[redacted]

Ferrellgas, Inc. (Buckeye Gas Prod.)
NW/NW Sec 8-T18N-R24E. Apache Cty 648

COUNTY Apache AREA 16 mi. W Holbrook LEASE NO. Williams Energy Co.

WELL NAME ~~WILLIAMS ENERGY~~ Buckeye Gas Product COMPANY ~~WEL~~ NO. 9 for Ademana (See Well #7 #646 for Plat)

LOCATION NE/NW SEC 8 TWP 18N RANGE 24E FOOTAGE 939.06' S & 2276.50' E NW Corner

ELEV 5317.80 GR 5323 KB SPUD DATE 9-17-75 STATUS ~~COMP~~. DATE 11-~~6~~-75 TOTAL DEPTH 1125'

CONTRACTOR J. O. BARNES DRILLING SERVICES, INC.

CASING SIZE	DEPTH	CEMENT	LINER SIZE & DEPTH
13 3/8	153'	150 sx	NA
9 5/8	933	370 sx	
~~7~~	~~967~~	~~Hung~~	
4 1/2	1111	Hung	

DRILLED BY ROTARY X

DRILLED BY CABLE TOOL

PRODUCTIVE RESERVOIR LPG Storage Well

INITIAL PRODUCTION

FORMATION TOPS	DEPTHS	SOURCE L.L.	SOURCE E.L.	REMARKS
Coconino	349'		x	
Top Salt	868'		x	

ELECTRIC LOGS	PERFORATED INTERVALS	PROD. INTERVALS

SAMPLE LOG

SAMPLE DESCRP.

SAMPLE NO.

CORE ANALYSIS

DSTs

REMARKS Verbal extension of permit by Dan Dougherty for 30 days from Sept. 3, 1975.

Samples Not Required

APP. TO PLUG

PLUGGING REP.

COMP. REPORT x

WATER WELL ACCEPTED BY

BOND CO. ~~The Ohio Casualty Insurance Co.~~ ~~Federal Ins. Co.~~ St. Paul Fire & Casualty Ins. Co. filed in P/N 778

BOND NO. ~~8047-02-65~~ S40-32083

DATE 1-15-80

BOND AMT. $ 25,000

CANCELLED

ORGANIZATION REPORT 11-21-72

FILING RECEIPT 0376 LOC. PLAT X WELL BOOK X PLAT BOOK X

API NO. 02-001-20213 DATE ISSUED 6-3-75 DEDICATION NA (LPG Storage Well)

PERMIT NUMBER 648

(over)

RECEIVED

JUN 22 1982

O & G CONS. COMM

WELL COMPLETION OR RECOMPLETION REPORT AND WELL LOG

DESIGNATE TYPE OF COMPLETION:

New Well [X] Work-Over [ ] Deepen [ ] Plug Back [ ] Same Reservoir [ ] Different Reservoir [ ] Oil [ ] Gas [ ] Dry [ ]

DESCRIPTION OF WELL AND LEASE

Operator: BUCKEYE GAS PRODUCTS CO.	Address: P.O. BOX 3478 TULSA, OK. 74101
Federal, State or Indian Lease Number or name of lessor if free lease: BUCKEYE GAS PRODUCTS CO.	Well Number: C9 / Field & Reservoir: ADAMANA, AZ.
Location: 939.06 FSL - 2276.50 FWL	County: APACHE
Sec. TWP-Range or Block & Survey: SEC. 8, T-18N R-24E G. & S.R. B. & M.	

Date spudded	Date total depth reached	Date completed, ready to produce	Elevation (DF, RKB, RT or Gr.)	Elevation of casing hd. flange
9-15-75	-	11-6-75	5318 feet	5323 feet

Total depth	P.B.T.D.	Single, dual or triple completion?	If this is a dual or triple completion, furnish separate report for each completion.
1125	-	SALT SOLUTION	

Producing interval (s) for this completion	Rotary tools used (interval)	Cable tools used (interval)
933 TO 1111	G.L. TO T.D.	-

Was this well directionally drilled?	Was directional survey made?	Was copy of directional survey filed?	Date filed
NO	NO	NO	-

Type of electrical or other logs run (check logs filed with the commission): COMPENSATED SONIC LOG WITH GAMMA RAY CALIPER, CMENT BOND LOG — Date filed:

CASING RECORD

Casing (report all strings set in well -- conductor, surface, intermediate, producing, etc.)

Purpose	Size hole drilled	Size casing set	Weight (lb./ft.)	Depth set	Sacks cement	Amt. pulled
SURFACE	17½	13 3/8	48 lbs.	153	150	0
PROTECTION	12¼	9 5/8	32.3	933	370	0
INTERMEDIATE	12¼	7	20	967	HUNG-UNCEMENTED	
SOLUTION	12¼	4½	11.6	1111	HUNG-UNCEMENTED	

TUBING RECORD

Size (in.)	Depth set (ft.)	Packer set at (ft.)

LINER RECORD

Size (in.)	Top (ft.)	Bottom (ft.)	Sacks cement	Screen (ft)

PERFORATION RECORD

Number per ft.	Size & type	Depth Interval

ACID, SHOT, FRACTURE, CEMENT SQUEEZE RECORD

Am't. & kind of material used	Depth Interval

INITIAL PRODUCTION

Date of first production: | Producing method (indicate if flowing, gas lift or pumping—if pumping, show size & type of pump:)

Date of test	Hrs. tested	Choke size	Oil prod. during test (bbls.)	Gas prod. during test (MCF)	Water prod. during test (bbls.)	Oil gravity (°API (Corr))

Tubing pressure	Casing pressure	Cal'ted rate of Production per 24 hrs.	Oil (bbls.)	Gas (MCF)	Water (bbls.)	Gas—oil ratio

Disposition of gas (state whether vented, used for fuel or sold):

CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the Mgr. of the Beachwood (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

6-28-82
Date

Armando Padilla
Signature

Permit No. 648

STATE OF ARIZONA
OIL & GAS CONSERVATION COMMISSION
Well Completion or Recompletion Report and Well Log
File One Copy
Form No. 4

DETAIL OF FORMATIONS PENETRATED

FORMATION	TOP	BOTTOM	DESCRIPTION*
SURFACE SOIL	0	20	SAND
	20	44	RED CLAY
	44	125	CLAY AND SAND SHELLS
	125	177	SAND SHELLS AND CLAY
	177	191	SAND
	191	223	SANDY SHALE
	223	278	SHALEY SAND
	278	333	SAND SHALE
COCONINO	333	792	COCONINO
	792	801	SHALE
	801	810	ANHYDRITE
	810	821	SHALE
	821	839	ANHYDRITE
	839	853	SHALE
	853	857	ANHYDRITE
	857	870	SAND
	870	889	SHALE
	889	894	POTASH
	894	899	SANDY SHALE
	899	1118	SALT
	1118	1125	SHALE

*Show all important zones of porosity, detail of all cores, and all drill-stem tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures, and recoveries.

INSTRUCTIONS:

Attach drillers log or other acceptable log of well.

This Well Completion or Recompletion report and well log shall be filed with the State of Arizona Oil & Gas Conservation Commission not later than thirty days after project completion.

Form No. 4

WELL COMPLETION OR RECOMPLETION REPORT AND WELL LOG

DESIGNATE TYPE OF COMPLETION:

New Well [X] Work-Over [ ] Deepen [ ] Plug Back [ ] Same Reservoir [ ] Different Reservoir [ ] Oil [ ] Gas [ ] Dry [ ]

DESCRIPTION OF WELL AND LEASE

Operator: Williams Energy Company	Address: P. O. Box 3478, Tulsa, Oklahoma 74101
Federal, State or Indian Lease Number or name of lessor if fee lease: Williams Energy Company	Well Number: 9 / Field & Reservoir: Adamana
Location: 1094' SNL and 1907' EWL	County: Apache
Sec. TWP-Range or Block & Survey: NW NE Section 8, T 18N, R 24E G & SR B & M	

Date spudded	Date total depth reached	Date completed, ready to produce	Elevation (DF, RKB, RT or Gr.)	Elevation of casing hd. flange
9-17-75	9-26-75	11-5-75	5318 feet	KB 5323 feet

Total depth	P.B.T.D.	Single, dual or triple completion?	If this is a dual or triple completion, furnish separate report for each completion.
1125	----	LPG Storage	

Producing interval (s) for this completion	Rotary tools used (interval)	Cable tools used (interval)
----	0-1125'	No

Was this well directionally drilled?	Was directional survey made?	Was copy of directional survey filed?	Date filed
No	No	----	----

Type of electrical or other logs run (check logs filed with the commission)	Date filed
Sonic-Gamma Ray	

CASING RECORD

Casing (report all strings set in well—conductor, surface, intermediate, producing, etc.)

Purpose	Size hole drilled	Size casing set	Weight (lb./ft.)	Depth set	Sacks cement	Amt. pulled
Surface	17½"	13-3/8"	48.00	153	150	0
Protection	12¼"	9-5/8"	32.30	933	370	0
Solution		7"	20.00	967	Hung	0
Solution		4½"	11.60	1111	Hung	0

TUBING RECORD

Size (in.)	Depth set (ft.)	Packer set at (ft.)

LINER RECORD

Size (in.)	Top (ft.)	Bottom (ft.)	Sacks cement	Screen (ft.)

PERFORATION RECORD

Number per ft.	Size & type	Depth Interval

ACID, SHOT, FRACTURE, CEMENT SQUEEZE RECORD

Amt. & kind of material used	Depth Interval

INITIAL PRODUCTION

Date of first production	Producing method (indicate if flowing, gas lift or pumping—if pumping, show size & type of pump:)

Date of test	Hrs. tested	Choke size	Oil prod. during test (bbls.)	Gas prod. during test (MCF)	Water prod. during test (bbls.)	Oil gravity (° API (Corr))

Tubing pressure	Casing pressure	Calc'ted rate of Production per 24 hrs.	Oil (bbls.)	Gas (MCF)	Water (bbls.)	Gas—oil ratio

Disposition of gas (state whether vented, used for fuel or sold):

CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the Manager of Operations of the Williams Energy Company (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

Date 12/23/75

Signature Robert J. Wirth

Permit No. 648

STATE OF ARIZONA
OIL & GAS CONSERVATION COMMISSION
Well Completion or Recompletion Report and Well Log
File One Copy
Form No. 4

(Complete Reverse Side)

DETAIL OF FORMATIONS PENETRATED

Formation	Top	Bottom	Description*
Surface	0	40	Soil
	40	66	Red clay
	66	150	Clay and shells
	150	349	Shale with sand stringers
Coconino	349	773	Sand
	773	806	Shaley sand
	806	823	Sandy shale
	823	836	Shaley anhydrite
	836	851	Anhydrite
	851	860	Shale
	860	866	Anhydrite
	866	868	Shale
Top Salt	868	1117	Salt with shale stringers
	1117	1125	Shale
TD		1125	

* Show all important zones of porosity, details of all cores, and all drill-stem tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures, and recoveries.

INSTRUCTIONS:

Attach drillers log or other acceptable log of well.

This Well Completion or Recompletion report and well log shall be filed with the State of Arizona Oil & Gas Conservation Commission not later than thirty days after project completion.

Form No. 4

W

SUNDRY NOTICES AND REPORTS ON WELLS

1. Name of Operator WILLIAMS ENERGY Co.

2. OIL WELL ☐ GAS WELL ☐ OTHER ☑ (Specify) LPG STORAGE

3. Well Name ADAMANA #9

Location NE/NW

Sec. 8 Twp. 18N Rge. 24E County APACHE Arizona.

4. Federal, State or Indian Lease Number, or lessor's name if fee lease

5. Field or Pool Name ADAMANA

6. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	MONTHLY PROGRESS	☐
FRACTURE TREAT	☐	DIRECTIONAL DRILL	☐	FRACTURE TREATMENT	☐	REPAIRING WELL	☐
SHOOT OR ACIDIZE	☐	PERFORATE CASING	☐	SHOOTING OR ACIDIZING	☐	ALTERING CASING	☐
REPAIR WELL	☐	CHANGE PLANS	☐			ABANDONMENT	☐
(OTHER)			☐	(OTHER) WEEKLY REPORT			☐

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

7. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

DRILLED TO 1125 TD
RAN SONIC LOG
RAN 29JTS 9 5/8" & 1 NIP (934.27) 32.30# RGE 2 8RD H-40
SS CSG. SET AT 933.27 K.B GSG CEMENTED W/310 SX
RFC & 60 SX EXPANDING CEMENT. GOOD RETURNS. PLUG
DOWN 3:00PM.
RAN BOND LOG. W.O.O. 9-30-75

RECEIVED
OCT 6 1975
O & G CONS. COMM.

8. I hereby certify that the foregoing is true and correct.

Signed [signature] Title Supt Date ~~10-2~~ 9-27-75

STATE OF ARIZONA
OIL & GAS CONSERVATION COMMISSION
Sundry Notices and Reports On Wells
File Two Copies
Form No. 25

Permit No. 648

WA

SUNDRY NOTICES AND REPORTS ON WELLS

1. Name of Operator WILLIAMS ENERGY Co

2. OIL WELL ☐ GAS WELL ☐ OTHER ☑ (Specify) LPG STORAGE

3. Well Name ADAMANA #9

Location NE/NW

Sec. 8 Twp. 18N Rge. 24E County APACHE Arizona.

4. Federal, State or Indian Lease Number, or lessor's name if fee lease

5. Field or Pool Name ADAMANA

6. Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	MONTHLY PROGRESS	☐
FRACTURE TREAT	☐	DIRECTIONAL DRILL	☐	FRACTURE TREATMENT	☐	REPAIRING WELL	☐
SHOOT OR ACIDIZE	☐	PERFORATE CASING	☐	SHOOTING OR ACIDIZING	☐	ALTERING CASING	☐
REPAIR WELL	☐	CHANGE PLANS	☐			ABANDONMENT	☐
(OTHER)			☐	(OTHER) WEEKLY REPORT			☐

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

7. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

SPUD 6:00 PM 9-15-75.

DRILL 157' 17½" HOLE

RAN 153.06 FT. 13⅜" 48# H-40 SS 8RD CSG

CEMENT CSG W/ 150 SX REG. CEMENT 2% C.C. ¼# FLOCELE

GOOD RETURNS ON CEMENT PLUG DOWN 4:30 PM 9-17-75

8. I hereby certify that the foregoing is true and correct.

Signed [signature] Title Supt Date 9/8-75

Permit No. 648

STATE OF ARIZONA
OIL & GAS CONSERVATION COMMISSION
Sundry Notices and Reports On Wells
File Two Copies
Form No. 25

APPLICATION FOR PERMIT TO DRILL OR RE-ENTER

APPLICATION TO DRILL ☒ RE-ENTER OLD WELL ☐

WILLIAMS ENERGY COMPANY
NAME OF COMPANY OR OPERATOR

P. O. BOX 3478 — Address
TULSA, — City
OKLAHOMA 74101 — State

J. O. BARNES DRILLING SERVICES, INC.
Drilling Contractor

P. O. BOX 141 CASA GRANDE, ARIZONA 85222
Address

DESCRIPTION OF WELL AND LEASE

Federal, State or Indian Lease Number, or if fee lease, name of lessor: Williams Energy Company	Well number: 9	Elevation (ground): 5317.80'
Nearest distance from proposed location to property or lease line: 150' feet	Distance from proposed location to nearest drilling, completed or applied--for well on the same lease: 400 feet	
Number of acres in lease: 114	Number of wells on lease, including this well, completed in or drilling to this reservoir: 8	
If lease, purchased with one or more wells drilled, from whom purchased: Name N/A	Address	
Well location (give footage from section lines): 1093.56' South & 1906.62' East of N.W. corner NE/NW	Section—township—range or block and survey: SEC. 8 T18N, R24E, G&S.R.B.&M.	Dedication (Comply with Rule 105)
Field and reservoir (if wildcat, so state): Unnamed	County: Apache	
Distance, in miles, and direction from nearest town or post office: 16 miles west to Holbrook		
Proposed depth: 1100	Rotary or cable tools: Rotary	Approx. date work will start: June 23, 1975
Bond Status / Amount	Organization Report: On file Yes Or attached	Filing Fee of $25.00: Attached Yes

Remarks: Request that commission grant an exception to Rule 105 describing minimum distances since these wells are a part of a liquified petroleum storage cavern complex in a salt strata.

CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the Manager of Operations of the Williams Energy (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

RECEIVED
JUN 3 1975
O & G CONS. COMM.

Signature Robert J. Wirth R. J. Wirth

Date 5/30/75

Permit Number: 648
Approval Date: 6-3-75
Approved By: W. E. Allen

Notice: Before sending in this form be sure that you have given all information requested. Much unnecessary correspondence will thus be avoided.

STATE OF ARIZONA
OIL & GAS CONSERVATION COMMISSION
Application to Drill or Re-enter
File Two Copies

Form No. 3

(Complete Reverse Side)

1. Operator shall outline the dedicated acreage for *both* oil and gas wells on the plat.

2. A registered professional engineer or land surveyor registered in the State of Arizona or approved by the Commission shall show on the plat the location of the well and certify this information in the space provided.

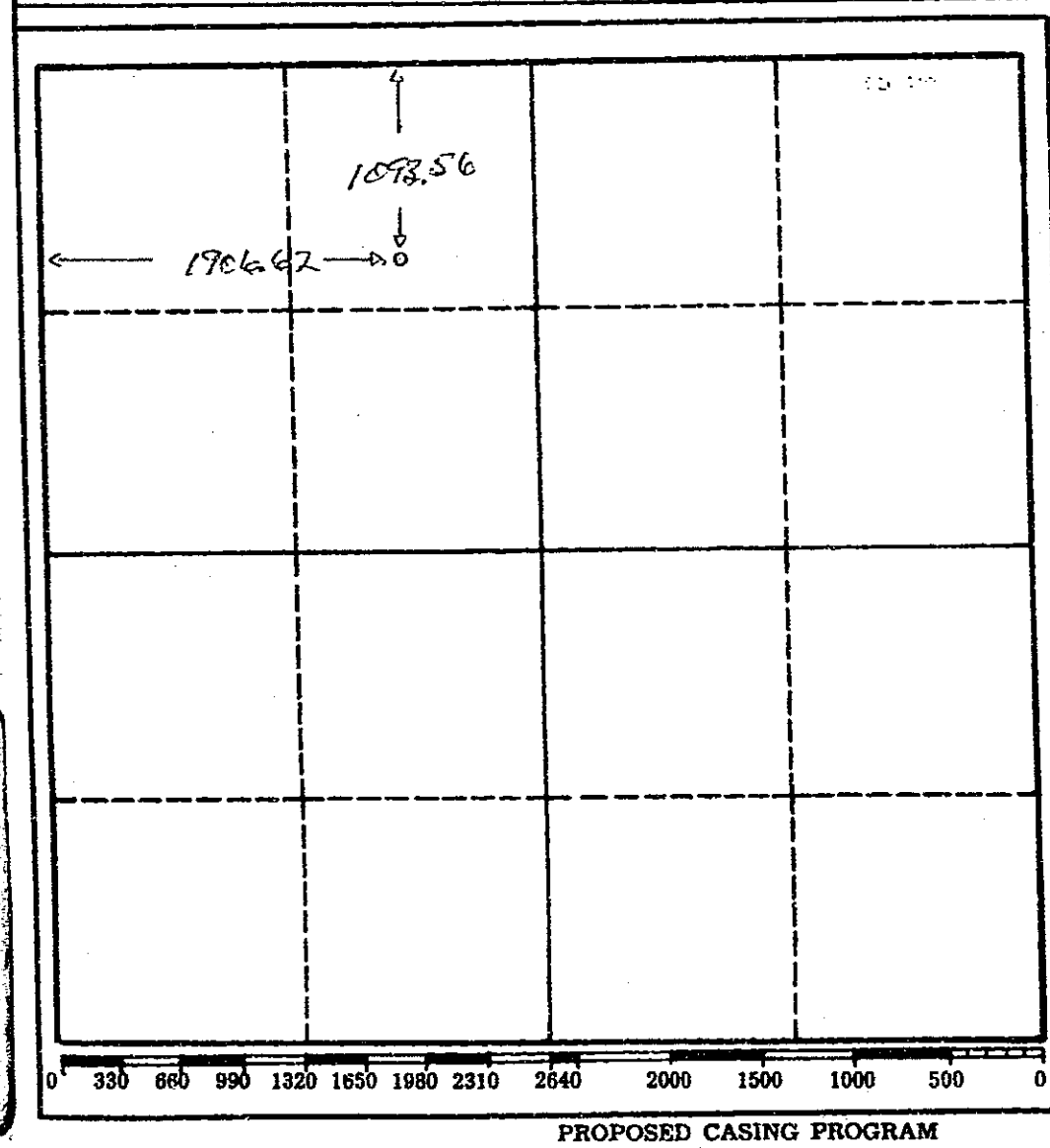
3. All distances shown on the plat must be from the outer boundaries of the Section.

4. Is the Operator the only owner in the dedicated acreage outlined on the plat below? YES X NO_____

5. If the answer to question four is "no," have the interests of all the owners been consolidated by communitization agreement or otherwise? YES_____ NO_____. If answer is "yes," Type of Consolidation_____

6. If the answer to question four is "no," list all the owners and their respective interests below:

Owner	Land Description



CERTIFICATION

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Name

Position

Company

Date

I hereby certify that the well location shown on the plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed

Registered Professional Engineer and/or Land Surveyor

Certificate No.

PROPOSED CASING PROGRAM

Size of Casing	Weight	Grade & Type	Top	Bottom	Cementing Depths	Sacks Cement
13 3/8"	48	H-40	G.L.	150'	Top to Bottom	
9 5/8"	32.3	H-40	G.L.	900'	Top to Bottom	

PERMIT TO DRILL

This constitutes the permission and authority from the

OIL AND GAS CONSERVATION COMMISSION,
STATE OF ARIZONA,

To: WILLIAMS ENERGY COMPANY
(OPERATOR)

to drill a well to be known as

WILLIAMS ENERGY COMPANY WELL NO. 9
(WELL NAME)

located 939.06' So. & 2276.50' Ea. of NW corner

Section 8 Township 18N Range 24E, Apache County, Arizona.

The NA (LPG STORAGE WELL) of said Section, Township and Range is dedicated to this well.

Said well is to be drilled substantially as outlined in the attached Application and must be drilled in full compliance with all applicable laws, statutes, rules and regulations of the State of Arizona.

Issued this 3rd day of June, 1975.

OIL AND GAS CONSERVATION COMMISSION

By W. E. Allen
EXECUTIVE SECRETARY

PERMIT Nº 648

RECEIPT NO. 0376
API NO. 02-001-20213

State of Arizona
Oil & Gas Conservation Commission
Permit to Drill
FORM NO. 27

SAMPLES ARE REQUIRED

DIGITAL SURVEYS, INC.

SONAR SURVEY

Ferrellgas

WELL NO. 9

MARCH 20,1992

ADAMANA, ARIZONA

CUSTOMER REP.:	MR. THOMPSON
SONAR OPERATOR:	BOB POLLOCK
HOIST OPERATOR:	" "
JOB NO.:	255
PERMANENT DATUM:	B.H.F.
ZERO POINT:	B.H.F.
CASING DIA.:	7.0"
CASING DEPTH:	1059.2'
INTERMEDIATE DIA.:	OUT
INTERMEDIATE DEPTH:	OUT
TUBING DIA.:	N/A
TUBING DEPTH:	OUT
TOTAL DEPTH:	1064.5'
GAGE T.D.:	N/A
SONAR T.D.:	1064.5'

REMARKS:
SURVEYED THRU 7" CASING STRING

DIGITAL SURVEYS, INC. 10700 CORPORATE DR. STE.100 STAFFORD, TX 77477
TELEPHONE (713)240-6777 FAX (713)240-6129

VOLUME REPORT

DEPTH feet	DEPTH meters	INCR ft^3	TOTAL ft^3	INCR m^3	TOTAL m^3	INCR bbls	TOTAL bbls
973	296.5	0	0	0.0	0	0.0	0
974	296.8	491	491	13.9	13	87.4	87
975	297.1	3163	3655	89.5	103	563.3	650
976	297.4	7829	11485	221.7	325	1394.3	2045
978	298.0	22838	34323	646.7	972	4067.4	6112
980	298.7	23093	57417	653.9	1626	4112.8	10225
982	299.3	21575	78993	611.0	2237	3842.5	14068
984	299.9	20022	99016	567.0	2804	3565.9	17634
986	300.5	18833	117849	533.3	3337	3354.1	20988
988	301.1	18373	136222	520.3	3857	3272.2	24261
990	301.7	18410	154633	521.3	4379	3278.8	27540
992	302.3	18353	172986	519.7	4898	3268.6	30808
994	302.9	17994	190981	509.5	5408	3204.7	34013
996	303.5	17484	208465	495.1	5903	3113.9	37127
998	304.1	16855	225321	477.3	6381	3001.8	40129
1000	304.8	15950	241271	451.7	6832	2840.6	42970
1002	305.4	14700	255972	416.3	7249	2618.0	45588
1004	306.0	12886	268858	364.9	7614	2294.9	47883
1005	306.3	5824	274682	164.9	7778	1037.2	48920
1006	306.6	5405	280088	153.0	7932	962.6	49883
1007	306.9	4922	285010	139.3	8071	876.6	50760
1008	307.2	4211	289222	119.2	8190	749.9	51510
1009	307.5	3539	292761	100.2	8290	630.2	52140
1010	307.8	3668	296430	103.8	8394	653.2	52794
1011	308.1	3951	300381	111.8	8506	703.6	53497
1012	308.4	3528	303910	99.9	8606	628.3	54126
1013	308.7	5676	309586	160.7	8767	1010.8	55137
1014	309.0	11388	320974	322.5	9089	2028.2	57165
1015	309.3	15926	336901	451.0	9541	2836.4	60002
1020	310.8	89320	426222	2529.5	12070	15907.8	75910
1025	312.4	83844	510067	2374.4	14445	14932.6	90842
1030	313.9	77661	587729	2199.3	16644	13831.4	104674
1035	315.4	75251	662980	2131.1	18775	13402.2	118076
1040	316.9	72417	735397	2050.8	20826	12897.4	130974
1045	318.5	66499	801897	1883.2	22709	11843.4	142817
1047	319.1	26003	827901	736.4	23446	4631.1	147449
1050	320.0	38712	866613	1096.3	24542	6894.6	154343
1052	320.6	25016	891629	708.4	25250	4455.3	158799
1055	321.5	30965	922595	876.9	26127	5514.8	164314
1057	322.1	11936	934532	338.0	26465	2125.8	166440
1060	323.0	9767	944300	276.6	26742	1739.5	168179
1061	323.3	2295	946595	64.9	26807	408.7	168588
1062	323.6	1010	947606	28.6	26836	179.8	168768
1063	324.0	135	947741	3.8	26840	24.0	168792
1064	324.3	21	947763	.5	26840	3.7	168796
1065	324.6	3	947767	.0	26840	.5	168797

MAJOR COMPASS RADII

Depth & Radii in feet

DEPTH	TILT	N	NE	E	SE	S	SW	W	NW
973	90	.3	.3	.3	.3	.3	.3	.3	.3
974	90	21.6	19.9	21.1	19.4	19.4	31.8	21.1	19.9
975	90	21.1	19.6	21.6	19.6	19.2	58.4	58.6	60.1
976	90	59.9	21.4	62.5	66.9	66.5	58.0	60.3	61.4
978	90	62.0	62.5	62.0	68.9	61.8	60.1	57.3	60.6
980	90	58.8	58.8	61.2	67.4	60.5	52.9	55.6	58.4
982	90	56.1	55.7	58.8	67.1	59.0	49.5	53.5	57.1
984	90	54.4	53.9	57.8	65.5	61.4	47.1	52.0	55.0
986	90	54.0	53.3	55.4	65.7	59.5	44.4	49.0	52.9
988	90	54.6	51.8	57.3	64.6	59.5	41.4	48.8	55.2
990	90	57.6	52.9	59.3	66.5	55.4	39.7	45.6	57.1
992	90	58.0	55.9	59.5	67.2	46.1	36.3	43.3	58.2
994	90	56.3	56.7	59.9	65.4	44.2	33.7	40.9	58.0
996	90	55.9	56.3	58.0	61.8	49.3	31.1	37.7	60.1
998	90	55.9	55.7	57.3	62.2	47.6	27.8	33.3	59.7
1000	90	54.4	53.5	55.9	63.7	43.7	25.6	31.6	58.2
1002	90	52.9	52.4	52.4	56.9	42.9	24.3	28.6	54.2
1004	90	49.1	48.6	50.8	47.1	37.7	20.9	26.3	52.2
1005	90	48.8	47.1	50.1	59.9	30.5	19.7	23.9	51.6
1006	90	47.6	45.6	47.6	47.3	35.0	18.8	23.3	50.5
1007	90	46.9	44.6	46.1	44.2	29.9	17.9	21.8	47.6
1008	90	40.7	42.0	44.6	41.6	17.7	12.4	14.5	37.1
1009	90	40.5	40.9	43.9	40.1	15.8	12.6	13.1	23.7
1010	90	37.7	42.0	38.8	38.0	39.3	12.0	39.2	37.1
1011	90	35.6	39.9	37.8	37.7	34.3	11.6	39.3	36.1
1012	90	32.4	37.1	33.9	34.6	31.8	8.6	35.0	34.1
1013	90	30.9	38.6	31.2	34.4	32.9	78.0	79.3	75.9
1014	90	39.3	78.7	36.9	36.1	78.4	78.6	78.0	73.5
1015	90	79.3	77.4	77.8	75.0	74.0	75.7	76.7	75.7
1020	90	78.7	76.5	74.6	72.9	71.0	74.8	72.9	76.5
1025	90	72.5	73.5	73.3	70.1	71.4	70.6	71.0	70.8
1030	90	70.4	72.7	72.3	68.4	69.5	66.9	70.4	66.9
1035	90	69.5	67.6	70.1	69.7	71.0	72.5	70.6	68.2
1040	90	67.4	68.2	66.1	66.7	71.2	70.1	63.7	62.2
1045	90	68.2	69.5	62.2	63.1	62.0	61.8	61.6	62.9
1047	90	69.5	66.3	61.2	59.9	64.8	66.3	63.1	64.8
1050	90	68.6	67.2	56.5	56.9	63.3	62.2	60.3	64.0
1052	90	69.9	66.7	55.6	53.7	62.9	59.5	59.5	65.0
1055	90	39.5	49.1	48.6	48.8	26.7	54.0	52.7	63.9
1057	90	28.6	50.1	47.1	46.7	19.9	21.1	21.3	22.9
1060	90	20.1	45.2	43.9	31.4	16.9	14.3	15.0	23.1
1061	90	18.0	38.2	41.8	23.1	13.7	10.3	12.4	22.0
1062	90	6.4	16.1	13.8	4.1	4.1	3.8	4.5	4.5
1063	90	3.1	3.3	3.0	3.1	3.3	3.4	3.6	3.9
1064	90	2.0	1.6	1.6	1.5	2.1	2.0	2.3	1.8
1065	90	.3	.3	.3	.3	.3	.3	.3	.3

