1995

Time to begin radial flow, $t = 9.6$ hours ($t_{Horner} = 84$)
Time to exit waste front, $t_w = 1.8$ hours ($t_{Horner} = 441$)

Semi-log plot utilizing Horner time function used to extrapolate P* and illustrate the beginning of radial flow and time to exit waste front.

Graphical Results

Semi-Log Slope	psi/cycle	M	7.313
Extrapolated Pressure @ 1hr	psia	P_{1hr}	1518
Extrapolated Pressure	psia	P*	1497

FIGURE 4

ECO Solutions, Inc.

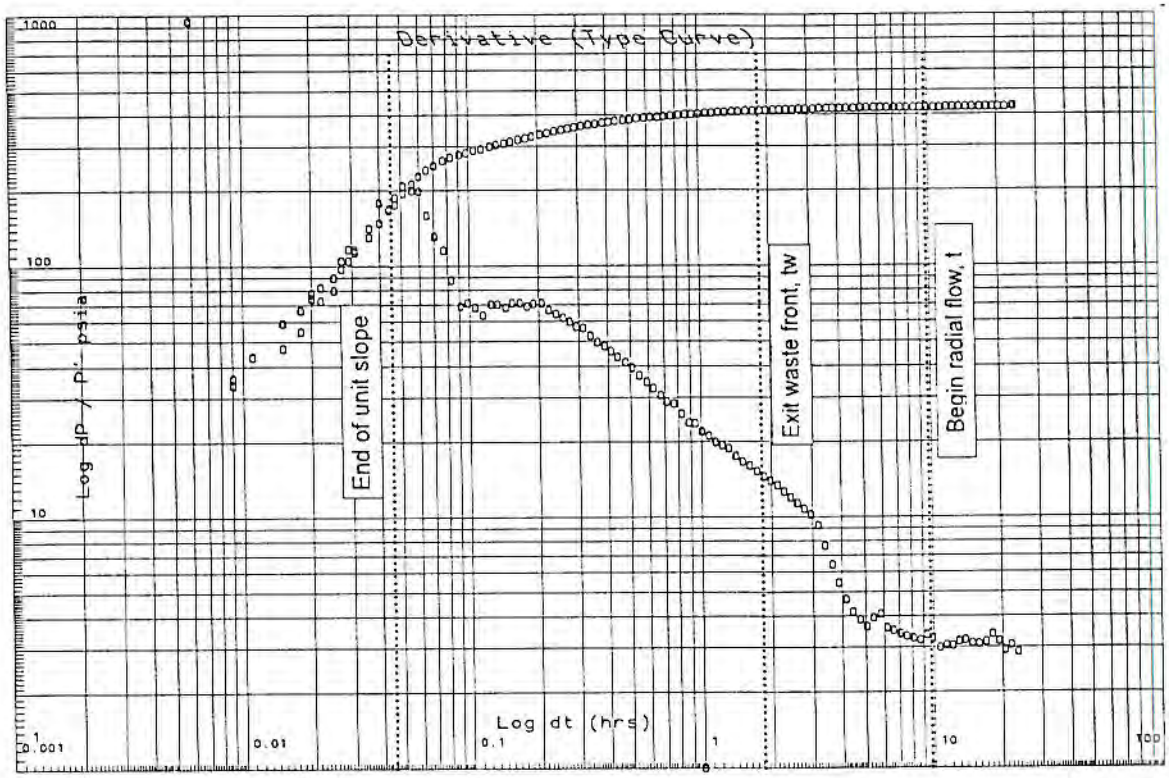
MECHANICAL INTEGRITY TEST

Fall-Off Test Data

Report File: 2008.KHS

Analysis Date: 03/27/1995

Log-Log Radial Flow Plot



HOECHST CELANESE CHEMICAL COMPANY
WDW - 49 Well #4
Bay City Facility, Texas

03/06/1995 - through - 03/09/1995

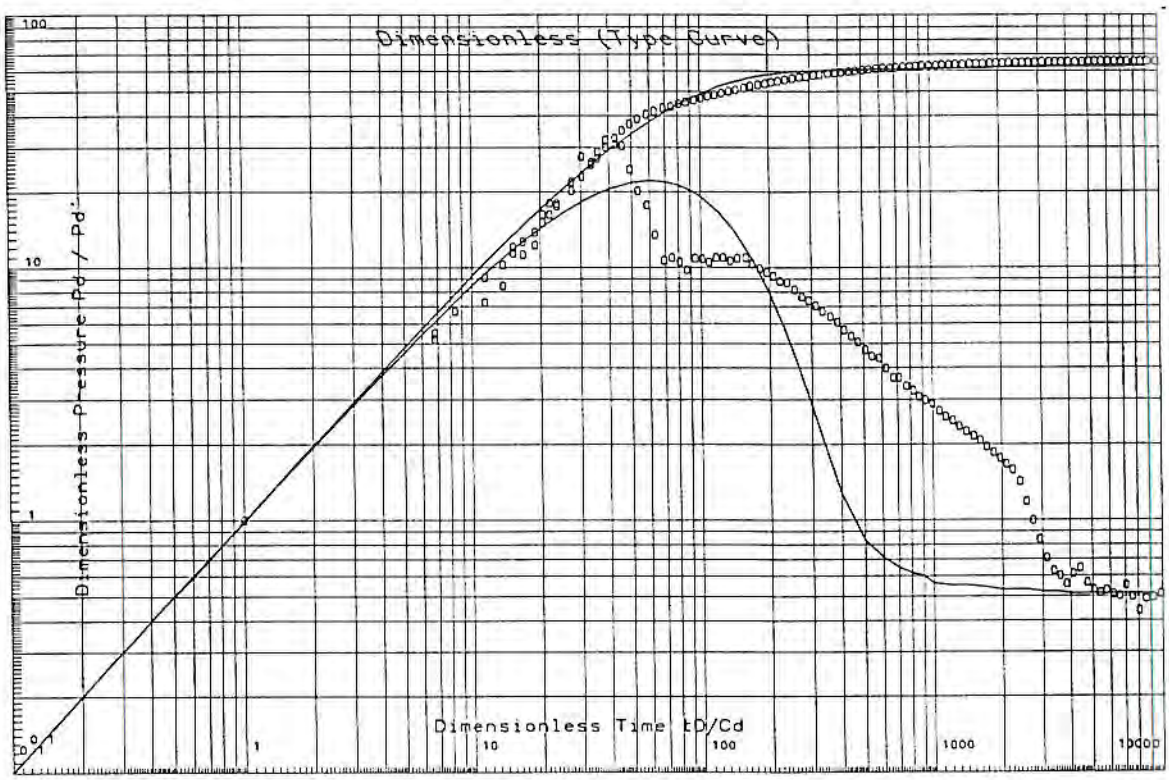
Log - Log plot used to identify various flow regimes.

Time end of unit slope,	t = 0.045 hours
Time to begin radial flow,	t = 9.64 hours
Time to exit waste front,	t_w = 1.82 hours

FIGURE 5

ECO Solutions, Inc.		Report File:	2008.KHS
MECHANICAL INTEGRITY TEST		Analysis Date:	03/27/1995
Fall-Off Test Data			

Log-Log Radial Flow Model



HOECHST CELANESE CHEMICAL COMPANY
WDW - 49 Well #4
Bay City Facility, Texas

03/06/1995 - through - 03/09/1995

Log - Log analysis utilizing Agarwal Equivalent time function.

Match Results

ΔP	419.621		P_d	64.778
Δt	10.564	$C_d e^{2S}$ 1E +50	t_D/C_d	8030.864

Model Results

Transmissibility	md-ft/cp	kh/u	208507.813
Flow Capacity	md-ft	kh	148040.547
Permeability	md	k	1741.653
Skin Damage	total	S	+53.66
Pressure Drop due to Skin	psi	ΔP	347.61
Flow Efficiency	%	FE	18.63

FIGURE 6

4.2 STATIC GRADIENT SURVEY

A Static Gradient Survey was run while pulling out of the hole immediately after the end of the bottom hole pressure fall-off test. Stops were made at 3475', 3300', 3000', 2000', 1000' and 500'. A plot of the static gradient survey is shown in Figure 7. Data collected during the survey is included in Appendix G.

Data collected at each gradient stop were as follows:

Depth (ft)	Pressure	PSI/ft
0	66.46	
500	289.04	0.445
1000	506.57	0.435
2000	942.02	0.435
3000	1377.23	0.435
3300	1508.44	0.437
3475	1585.02	0.438

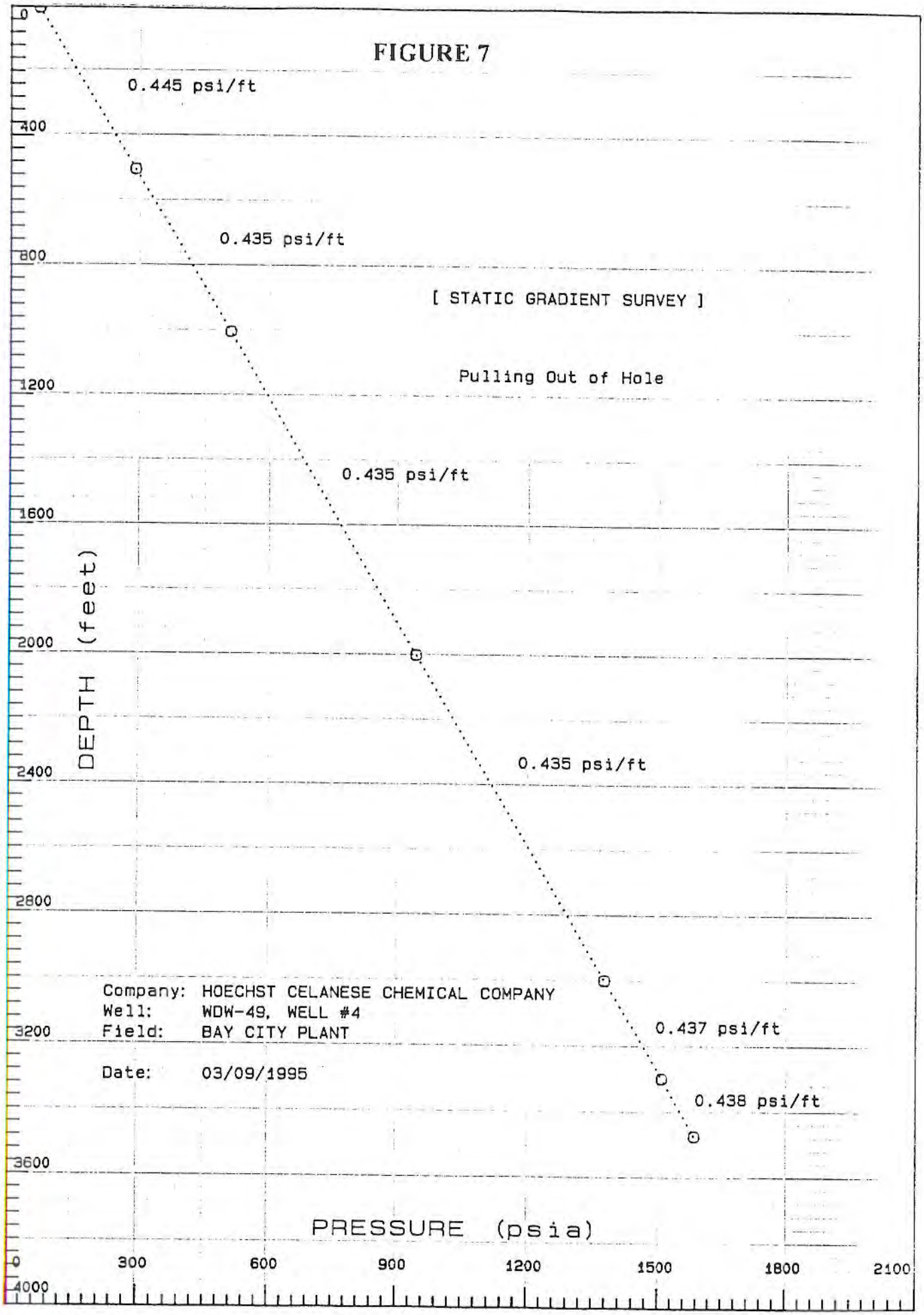


FIGURE 7
0.445 psi/ft
0.435 psi/ft
[STATIC GRADIENT SURVEY]
Pulling Out of Hole
0.435 psi/ft
0.435 psi/ft
0.437 psi/ft
0.438 psi/ft
Company: HOECHST CELANESE CHEMICAL COMPANY
Well: WDW-49, WELL #4
Field: BAY CITY PLANT
Date: 03/09/1995
DEPTH (feet)
0
400
800
1200
1600
2000
2400
2800
3200
3600
4000
PRESSURE (psia)
0
300
600
900
1200
1500
1800
2100

SOLUTIONS, INC.

Final Report

Hoechst Celanese Chemical Group, Ltd.
Bay City, Texas
MIT/Fall-off Report
Injection Well WDW-49 (Well No. 4)

March 1996

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, Texas 77042
(713) 780-1955
FAX (713) 780-0870

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ECO SOLUTIONS, INC.

Hoechst Celanese Chemical Group, Ltd.
Bay City Plant
Bottom Hole Pressure Falloff and
Mechanical Integrity Testing
For WDW-49 (Well No. 4)

ECO Solutions, Inc
9800 Richmond
Suite 320
Houston, Texas 77042
(713) 780-1955

March 1996

ECO Job No. 96006

RECEIVED
APR 17 1996
G.W.QU

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1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.1 INTRODUCTION

Hoechst Celanese Chemical Group, Ltd. (HCCG) contracted ECO Solutions, Inc. (ECO) to perform the annual mechanical integrity testing on their Class I nonhazardous injection well, WDW-49 (Well No. 4), located at their Bay City facility. A schematic drawing of WDW-49 is included as Figure 1. The attached report details the data and test results associated with the mechanical integrity testing.

The following provides an overview of the key elements of the testing on WDW-49 (Well No. 4).

- An Annulus Pressure Test (APT) was conducted to satisfy the annual mechanical integrity test (MIT) requirements of the Texas Natural Resource Conservation Commission's (TNRCC), Underground Injection Control (UIC) Program.
- A Radioactive Tracer (RAT) survey was conducted to satisfy the annual MIT requirements of the TNRCC.
- Bottom Hole Pressure (BHP) Falloff testing was conducted to satisfy the annual ambient monitoring requirements of the U.S. Environmental Protection Agency (EPA) and the TNRCC

HCCG personnel contacted the TNRCC personnel to inform them of the MIT schedule on WDW-49 and whether a field inspector would be present. TNRCC personnel informed HCCG that no field inspector would be present for this MIT.

The APT on WDW-49 (Well No. 4) was conducted on Thursday, March 7, 1996, and was witnessed by Mr. Wesley Smith of ECO and Mr. Ray Horton of HCCG. The RAT survey was conducted on Thursday, March 7, 1996, and was witnessed by Mr. Wesley Smith of ECO.

The BHP/falloff test was conducted on Tuesday, March 12, 1996 through Thursday, March 14, 1996 and was witnessed by Mr. Wes Smith of ECO and Mr. Ray Horton of HCCG.

1.2 EXECUTIVE SUMMARY

The MIT was successfully conducted on March 7, 1996 on WDW-49, and HCCG returned WDW-49 to injection service. The BHP/Falloff test was conducted from March 12 through 14, 1996. A summary of the results of the MIT and BHP/Falloff surveys are as follows:

Radioactive Tracer Survey

The analysis of the RAT survey performed on March 7, 1996 demonstrated external mechanical integrity since no upward fluid movement from the injection interval adjacent to the long string casing is occurring. This determination can be made as a result of (1) the favorable comparison of the before and after base gamma ray surveys, (2) the two multiple pass tracer surveys and the two stationary surveys conducted 20' above the screened interval. All surveys showed no evidence of upward fluid movement. This interpretation was supported by an independent evaluation letter provided by Atlas Wireline Services (Atlas) and is included in Appendix A together with the RAT log.

Annulus Pressure Test

A demonstration of internal mechanical integrity was supported by an APT conducted on March 7, 1996. The annulus was pressurized to a maximum of 1153 pounds per square inch gauge (psig). The APT was monitored for sixty minutes. During the final 30 minutes the pressure dropped from 1150 to 1148 psig, then up to 1150 psig, or a zero pressure loss/gain pound per square inch (psi) (0%), which is well within the 5% pressure loss criteria set by the TNRCC. The APT data and plot are included in Appendix B.

Bottom Hole Pressure Falloff Survey

Waste effluent fluid was injected into WDW-49 at a steady rate of 219 gallons per minute (gpm) for 91 hours and was shut-in for a total of 39 hours. The shape of both the pressure and pressure derivative curves on log-log plots at early times are reasonable, and are similar to the survey conducted in March 1995. A full discussion of the falloff analyses is presented in Section 4.0.

Conclusions

All field work associated with the MIT/BHP/Falloff survey on HCCG's WDW-49 at the Bay City Plant conducted from March 7 through 14, 1996, was successfully completed. WDW-49 has mechanically integrity at this time and is suitable for continued use as a Class I waste injection well.

In accordance with the TNRCC/UIC Program, 31TAC, 331.4 and 331.43, the mechanical integrity test conducted on WDW-49 demonstrated that (1) 'there is no significant leak in the casing, tubing or packer" and (2) 'there is no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the injection borehole."

HOECHST CELANESE CHEMICAL GROUP, Ltd.

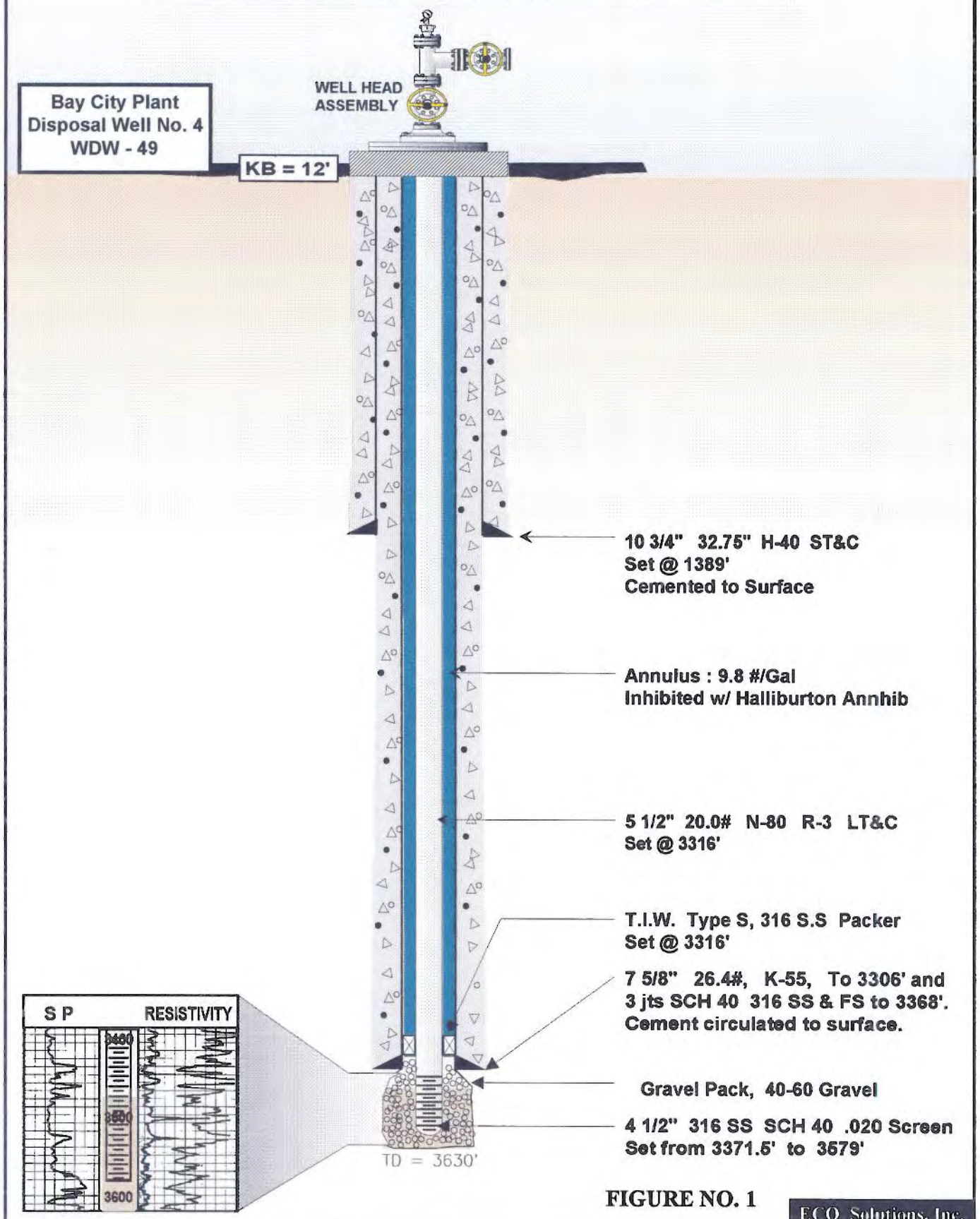


FIGURE NO. 1

ECO Solutions, Inc.

HC-W49 / BHS / 04-07-94

2.0 FIELD OPERATIONS SUMMARY

2.1 BOTTOM HOLE PRESSURE/FALLOFF SURVEY

Friday, March 1, 1996

Brought injection up from zero to 186 gallons per minute (gpm) at 1800 hours.

Saturday, March 2 - Monday, March 4, 1996

Continued injecting at an average rate of 186 gpm.

Tuesday, March 5, 1996

Wes Smith arrived at plant location at 0700 hours, checked in with front gate security guard and went to WDW-49 well site at 0730 hours. Milton Cooke Company (Cooke) personnel checked in at 0630 hours and drove to well site. Effluent was being injected at a well head pressure (WHP) = 436 pounds per square inch gauge (psig). Cooke commenced rigging up on well. NOTE: All depths are referenced to rotary drive bushing (RKB) at 12' above ground level.

WDW-49 (Well No. 4)	active/injecting
WDW-14 (Well No. 2)	out of service
WDW-32 (Well No. 3)	out of service
WDW-110 (Well No. 1-A)	out of service

Checked with Paul Richardson and Andy Bradley in the control room. WDW-49 injecting at approximately 186 gpm. At 0800 hours Cooke started pressure gauge calibrations on the following tools:

EPG 520 Serial # 69681 (Surface ReadOut) - Range 0 - 2500 psia.
EMS 725 Serial # 76651 (Back-up, Memory gauge)

Met with Ray Horton and Brian Barrington at 0845 hours to review test procedures and current condition of injection well. At 0850 hours placed tool string in lubricator (+/-18' length) as follows:

Length	Description
1.0'	Cable head
2'	Collar locator
1-1/4'	EPG 520 (SRO gauge)
4'	EPG 725 (memory gauge)
5'	weight bar
5'	weight bar

At 0851 hours opened master valve, pressured up lubricator, and prepared to go in hole. At 1055 hours check SRO gauge (WHP = 449.95 pounds per square inch absolute (psia)) and going into hole. Tied into packer (1995 RAT log) at 3316' using casing collar locator (CCL). Based on CCL recorder, correlated tool depth to packer depth tagged plugged back total depth (PBTD) at 3408; and pulled BHP tools up to 3300' at 1100 hours.

Met with shift supervisor, prepared to shut-down injection operations. Partially stopped injection pumps at 1300 hours and fully stopped injection pump at 1400 hours.

Due to the partial shut down of WDW-49, the initial falloff survey was canceled and rescheduled to commence at 1800 hours on March 8, 1996. Cooke pulled tool out of the hole and rigged down. Moved off location at 1730 hours. Well was left injecting waste effluent at a rate of 190 gpm.

Friday, March 8, 1996

Commenced injection at 219 gpm at 1800 hours.

Saturday March 9 - Monday, March 11, 1996

Continued injecting at an average rate of 219 gpm.

Tuesday, March 12, 1996

Injecting effluent into WDW-49 at the rate of 219 gpm. Wes Smith arrived at plant location at 0700 hours, checked in with front gate security guard, and drove to WDW-49. Cooke personnel checked in at 0630 hours and drove to well site. The same well conditions prevailed on all four injection wells as noted on March 5, 1996.

Checked with Paul Richardson and Andy Bradley in the control room. At 0800 hours Cooke commenced pressure gauge calibration on BHP tools (Note: EPG 520 SRO - Serial No. 80179 and EPG 725 memory tool, Serial No. 76653). At 0900 hours placed same tool string sequence as noted on March 5, 1996 in lubricator. Opened master valve, pressured up lubricator, and prepared to go into hole. Initial WHP 476.85 psia. Tied into

the packer (@3316') using CCL. Pulled tool up to 3300' at 1050 hours and commenced monitoring injection pressures and temperatures.

Monitoring injection operations at 1200 hours.

Injection rate	219 gpm
Down hole injection pressure	1891.13 psia
Surface injection pressure	467 psig

Met with shift supervisor, prepared to shut down injection operations on WDW-49. Stopped injection pumps at 1300 hours and begin falloff survey. Double block @ injection and boiler feed water flow lines.

Final injection conditions:	
Injection rate	219 gpm
Down hole injection pressure	1891.64 psia
Surface injection pressure	467 psig

Wednesday, March 13, 1996

Continue monitoring fall-off period of test (0800 hours).

Shut-in down hole pressure	1509.00 psia
Surface shut-in pressure	65.9 psig

2200 hours continue monitoring fall-off period of test.

Shut-in down hole pressure	1507.60 psia
Surface shut-in pressure	64.2 psig

Thursday, March 14, 1996

0200 hours continue monitoring fall-off period of test.

Shut-in down hole pressure	1507.31 psia
Surface shut-in pressure	63.9 psig

At 0400 hours recorded final downhole pressure, and printed final BHP plots. Pull out of hole with tool, making static gradient stops (15 minutes/stop) at 3000', 2000', 1000', 500' and surface and downloaded ASCII data file.

Final shut-in pressures/temperature

Shut-in down hole pressure	1507.23 psia
Shut-in down hole temperature	102.17 Deg. F
Surface shut-in pressure	63.6 psig

At 0530 hours gauges in lubricator and end of pressure falloff survey. Begin rigging down wireline equipment. Cooke crew left location at 0830 hours.

Moved in and rigged up B&G Wireline Service bobtail pump truck. First, picked up a 50-barrel load of 10 pound per gallon brine from a frac tank located at WDW-14. Transported the brine to WDW-49, rigged up and pumped the brine down the tubing at a rte of 1 to 1.5 barrels per minute and a surface pressure of 450 psig to zero. Brining operations on WDW-49 completed at 1700 hours. Rigged down B&G Wireline and moved off location. Wes Smith returned to Houston. All field work on WDW-49 associated with the MIT/BHP/falloff survey and brining-in is complete.

2.2 MECHANICAL INTEGRITY TEST

Thursday, March 7, 1996

At 0730 hours Mr. Wes Smith of ECO and Mr. Ray Horton of HCCG traveled to WDW-49 and met with Mr. Wilson Cupples with HCCG's instrument group to conduct and witness the APT. WDW-49 was shut-in with 63 psig on the tubing gauge and 256 psig on the annulus. HCCG's facility pressure recorder was used. Also, a certified calibrated pressure gauge, CMM Pressure Sensor, Serial No. 97223 with a range from zero to 2,000 psig, was installed onto the annulus outlet. WDW-49 had been shut-in for continuous period of 44 hours. HCCG personnel pressurized the annulus system using nitrogen. The annulus was tested to a maximum pressure of 1153 psig. The annulus was monitored for 60 minutes revealing a maximum pressure change from 1152 to 1148 psig. However, during the final 30 minute period, a zero pressure loss on the annulus was measured at 1150 psig, or 0 psi change (0%). After completion of the APT, the nitrogen gas was bled off the annulus lowering the pressure to 250 psig. WDW-49 was left shut-in.

At 0830 hours Atlas Wireline Service (Atlas) personnel arrived at HCCG's Bay City plant, checked through plant security and went through safety orientation. Moved in and rigged up Atlas' wireline unit including radioactive (RA) tools on WDW-49. At 1300 hours

started the RAT survey as witnessed by Mr. Wes Smith of ECO. Ran tool into hole and tagged bottom of borehole at a maximum depth of 3520'. Ran base gamma ray (GR) log, a short repeat section and one statistical check. Commenced injecting waste effluent into well at 1330 hours. Ran multiple pass survey from 3420' to 3000' at an injection rate of 50 gpm, depicting all injected fluid was entering the injection interval below the bottom of the borehole. Repeated multiple pass survey and obtained similar positive results. Set the RAT tool at 3350' for a stationary survey, injected a RA slug at the same injection rate and monitored for 20 minutes with no indicated upward flow. Repeated stationary survey with same positive results. Ran the final baseline GR log from 3420' to 3000'. Completed the RAT survey at 1900 hours and pulled the tool out of the hole. Rigged down Atlas and moved off site. WDW-49 was left operating at an injection rate of 190 gpm.

3.0 MECHANICAL INTEGRITY TESTING

3.1 ANNULUS PRESSURE TEST

An APT was conducted on Thursday, March 7, 1996 to demonstrate internal mechanical integrity. The APT was witnessed by Mr. Ray Horton of HCCG and Mr. Wesley Smith of ECO. The annulus was pressurized to a maximum pressure of 1153 psig with 66 psig on the tubing. The APT was monitored for plus sixty (60) minutes using a certified calibrated pressure gauge and facility recorder. During the final 30 minutes the pressure was measured from 1150 to 1148 psig and back up to 1150 psig for zero pressure change, or 0 psi (0%), which was well within the 5% pressure loss criteria set by the TNRCC. APT data and plot are included in Appendix B.

3.2 RADIOACTIVE TRACER SURVEY

On Thursday, March 7, 1996 a RAT survey was conducted by Atlas to demonstrate external mechanical integrity and to insure that all fluids are entering the injection interval. The RAT was witnessed by Mr. Wes Smith of ECO. Analysis of the RAT survey showed no upward fluid movement. Atlas and ECO conducted the RAT as follows:

1. Ran API gamma-ray (GR) tie-in strip.
2. Ran initial baseline GR log from 3420' to 3000'.
3. Ran repeat GR log from 3400' to 3220' to confirm tool repeatability.
4. Ran 5-minute statistical check at 3350'.
5. Made multiple pass survey #1 with RA slug ejected at 3000' and a pump rate of 50 gpm.
6. Made multiple pass survey #2 with a RA slug ejected at 3000' and a pump rate of 50 gpm.
7. Ran stationary survey #1 at 3350'. Watched RA slug pass tool and monitored for 20 minutes. Pump rate 50 gpm.
8. Ran stationary survey #2 at 3350'. Watched RA slug pass tool and monitored for 20 minutes. Pump rate 50 gpm.
9. Ran after survey base GR log from 3420' to 3000'. RAT survey completed.

3.3 ESTIMATED TIME TO RUN STATIONARY SURVEY SEQUENCE

The purpose of this estimate is to calculate the "worst case" time for the radioactive slug to move from the GR tool (1) down the tubing, (2) into the perforations, and (3) up the casing/borehole annulus to the tool depth.

Basic Data:

Capacities:	4-1/2" liner	-	0.653 gal/ft.
	4-1/2" liner x 9-7/8" borehole	-	3.15gal/ft.
Pump Rate:	50 gpm		

Note: RAT detection tool was held stationary at 3350 feet, or 25 feet above the top of the screened section (receiving fluid) at +/-3375'.

Worst Case Calculations:

Volumes:	Liner	- 25 ft. x 0.653 gal/ft.	=	16.3
	Liner/borehole	- 25 ft. x 3.15 gal/ft.	=	78.8
		TOTAL		95.1 gallons

Calculated time to circulate RA slug around the end of the tubing and casing strings:

= 95.1 gal / 50 gpm

= 1.9 minutes

Note: Actual time surveys were run = 20 minutes

4.0 BOTTOM HOLE PRESSURE FALLOFF

4.1 BOTTOM HOLE PRESSURE FALL-OFF ANALYSIS

Purpose Of Test: Required annual Reservoir Evaluation Test for year **1996.** Calculate the following reservoir characteristics: permeability, skin damage, pressure drop due to skin and flow efficiency.

Analysis Description - Fall-Off Test

Method Of Interpretation: The following analysis was performed by utilizing both Semi-Log and Log-Log analysis. The Semi-Log curve was generated by plotting the Pressure vs the Superposition time function, utilizing the given rate history. The semi-log straight line was calculated by linear regression through the infinite acting flow period of the curve. The slope **m**, $\mathbf{P_{1hr}}$ values were obtained from this curve and utilized for permeability and skin calculations. The Log-Log curves were generated by plotting **ΔP** and Pressure derivative vs the Agarwal Equivalent time function, $[t_p\ \Delta t/(t_p+\Delta t)]$. The Log-Log curves were simultaneously positioned over Bourdet et al type curves until a solution match was obtained. Permeability and skin values were calculated from this match and then compared with those obtained from the Semi-Log analysis.

A. Semi-Log (Horner): The straight line area of the semi-log curve was identified by first using the 1-1/2 log cycle rule to estimate the end of wellbore storage effects. Secondly, the time of the flat portion from the Pressure Derivative curve was used in determining the area of the semi-log curve in which the straight line was drawn. The semi-log yielded a slope value of **7.0 psi/cycle** and a P_{1hr} of **1522 psi**. The pressure difference between P_{1hr} and the injection pressure, P_{inj} of **1892 psi** compared with the calculated slope would give indications of positive skin damage and high permeability.

B. Log-Log (Bourdet et al Type Curves): Development of the unit slope line in the early portion of the derivative curve coupled with the high maximum of the derivative is indicative of a damaged well with wellbore storage. The flattening portion of the derivative curve at 0.5 P_d/P_d' indicates the beginning of the radial flow regime and was observed approximately five hours into the fall-off test. The flat portion of the derivative curve was the main factor used to obtain a type curve match yielding similar results to the semi-log analysis.

4.2 COMPARISON TO PETITION MODEL DATA

The reservoir properties (pressure, permeability, etc.) of the upper Miocene injection interval were determined through fall-off testing conducted on WDW-49. The following or operational formation pressures from the tests can be compared with the modeled

operational pressures by converting the meas
ground level and removing the pressure increa
0.435 psi/ft was used to correct all pressures
The formation pressures predicted by the mod
other near-wellbore conditions. The measured
and maximum predicted operational pressures a

Formation P

WDW-49 (Well 4) Depth	Flowing Formation Pressures, psia	Skin Pr Loss, psi	Formation Pressure, psia	Modeled Pressure, psi
3300'	1892	329	1563	NA
3440'	1953	329	1624	1639

The measured flowing pressure is below the maximum modeled operational pressure by 15 psi for WDW-49. A graph of the modeled pressures for WDW-49 is included. The graph shows the yearly predicted modeled injection rates (250 gpm for each well). All predicted operational pressures correspond to a depth of 3440' below ground level and an original estimated formation pressure for the upper Miocene injection interval of 1555 psi.

The measured static formation pressures from the well tests, corrected to a depth of 3440' below ground level, show a formation pressure increase of 13 psi. This illustrates that injection operations at the plant have had limited impact on formation pressures.

Static Formation Pressures From WDW-49 Well Test

Original Estimated Formation Pressure at 3440'	Static Formation Pressure at 3440'	Formation Pressure Increase, psi
1555	1568	+13

A comparison of the test permeability and transmissivity values with the modeled values of permeability and transmissivity for WDW-49 are given below:

Well Name	Test Permeability, md	Petition Permeability, md	Test Transmissivity, md-ft/cp	Petition Transmissivity, md-ft/cp
WDW-49 (well 4)	1448	1350	173,315	313,700

Conclusions: This particular well was diagnosed to be injecting into a homogeneous reservoir with a calculated permeability of **1445 (md)** and skin damage of **+30** utilizing an h_{net} value of **85 feet**. The flow efficiency of **14.4%** suggests that the near wellbore conditions impact the injection volume limitations. Also, the total pressure drop is primarily due to conditions within a small radius from the well.

The following Table is provided to give comparative results with the previous tests and calculations. The primary variables affecting the calculated results are included.

Table 4.1
SUMMARY OF RESULTS

Date MM/YY	Rate gpm	h_{net} ft	μ_w cp	slope psi/cycle	kh/μ	kh md-ft	k md	Skin
3/96	**219**	**85**	**0.7100**	**7.0**	**173,315**	**123,054**	**1448**	**+53**
03/95	**279**	**85**	**0.7100**	**8.486**	**183,299**	**130,142**	**1531**	**+49**
03/94	168	85	0.7100	5.517	169,620	120,430	1417	+70
09/92	79.5	85	0.7000	2.710	163,584	116,145	1366	+117

The calculated results indicate a difference in transmissivity, (kh/μ) of **5.4%** coupled with a **8.2%** difference in skin values between 1995 and 1996. In addition, the results calculated from type curve analysis compare favorably to those calculated from the semi-log straight line analysis thus supporting the integrity of the calculated results.

Note: The start time of the infinite acting flow period exceeded the time to exit the waste front, therefore the viscosity of the original reservoir fluid was used for the final analysis.

Table 4.2

WELL INFORMATION

Well Type: Injection
Screen: 3371.5' - 3579' (Gravel Pack Screen)

Test Gauge Depth: 3300 feet
Extrapolated Depth: 3440 feet

[Input Parameters]

Reservoir Pressure	psia	P	1507
Reservoir Temperature	Deg.F	T	102
Final Static Pressure	psia	P_{si}	1568
Final Injection Pressure	psia	P_{inj}	1953
Water Flow Rate	gsl/min	q_w	219
Sand Thickness	feet	h_{net}	85
Wellbore Radius	feet	r_w	0.4580
Formation Porosity	%	ϕ	33.0
Extrapolated Pressure	psia	P^*	1504
Extrapolated Pressure @ 1 hr	psia	P_{ihr}	1522
Semi=Log Slope	psi/cycle	M	7.053
Injection Time	hrs	t_p	91.0
Shut-in Time	hrs	t_{si}	39.0

[Fluid Properties]

Fluid Viscosity	cp	μ_w	7.1000E-01
Formation Volume Factor	RB/STB	β_w	1.0000E+00
Fluid Compressibility	1/psi	C_w	3.0547E-06
Total Compressibility	1/psi	Ct	5.0000E-06

Table 4.3
Calculated Results

[Semi-Log Analysis - Multi-Rate Method]

Transmissibility	md-ft/cp	kh/u	173,315
Flow Capacity	md-ft	kh	123,054
Permeability	md	k	1448
Skin Damage	total	S	+53
Pressure Drop Due to Skin	psi	dP	+328.7
Flow Efficiency	%	FE	+14.4
Radius of Investigation	feet	r_i	8906

[Type Curve (Log-Log) Analysis]

Transmissibility	md-ft/cp	kh/u	173,071.26
Flow Capacity	md-ft	kh	122,880
Permeability	md	k	1445
Skin Damage	total	S	+30.1
Pressure Drop Due to Skin	psi	dP	184.5
Flow Efficiency	%	FE	+52

FIGURE 2

HORNER

PRESSURE BUILDUP PLOT

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14, 1996

$[k_1/u]_t$=2039.00 k_1=1447.69 md s=53.7 p*=1504.4

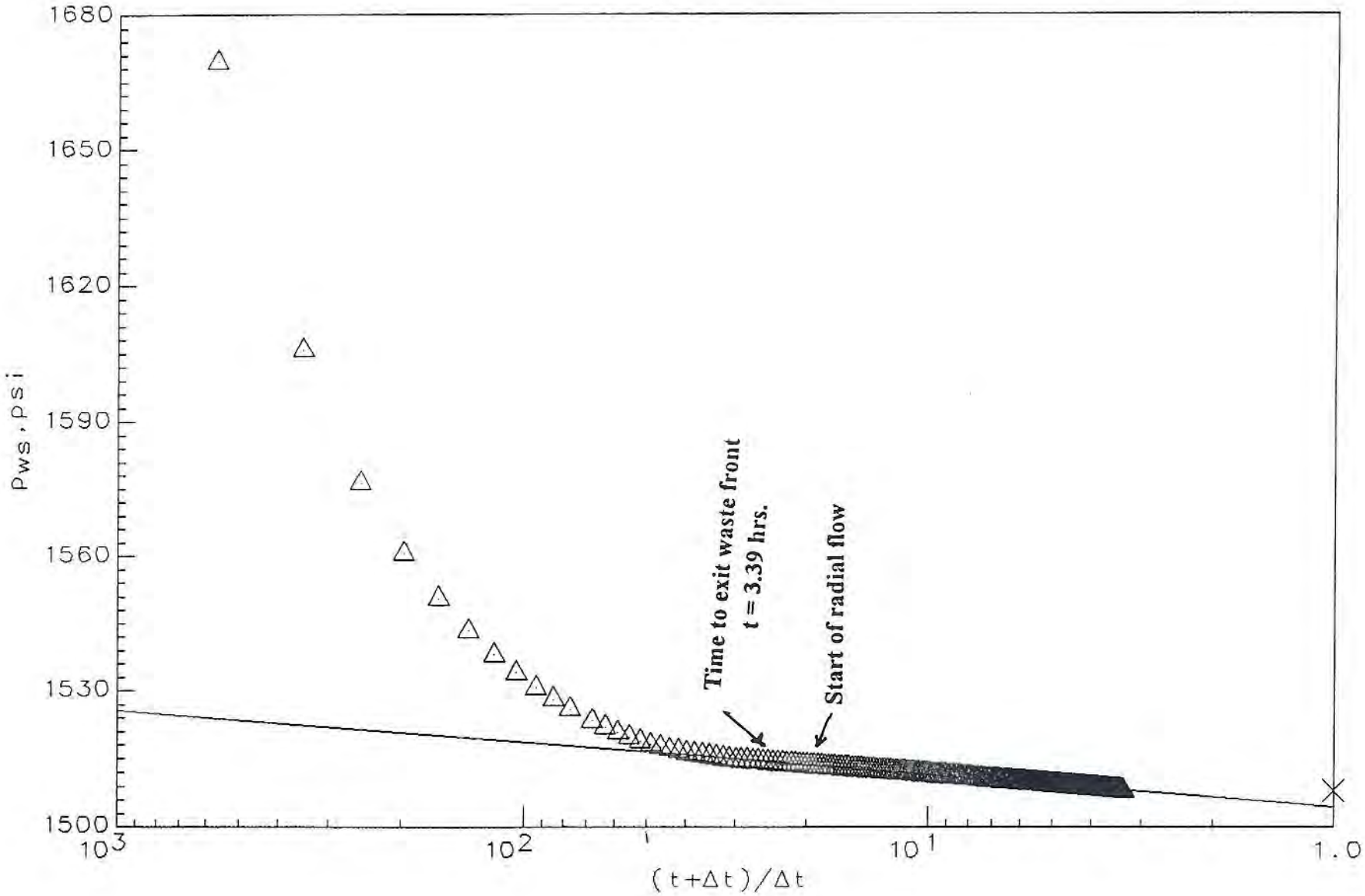


FIGURE 3

HORNER

PRESSURE BUILDUP PLOT

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14, 1996

$[k_1/u]_t$=2039.00 k_1=1447.69 md s=53.7 p*=1504.4

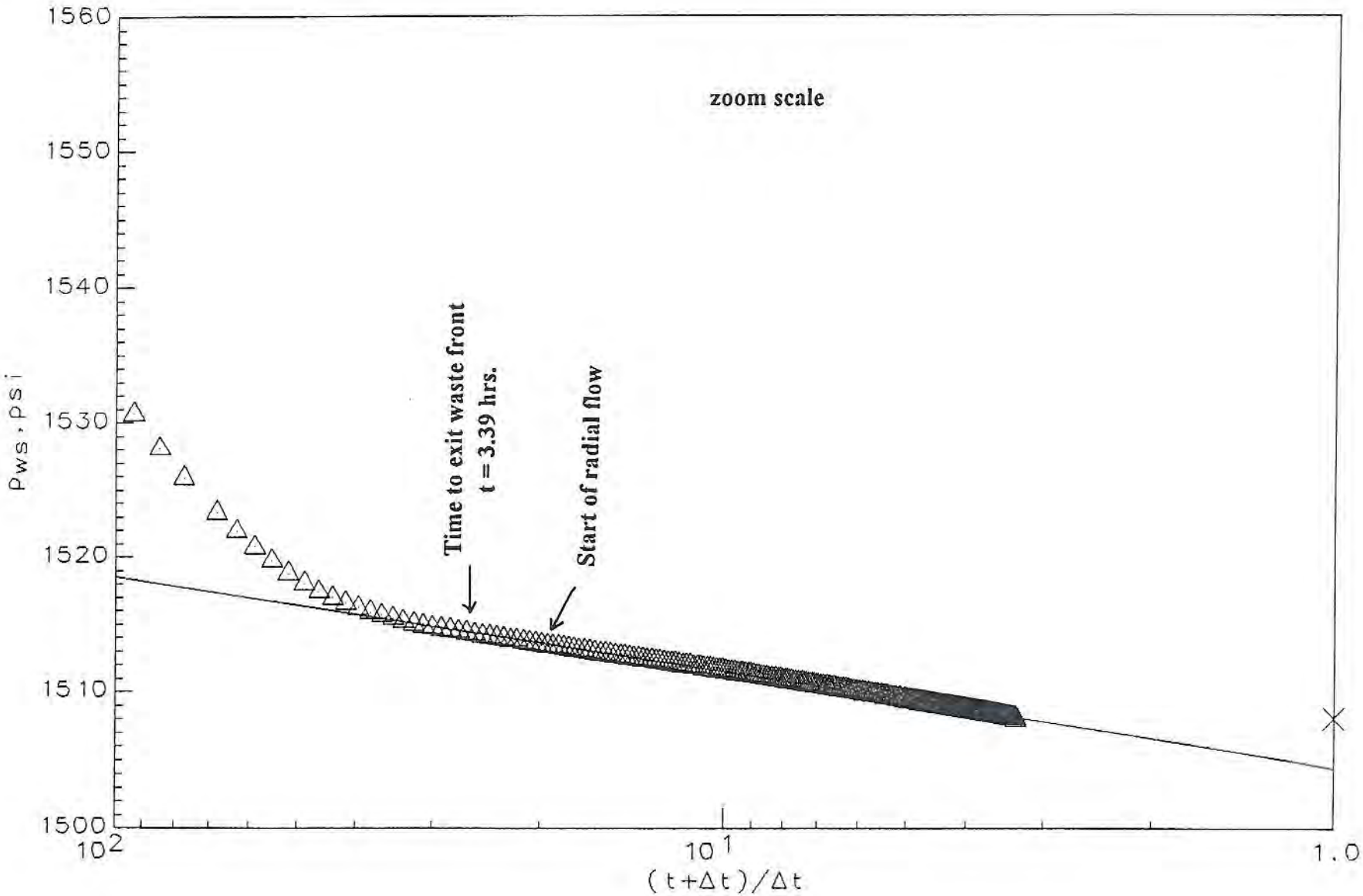


FIGURE 4

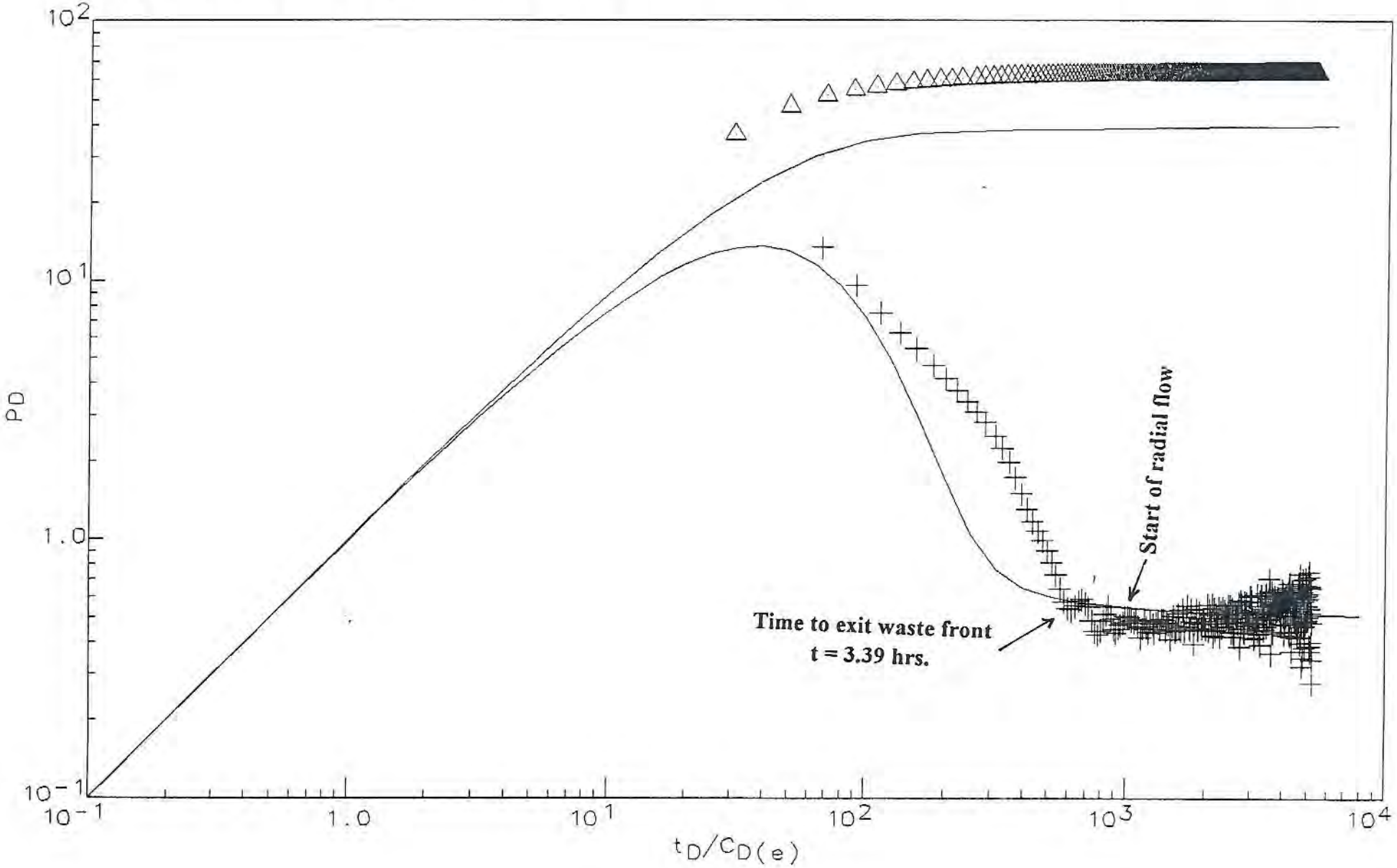
STORAGE AND SKIN TYPECURVE (Bourdet et al)

PRESSURE FALLOFF PLOT

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14, 1996

$[k_1/u]_t$=2036.13 k_1=1445.65 C_D=6778 s=30.1



K+E RITH x 5 C
KEUFFEL & ESSER CO. MADE IN U.S.A.

FIGURE 5

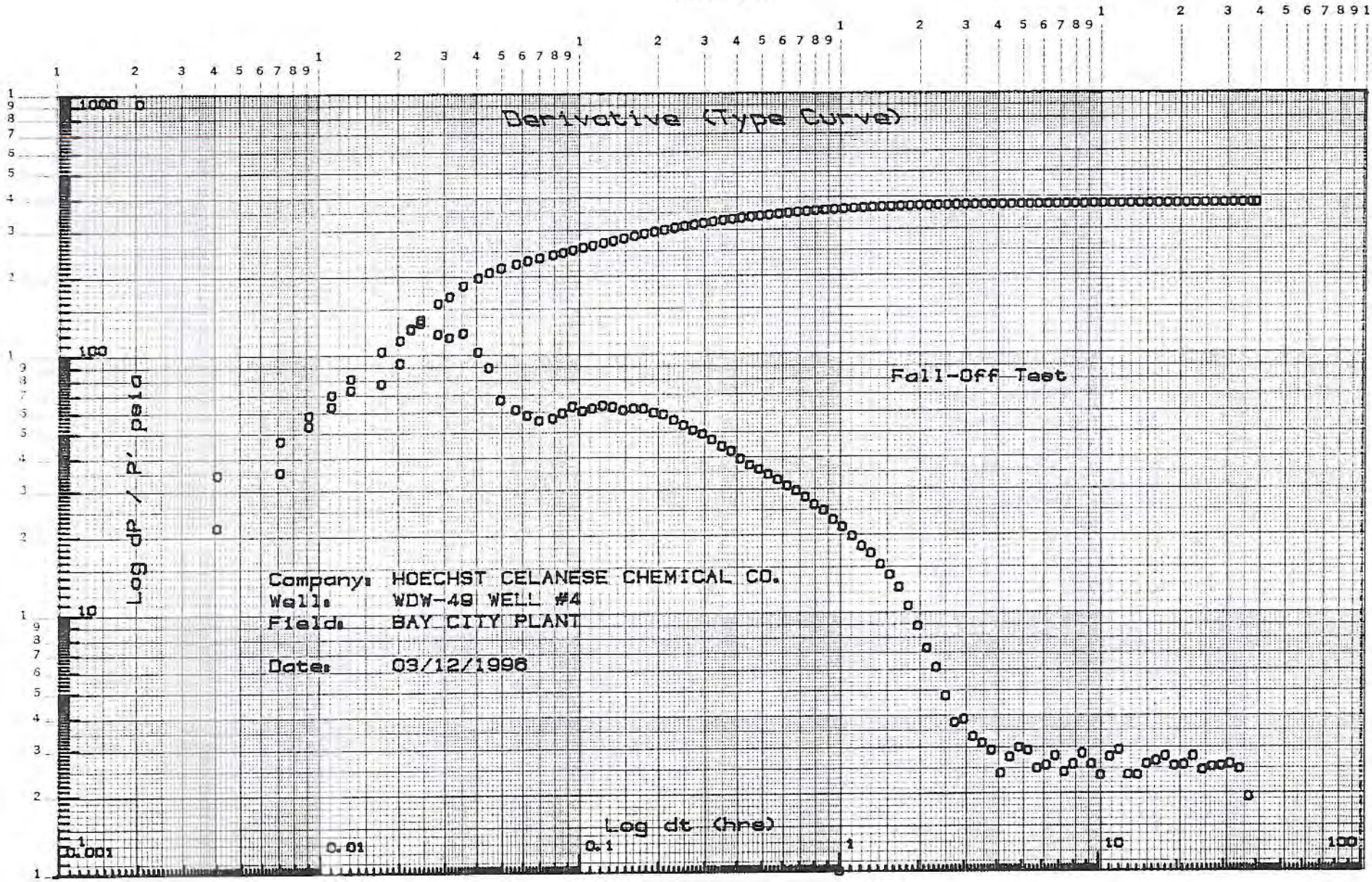


TABLE 4.4

Water Well Test - BUILDUP

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14,1996

Zone 1

Extended Rates

3 - Month Constant Rate	=	-	bbl/d
6 - Month Constant Rate	=	-	bbl/d

Stabilized Rate

Shape Code	=	R1A		<DEF>
Drainage Area	A =	160.0	acres	<DEF>
Time To Stabilize	ts =	2.550	hr	
Stabilized Rate @ Current Skin	qs =	-10162.31	bbl/d	
Stabilized Rate @ Skin Of 0	qs =	-78719.76	bbl/d	
Stabilized Rate @ Skin Of -4	qs =	-158138.28	bbl/d	

Water Well Test - BUILDUP

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14,1996

Zone 1

Pressures

Initial Pressure	pi =	1508.0	psi
Extrapolated Pressure	p* =	1504.4	psi
Average Reservoir Pressure	pR =	-	psi
Final Flowing Pressure	pwfo =	1892.5	psi

Straight Line Results

Total Sandface Rate	QTBT =	-7508.00	bbl/d
Semilog Slope	msl =	7.0	psi/cycle
Transmissivity (Total)	kh/mu =	173315.17	md.ft/cp
Mobility (Total)	k/mu =	2039.002	md/cp
Flow Capacity (Water)	kh =	123053.77	md.ft
Permeability (Water)	k =	1447.69	md
Skin Effect (Total)	s =	53.733	
Pressure Drop Due To Skin	delps =	328.7	psi
Flow Efficiency	FE =	1.64	
Damage Ratio	DR =	0.61	
Radius Of Investigation	r(inv) =	-	ft
@ Time Of Investigation	t(inv) =	-	hr

Water Well Test - BUILDUP

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14,1996

Reservoir Parameters

Net Pay	h =	85.00	ft	
Total Porosity	phit =	33.00	%	
Water Saturation	Sw =	100.00	%	
Oil Saturation	So =	0.00	%	
Gas Saturation	Sg =	0.00	%	
Wellbore Radius	rw =	0.46	ft	
Formation Temperature	T =	96.00	deg F	
Formation Compressibility	cf =	2.962×10^{-06}	psi^{-1}	<DEF>
Total Compressibility	ct =	5.962×10^{-06}	psi^{-1}	<DEF>

TABLE 4.5

Water Well Test - FALLOFF

Bourdet Et Al Type Curve Analysis

(Equivalent Time)

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14,1996

Inner Zone

Match Curve	CDe2s	=	1.00×10^{30}	
Match Point (pressure Ratio)		=	6.1	psi
Match Point (time Ratio)		=	0.005	hr
Dimensionless Storage Constant	CD	=	6778.19	
Wellbore Storage Constant	C	=	0.26	bbl/psi
Transmissivity (Total)	kh/mu	=	173071.26	md.ft/cp
Mobility (Total)	k/mu	=	2036.132	md/cp
Flow Capacity	kh	=	122880.59	md.ft
Permeability	k	=	1445.65	md
Skin Effect (Total)	s	=	30.128	
Pressure Drop Due To Skin	delps	=	184.5	psi
Radius Of Investigation	r(inv)	=	-	ft
@ Time Of Investigation	t(inv)	=	-	hr
Number Of Points In Derivative		=	7	

Dual Porosity

Inter Porosity Coeff	Lambda	=	-
Storativity Ratio	Omega	=	-

Water Well Test - FALLOFF

Bourdet Et Al Type Curve Analysis

(Equivalent Time)

HOECHST CELANESE WDW-49
WELL #4

PRESSURE FALL-OFF TEST
MARCH 12-14,1996

Inner Zone

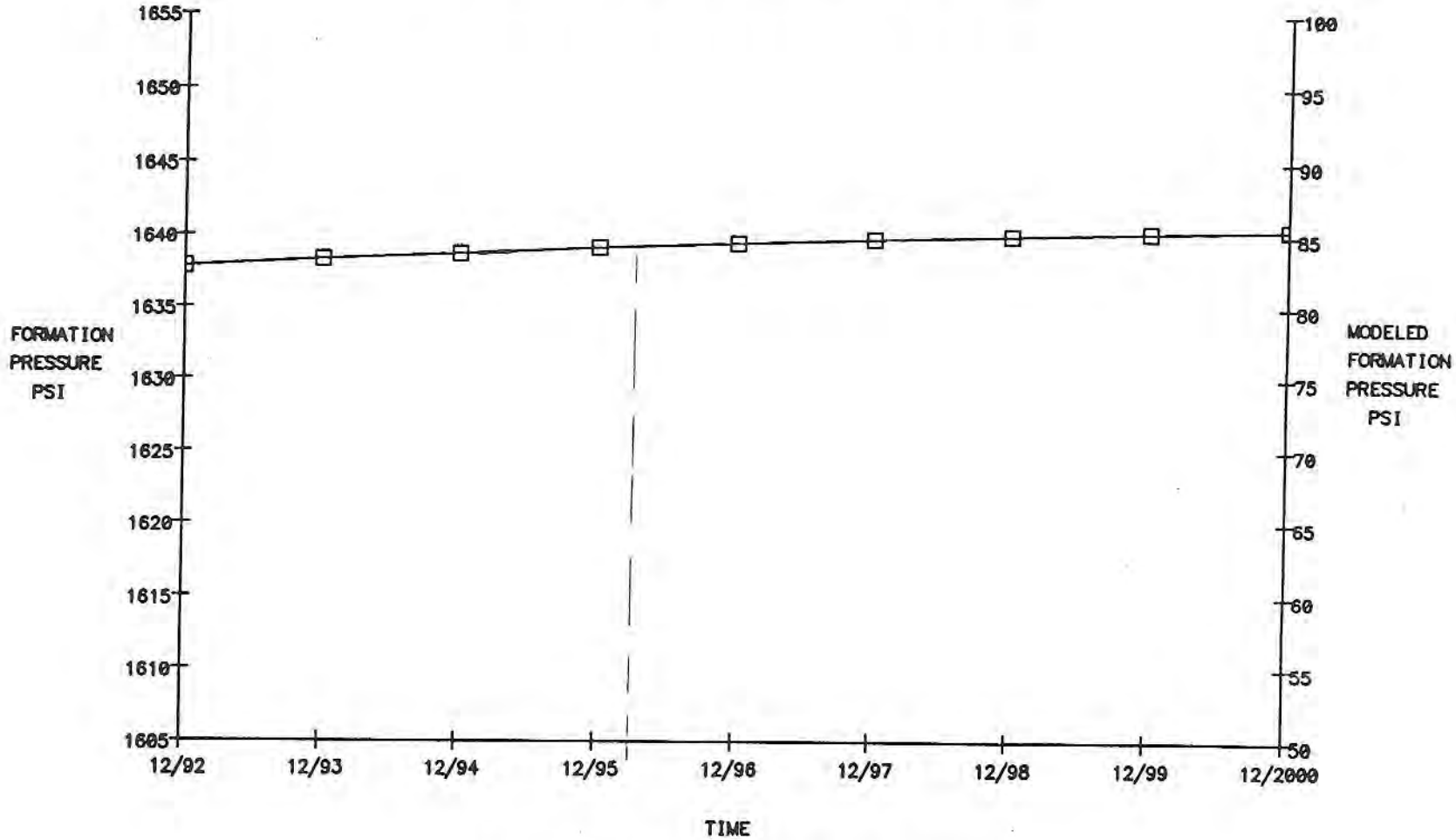
Match Curve	CDe2s	=	-	
Match Point (pressure Ratio)		=	6.1	psi
Match Point (time Ratio)		=	0.005	hr
Dimensionless Storage Constant	CD	=	6778.19	
Wellbore Storage Constant	C	=	0.26	bbl/psi
Transmissivity (Total)	kh/mu	=	173071.26	md.ft/cp
Mobility (Total)	k/mu	=	2036.132	md/cp
Flow Capacity	kh	=	122880.59	md.ft
Permeability	k	=	1445.65	md
Skin Effect (Total)	s	=	-	
Pressure Drop Due To Skin	delps	=	-	psi
Radius Of Investigation	r(inv)	=	-	ft
@ Time Of Investigation	t(inv)	=	-	hr
Number Of Points In Derivative		=	7	

Dual Porosity

Inter Porosity Coeff	Lambda	=	-
Storativity Ratio	Omega	=	-

FIGURE 6

UPPER MIOCENE INJECTION SAND - WDW-49



—□— MODELED FORMATION PRESSURES

MODELED OPERATIONAL FORMATION PRESSURES IN WDW-49 (1992 - 2000)

SECTION 4.3

CALCULATION FLOW CHART

1. Calculate slope value from Semi-Log Plot.

2 a. Utilize reservoir viscosity for *Initial Calculations*.

b. If required, redo calculations with waste viscosity.

3. Calculate Permeability.

4. Calculate Time to exit waste front.

5. Conditional statements.

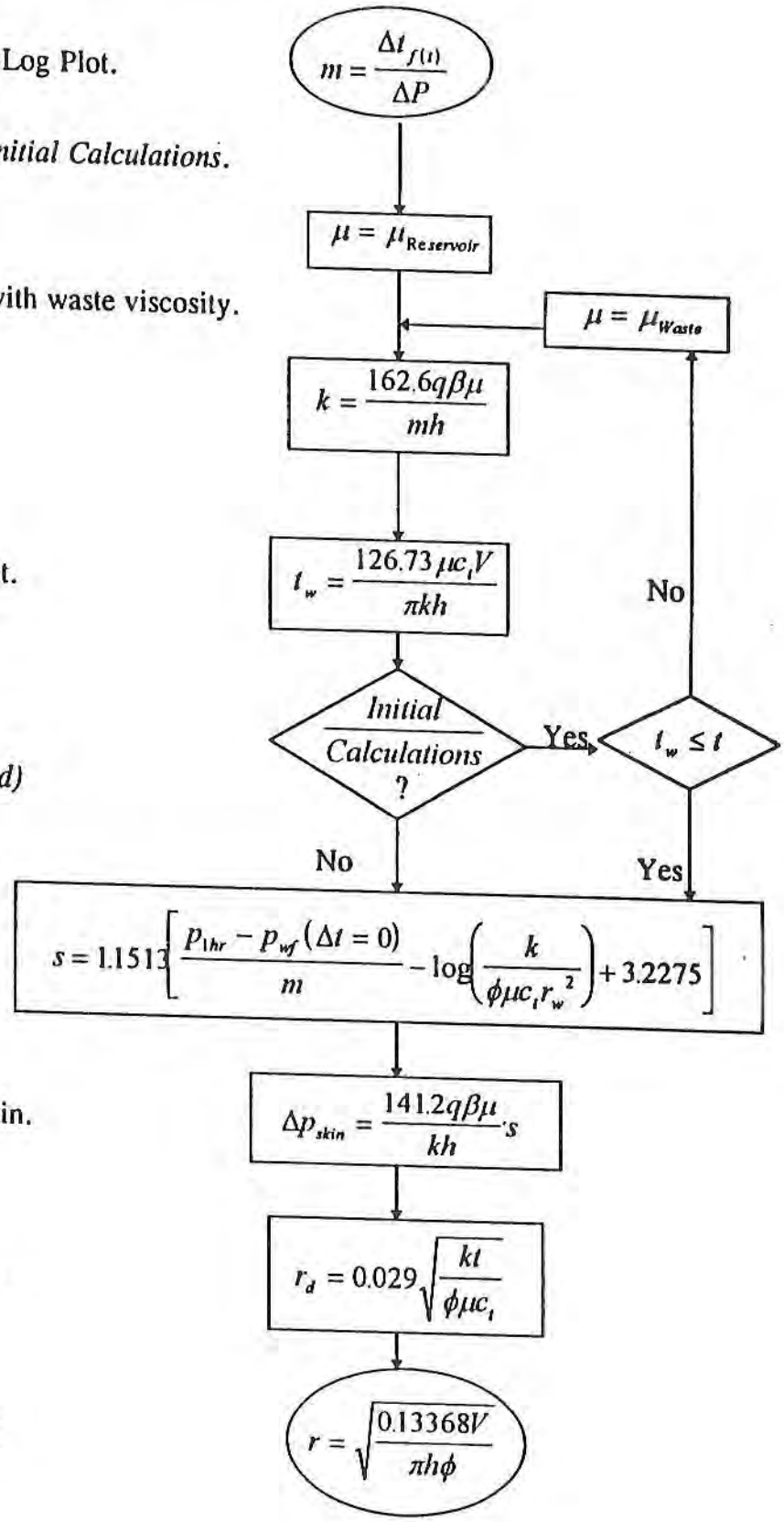
(t, beginning of radial flow period)

6. Calculate skin factor.

7. Calculate Pressure drop due to skin.

8. Calculate radius of investigation.

9. Calculate distance to waste front.



FALLOFF TEST - EQUATIONS AND CALCULATIONS

Input Parameters

Symbol	Name	Unit	Value
k	Permeability	millidarcies	1,457
q_{gpm}	Flow rate	gallons per minute	219
q_{bpd}	Flow rate	barrels per day	7,509
β	Formation volume factor	RB/STB	1.00
μ	Fluid viscosity	centipoise	0.71
m	Semi-log slope,	psi per cycle	7.0
h	Net sand thickness	feet	85
Ct	Total compressibility	1/psi	.0000050
π	Pi		3.1416
s	Skin Factor	total	53
ϕ	Porosity	fraction	.33
V	Total injected volume	gallons	1951004846
t	Time to radial flow period	hours	4.8

Calculate Permeability

Equation: $$k = \frac{162.6 q_{bpd} \mu \beta}{mh}$$

$$k = \frac{(162.6)\,(7{,}509)\,(1)\,(0.71)}{(7)\,(85)}$$

$$k = \frac{866{,}884.01}{595}$$

$$k = 1457 \text{ md}$$

Calculate Time To Exit Waste Front

Equation: $$T_w = \frac{126.73 \mu C_t V}{\pi k h}$$

$$T_w = \frac{(126.73)\,(0.71)\,(0.000005)\,(1{,}951{,}004{,}846)}{(3.1416)\,(1{,}457)\,(85)}$$

$$T_w = \frac{877740.50}{389071.45}$$

$$T_w = 2.26 \text{ hrs.}$$

Calculate Pressure Drop Due To Skin

Equation: $\Delta P_{skin} = \frac{141.2 q_{bpd} \mu \beta}{kh} s$

$\Delta P_{skin} = \frac{(141.2)\ (7{,}509)\ (1)\ (0.71)}{(1{,}457)\ (85)}$ x (53)

$\Delta P_{skin} = \frac{(39{,}897{,}990)}{(123{,}845)}$

$\Delta P_{skin} =$ 322.16 psi

Calculate Radius Of Investigation

Equation: $R_i = 0.029 \sqrt{\frac{kt}{\phi \mu C_t}}$

Ri = $0.029\ [(1{,}457)\ (4.8)/\ (0.33)\ (0.71)\ (0.000005)]^{1/2}$

$R_i = 0.029\ [6{,}994/0.0000012]^{1/2}$

$R_i = 0.029\ (5{,}828{,}333{,}333.3333)^{1/2}$

$R_i = 0.029\ (76{,}344)$

$R_i =$ 2,214'

Calculate Distance To Waste Front

Equation: $R_{wf} = \sqrt{\frac{0.13368V}{\pi h \phi}}$

$R_{wf} = [(0.13368)(1{,}951{,}004{,}846)/(3.14)(85)(0.33)]^{1/2}$

$R_{wf} = [260{,}810{,}328/88.1]^{1/2}$

$R_{wf} = [2{,}960{,}389.65]^{1/2}$

$R_{wf} =$ 1,721'

4.4 STATIC GRADIENT SURVEY

A static gradient survey was conducted while pulling out of the hole immediately following the bottom hole pressure falloff test. Stops were made at 3000', 2000', 1000', 500' and surface. Data collected during the static gradient survey is included in Appendix G and presented graphically in Figure 7. Data collected at each stop were as follows:

Table 4.4
Static Gradient Survey Results

Depth (ft)	Pressure (psia)	PSI/ft
0	69.99	
500	293.30	0.447
1000	509.98	0.433
2000	943.62	0.434
3000	1376.83	0.433
3300	1507.23	0.435
3440*	1568.08	0.435

* Pressure extrapolated to mid-point screen.

APPENDIX A

RADIOACTIVE TRACER LOG AND ATLAS WIRELINE'S INTERPRETATION LETTER

APR 17 1996

6W-SU

Western Atlas International

WIRELINE SERVICES

PRODUCTION LOGGING SERVICES

FINAL PRINT

FILE NO.	
API NO.	
COMPANY	HOECHST CELANESE CHEMICAL GROUP, LTD.
WELL	WDW 49
FIELD	BAY CITY PLANT
COUNTY	MATAGORDA STATE TEXAS
LOCATION: BAY CITY PLANT	SEC TWP RGE
OTHER SERVICES	NONE

PERMANENT DATUM GL ELEV. N/A

LOGGING MEASURED FROM RKB 12 FT. ABOVE P.D.

