APPENDIX E

CALCULATION FLOW CHART

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.

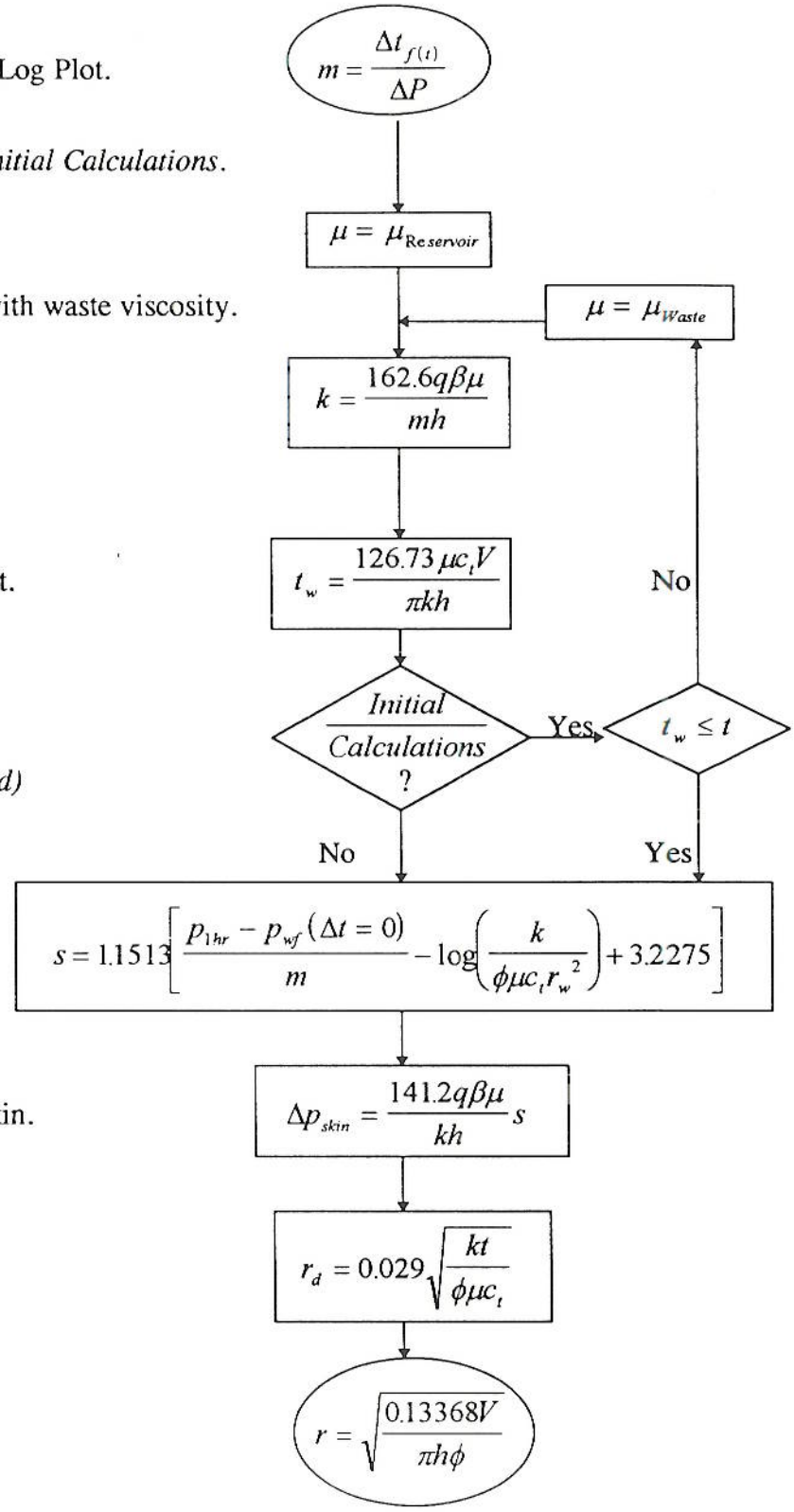
(t, beginning of radial flow period)

6. Calculate skin factor.

7. Calculate Pressure drop due to skin.

8. Calculate radius of investigation.

9. Calculate distance to waste front.



ECO Solutions, Inc.
Hoechst Celanese Chemical Group, Inc.
Pressure Falloff/MIT Testing

APPENDIX F

STATIC GRADIENT SURVEY

Company: HOECHST CELANESE CHEMICAL GROUP, INC.
Well: WDW-110 WELL #1A
Field: BAY CITY, TEXAS PLANT
County: MATAGORDA
State: TEXAS

Engineer: DOUG BEALL
Date: 03/24/1994
Gauge Type: GRC EPG-520
Serial No.: 69491
Gauge Range: 5,000 PSI
Gauge Depth: 3300 ft
Well Type: INJECTION
Test Type: GRADIENT SURVEY
Well Status: SHUT-IN

Tubing: 5 1/2" TO 3380'
Tubing: TO
Casing: 9 5/8" TO 4616'
Perfs.: 3376' - 3471'
Perfs.: 3494' - 3572'
Elevation: 17'