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 973 ft TILT: 90 degrees

0	.3	.3	.3	.3	.3	.3	.3	.3	.3
45	.3	.3	.3	.3	.3	.3	.3	.3	.3
90	.3	.3	.3	.3	.3	.3	.3	.3	.3
135	.3	.3	.3	.3	.3	.3	.3	.3	.3
180	.3	.3	.3	.3	.3	.3	.3	.3	.3
225	.3	.3	.3	.3	.3	.3	.3	.3	.3
270	.3	.3	.3	.3	.3	.3	.3	.3	.3
315	.3	.3	.3	.3	.3	.3	.3	.3	.3

AZ DEPTH: 974 ft TILT: 90 degrees

0	21.6	20.7	20.1	19.4	20.3	20.5	20.1	20.1	19.6
45	19.9	20.3	20.1	20.3	20.3	19.7	19.4	20.1	20.3
90	21.1	19.2	18.6	19.2	19.7	19.0	18.2	19.0	18.8
135	19.4	19.7	20.1	19.0	19.2	19.2	19.9	19.6	19.7
180	19.4	20.1	19.9	20.1	20.5	35.8	35.8	33.5	32.2
225	31.8	26.2	21.4	19.9	19.9	19.9	20.3	20.3	21.1
270	21.1	20.9	20.5	19.9	20.5	20.7	21.8	20.3	19.6
315	19.9	21.1	20.7	20.7	20.5	20.1	20.7	21.3	21.8

AZ DEPTH: 975 ft TILT: 90 degrees

0	21.1	21.1	21.1	20.5	19.6	20.9	21.1	20.1	20.9
45	19.6	20.5	20.5	20.9	20.5	20.9	21.1	19.4	20.9
90	21.6	20.7	19.9	19.2	19.2	21.1	18.8	19.7	19.2
135	19.6	20.9	20.3	20.3	19.0	19.7	18.2	20.1	19.4
180	19.2	19.7	65.2	62.5	60.8	61.0	61.2	60.5	59.1
225	58.4	59.9	59.7	60.3	60.3	61.6	60.3	60.5	60.3
270	58.6	59.3	58.4	59.1	58.8	59.1	59.1	59.3	59.9
315	60.1	60.1	60.6	61.4	60.5	19.7	20.9	21.1	21.1

AZ DEPTH: 976 ft TILT: 90 degrees

0	59.9	60.8	61.2	62.0	22.0	22.0	21.6	21.4	21.6
45	21.4	21.1	21.4	65.5	63.1	62.9	62.9	60.3	60.3
90	62.5	63.1	63.1	62.9	64.0	64.4	65.9	65.4	66.5
135	66.9	69.7	68.9	67.6	68.4	67.8	68.6	67.8	65.4
180	66.5	65.0	64.8	62.2	62.2	61.6	60.5	59.3	60.3
225	58.0	58.4	60.1	60.6	60.5	60.5	61.2	62.0	60.3
270	60.3	59.5	59.1	60.8	59.9	60.1	59.0	60.1	60.5
315	61.4	61.6	61.0	62.2	60.8	60.3	62.2	60.8	62.0

AZ DEPTH: 978 ft TILT: 90 degrees

0	62.0	60.3	62.5	63.5	62.2	60.1	61.4	59.0	61.0
45	62.5	61.8	61.4	61.0	62.0	60.8	61.8	60.6	62.7
90	62.0	62.5	62.3	63.7	63.7	64.6	66.5	65.0	68.4
135	68.9	68.8	69.1	68.0	67.1	66.9	65.9	65.2	62.7
180	61.8	60.6	59.7	58.4	57.4	57.3	55.2	57.8	55.7
225	60.1	59.0	59.1	61.0	59.7	56.5	58.2	58.0	58.2
270	57.3	57.8	57.8	58.2	58.6	59.0	59.5	59.5	59.3
315	60.6	61.6	62.2	61.4	61.4	61.0	60.6	60.8	60.8

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 980 ft TILT: 90 degrees

0	58.8	59.1	59.3	59.1	60.1	60.5	59.5	59.7	60.3
45	58.8	59.0	59.0	59.9	59.7	60.6	60.1	60.1	60.5
90	61.2	60.8	61.8	63.9	64.4	65.4	65.7	65.7	67.6
135	67.4	68.6	66.3	67.2	64.8	64.2	64.2	62.9	62.5
180	60.5	60.5	58.4	56.1	56.9	53.7	52.5	52.0	53.5
225	52.9	53.3	58.8	59.5	57.3	55.6	55.4	55.9	56.9
270	55.6	55.9	55.7	56.1	56.7	57.6	58.0	58.0	59.0
315	58.4	58.8	59.7	59.1	58.8	57.6	59.1	59.0	58.4

AZ DEPTH: 982 ft TILT: 90 degrees

0	56.1	56.5	56.3	56.9	57.1	56.9	57.3	57.3	56.9
45	55.7	55.0	56.5	57.4	59.5	59.9	60.1	59.3	59.0
90	58.8	58.8	59.1	60.1	61.8	61.6	62.5	62.9	66.1
135	67.1	68.8	68.9	67.2	64.4	63.1	64.0	62.3	61.6
180	59.0	59.1	55.4	55.9	53.3	52.2	50.3	50.1	49.1
225	49.5	49.1	49.5	50.3	49.7	51.0	51.6	53.3	52.7
270	53.5	53.5	54.2	53.5	53.1	55.2	55.0	56.1	56.9
315	57.1	56.7	57.3	58.0	57.3	55.0	57.3	57.6	56.3

AZ DEPTH: 984 ft TILT: 90 degrees

0	54.4	54.8	53.9	54.4	54.2	55.2	56.1	55.4	54.6
45	53.9	54.8	53.5	54.8	55.4	55.4	57.8	57.3	55.0
90	57.8	57.3	56.7	58.2	59.0	60.6	60.8	61.6	64.2
135	65.5	68.0	63.1	64.2	63.1	62.3	61.8	62.3	60.6
180	61.4	56.9	54.8	51.8	50.8	49.3	48.2	46.7	45.8
225	47.1	47.3	47.8	47.6	48.2	50.1	50.5	50.1	50.1
270	52.0	51.2	51.4	51.6	52.2	52.7	54.2	54.2	54.8
315	55.0	55.4	55.9	57.1	55.2	54.4	54.8	54.2	55.0

AZ DEPTH: 986 ft TILT: 90 degrees

0	54.0	54.4	53.5	53.1	53.3	53.5	54.4	53.7	53.9
45	53.3	52.5	52.9	53.7	53.1	53.9	53.7	55.4	55.4
90	55.4	56.5	56.3	56.3	56.7	56.9	57.6	58.8	62.3
135	65.7	65.2	66.1	64.4	65.0	64.4	64.4	62.5	62.3
180	59.5	57.6	53.9	51.2	49.7	48.8	48.2	45.2	45.0
225	44.4	44.4	43.7	44.4	44.6	46.1	45.9	48.4	47.8
270	49.0	49.0	49.5	48.4	49.0	49.0	50.5	51.2	51.8
315	52.9	54.6	55.0	55.7	55.2	56.7	54.0	53.1	53.1

AZ DEPTH: 988 ft TILT: 90 degrees

0	54.6	54.0	53.7	53.1	53.5	53.5	53.5	53.3	52.7
45	51.8	53.3	53.9	55.0	55.2	57.1	55.7	56.5	56.1
90	57.3	56.7	56.9	58.2	57.8	58.8	59.3	61.2	60.8
135	64.6	66.9	66.7	65.7	66.1	64.4	62.7	62.5	60.8
180	59.5	58.6	54.4	50.1	48.2	44.6	43.9	43.1	43.5
225	41.4	41.4	41.4	40.9	41.6	45.6	45.9	46.5	48.4
270	48.8	47.8	46.7	49.1	49.1	49.3	50.3	53.1	53.1
315	55.2	55.0	56.7	56.9	55.7	54.8	55.4	55.0	54.2

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 990 ft TILT: 90 degrees

0	57.6	55.4	54.8	54.2	55.2	54.4	52.9	53.7	53.5
45	52.9	54.6	55.9	54.8	57.6	56.5	57.3	57.6	57.8
90	59.3	58.6	58.6	59.1	58.4	59.9	60.3	61.0	63.9
135	66.5	66.9	66.5	66.1	65.0	63.7	62.3	61.4	61.2
180	55.4	46.9	47.6	41.6	41.4	41.8	40.7	39.9	39.2
225	39.7	39.9	39.5	40.5	40.5	44.4	47.5	45.4	47.6
270	45.6	46.3	46.7	46.9	46.9	50.3	52.7	53.9	55.9
315	57.1	58.4	58.6	58.8	57.3	57.4	56.3	56.9	57.1

AZ DEPTH: 992 ft TILT: 90 degrees

0	58.0	55.7	55.6	55.7	56.3	56.3	55.6	55.7	56.9
45	55.9	56.3	56.9	57.8	57.4	58.6	58.4	59.0	59.5
90	59.5	59.7	59.5	59.0	59.1	59.7	60.6	61.0	64.0
135	67.2	66.3	66.3	65.2	64.8	61.4	59.7	58.8	54.8
180	46.1	44.4	42.2	41.2	39.2	38.8	38.4	37.3	36.1
225	36.3	35.6	36.9	36.7	37.7	42.4	43.1	45.9	44.2
270	43.3	45.4	47.1	46.3	49.0	51.0	54.2	55.2	57.6
315	58.2	58.6	59.5	58.0	57.1	57.4	56.9	58.4	57.6

AZ DEPTH: 994 ft TILT: 90 degrees

0	56.3	56.1	56.3	56.5	56.5	56.5	56.7	56.3	56.3
45	56.7	56.9	57.6	57.8	57.8	58.2	58.2	58.6	59.1
90	59.9	60.1	59.7	59.3	58.8	59.5	59.1	60.3	62.5
135	65.4	65.2	65.9	66.1	64.6	61.4	57.4	56.5	54.2
180	44.2	44.2	42.7	42.2	40.3	38.2	36.1	35.4	35.0
225	33.7	33.3	33.7	34.1	34.6	35.8	37.3	40.7	40.5
270	40.9	41.6	44.1	46.1	47.5	49.1	54.0	54.8	56.9
315	58.0	58.6	58.8	59.1	57.3	55.7	55.7	55.9	56.3

AZ DEPTH: 996 ft TILT: 90 degrees

0	55.9	55.2	56.1	56.5	55.9	56.9	57.8	57.3	57.6
45	56.3	56.9	56.1	57.1	57.8	57.6	57.4	57.8	58.4
90	58.0	58.4	58.0	57.1	57.3	57.3	57.8	58.4	59.5
135	61.8	65.4	66.1	65.0	65.5	58.4	59.3	54.4	54.0
180	49.3	43.7	42.9	40.3	37.8	34.3	33.9	32.4	31.6
225	31.1	30.5	30.7	30.7	31.8	32.9	33.7	34.3	35.4
270	37.7	38.4	42.7	44.1	47.5	49.9	53.9	56.5	59.0
315	60.1	60.5	60.1	59.0	57.4	56.9	57.1	56.7	56.9

AZ DEPTH: 998 ft TILT: 90 degrees

0	55.9	56.3	55.2	56.3	56.5	57.3	55.6	56.5	57.1
45	55.7	56.3	55.6	56.9	56.5	57.3	56.5	57.1	56.9
90	57.3	57.3	55.9	55.0	54.0	54.8	56.3	58.2	60.5
135	62.2	66.1	66.1	68.2	66.7	59.7	55.2	51.0	48.2
180	47.6	43.5	42.6	39.2	33.5	31.4	30.3	29.4	28.4
225	27.8	27.5	27.5	27.7	28.6	29.2	30.7	30.7	31.6
270	33.3	34.4	36.3	40.7	44.2	47.1	50.1	55.6	58.2
315	59.7	61.8	61.8	60.3	57.4	56.5	55.0	55.4	57.1

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 1000 ft TILT: 90 degrees

0	54.4	55.0	54.8	55.4	55.0	55.2	55.0	55.2	54.8
45	53.5	53.7	53.7	56.3	55.7	54.2	54.6	54.8	55.4
90	55.9	55.2	52.7	53.1	52.2	52.0	56.1	65.0	66.7
135	63.7	63.9	65.0	66.3	68.0	52.4	49.5	47.5	45.8
180	43.7	41.2	41.8	31.2	29.2	26.3	27.3	26.2	26.7
225	25.6	25.8	25.4	26.0	26.9	27.1	28.2	28.4	29.7
270	31.6	34.4	36.1	39.3	44.6	45.8	49.9	55.2	56.3
315	58.2	56.5	58.4	55.4	52.0	52.5	52.9	54.4	54.2

AZ DEPTH: 1002 ft TILT: 90 degrees

0	52.9	52.9	53.9	53.3	53.3	54.6	53.5	52.5	51.6
45	52.4	50.1	50.1	52.7	51.8	51.4	53.1	52.7	52.9
90	52.4	52.0	49.7	50.1	49.7	50.7	51.4	52.2	54.4
135	56.9	64.6	65.7	65.5	64.8	49.9	50.7	46.3	47.8
180	42.9	40.7	40.7	30.1	26.9	25.8	25.8	24.5	24.5
225	24.3	23.1	23.3	23.5	23.9	25.4	26.2	26.7	27.7
270	28.6	32.0	35.2	37.3	39.7	42.9	47.6	49.5	55.2
315	54.2	55.0	54.4	53.5	52.7	49.3	50.5	51.2	52.0

AZ DEPTH: 1004 ft TILT: 90 degrees

0	49.1	49.7	50.5	50.8	52.0	52.0	52.2	50.7	49.1
45	48.6	47.6	49.0	51.0	50.1	48.8	50.7	50.7	51.2
90	50.8	49.5	48.4	47.6	46.9	48.8	49.5	47.1	47.1
135	47.1	47.1	56.5	63.3	58.4	44.8	43.9	42.6	40.3
180	37.7	35.6	29.7	25.2	22.9	22.2	21.4	21.4	20.7
225	20.9	19.7	20.3	20.9	21.3	21.4	22.2	22.2	24.5
270	26.3	27.5	29.2	30.3	34.3	41.0	45.0	49.9	50.3
315	52.2	50.3	52.2	48.0	47.6	47.1	48.2	48.4	49.7