DRILLING MEASURED FROM RKB

ELEVATIONS

KB N/A
DF N/A
GL N/A

DATE	3/7/96	
RUN	1	
SERVICE ORDER	134699	
DEPTH-DRILLER	3433	
DEPTH-LOGGER	3420	
BOTTOM LOGGED INTERVAL	3419	
TOP LOGGED INTERVAL	2800	
TYPE FLUID IN HOLE		
SALINITY PPM CL.	N/A	
DENSITY LB/GAL.		
LEVEL	FULL	
MAX. REC. TEMP. DEG. F	N/A	
OPR. RIG TIME	MAST	
EQUIP. NO. / LOC.	41111 VICTORIA	
RECORDED BY	JOHNSTON	
WITNESSED BY	MR. W. SMITH	

BOREHOLE RECORD

NO.	BIT	FROM	TO

FOLD HERE

IN MAKING INTERPRETATIONS OF LOGS OUR EMPLOYEES WILL GIVE CUSTOMER THE BENEFIT OF THEIR BEST JUDGEMENT, BUT SINCE ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS, WE CANNOT, AND WE DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION. WE SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COST, DAMAGES, OR EXPENSES WHATSOEVER INCURRED OR SUSTAINED BY THE CUSTOMER RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR EMPLOYEES.

R.A.T. (Mech. Integrity Test)

CASING RECORD

SIZE	WGT	FROM	TO
5 1/2	20	0	3316
7 5/8	26.4	0	3579

REMARKS RUN (1)

LOG RUN IN ORDER TO STABLISH MECH. INTEGRITY. LOG FILES ARE PRESENTED FROM TOP DOWN, IN ORDER RUN. NO INDICATION OF FLUID MOVEMENT UPWARD WAS SEEN.

LOGS BELOW CORRELATED TO PACKER DEPTH OF 3316 FT.

LOGS BELOW CORRELATED TO PACKER DEPTH OF 3316 FT.

FIRST BASE PASS & REPEAT BELOW
TIME IS 1230 PM, NO INJECTION
****

****

FILE: 2

CURVE DELAY REPORT

CURVE	PHYS. DELAY	UNITS
TDET	6,0	FT,IN
BDET	0	FT,IN
CCL	9,9	FT,IN

PARAMETERS

*** NONE ***

DISPLAY SCALE CHANGES

*** NONE ***

COMPANY: HOECHST CELANESE RUN: 1

WELL NAME: WDW 49 TRIP: 1

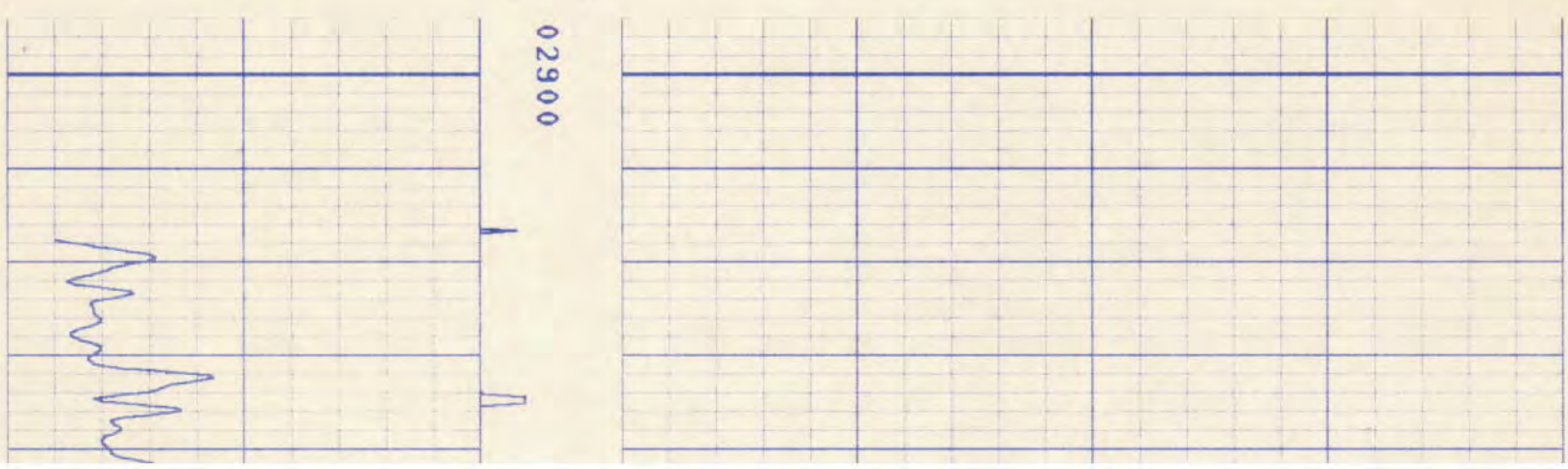
SERVICE: M 150A FILE: 2 DATE: 03/08/96 TIME: 12:18:41

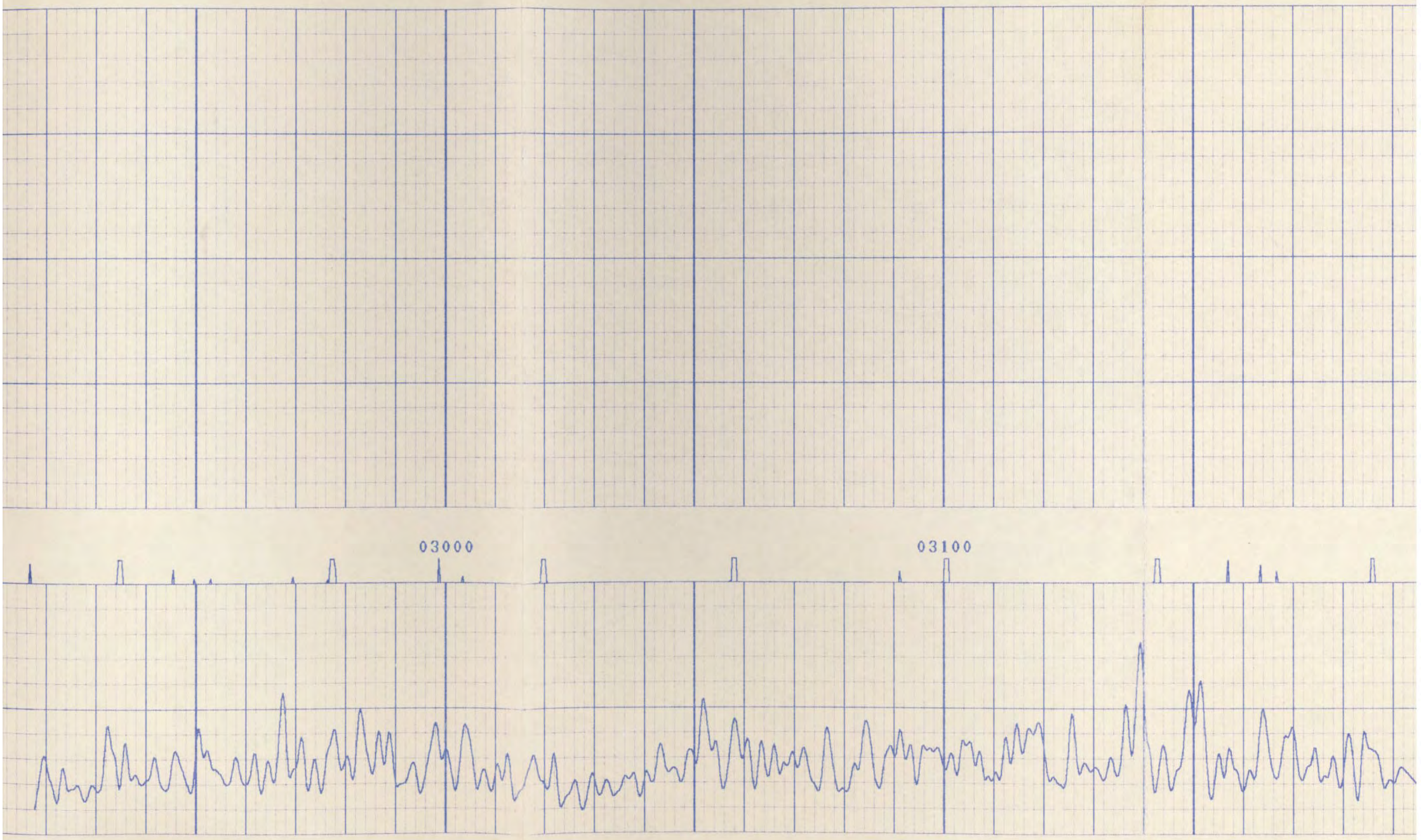
REVISION: FSYS256 REV:G002 VER:2.0 MODE: RECORD

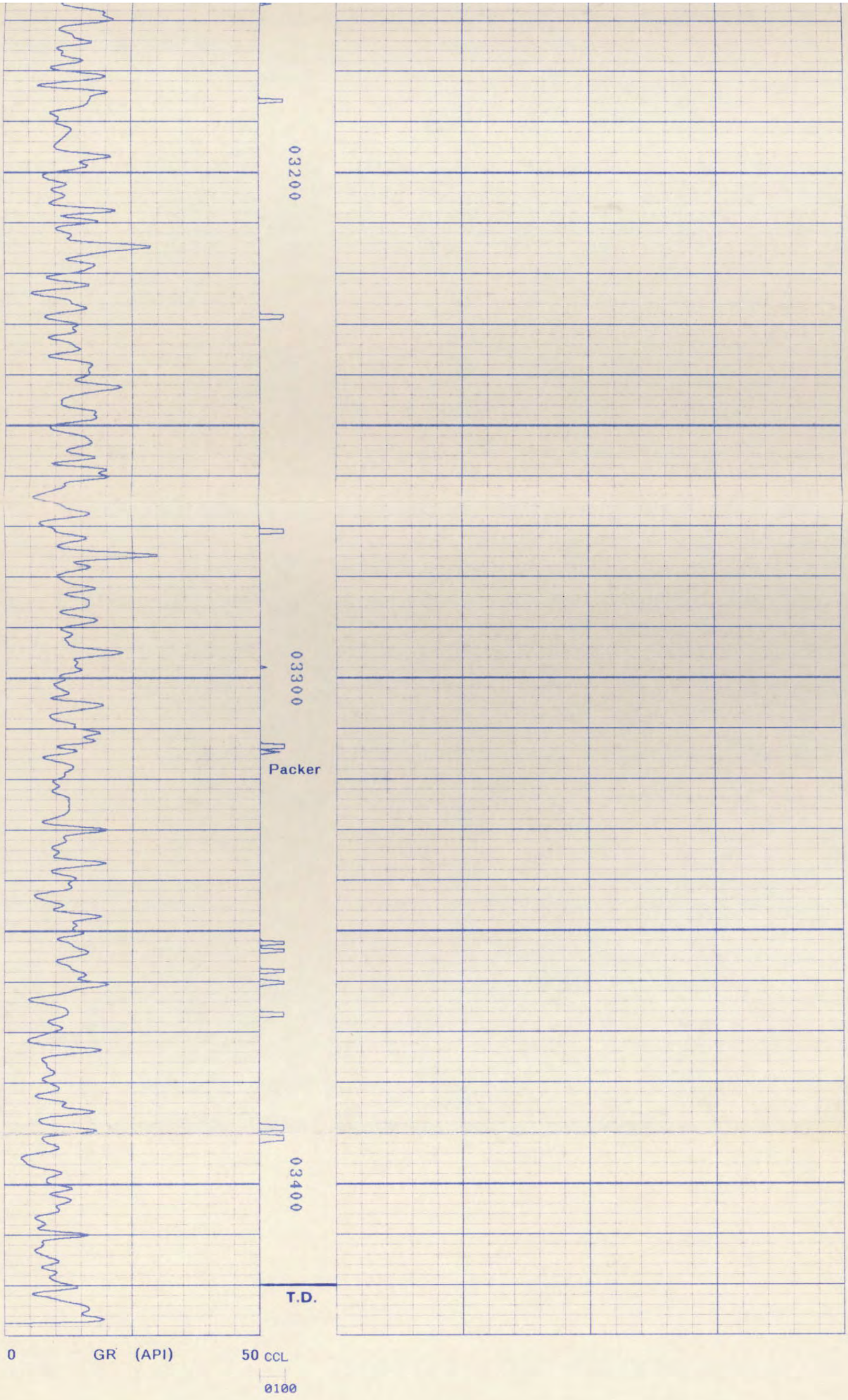
CCL

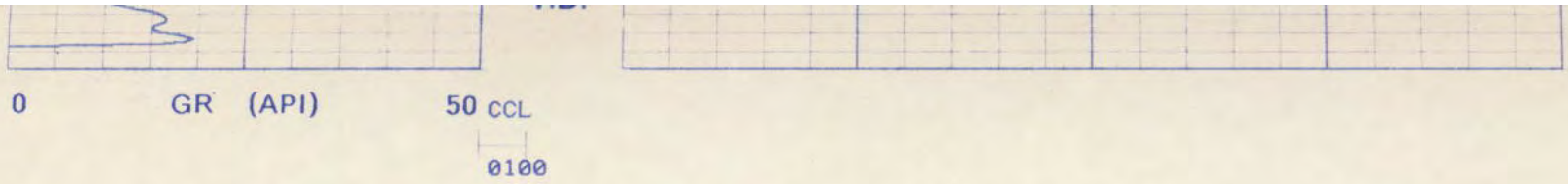
0100

0 GR (API) 50




03000
03100


03200
03300
Packer
03400
T.D.
0
GR (API)
50
CCL
0100



FILE: 2

****
****

FILE: 1

CURVE DELAY REPORT

CURVE	PHYS. DELAY	UNITS
TDET	6,0	FT,IN
BDET	0	FT,IN
CCL	9,9	FT,IN

PARAMETERS

*** NONE ***

REPEAT SECTION

DISPLAY SCALE CHANGES

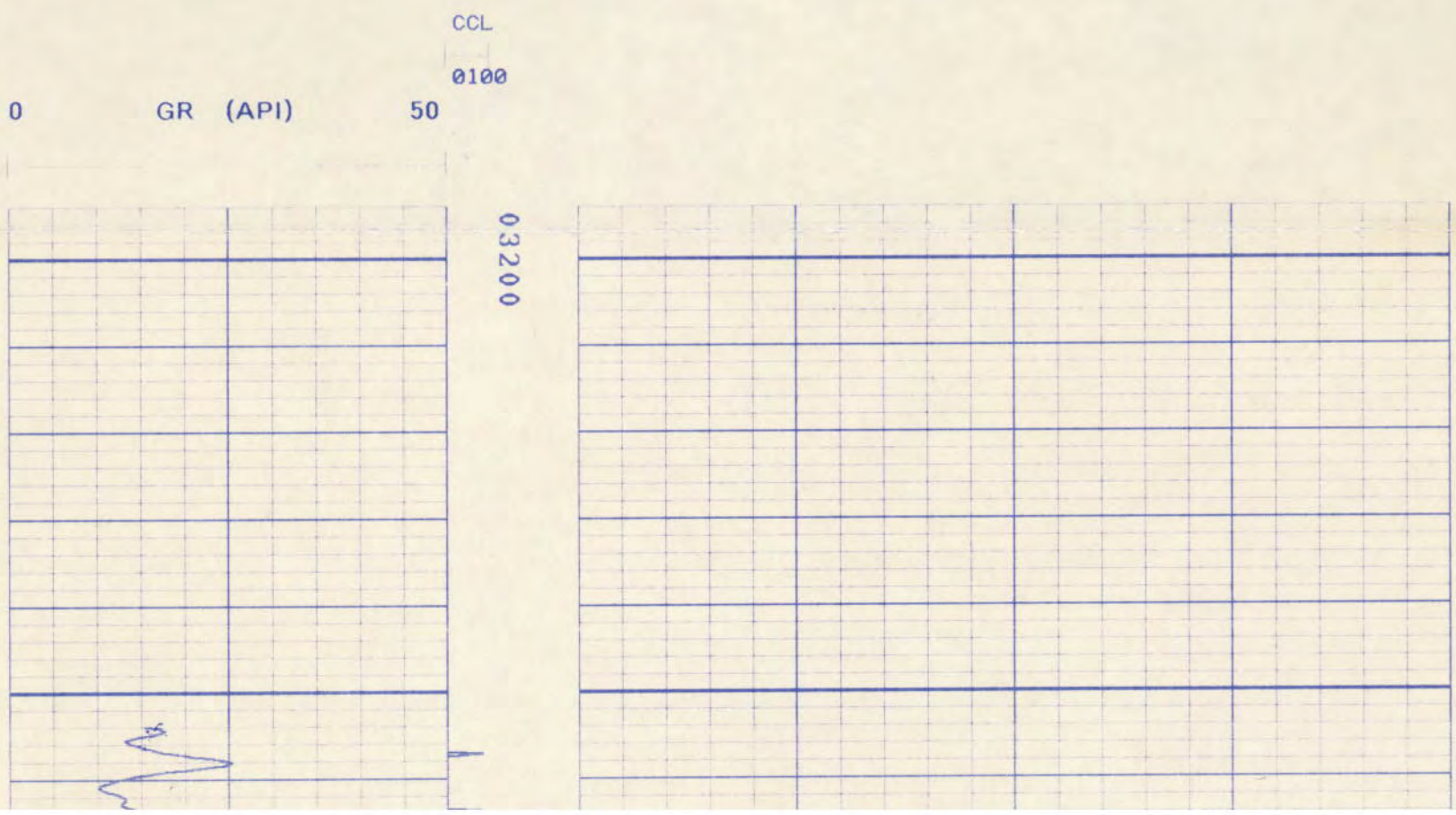
*** NONE ***

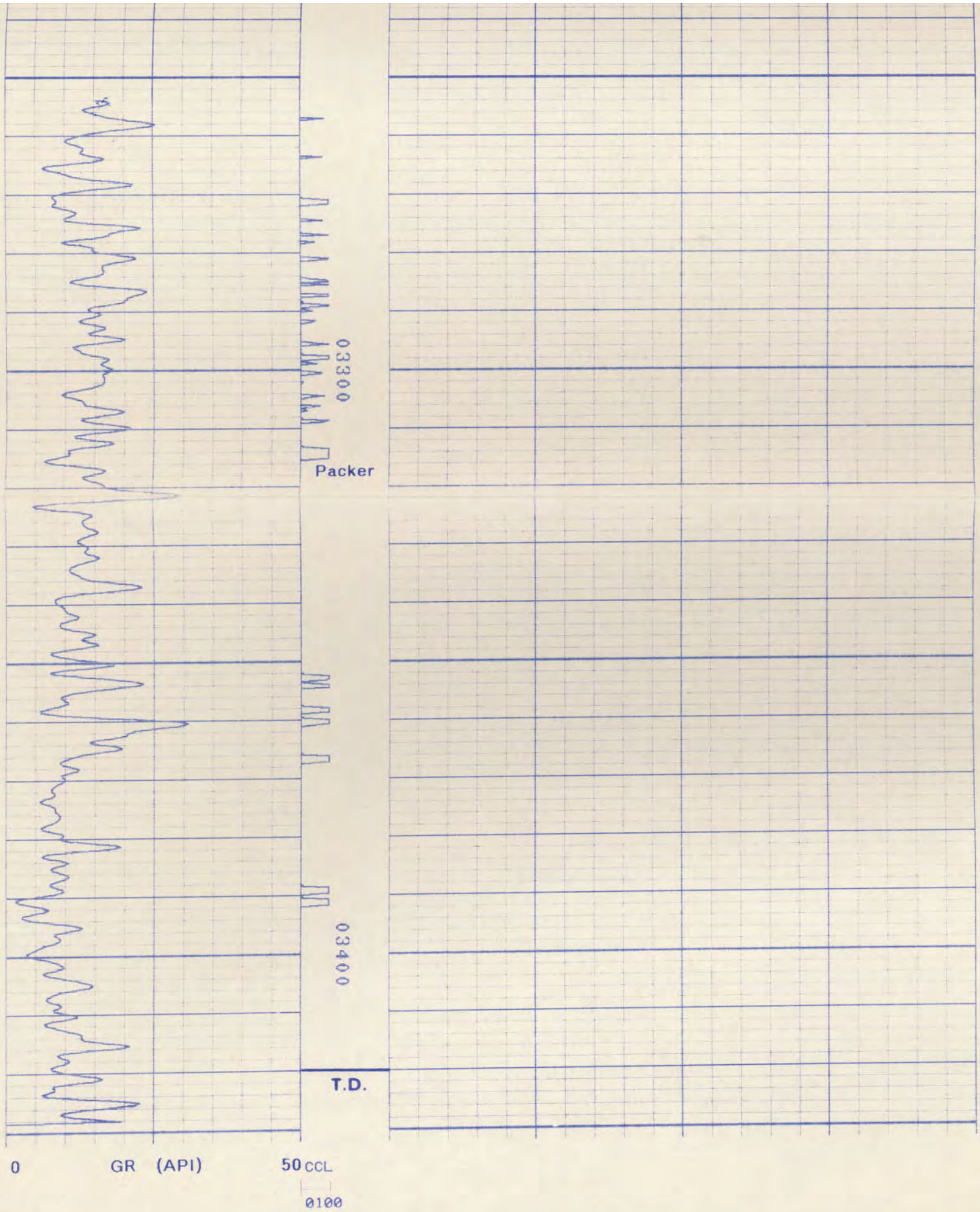
COMPANY: HOECHST CELANESE RUN: 1

WELL NAME: WDW 49 TRIP: 1

SERVICE: M 150A FILE: 1 DATE: 03/08/96 TIME: 12:07:38

REVISION: FSYS256 REV:G002 VER:2.0 MODE: RECORD





****

FILE BELOW IS TIME DRIVE
STAT CHECKS PRIOR TO INJECTION
TIME IS 1245, SCALE IS 2 INCHES
PER 100. TIME MODE IS 1 SEC/FT.
****

****

FILE: 3

****

****

FILE: 3

Tool Positioned at 3350 ft.

stat. check run for 10 minutes, at same sensitivity as log.

*** NONE ***

PARAMETERS

*** NONE ***

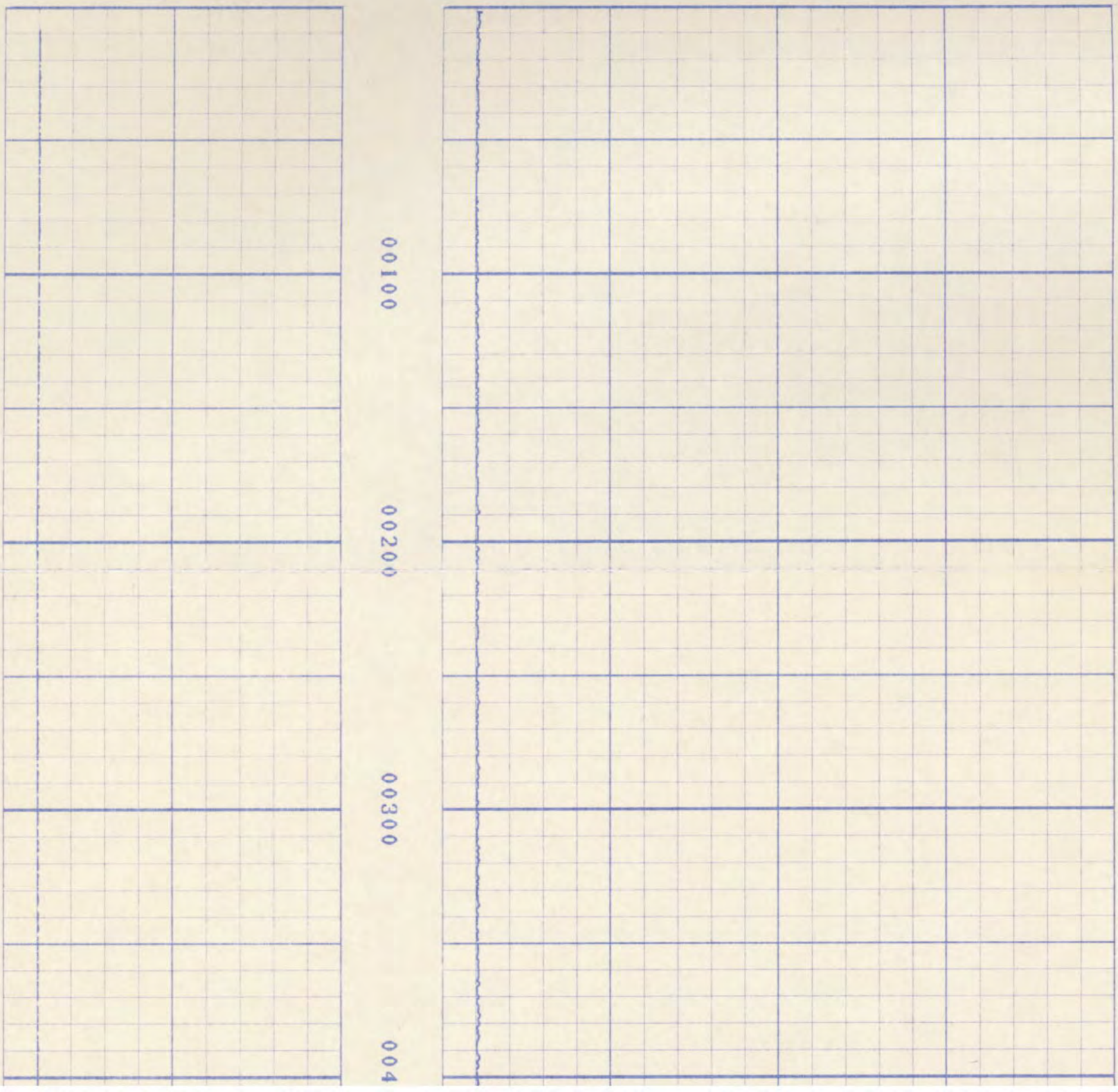
DISPLAY SCALE CHANGES

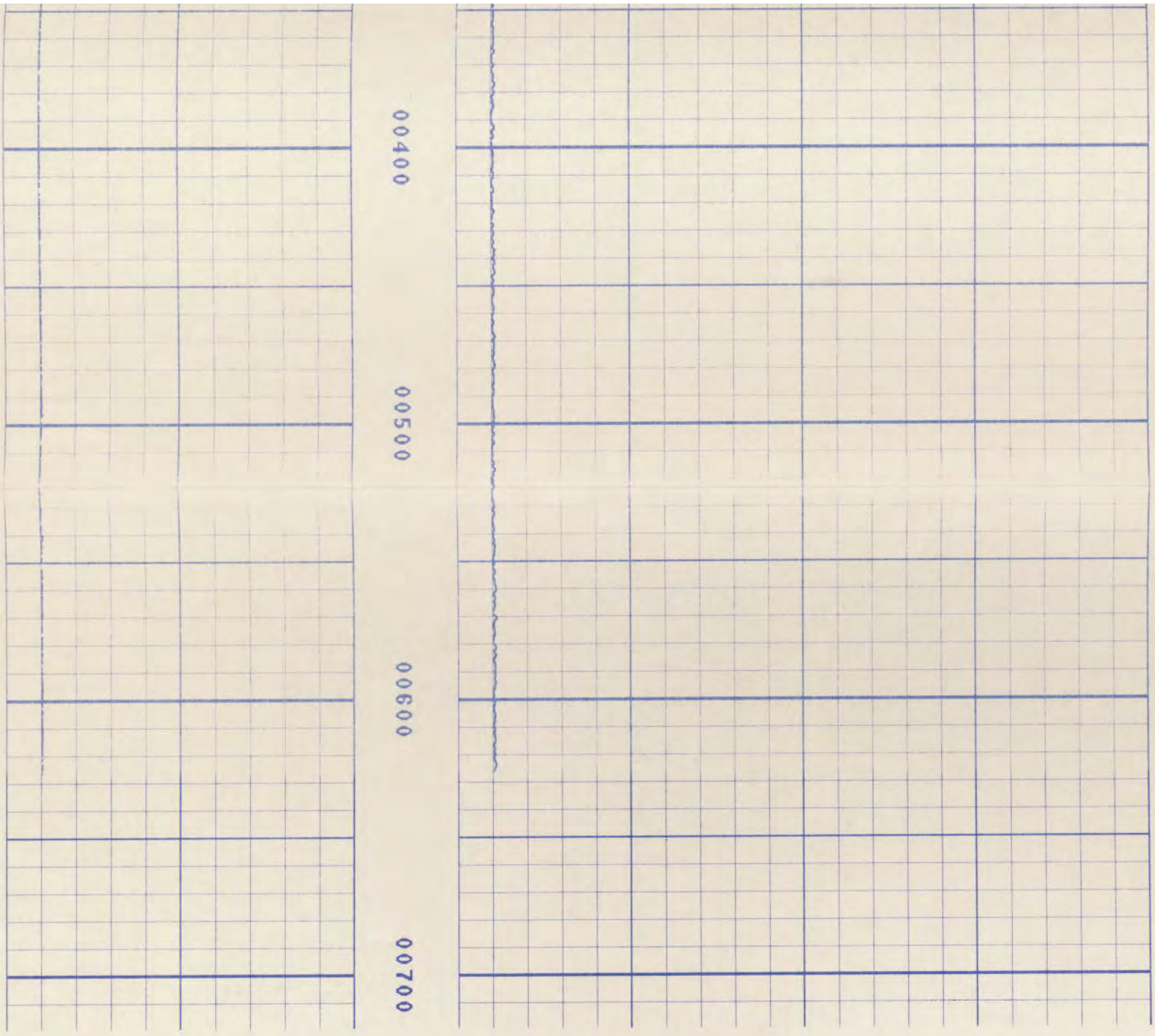
0100

CCL

0 400 0 400

TDET (CPS) BDET (CPS)





VELOCITY SHOT BELOW, TIME IS
1 PM. EXPECTED RATE IS 50 GPM.
****

****

FILE: 4

*** NONE ***

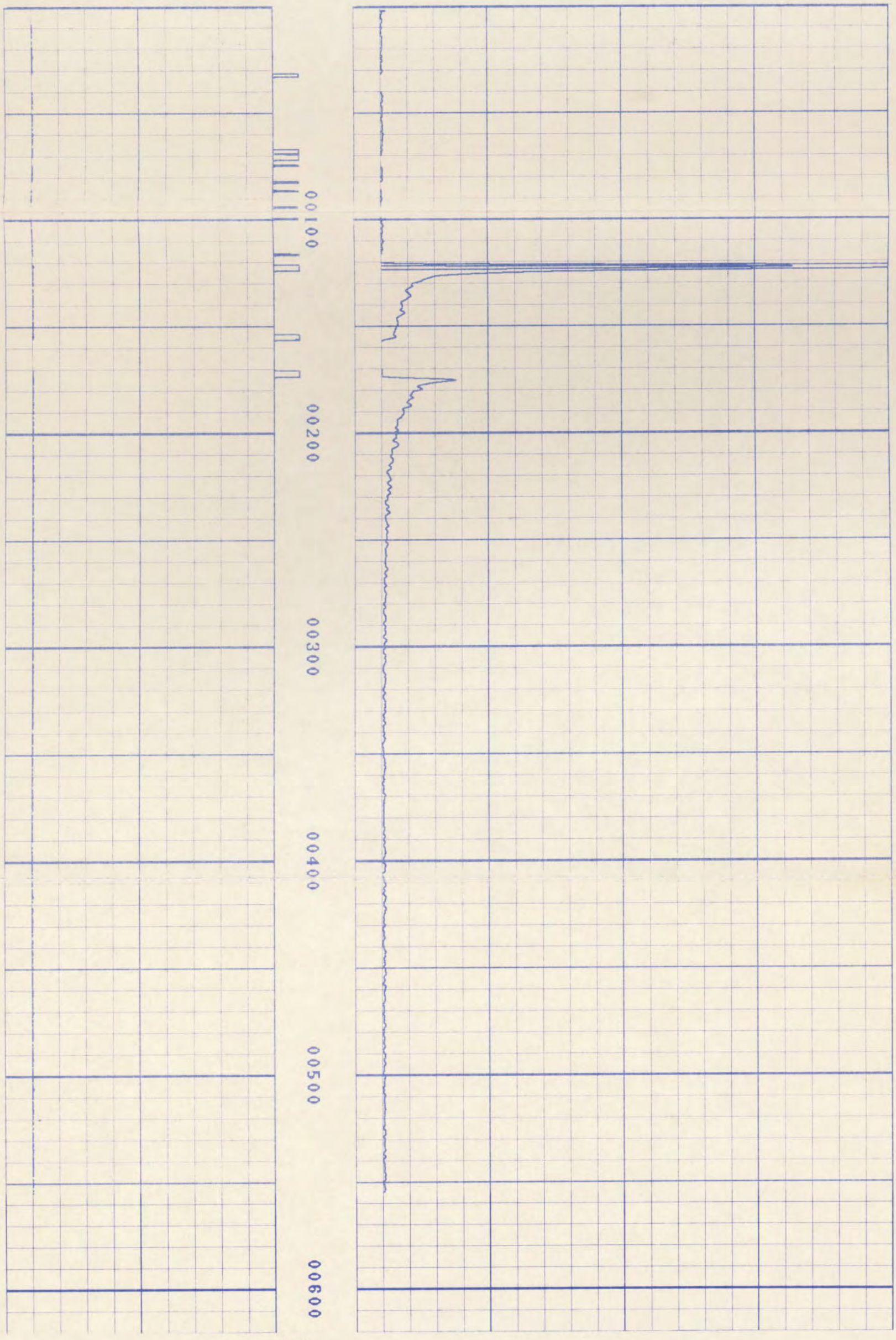
PARAMETERS

*** NONE ***

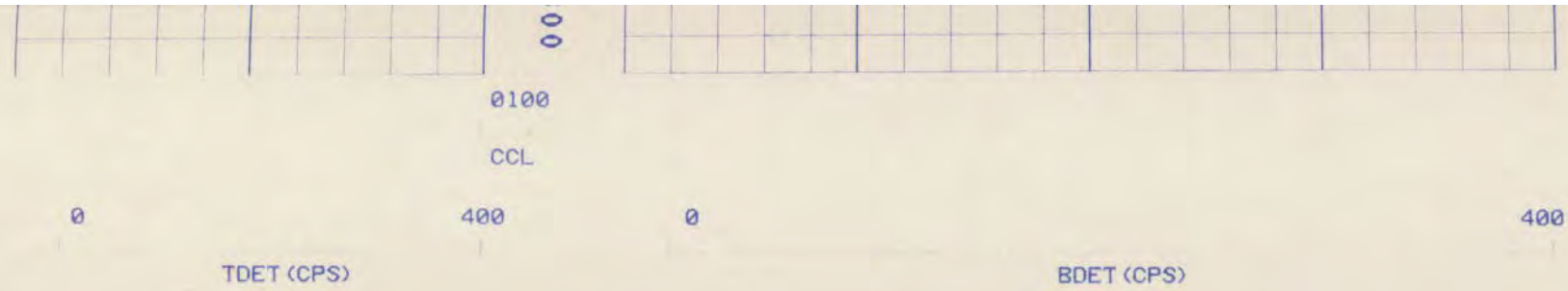
DISPLAY SCALE CHANGES

*** NONE ***

DISPLAY SCALE CHANGES

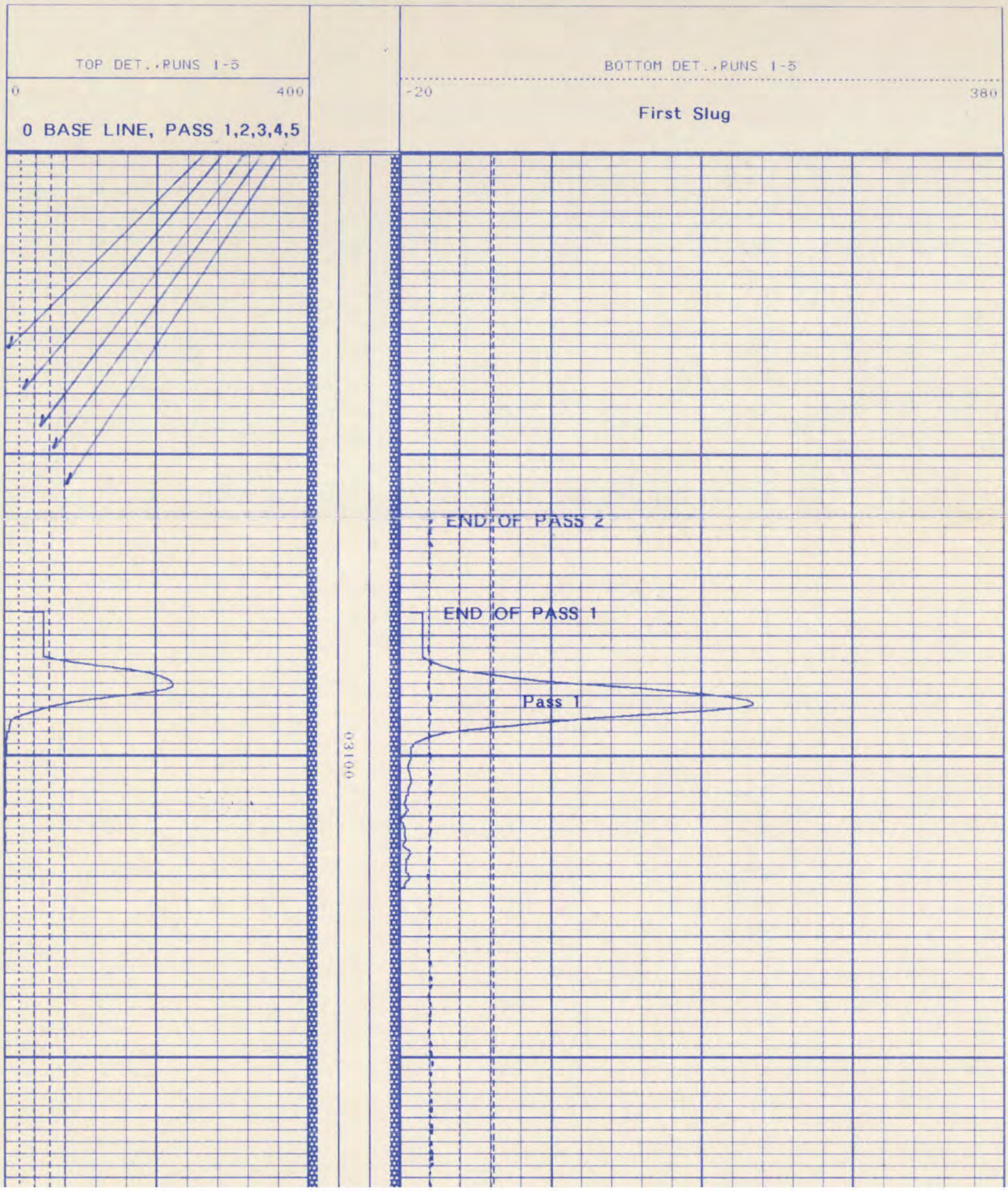


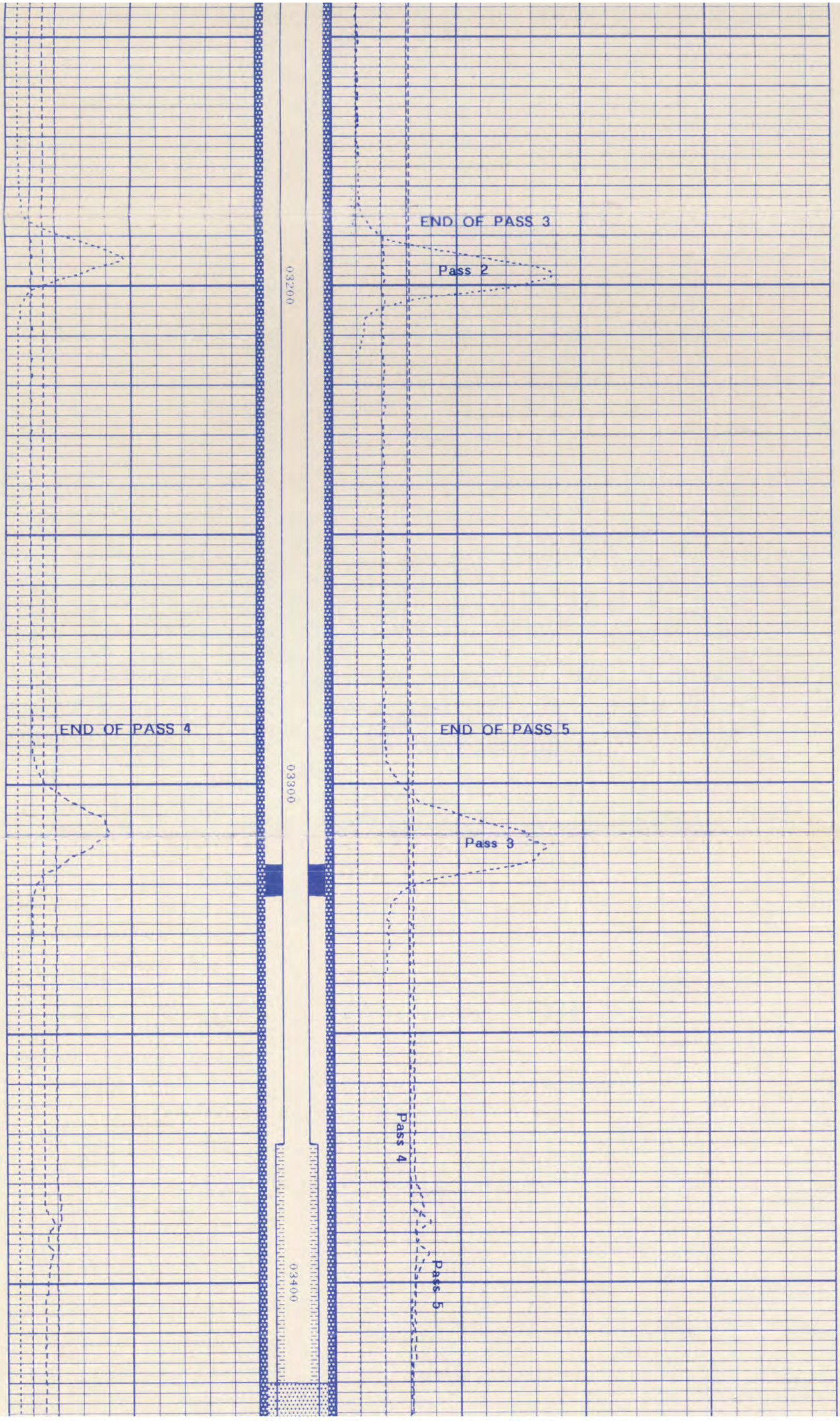
CCL

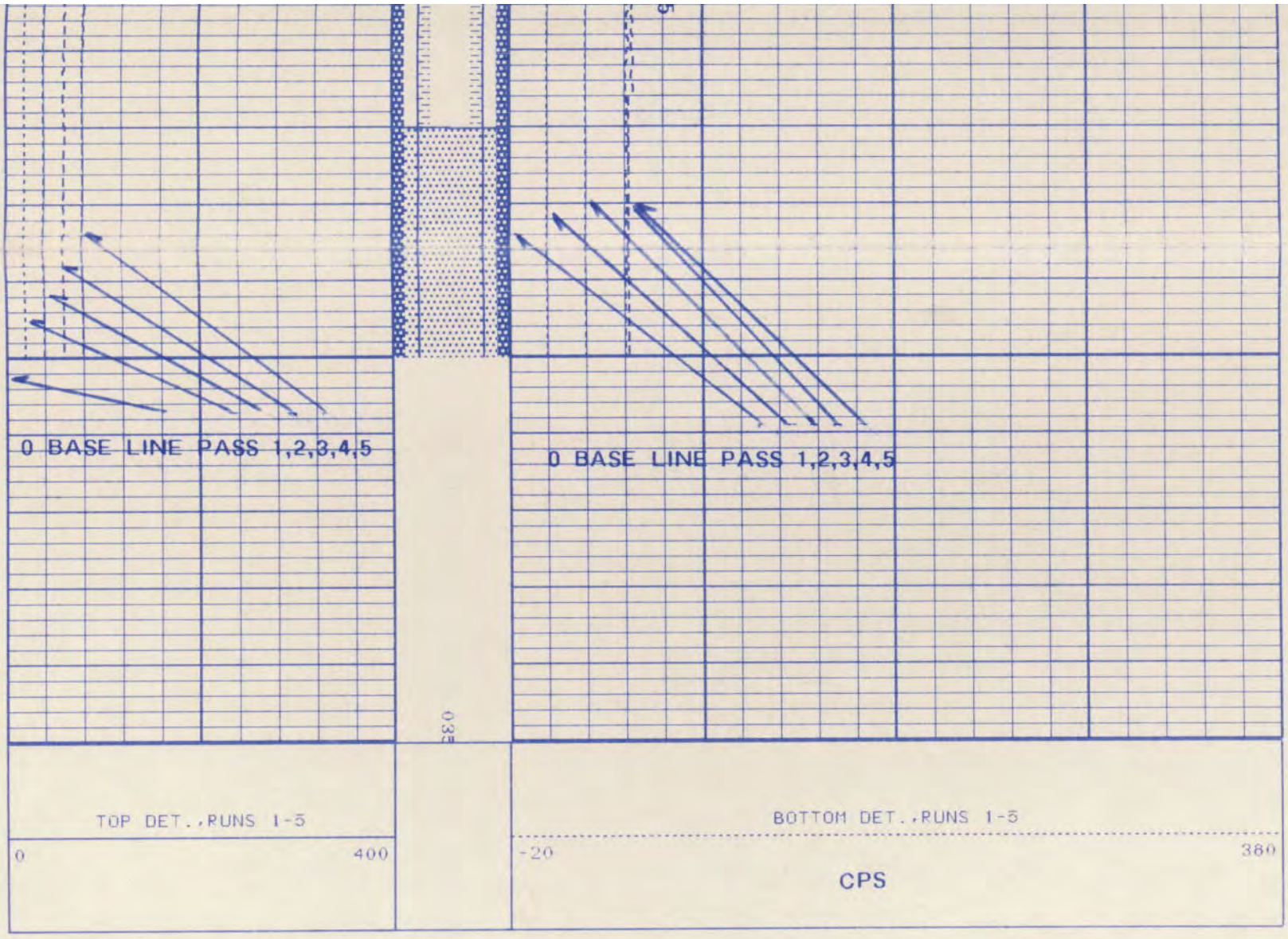


TRACER SLUGS FIRED AT 3000 FT,
AND CHASED DOWNWARD.

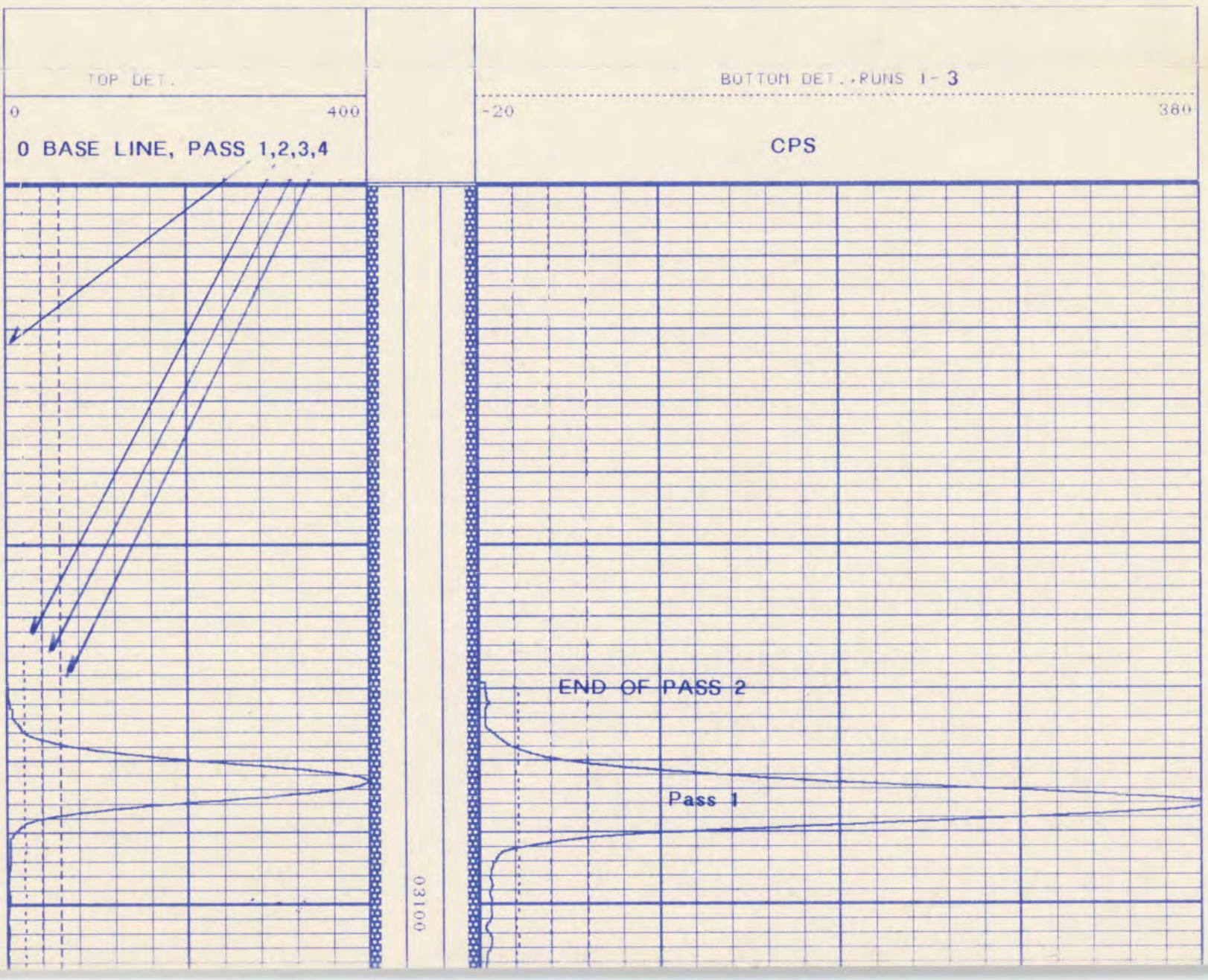
Slugs Chased in Overlays Below; slugs fired at 3000ft.

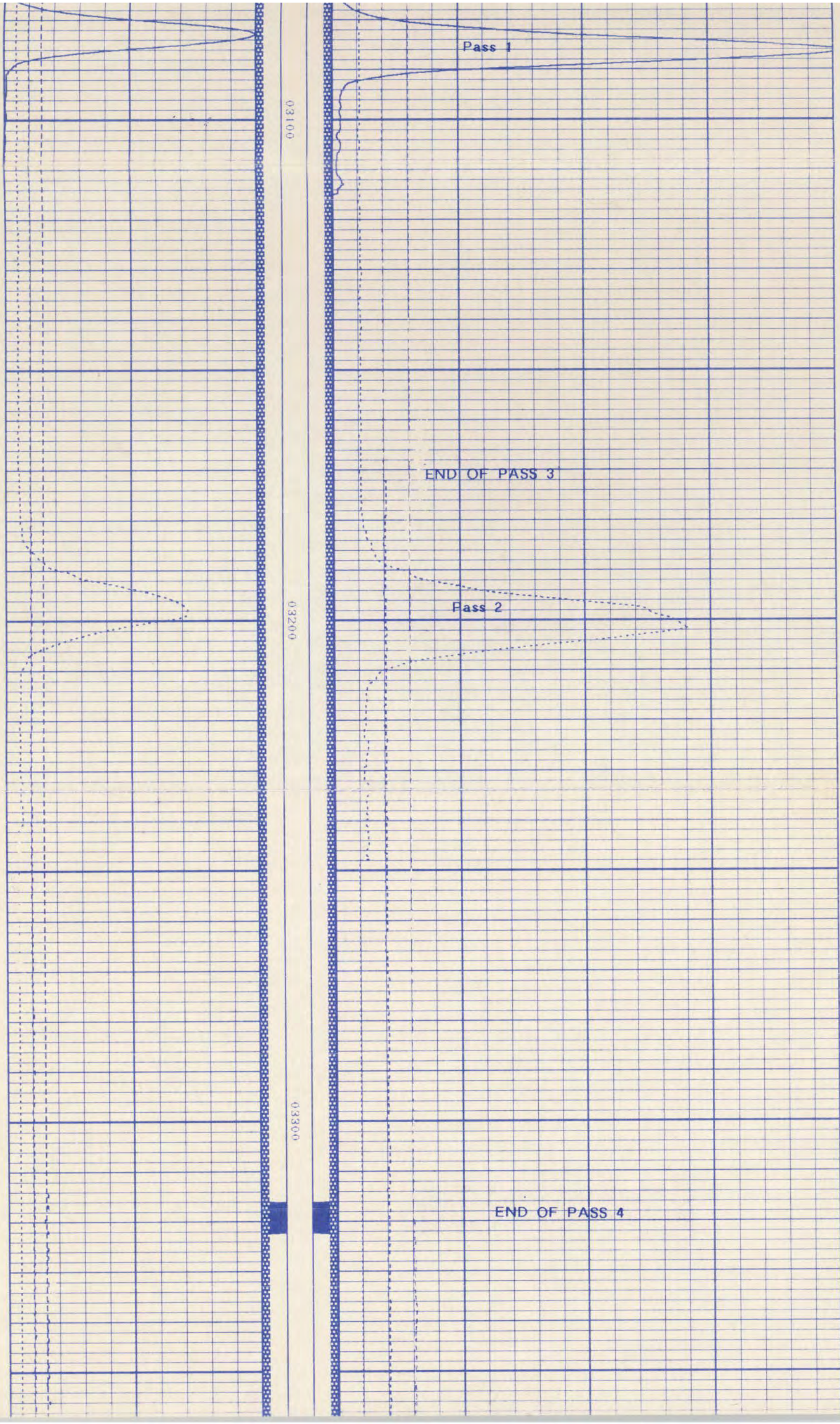


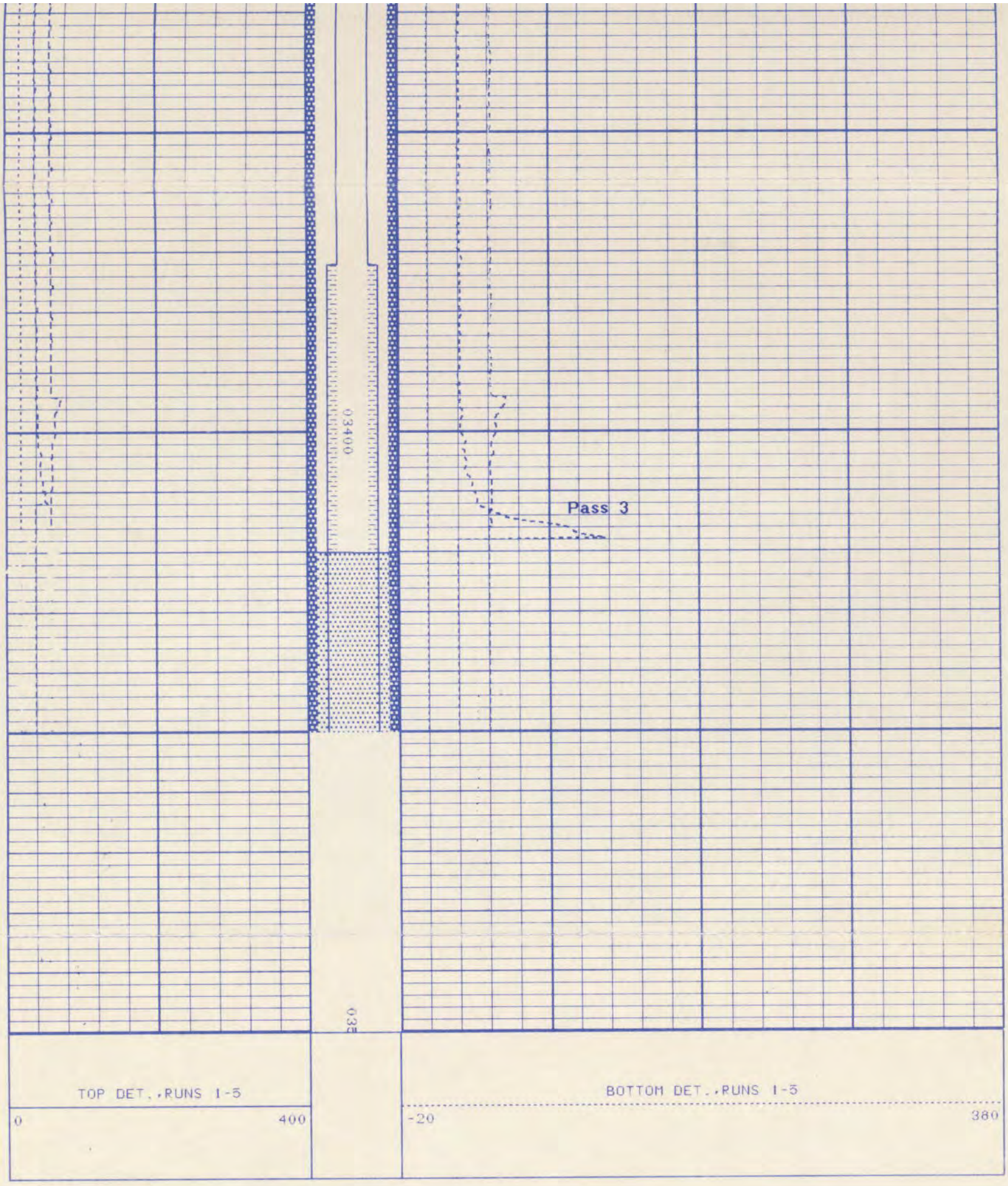

END OF PASS 3
Pass 2
03200
END OF PASS 4
END OF PASS 5
03300
Pass 3
Pass 4
Pass 5
03400



Second Slug (Repeat)




03100
03200
03300
Pass 1
END OF PASS 3
Pass 2
END OF PASS 4



TIME DRIVE FILE BELOW, WITH
TOOL POSITIONED AT 3350.
TIME IS 2:30 PM. 3 SEC SLUG
FIRED, NO SIGN OF RETURN.
TIME MODE IS 1 SEC FT., LOG
RUN STATIONARY FOR 20 MINUTES.
****

CCL

0100

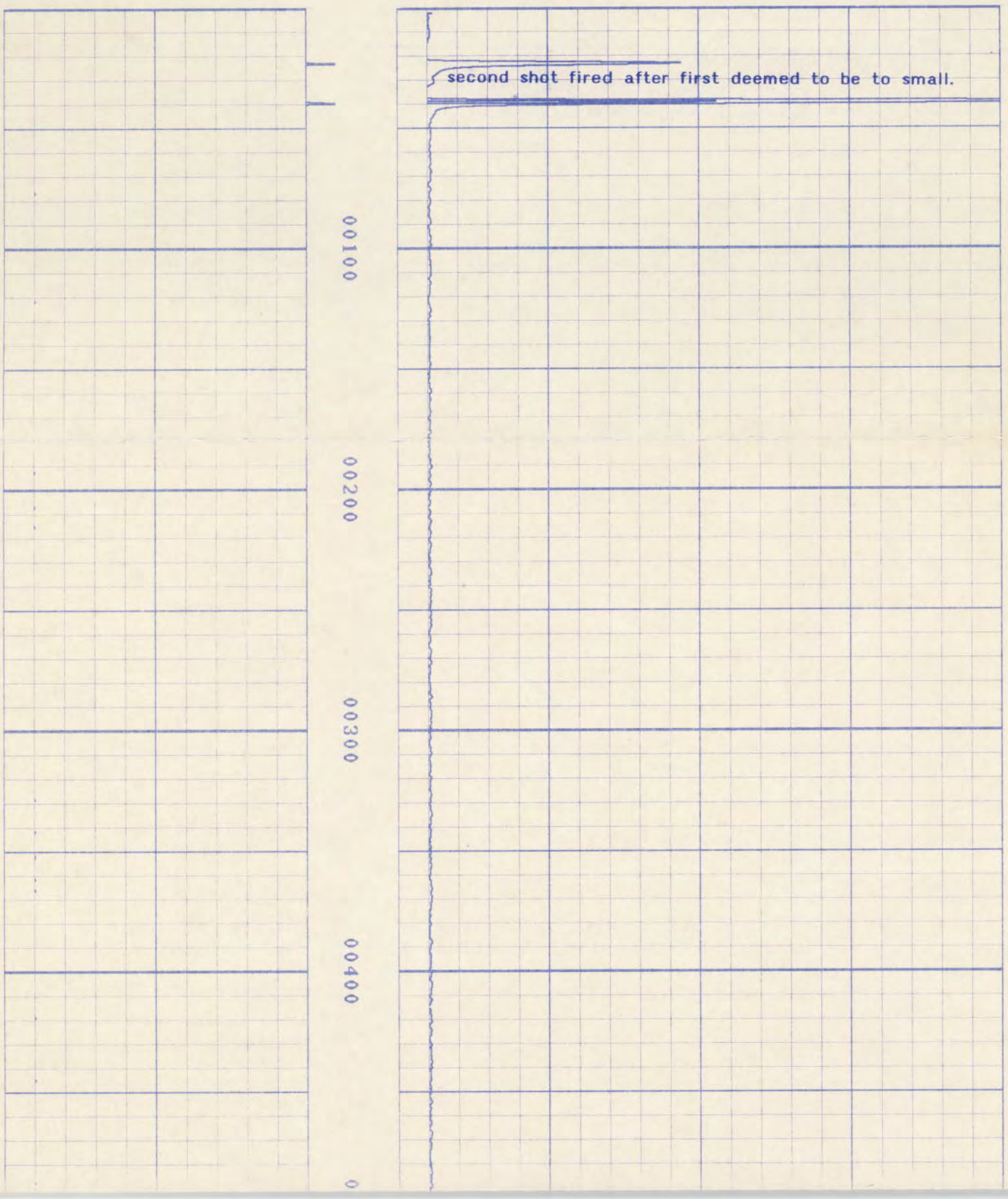
CCL

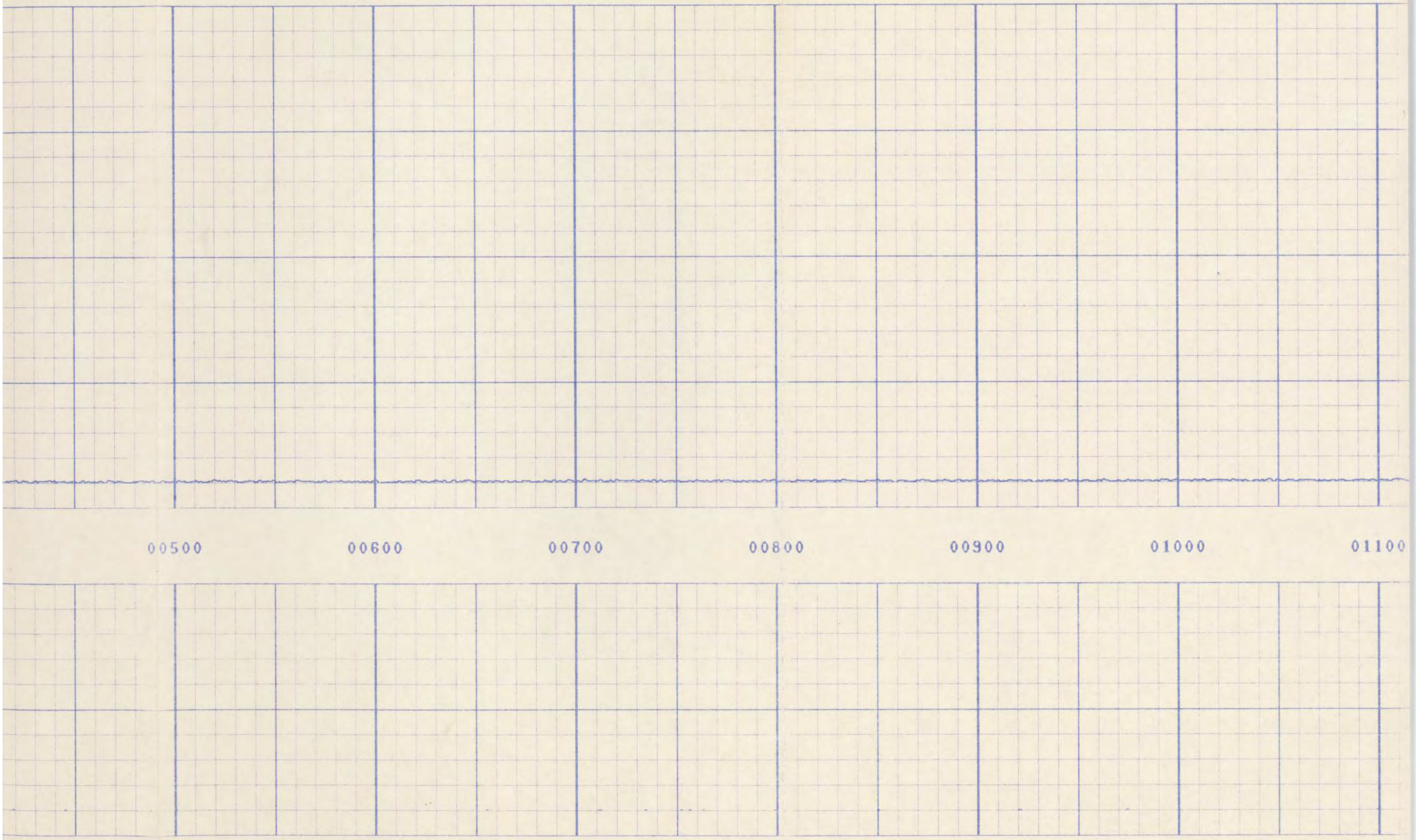
0100

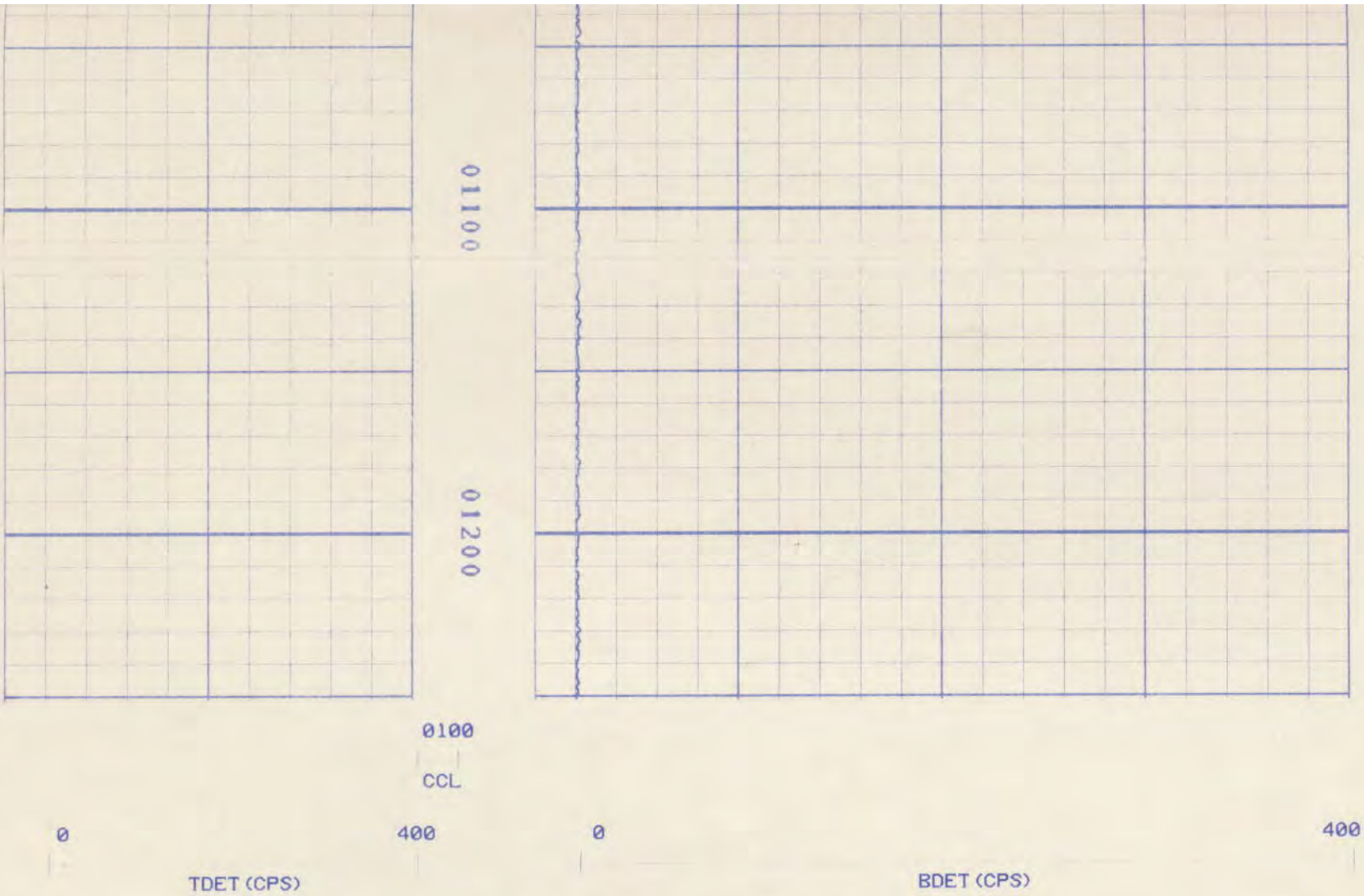
TDET (CPS) BDET (CPS)

0 400 0 400

FILE: 1




00500
00600
00700
00800
00900
01000
01100



DEPTH: 3352

REVISION: FSYS256 REV:G002 VER:2.0 MODE: RECORD

SERVICE: M 150A FILE: 3 DATE: 03/08/96 TIME: 15:52:22

WELL NAME: WDW 49 TRIP: 1

COMPANY: HOECHST CELANESE RUN: 1

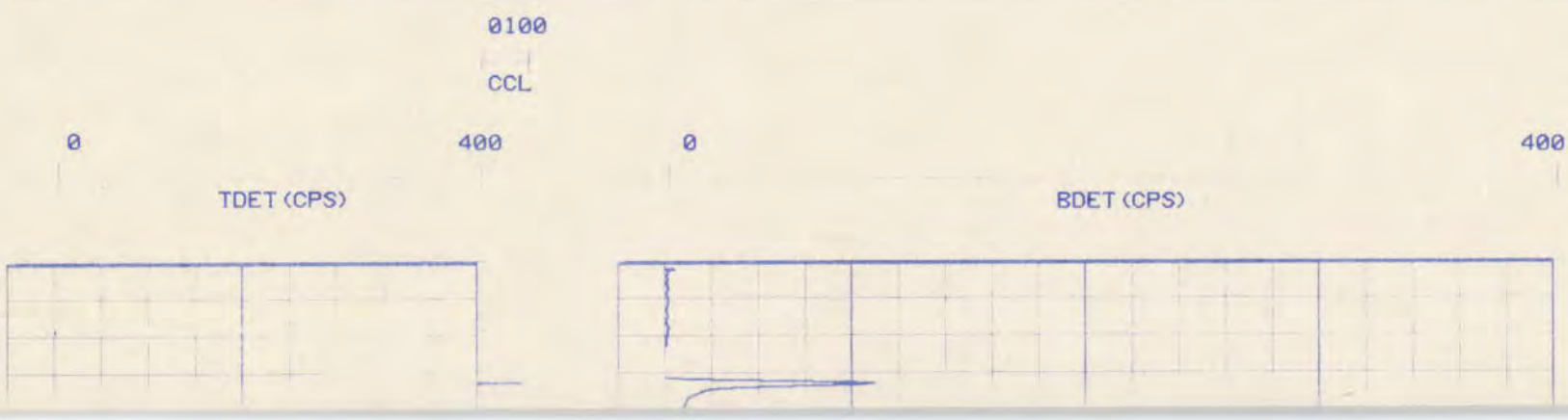
FILE: 3

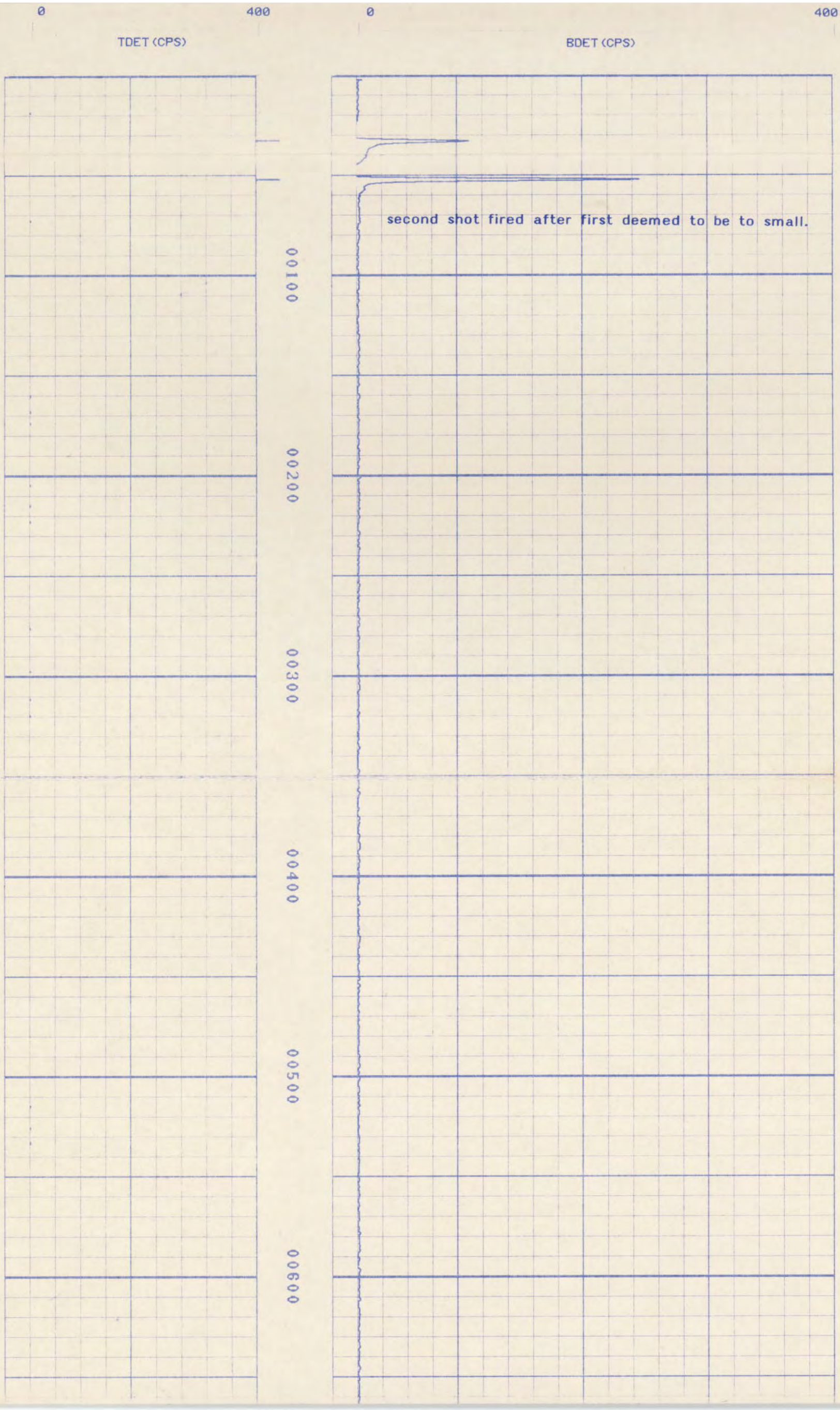
****

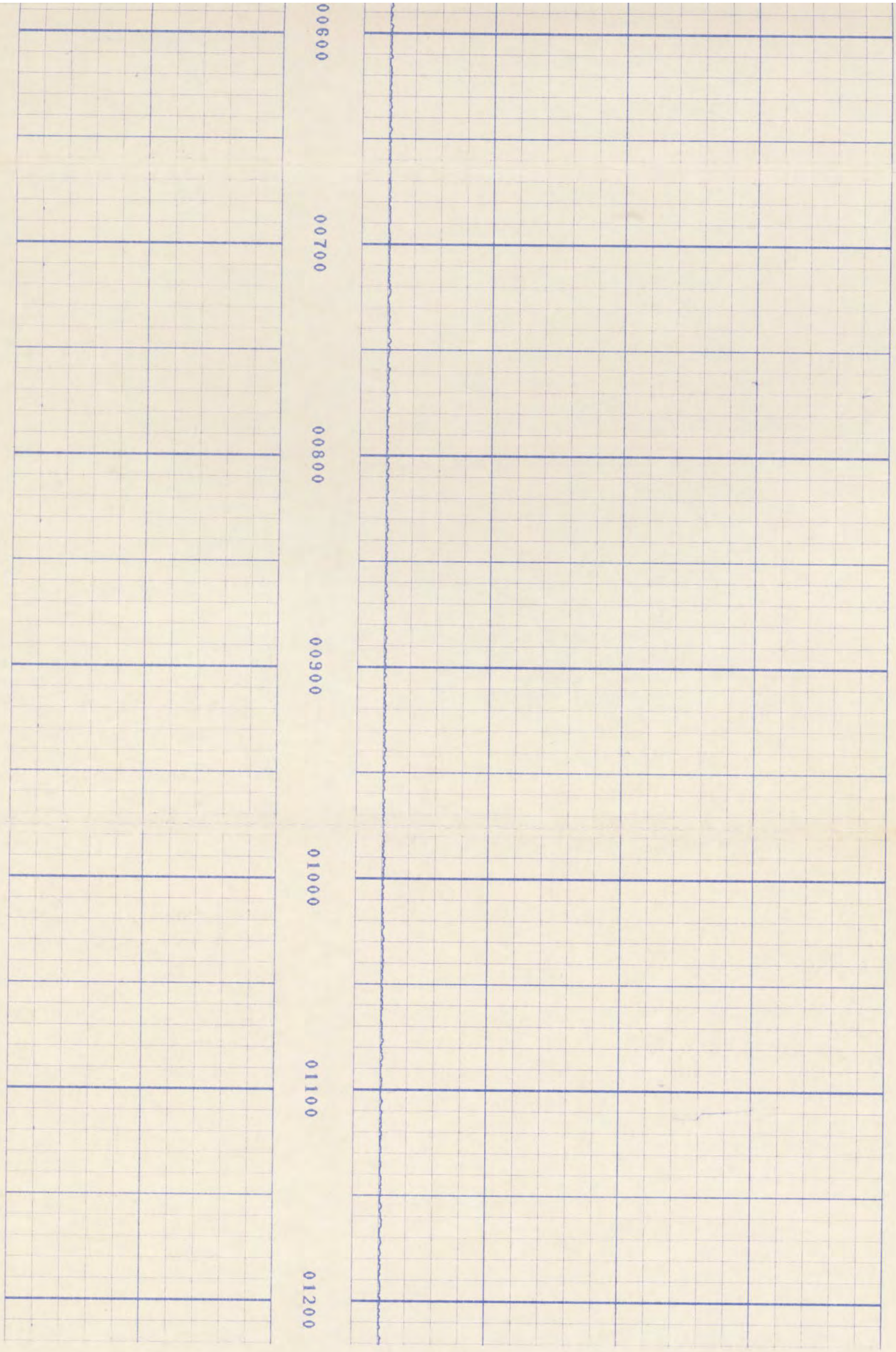
SECOND TIME FILE BELOW, TOOL STILL AT 3350. 3 SEC SLUG FIRED, RUN FOR 20 MIN. NO SIGN OF CHANNEL. BEGUN AT 3:52 PM

****

TIME IS 1 SEC/FT. FILE RUN FOR 1200 SEC, RATE IS STILL 50 GPM.