Packer Depth 3330 ft
PBTD 3800 ft
Oil Level None
H2O Level 4 ft

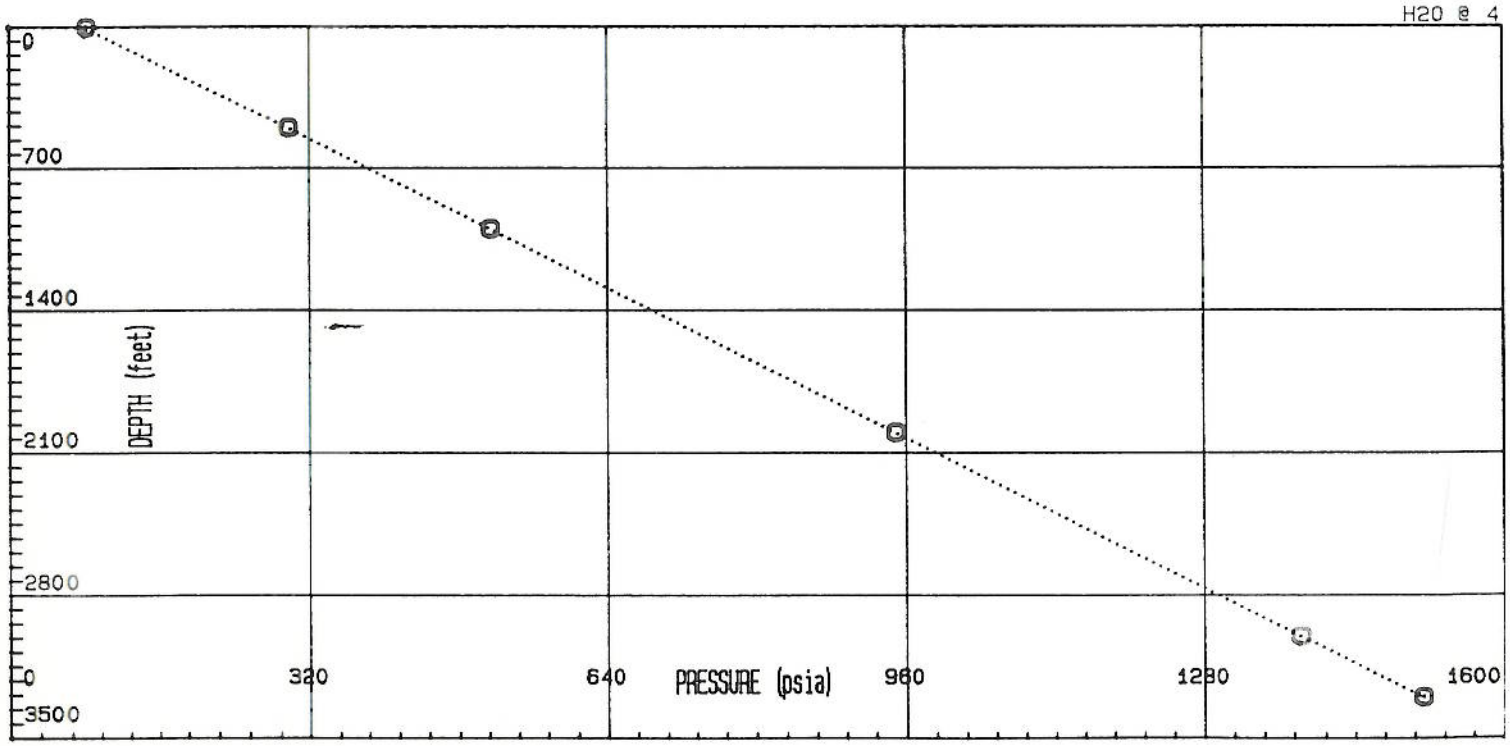
Zero: KB

Shut-in BHP	1512	@	3300 ft	Shut-in BHT	104 F	@	3300 ft
Flowing BHP	1754	@	3300 ft	Flowing BHT	100 F	@	3300 ft
Shut-in WHP	81			Shut-in WHT	76 F		
Flowing WHP	328			Flowing WHT	83 F		

[GRADIENT DATA]

#	MD	TVD	PRESSURE	PSI/ft
1	0	0	80.60	
2	500	500	296.59	0.432
3	1000	1000	513.93	0.435
4	2000	2000	948.17	0.434
5	3000	3000	1381.99	0.434
6	3300	3300	1512.40	0.435

Remarks: STATIC GRADIENT SURVEY, PULLING OUT OF HOLE.
Tagged fill @ 3558.5 feet.



REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)	Delta-P (psi)
3504	3	12:49: 8	20.6110	1512.44	103.85	-241.69
3505	3	12:50: 5	20.6270	1512.44	103.86	-241.69
3506	3	12:51: 3	20.6430	1512.43	103.86	-241.70
3507	3	12:52: 1	20.6590	1512.43	103.86	-241.70
3508	3	12:52:58	20.6750	1512.43	103.86	-241.70
3509	3	12:53:56	20.6910	1512.43	103.86	-241.70
3510	3	12:54:53	20.7070	1512.43	103.87	-241.70
3511	3	12:55:51	20.7230	1512.43	103.87	-241.70
3512	3	12:56:49	20.7390	1512.43	103.87	-241.70
3513	3	12:57:46	20.7550	1512.43	103.87	-241.70
3514	3	12:58:44	20.7710	1512.42	103.87	-241.71
3515	3	12:59:41	20.7870	1512.42	103.88	-241.71
3516	3	13: 0:39	20.8030	1512.42	103.88	-241.71
3517	3	13: 1:37	20.8190	1512.42	103.88	-241.71
3518	3	13: 2:34	20.8350	1512.41	103.88	-241.72
3519	3	13: 3:32	20.8510	1512.41	103.88	-241.72
3520	3	13: 4:29	20.8670	1512.41	103.89	-241.72
3521	3	13: 5:27	20.8830	1512.41	103.89	-241.72
3522	3	13: 6:25	20.8990	1512.41	103.89	-241.72
3523	3	13: 7:22	20.9150	1512.40	103.89	-241.73
3524	3	13: 8:20	20.9310	1512.40	103.89	-241.73
3525	3	13: 9:17	20.9470	1512.40	103.90	-241.73
3526	3	13:10:15	20.9630	1512.40	103.90	-241.73
		Drop downhole 10 feet, then pull out of hole making static gradient stops.				
3527	3	13:11:13	20.9790	1512.40	103.90	-241.73
3528	3	13:12:10	20.9950	1513.12	103.90	-241.01
3529	3	13:13: 8	21.0110	1502.55	103.87	-251.58
3530	3	13:14: 5	21.0270	1483.56	103.42	-270.57
3531	3	13:15: 3	21.0430	1461.28	102.95	-292.85
3532	3	13:16: 1	21.0590	1435.38	102.46	-318.75
3533	3	13:16:58	21.0750	1410.18	102.05	-343.95
3534	3	13:17:56	21.0910	1384.31	101.89	-369.82
3535	3	13:18:53	21.1070	1381.54	101.63	-372.59
3536	3	13:19:51	21.1230	1381.76	101.56	-372.37
3537	3	13:20:49	21.1390	1381.86	101.54	-372.27
3538	3	13:21:46	21.1550	1381.92	101.53	-372.21
3539	3	13:22:44	21.1710	1381.95	101.52	-372.18
3540	3	13:23:41	21.1870	1381.97	101.51	-372.16
3541	3	13:24:39	21.2030	1381.98	101.51	-372.15
3542	3	13:25:37	21.2190	1381.99	101.50	-372.14
		Leaving 3,000 feet.				
3543	3	13:26:34	21.2350	1381.99	101.50	-372.14
3544	3	13:27:32	21.2510	1381.53	101.50	-372.60
3545	3	13:28:29	21.2670	1336.31	101.43	-417.82
3546	3	13:29:27	21.2830	1272.21	101.14	-481.92
3547	3	13:30:25	21.2990	1204.75	100.25	-549.38
3548	3	13:31:22	21.3150	1138.23	99.72	-615.90
3549	3	13:32:20	21.3310	1069.91	99.05	-684.22
3550	3	13:33:17	21.3470	1001.20	98.46	-752.93

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)	Delta-P (psi)
3551	3	13:34:15	21.3630	947.67	97.78	-806.46
3552	3	13:35:13	21.3790	947.60	97.29	-806.53
3553	3	13:36:10	21.3950	947.90	97.20	-806.23
3554	3	13:37: 8	21.4110	948.04	97.16	-806.09
3555	3	13:38: 5	21.4270	948.11	97.14	-806.02
3556	3	13:39: 3	21.4430	948.14	97.13	-805.99
3557	3	13:40: 1	21.4590	948.16	97.11	-805.97
3558	3	13:40:58	21.4750	948.17	97.10	-805.96
		Leaving 2,000 feet.				
3559	3	13:41:56	21.4910	948.17	97.10	-805.96
3560	3	13:42:53	21.5070	923.72	97.09	-830.41
3561	3	13:43:51	21.5230	861.39	96.85	-892.74
3562	3	13:44:49	21.5390	805.27	96.39	-948.86
3563	3	13:45:46	21.5550	744.70	95.95	-1009.43
3564	3	13:46:44	21.5710	682.01	95.39	-1072.12
3565	3	13:47:41	21.5870	619.76	94.98	-1134.37
3566	3	13:48:39	21.6030	557.24	94.43	-1196.89
3567	3	13:49:37	21.6190	512.90	93.92	-1241.23
3568	3	13:50:34	21.6350	513.42	93.49	-1240.71
3569	3	13:51:32	21.6510	513.68	93.40	-1240.45
3570	3	13:52:29	21.6670	513.81	93.37	-1240.32
3571	3	13:53:27	21.6830	513.87	93.35	-1240.26
3572	3	13:54:25	21.6990	513.90	93.33	-1240.23
3573	3	13:55:22	21.7150	513.92	93.32	-1240.21
3574	3	13:56:20	21.7310	513.93	93.31	-1240.20
3575	3	13:57:17	21.7470	513.93	93.30	-1240.20
		Leaving 1,000 feet.				
3576	3	13:58:15	21.7630	513.93	93.29	-1240.20
3577	3	13:59:13	21.7790	477.66	93.28	-1276.47
3578	3	14: 0:10	21.7950	410.32	93.09	-1343.81
3579	3	14: 1: 8	21.8110	340.38	92.59	-1413.75
3580	3	14: 2: 5	21.8270	296.06	92.17	-1458.07
3581	3	14: 3: 3	21.8430	296.30	91.98	-1457.83
3582	3	14: 4: 1	21.8590	296.44	91.90	-1457.69
3583	3	14: 4:58	21.8750	296.51	91.86	-1457.62
3584	3	14: 5:56	21.8910	296.55	91.85	-1457.58
3585	3	14: 6:53	21.9070	296.57	91.84	-1457.56
3586	3	14: 7:51	21.9230	296.58	91.83	-1457.55
3587	3	14: 8:49	21.9390	296.58	91.82	-1457.55
3588	3	14: 9:46	21.9550	296.59	91.81	-1457.54
		Leaving 500 feet.				
3589	3	14:10:44	21.9710	296.59	91.81	-1457.54
3590	3	14:11:41	21.9870	296.60	91.80	-1457.53
3591	3	14:12:39	22.0030	254.57	91.78	-1499.56
3592	3	14:13:37	22.0190	188.81	91.59	-1565.32
3593	3	14:14:34	22.0350	131.86	91.18	-1622.27
3594	3	14:15:32	22.0510	111.25	90.65	-1642.88
3595	3	14:16:29	22.0670	95.64	90.63	-1658.49
3596	3	14:17:27	22.0830	86.81	87.98	-1667.32
3597	3	14:18:25	22.0990	78.08	84.08	-1676.05