AZ DEPTH: 1005 ft TILT: 90 degrees

0	48.8	49.9	49.1	50.5	50.5	49.5	49.7	49.1	49.3
45	47.1	47.3	47.1	48.2	48.0	48.4	49.1	49.7	49.9
90	50.1	48.8	46.9	46.5	45.6	45.8	48.0	48.0	47.5
135	59.9	59.9	61.2	62.9	56.7	48.2	43.3	41.0	40.3
180	30.5	29.9	27.7	24.6	22.9	21.3	20.5	20.3	20.3
225	19.7	20.1	19.6	20.1	21.1	22.2	21.8	22.4	22.2
270	23.9	25.4	27.3	29.7	33.7	38.6	42.7	47.6	48.4
315	51.6	51.4	48.6	47.1	46.1	44.8	46.5	47.1	49.9

AZ DEPTH: 1006 ft TILT: 90 degrees

0	47.6	47.8	46.9	47.1	47.5	47.5	46.9	48.0	46.7
45	45.6	45.8	46.1	47.6	47.5	47.1	47.6	48.2	48.8
90	47.6	46.1	46.5	45.0	43.7	44.2	45.0	47.3	47.3
135	47.3	47.3	47.3	47.3	45.0	42.9	41.2	41.2	36.9
180	35.0	32.2	29.0	23.5	20.3	20.5	19.2	19.4	19.0
225	18.8	18.4	19.2	19.6	19.7	20.3	20.5	20.9	22.2
270	23.3	24.6	27.1	28.8	30.7	36.7	39.5	44.2	48.0
315	50.5	48.4	47.8	45.2	45.2	44.4	45.4	45.4	46.5

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 1007 ft TILT: 90 degrees

0	46.9	46.7	46.7	46.9	47.3	47.5	45.4	46.9	45.2
45	44.6	43.1	45.9	46.1	46.3	46.7	46.9	47.8	47.8
90	46.1	44.8	44.2	43.1	44.4	43.9	44.1	44.2	44.2
135	44.2	44.2	44.2	43.5	43.5	41.0	39.3	38.6	28.4
180	29.9	25.4	23.3	19.0	18.2	18.2	18.4	17.7	17.7
225	17.9	19.2	18.8	19.9	19.7	19.9	20.1	20.1	20.9
270	21.8	23.7	25.6	26.2	29.4	35.4	42.4	45.6	48.4
315	47.6	47.6	45.0	44.2	43.9	44.8	45.4	46.1	46.1

AZ DEPTH: 1008 ft TILT: 90 degrees

0	40.7	42.6	45.0	42.6	43.9	45.0	44.6	42.6	44.1
45	42.0	40.1	41.8	40.5	40.7	44.1	44.1	45.6	44.1
90	44.6	42.6	40.7	40.3	39.9	39.5	40.5	39.7	41.6
135	41.6	41.6	41.6	41.6	41.6	42.6	39.0	36.7	28.4
180	17.7	16.5	18.0	16.2	15.4	15.2	15.0	15.0	12.4
225	12.4	12.6	12.6	12.8	12.4	12.0	12.6	14.5	14.5
270	14.5	14.8	15.0	14.8	15.8	18.8	24.5	24.5	32.0
315	37.1	41.4	40.7	42.0	41.2	39.7	40.9	40.5	40.3

AZ DEPTH: 1009 ft TILT: 90 degrees

0	40.5	42.0	41.6	42.4	40.5	43.9	40.5	44.2	40.3
45	40.9	40.5	40.1	37.8	39.7	37.5	39.9	43.5	43.5
90	43.9	42.7	39.9	38.8	39.5	38.8	39.3	39.2	40.1
135	40.1	40.1	40.1	40.1	39.2	40.9	39.7	37.5	26.5
180	15.8	15.0	15.8	14.8	14.3	14.5	14.5	13.5	13.0
225	12.6	12.6	12.6	12.6	12.6	11.8	12.6	12.4	12.8
270	13.1	12.4	15.0	14.8	14.8	14.8	16.3	19.7	20.3
315	23.7	38.6	42.0	40.7	38.8	36.7	40.1	39.2	39.9

AZ DEPTH: 1010 ft TILT: 90 degrees

0	37.7	37.3	38.4	38.2	37.8	40.3	41.4	42.0	40.7
45	42.0	39.2	41.2	39.9	39.5	39.9	39.2	38.0	37.1
90	38.8	39.9	39.2	41.2	39.0	39.2	37.1	37.8	37.5
135	38.0	36.1	37.8	43.9	41.0	42.9	41.4	39.2	38.8
180	39.3	36.1	36.7	36.1	35.0	11.8	11.8	12.0	12.2
225	12.0	12.0	11.8	12.2	12.2	12.2	13.3	38.4	38.8
270	39.2	38.2	36.9	38.4	35.2	38.2	36.7	37.5	36.0
315	37.1	36.0	37.8	39.2	38.4	38.6	37.5	37.1	38.2

AZ DEPTH: 1011 ft TILT: 90 degrees

0	35.6	35.6	36.7	39.2	38.0	40.1	39.5	40.1	39.3
45	39.9	39.3	39.5	38.8	38.2	37.5	34.4	35.0	34.6
90	37.8	39.2	39.2	42.0	42.7	37.7	36.1	36.7	36.9
135	37.7	36.9	39.0	39.5	39.5	39.5	39.2	37.3	36.1
180	34.3	35.4	33.7	22.2	10.7	11.4	11.3	11.3	11.3
225	11.6	11.1	11.1	11.3	11.1	11.3	12.4	38.4	38.6
270	39.3	38.8	39.7	39.5	37.8	38.4	38.4	37.8	36.9
315	36.1	37.7	38.4	38.8	37.1	36.3	36.5	35.4	35.2

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 1012 ft TILT: 90 degrees

0	32.4	32.9	35.2	36.1	39.5	38.0	37.7	36.9	37.8
45	37.1	38.4	37.7	33.7	30.7	31.2	31.4	32.2	32.4
90	33.9	33.9	33.7	36.5	34.3	34.4	35.2	36.1	34.8
135	34.6	36.3	36.0	37.3	38.2	36.0	36.1	35.2	34.3
180	31.8	33.3	31.2	32.6	8.4	8.4	8.2	9.0	8.6
225	8.6	8.4	8.6	8.8	8.6	9.6	9.2	35.6	35.4
270	35.0	35.4	35.2	36.0	36.7	37.3	35.0	37.3	36.7
315	34.1	33.1	34.3	34.4	33.1	33.3	33.3	32.7	32.0

AZ DEPTH: 1013 ft TILT: 90 degrees

0	30.9	35.0	35.8	36.1	38.4	38.6	38.6	38.2	37.8
45	38.6	36.1	35.8	30.9	29.9	30.5	29.7	30.5	29.4
90	31.2	35.4	35.6	34.3	34.8	34.4	34.1	34.8	36.7
135	34.4	35.8	35.4	35.8	38.2	36.0	36.0	36.0	33.9
180	32.9	32.6	32.4	32.4	78.7	78.2	78.7	78.6	79.3
225	78.0	78.9	79.1	80.1	78.9	78.6	79.1	78.6	79.3
270	79.3	77.4	78.2	77.4	77.8	77.4	77.4	77.4	76.7
315	75.9	76.5	75.9	35.4	34.1	33.1	32.4	31.1	30.5

AZ DEPTH: 1014 ft TILT: 90 degrees

0	39.3	38.8	37.8	77.0	76.7	76.3	78.2	78.4	77.6
45	78.7	79.5	78.6	78.6	78.4	76.5	74.8	38.2	36.1
90	36.9	35.8	35.2	34.8	35.8	35.8	33.1	33.7	35.2
135	36.1	36.5	35.8	33.1	79.1	79.1	78.9	77.6	78.4
180	78.4	78.6	78.7	78.2	78.7	78.2	78.4	78.6	79.7
225	78.6	80.1	78.7	79.5	78.2	77.8	77.6	78.0	78.0
270	78.0	77.8	77.2	76.7	77.0	75.5	75.5	74.6	73.5
315	73.5	73.5	73.5	34.1	36.7	36.9	37.5	37.8	38.6

AZ DEPTH: 1015 ft TILT: 90 degrees

0	79.3	78.6	78.6	77.8	78.4	78.2	77.6	77.6	77.8
45	77.4	78.2	78.0	77.6	78.2	78.4	73.8	74.6	75.2
90	77.8	75.9	74.8	75.0	76.7	75.2	77.4	76.5	76.7
135	75.0	75.4	74.6	74.2	73.7	74.8	74.2	74.0	73.5
180	74.0	73.5	73.8	73.5	74.2	73.8	74.2	75.4	74.6
225	75.7	75.7	75.0	75.7	75.9	76.1	76.7	77.4	75.0
270	76.7	75.7	76.3	74.6	75.2	75.2	75.9	75.7	78.6
315	75.7	78.7	79.7	78.9	78.9	80.3	78.9	79.5	79.5

AZ DEPTH: 1020 ft TILT: 90 degrees

0	78.7	78.0	76.5	75.2	75.5	78.6	75.7	76.9	77.4
45	76.5	76.9	76.5	76.5	76.3	76.5	72.1	71.4	74.2
90	74.6	74.4	72.7	74.2	73.1	75.2	75.0	73.1	75.0
135	72.9	72.0	71.8	72.7	71.8	71.2	72.5	71.2	71.4
180	71.0	71.6	73.7	71.6	71.8	73.1	75.0	73.1	74.2
225	74.8	73.5	74.0	75.4	75.9	76.9	72.5	72.3	75.0
270	72.9	73.5	71.0	72.5	71.0	74.6	72.0	74.4	74.8
315	76.5	75.4	74.8	74.8	76.5	75.0	77.8	78.4	78.4

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 1025 ft TILT: 90 degrees

0	72.5	72.5	71.0	72.0	70.6	75.5	75.2	74.6	72.7
45	73.5	71.8	72.7	72.1	74.2	70.8	72.5	73.3	74.4
90	73.3	72.9	72.3	71.2	72.1	71.6	71.2	70.8	71.2
135	70.1	71.8	71.2	69.9	72.5	72.1	70.8	69.9	69.9
180	71.4	70.6	71.0	68.9	69.3	69.1	68.6	69.1	68.4
225	70.6	70.4	70.1	70.4	72.3	70.6	72.0	70.3	70.6
270	71.0	74.0	75.0	73.1	70.1	71.6	73.8	71.8	70.6
315	70.8	70.8	70.8	71.2	71.8	72.3	71.0	71.8	71.2

AZ DEPTH: 1030 ft TILT: 90 degrees

0	70.4	68.9	69.3	69.7	74.6	71.2	71.2	69.7	70.1
45	72.7	71.0	71.4	71.4	70.8	72.0	71.4	73.3	73.7
90	72.3	68.9	68.9	69.1	68.8	68.9	70.1	67.6	67.4
135	68.4	68.6	68.8	68.9	68.2	68.0	68.0	67.2	68.2
180	69.5	65.7	68.0	65.9	66.5	66.1	66.5	66.7	68.6
225	66.9	66.5	66.3	66.1	66.1	66.7	66.7	67.2	71.8
270	70.4	70.1	70.1	68.2	67.6	68.2	68.0	66.9	67.2
315	66.9	66.5	66.5	66.3	69.3	69.3	68.9	71.0	69.7

AZ DEPTH: 1035 ft TILT: 90 degrees

0	69.5	68.0	68.0	67.8	67.4	67.4	67.8	67.6	67.2
45	67.6	67.8	67.6	67.8	67.8	67.4	68.4	71.2	69.7
90	70.1	69.1	68.0	69.9	69.7	68.9	68.6	70.1	70.1
135	69.7	69.5	70.3	70.4	70.8	72.0	70.4	71.8	70.4
180	71.0	70.4	70.8	72.1	71.8	73.1	70.8	70.8	70.8
225	72.5	74.2	69.3	67.6	68.0	67.6	70.1	70.8	72.0
270	70.6	69.9	68.2	68.6	69.3	68.8	69.3	68.9	68.2
315	68.2	69.5	70.4	69.5	69.5	69.3	68.4	69.3	68.0

AZ DEPTH: 1040 ft TILT: 90 degrees

0	67.4	67.4	67.4	68.2	68.6	68.6	68.0	66.9	67.8
45	68.2	68.6	66.1	64.4	64.4	60.5	65.4	62.7	62.5
90	66.1	66.1	66.5	64.8	65.5	64.2	64.2	67.1	67.8
135	66.7	66.9	65.9	66.9	67.1	66.1	66.9	70.8	70.8
180	71.2	71.2	71.2	69.9	68.6	67.6	68.2	68.4	68.4
225	70.1	68.6	66.9	65.4	64.6	64.8	62.9	63.1	63.5
270	63.7	63.1	62.5	62.9	63.3	64.4	65.7	63.5	60.6
315	62.2	62.0	62.2	65.2	67.8	65.4	65.9	63.5	66.1

AZ DEPTH: 1045 ft TILT: 90 degrees

0	68.2	67.8	68.9	68.0	68.6	68.6	68.6	67.1	68.0
45	69.5	68.2	65.4	67.4	66.9	62.0	62.5	63.3	62.9
90	62.2	62.2	62.7	62.7	62.9	62.9	63.3	61.8	62.7
135	63.1	61.0	61.2	60.8	60.8	60.8	61.4	63.5	61.4
180	62.0	62.2	62.0	62.0	61.8	61.8	61.0	62.0	61.6
225	61.8	62.0	63.1	66.3	62.0	63.3	62.5	62.9	60.8
270	61.6	60.8	61.4	63.7	62.9	63.7	63.7	62.9	62.2
315	62.9	63.1	62.9	65.2	67.1	67.8	66.7	68.0	68.0

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 1047 ft TILT: 90 degrees

0	69.5	67.6	68.9	65.5	66.9	66.7	67.6	69.3	66.7
45	66.3	66.1	68.2	65.7	67.6	66.9	63.7	62.2	61.4
90	61.2	59.9	60.1	59.5	60.8	61.6	59.9	60.6	60.3
135	59.9	61.8	60.6	61.8	62.3	61.8	62.7	67.1	66.5
180	64.8	62.9	65.7	67.4	67.1	62.3	67.2	65.5	63.9
225	66.3	65.9	64.8	67.2	66.7	65.9	65.9	62.2	63.5
270	63.1	63.9	62.0	65.7	66.1	65.5	65.0	63.7	64.4
315	64.8	64.8	66.1	65.2	68.0	65.4	63.9	68.2	67.8

AZ DEPTH: 1050 ft TILT: 90 degrees

0	68.6	70.8	68.9	68.9	68.9	68.9	68.9	68.9	68.8
45	67.2	66.1	65.7	67.8	67.8	68.4	59.0	58.0	57.3
90	56.5	56.5	56.5	55.9	55.9	55.9	58.0	56.9	57.1
135	56.9	56.1	56.7	56.5	57.6	61.0	62.3	63.5	63.7
180	63.3	63.5	63.3	64.4	68.4	68.2	68.2	66.3	66.9
225	62.2	63.9	61.8	63.7	65.0	62.5	62.3	63.7	59.3
270	60.3	63.1	61.0	60.8	61.6	65.0	64.8	62.3	64.8
315	64.0	64.4	64.4	67.1	66.5	66.9	67.8	68.8	68.9