0
400
TDET (CPS)
0
400
BDET (CPS)
second shot fired after first deemed to be to small.
00100
00200
00300
00400
00500
00600



FINAL BASE PASS BELOW.

FINAL BASE PASS BELOW.
AFTER INJ. RATE INCREASED
FROM 50 TO 190 GPM.
****
TIME IS 4:45PM

****

FILE: 5

CURVE DELAY REPORT

CURVE	PHYS. DELAY	UNITS
TDET	6,0	FT,IN
BDET	0	FT,IN
CCL	9,9	FT,IN

PARAMETERS

*** NONE ***

COMPANY: HOECHST CELANESE RUN: 1

WELL NAME: WDW 49 TRIP: 1

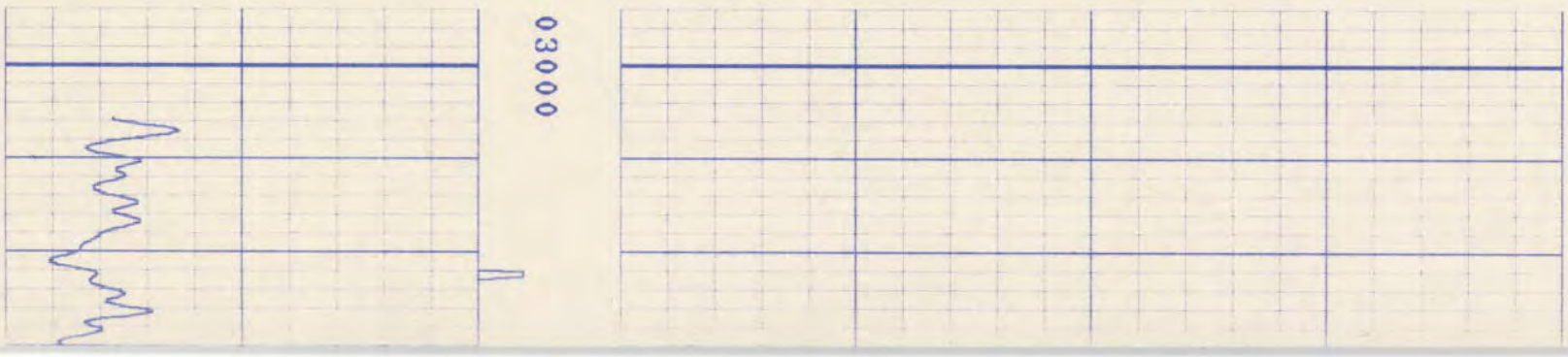
SERVICE: M 150A FILE: 5 DATE: 03/08/96 TIME: 16:40:07

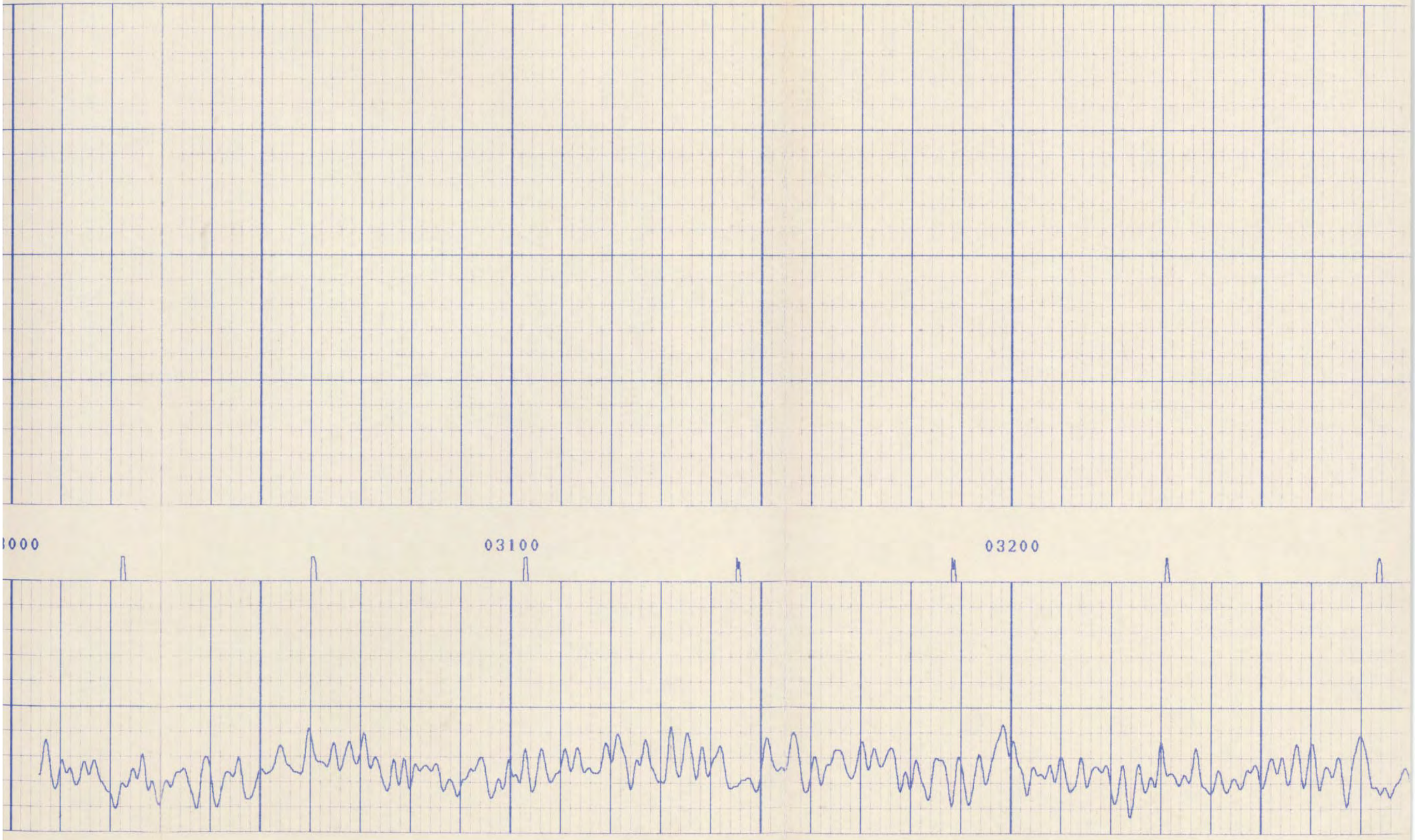
REVISION: FSYS256 REV:G002 VER:2.0 MODE: RECORD

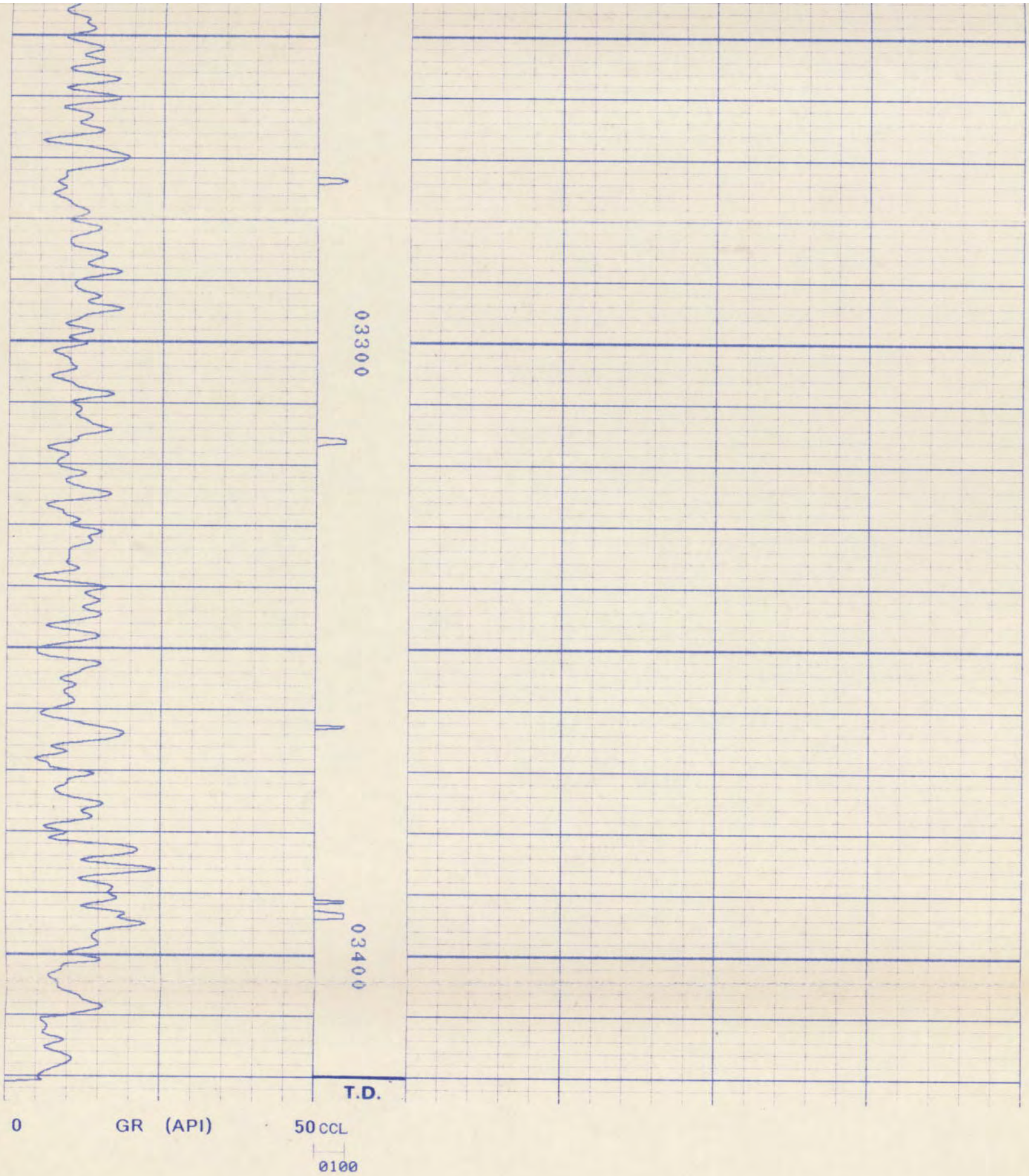
CCL

0100

0 GR (API) 50




3000
03100
03200


03300
03400
T.D.
0
GR (API)
50
CCL
0100

DIAGNOSTIC RADIOACTIVE TRACERLOG

Hoechst Celanese Chemical Group, Inc.
Waste Disposal Well #49
Bay City Plant
Matagorda County, Texas

Prepared for
ECO Solutions, Inc.
Houston, Texas

WESTERN ATLAS LOGGING SERVICES
WESTERN ATLAS INTERNATIONAL

March 7, 1996

Prepared by Freeman Hill, III

DISCLAIMER

In making interpretations of logs, our employees will give Customer the benefit of their best judgement, but since all interpretations are opinions based on inferences from electrical or other measurements, we cannot, and we do not guarantee the accuracy or the correctness of any interpretation. We shall not be liable or responsible for any loss, cost, damages, or expenses whatsoever incurred or sustained by the Customer resulting from any interpretation made/by any of our employees.

Disposal Well Background

The Hoechst Celanese Chemical Group, Inc.'s waste disposal well #49, located at the Bay City facility has been used for underground injection of waste fluids. In addition to surface casing, the well contains a string of 7 5/8 inch O.D. casing cemented from surface to 3,368 ft. From 3,306 to 3,368 ft. this casing is composed of stainless steel. Five and a half inch pipe (5 1/2 inch) is within the 7 5/8" casing, and is from surface to 3,316 ft. At this point, the 5 1/2" tubing is tied into a packer and screen assembly. The screen assembly is located from 3,371 ft. to 3,579 ft. Measured depth was at 3,420 ft.

A logging program consisting of a Radioactive Tracerlog (ejector and two detector instrument), was used to evaluate the integrity of the casing and cement. This should also verify that the injection interval is accepting the disposed fluids.

Radioactive Tracerlog Survey

1. Logged base gamma ray detector pass from 3,420 ft. to 2,918 ft.

   Purpose: Base-line for radioactive tracer instrument and comparison for post survey.

   Analysis: Gamma ray instruments respond to naturally occurring and manmade radiation. For this logging run, we will only consider the naturally occurring radiation (e.g., potassium, uranium, and thorium) found in formations. Normally, shaly formations tend to contain more of these gamma ray producing elements than a sand formation.

2. Repeat step (1.) Base gamma ray pass from 3,420 ft. to 3,254 ft.

   Analysis: No significant anomalies noted.

3. Statistical stationary check. (10.5 minute)(3,350 ft)

   Purpose: To establish stability of instrumentation before proceeding with testing.

   Analysis: No anomalies found. Tool operating properly and stable.

4. While injecting into the well at a rate of 50 gpm, radioactive material (Iodine-131) was ejected from the radioactive tracer instrument. The instrument was lowered further into the well and then logged in the upward direction in order to intercept and detect the

radioactive slug as it moved down the well. By repeating this process of lowering the instrument and logging in the upward direction, the radioactive slug was traced through the casing packer and into the injection interval located below.
Release of radioactive slug indicated.
Purpose: Ensure injected fluids move through the tubing in a downward direction and that no upward or out of zone fluid movement through a cement channel is detected.

Analysis: The following table depicts the depths where the detectors intercepted the radioactive slug as it moved with the surface-injected fluids downward toward the injection interval.

Interception Number	Depth, ft.(Bottom Detector) (BDET)
1	3,091
2	3,198
3	3,313
4	Dispersing in zone.
5	Dispersing in zone.

The radiation peak responses from the first pass to the fifth pass, become smaller, but cover a longer vertical interval, due to the movement of the wireline and instrument mixing the radioactive slug with the injected fluids. No anomalies observed.

5. Repeat step (4.) (50 gpm)

Analysis: The following table depicts the depths where the detector intercepted the second radioactive slug as it moved with the injected fluids downward toward the injection interval.

Interception Number	Depth, ft.(Bottom Detector) (BDET)
1	3,086
2	3,200
3	3,418 Dispersing into zone.
4	Dispersing in zone.

The radioactive peak responses from the first to the fourth pass, become smaller, but cover a longer vertical interval, due to the movement of the wireline and instrument mixing the radioactive slug with the injected fluids. The radioactive material appears to continually move in the downward direction and into the disposal interval. There is no evidence of any problems.

6. The tool was stationed at 3,350 ft., above the disposal interval, for a stationary reading. The radioactive isotope is released and after the initial response to the isotope passing by the detector in a downward motion, then the isotope or an increase in radiation, should not be monitored again. If the isotope is seen again, then communication (channel behind the pipe) is highly possible.

   Purpose: Ensure injected fluids move downward and not back up on the outside of casing in a channel. (Pump rate 50 gpm) (29 minute test.)

   Analysis: After initial response to the radioactive slug, the isotope did not come back in the tool's vicinity. No channel indicated.

7. Repeat step (6.) (Pump rate = 50 gpm) (19.5 minute test.)

   Purpose: Ensure injected fluids are not channeling up.

   Analysis: After the initial response to the radioactive slug, the isotope did not come back in the tool's vicinity. No channel indicated.

8. Logged gamma ray detectors from 3,420 ft. to 3,006 ft.

   Purpose: Monitor any anomalies or major changes in background baseline.

   Analysis: No significant anomalies found.

Conclusion:

In my opinion, the Hoechst Celanese Waste Disposal Well #49, located in the Bay City Plant, does not have any integrity problems that would result in disposed fluids migrating to intervals other than the injection interval. The logging program consisting of a radioactive tracer ejector and detector instrument should satisfy the annual mechanical integrity requirement.

Hoechst Celanese Chemical Group, Ltd.
WDW -49
RAT - Tracer Survey #1

No.	Depth		Time		Slug		Remarks
Pass	Start	Stop	Start	Stop	Depth	Time	
	3000		1:10:00				2 sec slug
1	3125	3084	1:44:40	1:45:20	3091	1:45:08	Injection rate 50 gpm
2	3213	3060	:46:00	:46:55	3198	1:46:42	
3	3341	3190	:48:10	:50:02	3112	:48:40	
4	3420	3300	:54:00	:56:00	3385	:54:50	In cased hole
5	3420	3300	:57:45	:59:45	3395	:58:32	

Tracer #2

	3000		2:04:50				3 sec slug
1	3115	3070	:05:45	2:06:30	3086	2:06:15	50 gpm
2	3248	3070	:07:27	:09:45	3202	:08:08	
3	3420	3190	:11:18	:14:45	3430	-	
4	3420	3320	:43:50	:45:35	N/A		*Problems w/ computer

Stationary Survey

No.	Depth (feet)	Start Survey (PM)	Survey Time (Minutes)
#1	3350'	3:10:30 3:30:30	20
#2	3350'	3:32:00 3:52:00	20

APPENDIX B

ANNULUS PRESSURE TEST DATA AND PLOTS

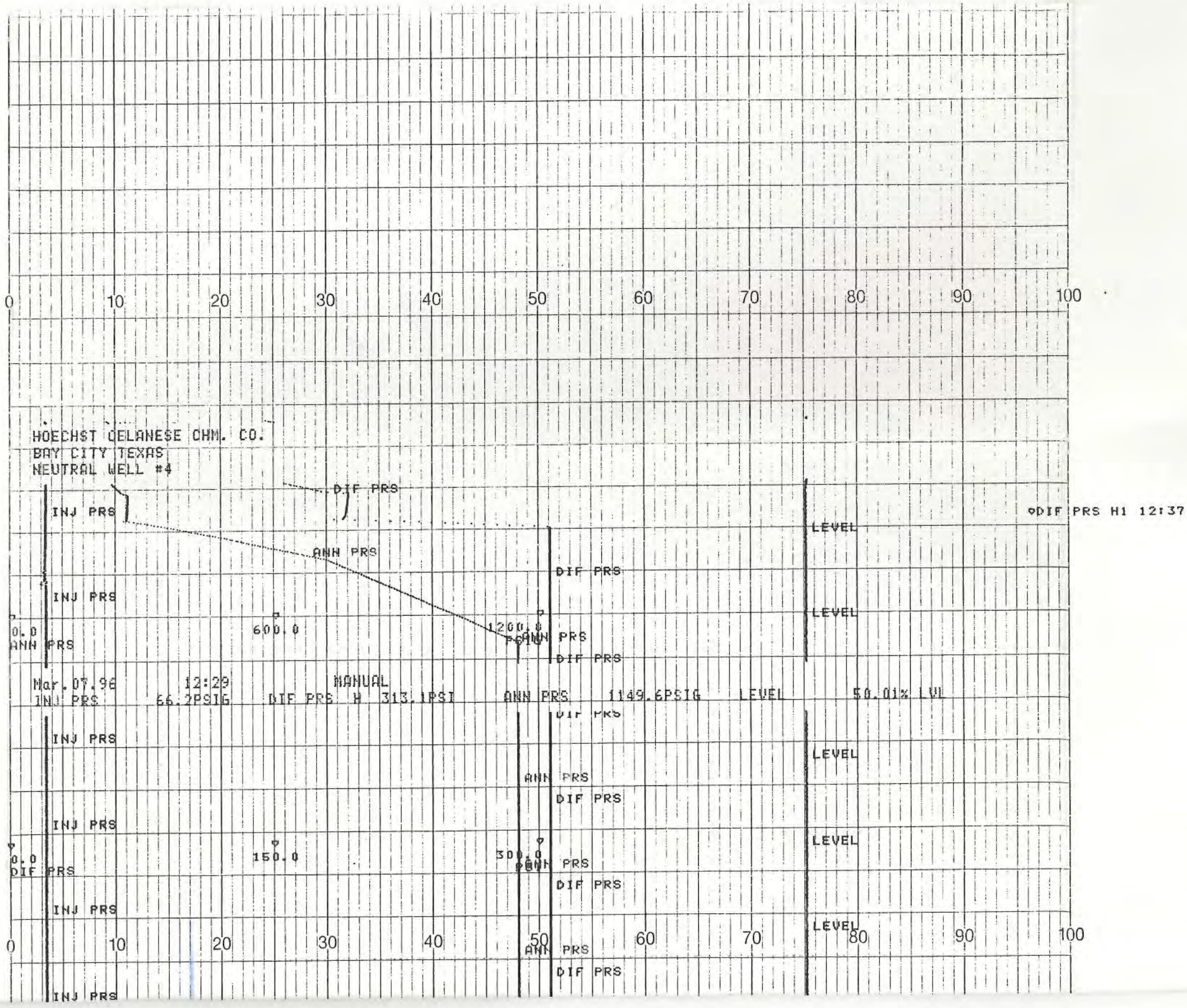
ANNULUS PRESSURE DATA
HOECHST CELANESE CHEMICAL GROUP, LTD.
Bay City Plant
Waste Disposal Well 49 (Well No. 4)

March 21, 1996

Time (am)	Tubing Pressure (psig)	Casing Pressure (psig)	Remarks
9:55	66	256	Well SI 44 hours
10:00	66	256	SI
10:05	66	280	Start injecting N_2 gas
10:15	66	840	Pressurizing annulus
10:28	66	1153	Block in N_2 source
10:31	66	1152	Start APT
10:36	66	1152	
10:41	66	1151	
10:46	66	1151	
10:51	66	1150	
10:56	66	1150	
11:01	66	1150	
11:06	66	1149	
11:11	66	1149	
11:16	66	1148	
11:21	66	1149	Note: Sun came out behind the clouds.
11:26	66	1150	
11:31	66	1150	Stop APT
11:36	66	1150	
11:41	66	1141	
11:46	66	800	Bleed to operating level
11:51	66	255	

Pressure was measured using HCCG's certified calibrated pressure gauge CMM, Serial No. 97223 with a pressure range from zero to 2000 psig and was installed onto the annulus outlet. A certificate of calibration, included in Appendix C, shows that the pressure sensor was calibrated on February, 1995.

HCCG's facility digital transmitter pressure recorder, Honeywell Instruments Coop., Smart Honeywell Model ST 3000, normally has a normal pressure range from zero to 1000 psig. However, for the APT the range was modified by Mr. Wilson Cupples and Mr. Ray Horton to a range of zero to 1200 psig. A copy of the computer run (included in Appendix B) shows that the annulus transmitter and recorder were calibrated as an "End to End" unit on November 15, 1995. Also, the same calibration standard was used on the Eaton Pressure Sensor and the facility digital transmitter pressure recorder. Also, attached is a copy of the calibration data sheet on the flow rate equipment which was performed on December 1995.



YOKOGAWA

2265cm

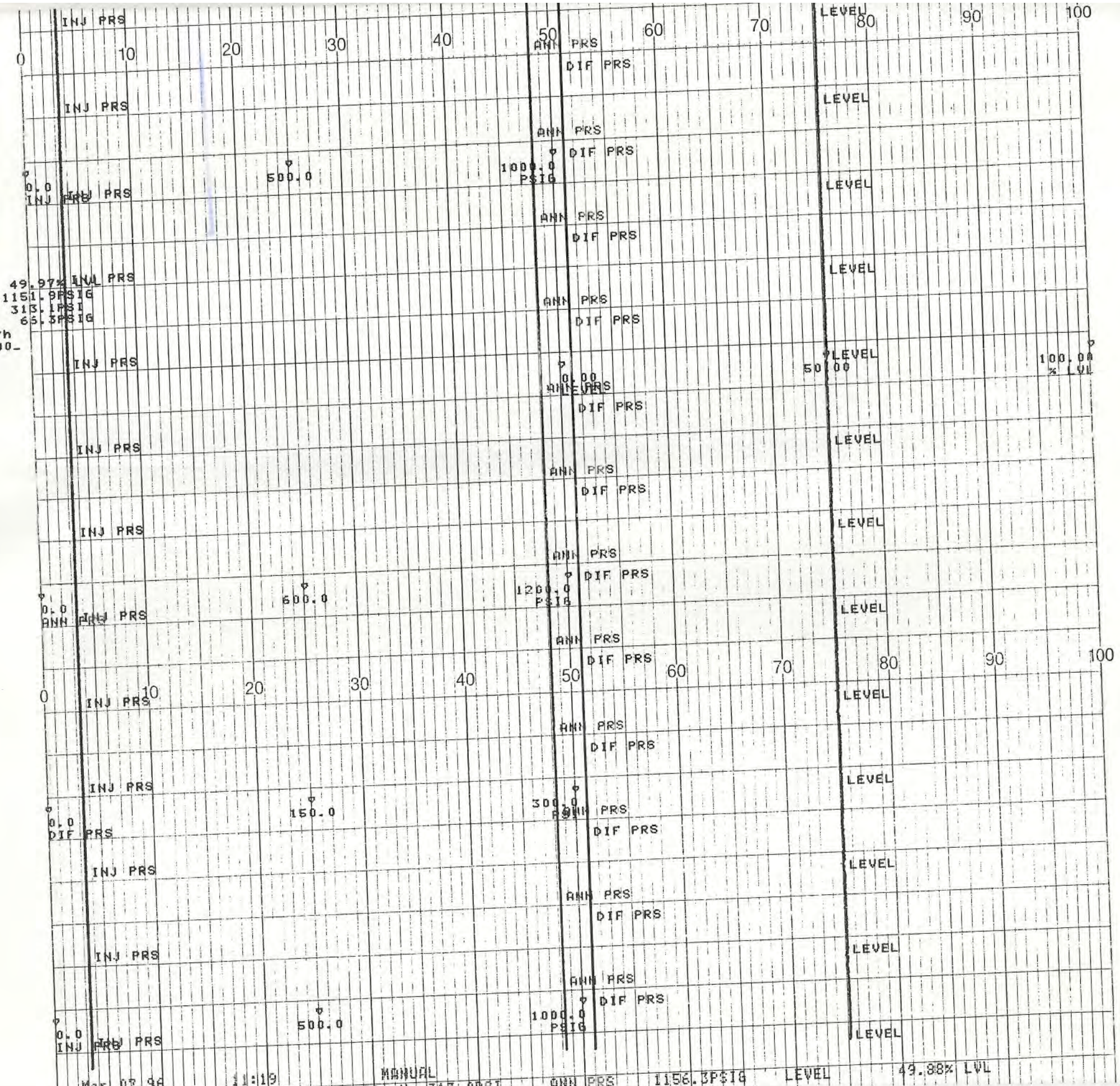
KOKUSAI CHART

CHART NO. B9627RY

2280cm

RE
APR
6

RECEIVED
APR 17 1996
6W-SU



2280cm

YOKOGAWA

2295cm

KOKUSAI CHART

CHA

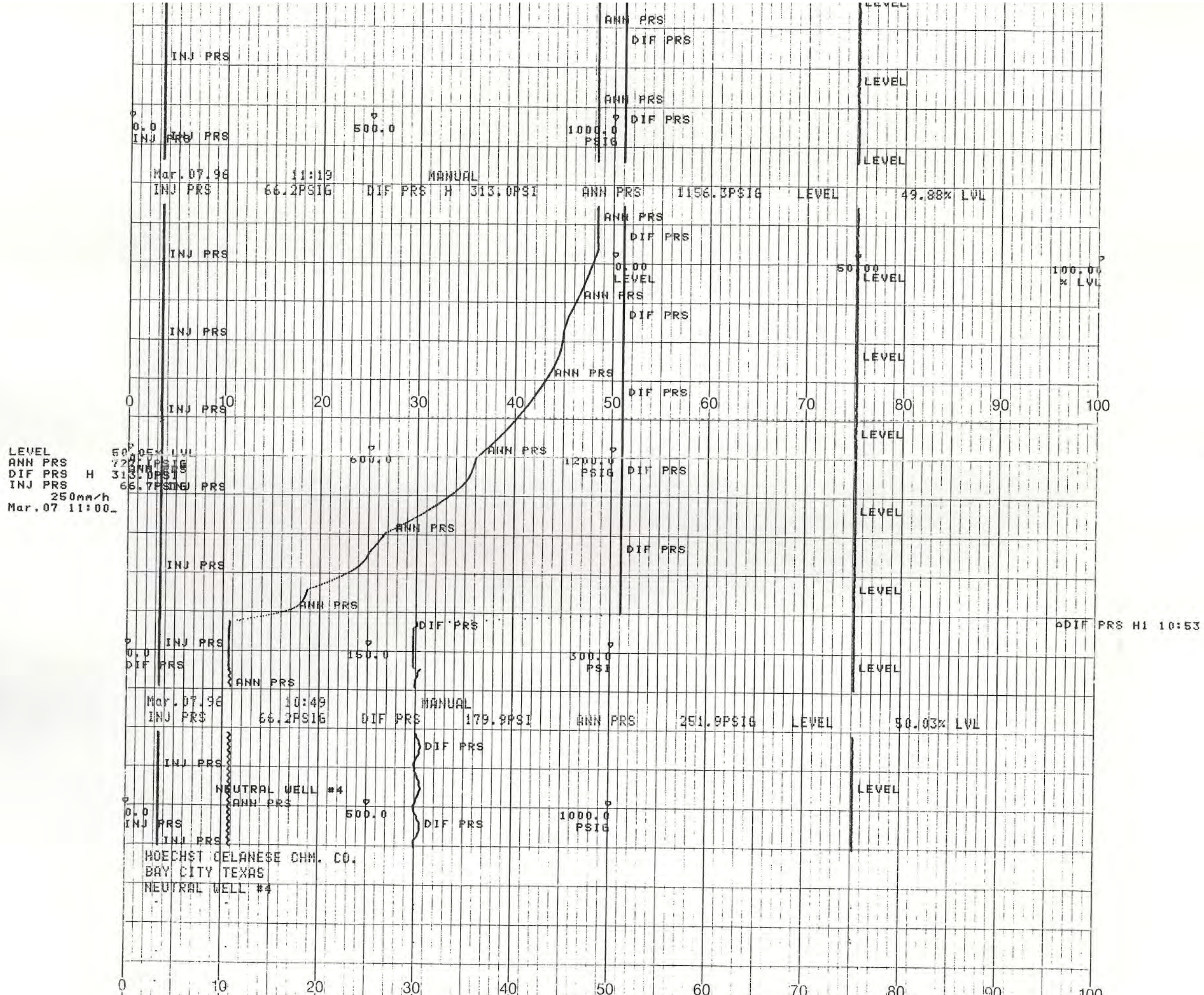
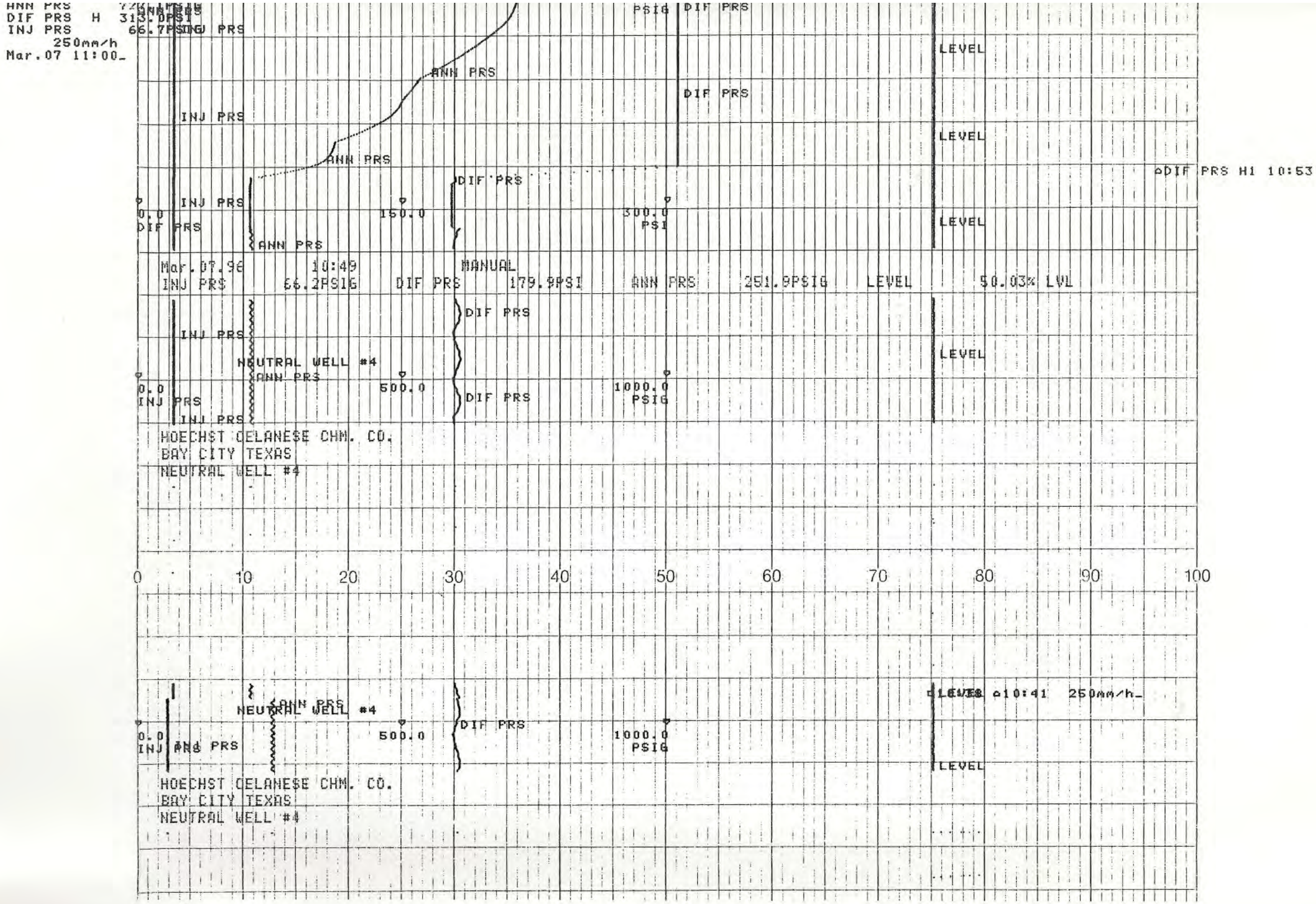


CHART NO. B9627RY

2310cm

YOKOGAWA ◆



YOKOGAWA ◆

2325cm

KOKUSAI CHART

APPENDIX C

CALIBRATION CERTIFICATES

DRESSER INDUSTRIES
DRESSER
INSTRUMENT DIVISION
153 South Main Street
Newtown, Connecticut 06470
Phone: (203) 426-3115 FAX: (203) 426-4349

CERTIFIED ISO 9001

Calibration Certification Report

Customer: HOECHST-CELANESE
Customer P.O.# B305027
House Order # 102811

Certification I.D. # CMM 97223 - 34744
Customer Control # N/A
Pressure Range 0 - 2000 PSIG

Model: CMM
Accuracy 0.1 %
Serial # CMM 97223

Readings: [X] Initial [ ] As Received [ ] As Left

Comments:

Point	Applied Pressure PSIG	Target Reading PSIG	Dial Reading PSIG	% of Span ERROR	Downscale Reading at Midpoint	Percent Hysteresis
1	0	0	0	0.00		
	200	200	200	0.00		
	400	400	400	0.00		
5	600	600	600	0.00		
	800	800	799	-0.05		
	1000	1000	1000	0.00		
9	1200	1200	1200	0.00	1000	0.000
10	1400	1400	1400	0.00		
1	1600	1600	1599	-0.05		
	1800	1800	1800	0.00		
	2000	2000	2000	0.00		

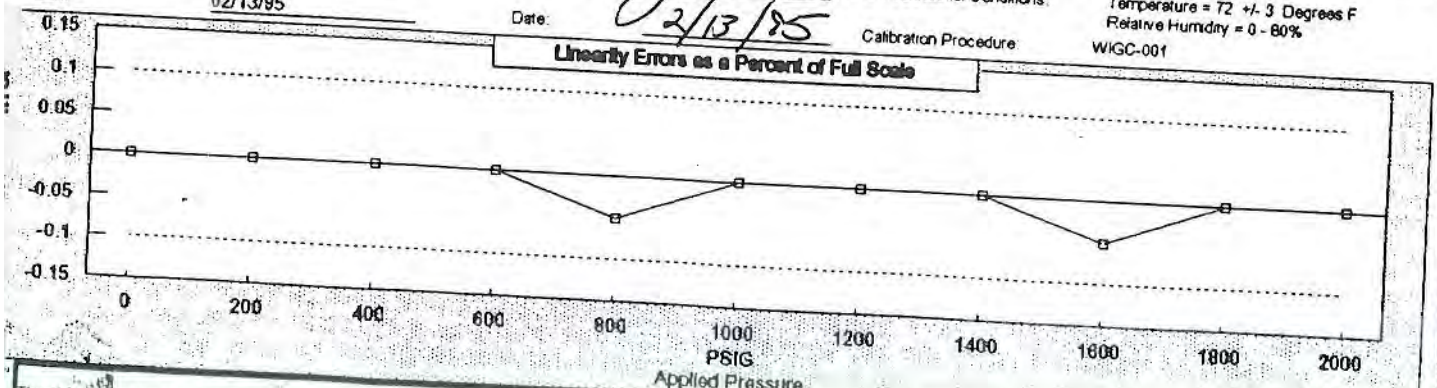
TOLERANCE ALLOWED: 2 PSIG

Calibrated by: Jace Keeton
Date: 02/13/95

Accepted by: Edgar Matthews
Date: 2/13/95

Environmental Conditions: Temperature = 72 +/- 3 Degrees F
Relative Humidity = 0 - 80%

Calibration Procedure: WIGC-001



This instrument has been calibrated with measurement standards whose accuracy is traceable to National Institute of Standards and Technology test numbers

Pressure: Mass: 38126
Piston and Cylinder TN-241829

Calibration Standard I.D. #: QAID 1279

Accuracy of standard is +/- 0.0212% of reading*

Last Cal. 07/92 Cal. Due 07/95

* The stated accuracy is obtained at reference conditions

All standards used in this calibration are maintained in accordance with the latest revisions of MIL-STD-45662 and ISO-10012

DRESSER INDUSTRIES
DRESSER
INSTRUMENT DIVISION
153 South Main Street
Newtown, Connecticut 06470
Phone: (203) 426-3115 FAX: (203) 426-4349

CERTIFIED ISO 9001

Calibration Certification Report

Customer:	HOECHST-CELANESE	Certification I.D. #	CMM 97223 - 34744	Model:	CMM
Customer P.O.#	8305027	Customer Control #	N/A	Accuracy	0.1 %
House Order #	102811	Pressure Range	0 - 2000 PSIG	Serial #	CMM 97223

Readings: [X] Initial [ ] As Received [ ] As Left

Comments:

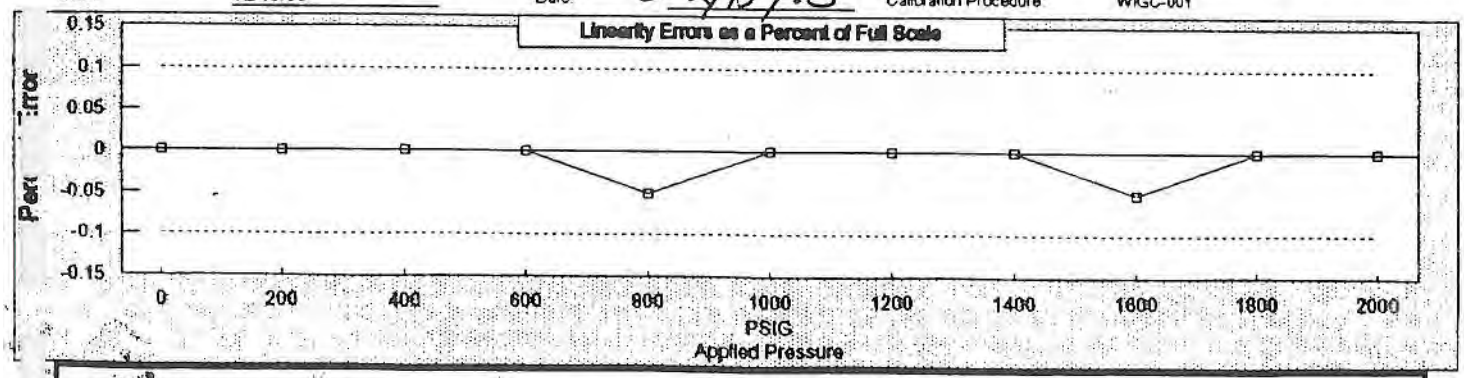
Point	Applied Pressure PSIG	Target Reading PSIG	Dial Reading PSIG	% of Span ERROR	Downscale Reading at Midpoint	Percent Hysteresis
1	0	0	0	0.00		
	200	200	200	0.00		
	400	400	400	0.00		
	600	600	600	0.00		
5	800	800	799	-0.05		
	1000	1000	1000	0.00	1000	0.000
	1200	1200	1200	0.00		
	1400	1400	1400	0.00		
9	1600	1600	1599	-0.05		
10	1800	1800	1800	0.00		
1	2000	2000	2000	0.00		

TOLERANCE ALLOWED: 2 PSIG

Calibrated by: Jace Keeton
Date: 02/13/95

Accepted by: [signature]
Date: 2/13/95

Environmental Conditions: Temperature = 72 +/- 3 Degrees F, Relative Humidity = 0 - 80%
Calibration Procedure: WIGC-001



This instrument has been calibrated with measurement standards whose accuracy is traceable to National Institute of Standards and Technology test numbers:

Pressure:	Mass:	38126
	Piston and Cylinder	TN-241829

Calibration Standard I.D. #: QAID 1279 Accuracy of standard is +/- 0.0212% of reading* Last Cal: 07/92 Cal. Due: 07/95

* The stated accuracy is obtained at reference conditions

All standards used in this calibration are maintained in accordance with the latest revisions of MIL-STD-45662 and ISO-10012

***** ELECTRONIC GAUGE CALIBRATION DATA *****

Gauge serial number: 80179
Range: 2514.76 PsiA
Date calibrated: 12/01/95
Date verified: 12/05/95
Model: EPG-520
Coefficient type: GRC FREQUENCY

TEMPERATURE SUMMARY

Maximum positive error: 0.852 Deg. F
Maximum negative error: -1.524 Deg. F
Sensitivity: 0.090 Deg. F/Hz
Sensitivity: 11.144 Hz/Deg. F

PRESSURE SUMMARY

Maximum positive error: 0.968 PsiA
Occurs at: 351.234 Deg. F
And at: 115.728 PsiA
Maximum negative error: -0.779 PsiA
Occurs at: 351.234 Deg. F
And at: 13.981 PsiA
Sensitivity: 0.886 PsiA/Hz
Sensitivity: 1.129 Hz/PsiA

FIELD CALIBRATION CHECK: [PRE-TEST]

(GRC EPG-520 - SURFACE READOUT GAUGE)

DATE: 03/12/1996

D.W.T. S/N: 3469

GRC GAUGE S/N: 80179

D.W.P. (PSIG)	GAUGE PRESSURE (PSIA)	DIFFERENCE (+/-PSI)
0.0	**15.17**	**+15.17**
500.0	**514.49**	**+14.49**
1000.0	**1014.79**	**+14.79**
1500.0	**1514.00**	**+ 14.00**

2000.00	**2014.27**	**+14.27**
0.00	**15.57**	**+ 15.57**

FIELD CALIBRATION CHECK: [POST-TEST]

(GRC EPG-520 - SURFACE READOUT GAUGE)

DATE: 03/14/1996

D.W.T. S/N: 3469

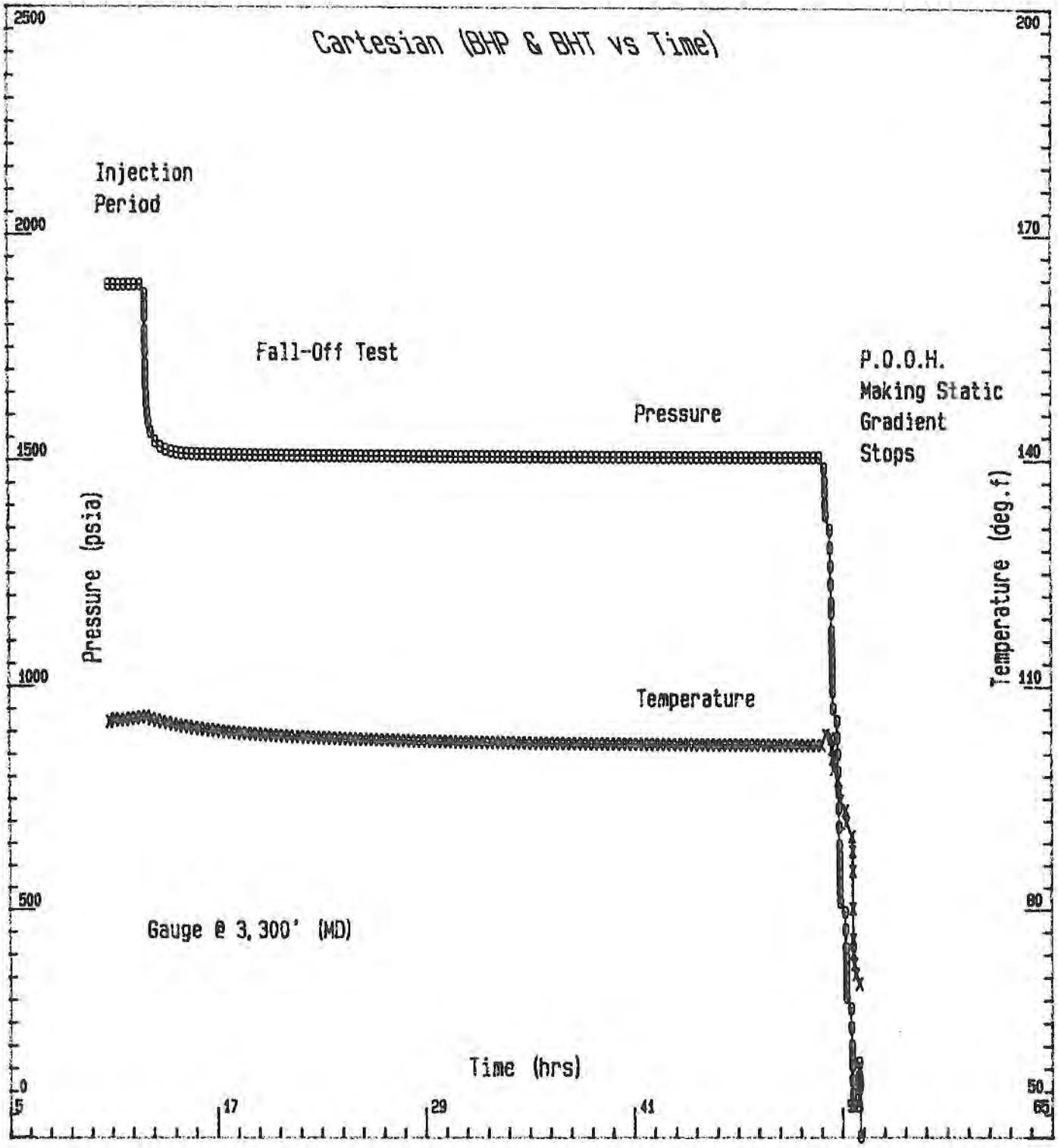
GRC GAUGE S/N: 80179

D.W.P. (PSIG)	GAUGE PRESSURE (PSIA)	DIFFERENCE (+/-PSI)
0.0	**16.15**	**+16.15**
500.0	**513.92**	**+13.92**
1000.0	**1015.28**	**+15.28**
1500.0	**1514.98**	**+ 14.98**

2000.00	**2013.55**	**+13.55**
0.00	**11.39**	**+ 11.39**

APPENDIX D

FALLOFF PLOTS

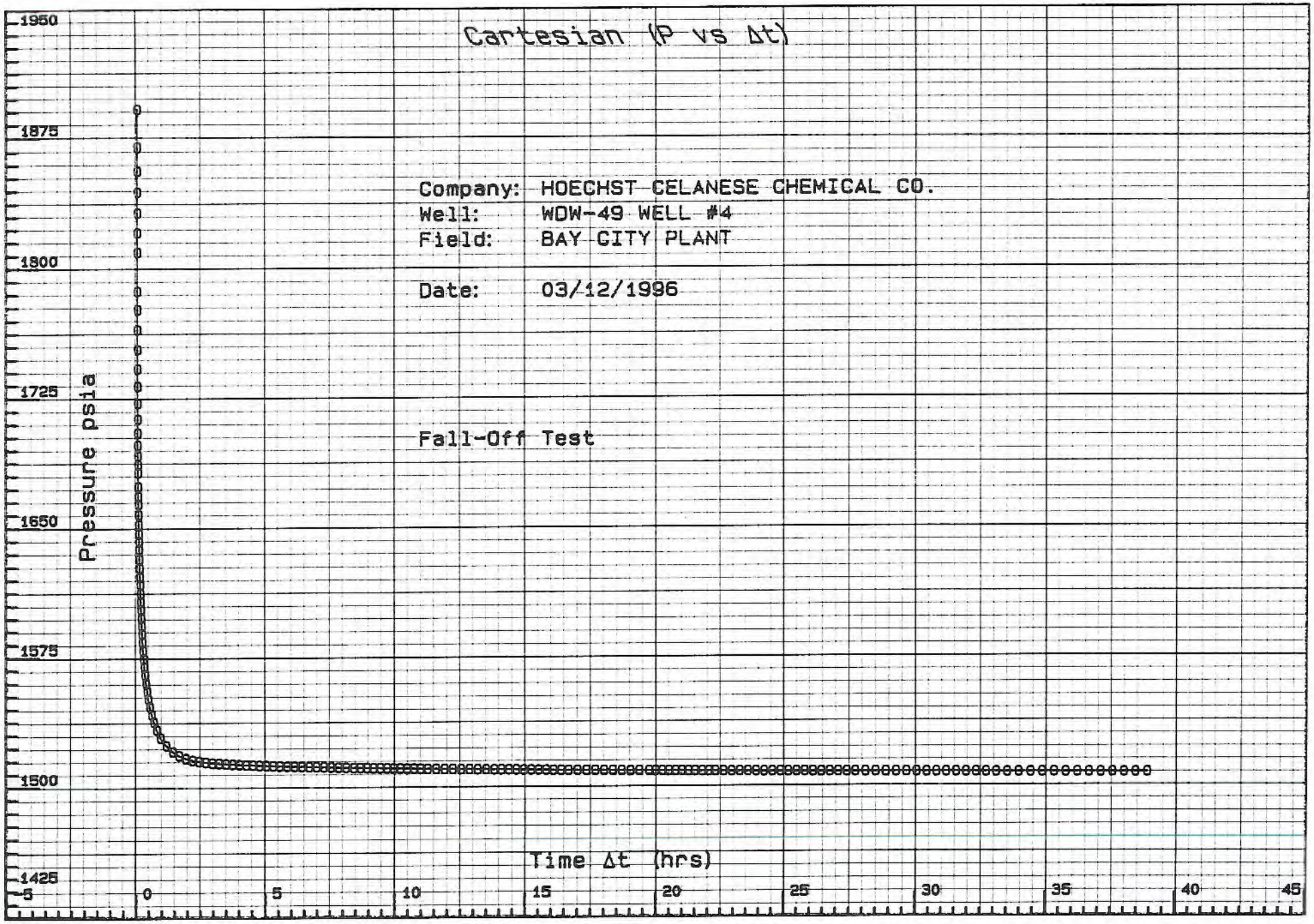


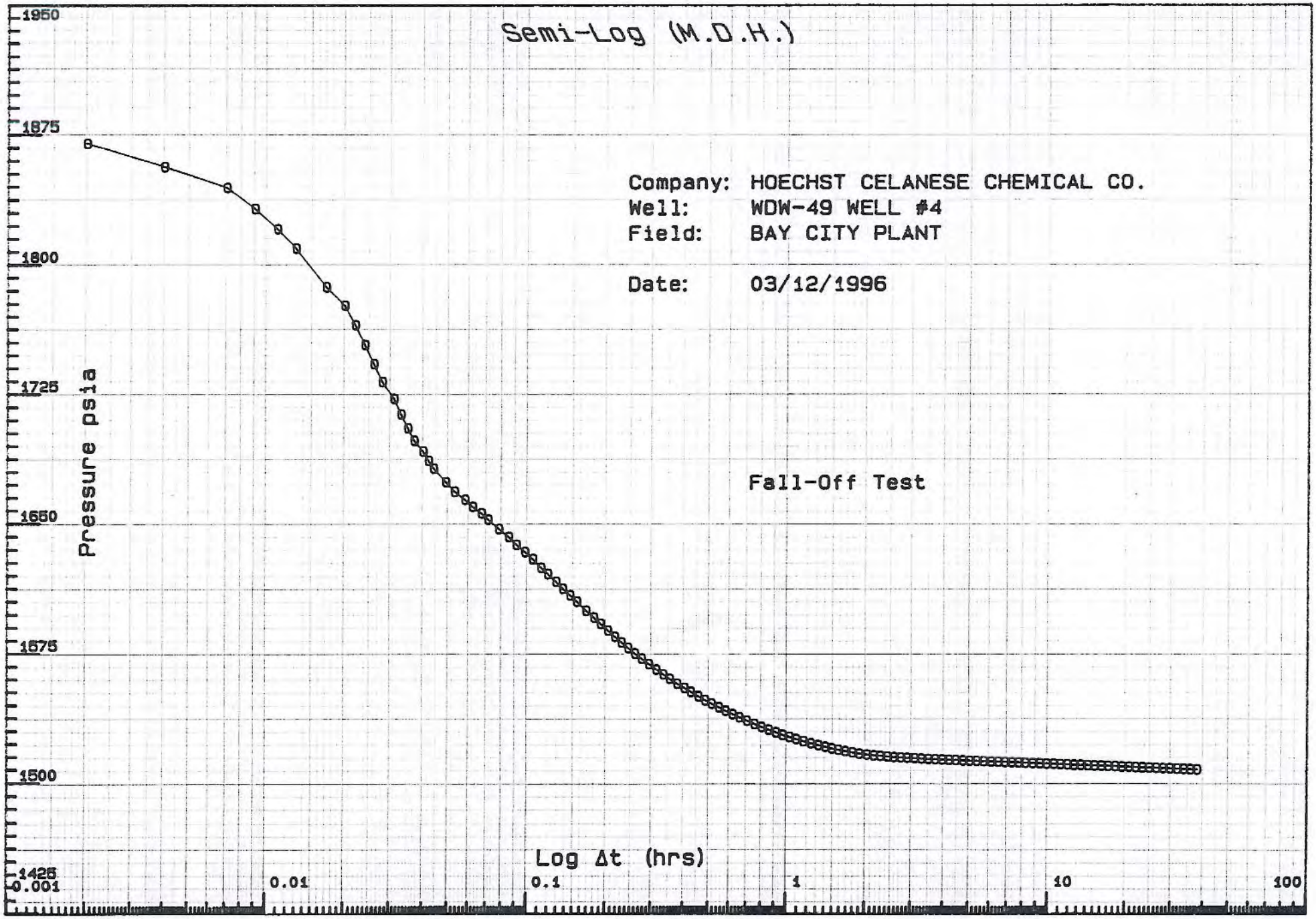
Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

Date: 03/12/1996

Begin Time: 10:53:09 03/12/96
End Time: 06:02:20 03/14/96

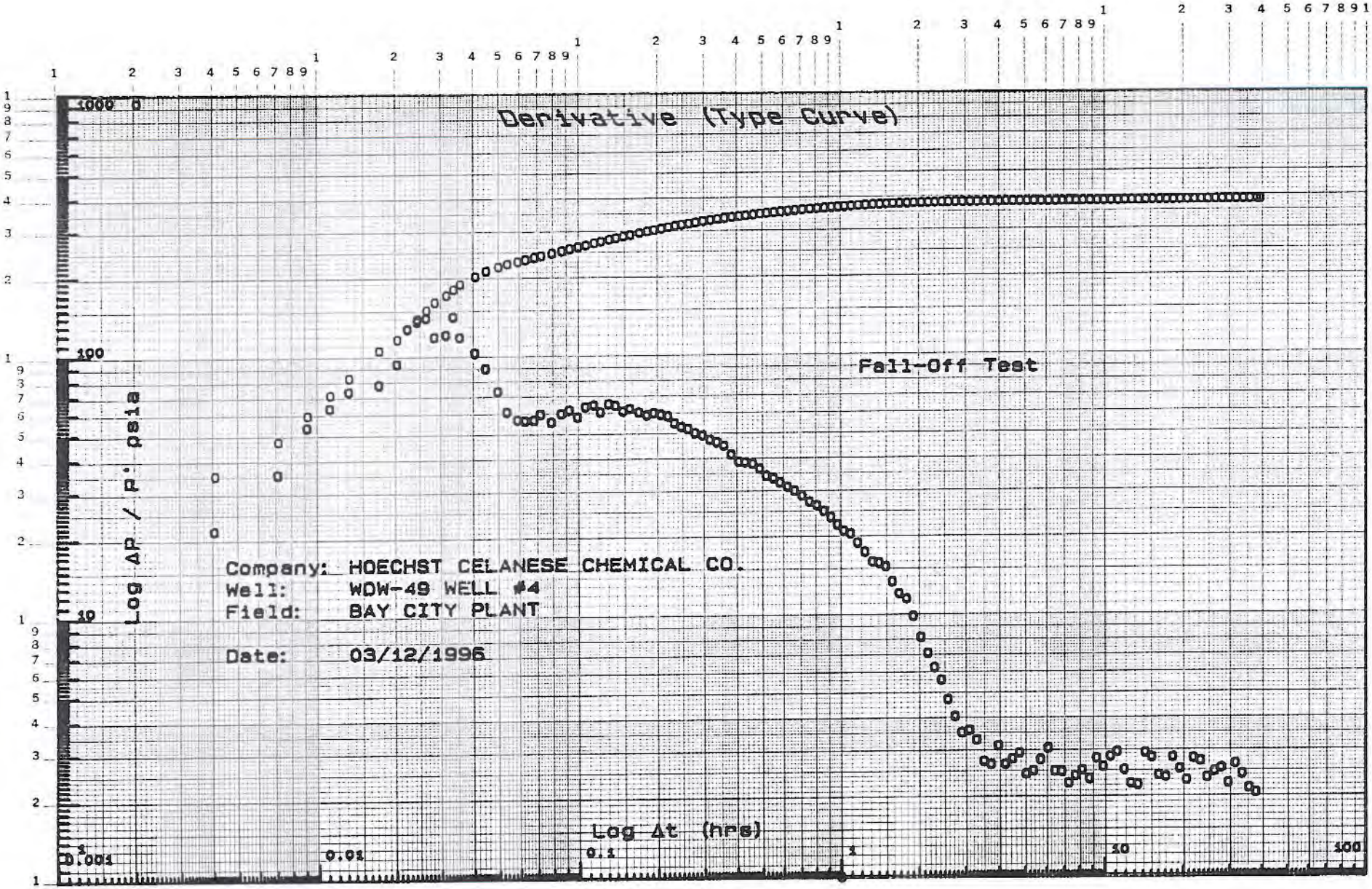
Final Injection B.H.P. = 1892 psi
Final Fall-Off B.H.P. = 1507 psi


Cartesian (P vs Δt)
Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT
Date: 03/12/1996
Fall-Off Test
Pressure psia
1950
1875
1800
1725
1650
1575
1500
1425
Time Δt (hrs)
-5
0
5
10
15
20
25
30
35
40
45


Semi-Log (M.D.H.)
Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT
Date: 03/12/1996
Fall-Off Test
Pressure psia
1950
1875
1800
1725
1650
1575
1500
1425
Log Δt (hrs)
0.001
0.01
0.1
1
10
100

K+E LOGARITHMIC 3 X 5 CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 7520



APPENDIX E

FALLOFF DATA
FLOW RATE DATA

COMMENTS FOR DATA PRINT-OUT

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
[Tuesday: March 12, 1996]					
		Start Data Acquisition System Gauges @ 3,300' (MD) SRO Gauge EPG-520 S/N 80179 Gauge tied-in with CCL to collors & packer. Monitoring Bottom-Hole Injection Press. @ 249 GPM			
1	0	10:53: 9	0.0000	1891.74	105.36
		Shut Down Injection and Start Fall-Off Test. Monitoring Bottom-Hole Fall-Off Pressures.			
181	0	12:58:23	2.0870	1891.64	106.00
		Continuing to monitor Bottom-Hole Fall-Off Press.			
1048	0	18: 0:21	7.1200	1512.49	103.91
[Wednesday: March 13, 1996]					
		Continuing to monitor Bottom-Hole Fall-Off Press.			
1829	1	6: 0:36	19.1240	1509.27	102.70
		Continuing to monitor Bottom-Hole Fall-Off Press.			
2343	1	18: 0:36	31.1240	1507.92	102.32
[Thursday: March 14, 1996]					
		Continuing to monitor Bottom-Hole Fall-Off Press.			
2593	2	2: 0:36	39.1240	1507.31	102.19
		End of Fall-Off Test Start out of hole making Static Gradient Stops			
2656	2	4: 2:49	41.1610	1507.23	102.17
		Depart 3,000 ft.			
2699	2	4:23:27	41.5050	1376.83	103.46
		Depart 2,000 ft.			
2745	2	4:45:32	41.8730	943.62	98.03
		Depart 1,000 ft.			
2800	2	5:11:56	42.3130	509.98	93.54

(continued)

COMMENTS FOR DATA PRINT-OUT

(continued)

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
[Tuesday: March 14, 1996]					
		Depart 500 ft.			
2839	2	5:30:39	42.6250	293.30	91.33]
		Arrived @ Surface			
2856	2	5:38:49	42.7610	67.94	74.11
		Shut-In Crown Valve.			
2893	2	5:56:35	43.0570	69.99	70.25
		Bleed-Off Lubricator			
2904	2	6: 1:51	43.1450	3.34	69.83
		Shut-Down Data Acquisition System.			
2905	2	6: 2:20	43.1530	3.40	69.77

HOECHST CELANESE CHEMICAL COMPANY

WDW-49, WELL #4
BAY CITY PLANT
MATAGORDA COUNTY, TEXAS

INPUT PARAMETERS

TUBING SIZE:	5-1/2" 20.0# TO 3,316 FT.
PACKER:	3,316 FT.
CASING:	7-5/8" 26.4# TO 3,306 FT.
PERFS: (4-1/2" GRAVEL PACK SCREEN)	3,371.5' - 3,579'
TOTAL DEPTH:	3,630 FT.
TEST DEPTH:	3,300 FT.
FORMATION POROSITY:	33.0 %
WELL BORE RADIUS	0.4580 FT.
SAND THICKNESS:	85.0 FT.