Company: HOECHST CELANESE CHEMICAL GROUP, INC.
Well: WDW-110 WELL #1A [Thursday: Mar. 24, 1994]
Field: BAY CITY, TEXAS PLANT

REC #	DAY	REAL TIME	DT (HRS)	BHP (PSIA)	BHT (Deg.F)	Delta-P (psi)
3598	3	14:19:22	22.1150	74.76	80.50	-1679.37
3599	3	14:20:20	22.1310	76.77	78.83	-1677.36
3600	3	14:21:17	22.1470	78.21	78.20	-1675.92
3601	3	14:22:15	22.1630	79.06	77.78	-1675.07
3602	3	14:23:13	22.1790	79.48	77.44	-1674.65
3603	3	14:24:10	22.1950	79.72	77.16	-1674.41
3604	3	14:25: 8	22.2110	79.92	76.87	-1674.21
3605	3	14:26: 5	22.2270	80.05	76.66	-1674.08
3606	3	14:27: 3	22.2430	80.13	76.47	-1674.00
3607	3	14:28: 1	22.2590	80.19	76.28	-1673.94
3608	3	14:28:58	22.2750	80.25	76.11	-1673.88
3609	3	14:29:56	22.2910	80.31	75.96	-1673.82
3610	3	14:30:53	22.3070	80.38	75.83	-1673.75
3611	3	14:31:51	22.3230	80.45	75.73	-1673.68
3612	3	14:32:49	22.3390	80.50	75.66	-1673.63
3613	3	14:33:46	22.3550	80.54	75.60	-1673.59
3614	3	14:34:44	22.3710	80.58	75.55	-1673.55
		Bleed off lubricator.				
3615	3	14:35:41	22.3870	80.60	75.51	-1673.53
3616	3	14:36:39	22.4030	43.21	75.48	-1710.92
3617	3	14:37:37	22.4190	3.30	75.43	-1750.83
3618	3	14:38:34	22.4350	13.26	75.37	-1740.87
3619	3	14:39:32	22.4510	13.32	75.37	-1740.81
3620	3	14:40:29	22.4670	13.32	75.37	-1740.81
3621	3	14:41:27	22.4830	13.35	75.36	-1740.78
3622	3	14:42:25	22.4990	13.35	75.35	-1740.78
3623	3	14:43:22	22.5150	13.45	75.33	-1740.68
		Shut down Data Acquisition System and rig down.				
3624	3	14:44:20	22.5310	13.31	75.32	-1740.82

ECO Solutions, Inc.
Hoechst Celanese Chemical Group, Inc.
Pressure Falloff/MIT Testing

APPENDIX G

GAUGE CALIBRATION CERTIFICATE

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: 03/21/1994

D.W.T. S/N: 13469

GRC GAUGE S/N: 69491

D.W.P. (PSIG)	GAUGE PRESSURE (PSIA)	DIFFERENCE (+/-PSI)
0.0	10.90	+10.90
550.0	564.48	+14.48
1050.0	1062.32	+12.32
2050.0	2060.34	+10.34

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: 03/24/1994

D.W.T. S/N: 13469

GRC GAUGE S/N: 69491

D.W.P. (PSIG)	GAUGE PRESSURE (PSIA)	DIFFERENCE (+/-PSI)
0.0	15.37	+15.37
550.0	561.17	+11.17
1050.0	1055.85	+ 5.85
2050.0	2053.94	+ 3.94