AZ DEPTH: 1052 ft TILT: 90 degrees

0	69.9	72.5	72.5	72.5	72.5	72.5	72.5	72.7	72.3
45	66.7	67.4	65.7	69.5	68.6	66.5	61.2	55.6	54.8
90	55.6	54.6	54.0	54.4	53.5	54.2	53.5	54.6	55.6
135	53.7	54.0	54.2	54.2	55.4	55.9	55.7	57.6	63.5
180	62.9	62.7	63.1	61.6	61.6	65.5	65.4	62.0	60.6
225	59.5	59.1	58.6	60.1	59.1	56.7	63.5	60.5	60.1
270	59.5	59.1	57.1	59.3	59.7	66.5	66.1	68.0	66.9
315	65.0	64.6	65.5	66.7	67.8	70.4	69.9	69.9	69.9

AZ DEPTH: 1055 ft TILT: 90 degrees

0	39.5	39.5	70.4	69.9	73.1	73.1	73.7	61.6	60.1
45	49.1	48.4	48.4	48.2	46.7	46.3	52.7	50.8	50.5
90	48.6	48.4	49.5	50.5	51.0	50.5	49.3	48.8	48.8
135	48.8	49.1	51.0	51.6	52.9	53.1	24.8	25.4	25.4
180	26.7	25.4	26.3	25.8	27.1	27.1	26.2	55.7	53.7
225	54.0	53.7	52.9	55.0	55.6	56.1	57.4	56.9	55.9
270	52.7	56.1	55.4	56.3	56.3	55.7	55.9	57.3	69.9
315	63.9	64.0	64.0	63.7	65.2	69.7	42.4	39.7	42.9

AZ DEPTH: 1057 ft TILT: 90 degrees

0	28.6	28.8	30.5	29.5	30.1	30.3	30.3	63.9	60.6
45	50.1	46.1	45.4	46.5	44.6	45.0	46.5	47.1	45.9
90	47.1	48.4	48.6	49.1	49.1	49.1	47.8	47.1	46.1
135	46.7	47.1	48.0	48.6	51.2	52.9	19.4	19.6	19.4
180	19.9	19.7	24.3	25.2	23.3	23.5	22.9	21.6	20.7
225	21.1	20.5	19.9	19.0	19.6	19.7	19.7	19.7	19.4
270	21.3	19.7	19.7	19.7	20.7	20.5	19.4	21.1	19.2
315	22.9	23.3	28.8	31.6	36.7	38.2	36.9	32.7	28.6

5 DEGREE RADII REPORT

Radii in feet

AZ DEPTH: 1060 ft TILT: 90 degrees

0	20.1	20.5	21.8	22.8	23.9	27.5	31.6	40.1	51.2
45	45.2	39.3	38.6	36.9	41.4	42.7	40.1	37.5	37.1
90	43.9	45.6	45.8	45.6	48.6	46.1	48.0	45.6	45.0
135	31.4	44.2	33.7	24.6	23.1	19.6	19.4	19.2	19.2
180	16.9	16.9	16.3	15.6	15.0	14.5	14.7	14.8	14.3
225	14.3	14.5	14.7	15.2	15.4	15.4	15.2	14.7	15.0
270	15.0	14.8	14.8	15.4	16.0	16.7	18.6	19.9	22.4
315	23.1	23.9	24.6	23.7	27.3	26.3	24.3	22.6	21.1

AZ DEPTH: 1061 ft TILT: 90 degrees

0	18.0	19.0	20.3	21.6	23.7	27.1	29.2	39.7	37.7
45	38.2	38.4	37.7	36.7	35.4	34.8	37.1	36.3	37.3
90	41.8	45.4	43.9	43.7	44.1	44.8	45.8	35.2	30.7
135	23.1	11.8	12.0	12.4	13.3	15.4	16.5	16.2	13.9
180	13.7	14.5	14.1	13.5	13.3	12.2	12.2	11.6	11.1
225	10.3	11.1	11.3	11.6	12.0	12.0	11.6	12.0	12.2
270	12.4	12.6	12.8	13.5	14.7	15.8	17.7	19.0	21.1
315	22.0	22.4	22.9	23.3	24.3	22.6	19.6	18.8	18.0

AZ DEPTH: 1062 ft TILT: 90 degrees

0	6.4	6.8	7.3	9.4	9.8	10.0	10.8	11.8	13.4
45	16.1	17.6	17.5	17.7	20.7	19.4	15.4	14.7	14.2
90	13.8	14.1	14.5	16.6	17.7	19.2	22.3	4.1	4.0
135	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.7	4.0
180	4.1	4.2	4.3	4.3	4.2	4.2	4.1	4.0	4.0
225	3.8	3.9	3.9	3.9	4.0	4.0	3.9	4.3	4.3
270	4.5	4.5	4.5	4.5	4.5	4.5	4.6	4.5	4.5
315	4.5	4.5	4.5	4.6	4.6	4.7	4.6	6.7	6.9

AZ DEPTH: 1063 ft TILT: 90 degrees

0	3.1	3.3	3.3	3.1	3.1	3.1	3.1	3.1	3.2
45	3.3	3.1	3.0	3.0	3.1	3.1	3.1	3.1	3.0
90	3.0	2.8	3.0	2.9	3.0	3.0	3.0	3.0	3.1
135	3.1	3.0	2.9	2.9	3.1	3.2	3.0	3.0	3.2
180	3.3	3.1	3.2	3.3	3.3	3.5	3.5	3.4	3.5
225	3.4	3.4	3.4	3.4	3.5	3.6	3.5	3.4	3.5
270	3.6	3.7	3.8	3.8	3.8	3.8	3.9	3.9	4.0
315	3.9	3.9	3.8	3.8	3.6	3.5	3.5	3.2	3.1

AZ DEPTH: 1064 ft TILT: 90 degrees

0	2.0	1.9	1.9	1.9	1.9	1.8	1.7	1.7	1.6
45	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.6	1.6
90	1.6	1.5	1.7	1.6	1.3	1.3	1.1	1.1	1.5
135	1.5	1.7	1.8	2.0	2.2	2.1	2.2	2.1	2.1
180	2.1	2.1	1.9	2.0	2.0	1.9	2.0	1.7	2.0
225	2.0	2.1	2.0	1.9	1.9	2.0	1.9	2.0	2.0
270	2.3	2.0	2.5	2.5	2.7	2.5	2.5	2.7	2.7
315	1.8	1.7	2.0	2.0	2.0	2.1	2.0	2.0	2.0

5 DEGREE RADII REPORT

Radii in feet

DEPTH: 1065 ft TILT: 90 degrees

AZ									
0	.3	.3	.3	.3	.3	.3	.3	.3	.3
45	.3	.3	.3	.3	.3	.3	.3	.3	.3
90	.3	.3	.3	.3	.3	.3	.3	.3	.3
135	.3	.3	.3	.3	.3	.3	.3	.3	.3
180	.3	.3	.3	.3	.3	.3	.3	.3	.3
225	.3	.3	.3	.3	.3	.3	.3	.3	.3
270	.3	.3	.3	.3	.3	.3	.3	.3	.3
315	.3	.3	.3	.3	.3	.3	.3	.3	.3

MAXIMUM HORIZONTAL RADII

AZM deg	RADIUS ft	DEPTH ft
0	79.3	1015
2	79.3	1015
4	78.7	1015
6	78.6	1015
8	80.3	1015
10	78.6	1015
12	78.6	1015
14	77.8	1014
16	77.8	1015
18	78.0	1015
20	78.4	1015
22	78.7	1020
24	78.7	1020
26	78.6	1020
28	78.6	1015
30	78.2	1014
32	78.6	1014
34	77.8	1014
36	79.1	1014
38	77.6	1014
40	77.8	1015
42	78.0	1015
44	79.1	1014
46	78.4	1014
48	78.7	1014
50	79.5	1014
52	78.2	1014
54	78.4	1015
56	78.9	1014
58	77.8	1014
60	78.6	1014
62	78.7	1014
64	78.4	1015
66	78.9	1014
68	78.4	1015
70	78.4	1015
72	78.7	1015
74	75.0	1014
76	74.6	1014
78	75.0	1015
80	74.6	1015
82	78.0	1015
84	75.0	1025
86	76.1	1015
88	77.8	1015
90	77.8	1015
92	76.7	1015
94	75.5	1015
96	76.3	1015
98	75.9	1015
100	74.8	1015
102	75.5	1015
104	75.0	1015
106	75.0	1015
108	76.7	1015
110	76.7	1015
112	75.0	1015
114	75.5	1020
116	75.7	1015
118	74.6	1020
120	77.4	1015
122	76.7	1015
124	76.7	1015
126	76.3	1015
128	76.9	1015
130	76.7	1015
132	76.3	1015
134	74.6	1015
136	75.5	1015
138	75.2	1015
140	75.4	1015
142	74.4	1015
144	74.4	1015
146	74.8	1015
148	74.4	1015
150	74.2	1015
152	74.4	1015
154	79.1	1014
156	79.1	1014
158	79.1	1014
160	79.1	1014
162	78.4	1014
164	79.5	1014
166	78.6	1014
168	79.3	1014
170	77.6	1014
172	78.7	1014
174	78.4	1014
176	78.4	1014
178	78.4	1014

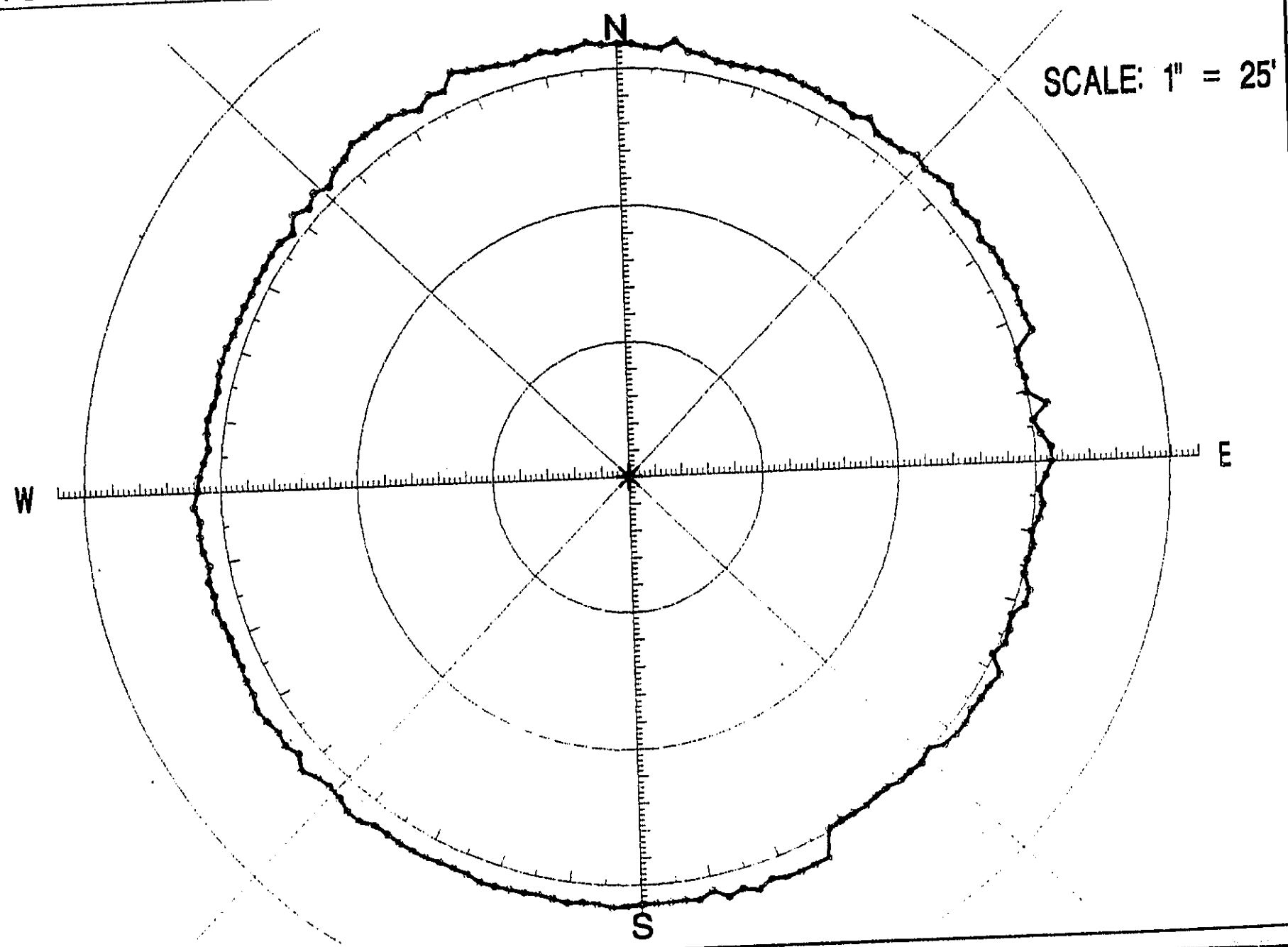
MAXIMUM HORIZONTAL RADII

AZM deg	RADIUS ft	DEPTH ft
180	78.4	1014
182	78.7	1014
184	78.9	1014
186	78.4	1014
188	78.4	1014
190	78.7	1014
192	78.4	1014
194	78.2	1014
196	78.4	1014
198	78.6	1014
200	78.7	1013
202	78.9	1014
204	78.4	1014
206	78.4	1013
208	78.4	1014
210	78.7	1013
212	78.7	1014
214	78.7	1013
216	78.6	1014
218	78.6	1014
220	79.7	1014
222	79.7	1014
224	78.7	1014
226	78.4	1014
228	78.7	1014
230	80.1	1014
232	78.4	1014
234	79.3	1013
236	78.9	1013
238	79.5	1013
240	80.1	1013
242	79.1	1013
244	79.1	1013
246	78.7	1013
248	78.7	1013
250	78.6	1013
252	78.9	1015
254	79.5	1013
256	78.9	1013
258	79.3	1013
260	78.6	1013
262	79.3	1013
264	79.5	1013
266	79.1	1013
268	80.1	1013
270	79.3	1013
272	78.9	1013
274	78.2	1014
276	77.4	1013
278	78.0	1013
280	78.2	1013
282	77.6	1013
284	77.2	1013
286	77.8	1013
288	78.0	1013
290	77.8	1013
292	77.4	1013
294	77.4	1013
296	77.4	1013
298	77.2	1013
300	77.4	1013
302	77.4	1013
304	77.6	1013
306	77.4	1013
308	76.5	1013
310	78.6	1015
312	77.0	1013
314	78.2	1015
316	77.0	1020
318	78.6	1015
320	78.7	1015
322	79.9	1015
324	79.7	1015
326	79.7	1015
328	79.7	1015
330	78.9	1015
332	77.8	1015
334	79.3	1015
336	78.6	1015
338	81.2	1015
340	80.3	1015
342	79.7	1015
344	79.3	1015
346	78.7	1015
348	79.1	1015
350	79.5	1015
352	78.9	1015
354	79.1	1015
356	79.9	1015
358	79.3	1015