TEST PARAMETERS & RESULTS

WELL TYPE:	INJECTION	
ATMOSPHERIC PRESSURE:	14.65	PSI
INJECTION RATE:	219	GPM
FINAL INJECTION B.H.P.:	1891.64	PSIA
FINAL FALL-OFF B.H.P.:	1507.23	PSIA
FINAL FALL-OFF B.H.T.:	102.17	DEG.F
FALL-OFF TIME:	39.0	HRS

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
		Start Data Acquisition System Gauges @ 3,300' (MD)			
		SRO Gauge EPG-520 S/N 80179			
		Gauge tied-in with CCL to collors & packer.			
		Monitoring Bottom-Hole Injection Press. @ 249 GPM			
1	0	10:53: 9	0.0000	1891.74	105.36
5	0	10:55: 5	0.0320	1891.50	105.35
10	0	10:57:29	0.0720	1891.29	105.35
15	0	10:59:53	0.1120	1891.27	105.40
20	0	11: 2:17	0.1520	1891.13	105.48
25	0	11: 4:41	0.1920	1891.18	105.53
30	0	11: 7: 5	0.2320	1891.13	105.58
35	0	11: 9:29	0.2720	1891.21	105.63
40	0	11:11:53	0.3120	1891.36	105.66
45	0	11:14:17	0.3520	1891.47	105.64
50	0	11:16:41	0.3920	1891.49	105.62
55	0	11:19: 5	0.4320	1891.59	105.60
60	0	11:21:29	0.4720	1891.53	105.59
65	0	11:23:53	0.5120	1891.29	105.57
68	0	11:26:31	0.5560	1890.95	105.54
71	0	11:29:24	0.6040	1890.81	105.53
74	0	11:32:17	0.6520	1890.87	105.53
77	0	11:35: 9	0.7000	1890.88	105.51
80	0	11:38: 2	0.7480	1890.76	105.50
83	0	11:40:55	0.7960	1890.75	105.58
86	0	11:43:48	0.8440	1890.90	105.63
89	0	11:46:41	0.8920	1891.07	105.61
92	0	11:49:33	0.9400	1891.17	105.60
95	0	11:52:26	0.9880	1891.16	105.64
98	0	11:55:19	1.0360	1891.21	105.67
101	0	11:58:12	1.0840	1891.17	105.69
104	0	12: 1: 5	1.1320	1891.26	105.70
107	0	12: 3:57	1.1800	1891.14	105.73
110	0	12: 6:50	1.2280	1891.16	105.72
113	0	12: 9:43	1.2760	1891.28	105.73
116	0	12:12:36	1.3240	1891.29	105.74
119	0	12:15:29	1.3720	1891.20	105.76
122	0	12:18:21	1.4200	1891.29	105.80
125	0	12:21:14	1.4680	1891.32	105.78
128	0	12:24: 7	1.5160	1891.31	105.79
131	0	12:27: 0	1.5640	1891.36	105.85
134	0	12:29:53	1.6120	1891.34	105.87
137	0	12:32:45	1.6600	1891.40	105.89
140	0	12:35:38	1.7080	1891.43	105.92
143	0	12:38:31	1.7560	1891.40	105.93
146	0	12:41:24	1.8040	1891.45	105.92
149	0	12:44:17	1.8520	1891.54	105.94
150	0	12:45:14	1.8680	1891.47	105.94
151	0	12:46:12	1.8840	1891.44	105.93
152	0	12:47: 9	1.9000	1891.47	105.93
153	0	12:48: 7	1.9160	1891.51	105.92

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4 [Tuesday: Mar. 12, 1996]
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
154	0	12:49: 5	1.9320	1891.47	105.92
155	0	12:50: 2	1.9480	1891.44	105.93
156	0	12:51: 0	1.9640	1891.46	105.94
157	0	12:51:57	1.9800	1891.47	105.95
158	0	12:52:55	1.9960	1891.46	105.96
159	0	12:53:53	2.0120	1891.47	105.97
160	0	12:54:50	2.0280	1891.61	105.98
161	0	12:55:26	2.0380	1891.60	105.99
162	0	12:55:33	2.0400	1891.63	106.00
163	0	12:55:51	2.0450	1891.60	106.00
164	0	12:55:59	2.0470	1891.57	106.00
165	0	12:56: 6	2.0490	1891.60	106.00
166	0	12:56:13	2.0510	1891.55	106.00
167	0	12:56:20	2.0530	1891.55	106.00
168	0	12:56:31	2.0560	1891.53	106.00
169	0	12:56:38	2.0580	1891.54	106.00
170	0	12:56:45	2.0600	1891.56	106.00
171	0	12:56:53	2.0620	1891.56	106.00
172	0	12:57: 3	2.0650	1891.60	106.00
173	0	12:57:11	2.0670	1891.58	106.00
174	0	12:57:18	2.0690	1891.60	106.00
175	0	12:57:25	2.0710	1891.55	106.00
176	0	12:57:43	2.0760	1891.59	106.00
177	0	12:57:50	2.0780	1891.60	106.00
178	0	12:57:57	2.0800	1891.59	106.00
179	0	12:58: 5	2.0820	1891.59	106.00
180	0	12:58:15	2.0850	1891.63	106.00
		Shut Down Injection and Start Fall-Off Test. Monitoring Bottom-Hole Fall-Off Pressures.			
181	0	12:58:23	2.0870	1891.64	106.00
182	0	12:58:30	2.0890	1870.31	106.01
183	0	12:58:37	2.0910	1856.85	106.00
184	0	12:58:48	2.0940	1844.71	106.00
185	0	12:58:55	2.0960	1832.66	106.00
186	0	12:59: 2	2.0980	1821.01	106.00
187	0	12:59: 9	2.1000	1809.67	105.99
188	0	12:59:24	2.1040	1787.30	105.99
189	0	12:59:35	2.1070	1776.72	105.99
190	0	12:59:42	2.1090	1765.14	105.99
191	0	12:59:49	2.1110	1753.69	105.99
192	0	12:59:56	2.1130	1742.57	105.98
193	0	13: 0: 3	2.1150	1732.22	105.98
194	0	13: 0:14	2.1180	1722.46	105.98
195	0	13: 0:21	2.1200	1713.45	105.98
196	0	13: 0:29	2.1220	1705.35	105.97
197	0	13: 0:36	2.1240	1698.21	105.97
198	0	13: 0:47	2.1270	1691.99	105.97
199	0	13: 0:54	2.1290	1686.68	105.97
200	0	13: 1: 1	2.1310	1682.14	105.97
201	0	13: 1:19	2.1360	1674.15	105.96

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
202	0	13: 1:26	2.1380	1671.22	105.96
203	0	13: 1:33	2.1400	1668.64	105.96
204	0	13: 1:44	2.1430	1666.28	105.96
205	0	13: 1:51	2.1450	1664.06	105.95
206	0	13: 1:59	2.1470	1661.96	106.00
207	0	13: 2: 6	2.1490	1659.91	105.95
208	0	13: 2:17	2.1520	1657.95	105.95
209	0	13: 2:24	2.1540	1656.04	105.94
210	0	13: 2:31	2.1560	1654.19	105.95
211	0	13: 2:38	2.1580	1652.39	105.94
212	0	13: 2:45	2.1600	1650.63	105.94
213	0	13: 3: 3	2.1650	1647.04	105.94
214	0	13: 3:11	2.1670	1645.61	105.94
215	0	13: 3:18	2.1690	1644.01	105.94
216	0	13: 3:29	2.1720	1642.44	105.93
217	0	13: 3:36	2.1740	1640.91	105.93
218	0	13: 3:43	2.1760	1639.42	105.93
219	0	13: 3:50	2.1780	1637.95	105.93
220	0	13: 3:57	2.1800	1636.51	105.92
221	0	13: 4: 8	2.1830	1635.10	105.92
222	0	13: 4:15	2.1850	1633.71	105.92
223	0	13: 4:23	2.1870	1632.34	105.92
224	0	13: 4:30	2.1890	1630.99	105.92
225	0	13: 4:41	2.1920	1629.67	105.92
226	0	13: 4:55	2.1960	1627.09	105.91
227	0	13: 5: 2	2.1980	1625.84	105.90
228	0	13: 5: 9	2.2000	1624.61	105.90
229	0	13: 5:20	2.2030	1623.40	105.90
230	0	13: 5:27	2.2050	1622.21	105.90
231	0	13: 5:35	2.2070	1621.04	105.89
232	0	13: 5:42	2.2090	1619.88	105.89
233	0	13: 5:53	2.2120	1618.75	105.89
234	0	13: 6: 0	2.2140	1617.63	105.88
235	0	13: 6: 7	2.2160	1616.55	105.88
236	0	13: 6:14	2.2180	1615.46	105.88
237	0	13: 6:21	2.2200	1614.40	105.88
238	0	13: 6:36	2.2240	1612.46	105.87
239	0	13: 6:47	2.2270	1611.56	105.86
240	0	13: 6:54	2.2290	1610.57	105.86
241	0	13: 7: 1	2.2310	1609.59	105.86
242	0	13: 7: 8	2.2330	1608.63	105.86
243	0	13: 7:15	2.2350	1607.68	105.86
244	0	13: 7:26	2.2380	1606.75	105.86
245	0	13: 7:33	2.2400	1605.84	105.86
246	0	13: 7:41	2.2420	1604.94	105.85
247	0	13: 7:48	2.2440	1604.05	105.85
248	0	13: 7:59	2.2470	1603.18	105.85
249	0	13: 8: 6	2.2490	1602.31	105.85
250	0	13: 8:13	2.2510	1601.49	105.85
251	0	13: 8:27	2.2550	1599.81	105.84

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
252	0	13: 8:38	2.2580	1599.02	105.84
253	0	13: 8:45	2.2600	1598.23	105.84
254	0	13: 8:53	2.2620	1597.43	105.84
255	0	13: 9: 0	2.2640	1596.66	105.83
256	0	13: 9:11	2.2670	1595.91	105.83
257	0	13: 9:18	2.2690	1595.17	105.83
258	0	13: 9:25	2.2710	1594.43	105.83
259	0	13: 9:32	2.2730	1593.70	105.83
260	0	13: 9:39	2.2750	1593.00	105.82
261	0	13: 9:50	2.2780	1592.30	105.82
262	0	13: 9:57	2.2800	1591.60	105.82
263	0	13:10:12	2.2840	1590.25	105.82
264	0	13:10:19	2.2860	1589.69	105.81
265	0	13:10:30	2.2890	1589.04	105.81
266	0	13:10:37	2.2910	1588.40	105.81
267	0	13:10:44	2.2930	1587.77	105.81
268	0	13:10:51	2.2950	1587.15	105.81
269	0	13:10:59	2.2970	1586.53	105.80
270	0	13:11: 9	2.3000	1585.92	105.80
271	0	13:11:17	2.3020	1585.35	105.80
272	0	13:11:24	2.3040	1584.76	105.80
273	0	13:11:31	2.3060	1584.17	105.79
274	0	13:11:38	2.3080	1583.61	105.79
275	0	13:11:49	2.3110	1583.06	105.79
276	0	13:12: 3	2.3150	1581.94	105.79
277	0	13:12:11	2.3170	1581.42	105.79
278	0	13:12:21	2.3200	1580.90	105.78
279	0	13:12:29	2.3220	1580.38	105.78
280	0	13:12:36	2.3240	1579.86	105.78
281	0	13:12:43	2.3260	1579.36	105.78
282	0	13:12:54	2.3290	1578.86	105.78
283	0	13:13: 1	2.3310	1578.35	105.78
284	0	13:13: 8	2.3330	1577.85	105.77
285	0	13:13:15	2.3350	1577.38	105.77
286	0	13:13:23	2.3370	1576.91	105.77
287	0	13:13:33	2.3400	1576.44	105.77
288	0	13:13:48	2.3440	1575.55	105.77
289	0	13:13:55	2.3460	1575.12	105.76
290	0	13:14: 2	2.3480	1574.68	105.76
291	0	13:14: 9	2.3500	1574.23	105.76
292	0	13:14:20	2.3530	1573.80	105.76
293	0	13:14:27	2.3550	1573.38	105.76
294	0	13:14:35	2.3570	1572.97	105.76
295	0	13:14:42	2.3590	1572.55	105.75
296	0	13:14:53	2.3620	1572.14	105.75
297	0	13:15: 0	2.3640	1571.73	105.75
298	0	13:15: 7	2.3660	1571.33	105.75
299	0	13:15:14	2.3680	1570.91	105.75
300	0	13:15:21	2.3700	1570.52	105.75
301	0	13:15:39	2.3750	1569.69	105.74

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
302	0	13:15:47	2.3770	1569.31	105.74
303	0	13:15:57	2.3800	1568.94	105.74
304	0	13:16: 5	2.3820	1568.57	105.73
305	0	13:16:12	2.3840	1568.21	105.73
306	0	13:16:19	2.3860	1567.84	105.73
307	0	13:16:30	2.3890	1567.50	105.73
308	0	13:16:37	2.3910	1567.15	105.72
309	0	13:16:44	2.3930	1566.81	105.72
310	0	13:16:51	2.3950	1566.46	105.72
311	0	13:16:59	2.3970	1566.12	105.72
312	0	13:17: 9	2.4000	1565.79	105.72
313	0	13:17:24	2.4040	1565.12	105.72
314	0	13:17:31	2.4060	1564.78	105.71
315	0	13:17:42	2.4090	1564.46	105.71
316	0	13:17:49	2.4110	1564.15	105.71
317	0	13:17:56	2.4130	1563.82	105.71
318	0	13:18: 3	2.4150	1563.51	105.70
319	0	13:18:11	2.4170	1563.21	105.70
320	0	13:18:21	2.4200	1562.90	105.70
321	0	13:18:29	2.4220	1562.60	105.70
322	0	13:18:36	2.4240	1562.31	105.69
323	0	13:18:43	2.4260	1562.03	105.69
324	0	13:18:50	2.4280	1561.74	105.69
325	0	13:19: 1	2.4310	1561.45	105.69
326	0	13:19:19	2.4360	1560.81	105.68
327	0	13:19:26	2.4380	1560.53	105.68
328	0	13:19:33	2.4400	1560.25	105.68
329	0	13:19:41	2.4420	1559.97	105.68
330	0	13:19:51	2.4450	1559.71	105.68
331	0	13:19:59	2.4470	1559.44	105.68
332	0	13:20: 6	2.4490	1559.18	105.68
333	0	13:20:13	2.4510	1558.91	105.67
334	0	13:20:24	2.4540	1558.65	105.67
335	0	13:20:31	2.4560	1558.40	105.67
336	0	13:20:38	2.4580	1558.14	105.67
337	0	13:20:45	2.4600	1557.89	105.66
338	0	13:21: 0	2.4640	1557.34	105.66
339	0	13:21: 7	2.4660	1557.22	105.66
340	0	13:21:18	2.4690	1556.98	105.65
341	0	13:21:25	2.4710	1556.74	105.65
342	0	13:21:32	2.4730	1556.51	105.65
343	0	13:21:39	2.4750	1556.27	105.65
344	0	13:21:47	2.4770	1556.03	105.65
345	0	13:21:57	2.4800	1555.79	105.65
346	0	13:22: 5	2.4820	1555.56	105.65
347	0	13:22:12	2.4840	1555.34	105.64
348	0	13:22:19	2.4860	1555.10	105.64
349	0	13:22:30	2.4890	1554.88	105.64
350	0	13:22:37	2.4910	1554.66	105.64
351	0	13:22:51	2.4950	1554.23	105.64

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
352	0	13:22:59	2.4970	1554.02	105.64
353	0	13:23: 6	2.4990	1553.82	105.64
354	0	13:23:17	2.5020	1553.61	105.64
355	0	13:23:24	2.5040	1553.41	105.64
356	0	13:23:31	2.5060	1553.21	105.63
357	0	13:23:38	2.5080	1553.00	105.63
358	0	13:23:45	2.5100	1552.80	105.63
359	0	13:23:56	2.5130	1552.60	105.63
360	0	13:24: 3	2.5150	1552.38	105.63
361	0	13:24:11	2.5170	1552.18	105.63
362	0	13:24:18	2.5190	1551.99	105.63
363	0	13:24:36	2.5240	1551.57	105.63
364	0	13:24:43	2.5260	1551.38	105.62
365	0	13:24:50	2.5280	1551.19	105.62
366	0	13:24:57	2.5300	1551.00	105.62
367	0	13:25: 8	2.5330	1550.81	105.61
368	0	13:25:15	2.5350	1550.64	105.61
369	0	13:25:23	2.5370	1550.46	105.61
370	0	13:25:30	2.5390	1550.28	105.61
371	0	13:25:41	2.5420	1550.10	105.61
372	0	13:25:48	2.5440	1549.92	105.61
373	0	13:25:55	2.5460	1549.75	105.61
374	0	13:26: 2	2.5480	1549.57	105.61
375	0	13:26: 9	2.5500	1549.39	105.61
376	0	13:26:27	2.5550	1549.02	105.60
377	0	13:26:35	2.5570	1548.85	105.60
378	0	13:26:42	2.5590	1548.67	105.60
379	0	13:26:53	2.5620	1548.50	105.60
380	0	13:27: 0	2.5640	1548.33	105.60
381	0	13:27: 7	2.5660	1548.16	105.59
382	0	13:27:14	2.5680	1547.99	105.59
383	0	13:27:21	2.5700	1547.83	105.59
384	0	13:27:32	2.5730	1547.68	105.59
385	0	13:27:39	2.5750	1547.52	105.59
386	0	13:27:47	2.5770	1547.37	105.59
387	0	13:27:54	2.5790	1547.20	105.59
388	0	13:28: 8	2.5830	1546.89	105.59
389	0	13:28:19	2.5860	1546.75	105.58
390	0	13:28:26	2.5880	1546.59	105.58
391	0	13:28:33	2.5900	1546.43	105.58
392	0	13:28:41	2.5920	1546.28	105.58
393	0	13:28:51	2.5950	1546.12	105.58
394	0	13:28:59	2.5970	1545.96	105.58
395	0	13:29: 6	2.5990	1545.81	105.57
396	0	13:29:13	2.6010	1545.66	105.57
397	0	13:29:24	2.6040	1545.51	105.57
398	0	13:29:31	2.6060	1545.36	105.57
399	0	13:29:38	2.6080	1545.21	105.57
400	0	13:29:45	2.6100	1545.08	105.57
401	0	13:30: 3	2.6150	1544.76	105.56

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4 [Tuesday: Mar. 12, 1996]
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
402	0	13:30:11	2.6170	1544.62	105.56
403	0	13:30:21	2.6200	1544.48	105.56
404	0	13:30:29	2.6220	1544.35	105.56
405	0	13:30:36	2.6240	1544.21	105.56
406	0	13:30:43	2.6260	1544.06	105.56
407	0	13:30:50	2.6280	1543.91	105.56
408	0	13:31: 1	2.6310	1543.77	105.56
409	0	13:31: 8	2.6330	1543.63	105.55
410	0	13:31:15	2.6350	1543.50	105.55
411	0	13:31:37	2.6410	1543.12	105.54
412	0	13:31:51	2.6450	1542.93	105.54
413	0	13:32: 9	2.6500	1542.51	105.54
414	0	13:32:24	2.6540	1542.40	105.53
415	0	13:32:38	2.6580	1542.17	105.53
416	0	13:32:53	2.6620	1541.94	105.53
417	0	13:33: 7	2.6660	1541.70	105.53
418	0	13:33:21	2.6700	1541.47	105.52
419	0	13:33:36	2.6740	1541.26	105.52
420	0	13:33:50	2.6780	1541.03	105.52
421	0	13:34: 5	2.6820	1540.83	105.51
422	0	13:34:19	2.6860	1540.61	105.51
423	0	13:34:33	2.6900	1540.42	105.51
424	0	13:34:48	2.6940	1540.23	105.51
425	0	13:35: 2	2.6980	1540.01	105.50
426	0	13:35:24	2.7040	1539.69	105.50
427	0	13:35:38	2.7080	1539.48	105.50
428	0	13:35:53	2.7120	1539.28	105.50
429	0	13:36: 7	2.7160	1539.09	105.50
430	0	13:36:21	2.7200	1538.90	105.50
431	0	13:36:36	2.7240	1538.72	105.49
432	0	13:36:50	2.7280	1538.54	105.49
433	0	13:37: 5	2.7320	1538.36	105.49
434	0	13:37:19	2.7360	1538.18	105.49
435	0	13:37:33	2.7400	1537.97	105.49
436	0	13:37:48	2.7440	1537.77	105.48
437	0	13:38: 2	2.7480	1537.59	105.48
438	0	13:38:20	2.7530	1537.32	105.48
439	0	13:38:35	2.7570	1537.19	105.47
440	0	13:38:49	2.7610	1537.01	105.47
441	0	13:39: 3	2.7650	1536.86	105.47
442	0	13:39:18	2.7690	1536.69	105.47
443	0	13:39:32	2.7730	1536.52	105.46
444	0	13:39:47	2.7770	1536.34	105.46
445	0	13:40: 1	2.7810	1536.14	105.46
446	0	13:40:15	2.7850	1535.98	105.46
447	0	13:40:30	2.7890	1535.81	105.45
448	0	13:40:44	2.7930	1535.66	105.45
449	0	13:40:59	2.7970	1535.51	105.45
450	0	13:41:13	2.8010	1535.34	105.44
451	0	13:41:31	2.8060	1535.16	105.44

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
452	0	13:41:45	2.8100	1535.00	105.43
453	0	13:42: 0	2.8140	1534.83	105.43
454	0	13:42:14	2.8180	1534.66	105.43
455	0	13:42:29	2.8220	1534.50	105.43
456	0	13:42:43	2.8260	1534.35	105.43
457	0	13:42:57	2.8300	1534.21	105.43
458	0	13:43:12	2.8340	1534.07	105.42
459	0	13:43:26	2.8380	1533.93	105.42
460	0	13:43:41	2.8420	1533.79	105.42
461	0	13:43:55	2.8460	1533.65	105.42
462	0	13:44: 9	2.8500	1533.49	105.42
463	0	13:44:31	2.8560	1533.31	105.41
464	0	13:44:45	2.8600	1533.13	105.41
465	0	13:45: 0	2.8640	1532.99	105.41
466	0	13:45:14	2.8680	1532.87	105.40
467	0	13:45:29	2.8720	1532.74	105.40
468	0	13:45:43	2.8760	1532.62	105.40
469	0	13:45:57	2.8800	1532.48	105.40
470	0	13:46:12	2.8840	1532.36	105.40
471	0	13:46:26	2.8880	1532.22	105.39
472	0	13:46:41	2.8920	1532.07	105.39
473	0	13:46:55	2.8960	1531.93	105.39
474	0	13:47: 9	2.9000	1531.79	105.39
475	0	13:47:24	2.9040	1531.67	105.38
476	0	13:47:42	2.9090	1531.52	105.37
477	0	13:47:56	2.9130	1531.41	105.37
478	0	13:48:11	2.9170	1531.28	105.37
479	0	13:48:25	2.9210	1531.17	105.37
480	0	13:48:39	2.9250	1531.04	105.37
481	0	13:48:54	2.9290	1530.90	105.36
482	0	13:49: 8	2.9330	1530.77	105.36
483	0	13:49:23	2.9370	1530.64	105.36
484	0	13:49:37	2.9410	1530.54	105.36
485	0	13:49:51	2.9450	1530.44	105.36
486	0	13:50: 6	2.9490	1530.33	105.35
487	0	13:50:20	2.9530	1530.22	105.35
488	0	13:50:38	2.9580	1530.04	105.35
489	0	13:50:53	2.9620	1529.97	105.35
490	0	13:51: 7	2.9660	1529.83	105.35
491	0	13:51:21	2.9700	1529.71	105.34
492	0	13:51:36	2.9740	1529.59	105.34
493	0	13:51:50	2.9780	1529.49	105.34
494	0	13:52: 5	2.9820	1529.40	105.34
495	0	13:52:19	2.9860	1529.30	105.33
496	0	13:52:33	2.9900	1529.21	105.33
497	0	13:52:48	2.9940	1529.11	105.33
498	0	13:53: 2	2.9980	1529.00	105.33
499	0	13:53:17	3.0020	1528.89	105.33
501	0	13:53:53	3.0120	1528.61	105.32
504	0	13:54:36	3.0240	1528.34	105.31

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
507	0	13:55:19	3.0360	1528.06	105.31
510	0	13:56: 2	3.0480	1527.73	105.30
513	0	13:56:53	3.0620	1527.40	105.29
516	0	13:57:36	3.0740	1527.20	105.29
519	0	13:58:15	3.0850	1526.90	105.28
521	0	13:58:48	3.0940	1526.72	105.27
524	0	13:59:27	3.1050	1526.51	105.27
526	0	14: 0: 3	3.1150	1526.28	105.26
528	0	14: 0:57	3.1300	1525.97	105.25
530	0	14: 1:41	3.1420	1525.77	105.25
532	0	14: 2:24	3.1540	1525.53	105.24
534	0	14: 3: 3	3.1650	1525.27	105.23
536	0	14: 3:47	3.1770	1525.08	105.22
538	0	14: 4:33	3.1900	1524.88	105.22
540	0	14: 5:17	3.2020	1524.62	105.21
542	0	14: 6: 0	3.2140	1524.43	105.21
544	0	14: 6:39	3.2250	1524.26	105.20
546	0	14: 7:23	3.2370	1524.02	105.20
548	0	14: 8: 9	3.2500	1523.83	105.19
550	0	14: 8:53	3.2620	1523.67	105.18
552	0	14: 9:36	3.2740	1523.44	105.18
554	0	14:10:19	3.2860	1523.26	105.17
556	0	14:11: 2	3.2980	1523.11	105.16
558	0	14:11:45	3.3100	1522.91	105.16
560	0	14:12:29	3.3220	1522.72	105.15
562	0	14:13: 8	3.3330	1522.59	105.14
564	0	14:13:55	3.3460	1522.41	105.14
566	0	14:14:38	3.3580	1522.21	105.13
568	0	14:15:21	3.3700	1522.10	105.12
570	0	14:16: 5	3.3820	1521.94	105.12
572	0	14:16:48	3.3940	1521.73	105.11
574	0	14:17:31	3.4060	1521.63	105.11
576	0	14:18:14	3.4180	1521.47	105.10
578	0	14:18:57	3.4300	1521.29	105.09
580	0	14:19:41	3.4420	1521.18	105.09
582	0	14:20:24	3.4540	1521.05	105.08
584	0	14:21: 7	3.4660	1520.87	105.07
586	0	14:21:50	3.4780	1520.74	105.07
588	0	14:22:33	3.4900	1520.68	105.06
590	0	14:23:17	3.5020	1520.47	105.06
592	0	14:24: 0	3.5140	1520.34	105.05
594	0	14:24:43	3.5260	1520.25	105.05
596	0	14:25:26	3.5380	1520.09	105.04
598	0	14:26: 9	3.5500	1519.96	105.03
600	0	14:26:53	3.5620	1519.88	105.03
602	0	14:27:36	3.5740	1519.73	105.02
604	0	14:28:23	3.5870	1519.59	105.01
606	0	14:29: 2	3.5980	1519.51	105.01
608	0	14:29:45	3.6100	1519.41	105.00
610	0	14:30:29	3.6220	1519.26	105.00

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
612	0	14:31:12	3.6340	1519.18	104.99
614	0	14:31:59	3.6470	1519.07	104.98
616	0	14:33: 0	3.6640	1518.89	104.97
618	0	14:33:57	3.6800	1518.80	104.97
620	0	14:34:55	3.6960	1518.61	104.96
622	0	14:35:53	3.7120	1518.52	104.96
624	0	14:36:50	3.7280	1518.38	104.95
626	0	14:37:48	3.7440	1518.25	104.94
628	0	14:38:45	3.7600	1518.15	104.93
630	0	14:39:43	3.7760	1517.99	104.92
632	0	14:40:41	3.7920	1517.96	104.92
634	0	14:41:38	3.8080	1517.82	104.91
636	0	14:42:36	3.8240	1517.76	104.90
638	0	14:43:33	3.8400	1517.58	104.89
640	0	14:44:31	3.8560	1517.45	104.89
642	0	14:45:29	3.8720	1517.39	104.88
644	0	14:46:26	3.8880	1517.22	104.87
646	0	14:47:24	3.9040	1517.16	104.86
648	0	14:48:21	3.9200	1517.02	104.86
650	0	14:49:19	3.9360	1516.92	104.85
652	0	14:50:17	3.9520	1516.85	104.84
654	0	14:51:14	3.9680	1516.72	104.83
656	0	14:52:12	3.9840	1516.70	104.82
658	0	14:53: 9	4.0000	1516.60	104.82
660	0	14:54: 7	4.0160	1516.56	104.81
662	0	14:55: 5	4.0320	1516.49	104.80
664	0	14:56: 2	4.0480	1516.40	104.80
666	0	14:57: 0	4.0640	1516.38	104.79
668	0	14:57:57	4.0800	1516.25	104.78
670	0	14:58:55	4.0960	1516.23	104.77
672	0	14:59:53	4.1120	1516.15	104.76
674	0	15: 0:50	4.1280	1516.09	104.76
676	0	15: 1:48	4.1440	1516.05	104.75
678	0	15: 2:45	4.1600	1515.94	104.75
680	0	15: 3:43	4.1760	1515.93	104.74
682	0	15: 4:41	4.1920	1515.83	104.74
684	0	15: 5:38	4.2080	1515.79	104.73
686	0	15: 6:36	4.2240	1515.75	104.73
688	0	15: 7:33	4.2400	1515.66	104.72
690	0	15: 8:31	4.2560	1515.65	104.71
692	0	15: 9:29	4.2720	1515.55	104.71
694	0	15:10:26	4.2880	1515.53	104.70
696	0	15:11:24	4.3040	1515.48	104.69
698	0	15:12:21	4.3200	1515.41	104.69
700	0	15:13:19	4.3360	1515.41	104.68
702	0	15:14:17	4.3520	1515.31	104.68
704	0	15:15:14	4.3680	1515.30	104.67
706	0	15:16:12	4.3840	1515.24	104.67
708	0	15:17: 9	4.4000	1515.20	104.66
710	0	15:18: 7	4.4160	1515.19	104.65

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
712	0	15:19: 5	4.4320	1515.09	104.65
714	0	15:20: 2	4.4480	1515.10	104.64
716	0	15:21: 0	4.4640	1515.02	104.63
718	0	15:21:57	4.4800	1515.00	104.63
720	0	15:22:55	4.4960	1514.98	104.62
722	0	15:23:53	4.5120	1514.91	104.62
724	0	15:24:50	4.5280	1514.92	104.61
726	0	15:25:48	4.5440	1514.83	104.60
728	0	15:26:45	4.5600	1514.84	104.60
730	0	15:27:43	4.5760	1514.79	104.59
732	0	15:28:41	4.5920	1514.75	104.59
734	0	15:29:38	4.6080	1514.75	104.58
736	0	15:30:36	4.6240	1514.66	104.58
738	0	15:31:33	4.6400	1514.70	104.57
740	0	15:32:31	4.6560	1514.63	104.57
742	0	15:33:29	4.6720	1514.61	104.56
744	0	15:34:26	4.6880	1514.59	104.56
746	0	15:35:24	4.7040	1514.52	104.55
748	0	15:36:21	4.7200	1514.55	104.54
750	0	15:37:19	4.7360	1514.48	104.54
752	0	15:38:17	4.7520	1514.48	104.54
754	0	15:39:14	4.7680	1514.45	104.53
756	0	15:40:12	4.7840	1514.39	104.52
758	0	15:41: 9	4.8000	1514.42	104.52
760	0	15:42: 7	4.8160	1514.35	104.51
762	0	15:43: 5	4.8320	1514.36	104.51
764	0	15:44: 2	4.8480	1514.31	104.50
766	0	15:45: 0	4.8640	1514.29	104.50
768	0	15:45:57	4.8800	1514.30	104.49
770	0	15:46:55	4.8960	1514.22	104.48
772	0	15:47:53	4.9120	1514.24	104.48
774	0	15:48:50	4.9280	1514.19	104.47
776	0	15:49:48	4.9440	1514.18	104.47
778	0	15:50:45	4.9600	1514.19	104.46
780	0	15:51:43	4.9760	1514.12	104.46
782	0	15:52:41	4.9920	1514.14	104.46
784	0	15:53:38	5.0080	1514.07	104.45
786	0	15:54:36	5.0240	1514.09	104.45
788	0	15:55:33	5.0400	1514.06	104.44
790	0	15:56:31	5.0560	1514.03	104.44
792	0	15:57:29	5.0720	1514.05	104.43
794	0	15:58:26	5.0880	1513.96	104.43
796	0	15:59:24	5.1040	1514.00	104.42
798	0	16: 0:21	5.1200	1513.95	104.42
800	0	16: 1:19	5.1360	1513.95	104.41
802	0	16: 2:17	5.1520	1513.95	104.40
804	0	16: 3:14	5.1680	1513.88	104.40
806	0	16: 4:12	5.1840	1513.92	104.39
808	0	16: 5: 9	5.2000	1513.85	104.38
810	0	16: 6: 7	5.2160	1513.87	104.38

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
812	0	16: 7: 5	5.2320	1513.85	104.38
814	0	16: 8: 2	5.2480	1513.80	104.37
816	0	16: 9: 0	5.2640	1513.83	104.36
818	0	16: 9:57	5.2800	1513.76	104.36
820	0	16:10:55	5.2960	1513.79	104.36
822	0	16:11:53	5.3120	1513.76	104.36
824	0	16:12:50	5.3280	1513.73	104.35
826	0	16:13:48	5.3440	1513.75	104.35
828	0	16:14:45	5.3600	1513.68	104.34
830	0	16:15:43	5.3760	1513.72	104.34
832	0	16:16:41	5.3920	1513.67	104.33
834	0	16:17:38	5.4080	1513.66	104.33
836	0	16:18:36	5.4240	1513.66	104.32
838	0	16:19:33	5.4400	1513.62	104.32
840	0	16:20:31	5.4560	1513.65	104.32
842	0	16:21:29	5.4720	1513.58	104.31
844	0	16:22:26	5.4880	1513.60	104.31
846	0	16:23:24	5.5040	1513.58	104.30
848	0	16:24:21	5.5200	1513.54	104.30
850	0	16:25:19	5.5360	1513.57	104.29
852	0	16:26:17	5.5520	1513.50	104.29
854	0	16:27:14	5.5680	1513.54	104.28
856	0	16:28:12	5.5840	1513.50	104.28
858	0	16:29: 9	5.6000	1513.48	104.27
860	0	16:30: 7	5.6160	1513.50	104.27
862	0	16:31: 5	5.6320	1513.43	104.26
864	0	16:32: 2	5.6480	1513.48	104.26
866	0	16:33: 0	5.6640	1513.42	104.26
868	0	16:33:57	5.6800	1513.43	104.25
870	0	16:34:55	5.6960	1513.43	104.25
872	0	16:35:53	5.7120	1513.37	104.25
874	0	16:36:50	5.7280	1513.42	104.24
876	0	16:37:48	5.7440	1513.35	104.24
878	0	16:38:45	5.7600	1513.37	104.24
880	0	16:39:43	5.7760	1513.35	104.23
882	0	16:40:41	5.7920	1513.32	104.22
884	0	16:41:38	5.8080	1513.36	104.22
886	0	16:42:36	5.8240	1513.28	104.22
888	0	16:43:33	5.8400	1513.31	104.21
890	0	16:44:31	5.8560	1513.27	104.21
892	0	16:45:29	5.8720	1513.27	104.20
894	0	16:46:26	5.8880	1513.29	104.20
896	0	16:47:24	5.9040	1513.22	104.19
898	0	16:48:21	5.9200	1513.26	104.19
900	0	16:49:19	5.9360	1513.20	104.18
902	0	16:50:17	5.9520	1513.21	104.18
904	0	16:51:14	5.9680	1513.21	104.18
906	0	16:52:12	5.9840	1513.17	104.17
908	0	16:53: 9	6.0000	1513.21	104.17
910	0	16:54: 7	6.0160	1513.14	104.17

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
912	0	16:55: 5	6.0320	1513.16	104.16
914	0	16:56: 2	6.0480	1513.15	104.16
916	0	16:57: 0	6.0640	1513.12	104.15
918	0	16:57:57	6.0800	1513.15	104.15
920	0	16:58:55	6.0960	1513.07	104.15
922	0	16:59:53	6.1120	1513.12	104.14
924	0	17: 0:50	6.1280	1513.08	104.14
926	0	17: 1:48	6.1440	1513.07	104.13
928	0	17: 2:45	6.1600	1513.09	104.13
930	0	17: 3:43	6.1760	1513.01	104.12
932	0	17: 4:41	6.1920	1513.07	104.11
934	0	17: 5:38	6.2080	1513.01	104.10
936	0	17: 6:36	6.2240	1513.03	104.10
938	0	17: 7:33	6.2400	1512.98	104.10
940	0	17: 8:31	6.2560	1512.97	104.10
942	0	17: 9:29	6.2720	1513.02	104.10
944	0	17:10:26	6.2880	1512.96	104.09
946	0	17:11:24	6.3040	1512.98	104.09
948	0	17:12:21	6.3200	1512.96	104.08
950	0	17:13:19	6.3360	1512.93	104.08
952	0	17:14:17	6.3520	1512.97	104.07
954	0	17:15:14	6.3680	1512.90	104.07
956	0	17:16:12	6.3840	1512.93	104.06
958	0	17:17: 9	6.4000	1512.89	104.06
960	0	17:18: 7	6.4160	1512.89	104.06
962	0	17:19: 5	6.4320	1512.92	104.06
964	0	17:20: 2	6.4480	1512.84	104.05
966	0	17:21: 0	6.4640	1512.89	104.04
968	0	17:21:57	6.4800	1512.83	104.04
970	0	17:22:55	6.4960	1512.85	104.04
972	0	17:23:53	6.5120	1512.85	104.03
974	0	17:24:50	6.5280	1512.81	104.03
976	0	17:25:48	6.5440	1512.85	104.03
978	0	17:26:45	6.5600	1512.78	104.02
980	0	17:27:43	6.5760	1512.81	104.02
982	0	17:28:41	6.5920	1512.77	104.01
984	0	17:29:38	6.6080	1512.77	104.01
986	0	17:30:36	6.6240	1512.80	104.00
988	0	17:31:33	6.6400	1512.70	104.00
990	0	17:32:31	6.6560	1512.77	104.00
992	0	17:33:29	6.6720	1512.72	104.00
994	0	17:34:26	6.6880	1512.73	104.00
996	0	17:35:24	6.7040	1512.74	103.99
998	0	17:36:21	6.7200	1512.69	103.99
1001	0	17:37:48	6.7440	1512.70	103.98
1004	0	17:39:14	6.7680	1512.70	103.97
1007	0	17:40:41	6.7920	1512.64	103.97
1010	0	17:42: 7	6.8160	1512.68	103.97
1013	0	17:43:33	6.8400	1512.64	103.96
1016	0	17:45: 0	6.8640	1512.62	103.96

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1019	0	17:46:26	6.8880	1512.63	103.95
1022	0	17:47:53	6.9120	1512.57	103.95
1025	0	17:49:19	6.9360	1512.60	103.94
1028	0	17:50:45	6.9600	1512.58	103.94
1031	0	17:52:12	6.9840	1512.54	103.93
1034	0	17:53:38	7.0080	1512.57	103.93
1037	0	17:55: 5	7.0320	1512.51	103.93
1040	0	17:56:31	7.0560	1512.54	103.92
1043	0	17:57:57	7.0800	1512.51	103.92
1046	0	17:59:24	7.1040	1512.48	103.91
		Continuing to monitor Bottom-Hole Fall-Off Press.			
1048	0	18: 0:21	7.1200	1512.49	103.91
1049	0	18: 0:50	7.1280	1512.51	103.90
1052	0	18: 2:17	7.1520	1512.44	103.90
1055	0	18: 3:43	7.1760	1512.49	103.90
1058	0	18: 5: 9	7.2000	1512.45	103.89
1061	0	18: 6:36	7.2240	1512.42	103.89
1064	0	18: 8: 2	7.2480	1512.44	103.88
1067	0	18: 9:29	7.2720	1512.38	103.88
1070	0	18:10:55	7.2960	1512.43	103.87
1073	0	18:12:21	7.3200	1512.38	103.87
1076	0	18:13:48	7.3440	1512.36	103.86
1079	0	18:15:14	7.3680	1512.38	103.86
1082	0	18:16:41	7.3920	1512.32	103.85
1085	0	18:18: 7	7.4160	1512.37	103.85
1088	0	18:19:33	7.4400	1512.31	103.84
1091	0	18:21: 0	7.4640	1512.30	103.84
1094	0	18:22:26	7.4880	1512.32	103.83
1097	0	18:23:53	7.5120	1512.26	103.83
1100	0	18:25:19	7.5360	1512.30	103.83
1103	0	18:26:45	7.5600	1512.25	103.82
1106	0	18:28:12	7.5840	1512.25	103.82
1109	0	18:29:38	7.6080	1512.26	103.82
1111	0	18:31:19	7.6360	1512.19	103.81
1113	0	18:33:14	7.6680	1512.19	103.81
1115	0	18:35: 9	7.7000	1512.22	103.80
1117	0	18:37: 5	7.7320	1512.20	103.79
1119	0	18:39: 0	7.7640	1512.15	103.79
1121	0	18:40:55	7.7960	1512.11	103.78
1123	0	18:42:50	7.8280	1512.13	103.78
1125	0	18:44:45	7.8600	1512.15	103.77
1127	0	18:46:41	7.8920	1512.11	103.76
1129	0	18:48:36	7.9240	1512.07	103.76
1131	0	18:50:31	7.9560	1512.05	103.75
1133	0	18:52:26	7.9880	1512.07	103.75
1135	0	18:54:21	8.0200	1512.07	103.74
1137	0	18:56:17	8.0520	1512.04	103.74
1139	0	18:58:12	8.0840	1511.99	103.73
1141	0	19: 0: 7	8.1160	1511.98	103.72
1143	0	19: 2: 2	8.1480	1512.01	103.72

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1145	0	19: 3:57	8.1800	1512.00	103.71
1147	0	19: 5:53	8.2120	1511.96	103.71
1149	0	19: 7:48	8.2440	1511.91	103.70
1151	0	19: 9:43	8.2760	1511.92	103.69
1153	0	19:11:38	8.3080	1511.94	103.69
1155	0	19:13:33	8.3400	1511.93	103.69
1157	0	19:15:29	8.3720	1511.91	103.68
1159	0	19:17:24	8.4040	1511.88	103.67
1161	0	19:19:19	8.4360	1511.83	103.67
1163	0	19:21:14	8.4680	1511.83	103.66
1165	0	19:23: 9	8.5000	1511.85	103.66
1167	0	19:25: 5	8.5320	1511.85	103.65
1169	0	19:27: 0	8.5640	1511.83	103.65
1171	0	19:28:55	8.5960	1511.79	103.64
1173	0	19:30:50	8.6280	1511.76	103.64
1175	0	19:32:45	8.6600	1511.76	103.63
1177	0	19:34:41	8.6920	1511.78	103.63
1179	0	19:36:36	8.7240	1511.78	103.63
1181	0	19:38:31	8.7560	1511.75	103.62
1183	0	19:40:26	8.7880	1511.71	103.62
1185	0	19:42:21	8.8200	1511.69	103.61
1187	0	19:44:17	8.8520	1511.68	103.61
1189	0	19:46:12	8.8840	1511.70	103.60
1191	0	19:48: 7	8.9160	1511.71	103.60
1193	0	19:50: 2	8.9480	1511.68	103.59
1195	0	19:51:57	8.9800	1511.64	103.59
1197	0	19:53:53	9.0120	1511.61	103.58
1199	0	19:55:48	9.0440	1511.61	103.58
1201	0	19:57:43	9.0760	1511.63	103.57
1203	0	19:59:38	9.1080	1511.63	103.57
1205	0	20: 1:33	9.1400	1511.61	103.56
1207	0	20: 3:29	9.1720	1511.57	103.56
1209	0	20: 5:24	9.2040	1511.54	103.56
1211	0	20: 7:19	9.2360	1511.55	103.55
1213	0	20: 9:14	9.2680	1511.56	103.54
1215	0	20:11: 9	9.3000	1511.56	103.54
1217	0	20:13: 5	9.3320	1511.53	103.53
1219	0	20:15: 0	9.3640	1511.49	103.53
1221	0	20:16:55	9.3960	1511.47	103.53
1223	0	20:18:50	9.4280	1511.48	103.52
1225	0	20:20:45	9.4600	1511.50	103.52
1227	0	20:22:41	9.4920	1511.49	103.51
1229	0	20:24:36	9.5240	1511.46	103.51
1231	0	20:26:31	9.5560	1511.43	103.50
1233	0	20:28:26	9.5880	1511.40	103.50
1235	0	20:30:21	9.6200	1511.42	103.49
1237	0	20:32:17	9.6520	1511.44	103.49
1239	0	20:34:12	9.6840	1511.43	103.48
1241	0	20:36: 7	9.7160	1511.40	103.48
1243	0	20:38: 2	9.7480	1511.36	103.48

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1245	0	20:39:57	9.7800	1511.34	103.47
1247	0	20:41:53	9.8120	1511.35	103.46
1249	0	20:43:48	9.8440	1511.37	103.46
1251	0	20:45:43	9.8760	1511.35	103.46
1253	0	20:47:38	9.9080	1511.33	103.45
1255	0	20:49:33	9.9400	1511.29	103.45
1257	0	20:51:29	9.9720	1511.28	103.44
1259	0	20:53:24	10.0040	1511.29	103.44
1261	0	20:55:19	10.0360	1511.31	103.43
1263	0	20:57:14	10.0680	1511.30	103.43
1265	0	20:59: 9	10.1000	1511.26	103.43
1267	0	21: 1: 5	10.1320	1511.22	103.42
1269	0	21: 3: 0	10.1640	1511.22	103.42
1271	0	21: 4:55	10.1960	1511.24	103.41
1273	0	21: 6:50	10.2280	1511.25	103.41
1275	0	21: 8:45	10.2600	1511.23	103.41
1277	0	21:10:41	10.2920	1511.20	103.40
1279	0	21:12:36	10.3240	1511.16	103.40
1281	0	21:14:31	10.3560	1511.16	103.39
1283	0	21:16:26	10.3880	1511.18	103.39
1285	0	21:18:21	10.4200	1511.19	103.39
1287	0	21:20:17	10.4520	1511.17	103.38
1289	0	21:22:12	10.4840	1511.13	103.38
1291	0	21:24: 7	10.5160	1511.10	103.38
1293	0	21:26: 2	10.5480	1511.10	103.37
1295	0	21:27:57	10.5800	1511.13	103.37
1297	0	21:29:53	10.6120	1511.13	103.36
1299	0	21:31:48	10.6440	1511.11	103.36
1301	0	21:33:43	10.6760	1511.06	103.36
1303	0	21:35:38	10.7080	1511.04	103.36
1305	0	21:37:33	10.7400	1511.06	103.35
1307	0	21:39:29	10.7720	1511.08	103.35
1309	0	21:41:24	10.8040	1511.07	103.35
1311	0	21:43:19	10.8360	1511.04	103.34
1313	0	21:45:14	10.8680	1511.00	103.33
1315	0	21:47: 9	10.9000	1510.98	103.33
1317	0	21:49: 5	10.9320	1511.00	103.33
1319	0	21:51: 0	10.9640	1511.02	103.32
1321	0	21:52:55	10.9960	1511.01	103.32
1323	0	21:54:50	11.0280	1510.98	103.32
1325	0	21:56:45	11.0600	1510.94	103.31
1327	0	21:58:41	11.0920	1510.93	103.31
1329	0	22: 0:36	11.1240	1510.95	103.30
1331	0	22: 2:31	11.1560	1510.97	103.30
1333	0	22: 4:26	11.1880	1510.95	103.30
1335	0	22: 6:21	11.2200	1510.92	103.29
1337	0	22: 8:17	11.2520	1510.88	103.29
1339	0	22:10:12	11.2840	1510.89	103.29
1341	0	22:12: 7	11.3160	1510.90	103.28
1343	0	22:14: 2	11.3480	1510.91	103.28

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1345	0	22:15:57	11.3800	1510.90	103.28
1347	0	22:17:53	11.4120	1510.86	103.27
1349	0	22:19:48	11.4440	1510.83	103.27
1351	0	22:21:43	11.4760	1510.84	103.26
1353	0	22:23:38	11.5080	1510.86	103.26
1355	0	22:25:33	11.5400	1510.86	103.26
1357	0	22:27:29	11.5720	1510.84	103.26
1359	0	22:29:24	11.6040	1510.80	103.25
1361	0	22:31:19	11.6360	1510.77	103.25
1363	0	22:33:14	11.6680	1510.78	103.24
1365	0	22:35: 9	11.7000	1510.81	103.24
1367	0	22:37: 5	11.7320	1510.80	103.24
1369	0	22:39: 0	11.7640	1510.79	103.24
1371	0	22:40:55	11.7960	1510.74	103.23
1373	0	22:42:50	11.8280	1510.72	103.23
1375	0	22:44:45	11.8600	1510.74	103.22
1377	0	22:46:41	11.8920	1510.77	103.22
1379	0	22:48:36	11.9240	1510.75	103.22
1381	0	22:50:31	11.9560	1510.72	103.21
1383	0	22:52:26	11.9880	1510.69	103.21
1385	0	22:54:21	12.0200	1510.68	103.21
1387	0	22:56:17	12.0520	1510.70	103.20
1389	0	22:58:12	12.0840	1510.72	103.20
1391	0	23: 0: 7	12.1160	1510.69	103.20
1393	0	23: 2: 2	12.1480	1510.65	103.20
1395	0	23: 3:57	12.1800	1510.64	103.19
1397	0	23: 5:53	12.2120	1510.66	103.19
1399	0	23: 7:48	12.2440	1510.67	103.18
1401	0	23: 9:43	12.2760	1510.64	103.18
1403	0	23:11:38	12.3080	1510.60	103.18
1405	0	23:13:33	12.3400	1510.59	103.18
1407	0	23:15:29	12.3720	1510.61	103.17
1409	0	23:17:24	12.4040	1510.63	103.17
1411	0	23:19:19	12.4360	1510.61	103.17
1413	0	23:21:14	12.4680	1510.58	103.16
1415	0	23:23: 9	12.5000	1510.55	103.16
1417	0	23:25: 5	12.5320	1510.55	103.16
1419	0	23:27: 0	12.5640	1510.58	103.16
1421	0	23:28:55	12.5960	1510.58	103.15
1423	0	23:30:50	12.6280	1510.56	103.15
1425	0	23:32:45	12.6600	1510.52	103.14
1427	0	23:34:41	12.6920	1510.50	103.14
1429	0	23:36:36	12.7240	1510.51	103.14
1431	0	23:38:31	12.7560	1510.54	103.13
1433	0	23:40:26	12.7880	1510.53	103.13
1435	0	23:42:21	12.8200	1510.50	103.13
1437	0	23:44:17	12.8520	1510.47	103.13
1439	0	23:46:12	12.8840	1510.45	103.12
1441	0	23:48: 7	12.9160	1510.48	103.12
1443	0	23:50: 2	12.9480	1510.50	103.12

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Tuesday: Mar. 12, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1445	0	23:51:57	12.9800	1510.48	103.11
1447	0	23:53:53	13.0120	1510.45	103.11
1449	0	23:55:48	13.0440	1510.42	103.11
1451	0	23:57:43	13.0760	1510.41	103.11
1453	0	23:59:38	13.1080	1510.44	103.10
[Wednesday: Mar. 13, 1996]					
1455	1	0: 1:33	13.1400	1510.46	103.10
1457	1	0: 3:29	13.1720	1510.43	103.10
1459	1	0: 5:24	13.2040	1510.40	103.09
1461	1	0: 7:19	13.2360	1510.37	103.09
1463	1	0: 9:14	13.2680	1510.36	103.09
1465	1	0:11: 9	13.3000	1510.40	103.09
1467	1	0:13: 5	13.3320	1510.41	103.08
1469	1	0:15: 0	13.3640	1510.39	103.08
1471	1	0:16:55	13.3960	1510.36	103.08
1473	1	0:18:50	13.4280	1510.33	103.07
1475	1	0:20:45	13.4600	1510.33	103.07
1477	1	0:22:41	13.4920	1510.36	103.07
1479	1	0:24:36	13.5240	1510.36	103.07
1481	1	0:26:31	13.5560	1510.34	103.06
1483	1	0:28:26	13.5880	1510.31	103.06
1485	1	0:30:21	13.6200	1510.28	103.06
1487	1	0:32:17	13.6520	1510.29	103.05
1489	1	0:34:12	13.6840	1510.31	103.05
1491	1	0:36: 7	13.7160	1510.32	103.05
1493	1	0:38: 2	13.7480	1510.30	103.05
1495	1	0:39:57	13.7800	1510.27	103.04
1497	1	0:41:53	13.8120	1510.23	103.04
1499	1	0:43:48	13.8440	1510.24	103.04
1502	1	0:46:41	13.8920	1510.24	103.03
1505	1	0:49:33	13.9400	1510.27	103.03
1508	1	0:52:26	13.9880	1510.24	103.03
1511	1	0:55:19	14.0360	1510.19	103.02
1514	1	0:58:12	14.0840	1510.22	103.02
1517	1	1: 1: 5	14.1320	1510.23	103.01
1520	1	1: 3:57	14.1800	1510.17	103.01
1523	1	1: 6:50	14.2280	1510.16	103.01
1526	1	1: 9:43	14.2760	1510.19	103.01
1529	1	1:12:36	14.3240	1510.17	103.00
1532	1	1:15:29	14.3720	1510.12	103.00
1535	1	1:18:21	14.4200	1510.14	103.00
1538	1	1:21:14	14.4680	1510.15	102.99
1541	1	1:24: 7	14.5160	1510.10	102.99
1544	1	1:27: 0	14.5640	1510.09	102.98
1547	1	1:29:53	14.6120	1510.12	102.98
1550	1	1:32:45	14.6600	1510.09	102.97
1553	1	1:35:38	14.7080	1510.05	102.97
1556	1	1:38:31	14.7560	1510.07	102.97
1559	1	1:41:24	14.8040	1510.08	102.96
1562	1	1:44:17	14.8520	1510.02	102.96

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Wednesday: Mar. 13, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1565	1	1:47: 9	14.9000	1510.03	102.96
1568	1	1:50: 2	14.9480	1510.06	102.95
1571	1	1:52:55	14.9960	1510.02	102.95
1574	1	1:55:48	15.0440	1509.97	102.94
1577	1	1:58:41	15.0920	1510.00	102.94
1580	1	2: 1:33	15.1400	1510.02	102.94
1583	1	2: 4:26	15.1880	1509.97	102.93
1586	1	2: 7:19	15.2360	1509.94	102.93
1589	1	2:10:12	15.2840	1509.97	102.93
1592	1	2:13: 5	15.3320	1509.97	102.92
1595	1	2:15:57	15.3800	1509.92	102.92
1598	1	2:18:50	15.4280	1509.92	102.92
1601	1	2:21:43	15.4760	1509.95	102.91
1604	1	2:24:36	15.5240	1509.91	102.91
1607	1	2:27:29	15.5720	1509.88	102.91
1610	1	2:30:21	15.6200	1509.92	102.90
1613	1	2:33:14	15.6680	1509.89	102.90
1616	1	2:36: 7	15.7160	1509.85	102.90
1619	1	2:39: 0	15.7640	1509.87	102.89
1622	1	2:41:53	15.8120	1509.88	102.89
1625	1	2:44:45	15.8600	1509.83	102.89
1628	1	2:47:38	15.9080	1509.81	102.89
1631	1	2:50:31	15.9560	1509.85	102.88
1634	1	2:53:24	16.0040	1509.83	102.88
1637	1	2:56:17	16.0520	1509.78	102.88
1640	1	2:59: 9	16.1000	1509.81	102.87
1643	1	3: 2: 2	16.1480	1509.82	102.87
1646	1	3: 4:55	16.1960	1509.77	102.87
1649	1	3: 7:48	16.2440	1509.75	102.86
1652	1	3:10:41	16.2920	1509.79	102.86
1655	1	3:13:33	16.3400	1509.78	102.86
1658	1	3:16:26	16.3880	1509.72	102.86
1661	1	3:19:19	16.4360	1509.75	102.85
1664	1	3:22:12	16.4840	1509.76	102.85
1667	1	3:25: 5	16.5320	1509.70	102.84
1670	1	3:27:57	16.5800	1509.70	102.84
1673	1	3:30:50	16.6280	1509.74	102.84
1676	1	3:33:43	16.6760	1509.68	102.83
1679	1	3:36:36	16.7240	1509.67	102.83
1682	1	3:39:29	16.7720	1509.71	102.83
1685	1	3:42:21	16.8200	1509.67	102.83
1688	1	3:45:14	16.8680	1509.63	102.82
1691	1	3:48: 7	16.9160	1509.67	102.82
1694	1	3:51: 0	16.9640	1509.66	102.82
1697	1	3:53:53	17.0120	1509.61	102.82
1700	1	3:56:45	17.0600	1509.63	102.81
1703	1	3:59:38	17.1080	1509.65	102.81
1706	1	4: 2:31	17.1560	1509.59	102.81
1709	1	4: 5:24	17.2040	1509.59	102.80
1712	1	4: 8:17	17.2520	1509.63	102.80

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Wednesday: Mar. 13, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1715	1	4:11: 9	17.3000	1509.58	102.80
1718	1	4:14: 2	17.3480	1509.56	102.79
1721	1	4:16:55	17.3960	1509.59	102.79
1724	1	4:19:48	17.4440	1509.57	102.79
1727	1	4:22:41	17.4920	1509.53	102.79
1730	1	4:25:33	17.5400	1509.55	102.79
1733	1	4:28:26	17.5880	1509.56	102.78
1736	1	4:31:19	17.6360	1509.51	102.78
1739	1	4:34:12	17.6840	1509.51	102.78
1742	1	4:37: 5	17.7320	1509.55	102.77
1745	1	4:39:57	17.7800	1509.50	102.77
1748	1	4:42:50	17.8280	1509.48	102.76
1751	1	4:45:43	17.8760	1509.51	102.76
1754	1	4:48:36	17.9240	1509.49	102.76
1757	1	4:51:29	17.9720	1509.45	102.76
1760	1	4:54:21	18.0200	1509.47	102.76
1763	1	4:57:14	18.0680	1509.48	102.75
1766	1	5: 0: 7	18.1160	1509.43	102.75
1769	1	5: 3: 0	18.1640	1509.44	102.75
1772	1	5: 5:53	18.2120	1509.47	102.75
1775	1	5: 8:45	18.2600	1509.42	102.74
1778	1	5:11:38	18.3080	1509.40	102.74
1781	1	5:14:31	18.3560	1509.43	102.74
1784	1	5:17:24	18.4040	1509.42	102.74
1787	1	5:20:17	18.4520	1509.37	102.73
1790	1	5:23: 9	18.5000	1509.40	102.73
1793	1	5:26: 2	18.5480	1509.41	102.73
1796	1	5:28:55	18.5960	1509.35	102.73
1799	1	5:31:48	18.6440	1509.36	102.72
1802	1	5:34:41	18.6920	1509.39	102.72
1805	1	5:37:33	18.7400	1509.35	102.72
1808	1	5:40:26	18.7880	1509.32	102.72
1811	1	5:43:19	18.8360	1509.35	102.71
1814	1	5:46:12	18.8840	1509.35	102.71
1817	1	5:49: 5	18.9320	1509.31	102.71
1820	1	5:51:57	18.9800	1509.30	102.71
1823	1	5:54:50	19.0280	1509.34	102.70
1826	1	5:57:43	19.0760	1509.30	102.70
		Continuing to monitor Bottom-Hole Fall-Off Press.			
1829	1	6: 0:36	19.1240	1509.27	102.70
1832	1	6: 3:29	19.1720	1509.29	102.70
1835	1	6: 6:21	19.2200	1509.31	102.70
1838	1	6: 9:14	19.2680	1509.25	102.69
1841	1	6:12: 7	19.3160	1509.24	102.69
1844	1	6:15: 0	19.3640	1509.28	102.69
1847	1	6:17:53	19.4120	1509.26	102.68
1850	1	6:20:45	19.4600	1509.21	102.68
1853	1	6:23:38	19.5080	1509.24	102.68
1856	1	6:26:31	19.5560	1509.26	102.68
1859	1	6:29:24	19.6040	1509.21	102.68

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Wednesday: Mar. 13, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
1862	1	6:32:17	19.6520	1509.20	102.67
1865	1	6:35: 9	19.7000	1509.23	102.67
1868	1	6:38: 2	19.7480	1509.22	102.67
1871	1	6:40:55	19.7960	1509.17	102.67
1874	1	6:43:48	19.8440	1509.18	102.66
1877	1	6:46:41	19.8920	1509.21	102.66
1880	1	6:49:33	19.9400	1509.17	102.66
1883	1	6:52:26	19.9880	1509.14	102.66
1886	1	6:55:19	20.0360	1509.16	102.65
1889	1	6:58:12	20.0840	1509.18	102.65
1892	1	7: 1: 5	20.1320	1509.15	102.65
1895	1	7: 3:57	20.1800	1509.12	102.65
1898	1	7: 6:50	20.2280	1509.14	102.65
1901	1	7: 9:43	20.2760	1509.16	102.64
1904	1	7:12:36	20.3240	1509.10	102.64
1907	1	7:15:29	20.3720	1509.08	102.64
1910	1	7:18:21	20.4200	1509.12	102.64
1913	1	7:21:14	20.4680	1509.12	102.63
1916	1	7:24: 7	20.5160	1509.09	102.63
1919	1	7:27: 0	20.5640	1509.06	102.63
1922	1	7:29:53	20.6120	1509.09	102.63
1925	1	7:32:45	20.6600	1509.10	102.63
1928	1	7:35:38	20.7080	1509.06	102.63
1931	1	7:38:31	20.7560	1509.04	102.63
1934	1	7:41:24	20.8040	1509.05	102.62
1937	1	7:44:17	20.8520	1509.07	102.62
1940	1	7:47: 9	20.9000	1509.02	102.62
1943	1	7:50: 2	20.9480	1509.02	102.61
1946	1	7:52:55	20.9960	1509.05	102.61
1949	1	7:55:48	21.0440	1509.03	102.61
1952	1	7:58:41	21.0920	1508.98	102.61
1955	1	8: 1:33	21.1400	1509.01	102.61
1958	1	8: 4:26	21.1880	1509.03	102.60
1961	1	8: 7:19	21.2360	1508.98	102.60
1964	1	8:10:12	21.2840	1508.97	102.60
1967	1	8:13: 5	21.3320	1509.00	102.60
1970	1	8:15:57	21.3800	1508.99	102.60
1973	1	8:18:50	21.4280	1508.94	102.60
1976	1	8:21:43	21.4760	1508.97	102.59
1979	1	8:24:36	21.5240	1508.98	102.59
1982	1	8:27:29	21.5720	1508.94	102.59
1985	1	8:30:21	21.6200	1508.91	102.59
1988	1	8:33:14	21.6680	1508.95	102.59
1991	1	8:36: 7	21.7160	1508.96	102.58
1994	1	8:39: 0	21.7640	1508.92	102.58
1997	1	8:41:53	21.8120	1508.90	102.58
2000	1	8:44:45	21.8600	1508.92	102.58
2003	1	8:47:38	21.9080	1508.94	102.58
2006	1	8:50:31	21.9560	1508.89	102.58
2009	1	8:53:24	22.0040	1508.87	102.57

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Wednesday: Mar. 13, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2012	1	8:56:17	22.0520	1508.91	102.57
2015	1	8:59: 9	22.1000	1508.90	102.57
2018	1	9: 2: 2	22.1480	1508.86	102.57
2021	1	9: 4:55	22.1960	1508.85	102.57
2024	1	9: 7:48	22.2440	1508.89	102.57
2027	1	9:10:41	22.2920	1508.87	102.57
2030	1	9:13:33	22.3400	1508.83	102.56
2033	1	9:16:26	22.3880	1508.85	102.56
2036	1	9:19:19	22.4360	1508.87	102.56
2039	1	9:22:12	22.4840	1508.83	102.56
2042	1	9:25: 5	22.5320	1508.81	102.56
2045	1	9:27:57	22.5800	1508.84	102.56
2048	1	9:30:50	22.6280	1508.83	102.55
2051	1	9:33:43	22.6760	1508.79	102.55
2054	1	9:36:36	22.7240	1508.80	102.55
2057	1	9:39:29	22.7720	1508.83	102.55
2060	1	9:42:21	22.8200	1508.79	102.54
2063	1	9:45:14	22.8680	1508.77	102.54
2066	1	9:48: 7	22.9160	1508.80	102.54
2069	1	9:51: 0	22.9640	1508.80	102.54
2072	1	9:53:53	23.0120	1508.75	102.54
2075	1	9:56:45	23.0600	1508.77	102.53
2078	1	9:59:38	23.1080	1508.79	102.53
2081	1	10: 2:31	23.1560	1508.74	102.53
2084	1	10: 5:24	23.2040	1508.73	102.53
2087	1	10: 8:17	23.2520	1508.78	102.53
2090	1	10:11: 9	23.3000	1508.73	102.53
2093	1	10:14: 2	23.3480	1508.71	102.53
2096	1	10:16:55	23.3960	1508.75	102.53
2099	1	10:19:48	23.4440	1508.74	102.52
2102	1	10:22:41	23.4920	1508.69	102.52
2105	1	10:25:33	23.5400	1508.70	102.52
2108	1	10:28:26	23.5880	1508.73	102.52
2110	1	10:31:19	23.6360	1508.71	102.52
2112	1	10:35: 9	23.7000	1508.70	102.51
2114	1	10:39: 0	23.7640	1508.67	102.51
2116	1	10:42:50	23.8280	1508.66	102.51
2118	1	10:46:41	23.8920	1508.68	102.51
2120	1	10:50:31	23.9560	1508.68	102.51
2122	1	10:54:21	24.0200	1508.63	102.50
2124	1	10:58:12	24.0840	1508.63	102.50
2126	1	11: 2: 2	24.1480	1508.66	102.50
2128	1	11: 5:53	24.2120	1508.64	102.50
2130	1	11: 9:43	24.2760	1508.60	102.50
2132	1	11:13:33	24.3400	1508.61	102.50
2134	1	11:17:24	24.4040	1508.63	102.49
2136	1	11:21:14	24.4680	1508.60	102.49
2138	1	11:25: 5	24.5320	1508.57	102.49
2140	1	11:28:55	24.5960	1508.59	102.49
2142	1	11:32:45	24.6600	1508.60	102.49

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4 [Wednesday: Mar. 13, 1996]
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2144	1	11:36:36	24.7240	1508.56	102.49
2146	1	11:40:26	24.7880	1508.54	102.48
2148	1	11:44:17	24.8520	1508.57	102.48
2150	1	11:48: 7	24.9160	1508.56	102.48
2152	1	11:51:57	24.9800	1508.52	102.48
2154	1	11:55:48	25.0440	1508.54	102.47
2156	1	11:59:38	25.1080	1508.54	102.47
2158	1	12: 3:29	25.1720	1508.50	102.47
2160	1	12: 7:19	25.2360	1508.52	102.47
2162	1	12:11: 9	25.3000	1508.52	102.47
2164	1	12:15: 0	25.3640	1508.48	102.46
2166	1	12:18:50	25.4280	1508.49	102.46
2168	1	12:23:38	25.5080	1508.47	102.46
2169	1	12:26:31	25.5560	1508.46	102.46
2171	1	12:30:21	25.6200	1508.45	102.46
2173	1	12:34:12	25.6840	1508.48	102.46
2175	1	12:38: 2	25.7480	1508.46	102.45
2177	1	12:41:53	25.8120	1508.42	102.45
2179	1	12:45:43	25.8760	1508.45	102.45
2181	1	12:49:33	25.9400	1508.45	102.45
2183	1	12:53:24	26.0040	1508.41	102.45
2185	1	12:57:14	26.0680	1508.42	102.44
2187	1	13: 1: 5	26.1320	1508.43	102.44
2189	1	13: 4:55	26.1960	1508.40	102.44
2191	1	13: 8:45	26.2600	1508.38	102.44
2193	1	13:12:36	26.3240	1508.40	102.44
2195	1	13:16:26	26.3880	1508.41	102.44
2197	1	13:20:17	26.4520	1508.37	102.43
2199	1	13:24: 7	26.5160	1508.35	102.43
2201	1	13:27:57	26.5800	1508.37	102.43
2203	1	13:31:48	26.6440	1508.38	102.43
2205	1	13:35:38	26.7080	1508.35	102.43
2207	1	13:39:29	26.7720	1508.32	102.42
2209	1	13:43:19	26.8360	1508.34	102.42
2211	1	13:47: 9	26.9000	1508.35	102.42
2213	1	13:51: 0	26.9640	1508.32	102.42
2215	1	13:54:50	27.0280	1508.30	102.42
2217	1	13:58:41	27.0920	1508.32	102.41
2219	1	14: 2:31	27.1560	1508.32	102.41
2221	1	14: 6:21	27.2200	1508.29	102.41
2223	1	14:10:12	27.2840	1508.27	102.41
2225	1	14:14: 2	27.3480	1508.29	102.41
2227	1	14:17:53	27.4120	1508.30	102.41
2229	1	14:21:43	27.4760	1508.26	102.40
2231	1	14:25:33	27.5400	1508.24	102.40
2233	1	14:29:24	27.6040	1508.27	102.40
2235	1	14:33:14	27.6680	1508.27	102.40
2237	1	14:37: 5	27.7320	1508.23	102.40
2239	1	14:40:55	27.7960	1508.22	102.39
2241	1	14:44:45	27.8600	1508.24	102.39

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4 [Wednesday: Mar. 13, 1996]
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2243	1	14:48:36	27.9240	1508.24	102.39
2245	1	14:52:26	27.9880	1508.20	102.39
2247	1	14:56:17	28.0520	1508.20	102.39
2249	1	15: 0: 7	28.1160	1508.22	102.39
2251	1	15: 3:57	28.1800	1508.21	102.39
2253	1	15: 7:48	28.2440	1508.17	102.39
2255	1	15:11:38	28.3080	1508.17	102.39
2257	1	15:15:29	28.3720	1508.20	102.38
2259	1	15:19:19	28.4360	1508.18	102.38
2261	1	15:23: 9	28.5000	1508.15	102.38
2263	1	15:27: 0	28.5640	1508.15	102.38
2265	1	15:30:50	28.6280	1508.18	102.38
2267	1	15:34:41	28.6920	1508.15	102.38
2269	1	15:38:31	28.7560	1508.12	102.38
2271	1	15:42:21	28.8200	1508.14	102.37
2273	1	15:46:12	28.8840	1508.15	102.37
2275	1	15:50: 2	28.9480	1508.12	102.37
2277	1	15:53:53	29.0120	1508.09	102.37
2279	1	15:57:43	29.0760	1508.12	102.37
2281	1	16: 1:33	29.1400	1508.13	102.36
2283	1	16: 5:24	29.2040	1508.09	102.36
2285	1	16: 9:14	29.2680	1508.07	102.36
2287	1	16:13: 5	29.3320	1508.10	102.36
2289	1	16:16:55	29.3960	1508.09	102.36
2291	1	16:20:45	29.4600	1508.06	102.36
2293	1	16:24:36	29.5240	1508.06	102.35
2295	1	16:28:26	29.5880	1508.08	102.36
2297	1	16:32:17	29.6520	1508.06	102.35
2299	1	16:36: 7	29.7160	1508.03	102.35
2301	1	16:39:57	29.7800	1508.04	102.35
2303	1	16:43:48	29.8440	1508.06	102.35
2305	1	16:47:38	29.9080	1508.04	102.35
2307	1	16:51:29	29.9720	1508.01	102.35
2309	1	16:55:19	30.0360	1508.03	102.35
2311	1	16:59: 9	30.1000	1508.04	102.34
2313	1	17: 3: 0	30.1640	1508.01	102.34
2315	1	17: 6:50	30.2280	1507.99	102.34
2317	1	17:10:41	30.2920	1508.01	102.34
2319	1	17:14:31	30.3560	1508.01	102.34
2321	1	17:18:21	30.4200	1507.97	102.34
2323	1	17:22:12	30.4840	1507.97	102.33
2325	1	17:26: 2	30.5480	1508.00	102.33
2327	1	17:29:53	30.6120	1507.98	102.33
2329	1	17:33:43	30.6760	1507.95	102.33
2331	1	17:37:33	30.7400	1507.95	102.33
2333	1	17:41:24	30.8040	1507.97	102.33
2335	1	17:45:14	30.8680	1507.95	102.33
2337	1	17:49: 5	30.9320	1507.92	102.32
2339	1	17:52:55	30.9960	1507.94	102.32
2341	1	17:56:45	31.0600	1507.95	102.32