***** ELECTRONIC GAUGE CALIBRATION SUMMARY *****

GAUGE S/N: 69491
RANGE: 5,000
DATE CALIBRATED: 1-19-94

*** TEMPERATURE SUMMARY ***

MAXIMUM POSITIVE ERROR:	1.366 Deg F
MAXIMUM NEGATIVE ERROR:	-0.811 Deg F
MAXIMUM ERROR SPECIFICATION:	3.000 Deg F
NUMBER OF POINTS EXCEEDING ERROR SPEC.:	0
SENSITIVITY:	0.078 Deg F/Hz
SENSITIVITY:	12.804 Hz/Deg F

*** PRESSURE SUMMARY ***

MAXIMUM POSITIVE ERROR:	1.300 PSIA
OCCURS AT:	251.366 Deg F
AND AT:	4016.000 PSIA
MAXIMUM NEGATIVE ERROR:	-1.670 PSIA
OCCURS AT:	149.809 Deg F
AND AT:	3013.030 PSIA
MAXIMUM ERROR SPECIFICATION:	20.000 PSIA
NUMBER OF POINTS EXCEEDING SPEC:	0
PERCENTAGE OF POINTS EXCEEDING SPECS:	0.000 %
SENSITIVITY:	2.772 PSIA/Hz
SENSITIVITY:	0.361 Hz/PSIA

Interoffice Memo

Hoechst Celanese

Date: October 13, 1992

GMQ-621-92

To: H. R. Horton

From: G. M. Quinney

Dept/Location: Maintenance Engineering

Dept/Location: Maintenance

Subject: Well Instrumentation

The well instrumentation for #2, #3 and #4 wells at the Bay City Plant is the Honeywell ST 3000. Its accuracy is ± .1% of full span in the analog mode. The ST 3000 transmitter is calibrated via the Smart Field Communication Model STS 102.

G. M. Quinney

G. M. Quinney

Condensed Specifications

Output

Linear or square root
- Analog Mode: 4-20 mA dc
- Digital Mode: DE protocol
  - Analog or digital mode selectable by SFC

Accuracy (Reference)

Analog Mode: ±0.1% span
Digital Mode: ±0.075% span or ±0.15% reading, whichever is smaller

Combined zero and span temperature effect per 28°C (50°F)

Analog Mode: ±0.175% span
Digital Mode: ±0.125% reading

Combined zero and span static pressure effect per 70 bar (1000 psi)–DP models only

Analog Mode: ±0.2% span
Digital Mode: ±0.2% reading

Ambient temperature limits

–40° to +93°C (–40° to +200°F)

Meter body temperature limits

–40° to +125°C (–40° to +257°F)

Damping

Adjustable from 0–32 seconds

Overpressure

210 bar (3000 psi) for DP models;
1.5 X upper range limit for GP models

Supply voltage

11 to 45 Vdc

ST 3000 Transmitter Ranges

Measurement	Model	Min-Max Span
Differential Pressure	STD 120	1–400 in H_2O
	STD 125*	25–600 in H_2O
	STD 130	5–100 psi
	STD 170	100–3000 psi
	STD 624	25–400 in H_2O
Flange Mount	STF 128	10–400 in H_2O
	STF 132	5–100 psi
	STF 12F	1–400 in H_2O
	STF 13F	5–100 psi
	STD 14F*	25–600 in H_2O
	STF 62F	25–400 in H_2O
Remote Seal	STR 126	10–400 in H_2O
	STR 130	5–100 psi
Gage Pressure	STG 140	5–500 psi
	STG 170	100–3000 psi
	STG 180	100–6000 psi
	STG 644	5–500 psi
	STG 674	100–3000 psi
Absolute Pressure	STA 122	10–780 mmHg
	STA 140	5–500 psi

*HTG

Honeywell

Helping You Control Your World

Industrial Automation and Control
Honeywell Inc.
1100 Virginia Drive
Fort Washington, PA 19034

34-ST-56-16 R (16M) 7/91 ©Honeywell Inc. Printed in U.S.A.

Honeywell

SFC Smart Field Communicator
Model STS102

Specification

Function

The hand-held SFC Smart Field Communicator is a battery-powered device which establishes two-way communication between Honeywell Smart Transmitters and an operator over the existing transmitter signal lines, thereby simplifying maintenance and providing operator access to transmitters without a trip to the field. The operator can send data to and receive data from the transmitter's microprocessor, through the SFC, when connected to the transmitter signal lines at any accessible location from the control room to the transmitter. The SFC is in an impact resistant housing and comes with a weather-proof carrying case, a NiCad rechargeable battery pack, and a dc recharger.

Description

Model STS102 is capable of communicating with ST 3000 differential pressure, gauge pressure and absolute pressure transmitters, with the STT 3000 Smart Temperature Transmitter, with the Smart MagneW 3000 Magnetic Flowmeter and with future additions to the Honeywell Smart Field Architecture.

You can use the SFC to:

Select the Communication Mode: Command the transmitter to transmit its output signal in either an analog (4-20 mA) mode or in the Digital Communications (DE) Mode.

Configure: Enter the desired operating parameters (LRV, URV, damping, fail-safe mode, input actuation type for STT, etc) into the transmitter.

Diagnose: Access the Smart Transmitter self-diagnostic capabilities to troubleshoot suspected operation or communication problems.