Maximum radius : 81.2
On Azmuth deg : 338

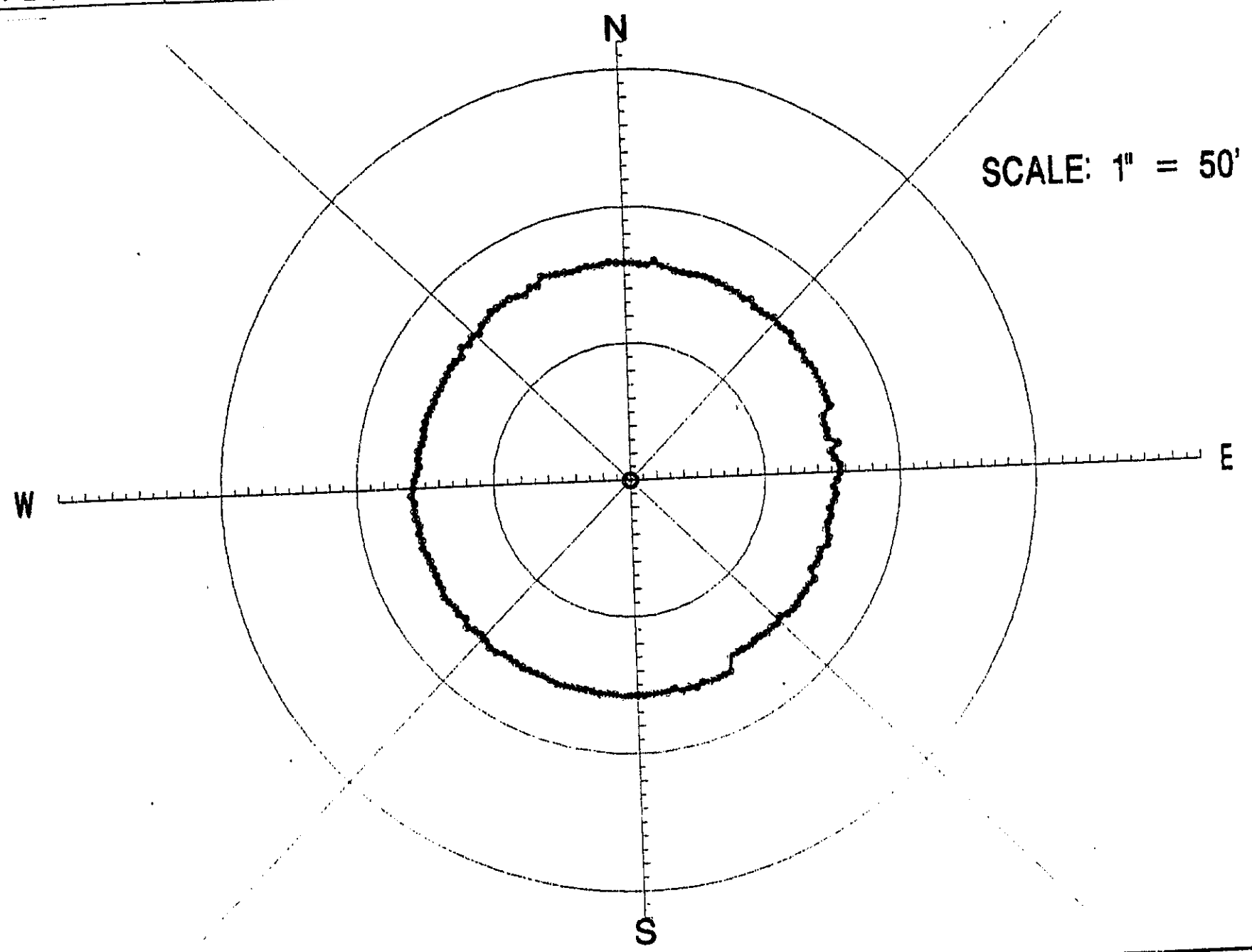
MAXIMUM RADIUS PLOT

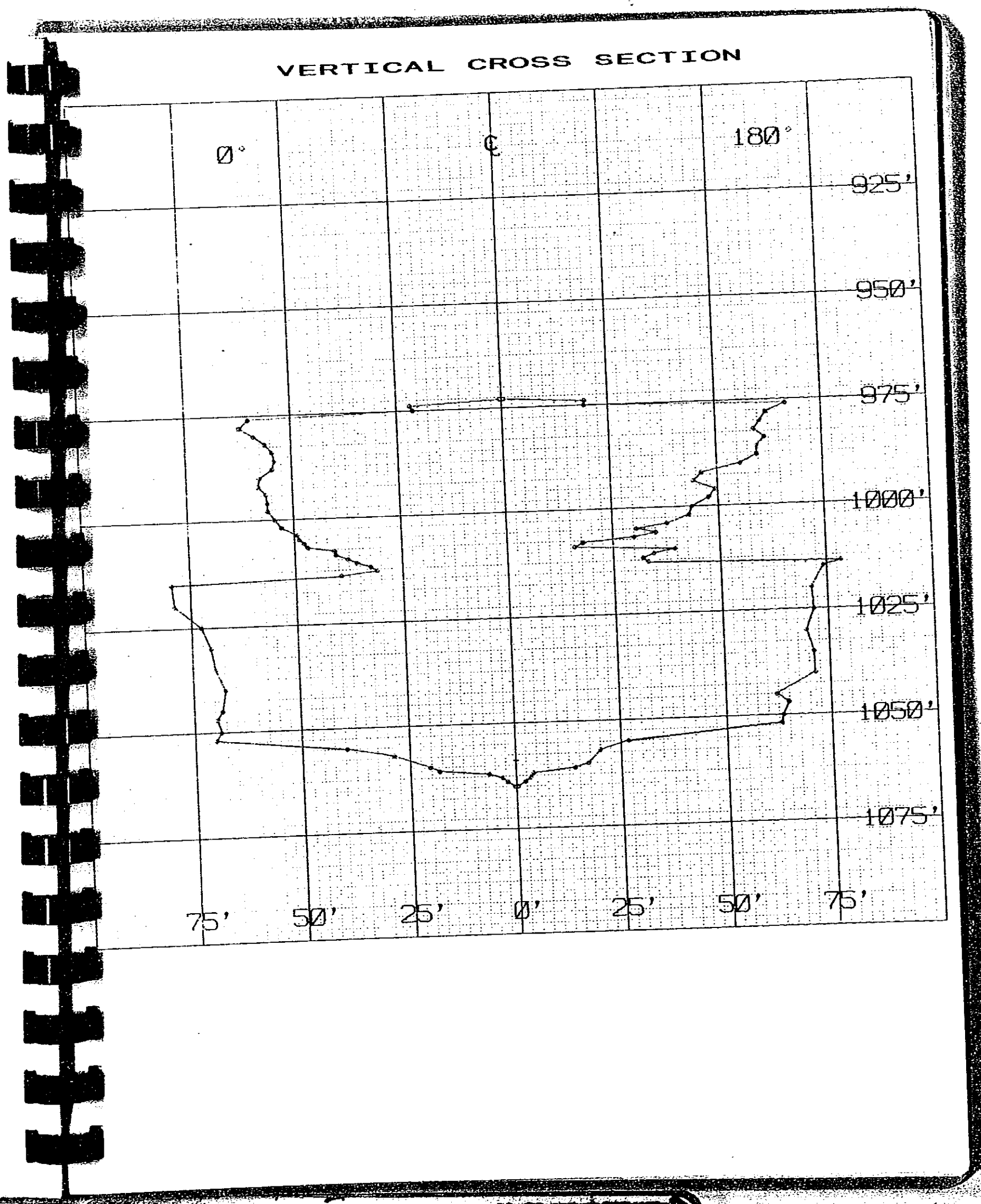
03/20/92 | Ferrellgas Inc. | No.: 9



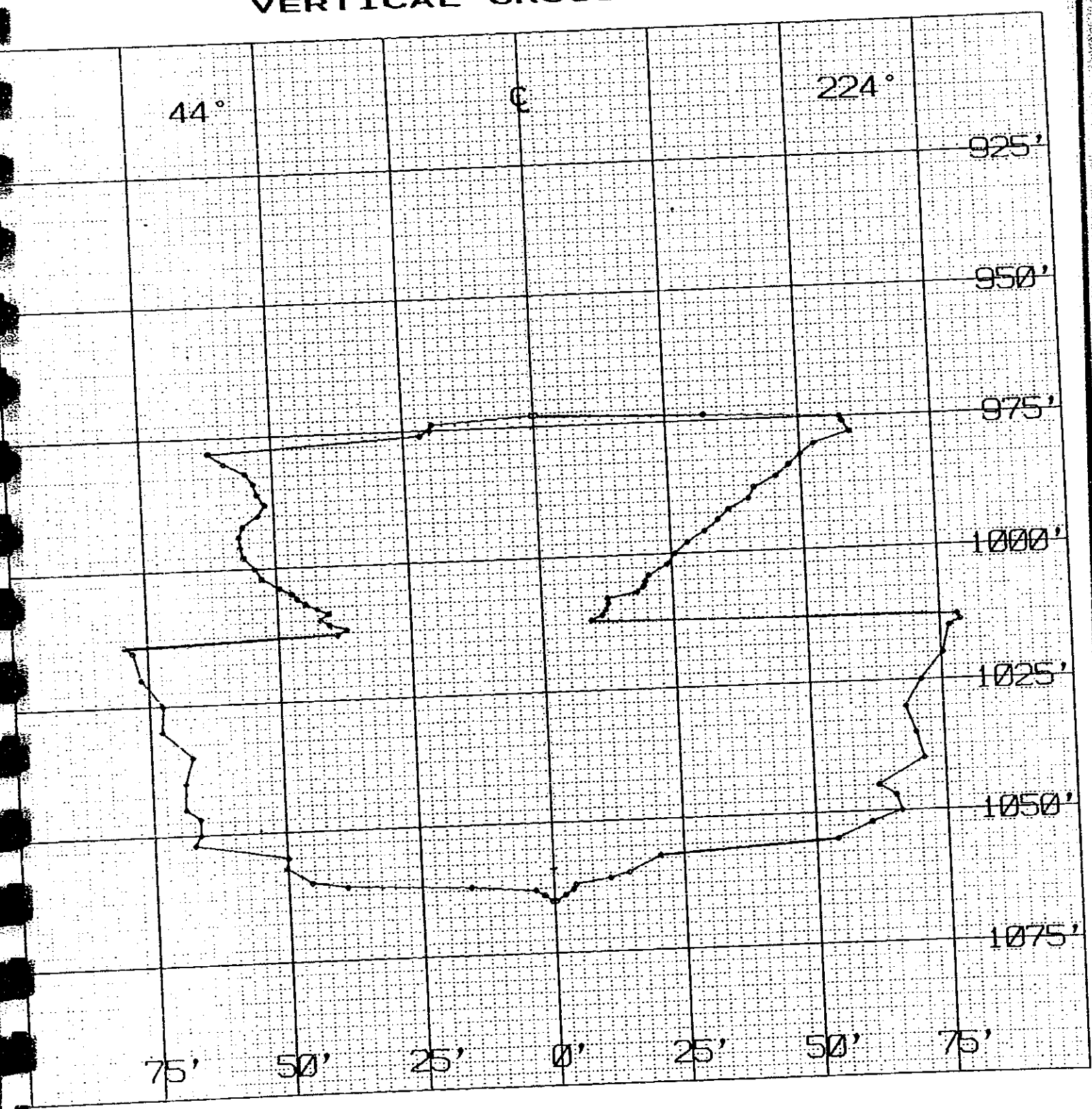
MAXIMUM RADIUS PLOT

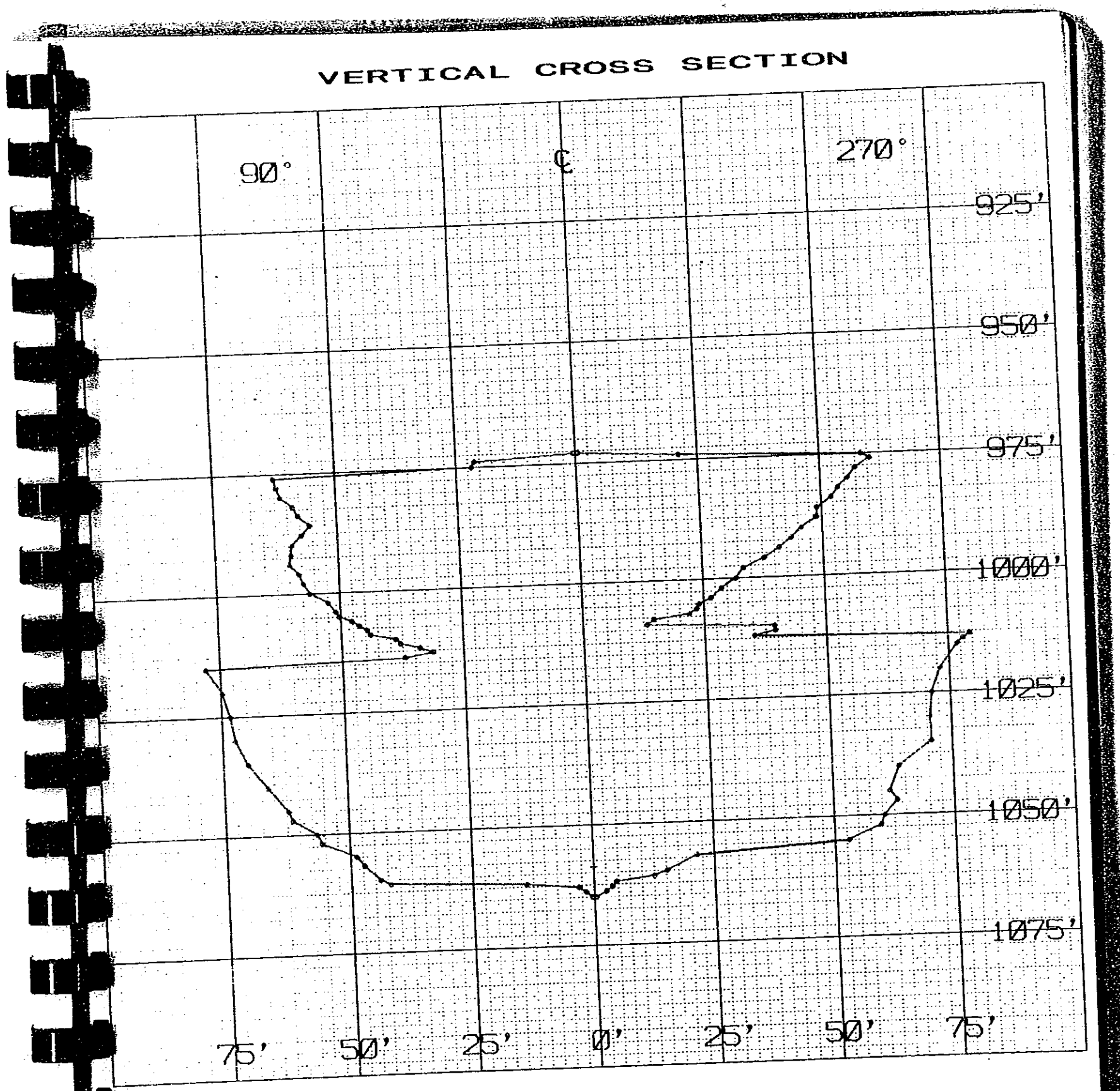
03/20/92 | Ferrellgas Inc. | No.: 9

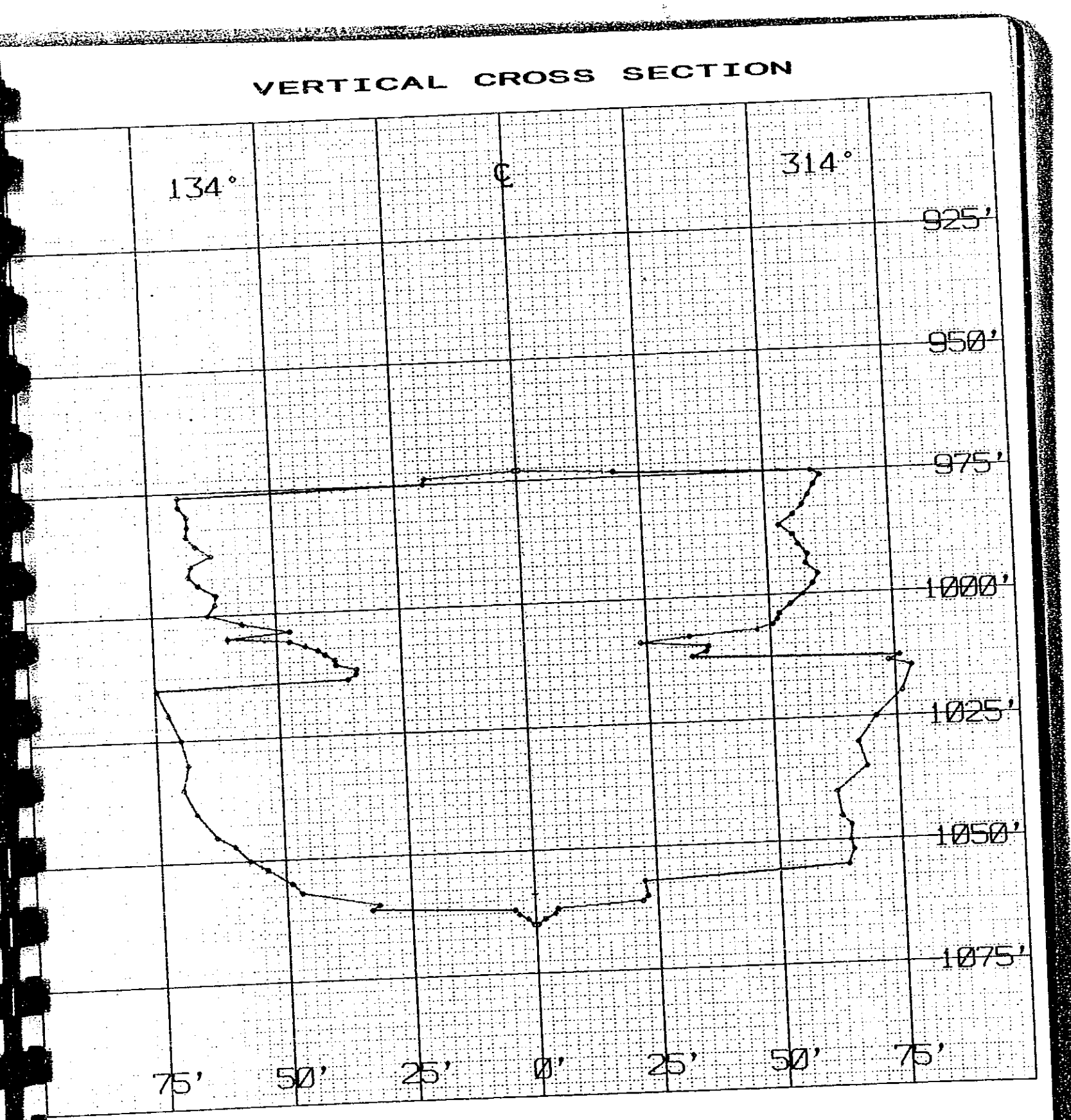



VERTICAL CROSS SECTION
0°
℄
180°
925'
950'
975'
1000'
1025'
1050'
1075'
75'
50'
25'
0'
25'
50'
75'

VERTICAL CROSS SECTION




VERTICAL CROSS SECTION
90°
℄
270°
925'
950'
975'
1000'
1025'
1050'
1075'
75'
50'
25'
0'
25'
50'
75'


VERTICAL CROSS SECTION
134°
℄
314°
925'
950'
975'
1000'
1025'
1050'
1075'
75'
50'
25'
0'