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Wednesday: Mar. 13, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
		Continuing to monitor Bottom-Hole Fall-Off Press.			
2343	1	18: 0:36	31.1240	1507.92	102.32
2345	1	18: 4:26	31.1880	1507.90	102.32
2347	1	18: 8:17	31.2520	1507.92	102.32
2349	1	18:12: 7	31.3160	1507.93	102.32
2351	1	18:15:57	31.3800	1507.89	102.32
2353	1	18:19:48	31.4440	1507.89	102.32
2355	1	18:23:38	31.5080	1507.91	102.32
2357	1	18:27:29	31.5720	1507.89	102.31
2359	1	18:31:19	31.6360	1507.86	102.31
2361	1	18:35: 9	31.7000	1507.88	102.31
2363	1	18:39: 0	31.7640	1507.89	102.31
2365	1	18:42:50	31.8280	1507.84	102.31
2367	1	18:46:41	31.8920	1507.86	102.31
2369	1	18:50:31	31.9560	1507.87	102.31
2371	1	18:54:21	32.0200	1507.83	102.30
2373	1	18:58:12	32.0840	1507.84	102.30
2375	1	19: 2: 2	32.1480	1507.86	102.30
2377	1	19: 5:53	32.2120	1507.82	102.30
2379	1	19: 9:43	32.2760	1507.81	102.30
2381	1	19:13:33	32.3400	1507.84	102.30
2383	1	19:17:24	32.4040	1507.83	102.30
2385	1	19:21:14	32.4680	1507.80	102.30
2387	1	19:25: 5	32.5320	1507.80	102.30
2389	1	19:28:55	32.5960	1507.82	102.29
2391	1	19:32:45	32.6600	1507.80	102.29
2393	1	19:36:36	32.7240	1507.77	102.29
2395	1	19:40:26	32.7880	1507.78	102.29
2397	1	19:44:17	32.8520	1507.80	102.29
2399	1	19:48: 7	32.9160	1507.78	102.29
2401	1	19:51:57	32.9800	1507.75	102.29
2403	1	19:55:48	33.0440	1507.77	102.29
2405	1	19:59:38	33.1080	1507.78	102.28
2407	1	20: 3:29	33.1720	1507.75	102.28
2409	1	20: 7:19	33.2360	1507.73	102.28
2411	1	20:11: 9	33.3000	1507.75	102.28
2413	1	20:15: 0	33.3640	1507.77	102.28
2415	1	20:18:50	33.4280	1507.73	102.28
2417	1	20:22:41	33.4920	1507.71	102.28
2419	1	20:26:31	33.5560	1507.73	102.28
2421	1	20:30:21	33.6200	1507.74	102.28
2423	1	20:34:12	33.6840	1507.71	102.27
2425	1	20:38: 2	33.7480	1507.69	102.27
2427	1	20:41:53	33.8120	1507.71	102.27
2429	1	20:45:43	33.8760	1507.72	102.27
2431	1	20:49:33	33.9400	1507.69	102.27
2433	1	20:53:24	34.0040	1507.68	102.27
2435	1	20:57:14	34.0680	1507.70	102.27
2437	1	21: 1: 5	34.1320	1507.71	102.27
2439	1	21: 4:55	34.1960	1507.67	102.27

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Wednesday: Mar. 13, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2441	1	21: 8:45	34.2600	1507.66	102.26
2443	1	21:12:36	34.3240	1507.69	102.26
2445	1	21:16:26	34.3880	1507.68	102.26
2447	1	21:20:17	34.4520	1507.65	102.26
2449	1	21:24: 7	34.5160	1507.65	102.26
2451	1	21:27:57	34.5800	1507.68	102.26
2453	1	21:31:48	34.6440	1507.65	102.26
2455	1	21:35:38	34.7080	1507.62	102.25
2457	1	21:39:29	34.7720	1507.64	102.26
2459	1	21:43:19	34.8360	1507.65	102.25
2461	1	21:47: 9	34.9000	1507.62	102.25
2463	1	21:51: 0	34.9640	1507.60	102.25
2465	1	21:54:50	35.0280	1507.63	102.25
2467	1	21:58:41	35.0920	1507.62	102.25
2469	1	22: 2:31	35.1560	1507.59	102.25
2471	1	22: 6:21	35.2200	1507.62	102.25
2473	1	22:10:12	35.2840	1507.62	102.25
2475	1	22:14: 2	35.3480	1507.58	102.25
2477	1	22:17:53	35.4120	1507.58	102.24
2479	1	22:21:43	35.4760	1507.61	102.25
2481	1	22:25:33	35.5400	1507.58	102.24
2483	1	22:29:24	35.6040	1507.56	102.24
2485	1	22:33:14	35.6680	1507.58	102.24
2487	1	22:37: 5	35.7320	1507.59	102.24
2489	1	22:40:55	35.7960	1507.55	102.24
2491	1	22:44:45	35.8600	1507.54	102.24
2493	1	22:48:36	35.9240	1507.57	102.24
2495	1	22:52:26	35.9880	1507.56	102.24
2497	1	22:56:17	36.0520	1507.53	102.23
2499	1	23: 0: 7	36.1160	1507.54	102.23
2501	1	23: 3:57	36.1800	1507.56	102.23
2503	1	23: 7:48	36.2440	1507.53	102.23
2505	1	23:11:38	36.3080	1507.51	102.23
2507	1	23:15:29	36.3720	1507.53	102.23
2509	1	23:19:19	36.4360	1507.53	102.23
2511	1	23:23: 9	36.5000	1507.49	102.23
2513	1	23:27: 0	36.5640	1507.50	102.23
2515	1	23:30:50	36.6280	1507.52	102.23
2517	1	23:34:41	36.6920	1507.48	102.23
2519	1	23:38:31	36.7560	1507.49	102.23
2521	1	23:42:21	36.8200	1507.51	102.22
2523	1	23:46:12	36.8840	1507.49	102.22
2525	1	23:50: 2	36.9480	1507.46	102.22
2527	1	23:53:53	37.0120	1507.48	102.22
2529	1	23:57:43	37.0760	1507.49	102.22
[Thursday: Mar. 14, 1996]					
2531	2	0: 1:33	37.1400	1507.47	102.22
2533	2	0: 5:24	37.2040	1507.44	102.22
2535	2	0: 9:14	37.2680	1507.47	102.22
2537	2	0:13: 5	37.3320	1507.48	102.22

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

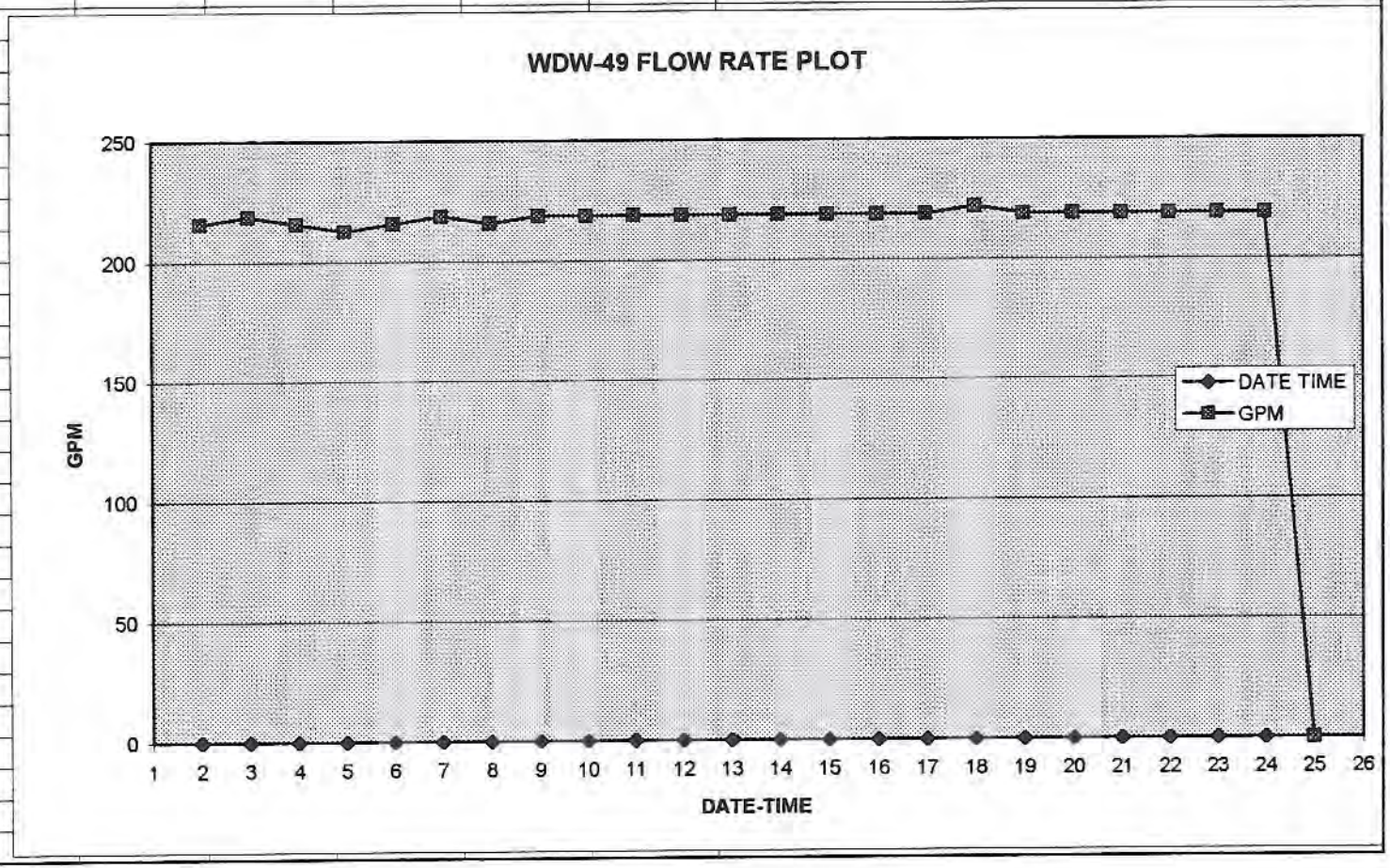
[Thursday: Mar. 14, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2539	2	0:16:55	37.3960	1507.44	102.22
2541	2	0:20:45	37.4600	1507.43	102.22
2543	2	0:24:36	37.5240	1507.46	102.21
2545	2	0:28:26	37.5880	1507.46	102.21
2547	2	0:32:17	37.6520	1507.42	102.21
2549	2	0:36: 7	37.7160	1507.42	102.21
2551	2	0:39:57	37.7800	1507.44	102.21
2553	2	0:43:48	37.8440	1507.43	102.21
2555	2	0:47:38	37.9080	1507.40	102.21
2557	2	0:51:29	37.9720	1507.41	102.21
2559	2	0:55:19	38.0360	1507.43	102.21
2561	2	0:59: 9	38.1000	1507.41	102.21
2563	2	1: 3: 0	38.1640	1507.38	102.21
2565	2	1: 6:50	38.2280	1507.40	102.20
2567	2	1:10:41	38.2920	1507.42	102.20
2569	2	1:14:31	38.3560	1507.38	102.20
2571	2	1:18:21	38.4200	1507.36	102.20
2573	2	1:22:12	38.4840	1507.39	102.20
2575	2	1:26: 2	38.5480	1507.39	102.20
2577	2	1:29:53	38.6120	1507.36	102.20
2579	2	1:33:43	38.6760	1507.35	102.20
2581	2	1:37:33	38.7400	1507.38	102.20
2583	2	1:41:24	38.8040	1507.37	102.19
2585	2	1:45:14	38.8680	1507.34	102.20
2587	2	1:49: 5	38.9320	1507.34	102.19
2589	2	1:52:55	38.9960	1507.37	102.19
2591	2	1:56:45	39.0600	1507.35	102.19
		Continuing to monitor Bottom-Hole Fall-Off Press.			
2593	2	2: 0:36	39.1240	1507.31	102.19
2595	2	2: 4:26	39.1880	1507.33	102.19
2597	2	2: 8:17	39.2520	1507.35	102.19
2599	2	2:12: 7	39.3160	1507.32	102.19
2601	2	2:15:57	39.3800	1507.30	102.19
2603	2	2:19:48	39.4440	1507.33	102.19
2605	2	2:23:38	39.5080	1507.32	102.18
2607	2	2:27:29	39.5720	1507.29	102.18
2609	2	2:31:19	39.6360	1507.31	102.18
2611	2	2:35: 9	39.7000	1507.32	102.19
2613	2	2:39: 0	39.7640	1507.28	102.19
2615	2	2:42:50	39.8280	1507.28	102.19
2617	2	2:46:41	39.8920	1507.31	102.18
2619	2	2:50:31	39.9560	1507.29	102.18
2621	2	2:54:21	40.0200	1507.26	102.18
2623	2	2:58:12	40.0840	1507.27	102.18
2625	2	3: 2: 2	40.1480	1507.29	102.18
2627	2	3: 5:53	40.2120	1507.28	102.18
2629	2	3: 9:43	40.2760	1507.25	102.18
2631	2	3:13:33	40.3400	1507.26	102.18
2633	2	3:17:24	40.4040	1507.28	102.18
2635	2	3:21:14	40.4680	1507.25	102.18

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4 [Thursday: Mar. 14, 1996]
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2637	2	3:25: 5	40.5320	1507.23	102.17
2639	2	3:28:55	40.5960	1507.25	102.17
2641	2	3:32:45	40.6600	1507.26	102.18
2643	2	3:36:36	40.7240	1507.24	102.17
2645	2	3:40:26	40.7880	1507.22	102.17
2647	2	3:44:17	40.8520	1507.25	102.17
2649	2	3:48: 7	40.9160	1507.26	102.17
2650	2	3:50: 2	40.9480	1507.24	102.17
2651	2	3:51:57	40.9800	1507.22	102.17
2652	2	3:53:53	41.0120	1507.21	102.17
2653	2	3:55:48	41.0440	1507.22	102.17
2654	2	3:57:43	41.0760	1507.23	102.17
2655	2	3:59:38	41.1080	1507.24	102.18
		End of Fall-Off Test			
		Start out of hole making Static Gradient Stops			
2656	2	4: 2:49	41.1610	1507.23	102.17
2657	2	4: 3:18	41.1690	1507.10	102.18
2658	2	4: 3:47	41.1770	1503.78	102.18
2659	2	4: 4:15	41.1850	1498.02	102.21
2660	2	4: 4:44	41.1930	1490.96	102.38
2661	2	4: 5:13	41.2010	1483.41	102.70
2662	2	4: 5:42	41.2090	1475.35	103.02
2663	2	4: 6:11	41.2170	1465.53	103.28
2664	2	4: 6:39	41.2250	1454.49	103.53
2665	2	4: 7: 8	41.2330	1442.60	103.69
2666	2	4: 7:37	41.2410	1430.57	103.81
2667	2	4: 8: 6	41.2490	1417.81	103.80
2668	2	4: 8:35	41.2570	1403.21	103.74
2669	2	4: 9: 3	41.2650	1391.38	103.68
2670	2	4: 9:32	41.2730	1378.83	103.59
2671	2	4:10: 1	41.2810	1376.73	103.57
2672	2	4:10:30	41.2890	1376.76	103.52
2673	2	4:10:59	41.2970	1376.74	103.50
2674	2	4:11:27	41.3050	1376.77	103.49
2675	2	4:11:56	41.3130	1376.80	103.48
2676	2	4:12:25	41.3210	1376.83	103.48
2677	2	4:12:54	41.3290	1376.78	103.48
2678	2	4:13:23	41.3370	1376.78	103.47
2679	2	4:13:51	41.3450	1376.80	103.47
2680	2	4:14:20	41.3530	1376.83	103.47
2681	2	4:14:49	41.3610	1376.82	103.47
2682	2	4:15:18	41.3690	1376.78	103.47
2683	2	4:15:47	41.3770	1376.80	103.47
2684	2	4:16:15	41.3850	1376.81	103.47
2685	2	4:16:44	41.3930	1376.84	103.46
2686	2	4:17:13	41.4010	1376.80	103.46
2687	2	4:17:42	41.4090	1376.78	103.46
2688	2	4:18:11	41.4170	1376.81	103.46
2689	2	4:18:39	41.4250	1376.82	103.46
2690	2	4:19: 8	41.4330	1376.83	103.46

DATE TIME	GPM
3/8/96 1800	216
3/8/96 2000	219
3/9/96 0200	216
3/9/96 0600	213
3/9/96 1000	216
3/9/96 1400	219
3/9/96 1800	216
3/9/96 2200	219
3/10/96 0200	219
3/10/96 0600	219
3/10/96 1000	219
3/10/96 1400	219
3/10/96 1800	219
3/10/96 2200	219
3/11/96 0200	219
3/11/96 0600	219
3/11/96 1000	222
3/11/96 1400	219
3/11/96 1800	219
3/11/96 2200	219
3/12/96 0200	219
3/12/96 0600	219
3/12/96 1000	219
3/12/96 1400	0



Hoechst Celanese

Interoffice Memo

Date: March 14, 1996 PLR- 0005-96

To: H. R. Horton From: P. L. Richard

Dept/Location: Maintenance Engr/BCP Dept/Location: Site Services Tech/BCP

Subject: **Analysis of #4 Well Feed Samples for Mechanical Integrity Testing**

cc: R. S. O'Neal W. E. Dentler B. G. Campbell
P. H. Richardson G. J. McCarthy
R. E. Van Wie --> L. P. Molina
H. R. Horton ---->Wes Smith - ECO Solutions, Inc.

Samples of the #4 Well Feed were collected by the Site Services Operators to support the MIT on the well. These samples were submitted to the laboratory for analysis of specific gravity and viscosity at 120°F as requested. The results are tabulated below.

Sample Date	Sample Time	Specific Gravity	Viscosity (cps)
3/8/95	6 PM	1.0017	0.523
3/9/95	6 AM	1.0018	0.561
3/9/95	10 AM	1.0018	0.533
3/9/95	6 PM	1.0018	0.559
3/10/95	2 AM	1.0018	0.532
3/10/95	10 AM	1.0018	0.558
3/10/95	6 PM	1.0018	0.522
3/11/95	10 AM	1.0018	0.551
3/11/95	6 PM	1.0018	0.519
3/12/95	6 AM	1.0018	0.558
3/12/95	10 AM	1.0018	0.524

I would like to acknowledge Luis Molina for his timely analysis of these samles as well as the samples from the previous weekend that were not used.

Paul L Richard
P. L. Richard

APPENDIX F

STATIC GRADIENT SURVEY

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49, WELL #4
Field: BAY CITY PLANT

County: MATAGORDA
State: TEXAS

Engineer: DOUG BEALL
Gauge Type: EPG-520
Serial No.: 80179
Gauge Range: 0 - 2,500 PSI
Gauge Depth: 3300 ft

Date: 03/14/1996

Well Type: INJECTION
Test Type: GRADIENT SURVEY
Well Status: SHUT-IN

Tubing: 5-1/2" TO 3316'
Tubing: TO
Casing: 7-5/8" TO 3,308'
Perfs.: 3,371.5' - 3,579'
Perfs.: (GRAVEL PACK SCREEN)
Elevation: 12
Shut-in Time 39 hrs

Packer Depth 3316 ft
PBTD 3440 ft
Oil Level
H2O Level 0 ft

Zero: KB

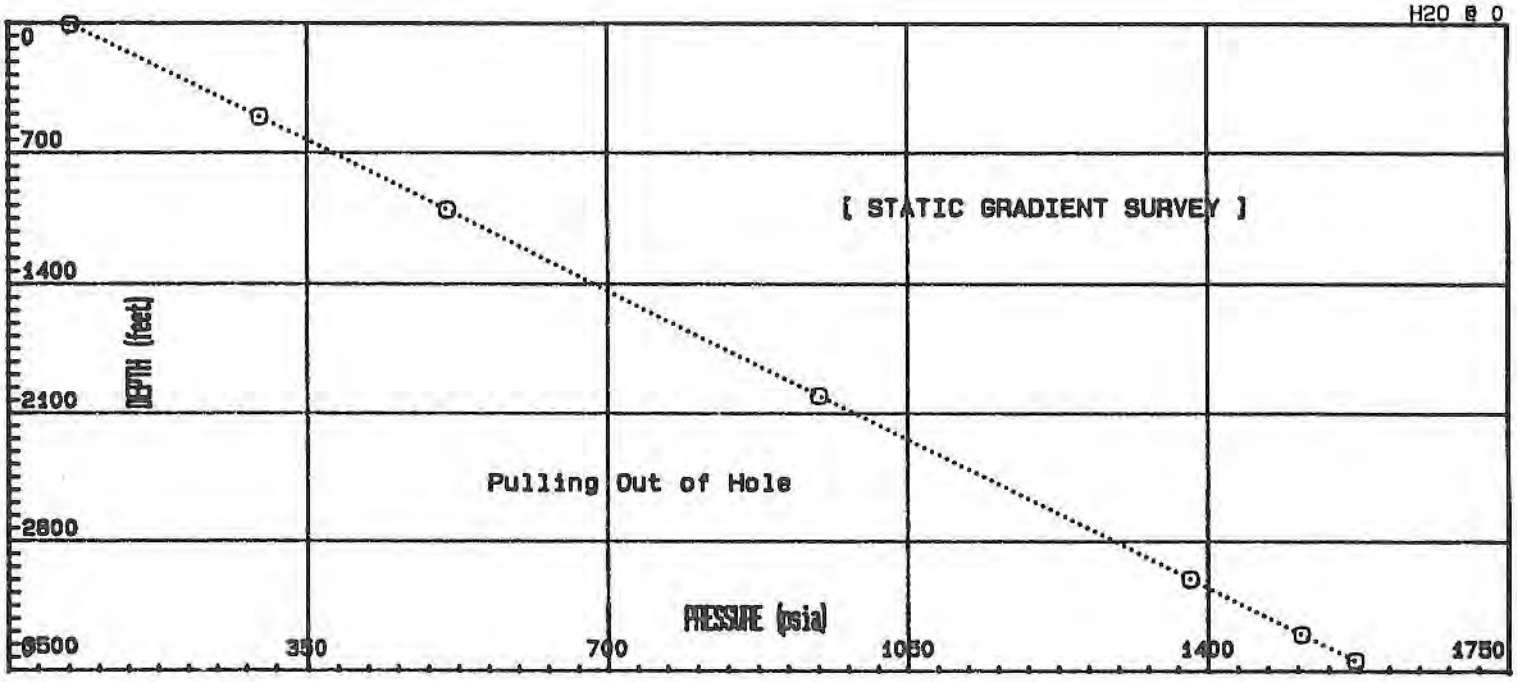
Shut-in BHP	1507	@	3300 ft	Shut-in BHT	102 F	@	3300 ft		
Flowing BHP	1892	@	3300 ft	Flowing BHT	106 F	@	3300 ft		
Shut-in WHP	70			Shut-in WHT	70 F				
Flowing WHP	477			Flowing WHT	83 F			Casing	306

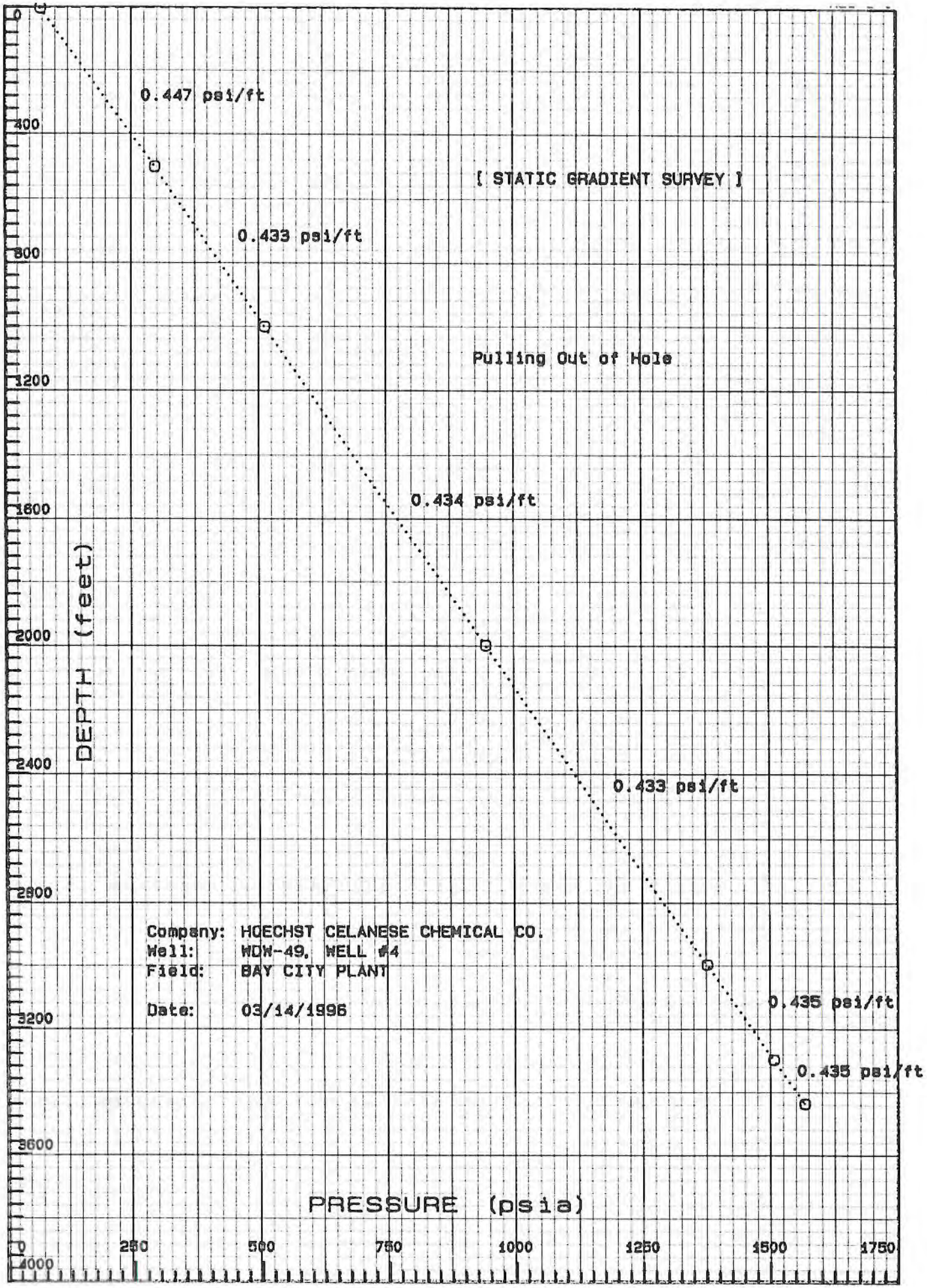
[GRADIENT DATA]

#	MD	TVD	PRESSURE	PSI/ft
1	0	0	69.99	
2	500	500	293.30	0.447
3	1000	1000	509.98	0.433
4	2000	2000	943.62	0.434
5	3000	3000	1376.83	0.433
6	3300	3300	1507.23	0.435
7	3440	3440	1568.08	0.435

MILTON M. COOKE CO.
2310 McAllister St.
Houston, Tx. 77092
Ph. 713-683-0333

Tagged fill @ 3,408.5 feet
Pressure extrapolated to 3,440' (KB)




0.447 psi/ft
[STATIC GRADIENT SURVEY]
0.433 psi/ft
Pulling Out of Hole
0.434 psi/ft
0.433 psi/ft
0.435 psi/ft
0.435 psi/ft
Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49, WELL #4
Field: BAY CITY PLANT
Date: 03/14/1996
DEPTH (feet)
0
400
800
1200
1600
2000
2400
2800
3200
3600
4000
PRESSURE (psia)
0
250
500
750
1000
1250
1500
1750

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Thursday: Mar. 14, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2637	2	3:25: 5	40.5320	1507.23	102.17
2639	2	3:28:55	40.5960	1507.25	102.17
2641	2	3:32:45	40.6600	1507.26	102.18
2643	2	3:36:36	40.7240	1507.24	102.17
2645	2	3:40:26	40.7880	1507.22	102.17
2647	2	3:44:17	40.8520	1507.25	102.17
2649	2	3:48: 7	40.9160	1507.26	102.17
2650	2	3:50: 2	40.9480	1507.24	102.17
2651	2	3:51:57	40.9800	1507.22	102.17
2652	2	3:53:53	41.0120	1507.21	102.17
2653	2	3:55:48	41.0440	1507.22	102.17
2654	2	3:57:43	41.0760	1507.23	102.17
2655	2	3:59:38	41.1080	1507.24	102.18
		End of Fall-Off Test			
		Start out of hole making Static Gradient Stops			
2656	2	4: 2:49	41.1610	1507.23	102.17
2657	2	4: 3:18	41.1690	1507.10	102.18
2658	2	4: 3:47	41.1770	1503.78	102.18
2659	2	4: 4:15	41.1850	1498.02	102.21
2660	2	4: 4:44	41.1930	1490.96	102.38
2661	2	4: 5:13	41.2010	1483.41	102.70
2662	2	4: 5:42	41.2090	1475.35	103.02
2663	2	4: 6:11	41.2170	1465.53	103.28
2664	2	4: 6:39	41.2250	1454.49	103.53
2665	2	4: 7: 8	41.2330	1442.60	103.69
2666	2	4: 7:37	41.2410	1430.57	103.81
2667	2	4: 8: 6	41.2490	1417.81	103.80
2668	2	4: 8:35	41.2570	1403.21	103.74
2669	2	4: 9: 3	41.2650	1391.38	103.68
2670	2	4: 9:32	41.2730	1378.83	103.59
2671	2	4:10: 1	41.2810	1376.73	103.57
2672	2	4:10:30	41.2890	1376.76	103.52
2673	2	4:10:59	41.2970	1376.74	103.50
2674	2	4:11:27	41.3050	1376.77	103.49
2675	2	4:11:56	41.3130	1376.80	103.48
2676	2	4:12:25	41.3210	1376.83	103.48
2677	2	4:12:54	41.3290	1376.78	103.48
2678	2	4:13:23	41.3370	1376.78	103.47
2679	2	4:13:51	41.3450	1376.80	103.47
2680	2	4:14:20	41.3530	1376.83	103.47
2681	2	4:14:49	41.3610	1376.82	103.47
2682	2	4:15:18	41.3690	1376.78	103.47
2683	2	4:15:47	41.3770	1376.80	103.47
2684	2	4:16:15	41.3850	1376.81	103.47
2685	2	4:16:44	41.3930	1376.84	103.46
2686	2	4:17:13	41.4010	1376.80	103.46
2687	2	4:17:42	41.4090	1376.78	103.46
2688	2	4:18:11	41.4170	1376.81	103.46
2689	2	4:18:39	41.4250	1376.82	103.46
2690	2	4:19: 8	41.4330	1376.83	103.46

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Thursday: Mar. 14, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2691	2	4:19:37	41.4410	1376.78	103.45
2692	2	4:20: 6	41.4490	1376.79	103.45
2693	2	4:20:35	41.4570	1376.81	103.46
2694	2	4:21: 3	41.4650	1376.83	103.46
2695	2	4:21:32	41.4730	1376.81	103.46
2696	2	4:22: 1	41.4810	1376.78	103.46
2697	2	4:22:30	41.4890	1376.80	103.46
2698	2	4:22:59	41.4970	1376.82	103.46
		Depart 3,000 ft.			
2699	2	4:23:27	41.5050	1376.83	103.46
2700	2	4:23:56	41.5130	1365.98	103.46
2701	2	4:24:25	41.5210	1346.97	103.32
2702	2	4:24:54	41.5290	1327.18	103.11
2703	2	4:25:23	41.5370	1307.16	102.92
2704	2	4:25:51	41.5450	1287.23	102.73
2705	2	4:26:20	41.5530	1266.76	102.50
2706	2	4:26:49	41.5610	1246.48	102.15
2707	2	4:27:18	41.5690	1225.81	101.91
2708	2	4:27:47	41.5770	1205.00	101.69
2709	2	4:28:15	41.5850	1184.43	101.47
2710	2	4:28:44	41.5930	1163.41	101.21
2711	2	4:29:13	41.6010	1142.65	100.97
2712	2	4:29:42	41.6090	1121.42	100.69
2713	2	4:30:11	41.6170	1100.02	100.41
2714	2	4:30:39	41.6250	1078.88	100.14
2715	2	4:31: 8	41.6330	1057.23	99.88
2716	2	4:31:37	41.6410	1035.68	99.65
2717	2	4:32: 6	41.6490	1013.71	99.44
2718	2	4:32:35	41.6570	989.18	99.17
2719	2	4:33: 3	41.6650	970.77	98.96
2720	2	4:33:32	41.6730	950.93	98.73
2721	2	4:34: 1	41.6810	943.37	98.51
2722	2	4:34:30	41.6890	943.49	98.33
2723	2	4:34:59	41.6970	943.50	98.25
2724	2	4:35:27	41.7050	943.52	98.21
2725	2	4:35:56	41.7130	943.56	98.17
2726	2	4:36:25	41.7210	943.59	98.15
2727	2	4:36:54	41.7290	943.58	98.14
2728	2	4:37:23	41.7370	943.55	98.13
2729	2	4:37:51	41.7450	943.57	98.12
2730	2	4:38:20	41.7530	943.59	98.12
2731	2	4:38:49	41.7610	943.61	98.11
2732	2	4:39:18	41.7690	943.58	98.10
2733	2	4:39:47	41.7770	943.56	98.09
2734	2	4:40:15	41.7850	943.59	98.08
2735	2	4:40:44	41.7930	943.61	98.08
2736	2	4:41:13	41.8010	943.61	98.07
2737	2	4:41:42	41.8090	943.58	98.07
2738	2	4:42:11	41.8170	943.57	98.06
2739	2	4:42:39	41.8250	943.61	98.06

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Thursday: Mar. 14, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2740	2	4:43: 8	41.8330	943.62	98.05
2741	2	4:43:37	41.8410	943.60	98.05
2742	2	4:44: 6	41.8490	943.57	98.04
2743	2	4:44:35	41.8570	943.59	98.04
2744	2	4:45: 3	41.8650	943.63	98.04
		Depart 2,000 ft.			
2745	2	4:45:32	41.8730	943.62	98.03
2746	2	4:46: 1	41.8810	943.58	98.03
2747	2	4:46:30	41.8890	936.96	98.03
2748	2	4:46:59	41.8970	923.47	97.98
2749	2	4:47:27	41.9050	905.54	97.82
2750	2	4:47:56	41.9130	886.73	97.52
2751	2	4:48:25	41.9210	868.14	97.29
2752	2	4:48:54	41.9290	848.89	97.05
2753	2	4:49:23	41.9370	829.37	96.79
2754	2	4:49:51	41.9450	809.92	96.61
2755	2	4:50:20	41.9530	789.85	96.49
2756	2	4:50:49	41.9610	769.96	96.35
2757	2	4:51:18	41.9690	749.62	96.29
2758	2	4:51:47	41.9770	728.84	95.97
2759	2	4:52:15	41.9850	708.30	95.69
2760	2	4:52:44	41.9930	687.32	95.46
2761	2	4:53:13	42.0010	666.66	95.18
2762	2	4:53:42	42.0090	645.55	95.03
2763	2	4:54:11	42.0170	624.38	94.81
2764	2	4:54:39	42.0250	603.42	94.76
2765	2	4:55: 8	42.0330	581.91	94.63
2766	2	4:55:37	42.0410	560.78	94.42
2767	2	4:56: 6	42.0490	539.21	94.16
2768	2	4:56:35	42.0570	516.98	94.03
2769	2	4:57: 3	42.0650	509.74	93.66
2770	2	4:57:32	42.0730	509.84	93.57
2771	2	4:58: 1	42.0810	509.92	93.56
2772	2	4:58:30	42.0890	509.95	93.56
2773	2	4:58:59	42.0970	509.95	93.56
2774	2	4:59:27	42.1050	509.92	93.56
2775	2	4:59:56	42.1130	509.95	93.56
2776	2	5: 0:25	42.1210	509.98	93.56
2777	2	5: 0:54	42.1290	509.99	93.56
2778	2	5: 1:23	42.1370	509.95	93.57
2779	2	5: 1:51	42.1450	509.94	93.57
2780	2	5: 2:20	42.1530	509.98	93.56
2781	2	5: 2:49	42.1610	509.99	93.56
2782	2	5: 3:18	42.1690	509.98	93.56
2783	2	5: 3:47	42.1770	509.94	93.56
2784	2	5: 4:15	42.1850	509.96	93.56
2785	2	5: 4:44	42.1930	509.98	93.55
2786	2	5: 5:13	42.2010	510.00	93.55
2787	2	5: 5:42	42.2090	509.97	93.55
2788	2	5: 6:11	42.2170	509.94	93.55

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Thursday: Mar. 14, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2789	2	5: 6:39	42.2250	509.97	93.55
2790	2	5: 7: 8	42.2330	509.99	93.55
2791	2	5: 7:37	42.2410	509.99	93.55
2792	2	5: 8: 6	42.2490	509.95	93.55
2793	2	5: 8:35	42.2570	509.94	93.54
2794	2	5: 9: 3	42.2650	509.98	93.54
2795	2	5: 9:32	42.2730	509.99	93.55
2796	2	5:10: 1	42.2810	509.97	93.54
2797	2	5:10:30	42.2890	509.94	93.54
2798	2	5:10:59	42.2970	509.96	93.54
2799	2	5:11:27	42.3050	509.99	93.54
		Depart 1,000 ft.			
2800	2	5:11:56	42.3130	509.98	93.54
2801	2	5:12:25	42.3210	509.80	93.54
2802	2	5:12:54	42.3290	494.45	93.53
2803	2	5:13:23	42.3370	475.30	93.40
2804	2	5:13:51	42.3450	455.60	93.15
2805	2	5:14:20	42.3530	434.99	93.31
2806	2	5:14:49	42.3610	413.98	92.93
2807	2	5:15:18	42.3690	392.67	92.41
2808	2	5:15:47	42.3770	371.32	92.30
2809	2	5:16:15	42.3850	350.01	92.16
2810	2	5:16:44	42.3930	328.46	91.68
2811	2	5:17:13	42.4010	307.19	91.90
2812	2	5:17:42	42.4090	293.82	91.91
2813	2	5:18:11	42.4170	293.20	91.68
2814	2	5:18:39	42.4250	293.25	91.56
2815	2	5:19: 8	42.4330	293.24	91.50
2816	2	5:19:37	42.4410	293.27	91.48
2817	2	5:20: 6	42.4490	293.30	91.46
2818	2	5:20:35	42.4570	293.31	91.45
2819	2	5:21: 3	42.4650	293.30	91.43
2820	2	5:21:32	42.4730	293.27	91.42
2821	2	5:22: 1	42.4810	293.31	91.42
2822	2	5:22:30	42.4890	293.33	91.41
2823	2	5:22:59	42.4970	293.33	91.40
2824	2	5:23:27	42.5050	293.30	91.40
2825	2	5:23:56	42.5130	293.29	91.39
2826	2	5:24:25	42.5210	293.33	91.38
2827	2	5:24:54	42.5290	293.34	91.38
2828	2	5:25:23	42.5370	293.32	91.36
2829	2	5:25:51	42.5450	293.30	91.36
2830	2	5:26:20	42.5530	293.31	91.36
2831	2	5:26:49	42.5610	293.35	91.35
2832	2	5:27:18	42.5690	293.34	91.35
2833	2	5:27:47	42.5770	293.31	91.34
2834	2	5:28:15	42.5850	293.30	91.34
2835	2	5:28:44	42.5930	293.33	91.34
2836	2	5:29:13	42.6010	293.35	91.34
2837	2	5:29:42	42.6090	293.33	91.34

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Thursday: Mar. 14, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2838	2	5:30:11	42.6170	293.31	91.33
		Depart 500 ft.			
2839	2	5:30:39	42.6250	293.30	91.33
2840	2	5:31: 8	42.6330	291.90	91.32
2841	2	5:31:37	42.6410	282.12	91.30
2842	2	5:32: 6	42.6490	263.84	91.10
2843	2	5:32:35	42.6570	240.58	90.63
2844	2	5:33: 3	42.6650	222.56	91.08
2845	2	5:33:32	42.6730	201.13	90.87
2846	2	5:34: 1	42.6810	179.82	90.86
2847	2	5:34:30	42.6890	158.47	90.58
2848	2	5:34:59	42.6970	142.29	89.86
2849	2	5:35:27	42.7050	125.33	89.44
2850	2	5:35:56	42.7130	108.12	89.23
2851	2	5:36:25	42.7210	95.64	89.00
2852	2	5:36:54	42.7290	84.90	87.82
2853	2	5:37:23	42.7370	76.74	85.12
2854	2	5:37:51	42.7450	71.24	80.08
2855	2	5:38:20	42.7530	68.13	75.94
		Arrived @ Surface			
2856	2	5:38:49	42.7610	67.94	74.11
2857	2	5:39:18	42.7690	68.46	73.90
2858	2	5:39:47	42.7770	68.94	73.71
2859	2	5:40:15	42.7850	69.22	73.50
2860	2	5:40:44	42.7930	69.36	73.29
2861	2	5:41:13	42.8010	69.47	73.08
2862	2	5:41:42	42.8090	69.55	72.88
2863	2	5:42:11	42.8170	69.65	72.70
2864	2	5:42:39	42.8250	69.70	72.53
2865	2	5:43: 8	42.8330	69.71	72.38
2866	2	5:43:37	42.8410	69.71	72.23
2867	2	5:44: 6	42.8490	69.75	72.10
2868	2	5:44:35	42.8570	69.81	71.97
2869	2	5:45: 3	42.8650	69.81	71.86
2870	2	5:45:32	42.8730	69.80	71.76
2871	2	5:46: 1	42.8810	69.79	71.65
2872	2	5:46:30	42.8890	69.85	71.56
2873	2	5:46:59	42.8970	69.87	71.47
2874	2	5:47:27	42.9050	69.86	71.38
2875	2	5:47:56	42.9130	69.86	71.30
2876	2	5:48:25	42.9210	69.85	71.22
2877	2	5:48:54	42.9290	69.93	71.15
2878	2	5:49:23	42.9370	69.93	71.08
2879	2	5:49:51	42.9450	69.91	71.01
2880	2	5:50:20	42.9530	69.91	70.94
2881	2	5:50:49	42.9610	69.95	70.87
2882	2	5:51:18	42.9690	69.98	70.82
2883	2	5:51:47	42.9770	69.96	70.75
2884	2	5:52:15	42.9850	69.95	70.69
2885	2	5:52:44	42.9930	69.94	70.64

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-49 WELL #4
Field: BAY CITY PLANT

[Thursday: Mar. 14, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
2886	2	5:53:13	43.0010	69.99	70.58
2887	2	5:53:42	43.0090	69.99	70.53
2888	2	5:54:11	43.0170	69.97	70.47
2889	2	5:54:39	43.0250	69.96	70.42
2890	2	5:55: 8	43.0330	69.97	70.38
2891	2	5:55:37	43.0410	70.13	70.33
2892	2	5:56: 6	43.0490	69.94	70.28
		Shut-In Crown Valve.			
2893	2	5:56:35	43.0570	69.99	70.25
2894	2	5:57: 3	43.0650	81.89	70.21
2895	2	5:57:32	43.0730	106.53	70.18
2896	2	5:58: 1	43.0810	134.54	70.15
2897	2	5:58:30	43.0890	164.61	70.11
2898	2	5:58:59	43.0970	175.27	70.08
2899	2	5:59:27	43.1050	179.48	70.04
2900	2	5:59:56	43.1130	179.39	70.01
2901	2	6: 0:25	43.1210	178.25	69.97
2902	2	6: 0:54	43.1290	176.81	69.93
2903	2	6: 1:23	43.1370	115.25	69.89
		Bleed-Off Lubricator			
2904	2	6: 1:51	43.1450	3.34	69.83
		Shut-Down Data Acquisition System.			
2905	2	6: 2:20	43.1530	3.40	69.77

APPENDIX G

CORRESPONDENCE

Hoechst Celanese

Chemical Group
Hoechst Celanese Corporation
Bay City Plant
PO Box 509
Highway 3057
Bay City, TX 77404-0509

November 28, 1995
IOC-079-95

FEDERAL EXPRESS MAIL

Mr. Ben Knape, Head
Underground Injection Control Unit
Texas Natural Resource Conservation Commission
P. O. Box 13087
12100 Park 35 Circle (78753)
Austin, Texas 78711-3087

Subject: PROPOSED MECHANICAL INTEGRITY TESTING (MIT) WDW-49 (PLANT WELL NO. 4) AND WDW-110 (PLANT WELL NO. 1A) HOECHST CELANESE CHEMICAL GROUP, INC. BAY CITY PLANT, BAY CITY, TEXAS

Dear Mr. Knape:

Enclosed herewith are the following documents: (1) Addendum I - Proposed Procedure To Demonstrate Mechanical Integrity For WDW-49 and (2) Addendum II - Proposed Procedure To Demonstrate Mechanical Integrity For WDW-110. These documents, which outline proposed procedures for demonstrating mechanical integrity of the two wells, are provided for your review and approval at your earliest convenience.

The tentative schedule for performing the above MITs is as follows:

INJECTION WELL	DATE
WDW-110	JANUARY 25, 1996
WDW-49	MARCH 7, 1996

Your consideration of our request to expedite review and approval of these proposed MIT procedures is appreciated.

Please contact me or Mr. H. R. Horton by telephone at 409/241-4197 or 409/241-4076 respectively if you have questions.

Very truly yours,

I. O. Coleman, Jr.
Staff Environmental Chemist

IOC/cjs
attachment

cc: Mr. Charles J. Green, Geologist
Underground Injection Control Team
Texas Natural Resource Conservation Commission
P. O. Box 13087
12100 Park 35 Circle
Austin, Texas 78711-3087

bcc: C. J. Griffith
W. E. Dentler
R. J. Johnston
R. S. O'Neal
H. R. Horton
B. S. Barrington
G. J. McCarthy
A. Conley-Pitchell - Bridgewater
Environmental File No. 202.4, 202.5 and 203.13

Mr. Wesley W. Smith - w/o attached MIT procedures
ECO Solutions
9800 Richmond Avenue
Suite 320
Houston, Texas 77042

Interoffice Memo

Hoechst Celanese

Date: January 4, 1996

IOC-002-96

To: As Listed*

From: I. O. Coleman, Jr.

Dept/Location: Bay City Plant

Dept/Location: EHSA/Bay City Plant

Subject: TEXAS NATURAL RESOURCE CONSERVATION COMMISSION (TNRCC) APPROVAL OF PROPOSED MECHANICAL INTERGITY TESTING (MIT) AND FALL OFF TEST PROCEDURES FOR BAY CITY PLANT WASTE DISPOSAL WELLS, WDW-49 (No. 4 WELL) AND WDW-110 (No. 1A WELL)

*C. R. Pennington
W. G. Cornman
B. L. Fritz
J. V. Anderson
B. R. Hightower
W. E. Dentler
C. J. Griffith
R. S. O'Neal
G. J. McCarthy
B. S. Barrington
H. R. Horton
R. J. Johnston
P. H. Richardson
R. E. Tower
M. D. Garcia
A. Conley-Pitchell - Bridgewater
Environmental File No. 203.13
Tom Jones, ECO Solutions, Inc. - Houston
Bob Hall, ECO Solutions, Inc. - Houston

The attached letter from Jim Boswell, TNRCC, which was received January 4, 1996, documents TNRCC approval of of the subject proposed procedures and is provided for your information.

Per reference letter IOC- 079-95, dated November 28, 1995, the schedule for conducting the MITs and Fall Off Tests is as follows: January 25, 1996 for WDW-110 (No. 1A Well) and March 7, 1996 for WDW-49 (No. 4 Well).

Please contact me if you have questions.

I. O. Coleman, Jr.

IOC/cjs
attachment

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

I.D.C.

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

Mr. I. O. Coleman, Jr.
Hoechst Celanese, Chemical Group
Bay City Plant
P. O. Box 509
Highway 3057
Bay City, TX 77404-0509

RE: Approval of Proposed Mechanical Integrity Testing and Fall Off Test Procedure, TNRCC Permits No. WDW-49 and WDW-110

Dear Mr. Coleman:

The staff has reviewed the proposed procedures dated November 28, 1995 for mechanical integrity testing including fall-off tests, an annulus pressure test, and a RAT survey, for the above referenced wells scheduled to begin January 25, 1995, for WDW-110 and March 7, 1995, for WDW-49 and finds it to be satisfactory.

Pursuant to 30 TAC §331.65(b)(4), within 30 days of completion of the tests, please submit a report to the executive director containing the results of the mechanical integrity testing.

A representative of the Commission does not intend to witness the MITs. Your report will serve as the evidence for confirming the integrity of the well. Should your plans change, please contact Jim Boswell at 512/239-6196, Mail Code MC-131.

Sincerely,

Jim L. Boswell

Jim L. Boswell, Permit Coordinator
Underground Injection Control
UIC, Uranium, & Radioactive Waste Section
Industrial & Hazardous Waste Division

JLB/jlb/jm

cc: Brian Graves, EPA Region 6, Dallas\

November 22, 1995

SOLUTIONS, INC.

Mr. Ray Horton
Hoechst Celanese Chemical Group, Inc.
Post Office Box 509
Bay City, Texas 77404-0509

RE: Proposed Mechanical Integrity Testing, Hoechst Celanese Chemical Group, Inc., Class I Injection Wellls, WDW-49 and WDW-110, Bay City Facility

Dear Mr. Horton:

As requested, attached are two copies of ECO Solutions, Inc.'s (ECO) proposed procedures to perform the 1996 annual mechanical integrity testing (MIT) on Hoechst Celanese Chemical Group, Inc.'s (HCCG) WDW-49 (Well No. 4) and WDW-110 (Well No. 1-A) at the Bay City Facility. The previous MITs were conducted on WDW-110 on January 28, 1995 and WDW-49 on March 9, 1995. ECO recommends that the MITs be scheduled for January 25, 1996 and March 7, 1996, respectively. The MIT to be performed on WDW-110 is imminent and a copy of the attached MIT procedure should be submitted to the Texas Natural Resources Conservation Commission for their review and approval soon.

Please note that following the MIT procedure on WDW-49, I presented the option of either returning the well to injection service, or brining-in prior to plugging and abandonment. As on WDW-32, if brining-in is the selected option, you may wish to make this cost item a separate project. If you have any questions regarding the MITs, please contact me at our Houston office at (713)780-1955 or via FAX at (713)780-0870.

Sincerely,

ECO Solutions, Inc.

Wesley W. Smith

Wesley W. Smith, P.E.
Vice President, UIC

cc: I.O. Coleman (HCCG)
Brian Berrington (HCCG)
Thomas Jones (ECO)
Bob Hall (ECO)

9800 Richmond Avenue - Suite 320 - Houston, Texas 77042 - Phone (713) 780-1955 - FAX (713) 780-0870

HOECHST CELANESE CHEMICAL GROUP, INC.
BAY CITY FACILITY

PROPOSED PROCEDURE TO DEMONSTRATE MECHANICAL INTEGRITY FOR WDW-49 (WELL #4)

The following step-by-step proposed procedures were developed in accordance with the Underground Injection Control (UIC) and the Hazardous Waste Disposal Injection Restrictions (HWDIR) Programs as issued by the United States Environmental Protection Agency (US EPA) and promulgated by the Texas Natural Resource Conservation Commission (TNRCC).

Except where noted, all steps of this procedure will be performed by ECO's personnel.

1) Request and secure approval from the TNRCC to demonstrate mechanical integrity testing (MIT). (ECO/HCCG)

* Define annulus pressure test and downhole logging procedures.

* Draft a letter including MIT procedures for review and approval by HCCG's personnel which will provide formal notification to the TNRCC of the intent and scope to demonstrate MIT.

* Modify these procedures as per HCCG's comments and submit to the TNRCC for review and approval.

2) Prepare well for MIT. (HCCG)

* Check wellhead valves to insure that special fittings can be easily installed during the MIT. ECO requests that 2" NPT connections be available on the tubing outlets.

* Since wireline services will be run while injecting into the well, a full opening valve (minimum 2" inside diameter) will be required on top the wellhead above the inlet effluent flowline.

* HCCG's personnel will maintain proper annulus pressure while conducting the RAT survey. HCCG will provide historical petition data on WDW-49 for ECO's personnel for use in the report preparation.

3) **Perform bottom hole pressure fall-off and static bottom hole pressure (BHP) survey. (ECO/HCCG)**

* HCCG is to inject non-hazardous effluent into Well #4 at a stable high rate for a minimum of four days prior to performing the falloff test. HCCG will furnish non-hazardous fluid. All other injection wells should be operated at a constant flowrate, or shut-in for a period extending from one (1) day prior to the start of the falloff testing to the end of the 48-hour shut-in period.

* Move in and rig up wireline unit to run bottom hole pressure falloff test with surface readout Panex bottom hole pressure gauges.

* Go in the hole with bottom hole pressure gauges to packer depth, or to the depth previously performed BHP surveys have been conducted.

* Maintain constant injection rates prior to shutting well in. Secure a representative sample of the effluent pumped into WDW-49.

* Shut-in well. Leave well shut-in for ±48 hours, or until tubing pressure stabilizes, to obtain pressure decay data. Data obtained at the end of this test will provide static BHP.

4) **Perform annulus/tubing differential pressure test (APT). (HCCG/ECO)**

* Rig up digital pressure transducer units and install onto the annulus and tubing outlet.

* HCCG's personnel will adjust annulus pressure to 1000 psi higher pressure above the tubing pressure.

* Monitor annulus/tubing pressures for a minimum period of 30 minutes. Maximum allowable differential pressure change during the APT is 5% of the maximum differential test pressures.

* Rig down transducer pressure units.

5) **Run radioactive tracer survey. (ECO)**

* Establish ±40 gpm injection rates utilizing HCCG's injection pump and non-hazardous effluent.

* Rig up gamma ray (G/R) detector, casing collar locator (CCL) and radioactive tracer ejector tool. Ejector contains ±10 millicuries of Iodine "131" radioactive solution.

* Continue pumping effluent into the well at a rate of ±50 gpm.

* Run G/R base log from PBTD (tag bottom) to ±300' above the packer (@ 3,316'), or up to ±3,000'. Make short repeat G/R run to prove tool repeatability.

* Run one (1) five-minute statistical log at a depth of 3,296'.

* Release first radioactive (R/A) slug inside tubing ±300' above the packer while pumping effluent down the tubing at an injection rate of ±50 gpm. Make multiple recorded passes following the R/A slug (1) down the tubing, (2) into the borehole and (3) into the disposal zone until the R/A slug virtually disappears and cannot be distinguished from the normal background G/R radioactivity. Repeat multiple pass survey.

* Release second R/A slug from tool at ±20' above top perforation, or at ±3,296' and hold tool stationary. Place recorder on time-drive sequence. Logging time will be predetermined based on actual injection rate as agreed upon by the TNRCC inspector.

* Repeat stationary sequence test above.

* Run final base G/R from PBTD to +/-300' above the packer (same interval as original base G/R log) to verify that all R/A materials have been flushed into the disposal zone and that no fluid is migrating up behind the casing string.

* Pull out of the hole and rig down wireline.

6) MIT field work is completed on Well #4. (ECO)

* Rig down all rental equipment and move off the location.

* Advise TNRCC of test results.

* If Well #4 has successfully passed all MIT tests, then return the well to injection service, or brine in using 10 pound/gallon brine.

7) Submit MIT report. (ECO/HCCG)

* Prepare a draft copy of the MIT report detailing the demonstration of MIT on Well #4.

7) Submit MIT report. (ECO/HCCG)

* Prepare a draft copy of the MIT report detailing the demonstration of MIT on Well #4.
* Submit draft report to HCCG for comments and approval.
* Modify the MIT report as per HCCG's comments and submit copies of final MIT report to HCCG. HCCG personnel will transmit final MIT report to the TNRCC.
* Receive TNRCC's acceptance letter pertaining to the MIT report.

8) Mechanical Integrity Testing Complete.

WDW-49 EFFLUENT WELL
FALL OFF TESTING
SCHEDULE

March 8		6:00 p.m.	Flow rate to #4 Well should be held constant (unchanging) at 220 gpm until shut in on Tuesday, March 12.
			Record flow rate every 4 hours.
			Take samples (one every 8 hours) of effluent to #4 Well during this period and check viscosity and specify gravity (at 120°F).
			Shut in Well #1A.
March 9			Maintain constant (unchanging) flow to #4 Well taking samples every 8 hours.
March 10			Same
March 11			Same
March 12		7:30 a.m.	Maintain constant flow to #4 Well taking samples every 8 hours.
			Move in and rig up logging unit on #4 Well. Run surface readout bottom hole pressure gauge into well.
			Monitor bottom hole pressure fall off with surface readout bottom hole pressure gauges.
			Shut in #4 Well.
March 13		7:30 a.m.	Monitor bottom hole pressure fall off with surface readout bottom hole pressure gauges.
March 14		7:30 a.m.	If bottom hole pressure has stabilized, pull out of the hole with bottom hole pressure tools making gradient stops at 500' intervals. **Keep #4 Well shut in.** Well will be filled with 10 lb/gal brine.
		10:00 a.m.	Complete Fall Off Test of #4 Well and put #1A well back in service.

APPENDIX H

FALLOFF DATA DISKETTE

SOLUTIONS, INC.

Final Report

Hoechst Celanese Chemical Group, Ltd.
Bay City, Texas
MIT/Fall-off Report
Injection Well WDW-110 (Well No. 1A)

FEB 2 6
6 W-SU

ECO Solutions, Inc.
9800 Richmond Avenue
Suite 320
Houston, Texas 77042
(713) 780-1955
FAX (713) 780-0870

ECO SOLUTIONS, INC.

Hoechst Celanese Chemical Group, Ltd.
Bay City Plant
Bottom Hole Pressure Falloff and
Mechanical Integrity Testing
For WDW-110 (Well No. 1-A)

ECO Solutions, Inc
9800 Richmond
Suite 320
Houston, Texas 77042
(713) 780-1955

January 1996

ECO Job No. 95045

RECEIVED
FEB 26
6 W-SU

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FEB 26
6 W-SU

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Feb 26
6 W-3U

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.1 INTRODUCTION

Hoechst Celanese Chemical Group, Ltd. (HCCG) contracted ECO Solutions, Inc. (ECO) to perform the annual mechanical integrity testing on their Class I nonhazardous injection well, WDW-110 (Well No. 1-A), located at their Bay City facility. A schematic drawing of WDW-110 is included as Figure 1. The attached report details the data and test results associated with the mechanical integrity testing.

The following provides an overview of the key elements of the testing on WDW-110 (Well No. 1-A).

- An Annulus Pressure Test (APT) was conducted to satisfy the annual mechanical integrity test (MIT) requirements of the Texas Natural Resource Conservation Commission's (TNRCC), Underground Injection Control (UIC) Program.
- A Radioactive Tracer (RAT) survey was conducted to satisfy the annual MIT requirements of the TNRCC.
- Bottom Hole Pressure (BHP) Falloff testing was conducted to satisfy the annual ambient monitoring requirements of the U.S. Environmental Protection Agency (EPA) and the TNRCC

HCCG personnel contacted the TNRCC personnel to inform them of the MIT schedule on WDW-110 and whether a field inspector would be present. TNRCC personnel informed HCCG that no field inspector would be present for this particular MIT.

The APT on WDW-110 (Well No.1-A) was conducted on Thursday, January 25, 1996, and was witnessed by Mr. Wesley Smith of ECO and Mr. Ray Horton of HCCG. The RAT was conducted on Thursday, January 25, 1996, and was witnessed by Mr. Wesley Smith of ECO and Mr. Ray Horton of HCCG.

The BHP/falloff test was conducted on Tuesday, January 23, 1996 through Thursday, January 25, 1996 and was witnessed by Mr. Wes Smith of ECO and Mr. Ray Horton of HCCG.

1.2 EXECUTIVE SUMMARY

Based on the successful results of the MIT conducted on January 25, 1996 on WDW-110, HCCG returned WDW-110 to injection service. A summary of the results of the MIT and BHP/Falloff surveys are as follows:

Radioactive Tracer Survey

The analysis of the RAT survey performed on January 25, 1996 demonstrated external mechanical integrity since no upward fluid movement from the injection interval adjacent to the long string casing is occurring. Additionally, this determination can be made as a result of (1) the favorable comparison of the before and after base gamma ray surveys, (2) the two multiple pass tracer surveys and the two stationary surveys conducted 20' above the perforated interval. All surveys showed no evidence of upward fluid movement. This interpretation was supported by an independent evaluation letter provided by Atlas Wireline Services (Atlas) and is included in Appendix A together with the RAT log.

Annulus Pressure Test

A demonstration of internal mechanical integrity was supported by an APT conducted on January 25, 1996. The annulus was pressurized to a maximum of 1113 pounds per square inch gauge (psig). The APT was monitored for sixty minutes. During the final 30 minutes the pressure loss was measured from 1107 to 1106 psig, or 1 pound per square inch (psi) (0.1%), which is well within the 5% pressure loss criteria set by the TNRCC. The APT data and plot are included in Appendix B.

Bottom Hole Pressure Falloff Survey

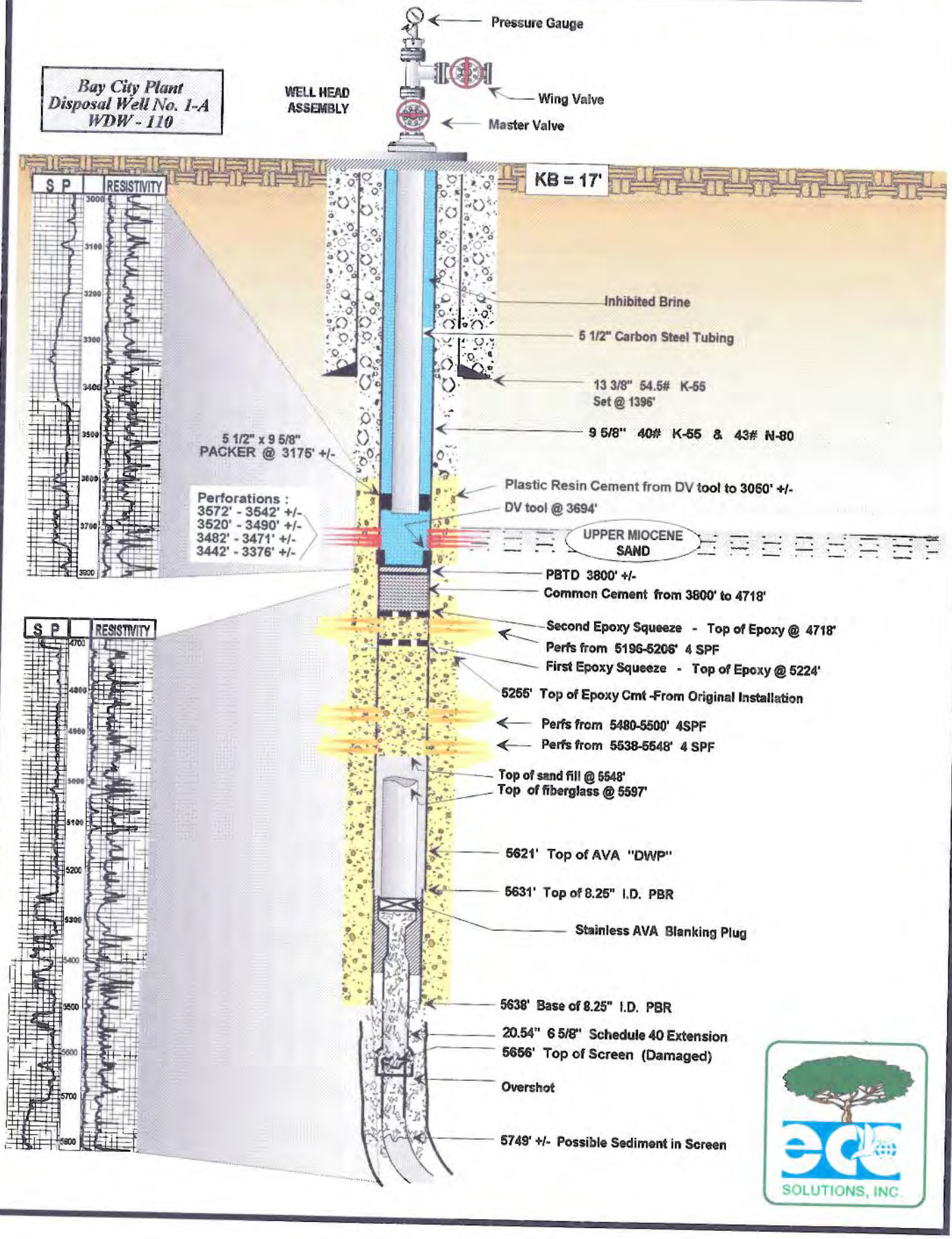
Waste effluent fluid was injected into WDW-110 at a steady rate of 215 gpm for 99-$^1/_4$ hours and was shut-in for a total of 30-$^3/_4$ hours. The shape of both the pressure and pressure derivative curves a log-log plots at early times are reasonable, and are similar to the test conducted in January 1995. A full discussion of the falloff analyses is presented in Section 4.0.

Conclusions

All field work associated with the MIT/BHP/Falloff survey on HCCG's WDW-110 at the Bay City Plant conducted from January 23 through 25, 1996 was successfully completed. WDW-110 has mechanically integrity at this time and is suitable for continued use as a Class I waste injection well.

In accordance with the TNRCC/UIC Program, 31TAC, 331.4 and 331.43, the mechanical integrity test conducted on WDW-110 demonstrated that (1) "there is no significant leak in the casing, tubing or packer" and (2) "there is no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the injection borehole."

HOECHST CELANESE CHEMICAL GROUP, LTD.



2.0 FIELD OPERATIONS SUMMARY

2.1 BOTTOM HOLE PRESSURE/FALLOFF SURVEY

Friday, January 19, 1996

Brought injection up from 123 to 215 gallons per minute (gpm) at 1800 hours.

Saturday, January 20 - Monday, January 22, 1996

Continued injecting at an average rate of 215 gpm.

Tuesday, January 23, 1996

Arrived at plant location at 0630, checked in with front gate security guard and went to site of WDW-110 at 0700 hours. Effluent was being injected at a well head pressure (WHP) = 402 pounds per square inch gauge (psig). At 0830 hours Mr. Ruben Garcia, Jr. (HCCG) processed Wes Smith (ECO), Doug Beall and Mike Staley with Milton M. Cooke Company (Cooke) through HCCG's contractor safety orientation check list. Cooke commenced rigging up on well. NOTE: All depths are referenced to rotary drive bushing (RKB) at 17' above ground level.

WDW-110 (Well No. 1-A)	active/injecting
WDW-14 (Well No. 2)	out of service
WDW-32 (Well No. 3)	out of service
WDW-49 (Well No. 4)	out of service

Checked with Paul Richardson in the control room. WDW-110 injecting approximately 215 gpm. At 0840 Cooke made run through gauge calibrations:

EPG 520 Serial # 69681 (Surface ReadOut) - Range 0 - 2500 psia.
EMS 725 Serial # 76651 (Back-up, Memory gauge)

Met with Ray Horton at 0900 hours to review test procedures and current condition of well. At 0910 hours placed tool string in lubricator (18 ft. length) as follows:

Length	Description
0.5'	Cable head
1'	Collar locator
1-1/2'	EPG 520 (SRO gauge)
5'	weight bar
5'	weight bar
4-1/2'	EPG 725 (memory gauge)

At 1045 hours opened master valve, pressured up lubricator, and prepared to go in hole. At 1056 hours check SRO gauge (WHP = 412.44 pounds per square inch absolute (psia)), going into hole. Attempted to tie into packer (1995 RAT log) using casing collar locator (CCL).

CCL unit not functioning. Pulled out of the hole and shut down waiting on a replacement CCL unit. Installed new CCL unit and rerun BHP tools into hole. BHP unit not working properly and pulled tools out of the hole. Shut down waiting on replacement BHP tool. Installed new BHP tool and ran into hole. BHP unit working all right, but CCL unit partly working. Based on CCL recorder, correlated tool depth to packer depth and pulled BHP tools up to 3300' at 1915 hours.

Monitoring injection operations at 1921 hours.

Injection rate	215 gpm
Down hole injection pressure	1816.29 psia
Surface injection pressure	410 psig

Continue monitoring injection period of test. Readings at 2030 hours:

Injection rate	215 gpm
Down hole injection pressure	1817.04 psia
Surface injection pressure	402 psig

Met with shift supervisor, prepared to shut-down injection operations. Stop injection pumps at 2119 hours and begin fall-off test. Double block @ injection and boiler feed water flow lines.

Final injection conditions:

Injection rate	215 gpm
Down hole injection pressure	1817.50 psia
Surface injection pressure	402 psig

Wednesday, January 24, 1996

Continue monitoring fall-off period of test (0800 hours).

Shut-in down hole pressure	1508.87 psia
Surface shut-in pressure	78 psig

2200 hours continue monitoring fall-off period of test.

Shut-in down hole pressure	1507.22 psia
Surface shut-in pressure	75 psig

Thursday, January 25, 1996

0200 hours continue monitoring fall-off period of test.

Shut-in down hole pressure	1506.75 psia
Surface shut-in pressure	75 psig

At 0422 hours stop recording downhole pressures, download ASCII data file, and printed preliminary BHP plots. At 0430 hours tagged bottom of borehole at 3558'. Pull out of hole with tool, making static gradient stops (15 minutes/stop) at 3000', 2000', 1000', 500' and surface.

Final shut-in pressures/temperature	
Shut-in down hole pressure	1506.59 psia
Shut-in down hole temperature	104.77 Deg. F
Surface shut-in pressure	75 psig

At 0830 hours gauges in lubricator and end of pressure falloff survey. Begin rigging down wireline equipment. Cooke crew leaving location at 0945 hours.

2.2 MECHANICAL INTEGRITY TEST

Thursday, January 25, 1996

At 0730 hours Mr. Wes Smith of ECO and Mr. Ray Horton of HCCG traveled to WDW-110 and met with Mr. Wilson Cupples with HCCG's instrument group. WDW-110 was shut-in with 75 psig on the tubing gauge and 873 psig on the annulus. HCCG's portable pressure recorder was used. Also, a certified calibrated pressure instrument, Eaton Pressure Sensor, Type UPC 5000 BACB with ranges from zero to 400, zero to 1,000 and zero to 2,000 psig, was installed onto the annulus outlet. NOTE: The zero to 2,000 psig

range was utilized for this test. HCCG personnel pressurized the annulus system using nitrogen. Surface valve leak detected. Shut down APT and bleed off nitrogen to 175 psig. Blocked off faulty valve and pressured the annulus system again with nitrogen. The annulus was tested to a maximum pressure of 1113 psig. The annulus was monitored for 60 minutes. During the final 30 minute period, the pressure loss on the annulus was measured from 1107 to 1106 psig, or 1 psi (0.1%). After completion of the APT, the nitrogen gas was bled off the annulus to 190 psig. WDW-110 was left shut-in.

At 1030 hours Atlas Wireline Service (Atlas) personnel arrived at HCCG's Bay City plant, checked through plant security and Atlas' personnel went through safety orientation. Moved in and rigged up Atlas' wireline unit including radioactive (RA) tools on WDW-110. At 1345 hours started the RAT survey as witnessed by Mr. Ray Horton of HCCG and Mr. Wes Smith of ECO. Ran tool to a maximum depth of 3550'. Ran base gamma ray (GR) log, a short repeat section and one statistical check. Ran multiple pass survey from 3550' to 2900' with an injection rate of 50 gpm, depicting that all injected fluid was entering the upper injection interval. Repeated multiple pass survey and obtained similar positive results. Set the RAT tool at 3356' for a stationary survey, injected a RA slug at the same injection rate and monitored for 20 minutes with no indicated upward flow. Repeated stationary survey with same results. Ran the final baseline GR log from 3550' to 2900' with hot spots indicated in the perforated interval. The GR hot spots were the result of the extra long shot duration to conduct the two stationary surveys. Completed the RAT survey at 1920 hours and pulled the tool out of the hole. Rigged down Atlas and moved the unit off site. WDW-110 was left operating at an injection rate of 50 gpm.

3.0 MECHANICAL INTEGRITY TESTING

3.1 ANNULUS PRESSURE TEST

An APT was conducted on Thursday, January 25, 1996 in order to demonstrate internal mechanical integrity. The APT was witnessed by Mr. Ray Horton of HCCG and Mr. Wesley Smith of ECO. The annulus was pressurized to a maximum pressure of 1113 psig with 73 psig on the tubing. The APT was monitored for sixty (60) minutes using a certified calibrated pressure gauge and portable recorder. During the final 30 minutes the pressure loss was measured from 1107 to 1106 psig, or 1 psi (0.1%), which was well within the 5% pressure loss criteria set by the TNRCC. APT data and plot are included in Appendix B.