Calibrate: The SFC provides a simplified procedure for calibrating Smart Transmitters, thus maintaining excellent transmitter accuracy with significantly reduced maintenance requirements. Note that Honeywell Smart Transmitters can be re-ranged from a remote location without the need to apply input signals from calibration standards

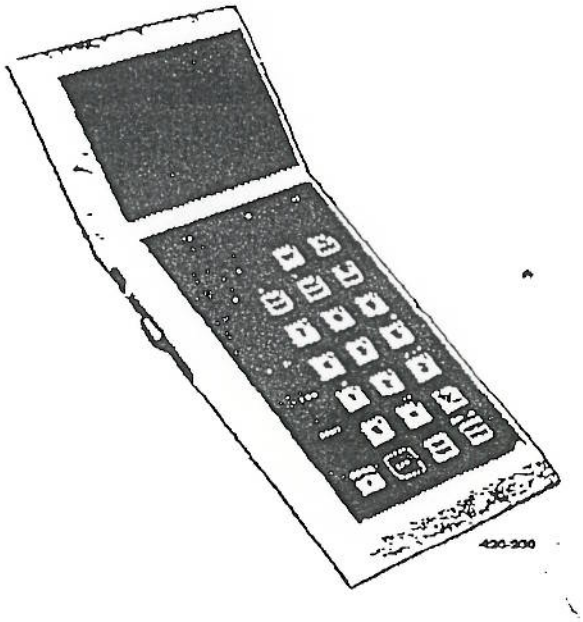


Figure 1—SFC Smart Field Communicator

Display: Readout all configured operating parameters from the transmitter as well as other data such as PROM/Serial No., tag no. sensor temperature (ST), hi/lo PV (STT), scratch pad memory (ST), etc. Also displays measured input values (pressure, differential pressure, temperature, flow velocity) in selected engineering units for readout by the operator. All readouts can be displayed in English, German, French or Spanish.

Checkout: Put the transmitter in the Output Mode and you can command the Smart Transmitter to transmit a precise signal, selectable from 0% to 100% full scale, to assist in verifying loop operation, loop calibration or troubleshooting.

Industrial Controls Division, 1100 Virginia Drive, Fort Washington, PA 19034

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ECO Solutions, Inc.
Hoechst Celanese Chemical Group, Inc.
Pressure Falloff/MIT Testing

APPENDIX H

CORRESPONDENCE

94-004

Hoechst Celanese

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

January 7, 1994
IOC-002-94

CERTIFIED MAIL

Mr. Mike Mishra
Underground Injection Control Unit
Texas Natural Resource Conservation Commission
P. O. Box 13087
1700 North Congress Avenue
Austin, TX 78711-3087

Subject: Revised (January 7, 1994) Proposed Mechanical Integrity Testing Procedures and Additional Information
WDW-14 and WDW-110
Hoechst Celanese Chemical Group, Inc.
Bay City Plant, Bay City, Texas
(Reference Letter, IOC-097-93, (dated December 7, 1993)

Dear Mr. Mishra:

Pursuant to your telephone request on Wednesday, January 5, 1994, please find included with this transmittal the following:

Addendum I - Detailed mechanical integrity test procedures and well schematic for WDW-14,

Addendum II - Detailed mechanical integrity test procedures and well schematic for WDW-110,

Addendum III - Bottom hole pressure falloff procedure for both WDW-14 and WDW-110, and

Addendum IV - Revised bottom hole pressure falloff schedule for both WDW-14 and WDW-110.

If you have any questions, contact me at (409) 241-4197.

Respectfully,

I. O. Coleman, Jr.
Environmental Section Leader

IOC/cjs
attachments

Hoechst

cc:

Mr. Larry Walker, Geologist
UIC Team
UIC, Uranium and Radioactive Waste Section
Industrial and Hazardous Waste Division
Texas Natural Resource Conservation Commission
P. O. Box 13087
1700 North Congress Avenue
Austin, TX 78711-3087

Mr. Chuck Green
Texas Natural Resource Conservation Commission
P. O. Box 13087
Austin, TX 78711-3087

Mr. Phil Dellinger, USEPA Region VI
Environmental Protection Agency, Region VI
Emergency Response Branch (6E-E)
1445 Ross Ave.
Dallas, Tx 75202-2733

Mr. Tom Jones, ECO
ECO Solutions
10333 Richmond Avenue
Suite 250
Houston, TX 77042

Mr. Bob Hall, ECO
ECO Solutions
10333 Richmond Avenue
Suite 250
Houston, TX 77042

PROPOSED PROCEDURES TO DEMONSTRATE
MECHANICAL INTEGRITY TESTING
HOECHST CELANESE - CHEMICAL GROUP
WDW-14
BAY CITY FACILITY

The following step-by-step proposed mechanical integrity testing (MIT) procedures were developed in accordance with the Underground Injection Control (UIC) and the Hazardous Waste Disposal Injection Restrictions (HWDIR) Programs issued by the United States Environmental Protection Agency (US EPA) and promulgated by the Texas Natural Resources Conservation Commission (TNRCC). Except where noted, all steps of this procedure will be performed by ECO Solutions Inc. (ECO) personnel.

1) **Request and secure approval from the TNRCC to demonstrate MIT (HCCG & ECO).**

* Define annulus pressure test, type logging tools and downhole logging procedures and submit to HCCG .