25'
50'
75'

DIGITAL SURVEYS, INC.

3/20/92

View Tilt : 0
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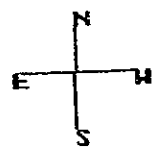

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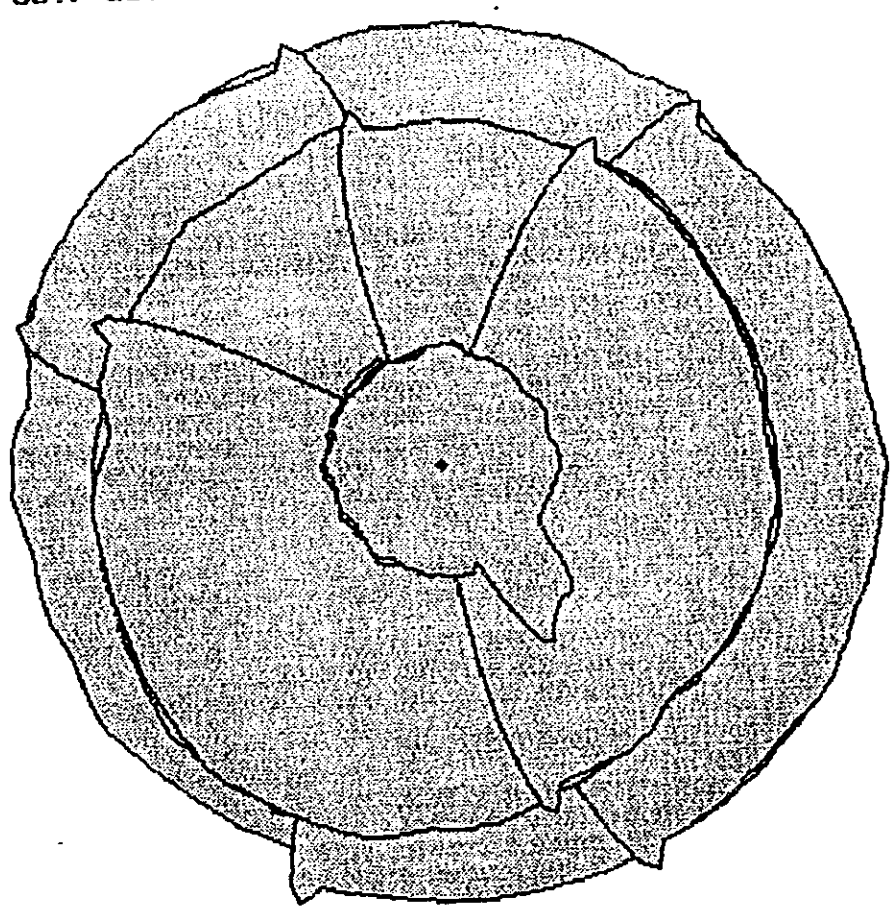

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DIGITAL SURVEYS, INC.

3/20/92

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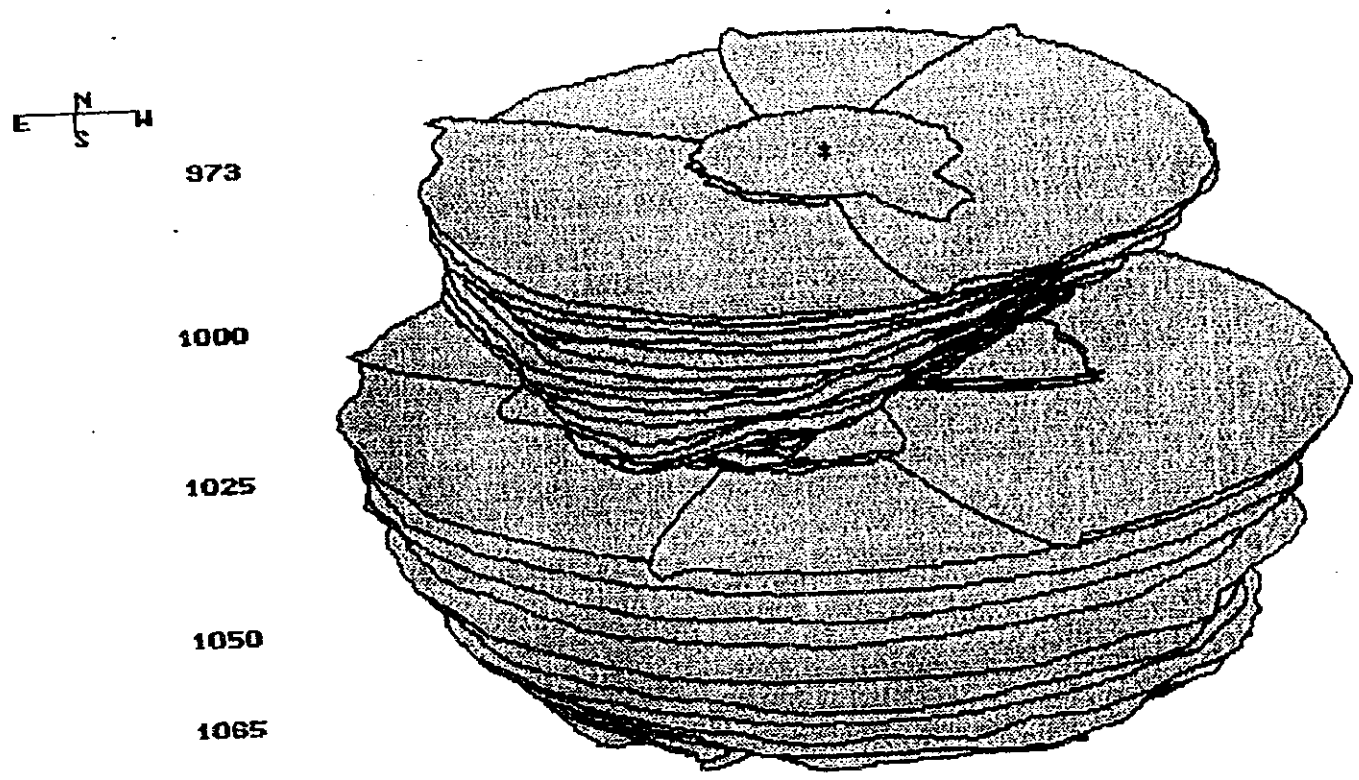

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DIGITAL SURVEYS, INC.

3/20/92

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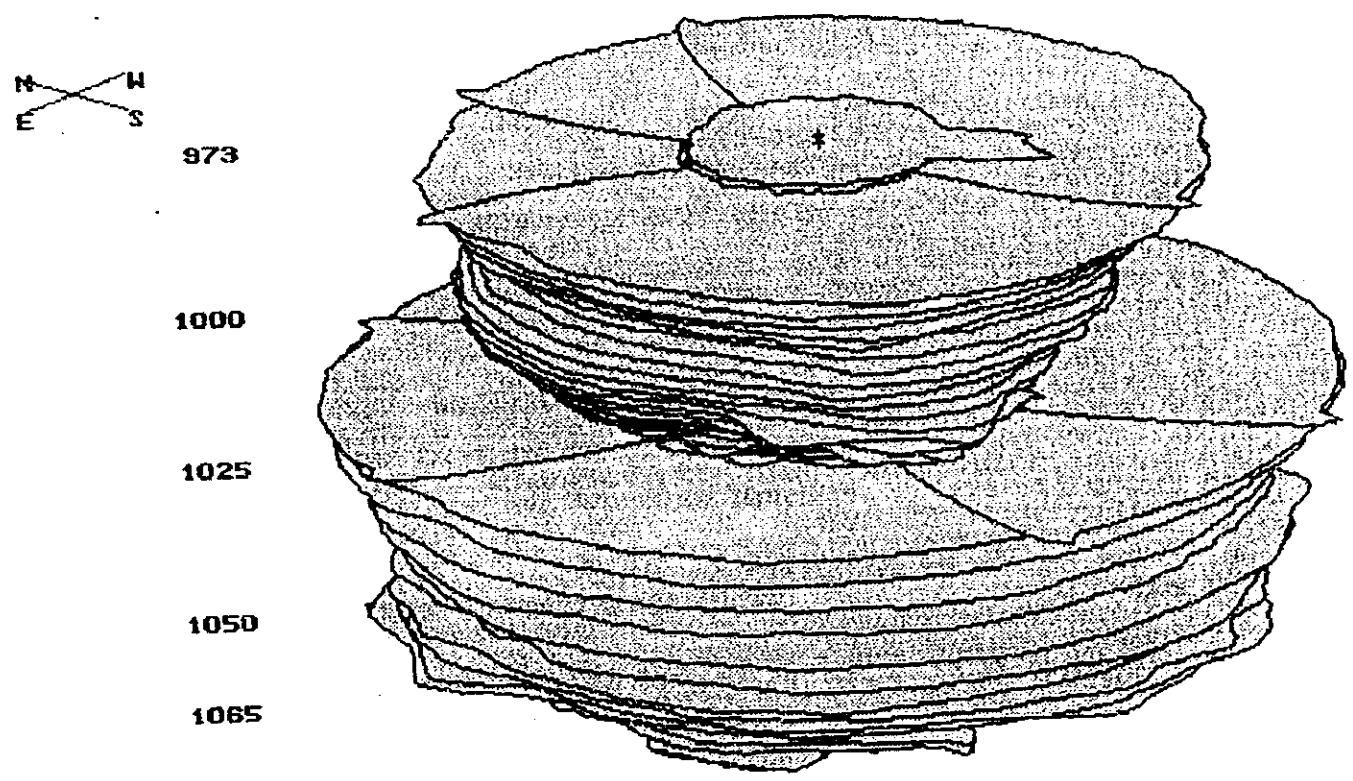

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DIGITAL SURVEYS, INC.