3.2 RADIOACTIVE TRACER SURVEY

On Thursday, January 25, 1996 a RAT survey was conducted by Atlas to demonstrate external mechanical integrity and to insure that all fluids are entering the injection interval. Analysis of the RAT survey showed no upward fluid movement. Atlas and ECO conducted the RAT as follows:

1. Ran API gamma-ray (GR) tie-in strip.
2. Ran initial baseline GR log from 3550' to 2900'.
3. Ran repeat GR log from 3400' to 3220' to confirm tool repeatability.
4. Ran 5-minute statistical check at 3356'.
5. Made multiple pass survey #1 with RA slug ejected at 2900' and a pump rate of 50 gpm.
6. Made multiple pass survey #2 with a RA slug ejected at 2900' and a pump rate of 50 gpm.
7. Ran stationary survey #1 at 3356'. Watched RA slug pass tool and monitored for 20 minutes. Pump rate 50 gpm.
8. Ran stationary survey #2 at 3356'. Watched RA slug pass tool and monitored for 20 minutes. Pump rate 50 gpm.
9. Ran after survey base GR log from 3550' to 2900'.

3.3 ESTIMATED TIME TO RUN STATIONARY SURVEY SEQUENCE

The purpose of the estimate is to calculate the "worst case" time for the radioactive slug to move from the GR tool (1) down the tubing, (2) into the perforations, and (3) up the casing/borehole annulus to the tool depth.

Basic Data:

Capacities:	5-1/2" tubing	-	0.9314 gal/ft.
	9-5/8" casing	-	2.972 gal/ft.
	9-5/8" casing x 12-1/4" borehole	-	2.343 gal/ft.
Pump Rate:	50 gpm		

Note: RAT detection tool was held stationary at 3356 feet, or 44 feet above the top of the perforated section (receiving fluid) at +/-3400'.

Worst Case Calculations:

Volumes:	Tubing	- 24 ft. x 0.9314 gal/ft.	=	22.4
	Casing	- 20 ft. x 2.972 gal/ft.	=	59.4
	Casing/borehole	- 44 ft. x 2.343 gal/ft.	=	103.1
		TOTAL		184.9 gallons

Calculated time to circulate RA slug around the end of the tubing and casing strings:

= 184.9 gal / 50 gpm

= 3.7 minutes

Note: Actual time surveys were run = 20 minutes

4.0 BOTTOM HOLE PRESSURE FALLOFF

4.1 BOTTOM HOLE PRESSURE FALL-OFF ANALYSIS

Purpose Of Test: Required annual Reservoir Evaluation Test for year **1996.** Calculate the following reservoir characteristics: permeability, skin damage, pressure drop due to skin and flow efficiency.

Analysis Description - Fall-Off Test

Method Of Interpretation: The following analysis was performed by utilizing both Semi-Log and Log-Log analysis. **A)** The Semi-Log curve was generated by plotting the standard Horner plot, **Pressure vs** $[(t_p+\Delta t)/\ \Delta t]$, using an injection time (t_p) of 99.25 hours. The semi-log straight line was calculated by linear regression through the infinite acting flow period of the curve. The slope **m**, P_{1hr}, and P^* values were obtained from this curve and utilized for permeability and skin calculations. **B)** The Log-Log curves were generated by plotting ΔP and **Pressure derivative** vs the Agarwal Equivalent time function, $[t_p\ \Delta t/(t_p+\Delta t)]$. The Log-Log curves were simultaneously positioned over Gringarten type curves until a solution match was obtained. Permeability and skin values were calculated from this match and then compared with those obtained from the Semi-Log analysis.

A. Semi-Log (Horner): The straight line area of the semi-log curve was identified by first using the 1-1/2 log cycle rule to estimate the end of wellbore storage effects. Secondly, the time of the flat portion from the Pressure Derivative curve was used in determining the area of the semi-log curve in which the straight line was drawn. The semi-log straight line yielded a slope value of **5.5 psi/cycle** and a P_{1hr} of **1515 psi**. The pressure difference between P_{1hr} and the injection pressure, P_{inj} of **1818.5** psi compared with the calculated slope would give indications of positive skin damage and high permeability.

B. Log-Log (Gringarten Type Curves): Development of the unit slope line in the early portion of the derivative curve coupled with the high maximum of the derivative is indicative of a damaged well with wellbore storage. The flattening portion of the derivative curve at 0.3 P_d/P_d' indicates the beginning of the radial flow regime and was observed approximately 2.0 hours into the fall-off test. The flat portion of the derivative curve was the main factor used to obtain a type curve match yielding similar results to the semi-log analysis.

Conclusions: This particular well was diagnosed to be injecting into a homogeneous reservoir with a calculated permeability of **937 (md)** and skin damage of **+57** utilizing an h_{net} value of **165** feet. The flow efficiency of **13.68%** suggests that the near wellbore conditions impact the injection volume limitations. Also, the total pressure drop is primarily due to conditions within a small radius from the well.

The following Table is provided to give comparative results with the previous tests and calculations. The primary variables affecting the calculated results are included.

Table 4.1
SUMMARY OF RESULTS

Date MM/YY	Rate gpm	h_{net} ft	μ_w cp	slope psi/cycle	kh/μ	kh md-ft	k md	Skin
01/96	215	165	0.7100	5.5	217708	154573	937	+57
01/95	192	165	0.7100	4.299	249010	176797	1071	+40
02/94	279	165	0.5914	5.308	292995	173277	1050	+43
03/93	200	165	0.5560	3.200	348621	193833	1175	+29

The calculated results indicate a difference in transmissivity, (kh/μ) of **13%** coupled with a **43%** difference in skin values between 1995 and 1996. In addition, the results calculated from type curve analysis compare favorably to those calculated from the semi-log straight line analysis thus supporting the integrity of the calculated results.

The start time of the infinite acting flow period exceeded the time to exit the waste front, therefore the viscosity of the original reservoir fluid was used for the final analysis.

A homogeneous simulator was utilized to confirm the calculated results mentioned above. The main assumptions were as follows: a single well with infinite acting and radial flow conditions being injected at a constant rate with constant reservoir conditions such as porosity, permeability, and compressibility. Based on this particular reservoir the simulated data matched the actual data with a reasonable degree of accuracy.

The program used for final analysis and well simulation was "FAST", marketed by FEKETE.

Table 4.2

Water Well Test - BUILDUP

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE (BAY CITY)
WDW-110 WELL 1-A

PRESSURE FALL-OFF TEST
JANUARY 23-25,1996

Production And Times

Cumulative Production (water)	=	-	bbl	<DEF>
Corrected Flow Time	tc =	99.250	hr	<DEF>
Final Water Rate	qw =	-7371.00	bbl/d	

Fluid Properties

Reference Pressure	pRef =	1800.0	psi	<DEF>
Water Formation Vol Factor	Bw =	1.00		<DEF>
Water Compressibility	cw =	3.000×10^{-06}	psi^{-1}	<DEF>
Water Viscosity	muw =	0.710	cp	
Oil Formation Vol Factor	Bo =	1.18		<DEF>
Oil Compressibility	co =	1.423×10^{-04}	psi^{-1}	<DEF>
Oil Viscosity	muo =	2.880	cp	<DEF>
Solution Gas Oil Ratio	Rso =	335.9	scf/bbl	<DEF>
Gas Formation Vol Factor	Bg =	1.25×10^{-03}		<DEF>
Gas Compressibility	cg =	6.229×10^{-04}	psi^{-1}	<DEF>

Table 4.2 Continued

Water Well Test - BUILDUP

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE (BAY CITY)
WDW-110 WELL 1-A

PRESSURE FALL-OFF TEST
JANUARY 23-25,1996

Zone 1

Pressures

Initial Pressure	pi =	1800.0	psi
Extrapolated Pressure	p* =	1504.1	psi
Average Reservoir Pressure	pR =	-	psi
Final Flowing Pressure	pwfo =	1818.5	psi

Straight Line Results

Total Sandface Rate	QTBT =	-7371.00	bbl/d
Semilog Slope	msl =	5.5	psi/cycle
Transmissivity (Total)	kh/mu =	217707.77	md.ft/cp
Mobility (Total)	k/mu =	1319.441	md/cp
Flow Capacity (Water)	kh =	154572.52	md.ft
Permeability (Water)	k =	936.80	md
Skin Effect (Total)	s =	56.779	
Pressure Drop Due To Skin	delps =	271.4	psi
Flow Efficiency	FE =	1.85	
Damage Ratio	DR =	0.54	
Radius Of Investigation	r(inv) =	-	ft
@ Time Of Investigation	t(inv) =	-	hr

Table 4.2 Continued

Water Well Test - BUILDUP

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE (BAY CITY)
WDW-110 WELL 1-A

PRESSURE FALL-OFF TEST
JANUARY 23-25,1996

Zone 1

Extended Rates

3 - Month Constant Rate	=	-	bbl/d	
6 - Month Constant Rate	=	-	bbl/d	

Stabilized Rate

Shape Code	=	R1A		<DEF>
Drainage Area	A =	160.0	acres	<DEF>
Time To Stabilize	ts =	27.362	hr	
Stabilized Rate @ Current Skin	qs =	-7560.31	bbl/d	
Stabilized Rate @ Skin Of 0	qs =	-58737.46	bbl/d	
Stabilized Rate @ Skin Of -4	qs =	-112282.48	bbl/d	

Table 4.2 Continued

Water Well Test - BUILDUP

Radial Flow Analysis

(Horner Time)

HOECHST CELANESE (BAY CITY)
WDW-110 WELL 1-A

PRESSURE FALL-OFF TEST
JANUARY 23-25,1996

Reservoir Parameters

Net Pay	h =	165.00	ft	
Total Porosity	phit =	330.00	%	
Water Saturation	Sw =	100.00	%	
Oil Saturation	So =	0.00	%	
Gas Saturation	Sg =	0.00	%	
Wellbore Radius	rw =	0.30	ft	<DEF>
Formation Temperature	T =	104.00	deg F	
Formation Compressibility	cf =	1.139×10^{-06}	psi^{-1}	<DEF>
Total Compressibility	ct =	4.139×10^{-06}	psi^{-1}	<DEF>

Figure 2

HORNER

PRESSURE BUILDUP PLOT

HOECHST CELANESE (BAY CITY)
WDW-110 WELL 1-A

PRESSURE FALL-OFF TEST
JANUARY 23-25, 1996

$[k_1/u]_t$=1319.44 k_1=936.80 md s=56.8 p*=1504.1

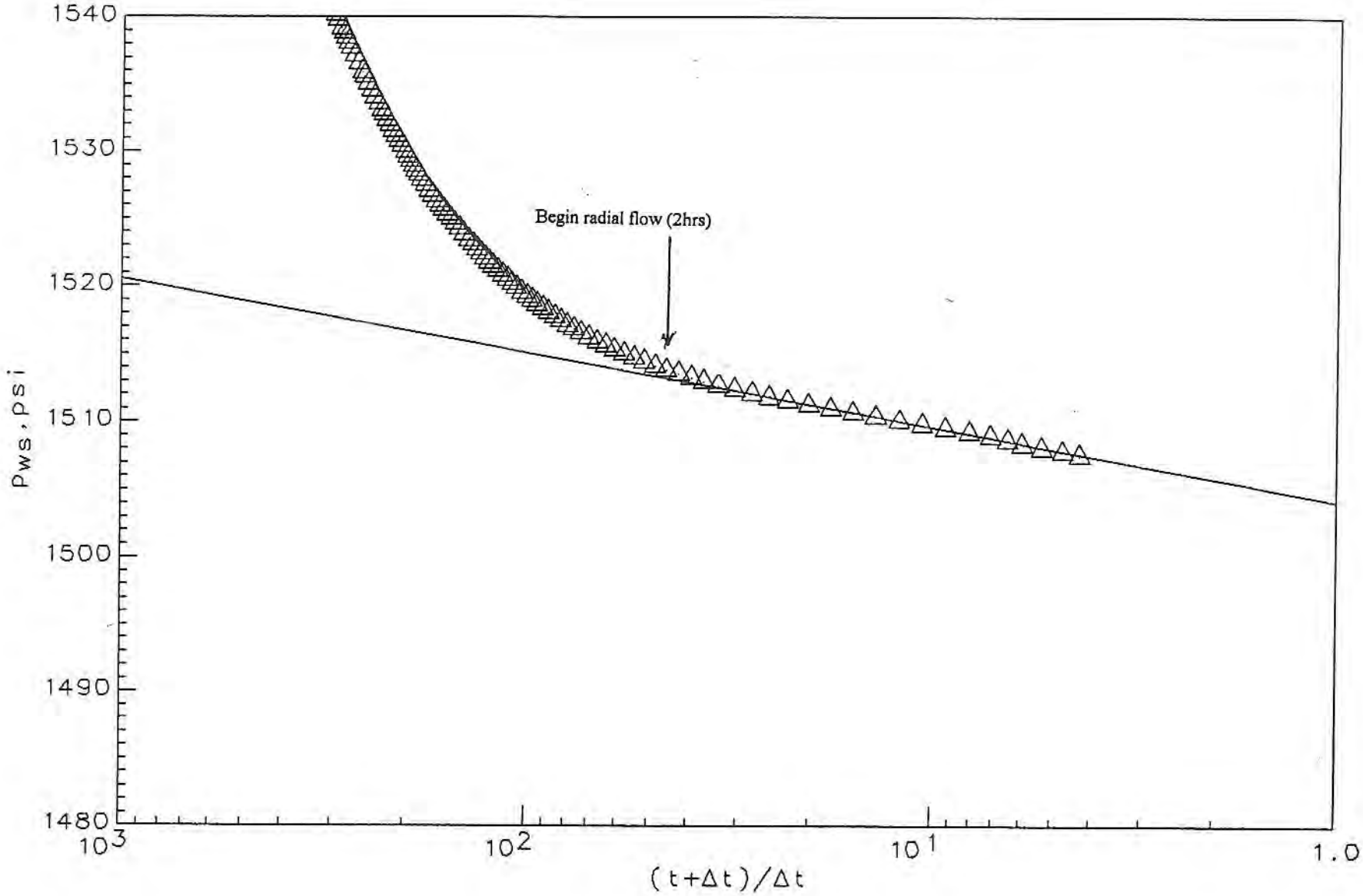


Figure 3

HORNER

PRESSURE BUILDUP PLOT

HOECHST CELANESE (BAY CITY)
WDW-110 WELL 1-A

PRESSURE FALL-OFF TEST
JANUARY 23-25, 1996

$[k_1/u]_t$=1327.24 k_1=942.34 md s=57.2 p*=1504.1

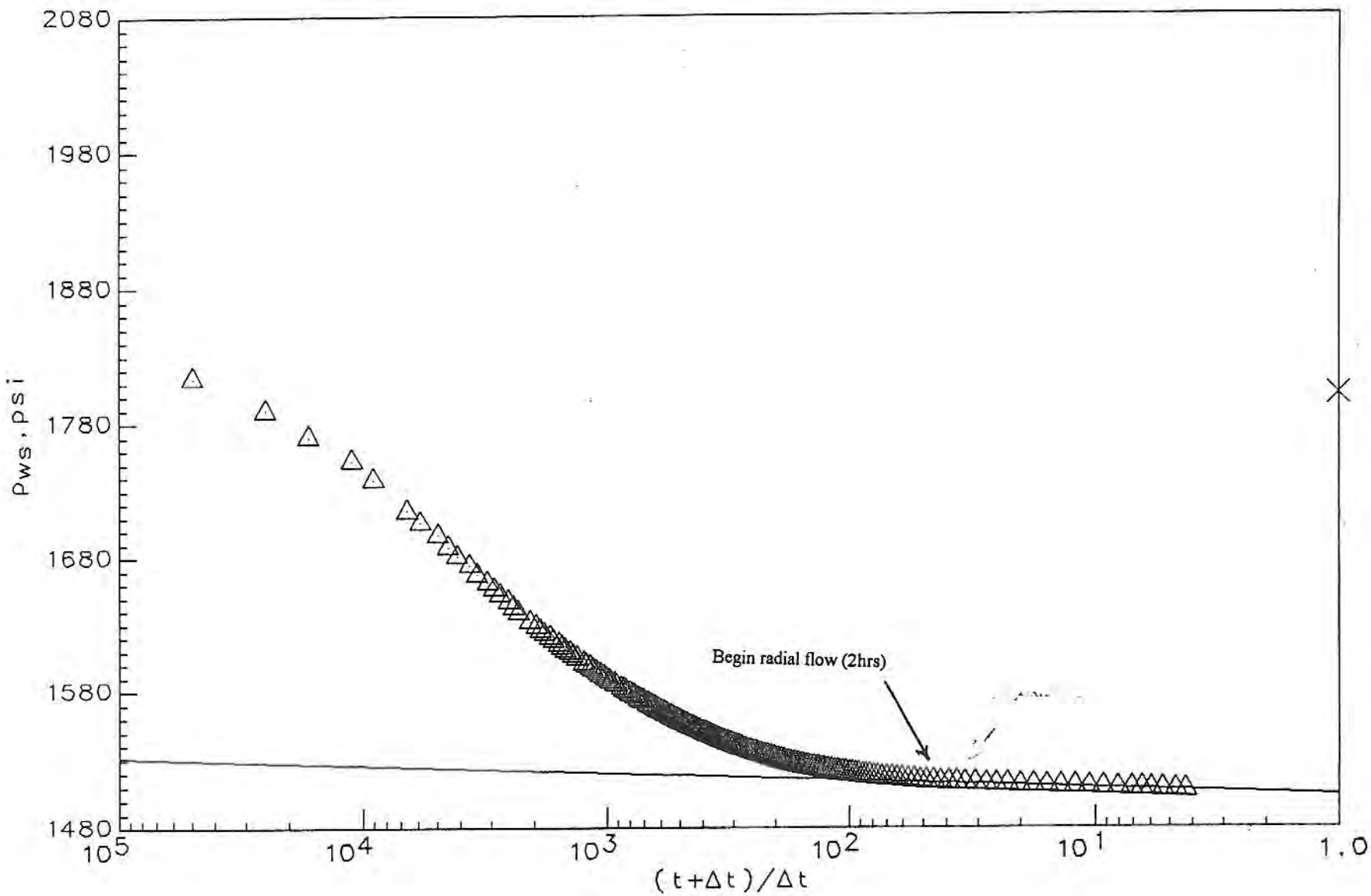


Figure 4

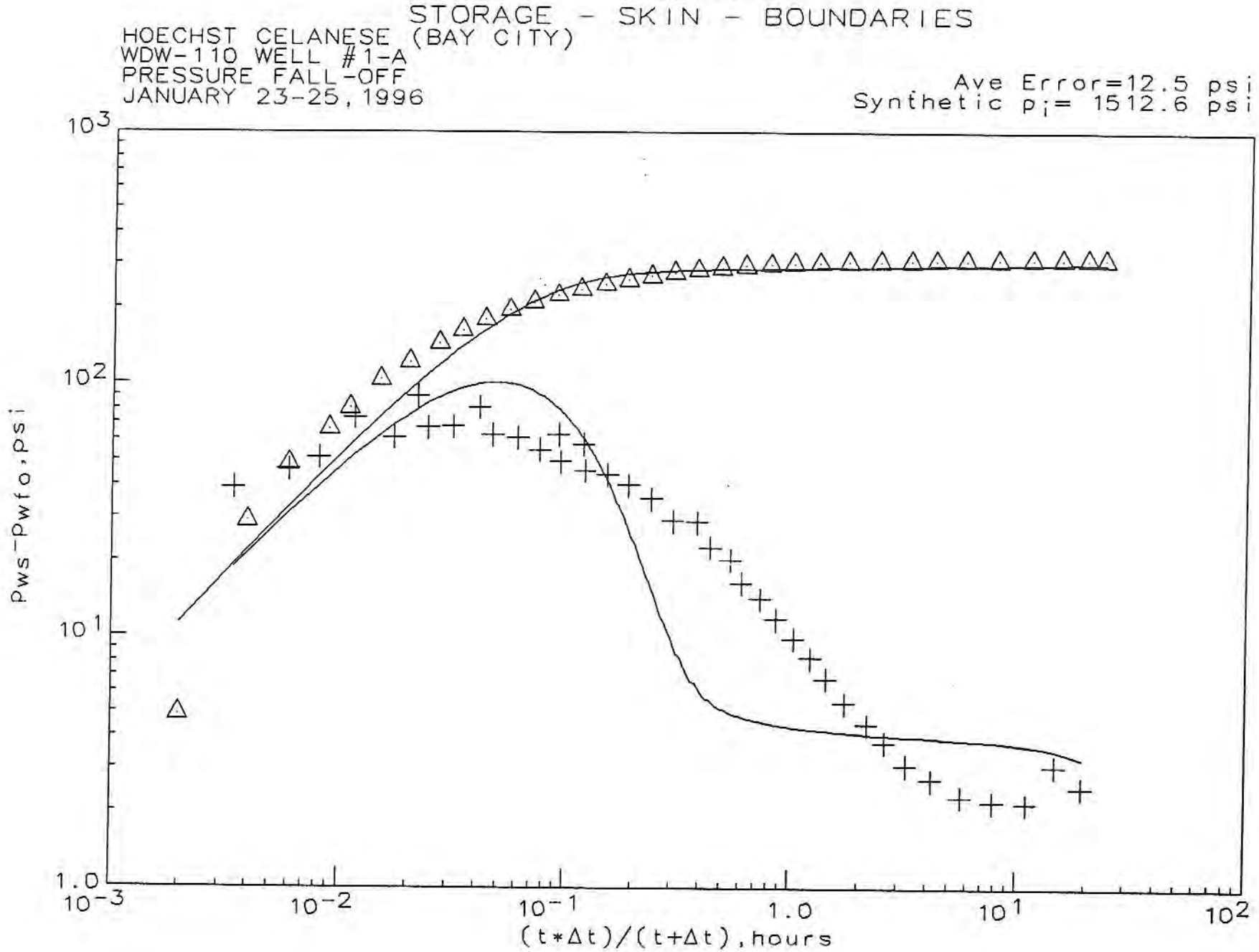

STORAGE - SKIN - BOUNDARIES
HOECHST CELANESE (BAY CITY)
WDW-110 WELL #1-A
PRESSURE FALL-OFF
JANUARY 23-25, 1996
Ave Error=12.5 psi
Synthetic pi= 1512.6 psi
pws-pwfo,psi
(t*Δt)/(t+Δt),hours
10^3
10^2
10^1
1.0
10^-3
10^-2
10^-1
1.0
10^1
10^2

Figure 5

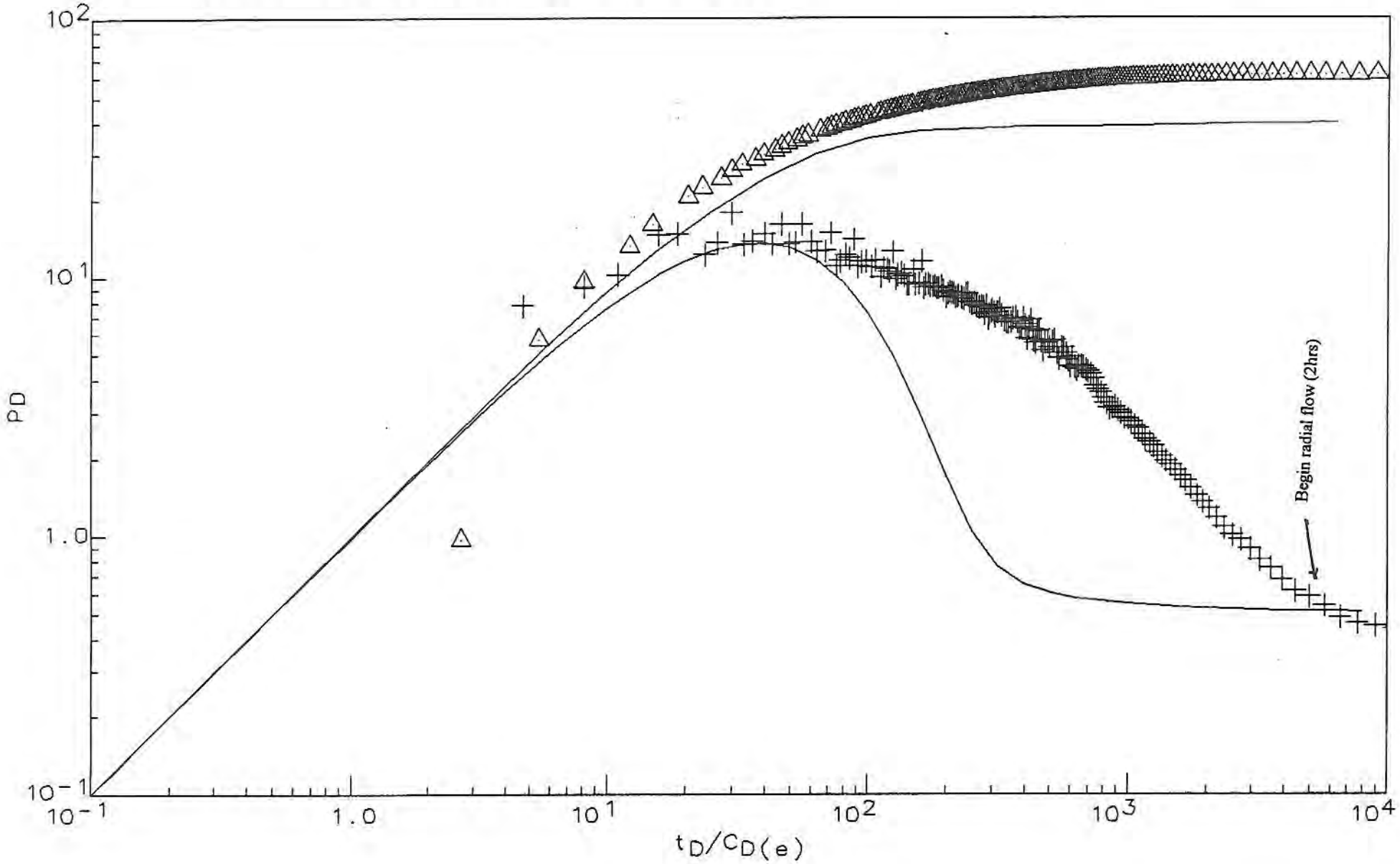
STORAGE AND SKIN TYPECURVE (Bourdet et al)

PRESSURE FALLOFF PLOT

HOECHST CELANESE (BAY CITY)
WDW-110 WELL #1-A

PRESSURE FALL-OFF
JANUARY 23-25, 1996

$[k_1/u]_t$=1247.09 k_1=929.71 C_D=1372 s=30.9



Water Well Test - FALLOFF

Bourdet Et Al Type Curve Analysis

(Equivalent Time)

HOECHST CELANESE (BAY CITY)
WDW-110 WELL #1-A

PRESSURE FALL-OFF
JANUARY 23-25,1996

Inner Zone

Match Curve	CDe2s	=	1.00×10^{30}	
Match Point (pressure Ratio)		=	5.1	psi
Match Point (time Ratio)		=	7.389×10^{-04}	hr
Dimensionless Storage Constant	CD	=	1372.18	
Wellbore Storage Constant	C	=	0.04	bbl/psi
Transmissivity (Total)	kh/mu	=	205769.86	md.ft/cp
Mobility (Total)	k/mu	=	1247.090	md/cp
Flow Capacity	kh	=	153401.43	md.ft
Permeability	k	=	929.71	md
Skin Effect (Total)	s	=	30.927	
Pressure Drop Due To Skin	delps	=	156.4	psi
Radius Of Investigation	r(inv)	=	-	ft
@ Time Of Investigation	t(inv)	=	-	hr
Number Of Points In Derivative		=	3	<DEF>

Dual Porosity

Inter Porosity Coeff	Lambda	=	-
Storativity Ratio	Omega	=	-

Table 4.3

Water Well Test - SYNTHESIZER

Model Parameters

Storage - Skin - Boundaries Model

HOECHST CELANESE (BAY CITY)
WDW-110 WELL #1-A

PRESSURE FALL-OFF
JANUARY 23-25,1996

Synthetic Initial Pressure		=	1512.6	psi

Formation Parameters

Transmissivity (Total)	kh/mu	=	132850.42	md.ft/cp
Mobility (Total)	k/mu	=	805.154	md/cp
Flow Capacity (Water)	kh	=	99039.99	md.ft
Permeability (Water)	k	=	600.24	md
Skin	s	=	29.279	
Wellbore Storage Constant (dim.)	CD	=	1624.75	
Inter Porosity Coeff	Lambda	=	-	
Storativity Ratio	Omega	=	-	

N. B. Origin At Lower Left Corner

Reservoir Length	(xe)	=	10000	ft
Reservoir Width	(ye)	=	10000	ft
Active Well At	xw	=	5000	ft
Active Well At	yw	=	5000	ft

Table 4.3 Continued

Water Well Test - SYNTHESIZER

Storage - Skin - Boundaries Model

HOECHST CELANESE (BAY CITY)
WDW-110 WELL #1-A

PRESSURE FALL-OFF
JANUARY 23-25,1996

Production And Pressure

Final Water Rate	qw =	-7371.00	bbl/d	
Final Flowing Pressure	Pwfo =	1818.5	psi	

Fluid Properties

Reference Pressure	pRef =	1506.0	psi	<DEF>
Water Formation Vol Factor	Bw =	1.05		
Water Compressibility	cw =	3.000×10^{-06}	psi^{-1}	<DEF>
Water Viscosity	muw =	0.710	cp	
Oil Formation Vol Factor	Bo =	1.15		<DEF>
Oil Compressibility	co =	1.919×10^{-04}	psi^{-1}	<DEF>
Oil Viscosity	muo =	3.372	cp	<DEF>
Solution Gas Oil Ratio	Rso =	276.3	scf/bbl	<DEF>
Gas Formation Vol Factor	Bg =	1.53×10^{-03}		<DEF>
Gas Compressibility	cg =	7.684×10^{-04}	psi^{-1}	<DEF>

Reservoir Parameters

Net Pay	h =	165.00	ft	
Total Porosity	phit =	33.00	%	
Water Saturation	Sw =	100.00	%	
Oil Saturation	So =	0.00	%	
Gas Saturation	Sg =	0.00	%	
Wellbore Radius	rw =	0.30	ft	<DEF>

Table 4.3 Continued

Water Well Test - SYNTHESIZER

Storage - Skin - Boundaries Model

HOECHST CELANESE (BAY CITY)
WDW-110 WELL #1-A

PRESSURE FALL-OFF
JANUARY 23-25,1996

Formation Temperature	T =	104.00 deg F	
Formation Compressibility	cf =	2.962×10^{-06} psi^{-1}	<DEF>
Total Compressibility	ct =	5.962×10^{-06} psi^{-1}	<DEF>

Table 4.3 Continued

Water Well Test - SYNTHESIZER

Storage - Skin - Boundaries Model

HOECHST CELANESE (BAY CITY)
WDW-110 WELL #1-A

PRESSURE FALL-OFF
JANUARY 23-25,1996

Synthesis Results

Average Error		=	12.5	psi
Initial Pressure	pi	=	1506.0	psi
Average Reservoir Pressure	pR	=	1517.9	psi
Pressure Drop Due To Skin	delps	=	-	psi
Flow Efficiency	FE	=	1.76	
Damage Ratio	DR	=	0.57	

Extended Rates

3 - Month Constant Rate	=	-5402.65	bbl/d
6 - Month Constant Rate	=	-4222.50	bbl/d
1 - Year Constant Rate	=	-2942.33	bbl/d
1 - Year Constant Rate @ Skin Of 0	=	-4199.29	bbl/d
1 - Year Constant Rate @ Skin Of -4	=	-4459.56	bbl/d

4.2 STATIC GRADIENT SURVEY

A static gradient survey was conducted while pulling out of the hole immediately following the bottom hole pressure falloff test. Stops were made at 3000', 2000', 1000', 500' and surface. Data collected during the static gradient survey is included in Appendix G and presented graphically in Figure 7. Data collected at each stop were as follows:

Table 4.4
Static Gradient Survey Results

Depth (ft)	Pressure (psia)	PSI/ft
0	77.99	
500	292.00	0.428
1000	508.70	0.433
2000	941.92	0.433
3000	1375.99	0.434
3300	1506.59	0.435
3474*	1582.34	0.435

* Pressure extrapolated to mid-point perforations.

APPENDIX A

RADIOACTIVE TRACER LOG AND ATLAS WIRELINE'S INTERPRETATION LETTER

DIAGNOSTIC RADIOACTIVE TRACERLOG

Hoechst Celanese Chemical Group, Inc.
Waste Disposal Well #110
Bay City Plant
Matagorda County, Texas

Prepared for
ECO Solutions, Inc.
Houston, Texas

WESTERN ATLAS LOGGING SERVICES
WESTERN ATLAS INTERNATIONAL

January 25, 1996

Prepared by Freeman Hill, III

DISCLAIMER

In making interpretations of logs, our employees will give Customer the benefit of their best judgement, but since all interpretations are opinions based on inferences from electrical or other measurements, we cannot, and we do not guarantee the accuracy or the correctness of any interpretation. We shall not be liable or responsible for any loss, cost, damages, or expenses whatsoever incurred or sustained by the Customer resulting from any interpretation made/by any of our employees.

Disposal Well Background

The Hoechst Celanese Chemical Group, Inc.'s waste disposal well #110, located at the Bay City facility has been used for underground injection of waste fluids. In addition to surface casing, the well contains a string of 9 5/8 inch O.D. casing cemented from surface to 4,718 ft. with a PBTD of 3,550 ft. Five and a half inch pipe (5 1/2 inch) is within the 9 5/8" casing, and is from surface to 3,380 ft. Measured depth was at 3,545 ft. The Injection Interval is located from 3,376 ft. to 3,572 ft.

A logging program consisting of a Radioactive Tracerlog (ejector and two detector instrument), was used to evaluate the integrity of the casing and cement. This should also verify that the injection interval is accepting the disposed fluids.

Radioactive Tracerlog Survey

1. Logged base gamma ray detector pass from 3,536 ft. to 2,820 ft.

   Purpose: Base-line for radioactive tracer instrument and comparison for post survey.

   Analysis: Gamma ray instruments respond to naturally occurring and man-made radiation. For this logging run, we will only consider the naturally occurring radiation (e.g., potassium, uranium, and thorium) found in formations. Normally, shaly formations tend to contain more of these gamma ray producing elements than a sand formation.

2. Repeat step (1.) Base gamma ray pass from 3,407 ft. depth to 3,220 ft.

   Analysis: No anomalies noted.

3. Statistical stationary check. (5 minute)(3,356 ft)

   Purpose: To establish stability of instrumentation before proceeding with testing.

   Analysis: No anomalies found. Tool operating properly and stable.

4. While injecting into the well at a rate of 50 gpm, radioactive material (Iodine-131) was ejected from the radioactive tracer instrument (@ 2,900 ft.). The instrument was lowered further into the well and then logged in the upward direction in order to intercept radioactive slug as it moved down the well. By repeating this process of lowering the instrument and logging in the upward direction, the radioactive slug was traced through the casing packer and into the injection interval located below.

Purpose: Ensure injected fluids move through the tubing in a downward direction and that no upward or out of zone fluid movement through a cement channel is detected.

Analysis: The following table depicts the depths where the detectors intercepted the radioactive slug as it moved with the surface-injected fluids downward toward the injection interval.

Interception Number	Depth, ft.(Bottom Detector) (BDET)
1	2,999
2	3,165
3	3,335
4	3,393 and dispersing
5	dispersing
6	dispersing
7	dispersing
8	dispersing
9	dispersing

The radiation peak responses from the first pass to the ninth pass, become smaller, but cover a longer vertical interval, due to the movement of the wireline and instrument mixing the radioactive slug with the injected fluids. No anomalies seen.

5. Repeat step (4.) (50 gpm)

Analysis: The following table depicts the depths where the detector intercepted the second radioactive slug as it moved with the injected fluids downward toward the injection interval.

Interception Number	Depth, ft.(Bottom Detector) (BDET)
1	3,032
2	3,251
3	3,390 and dispersing
4	dispersing
5	dispersing
6	dispersing
7	dispersing

The radioactive peak responses from the first to the seventh pass, become smaller, but cover a longer vertical interval, due to the movement of the wireline and instrument mixing the radioactive slug with the injected fluids. The radioactive material appears to continually move in the downward direction and into the disposal interval. There is no evidence of any problems.

6. The tool was stationed at 3,356 ft., above the disposal interval, for a stationary reading. The radioactive isotope is released and after the initial response to the isotope passing by the detector in a downward motion, then the isotope or an increase in radiation, should not be monitored again. If the isotope is seen again, then communication (channel behind the pipe) is highly possible.

Purpose: Ensure injected fluids move downward and not back up on the outside of casing in a channel. (Pump rate 50 gpm) (20 minute test.)

Analysis: After initial response to the radioactive slug, the isotope did not come back in the tool's vicinity. No channel indicated.

7. Repeat step (6.) (Pump rate = 50 gpm) (20 minute test.)

Purpose: Ensure injected fluids are not channeling up.

Analysis: After the initial response to the radioactive slug, the isotope did not come back in the tool's vicinity. No channel indicated.

8. Logged gamma ray detectors from 3,537 ft. to 2,817 ft.

Purpose: Monitor any anomalies or changes in background baseline.

Analysis: There are gamma ray "hot spots" in the injection interval. This is probably due to the amount of time pumping and isotope released during the previous stationary tests. The isotope migrated to the lower part of the injection interval, where the fluid is dispersing into the formation at a much slower rate. No anomalies found above injection interval.

9. Repeat step (8.) Logged gamma ray detectors from 3,537 ft. to 3,232 ft.

Purpose: Monitor any anomalies or changes in background baseline.

Analysis: The gamma ray "hot spots" in the injection interval did repeat indicating no upward movement.

Conclusion:

In my opinion, the Hoechst Celanese Waste Disposal Well #110, located in the Bay City Plant, does not have any integrity problems that would result in disposed fluids migrating to intervals other than the injection interval. The logging program consisting of a radioactive tracer ejector and detector instrument should satisfy the annual mechanical integrity requirement.

Hoechst Celanese Chemical Group, Ltd.
RAT - Tracer Survey #1
WDW - 110

No. Pass	Depth Start	Depth Stop	Time Start	Time Stop	Slug Depth	Slug Time	Remarks
	2900		3:15:18				
1	3100	2900	3:51:34	3:53:00	2999	3:52:24	3 second
2	3300	2990	:54:15	:56:15	3164	:55:30	50gpm
3	3400	3150	:58:05	:59:15	3335	:58:45	
4	3500	3325	4:01:42	4:02:50	3393	4:03:30	
5	3470	3386	:04:10	:05:25	3403	:04:50	
6	3530	3350	:06:55	:08:10	3408	:08:00	
7	3545	3390	:10:08	:11:40	3418	:11:25	
8	3540	3398	:12:50	:14:20	3420	:13:55	
9	3540	3390	:16:20	:18:35	3422	:18:10	

Tracer #2

	2900		5:16:15				
1	3100	2900	:18:10	5:20:20	3032	5:18:15	3 sec
2	3294	3017	:22:55	:25:20	3252	:23:00	50 gpm
3	3440	3236	:27:20	:29:30	3390	:28:00	
4	3466	3365	:30:30	:32:00	3402	:31:40	
5	3580	3380	:33:05	:34:40	3410	:34:30	
6	3534	3360	:35:15	:36:45	3413	:36:30	
7	3528	3470	:35:40	:46:42	3423	:46:20	

Stationary Survey

No.	Depth	Start Survey	Survey Time
#1	3356'	6:03:09	20 minutes
#2	3356'	6:29:14	20 minutes

Final: 3550 - 2900 7:25:53 - 7:36:00

FEB 26 1996

WESTERN ATLAS

Atlas Wireline Services

PRODUCTION LOGGING SERVICES

FILE NO. 95237

API NO.

COMPANY HOECHST CELANESE CHEMICAL GROUP, LTD.

WELL WASTE DISPOSAL WELL NO. 1-A

FIELD BAY CITY PLANT

COUNTY MATAGORDA STATE TEXAS

FINAL PRINT

LOCATION:

BAY CITY PLANT

SEC N/A TWP N/A RGE N/A

OTHER SERVICES

PERMANENT DATUM GROUND LEVEL ELEV. N/A

LOGGING MEASURED FROM RKB 17.0' FT. ABOVE P.D.

DRILLING MEASURED FROM RKB

ELEVATIONS

KB N/A

DF N/A

GL N/A

DATE	25-JAN-96	
RUN	1	
SERVICE ORDER	177454	
DEPTH-DRILLER	3550' PBTD	
DEPTH-LOGGER	3545'	
BOTTOM LOGGED INTERVAL	3545'	
TOP LOGGED INTERVAL	2820'	
TYPE FLUID IN HOLE	INJECTION WATER	
SALINITY PPM CL.	-----	
DENSITY LB/GAL.	-----	
LEVEL	FULL	
MAX. REC. TEMP. DEG. F	N/A	
OPR. RIG TIME	10 HRS.	
EQUIP. NO. / LOC.	ML-4110 PEARLAND	
RECORDED BY	HARBSTREIT	
WITNESSED BY	MR. WESS SMITH	

BOREHOLE RECORD

NO.	BIT	FROM	TO

FOLD HERE

IN MAKING INTERPRETATIONS OF LOGS OUR EMPLOYEES WILL GIVE CUSTOMER THE BENEFIT OF THEIR BEST JUDGEMENT, BUT SINCE ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS, WE CANNOT, AND WE DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION. WE SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COST, DAMAGES, OR EXPENSES WHATSOEVER INCURRED OR SUSTAINED BY THE CUSTOMER RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR EMPLOYEES.

CASING RECORD

SIZE	WGT	FROM	TO
7.625	-----	SURFACE	3550
5.500	-----	SURFACE	3376

REMARKS RUN (1)

PURPOSE OF LOG WAS TO TEST THE MECHANICL INTEGRITY OF WELL NO. 1-A. A TOTAL OF 10 MCI OF IODINE 131 WAS USED. AT TIME OF LOGGING THE INJECTION RATE WAS 50 GPM STEADY. ALL TIME FILES ARE RECORDED AT 1/FOOT. NOTE: THE DETECTOR SPACING WAS 6 FEET.

AFTER LOG RESULTS INDICATE A GOOD M.I.T. TEST AND THAT ALL INJECTION FLUIDS APPEAR TO BE ENTERING COMPLETION ZONE OF 3376 TO 3572.

EQUIPMENT DATA

RUN	TRIP	TOOL	SERIAL NO.	SERIES NO.	POSITION

PURPOSE OF LOG IS TO CHECK THE M.I.T. OF THE WELL NO.1-A (WDW-110)

BEFORE LOG BASE PASS

****

FILE: 2

PARAMETERS

*** NONE ***

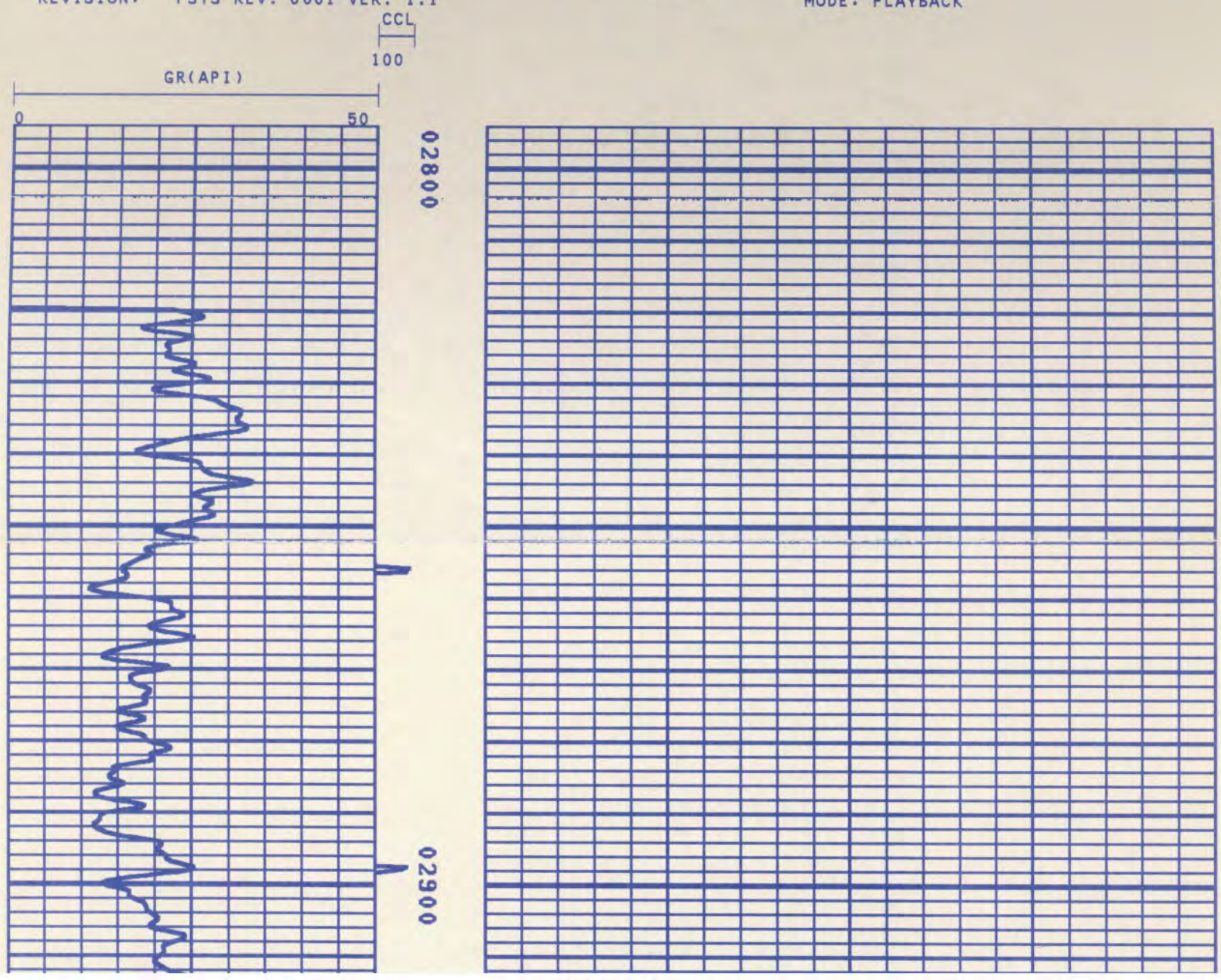
DISPLAY SCALE CHANGES

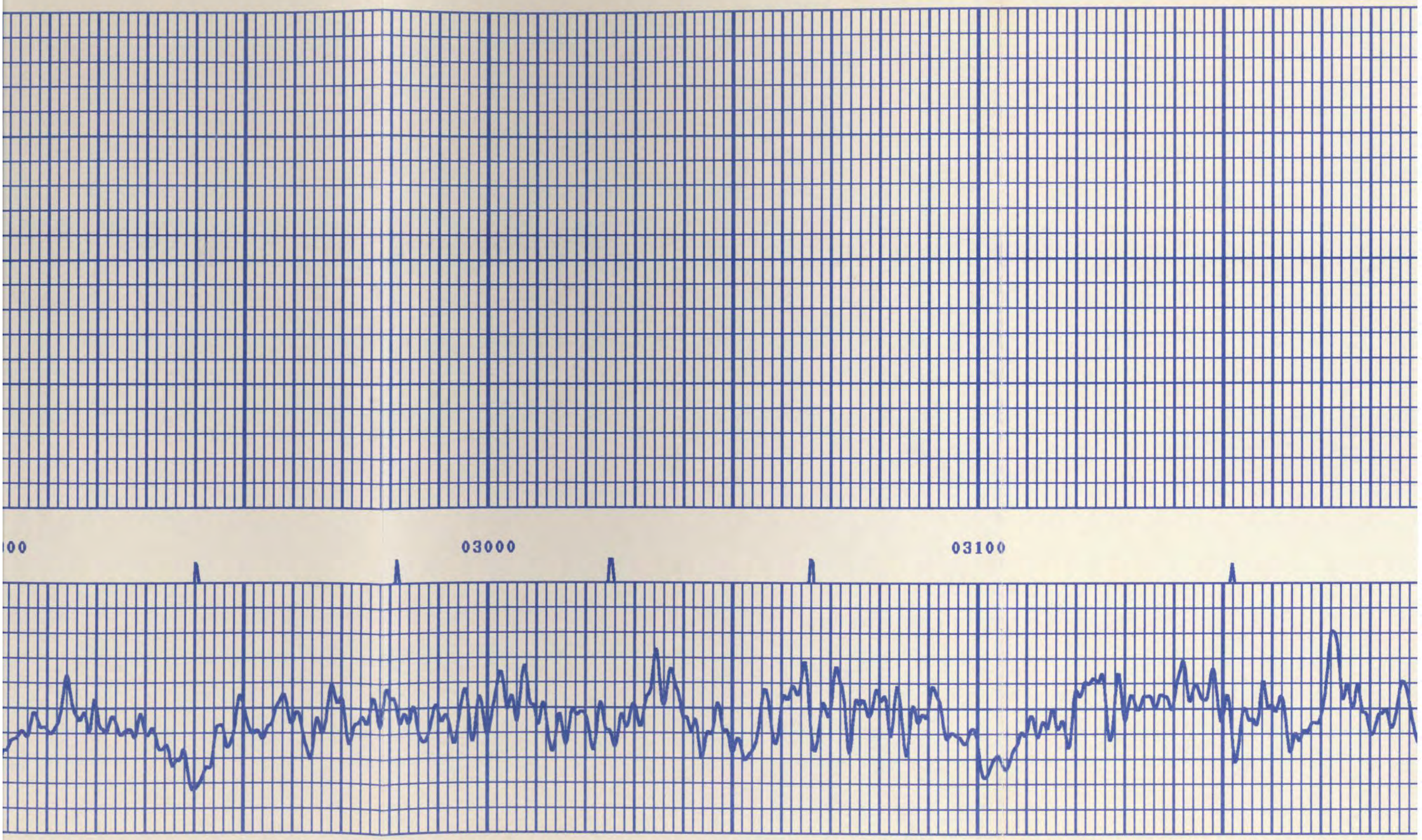
*** NONE ***

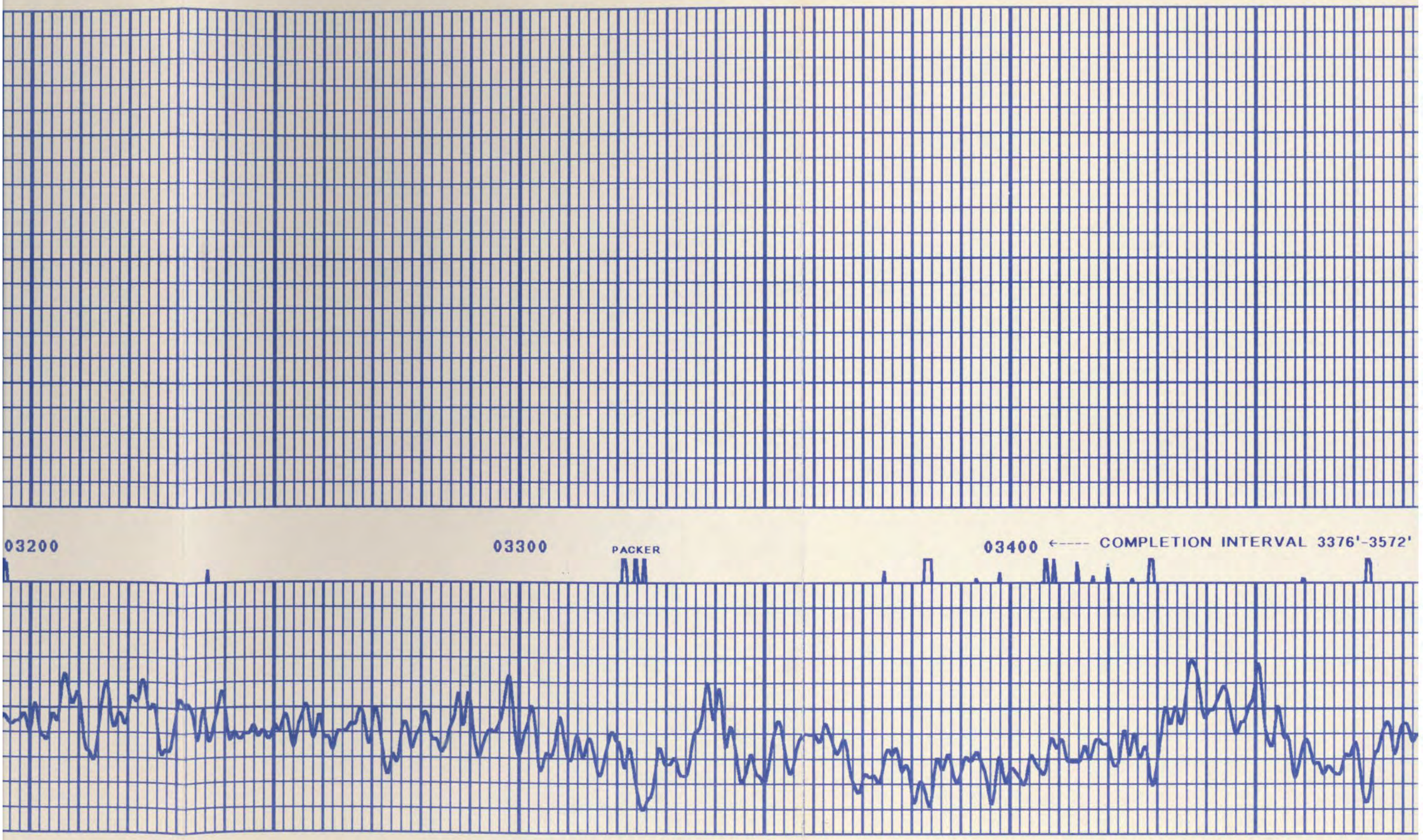
LTD

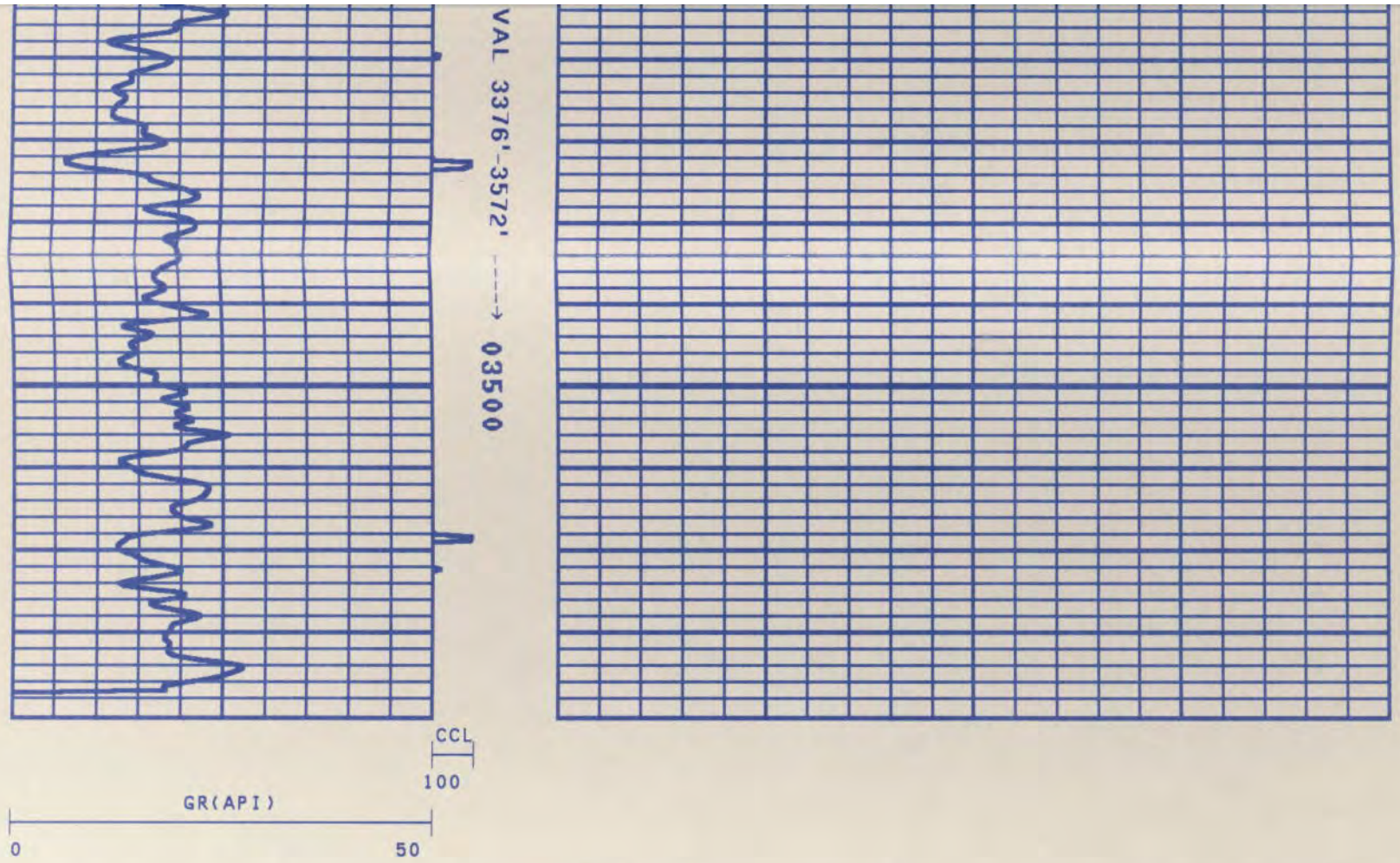
COMPANY: HOECHST CELANESE CHEMICAL GROUP, [redacted].
WELL NAME: WASTE DISPOSAL WELL NO.1-A
SERVICE: M 159P FILE: 2 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1

RUN: 1
TRIP: 1
TIME: 14:21:17
MODE: PLAYBACK




00
03000
03100


03200
03300
PACKER
03400
<---- COMPLETION INTERVAL 3376'-3572'



FILE: 2

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BEFORE LOG BASE PASS REPEAT

****

FILE: 3

PARAMETERS

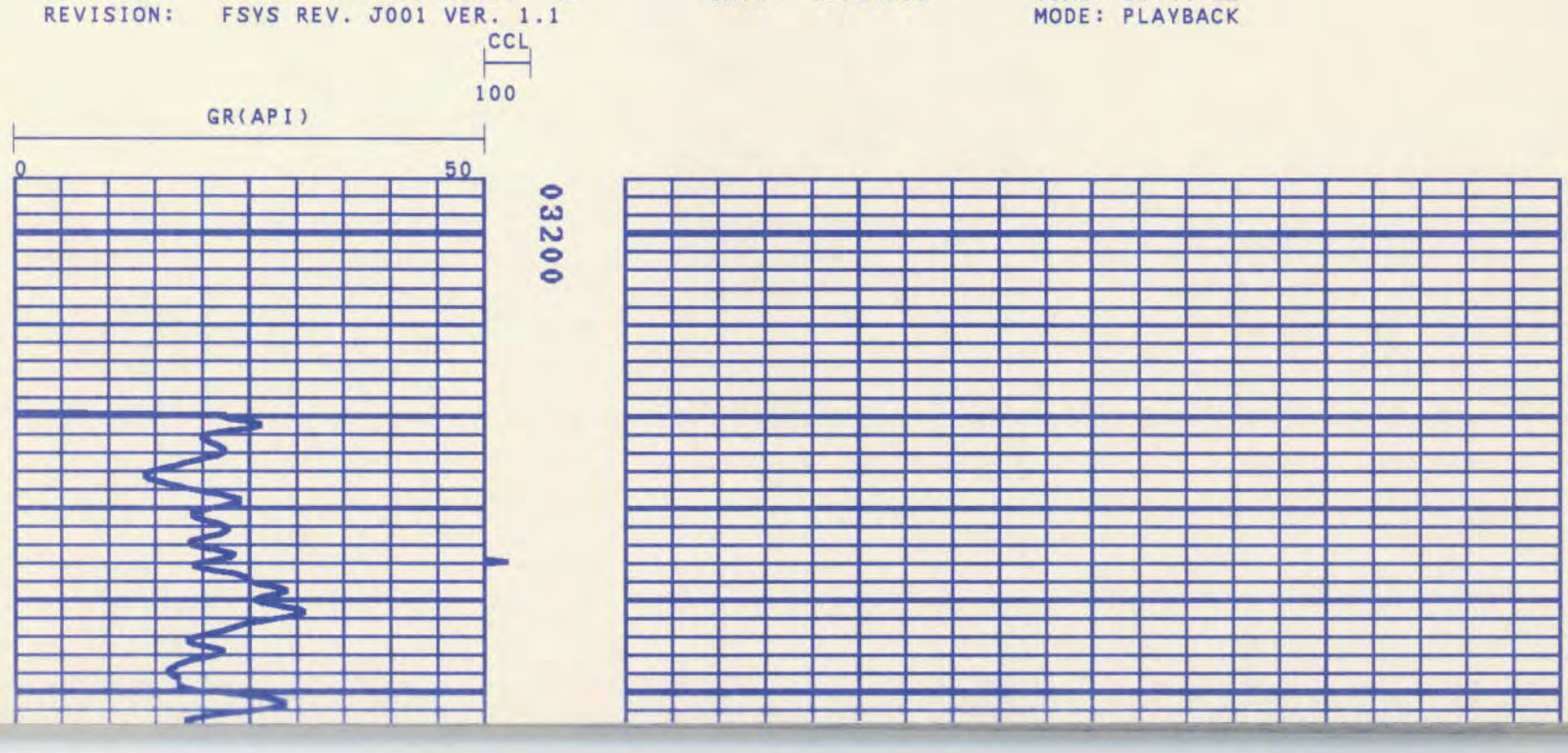
*** NONE ***

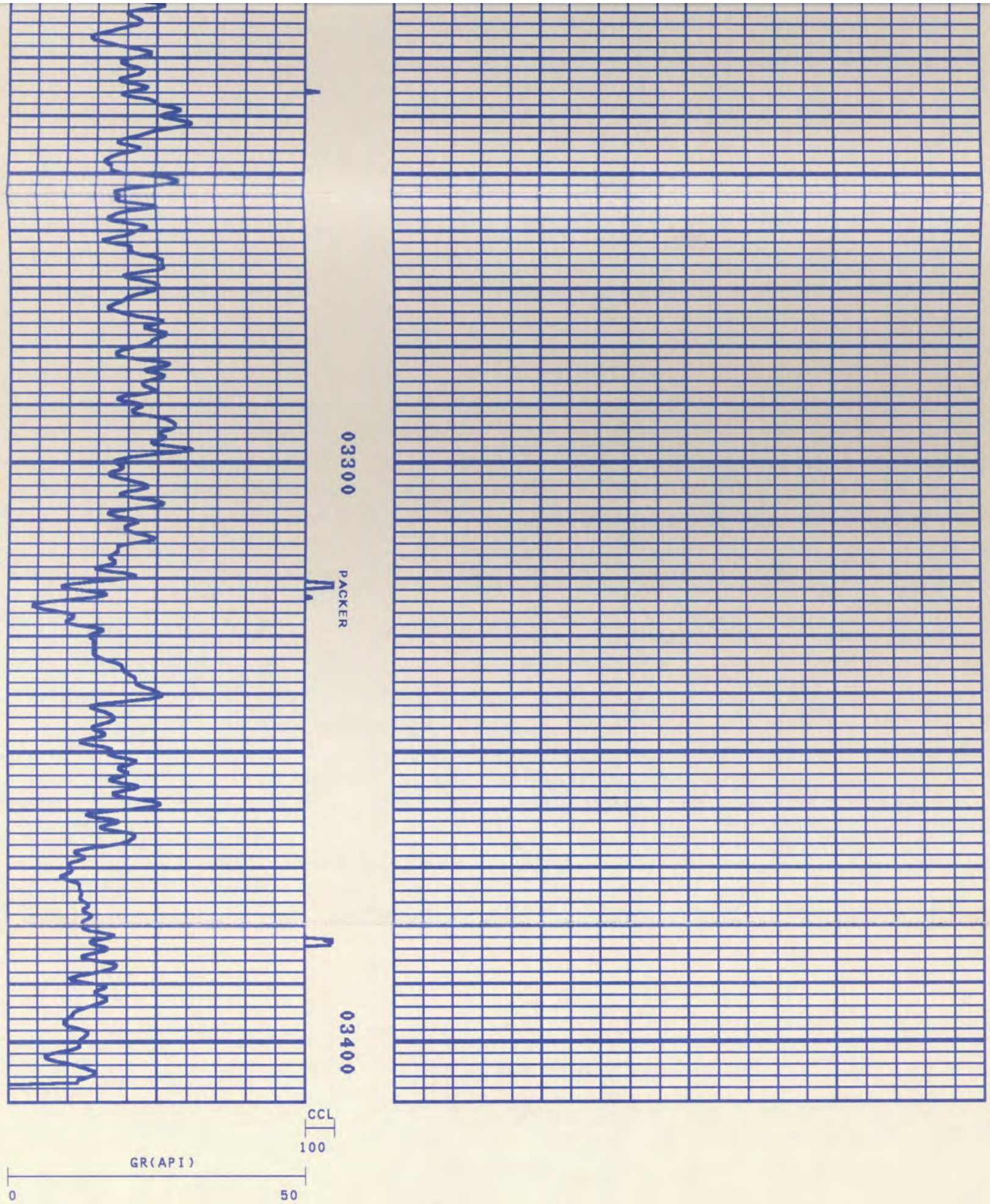
DISPLAY SCALE CHANGES

*** NONE ***

COMPANY: HOECHST CELANESE CHEMICAL GROUP, LTD [redacted].
WELL NAME: WASTE DISPOSAL WELL NO.1-A
SERVICE: M 159P FILE: 3 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1

RUN: 1
TRIP: 1
TIME: 14:44:22
MODE: PLAYBACK





FILE: 3

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5 MIN STAT CHECK AT 3356'

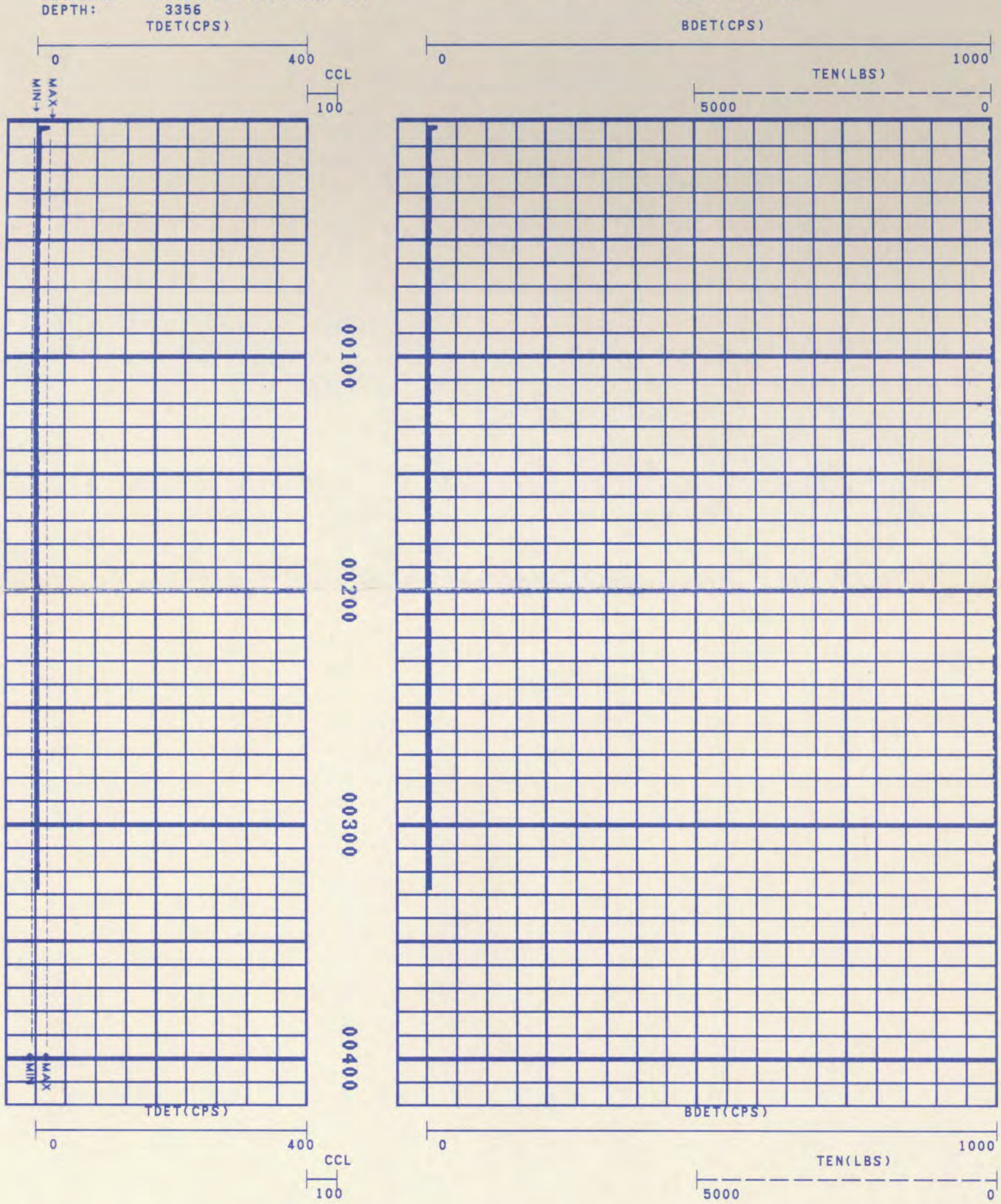
5 MIN STAT CHECK AT 3356'

****

FILE: 25

COMPANY: HOECHST CELANESE CHEMICAL GROUP, LTD [redacted].
WELL NAME: WASTE DISPOSAL WELL 1-A
SERVICE: M 150A FILE: 25 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1
DEPTH: 3356