* HCCG will draft a letter which will provide formal notification to the TNRCC of the intent to demonstrate MIT.

* HCCG will issue the letter to the TNRCC for review and acceptance.

* Receive approval letter from TNRCC on proposed MIT.

2) **Notify the TNRCC field inspector of the scheduled MIT (HCCG).**

* Verbally notify the field inspector of the date field work is scheduled and the estimated starting time for the first test to be witnessed by the TNRCC.

* Determine the intent of TNRCC to field witness MIT.

* Determine desire of TNRCC for any special documentation of test results.

3) **Prepare well for MIT (HCCG).**

* Test master valve to make sure that it will open, close and seal off properly.

* Check wellhead valves to insure that standard fittings can be installed during the MIT. ECO requests that a 2" NPT connection, or standard oil field size adapter, be available on the tubing and casing outlets.

* HCCG's personnel will be set-up to maintain proper annulus pressure while conducting the radioactive tracer (RAT) survey.

* Close well in 48 hours prior to performing annulus pressure test/temperature survey.

4) **Perform annulus pressure test.**

* Install calibrated pressure gauge onto the annulus. Also, HCCG will furnish and install a pressure recorder.

* HCCG's personnel will slowly pressurize the annulus using nitrogen gas to +/- 800 psig. The annulus is reportedly filled with inhibited brine.

* Monitor casing pressure for a minimum period of 60 minutes. Maximum allowable pressure leak-off rate during test is 5% of maximum test pressure.

* Gradually bleed off annulus pressure to normal operating level.

5) **Run temperature survey and radioactive tracer (RAT) survey.**

* Rig up electrical wireline service unit including two gamma ray (G/R) detectors, casing collar locator (CCL) and radioactive tracer (RAT) ejector tool and temperature tools.. Ejector containes +/-5 millicuries of Iodine 131 radioactive (R/A) solution.

* Run temperature survey from surface to either the top of fill or plug back total depth.

* Run initial base G/R log from just below perforated section up to +/-300' above the packer (@3162'), or up to +/-2800. Make repeat G/R run in cased section to prove G/R tool repeatability.

* Run one (1) five-minute statistical log at a depth of 3340'.

* Commence pumping non hazardous effluent fluid down tubing using HCCG's injection pumps at a steady rate.

* Release first R/A slug inside tubing at +/-2800' while pumping fluid down the tubing at the rate of +/-40 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.

* Release second R/A slug. Repeat multiple pass survey above.

* Release third R/A slug from tool at +/-3340'. Hold tool stationary with a pump rate of approximately 100 gpm. Place recorder on time-drive sequence. Logging time will be predetermined based on actual injection rate and as agreed upon with the TNRCC inspector.

* Release fourth R/A slug from tool at +/-3340. Repeat stationary survey above.

* Run final base G/R from just below base of perforated section up to +/-2800' (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 strings. Pull tool out of the hole.

6) **MIT field work is completed.**

* Rig down all rental equipment and either move to the next injection well or off the location.

7) **Submit MIT report (HCCG & ECO).**

* Prepare a draft MIT report detailing the demonstration of MIT on WDW No. 14.

* Submit draft report to HCCG for comments and approval (ECO).

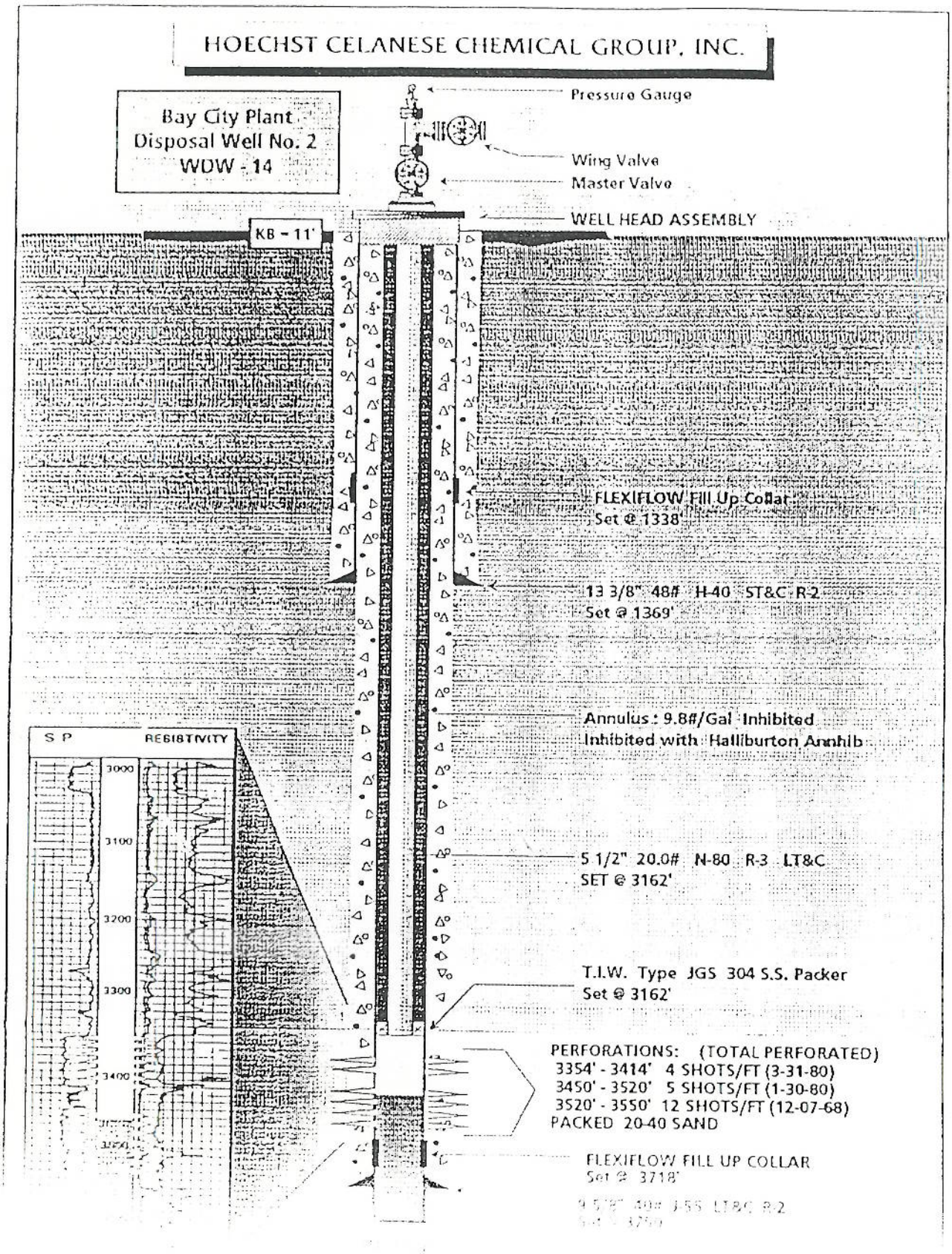
* ECO will correct the MIT report as required and issue 5 copies of the final report to HCCG.

* HCCG will submit report to the TNRCC for review and approval.

* HCCG will receive TNRCC's acceptance of the MIT report.

8) **Mechanical Integrity Testing Complete.**

FIGURE 7.1


HOECHST CELANESE CHEMICAL GROUP, INC.
Bay City Plant
Disposal Well No. 2
WDW - 14
Pressure Gauge
Wing Valve
Master Valve
WELL HEAD ASSEMBLY
KB - 11'
FLEXIFLOW Fill Up Collar
Set @ 1338'
13 3/8" 48# H-40 ST&C R-2
Set @ 1369'
Annulus : 9.8#/Gal Inhibited
Inhibited with Halliburton Annhib
S P
REGISTIVITY
3000
3100
3200
3300
3400
5 1/2" 20.0# N-80 R-3 LT&C
SET @ 3162'
T.I.W. Type JGS 304 S.S. Packer
Set @ 3162'
PERFORATIONS: (TOTAL PERFORATED)
3354' - 3414' 4 SHOTS/FT (3-31-80)
3450' - 3520' 5 SHOTS/FT (1-30-80)
3520' - 3550' 12 SHOTS/FT (12-07-68)
PACKED 20-40 SAND
FLEXIFLOW FILL UP COLLAR
Set @ 3718'

BOTTOM HOLE PRESSURE FALLOFF TESTING
WDW NOS. 14 & 110

HOECHST CELANESE - CHEMICAL GROUP
BAY CITY, TEXAS

Prepared by ECO Solutions

The following is an overview of the proposed bottom hole pressure falloff test procedures for WDW-14 and WDW-110. The falloff test procedures feature the shutting-in of adjacent, onsite, injection wells prior to conducting each falloff test.

Effluent samples will be taken prior to and during each falloff test. Specific gravity and viscosity measurements will be taken on each sample at simulated bottom hole temperature.

ECO Solutions will provide an engineer on-site with the appropriate computer software for analysis of each falloff test.

1) WDW-49 will remain brined in while conducting bottom hole pressure falloff testing on WDW-14 and WDW-110.

2) Maintain high constant injection rates on WDW-14 for approximately four (4) days prior to conducting falloff test on same.

3) Approximately 48 hours prior to conducting bottom hole pressure testing on WDW-14, shut-in WDW-110 and WDW-32.

4) Install surface readout bottom hole pressure gauges in WDW-14 and monitor/record flowing bottom hole pressure for approximately 24 hours.

5) Conduct bottom hole pressure falloff test on WDW-14.

6) Place WDW-14, WDW-32 and WDW-49 back in service for approximately one week prior to conducting falloff testing on WDW-110.

7) Maintain high constant injection rates on WDW-110 for approximately four (4) days prior to conducting falloff test on same.

8) Approximately 48 hours prior to conducting bottom hole pressure testing on WDW-110, shut-in WDW-14 and WDW-32.

9) Install surface readout bottom hole pressure gauges in WDW-110 and monitor/record flowing bottom hole pressure for approximately 24 hours.

10) Conduct bottom hole pressure falloff test on WDW-110.

11) Place all wells back in service.

12) Prepare and submit report detailing field activities to Texas Natural Resources Conservation Commission