RUN: 1
TRIP: 1
TIME: 17:55:38
MODE: PLAYBACK



DISPLAY SCALE CHANGES

*** NONE ***

0 400 CCL 100

0 1000 TEN(LBS) 5000 0

DISPLAY SCALE CHANGES

*** NONE ***

PARAMETERS

*** NONE ***

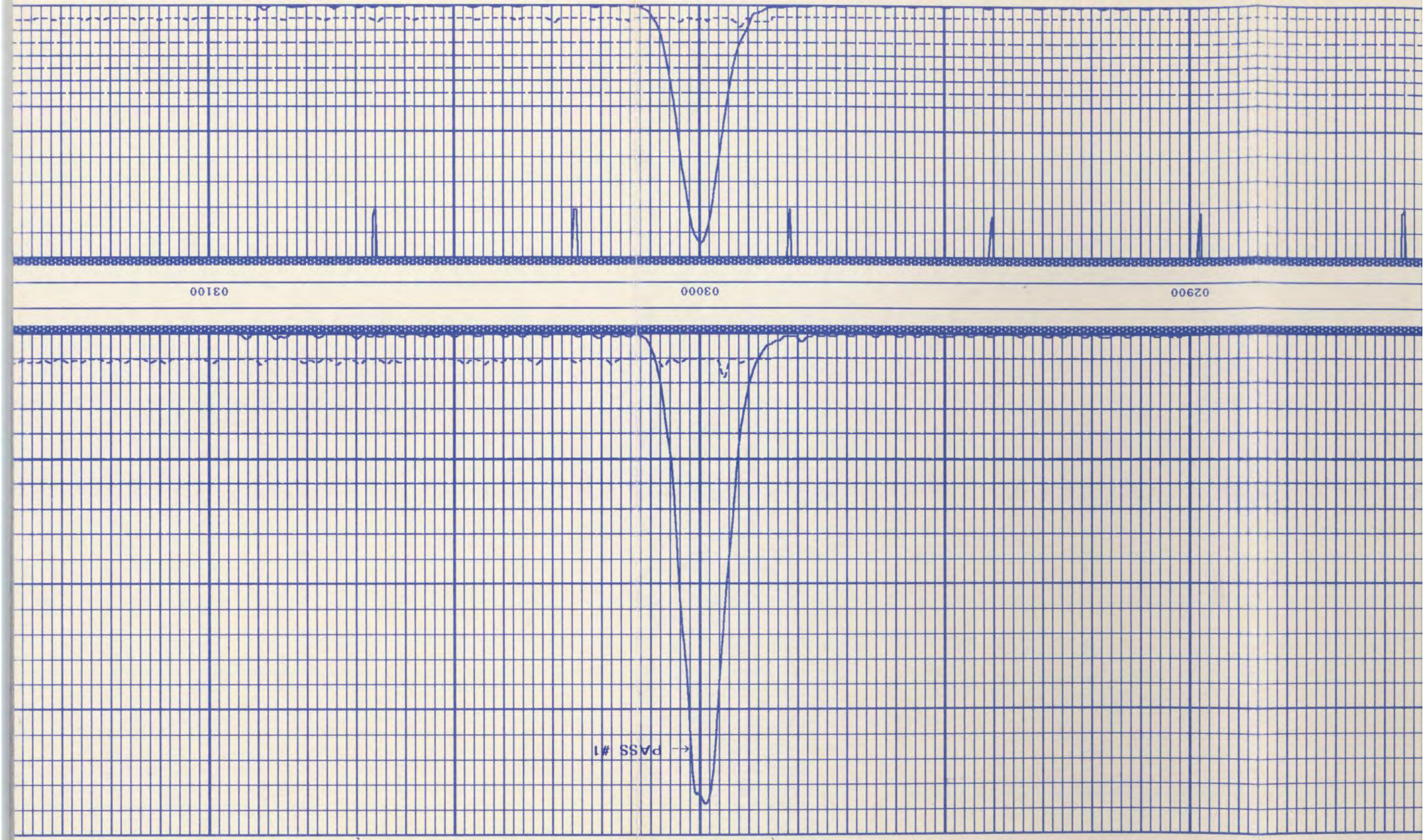
FILE: 25

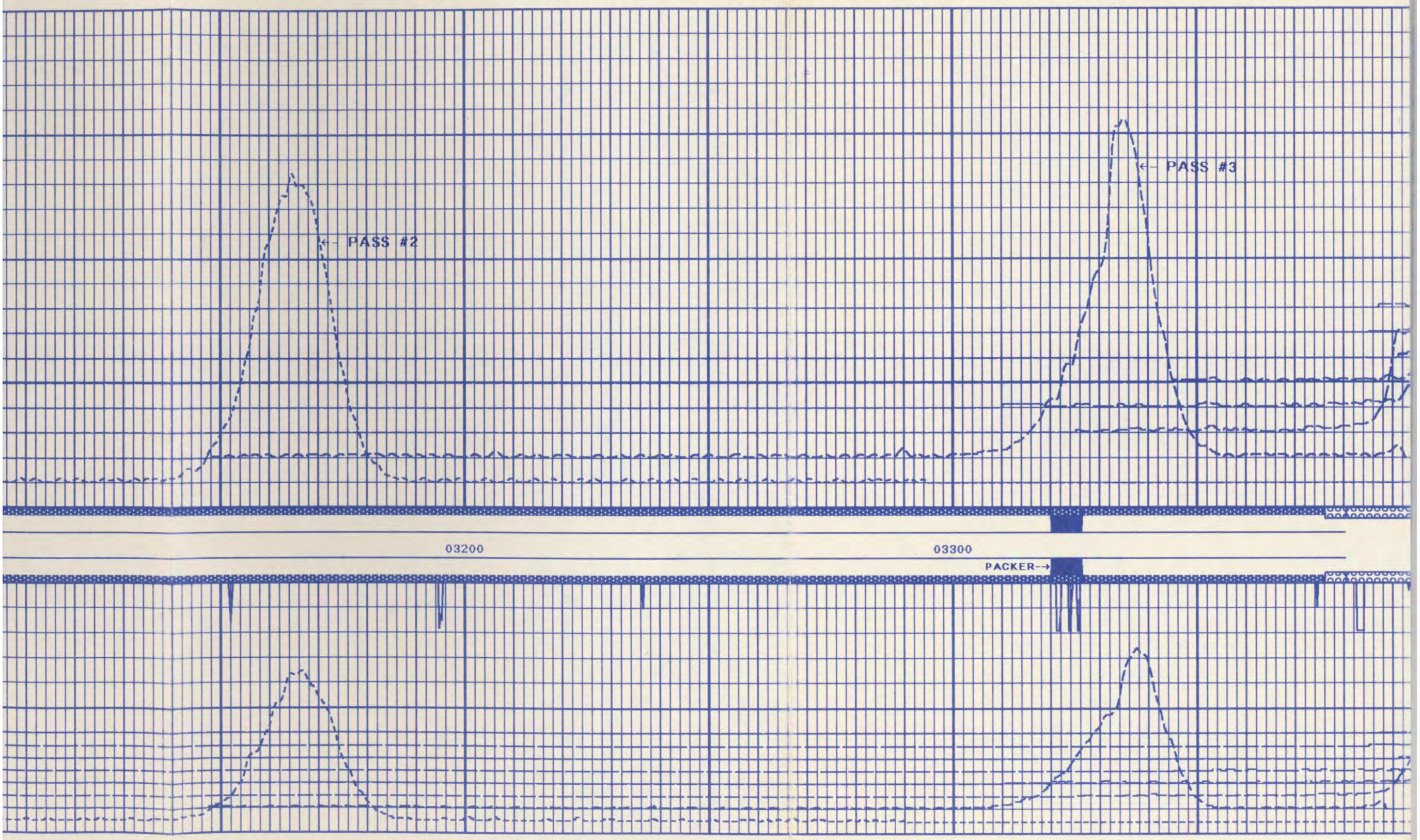
****

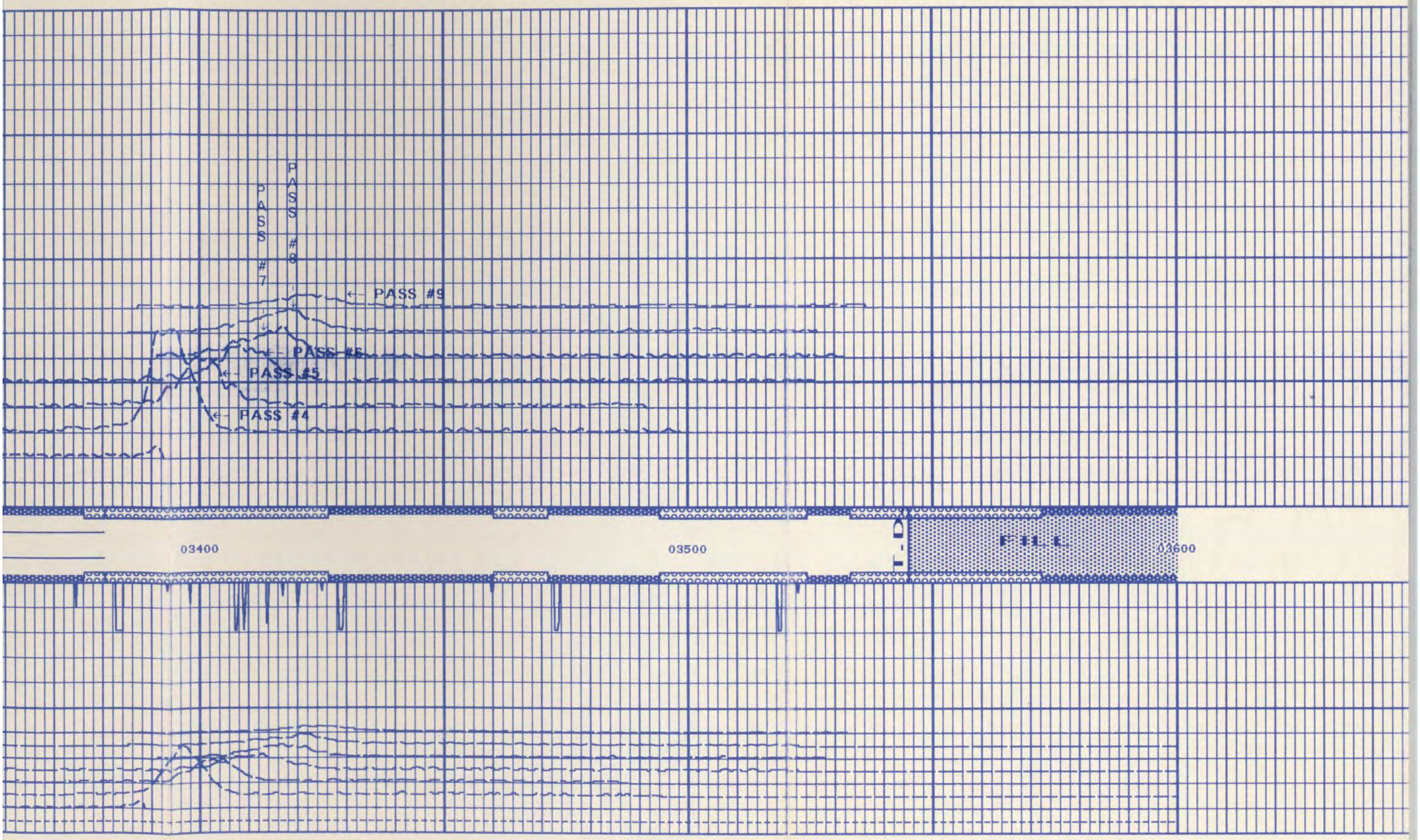
CHASE DOWN NO.1 SHOT SLUG AT 2900'
ALL DEPTHS REFERENCED TO BDET
RKB WAS +17'

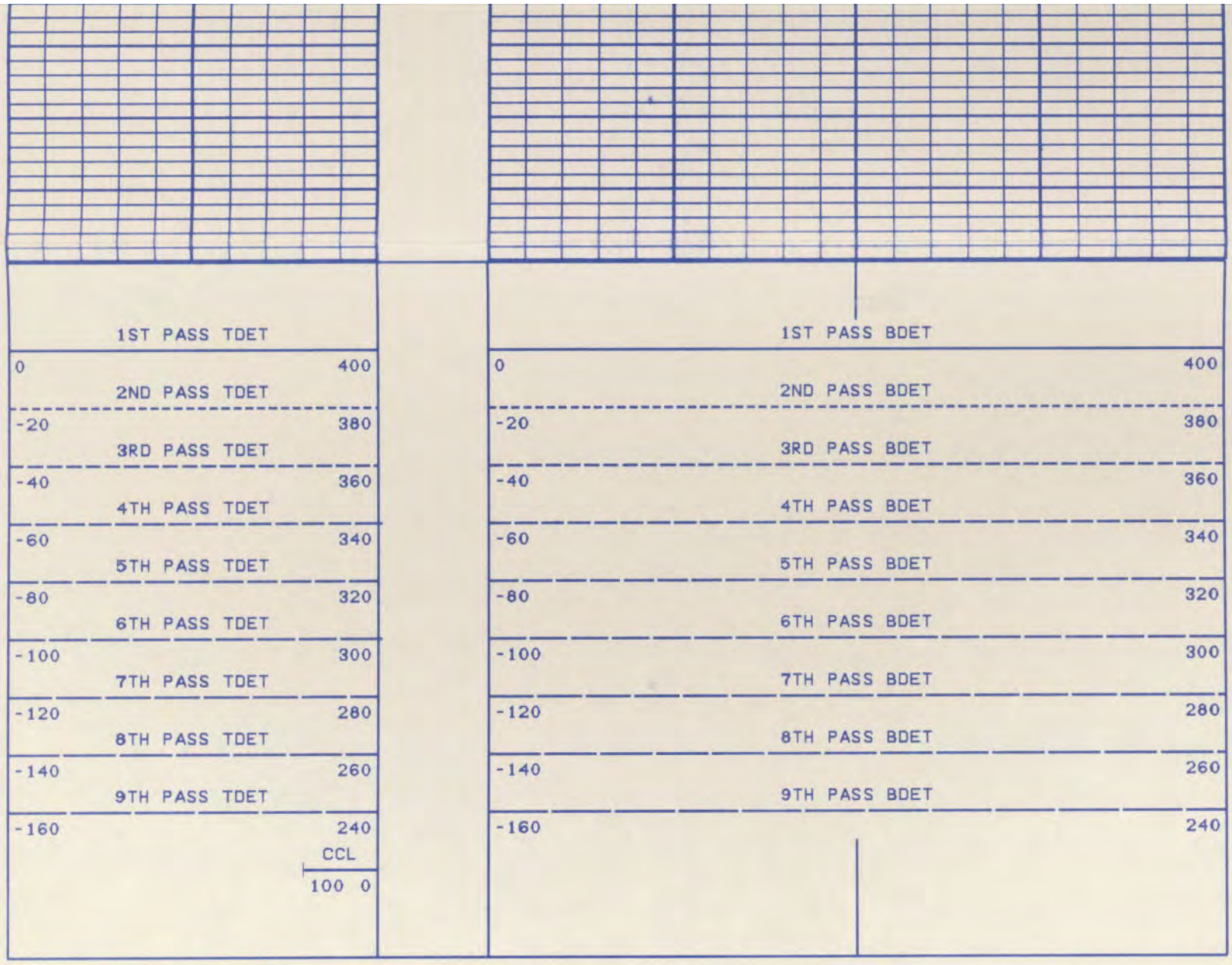
1ST PASS TDET	1ST PASS BDET
0 400	0 400
2ND PASS TDET	2ND PASS BDET
-20 380	-20 380
3RD PASS TDET	3RD PASS BDET
-40 360	-40 360
4TH PASS TDET	4TH PASS BDET
-60 340	-60 340
5TH PASS TDET	5TH PASS BDET
-80 320	-80 320
6TH PASS TDET	6TH PASS BDET
-100 300	-100 300
7TH PASS TDET	7TH PASS BDET
-120 280	-120 280
8TH PASS TDET	8TH PASS BDET
-140 260	-140 260
9TH PASS TDET	9TH PASS BDET
-160 240	-160 240

CCL 100 0

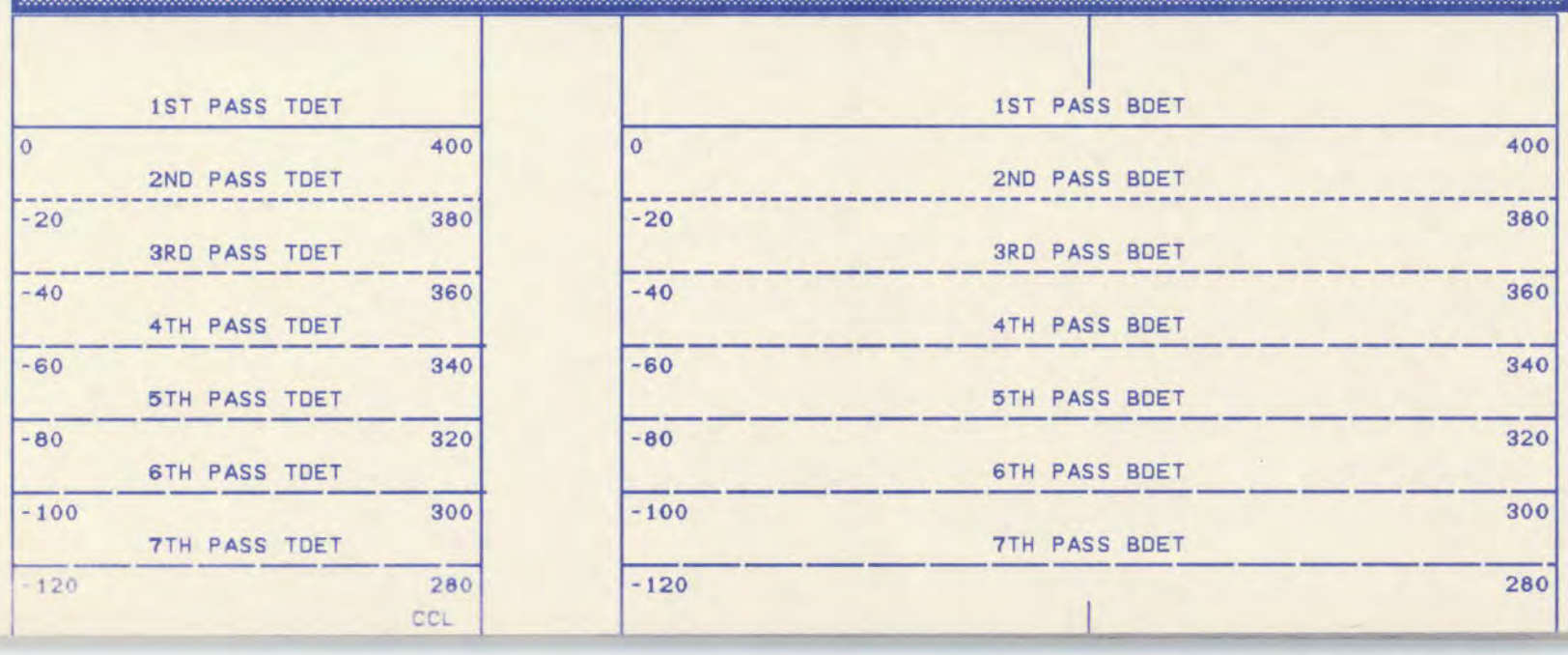

02900
03000
03100
← PASS #1

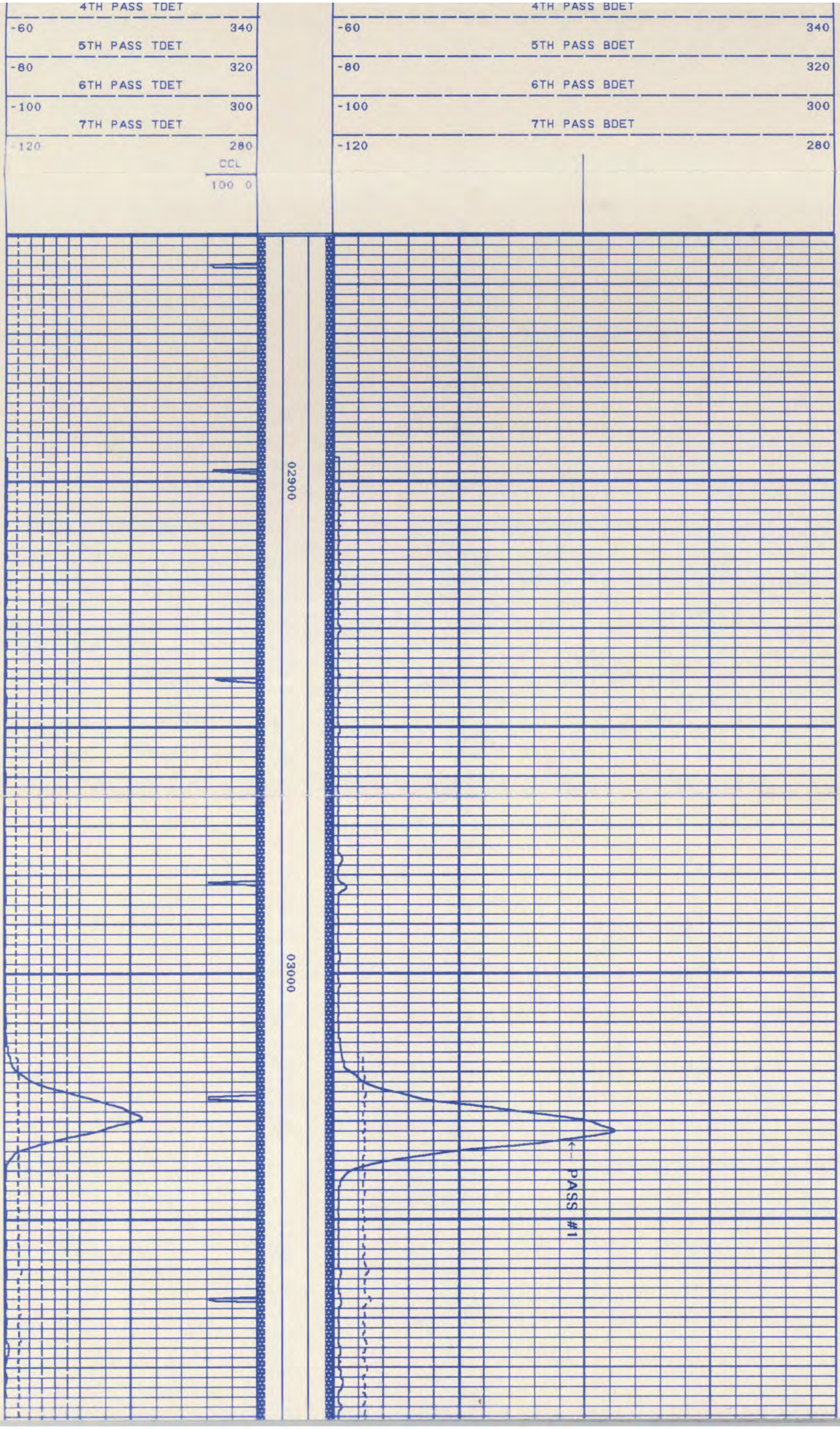

← PASS #2
← PASS #3
03200
03300
PACKER→

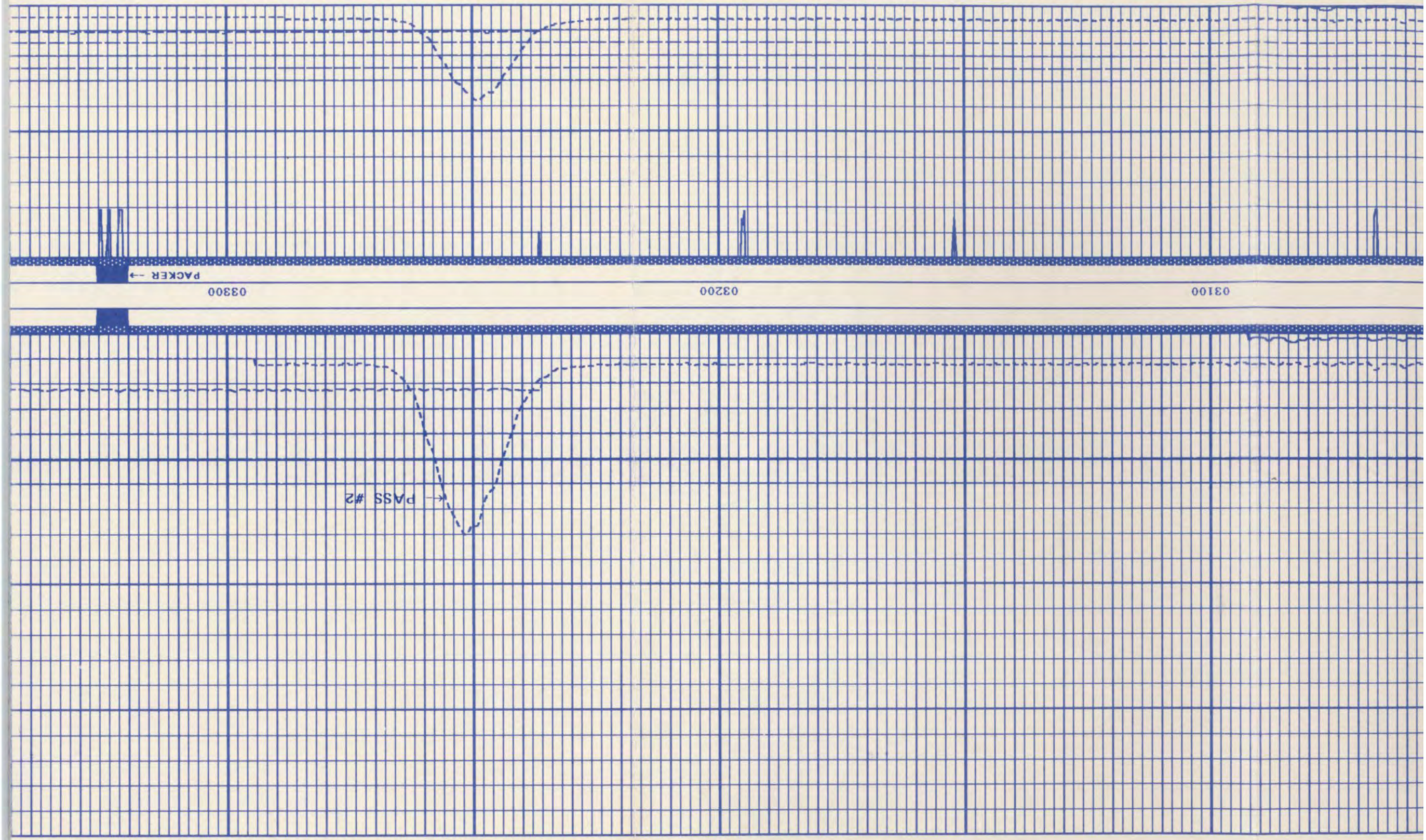

PASS #7
PASS #8
← PASS #9
← PASS #6
← PASS #5
← PASS #4
03400
03500
T.D.
FILL
03600

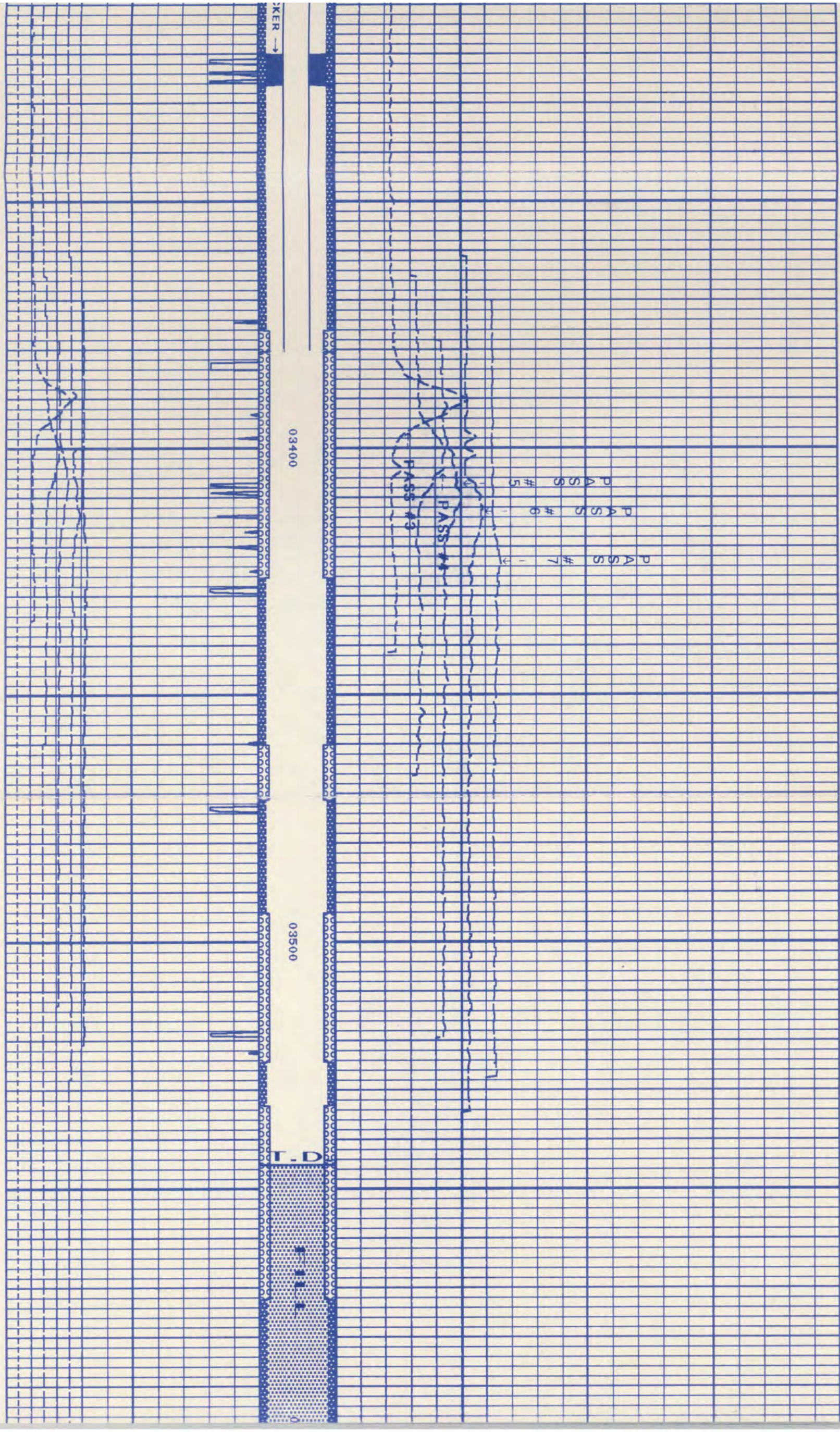


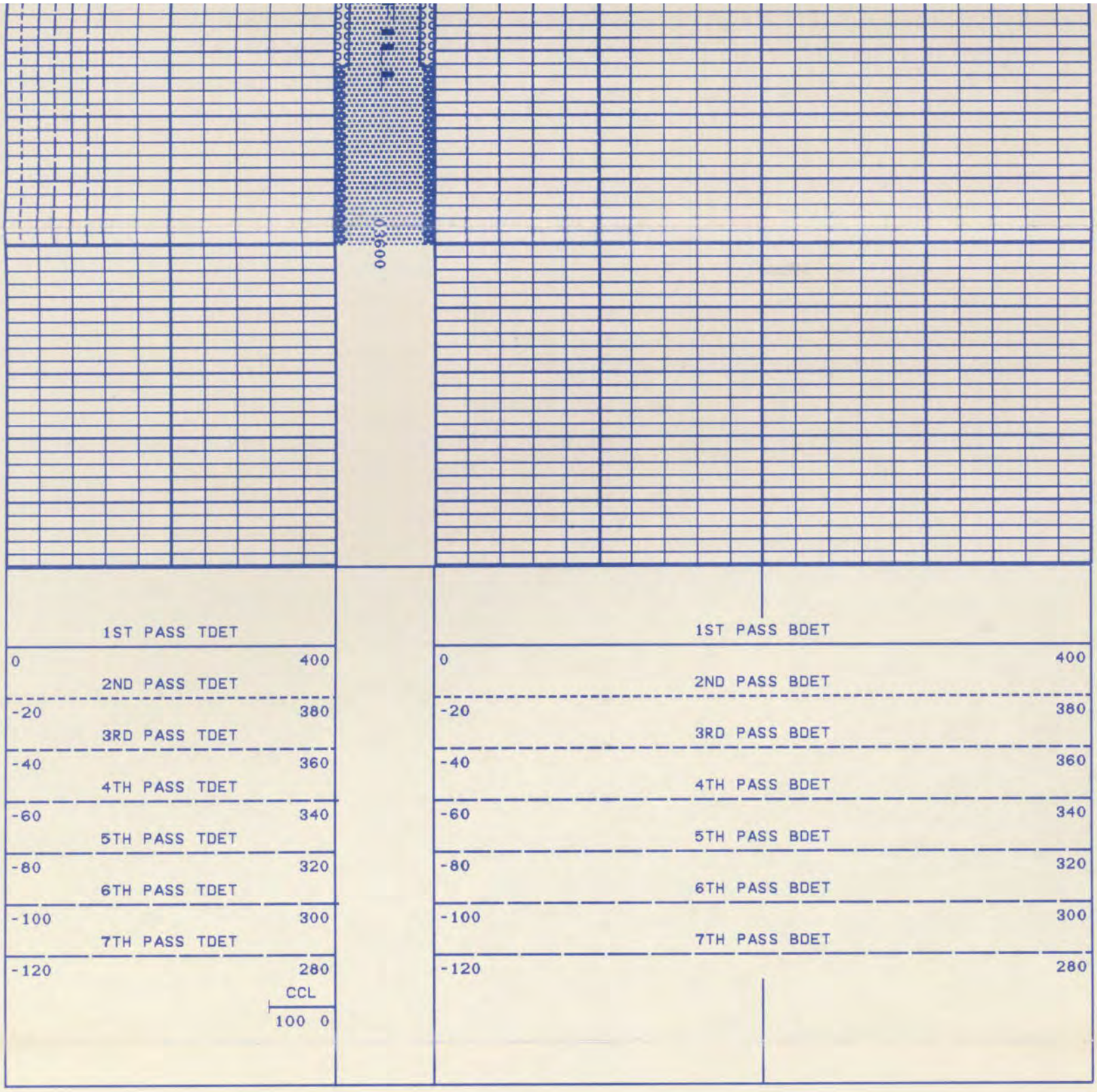
CHASE DOWN NO.2 SHOT SLUG AT 2900′
ALL DEPTHS REFERENCED TO BDET
RKB WAS +17′




4TH PASS TDET
-60
340
5TH PASS TDET
-80
320
6TH PASS TDET
-100
300
7TH PASS TDET
-120
280
CCL
100 0
4TH PASS BDET
-60
340
5TH PASS BDET
-80
320
6TH PASS BDET
-100
300
7TH PASS BDET
-120
280
02900
03000
← PASS #1


PACKER →
03300
03200
03100
← PASS #2


KER →
03400
03500
T.D
PASS #5
PASS #6
PASS #7
PASS #3
PASS #4



20 MIN. PERFORATIONS CHECK, SHOT SLUG AT 3356'. DURATION OF SHOT WAS 3 SECONDS.

****

FILE: 26

COMPANY: HOECHST CELANESE CHEMICAL GROUP, LTD.
WELL NAME: WASTE DISPOSAL WELL 1-A
SERVICE: M 150A FILE: 26 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1
DEPTH: 3356

RUN: 1
TRIP: 1
TIME: 18:03:14
MODE: PLAYBACK

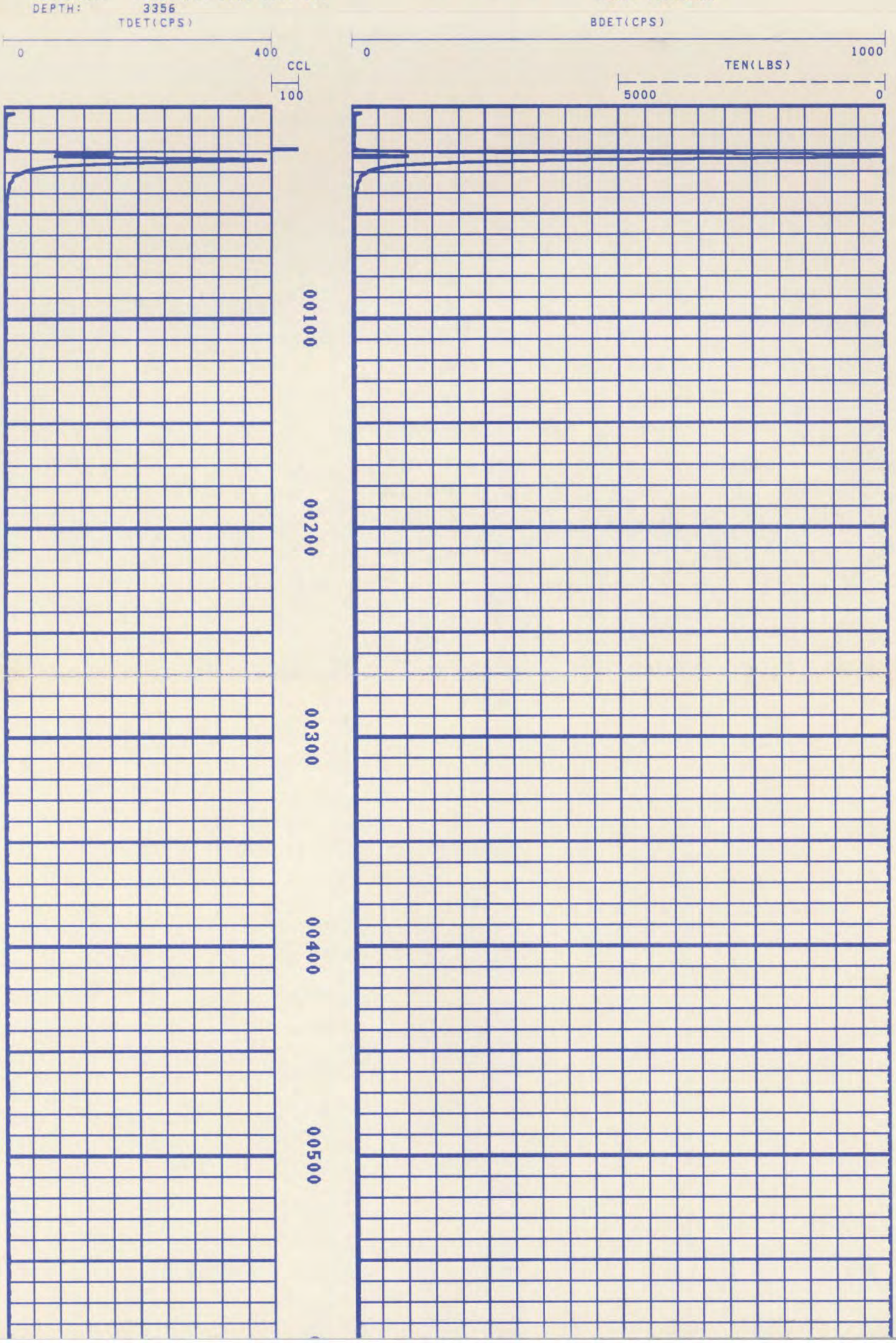
WAS 3 SECONDS.

****

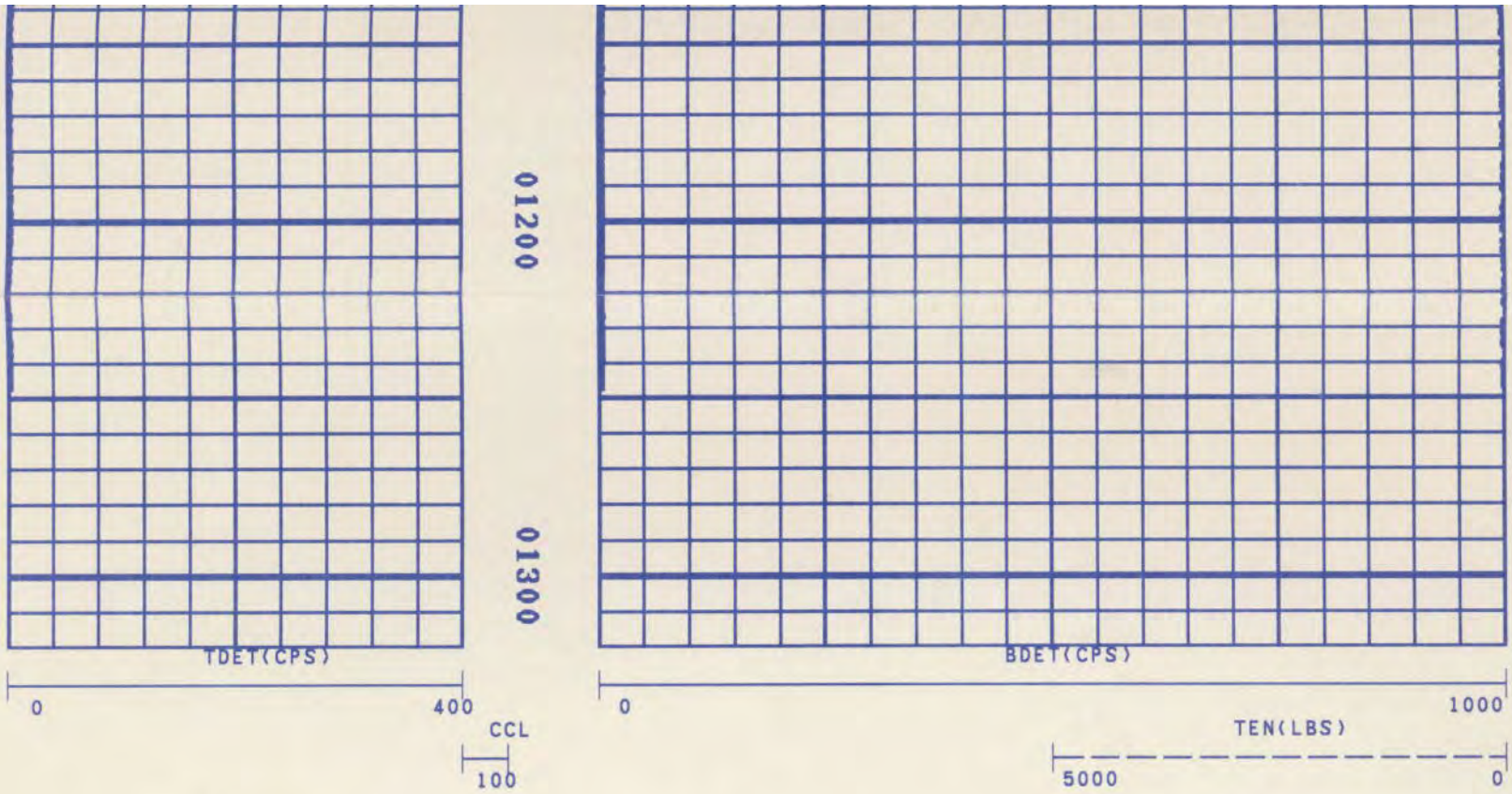
FILE: 26

COMPANY: HOECHST CELANESE CHEMICAL GROUP, LTD [redacted].
WELL NAME: WASTE DISPOSAL WELL 1-A
SERVICE: M 150A FILE: 26 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1
DEPTH: 3356

RUN: 1
TRIP: 1
TIME: 18:03:14
MODE: PLAYBACK



500 00600 00700 00800 00900 01000 01100 01200



DISPLAY SCALE CHANGES

*** NONE ***

PARAMETERS

*** NONE ***

FILE: 26

****

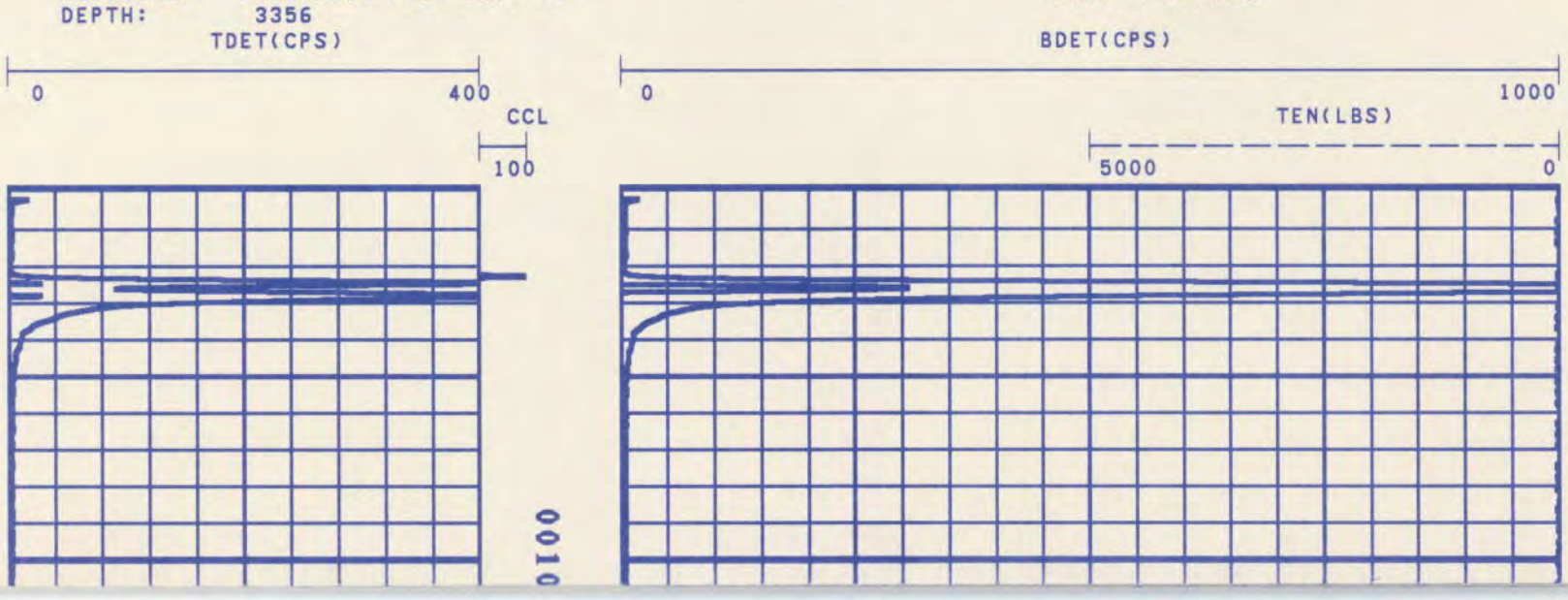
20 MIN. PERFORATIONS CHECK, SLUG SHOT AT 3356'. DURATION OF SHOT WAS 3 SECONDS.

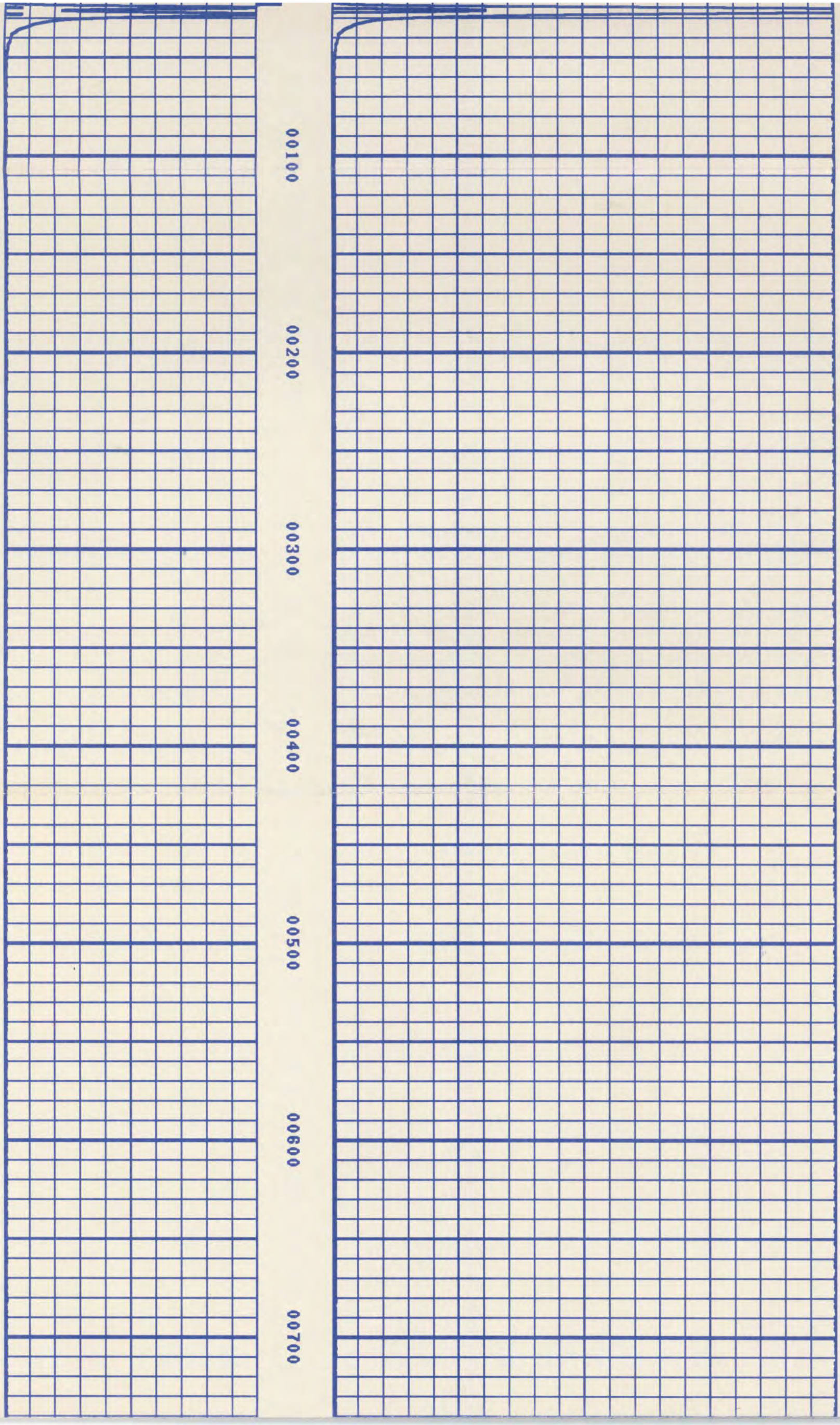
****

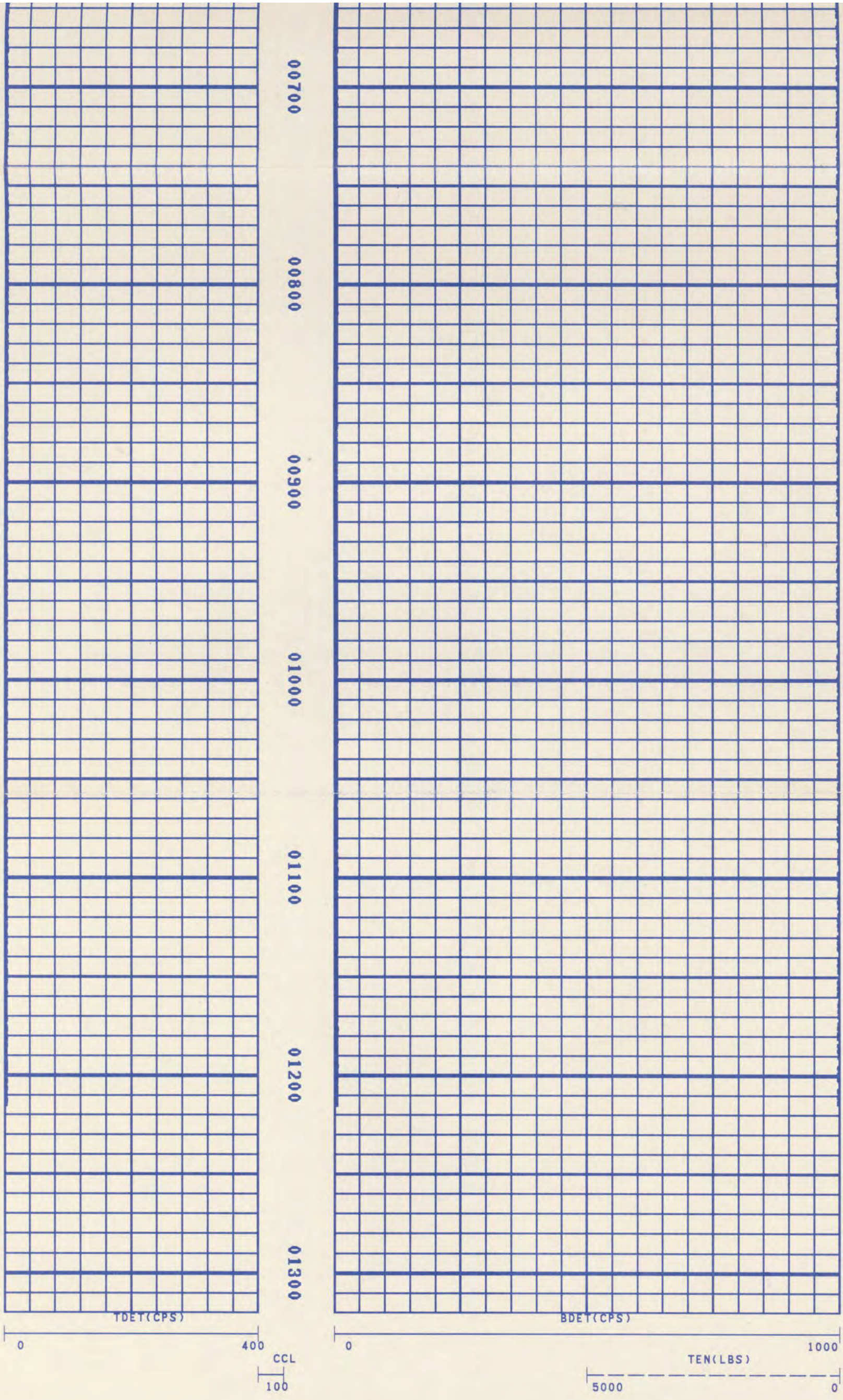
FILE: 27

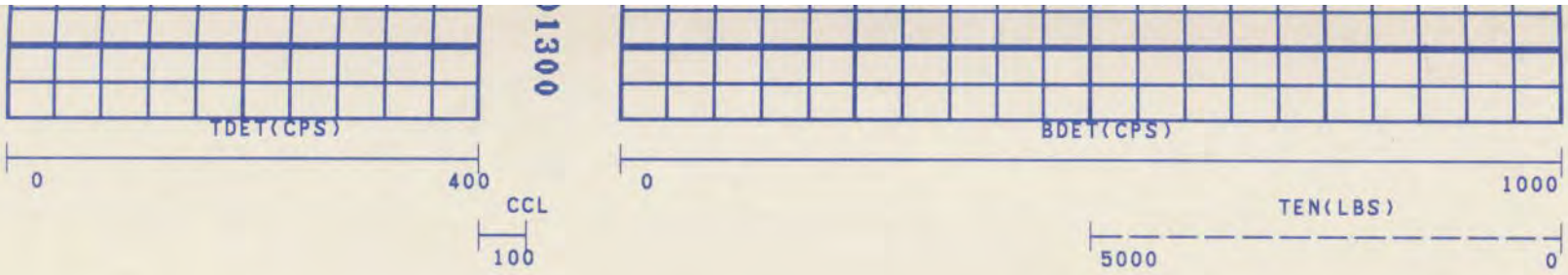
COMPANY: HOECHST CELANESE CHEMICAL GROUP, LTD [redacted].
WELL NAME: WASTE DISPOSAL WELL 1-A
SERVICE: M 150A FILE: 27 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1
DEPTH: 3356

RUN: 1
TRIP: 1
TIME: 18:29:19
MODE: PLAYBACK




00100
00200
00300
00400
00500
00600
00700


00700
00800
00900
01000
01100
01200
01300
TDET(CPS)
0
400
CCL
100
BDET(CPS)
0
1000
TEN(LBS)
5000
0



DISPLAY SCALE CHANGES

*** NONE ***

PARAMETERS

*** NONE ***

FILE: 27

****

AFTER LOG BASE PASS

NOTE: GAMMA RAY HOT SPOTS IN THE PERFORATED INTERVAL, ARE THE RESULT OF THE EXTRA LONG SHOT DURATION FOR THE STATIONARY CHECKS THESE HOT SPOT IN THE GAMMA RAY REPEATED AND IT IS EVIDENT THAT THERE IS NO UPWARD FLUID MOVEMENT.

****

FILE: 6

PARAMETERS

*** NONE ***

DISPLAY SCALE CHANGES

PARAMETERS

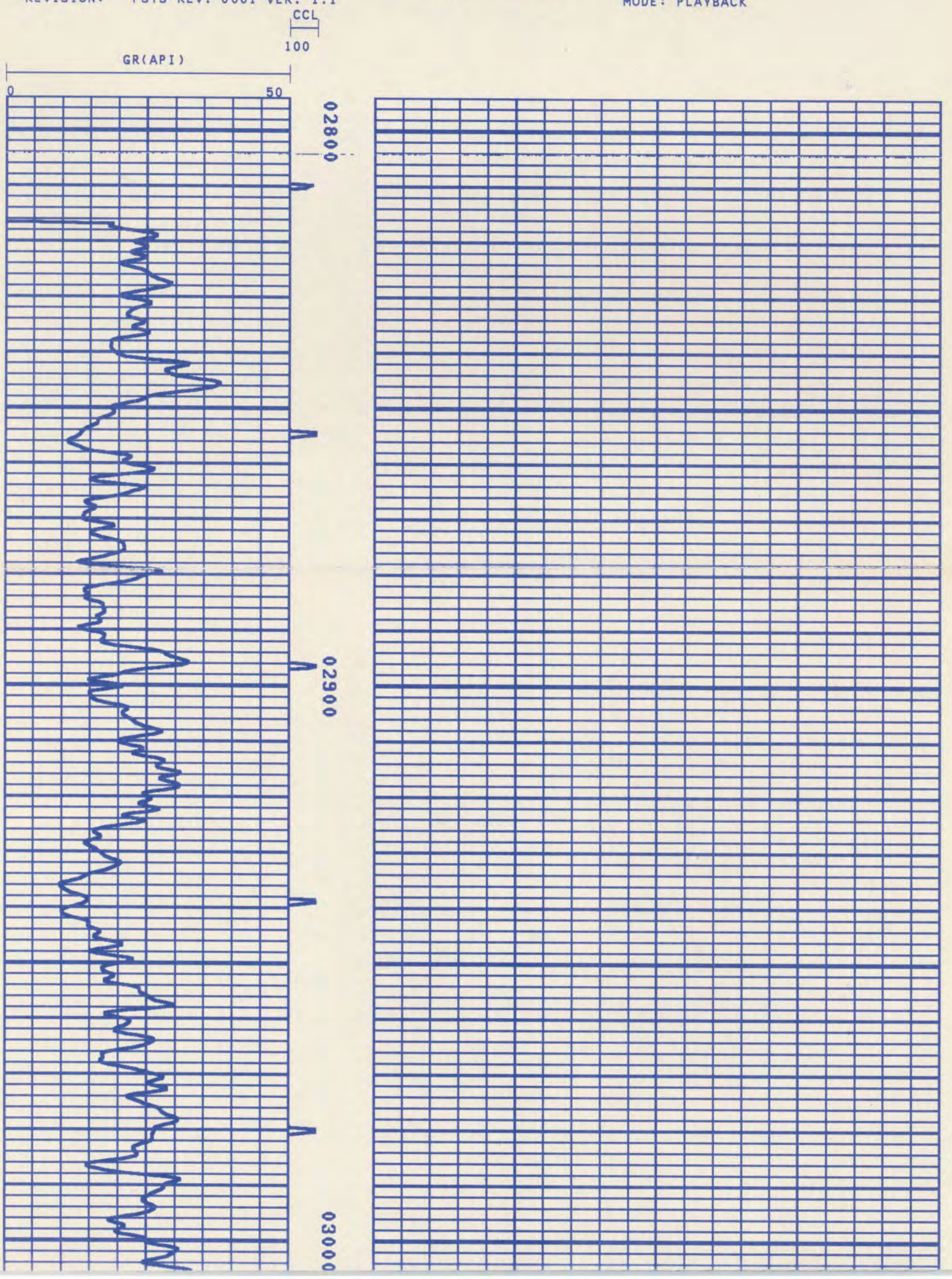
*** NONE ***

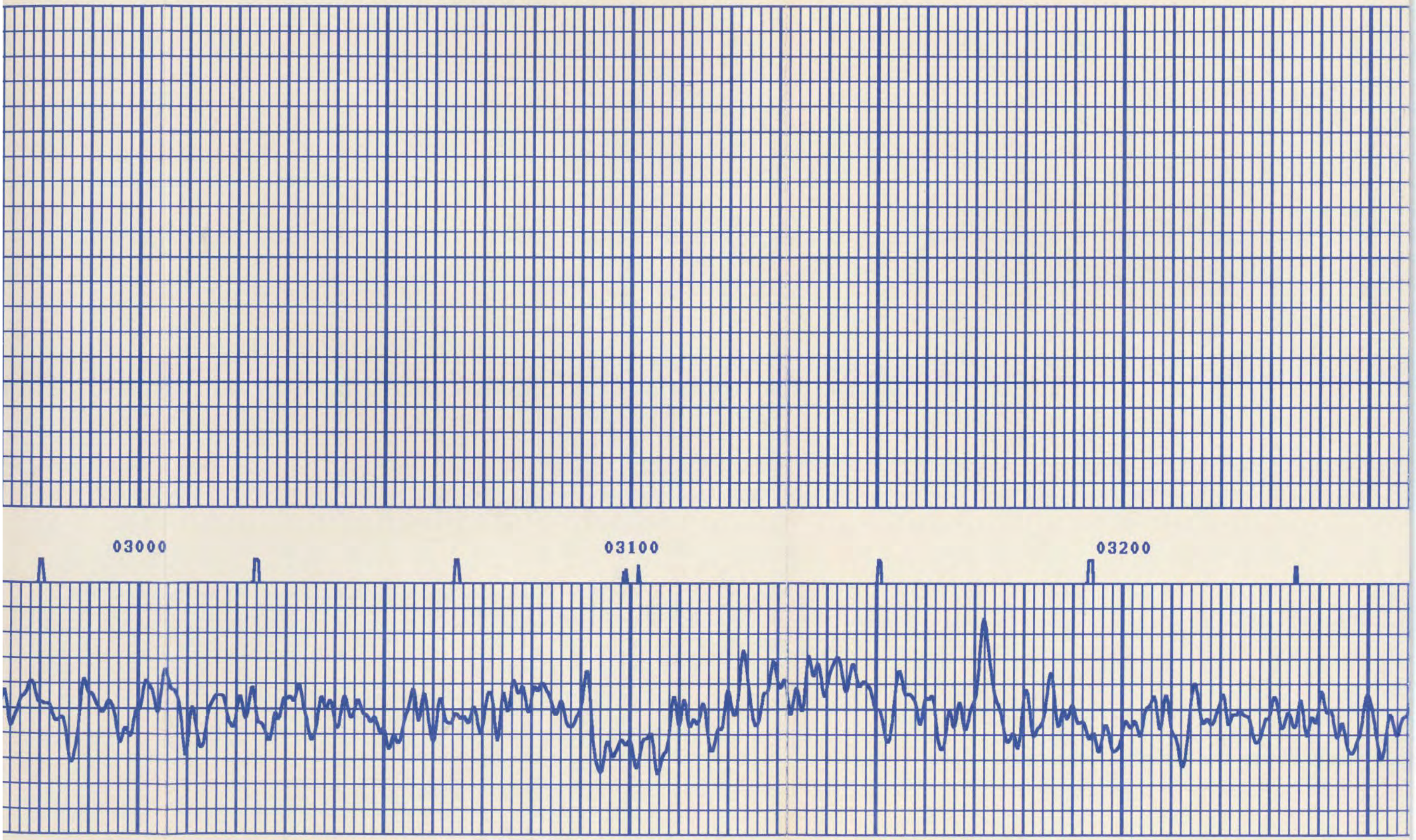
DISPLAY SCALE CHANGES

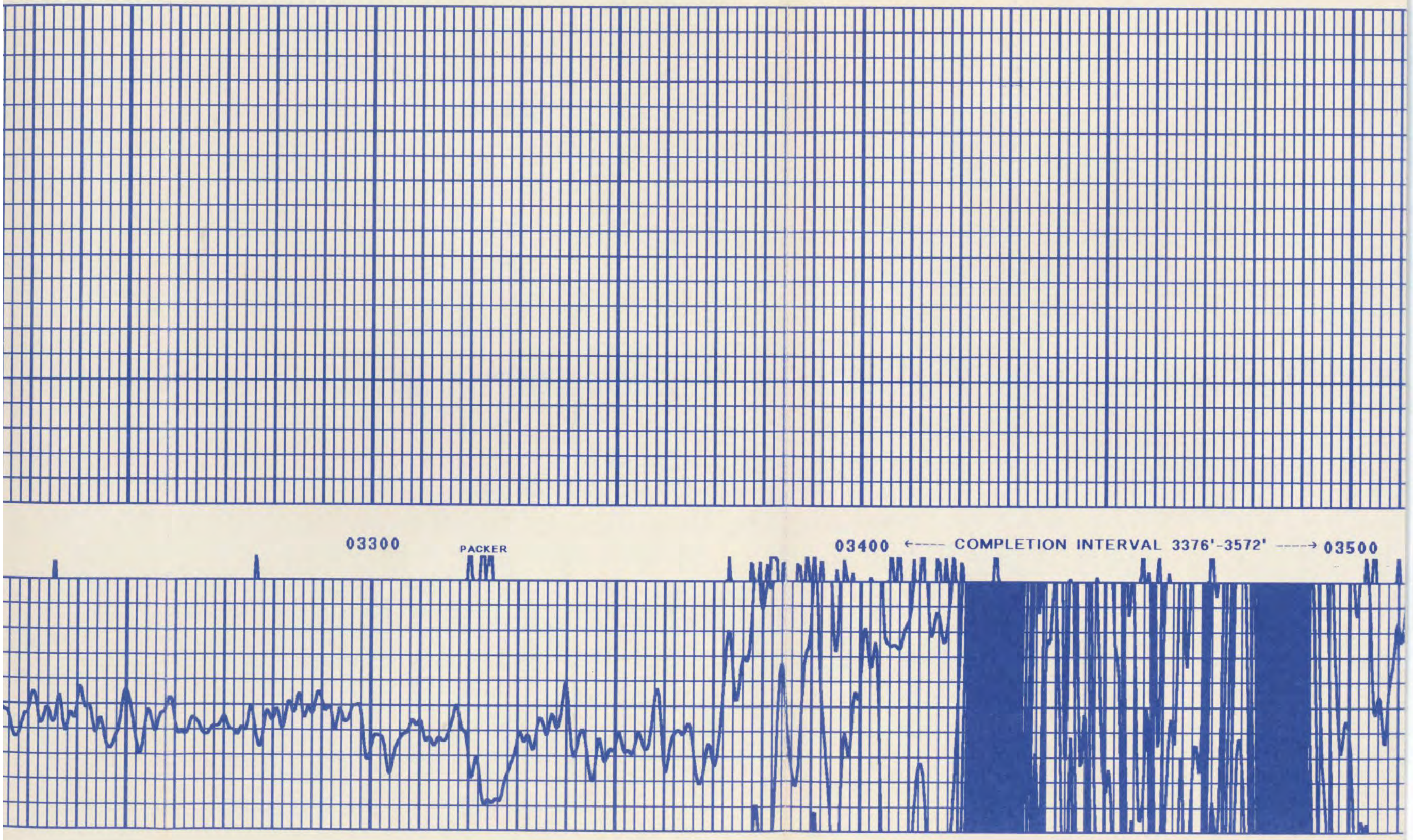
*** NONE ***

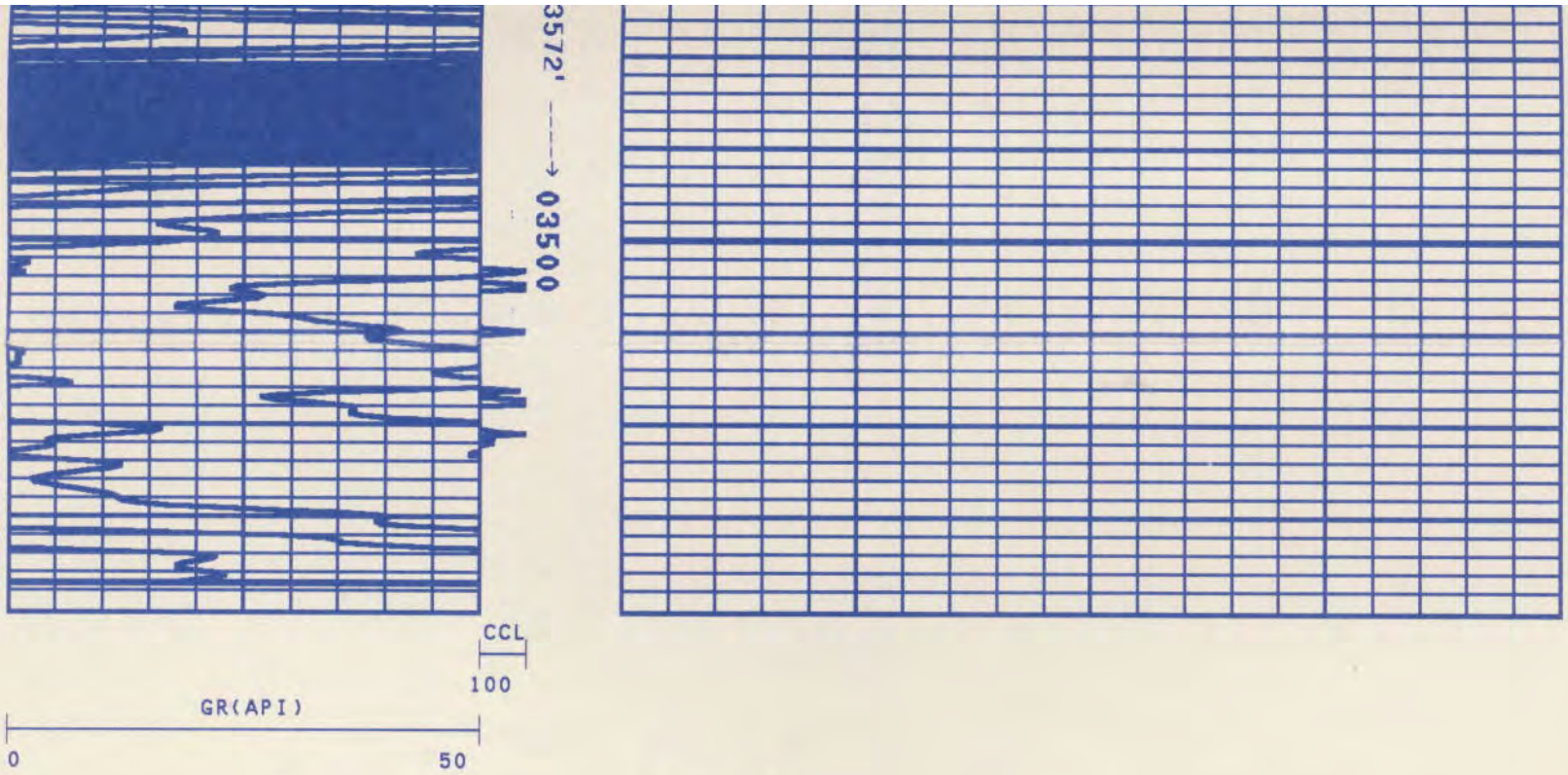
COMPANY: HOECHST CELANESE CHEMICAL GROUP, LTD [redacted].
WELL NAME: WASTE DISPOSAL WELL NO.1-A
SERVICE: M 159P FILE: 6 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1

RUN: 1
TRIP: 1
TIME: 19:25:53
MODE: PLAYBACK




03000
03100
03200


03300
PACKER
03400
COMPLETION INTERVAL 3376'-3572'
03500



FILE: 6

****

AFTER LOG BASE PASS REPEAT
NOTE: NO UPWARD MOVEMENT

****

FILE: 4

PARAMETERS

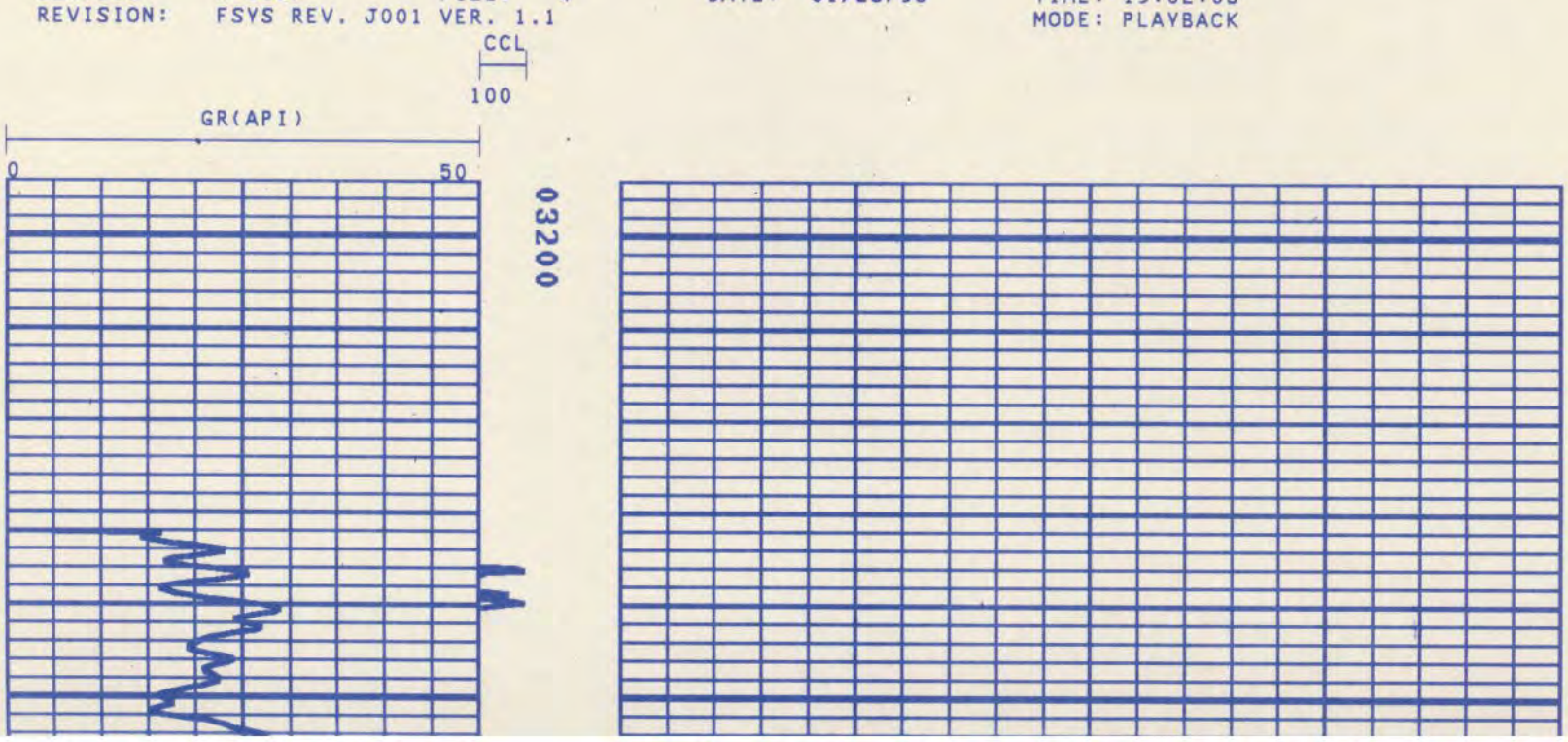
*** NONE ***

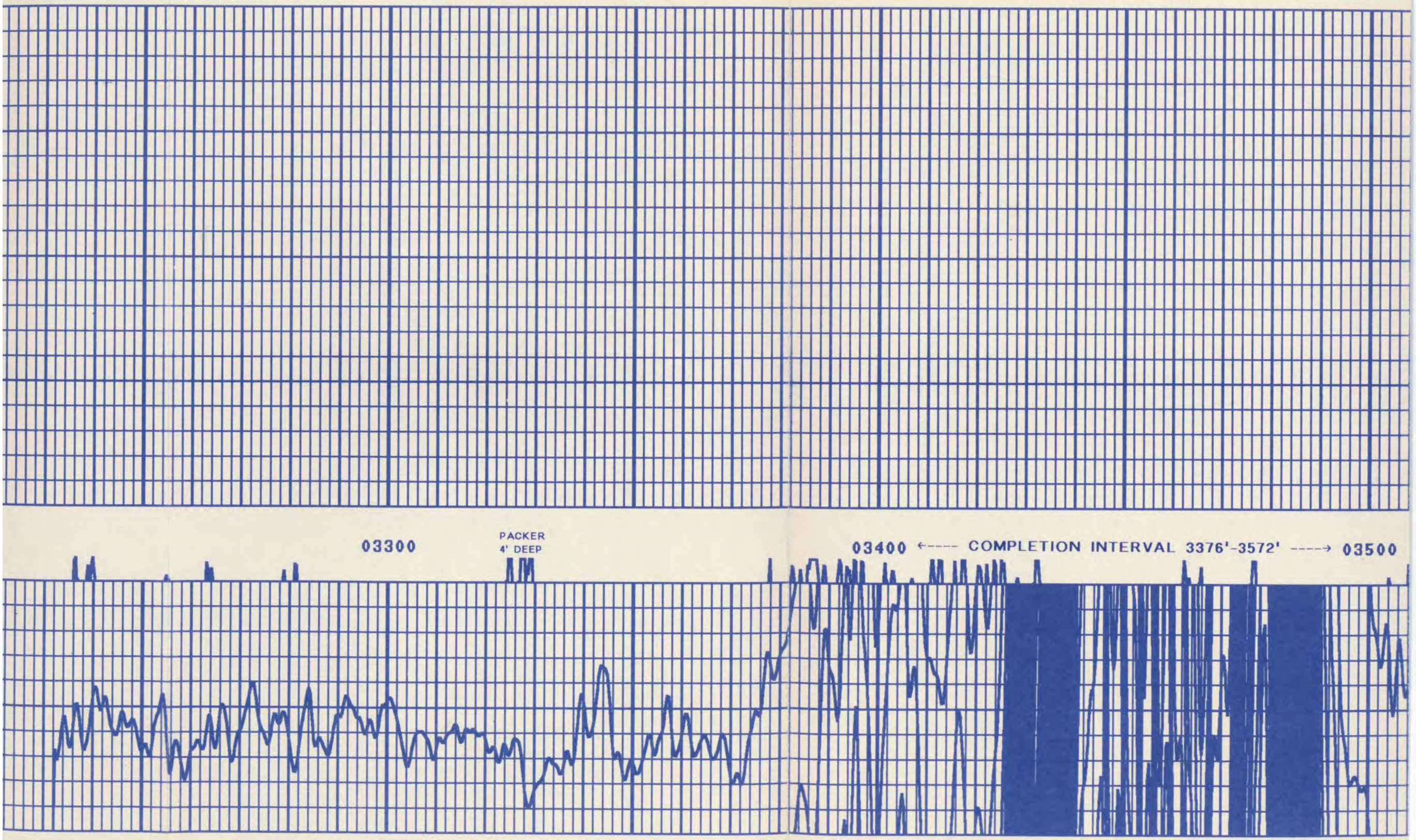
DISPLAY SCALE CHANGES

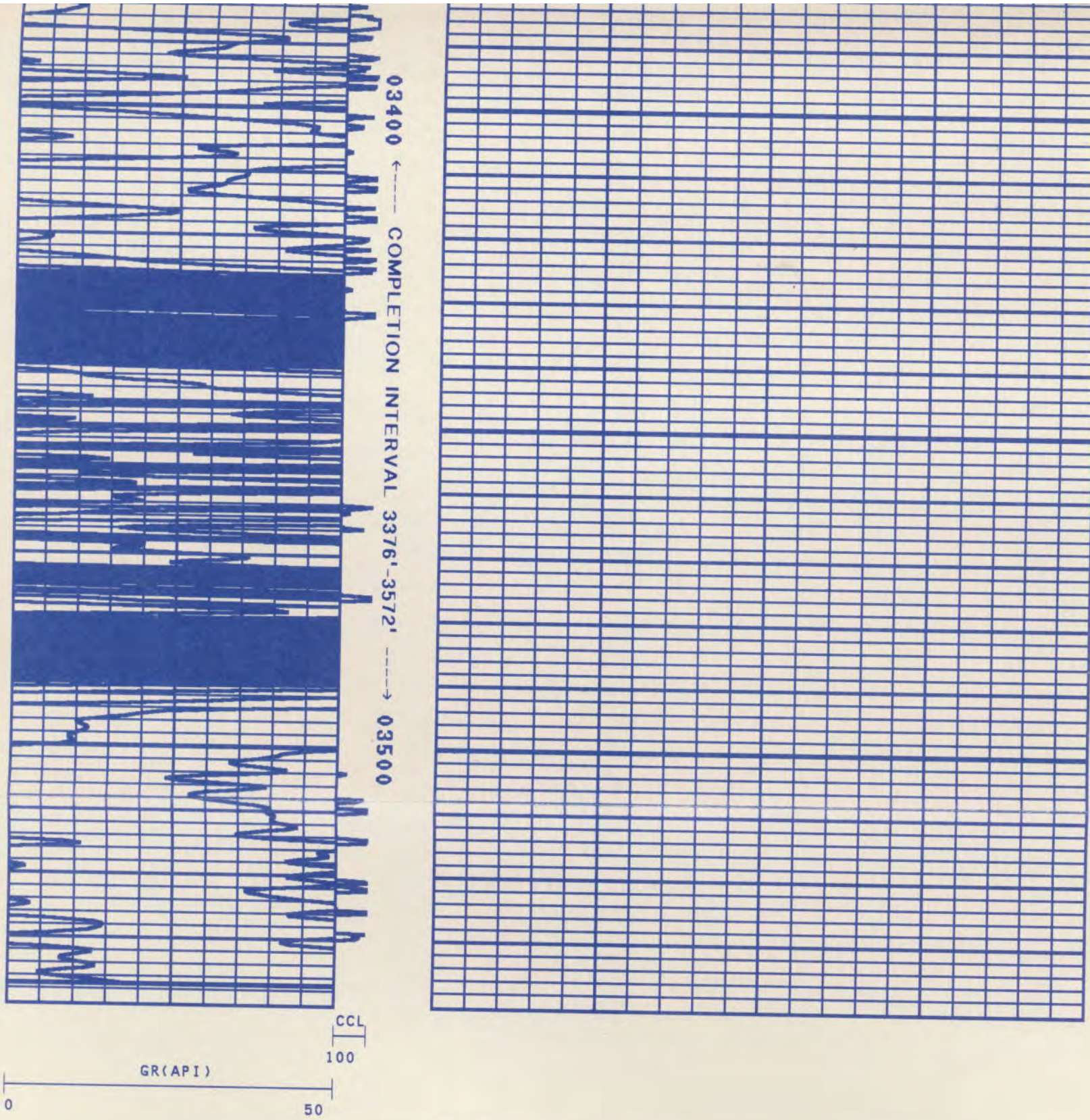
*** NONE ***

COMPANY: HOECHST CELANESE CHEMICAL GROUP, LTD.
WELL NAME: WASTE DISPOSAL WELL NO.1-A
SERVICE: M 159P FILE: 4 DATE: 01/25/96
REVISION: FSYS REV. J001 VER. 1.1

RUN: 1
TRIP: 1
TIME: 19:02:05
MODE: PLAYBACK




03300
PACKER
4' DEEP
03400 ←---- COMPLETION INTERVAL 3376'-3572' ----→ 03500



FILE: 4

****

WESTERN ATLAS LOGGING SERVICES

APPENDIX B

ANNULUS PRESSURE TEST DATA AND PLOTS

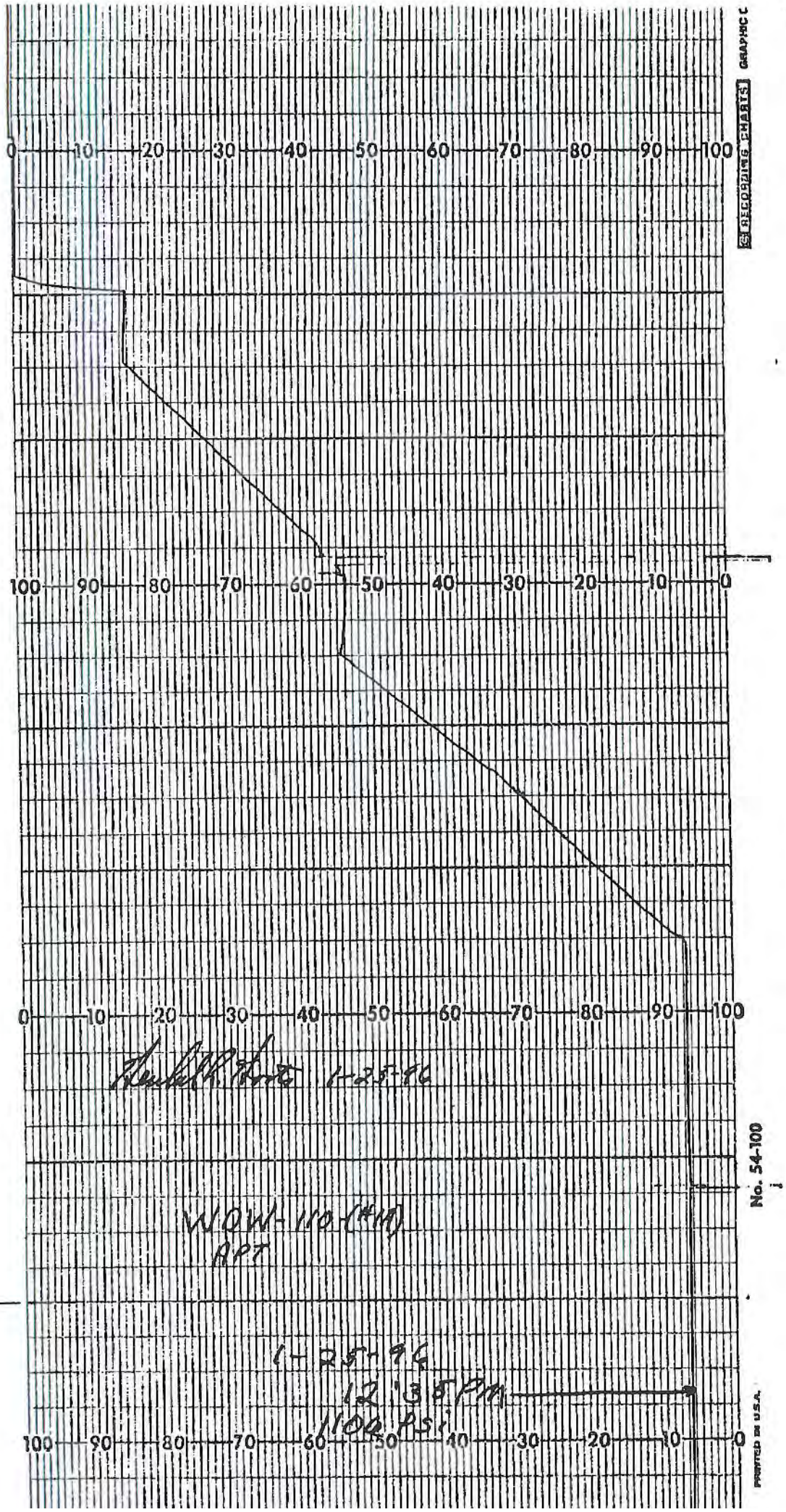
ANNULUS PRESSURE DATA
HOECHST CELANESE CHEMICAL GROUP, LTD.
Bay City Plant
Waste Disposal Well 110 (Well No. 1-A)

January 25, 1996

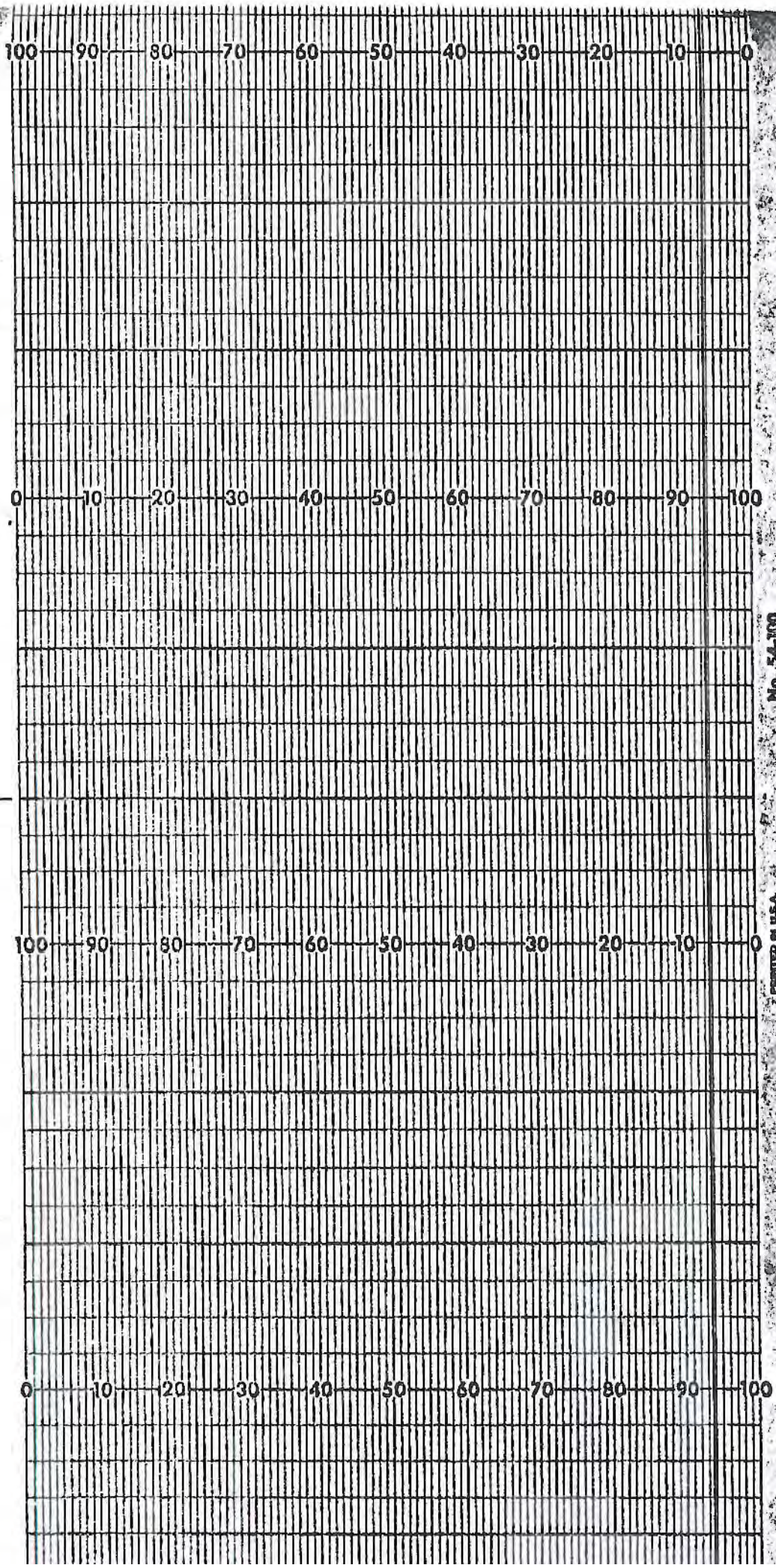
Time (am)	Tubing Pressure (psig)	Casing Pressure (psig)	Remarks
9:15	73	859	SI 36 hours following BHP survey
9:30	73	859	SI
9:31	73	900	Starting injection N_2
9:34	73	1050	
9:36	73	1110	Block in N_2 source
9:37	73	1109	
9:45	73	1101	Valves leaking at surface
9:50	73	1095	
10:45	73	800	Bleeding off N_2 gas to 175
11:10	73	175	Repressuring system
11:15	73	500	
11:25	73	1050	
11:27	73	1113	Blocked in N_2 tanks
11:30	73	1110	
11:35	73	1109	Start APT
11:40	73	1109	
11:45	73	1108	
11:50	73	1108	
11:55	73	1108	
12:00 PM	73	1107	
12:05	73	1107	
12:10	73	1107	
12:15	73	1107	
12:20	73	1106	
12:25	73	1106	
12:30	73	1106	
12:35	73	1106	Stop APT
12:40	73	190	Bleed to operating level

Pressure was measured using HCCG's certified calibrated pressure instrument, a portable digital Eaton Pressure Sensor, Type UPC BACB, Serial No. A1258, with optional ranges from zero to 400 psig, zero to 1,000 psig and zero to 2000 psig and was installed onto the annulus outlet. Note: The zero to 2000 psig range was utilized for this test. A certificate of calibration, included in Appendix C, shows that the pressure sensor was calibrated on November 15, 1995.

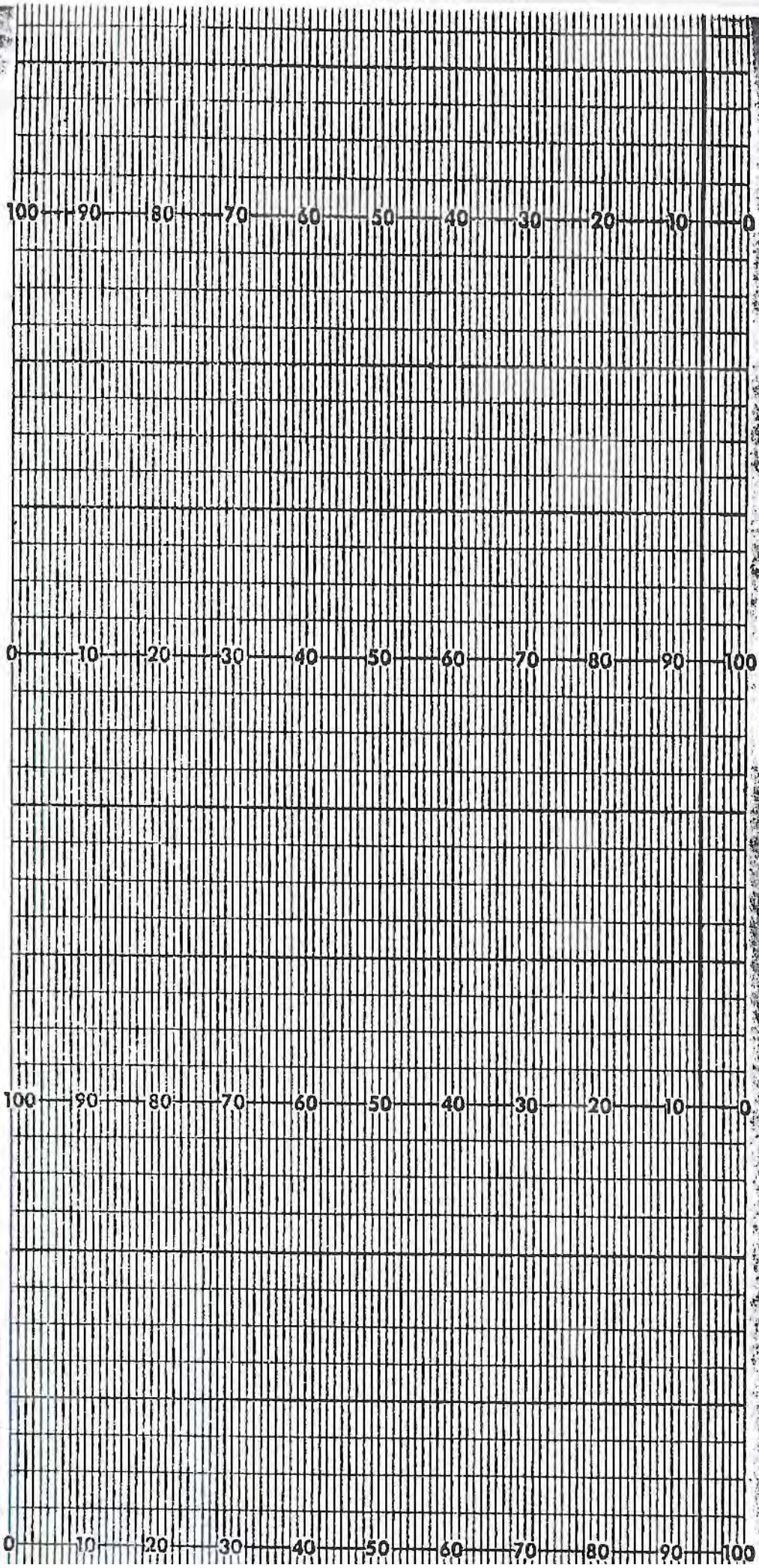
HCCG's facility digital transmitter pressure recorder, Honeywell Instruments Coop., Smart Honeywell Model ST 3000, normally has a normal pressure range from zero to 1000 psig. However, for the APT the range was modified by Mr. Wilson Cupples and Mr. Ray Horton to a range of zero to 1200 psig. A copy of the computer run (included in Appendix B) shows that the annulus transmitter and recorder were calibrated as an 'End to End" unit on November 15, 1995. Also, the same calibration standard was used on the Eaton Pressure Sensor and the facility digital transmitter pressure recorder.

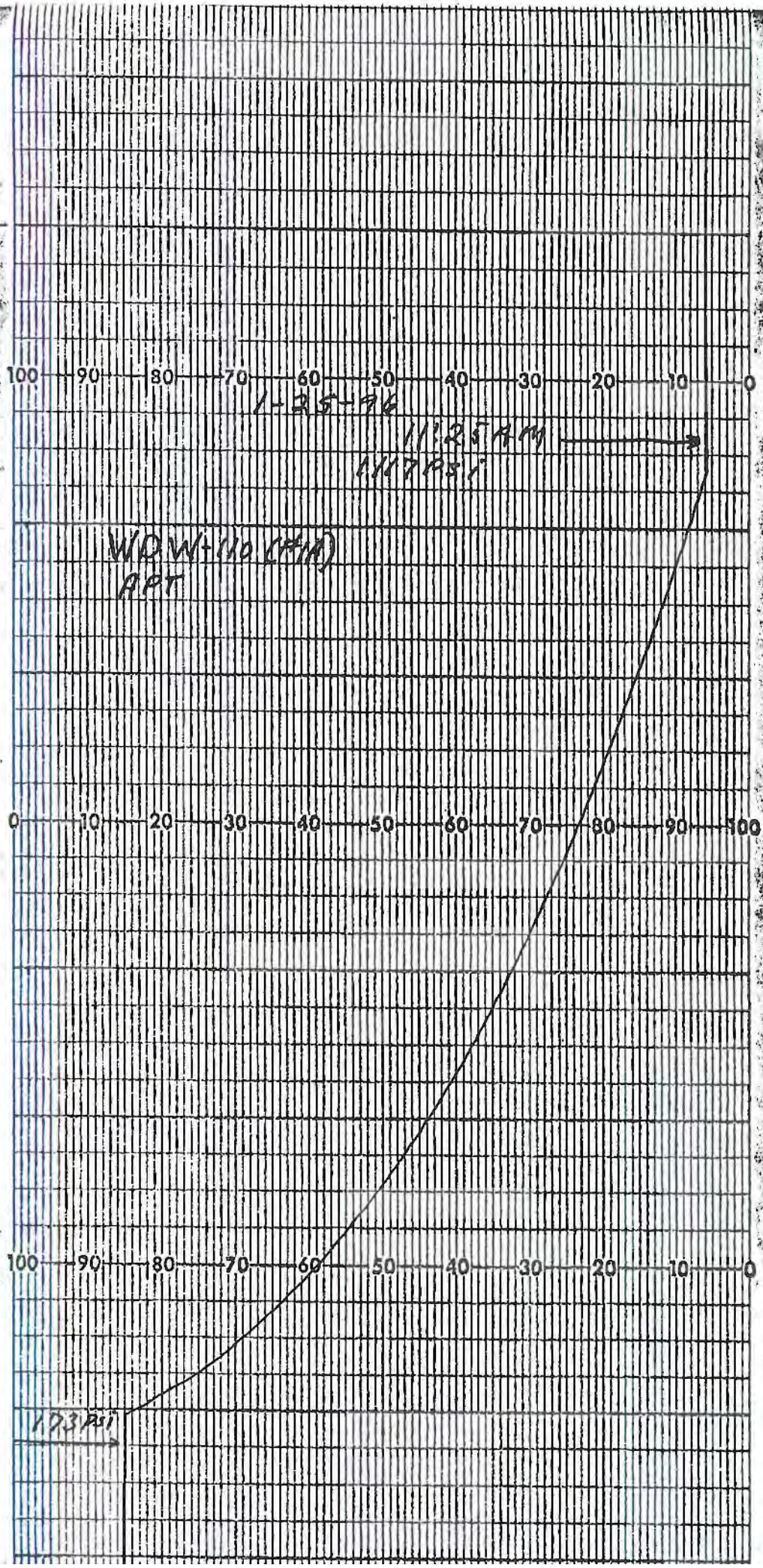

0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
1-25-96
WOW-110-(#11)
APT
1-25-96
12:35 PM
1100 PSI
100 90 80 70 60 50 40 30 20 10 0
No. 54-100
PRINTED IN U.S.A.
RECORDING CHARTS
GRAPHIC C

0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
RECORDING CHARTS
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK



No. 54-100
PRINTED IN U.S.A.


100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
RECORDING CHARTS
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK


100 90 80 70 60 50 40 30 20 10 0
1-25-96
11:25 AM
1117 PSI
WOW-110 (HA)
APT
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
173 PSI
No. 54-100
PRINTED IN U.S.A.
CONTROLS CORPORATION
BUFFALO, NEW YORK

APPENDIX C

CALIBRATION CERTIFICATES

Gauge serial number: 69681
Range: 2514.76 PSIA
Date calibrated: 12/01/95
Date verified: 12/06/95
Model: EPG-520

GRC HOUSTON SERVICE CENTER
CUSTOMER:
GAUGE #:
REFERENCE:

Fax 683-0128

Gauge serial number: 69681
Range: 2514.76 PsiA
Date calibrated: 12/01/95
Date verified: 12/06/95
Model: EPG-520

GAUGE ACCURACY CALCULATIONS

Curve fit: 2.028 PsiA
1/2 Hysteresis: 0.000 PsiA
Short term repeatability at 0 Deg. F: 0.000 PsiA
Long term repeatability at 0 Deg. F: 0.000 PsiA

Overall accuracy: 2.028 PsiA

ELECTRONIC GAUGE CALIBRATION

Gauge serial number: 69681
Range: 2514.76 PsiA
Date calibrated: 12/01/95
Date verified: 12/06/95
Model: EPG-520
Coefficient type: GRC FREQUENCY

TEMPERATURE SUMMARY

Maximum positive error: 0.987 Deg. F
Maximum negative error: -0.892 Deg. F
Sensitivity: 0.085 Deg. F/Hz
Sensitivity: 11.765 Hz/Degr. F

PRESSURE SUMMARY

Maximum positive error: 2.028 PsiA
Occurs at: 349.971 Deg. F
And at: 116.788 PsiA
Maximum negative error: -1.530 PsiA
Occurs at: 349.971 Deg. F
And at: 13.230 PsiA
Sensitivity: 1.741 PsiA/Hz
Sensitivity: 0.574 Hz/PsiA

MILTON M. COOKE COMPANY

WELL TESTING SPECIALISTS

2310 McALLISTER • HOUSTON, TEXAS 77092

713/683-0333

TX. WATS: 1-800-392-3861

FAX: 683-0128

FIELD CALIBRATION CHECK: [PRE-TEST]

(GRC EPG-520 - SURFACE READOUT GAUGE)

DATE: 01/23/1996

D.W.T. S/N: 3469

GRC GAUGE S/N: 69681

D.W.P. (PSIG)	GAUGE PRESSURE (PSIA)	DIFFERENCE (+/-PSI)
0.0	14.41	+14.41
500.0	514.72	+14.72
1000.0	1014.24	+14.24
1500.0	1515.30	+ 15.30

2000.00	2014.09	+14.09
0.00	14.55	+ 14.55

MILTON M. COOKE COMPANY

WELL TESTING SPECIALISTS

2310 McALLISTER • HOUSTON, TEXAS 77092

713/683-0333

TX. WATS: 1-800-392-3861

FAX: 683-0128

FIELD CALIBRATION CHECK: [POST-TEST]

(GRC EPG-520 - SURFACE READOUT GAUGE)

DATE: 01/25/1996

D.W.T. S/N: 3469

GRC GAUGE S/N: 69681

D.W.P. (PSIG)	GAUGE PRESSURE (PSIA)	DIFFERENCE (+/-PSI)
0.0	17.93	+17.93
500.0	514.13	+14.13
1000.0	1014.03	+14.03
1500.0	1514.73	+ 14.73

2000.00	**2014.73**	**+14.73**
0.00	**14.25**	**+ 14.25**

TRANSCAT®

CALIBRATION LAB

Certificate of Calibration

TRANSCAT will maintain and document the traceability of all its standards to the National Institute of Standards and Technology, NIST (formerly NBS), or the National Research Council, NRC, of Canada, or to other recognized national or international standard bodies, or to measurable conditions created in our laboratory using established physical constants and/or natural physical phenomena, and recognized procedures. The TRANSCAT calibrations system, when applicable, conforms to the requirements of MIL-STD-45662A.

Complete records of work performed are maintained by TRANSCAT and are available for inspection. Laboratory assets used in the performance of this calibration are shown below the certified instrument description.

TEMPERATURE : 68 °F

RELATIVE HUMIDITY OF: 43 %

Customer : HOECHST CELANESE
Manufacturer : EATON CORPORATION
Model Number : UPC5000BACB
Serial Number : A1258
Description : PRESSURE CALIBRATOR
Calibrated : 11/15/95
Date Due : 11/15/96 PO# :3310702
RA# : 5-D6356-1-1
ID No. : 00008
ITEM RECEIVED OUT OF TOLERANCE

(Customer Use Only) **NOTES:**

Transmitter & Recorder were calibrated with the pressure calibrator listed to the left.

ASSETS	MANUFACTURER	MODEL#	DESCRIPTION	CALIBRATED	DATE DUE
5019	FLUKE	5700A	METER CALIBRATOR	9/7/95	9/7/96
5020	AMETEK	RK-300	DEAD WEIGHT TESTER	11/18/94	11/18/95
5032	AMETEK	T-150	DEAD WEIGHT TESTER	5/20/95	5/20/96

This is the standard that was used to calibrate the Transmitter/Recorder on 1-23-96. W. Cuppler

Calibrated at :

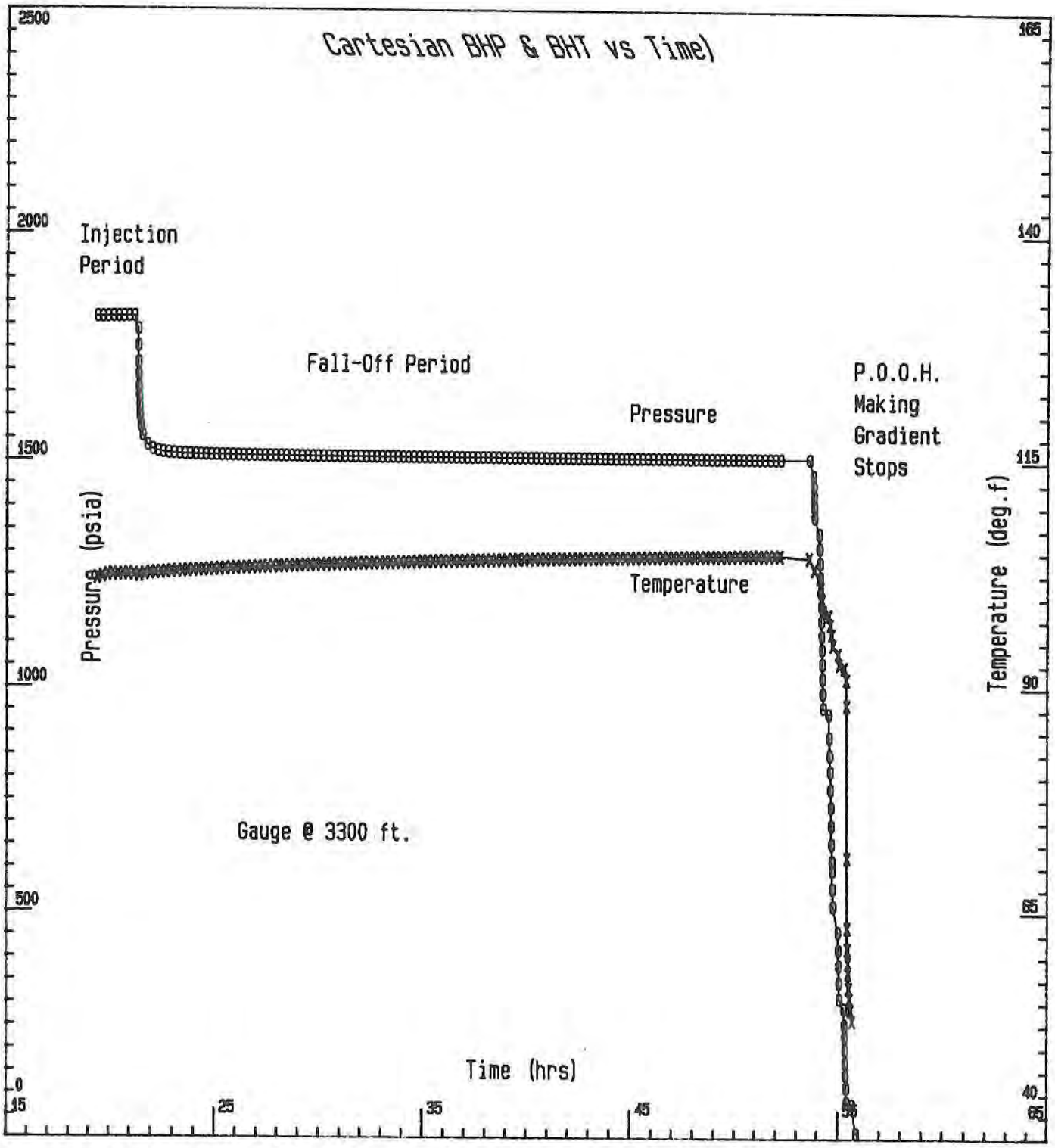
1181 Brittmore Suite 600
Houston, TX 77043, USA
800-828-1470 FAX# 800-395-0543
By: Keith Kucera

B. ECKEL
LAB MANAGER

F0013R2 1/25/95

APPENDIX D

FALLOFF PLOTS



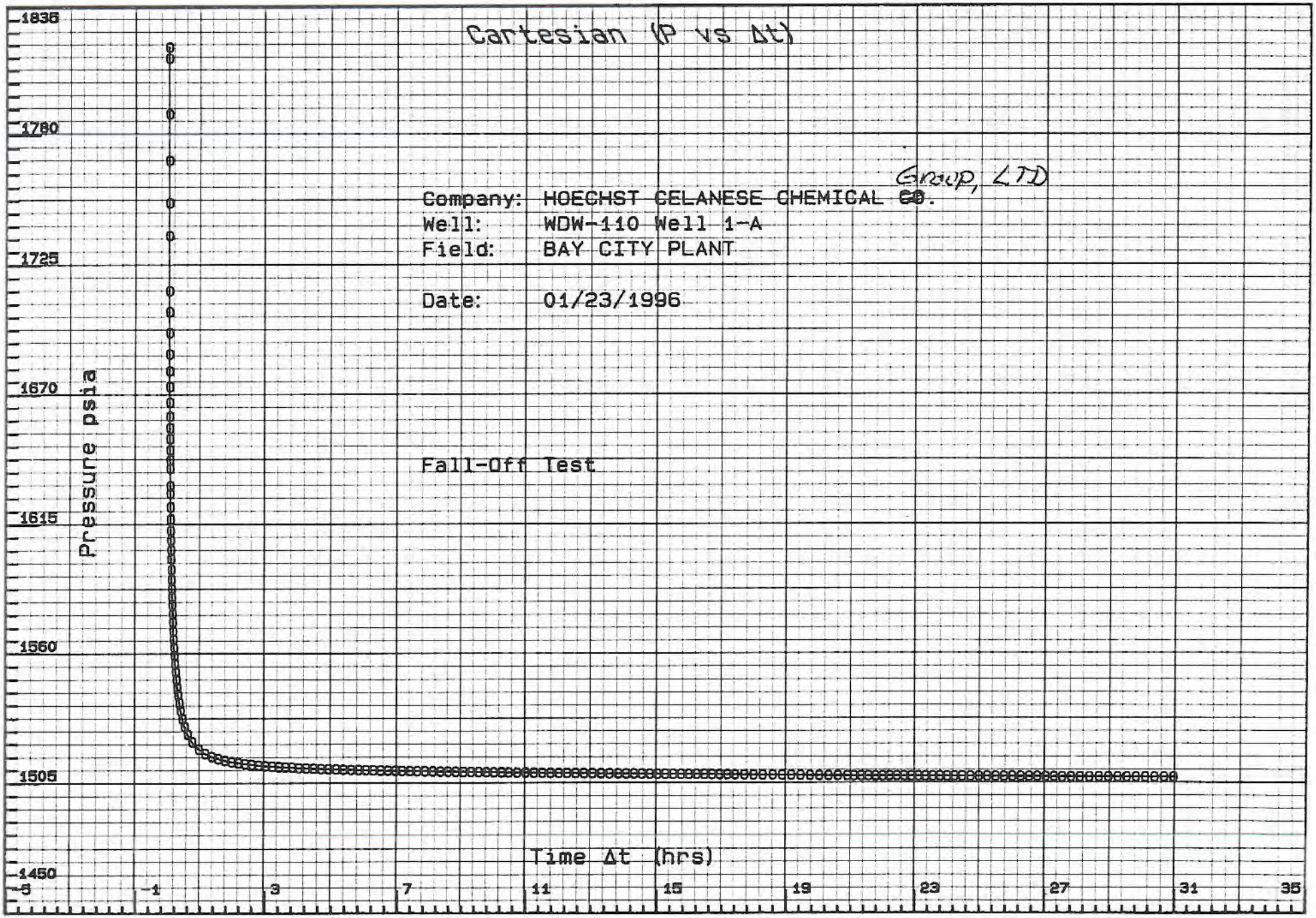
Company: HOECHST CELANESE CHEMICAL Group, LTD.
Well: WDW-110 Well 1-A
Field: BAY CITY PLANT

Date: 01/23/1996

Test History
Begin Time: 19:21:43 01/23/96
End Time: 07:52:04 01/25/96

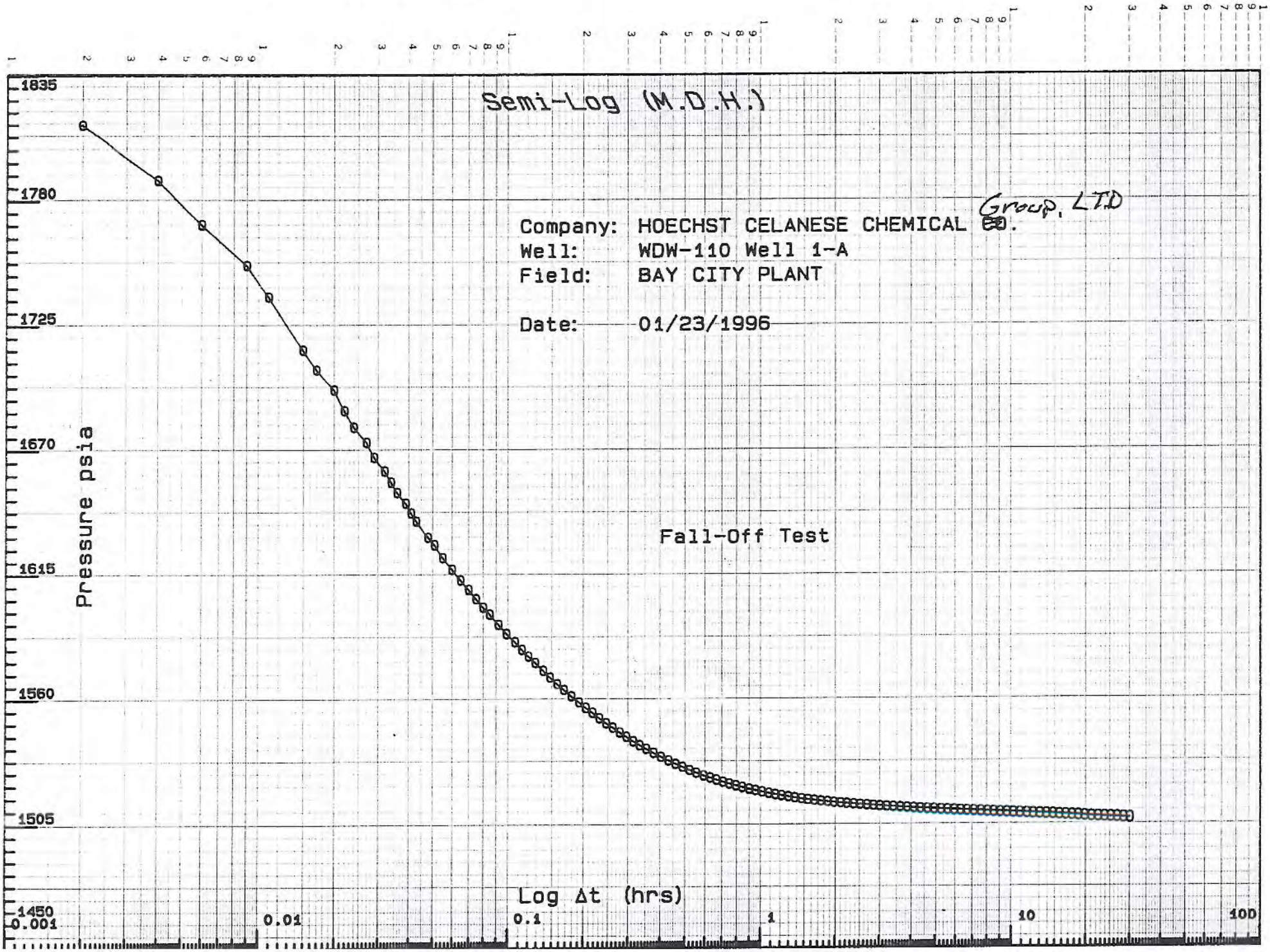
Injection Pressure = 1818 psi
Fall-Off Pressure = 1507 psi
Injection Rate = 213 GPM

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

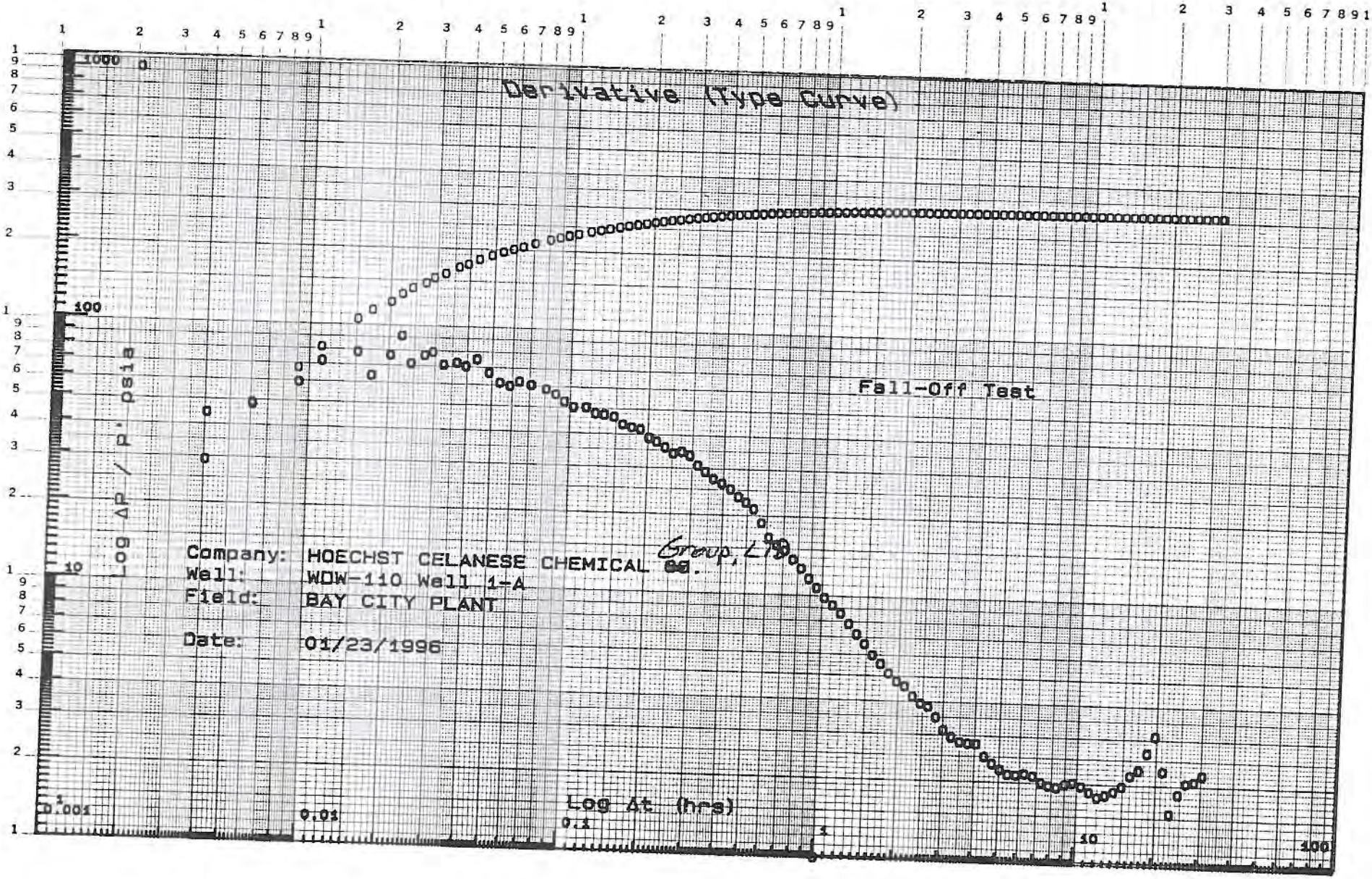


K+E SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 6210



KEUFFEL & ESSER CO. MADE IN U.S.A.



APPENDIX E

FALLOFF DATA
FLOW RATE DATA

[Tuesday

1

282

[Wednesday: Janua

1220 1

1966 1

[Thursday: January 25, 19

En
Sh
pac
2614 2 4:2

Tied
Start
2615 2 5:36:

Depart
2625 2 5:45:5

Depart 3,
2643 2 6: 3: 7

COMMENTS FOR DATA PRINT-OUT

Company: HOECHST CELANESE CHEMICAL ~~CO.~~ Group, LTD
Well: WDW-110 Well 1-A
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
[Tuesday: January 23, 1996]					
		Start Data Acquisition System. GRC S.R.O Gauge S/N 69681 @ Test Depth of 3,300 ft Plant Injecting into well @ approximatley 213 GPM. Monitoring Bottom-Hole Injection Pressure.			
1	0	19:21:43	0.0000	1816.29	102.03
		Shut-Down Injection & Start Fall-Off Test. Monitoring Bottom-Hole Fall-Off Pressure.			
282	0	21:19:19	1.9600	1817.51	102.31
[Wednesday: January 24, 1996]					
		Continuing to monitor Bottom-Hole Fall-Off press.			
1220	1	6: 0:22	10.6440	1509.29	103.57
		Continuing to monitor Bottom-Hole Fall-Off press.			
1966	1	18: 0:15	22.6420	1507.37	104.34
[Thursday: January 25, 1996]					
		End of Fall-Off Test. Shut-Down Data Acquisition System to tie-in to packer and E.O.T. with CCL.			
2614	2	4:22:19	33.0100	1506.59	104.77
		Tied into Packer & E.O.T. with CCL. Start Gradient Survey.			
2615	2	5:36:15	34.2420	1506.81	104.49
		Depart 3,300'			
2625	2	5:45:51	34.4020	1506.59	104.77
		Depart 3,000'			
2643	2	6: 3: 7	34.6900	1375.99	102.83

(continued)

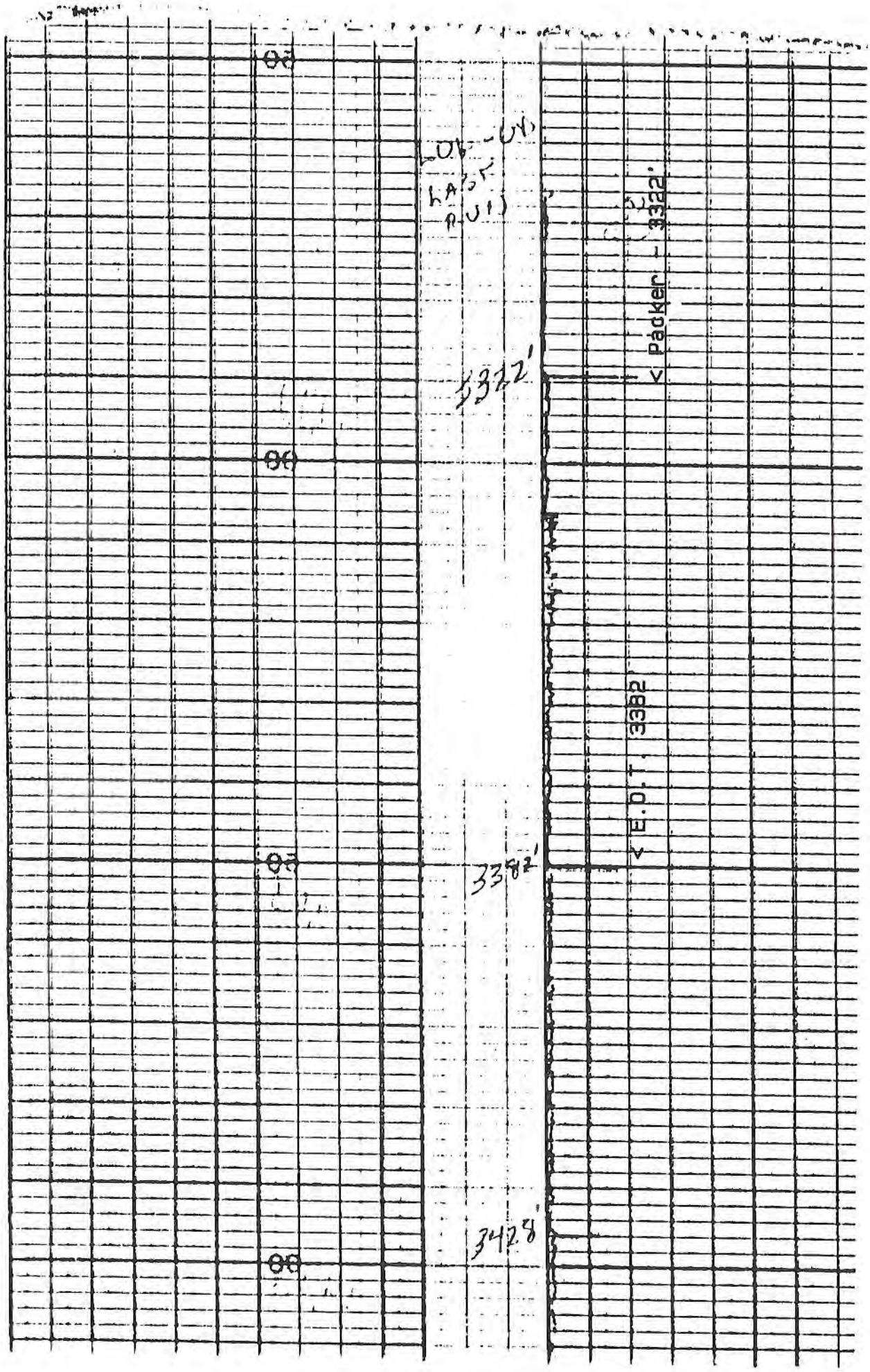
COMMENTS FOR DATA PRINT-OUT

(continued)

Company: HOECHST CELANESE CHEMICAL ~~Co~~. Group, LTD.
Well: WDW-110 Well 1-A
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
		Depart 2,000'			
2673	2	6:31:55	35.1700	941.92	98.23
		Depart 1,000'			
2699	2	6:56:53	35.5860	508.70	93.99
		Depart 500'			
2718	2	7:15: 7	35.8900	292.00	92.61
		Arrived @ Surface.			
2729	2	7:25:41	36.0660	74.51	71.07
		End of Gradient Survey.			
		Bleed-Off Lubricator and rig down e-line equip.			
2755	2	7:50:39	36.4820	77.99	52.08

[Thursday: January 25, 1996]



LOG-UP
LAST
RUN
3322'
< Packer - 3322'
3382'
< E.O.T. 3382
3428'

Company: HOECHST CELANESE CHEMICAL ~~CO.~~ Group, LTD.
Well: WDW-110 Well 1-A
Field: BAY CITY PLANT

[Tuesday: Jan. 23, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
		Start Data Acquisition System.			
		GRC S.R.O Gauge S/N 69681 @ Test Depth of 3,300 ft			
		Plant Injecting into well @ approximatley 213 GPM.			
		Monitoring Bottom-Hole Injection Pressure.			
1	0	19:21:43	0.0000	1816.29	102.03
5	0	19:23:39	0.0320	1816.15	102.04
10	0	19:26: 3	0.0720	1816.23	102.07
15	0	19:28:27	0.1120	1816.38	102.10
20	0	19:30:51	0.1520	1816.40	102.13
25	0	19:33:15	0.1920	1816.21	102.15
30	0	19:35:39	0.2320	1815.91	102.17
35	0	19:38: 3	0.2720	1815.97	102.18
40	0	19:40:27	0.3120	1816.11	102.19
45	0	19:42:51	0.3520	1816.22	102.21
50	0	19:45:15	0.3920	1816.26	102.25
55	0	19:47:39	0.4320	1816.35	102.29
60	0	19:50: 3	0.4720	1816.46	102.31
65	0	19:52:27	0.5120	1816.51	102.35
70	0	19:54:51	0.5520	1816.49	102.38
75	0	19:57:15	0.5920	1816.67	102.41
80	0	19:59:39	0.6320	1816.71	102.45
85	0	20: 2: 3	0.6720	1816.76	102.47
90	0	20: 4:27	0.7120	1816.72	102.48
95	0	20: 6:51	0.7520	1816.83	102.48
100	0	20: 9:15	0.7920	1816.90	102.45
105	0	20:11:42	0.8330	1816.93	102.43
110	0	20:14: 6	0.8730	1817.14	102.43
115	0	20:16:30	0.9130	1817.11	102.43
120	0	20:18:54	0.9530	1817.06	102.42
125	0	20:21:18	0.9930	1817.12	102.42
130	0	20:23:42	1.0330	1817.11	102.42
135	0	20:26: 6	1.0730	1817.11	102.41
140	0	20:28:30	1.1130	1817.06	102.40
145	0	20:30:54	1.1530	1817.04	102.42
150	0	20:33:18	1.1930	1817.08	102.43
155	0	20:35:42	1.2330	1817.20	102.43
160	0	20:38: 6	1.2730	1817.20	102.44
165	0	20:40:30	1.3130	1817.24	102.46
170	0	20:42:54	1.3530	1817.27	102.46
175	0	20:45:18	1.3930	1817.26	102.47
180	0	20:47:42	1.4330	1817.39	102.49
185	0	20:50: 6	1.4730	1817.38	102.49
190	0	20:52:30	1.5130	1817.35	102.49
195	0	20:54:54	1.5530	1817.34	102.50
200	0	20:57:18	1.5930	1817.27	102.49
205	0	20:59:42	1.6330	1817.27	102.48
210	0	21: 2: 6	1.6730	1817.29	102.48
215	0	21: 4:30	1.7130	1817.41	102.48
220	0	21: 6:54	1.7530	1817.30	102.45
225	0	21: 9:18	1.7930	1817.36	102.43

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-110 Well 1-A
Field: BAY CITY PLANT

[Tuesday: Jan. 23, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
230	0	21:11:49	1.8350	1817.35	102.40
245	0	21:13:55	1.8700	1817.39	102.37
259	0	21:15:58	1.9040	1817.40	102.34
274	0	21:18: 4	1.9390	1817.47	102.32
275	0	21:18:11	1.9410	1817.45	102.32
276	0	21:18:29	1.9460	1817.48	102.32
277	0	21:18:36	1.9480	1817.52	102.32
278	0	21:18:47	1.9510	1817.53	102.32
279	0	21:18:54	1.9530	1817.51	102.32
280	0	21:19: 1	1.9550	1817.52	102.32
281	0	21:19: 9	1.9570	1817.50	102.31
		Shut-Down Injection & Start Fall-Off Test.			
		Monitoring Bottom-Hole Fall-Off Pressure.			
282	0	21:19:19	1.9600	1817.51	102.31
283	0	21:19:27	1.9620	1812.64	102.31
284	0	21:19:34	1.9640	1788.71	102.31
285	0	21:19:41	1.9660	1769.21	102.31
286	0	21:19:52	1.9690	1751.30	102.31
287	0	21:19:59	1.9710	1737.32	102.31
288	0	21:20:13	1.9750	1713.90	102.31
289	0	21:20:21	1.9770	1705.14	102.31
290	0	21:20:31	1.9800	1696.15	102.30
291	0	21:20:39	1.9820	1687.11	102.30
292	0	21:20:46	1.9840	1679.88	102.31
293	0	21:20:57	1.9870	1673.22	102.30
294	0	21:21: 4	1.9890	1666.47	102.30
295	0	21:21:15	1.9920	1660.49	102.30
296	0	21:21:22	1.9940	1655.61	102.30
297	0	21:21:29	1.9960	1651.02	102.30
298	0	21:21:40	1.9990	1646.26	102.30
299	0	21:21:47	2.0010	1641.98	102.30
300	0	21:21:54	2.0030	1638.41	102.31
301	0	21:22:12	2.0080	1631.06	102.31
302	0	21:22:23	2.0110	1627.75	102.31
303	0	21:22:30	2.0130	1624.69	102.31
304	0	21:22:37	2.0150	1622.13	102.31
305	0	21:22:48	2.0180	1619.64	102.31
306	0	21:22:55	2.0200	1616.99	102.32
307	0	21:23: 6	2.0230	1614.51	102.32
308	0	21:23:13	2.0250	1612.17	102.32
309	0	21:23:21	2.0270	1610.18	102.32
310	0	21:23:31	2.0300	1608.05	102.32
311	0	21:23:39	2.0320	1605.98	102.33
312	0	21:23:49	2.0350	1604.02	102.32
313	0	21:24: 7	2.0400	1600.23	102.33
314	0	21:24:15	2.0420	1598.85	102.33
315	0	21:24:25	2.0450	1597.18	102.33
316	0	21:24:33	2.0470	1595.59	102.33
317	0	21:24:43	2.0500	1594.06	102.33
318	0	21:24:51	2.0520	1592.61	102.34

326	0	21:29:
327	0	21:29:
328	0	21:29:
329	0	21:30:
330	0	21:30:1
331	0	21:30:25
332	0	21:30:36
333	0	21:30:43
334	0	21:30:54
335	0	21:31: 1
336	0	21:31:12
337	0	21:31:19
338	0	21:31:30
339	0	21:31:37
340	0	21:31:48
341	0	21:32: 6
342	0	21:32:13
343	0	21:32:24
344	0	21:32:31
345	0	21:32:42
346	0	21:32:49
347	0	21:29
348	0	21:29
349	0	21:29:
350	0	21:29:
351	0	21:30:
352	0	21:30:1
353	0	21:30:25
354	0	21:30:36
355	0	21:30:43
356	0	21:30:54
357	0	21:31: 1
358	0	21:31:12
359	0	21:31:19
360	0	21:31:30
361	0	21:31:37
362	0	21:31:48
363	0	21:32: 6
364	0	21:32:13
365	0	21:32:24
366	0	21:32:31
367	0	21:32:42
368	0	21:32:49

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-110 Well 1-A
Field: BAY CITY PLANT

[Tuesday: Jan. 23, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
319	0	21:24:58	2.0540	1591.32	102.34
320	0	21:25: 9	2.0570	1589.97	102.37
321	0	21:25:16	2.0590	1588.63	102.34
322	0	21:25:27	2.0620	1587.33	102.34
323	0	21:25:34	2.0640	1586.11	102.35
324	0	21:25:45	2.0670	1585.04	102.35
325	0	21:25:52	2.0690	1583.86	102.35
326	0	21:26:10	2.0740	1581.61	102.36
327	0	21:26:21	2.0770	1580.57	102.36
328	0	21:26:28	2.0790	1579.54	102.36
329	0	21:26:35	2.0810	1578.63	102.37
330	0	21:26:46	2.0840	1577.65	102.37
331	0	21:26:53	2.0860	1576.70	102.37
332	0	21:27: 4	2.0890	1575.76	102.37
333	0	21:27:11	2.0910	1574.88	102.38
334	0	21:27:22	2.0940	1573.99	102.37
335	0	21:27:29	2.0960	1573.13	102.38
336	0	21:27:40	2.0990	1572.30	102.38
337	0	21:27:47	2.1010	1571.47	102.38
338	0	21:28: 5	2.1060	1569.99	102.39
339	0	21:28:12	2.1080	1569.30	102.39
340	0	21:28:23	2.1110	1568.57	102.39
341	0	21:28:30	2.1130	1567.84	102.40
342	0	21:28:41	2.1160	1567.12	102.39
343	0	21:28:48	2.1180	1566.42	102.39
344	0	21:28:59	2.1210	1565.74	102.40
345	0	21:29: 6	2.1230	1565.10	102.40
346	0	21:29:17	2.1260	1564.44	102.40
347	0	21:29:24	2.1280	1563.80	102.40
348	0	21:29:35	2.1310	1563.18	102.40
349	0	21:29:42	2.1330	1562.57	102.40
350	0	21:29:53	2.1360	1561.98	102.41
351	0	21:30: 7	2.1400	1560.87	102.41
352	0	21:30:18	2.1430	1560.31	102.41
353	0	21:30:25	2.1450	1559.76	102.41
354	0	21:30:36	2.1480	1559.23	102.41
355	0	21:30:43	2.1500	1558.69	102.41
356	0	21:30:54	2.1530	1558.17	102.42
357	0	21:31: 1	2.1550	1557.67	102.42
358	0	21:31:12	2.1580	1557.16	102.42
359	0	21:31:19	2.1600	1556.69	102.42
360	0	21:31:30	2.1630	1556.20	102.42
361	0	21:31:37	2.1650	1555.73	102.42
362	0	21:31:48	2.1680	1555.26	102.42
363	0	21:32: 6	2.1730	1554.36	102.42
364	0	21:32:13	2.1750	1553.97	102.42
365	0	21:32:24	2.1780	1553.55	102.43
366	0	21:32:31	2.1800	1553.13	102.43
367	0	21:32:42	2.1830	1552.71	102.43
368	0	21:32:49	2.1850	1552.28	102.43

3		
37		
37		
37		
379		
380		
381		
382		
383		
384		
385		
386	0	
387	0	
388	0	
389	0	
390	0	
391	0	
392	0	2
393	0	2
394	0	21
395	0	21
396	0	21:
397	0	21:
398	0	21:3
399	0	21:3
400	0	21:37
401	0	21:38:
402	0	21:38:
403	0	21:38:2
404	0	21:38:3
405	0	21:38:39
406	0	21:38:49
407	0	21:38:57
408	0	21:39: 4
409	0	21:39:15
410	0	21:39:22
411	0	21:39:29
412	0	21:39:40
413	0	21:39:54
414	0	21:40: 1
415	0	21:40:12
416	0	21:40:19
417	0	21:40:27
418	0	21:40:34

[MILTON M. COOKE COMPANY]

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-110 Well 1-A
Field: BAY CITY PLANT

[Tuesday: Jan. 23, 1996]

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
369	0	21:33: 0	2.1880	1551.89	102.43
370	0	21:33: 7	2.1900	1551.50	102.43
371	0	21:33:15	2.1920	1551.15	102.43
372	0	21:33:25	2.1950	1550.77	102.44
373	0	21:33:33	2.1970	1550.39	102.44
374	0	21:33:43	2.2000	1550.03	102.44
375	0	21:33:51	2.2020	1549.65	102.44
376	0	21:34: 9	2.2070	1548.93	102.44
377	0	21:34:19	2.2100	1548.61	102.44
378	0	21:34:27	2.2120	1548.27	102.45
379	0	21:34:37	2.2150	1547.93	102.45
380	0	21:34:45	2.2170	1547.60	102.45
381	0	21:34:55	2.2200	1547.26	102.45
382	0	21:35: 3	2.2220	1546.97	102.45
383	0	21:35:13	2.2250	1546.64	102.46
384	0	21:35:21	2.2270	1546.32	102.45
385	0	21:35:31	2.2300	1546.02	102.46
386	0	21:35:39	2.2320	1545.68	102.46
387	0	21:35:46	2.2340	1545.39	102.46
388	0	21:36: 4	2.2390	1544.79	102.46
389	0	21:36:15	2.2420	1544.51	102.46
390	0	21:36:22	2.2440	1544.24	102.47
391	0	21:36:29	2.2460	1543.97	102.47
392	0	21:36:40	2.2490	1543.68	102.47
393	0	21:36:47	2.2510	1543.38	102.47
394	0	21:36:58	2.2540	1543.14	102.47
395	0	21:37: 5	2.2560	1542.87	102.47
396	0	21:37:12	2.2580	1542.62	102.47
397	0	21:37:23	2.2610	1542.37	102.47
398	0	21:37:30	2.2630	1542.15	102.48
399	0	21:37:37	2.2650	1541.90	102.48
400	0	21:37:48	2.2680	1541.67	102.48
401	0	21:38: 6	2.2730	1541.11	102.48
402	0	21:38:13	2.2750	1540.91	102.48
403	0	21:38:21	2.2770	1540.69	102.48
404	0	21:38:31	2.2800	1540.46	102.48
405	0	21:38:39	2.2820	1540.22	102.48
406	0	21:38:49	2.2850	1540.02	102.49
407	0	21:38:57	2.2870	1539.81	102.49
408	0	21:39: 4	2.2890	1539.59	102.49
409	0	21:39:15	2.2920	1539.37	102.49
410	0	21:39:22	2.2940	1539.18	102.49
411	0	21:39:29	2.2960	1538.97	102.49
412	0	21:39:40	2.2990	1538.79	102.49
413	0	21:39:54	2.3030	1538.35	102.49
414	0	21:40: 1	2.3050	1538.20	102.50
415	0	21:40:12	2.3080	1538.01	102.50
416	0	21:40:19	2.3100	1537.83	102.50
417	0	21:40:27	2.3120	1537.67	102.50
418	0	21:40:34	2.3140	1537.49	102.50

Company: HOECHST CELANESE CHEMICAL CO.
Well: WDW-110 Well 1-A [Tuesday: Jan. 23, 1996]
Field: BAY CITY PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)
419	0	21:40:45	2.3170	1537.31	102.50
420	0	21:41: 3	2.3220	1536.89	102.50
421	0	21:41:13	2.3250	1536.63	102.50
422	0	21:41:31	2.3300	1536.31	102.50
423	0	21:41:46	2.3340	1536.04	102.50
424	0	21:42: 0	2.3380	1535.74	102.50
425	0	21:42:15	2.3420	1535.46	102.51
426	0	21:42:33	2.3470	1535.05	102.51
427	0	21:42:51	2.3520	1534.76	102.51
428	0	21:43: 1	2.3550	1534.49	102.51
429	0	21:43:16	2.3590	1534.24	102.51
430	0	21:43:34	2.3640	1533.96	102.51
431	0	21:43:45	2.3670	1533.72	102.51
432	0	21:44: 3	2.3720	1533.47	102.51
433	0	21:44:13	2.3750	1533.23	102.51
434	0	21:44:28	2.3790	1532.99	102.52
435	0	21:44:46	2.3840	1532.74	102.52
436	0	21:44:57	2.3870	1532.52	102.52
437	0	21:45:15	2.3920	1532.28	102.52
438	0	21:45:33	2.3970	1531.93	102.52
439	0	21:45:43	2.4000	1531.76	102.53
440	0	21:46: 1	2.4050	1531.54	102.52
441	0	21:46:16	2.4090	1531.34	102.52
442	0	21:46:30	2.4130	1531.12	102.53
443	0	21:46:45	2.4170	1530.92	102.53
444	0	21:46:55	2.4200	1530.73	102.53
445	0	21:47:13	2.4250	1530.53	102.53
446	0	21:47:28	2.4290	1530.34	102.53
447	0	21:47:42	2.4330	1530.15	102.53
448	0	21:47:57	2.4370	1529.98	102.53
449	0	21:48: 7	2.4400	1529.80	102.54
450	0	21:48:25	2.4450	1529.60	102.54
451	0	21:48:43	2.4500	1529.35	102.54
452	0	21:48:58	2.4540	1529.16	102.54
453	0	21:49:12	2.4580	1528.97	102.54
454	0	21:49:27	2.4620	1528.79	102.54
455	0	21:49:41	2.4660	1528.62	102.54
456	0	21:49:55	2.4700	1528.45	102.54
457	0	21:50:10	2.4740	1528.27	102.54
458	0	21:50:24	2.4780	1528.10	102.54
459	0	21:50:39	2.4820	1527.94	102.55
460	0	21:50:53	2.4860	1527.77	102.55
461	0	21:51: 7	2.4900	1527.63	102.55
462	0	21:51:22	2.4940	1527.46	102.55
463	0	21:51:40	2.4990	1527.23	102.55
464	0	21:51:54	2.5030	1527.11	102.55
465	0	21:52: 9	2.5070	1526.96	102.55
466	0	21:52:23	2.5110	1526.83	102.55
467	0	21:52:37	2.5150	1526.68	102.55
468	0	21:52:52	2.5190	1526.54	102.55