3/20/92

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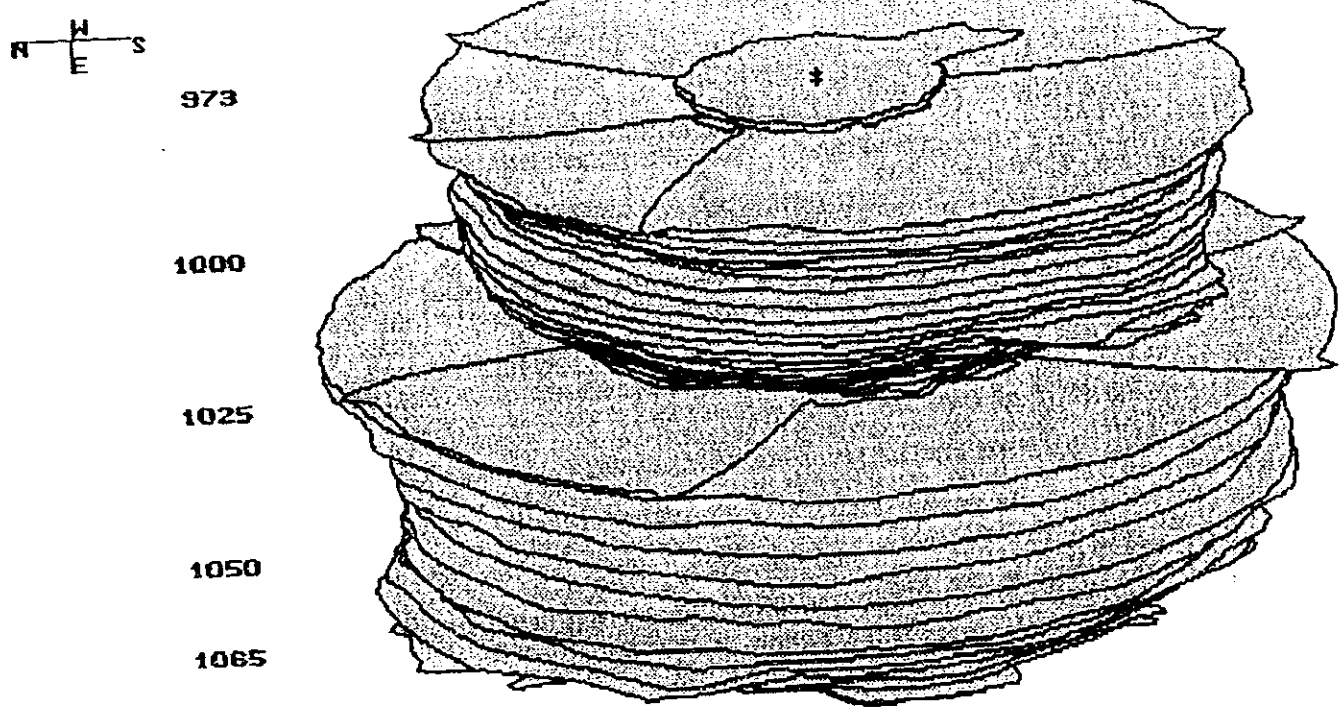

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DIGITAL SURVEYS, INC.

3/20/92

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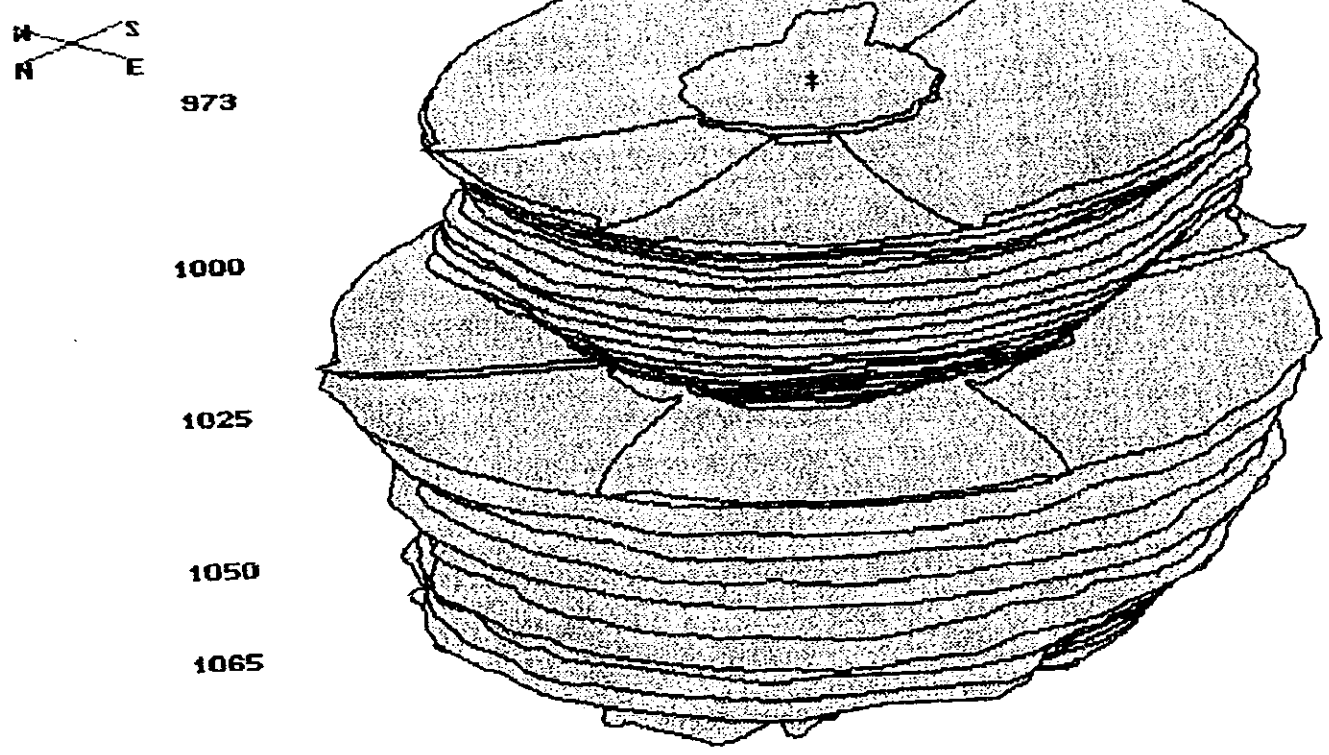

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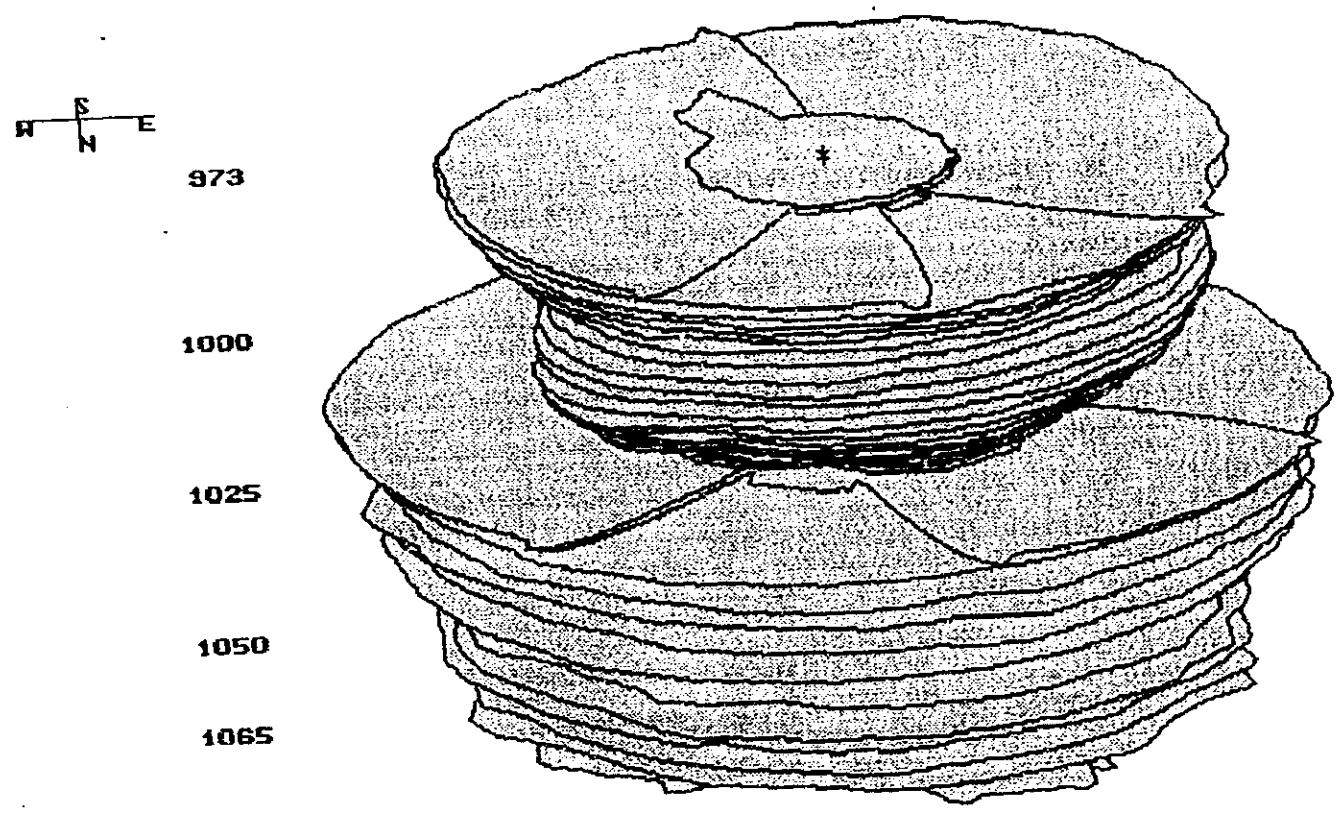

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3/20/92

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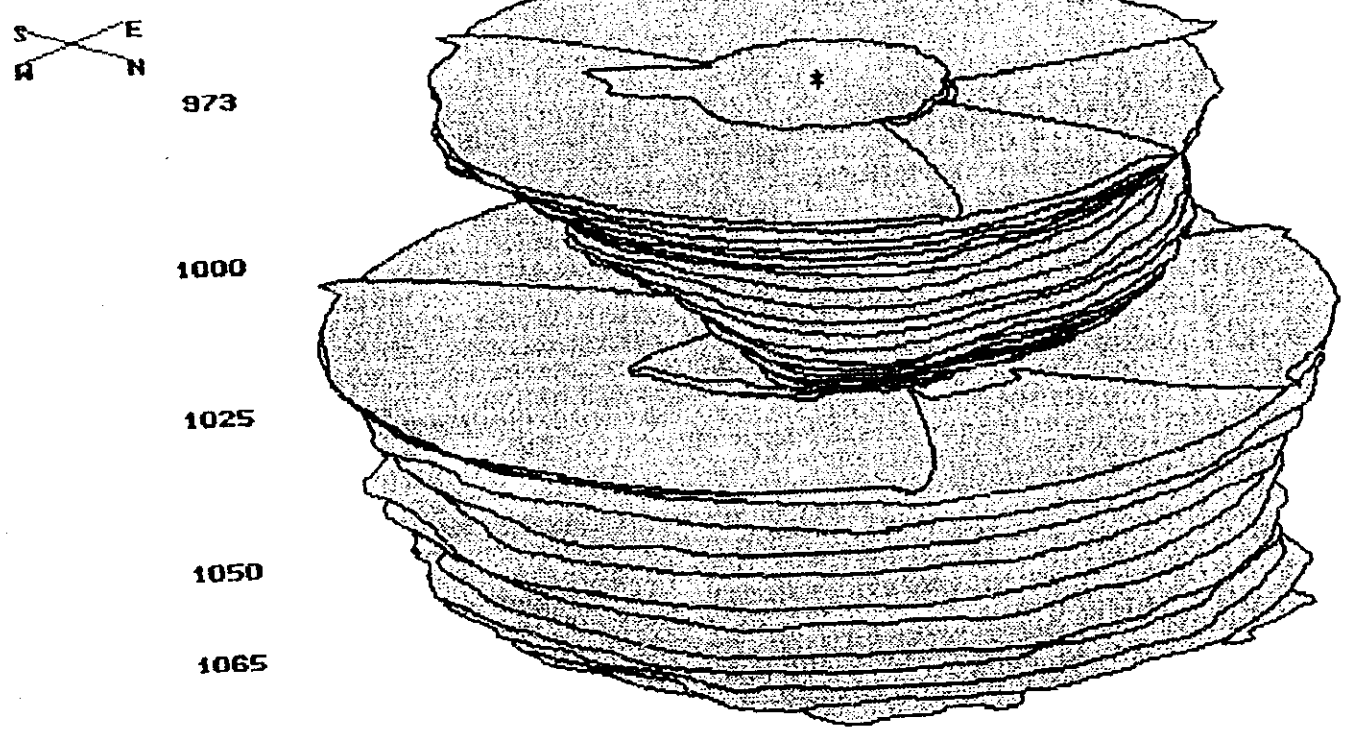

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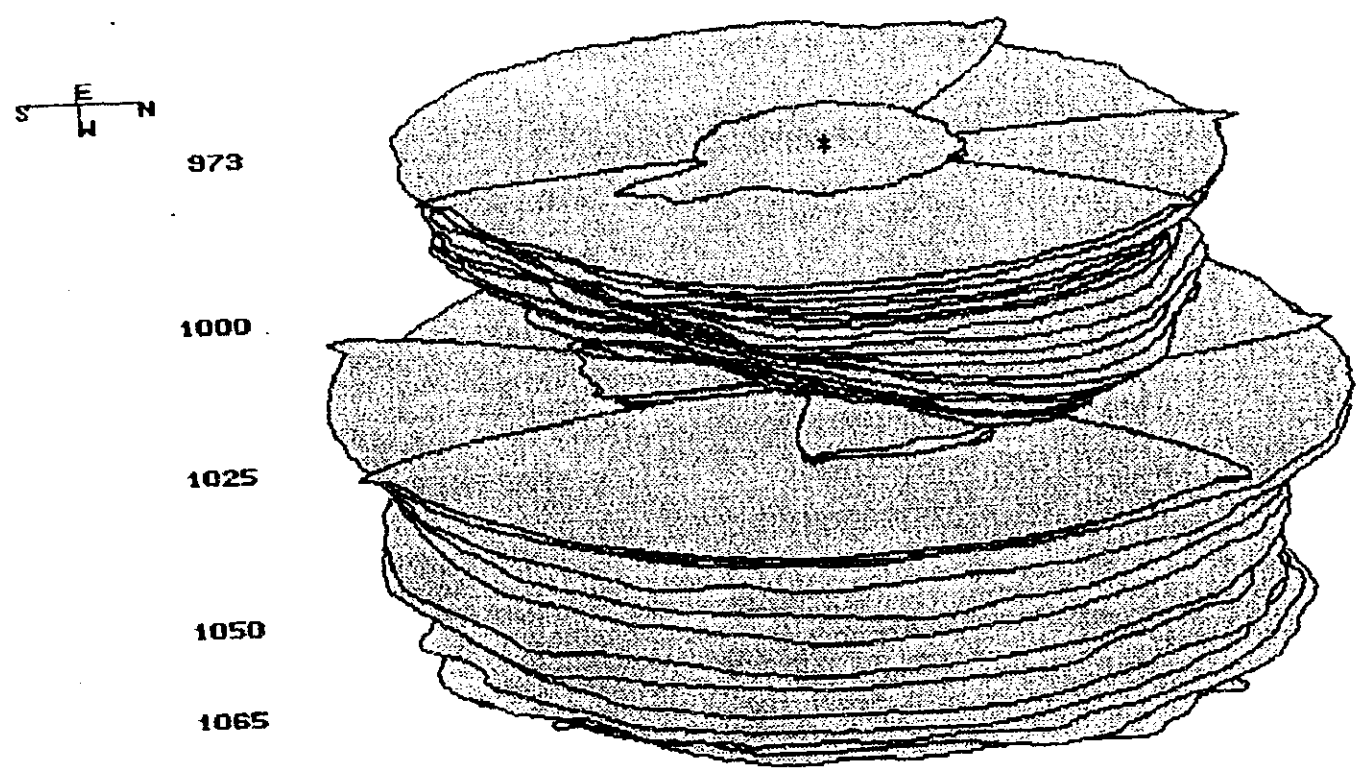

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3/20/92

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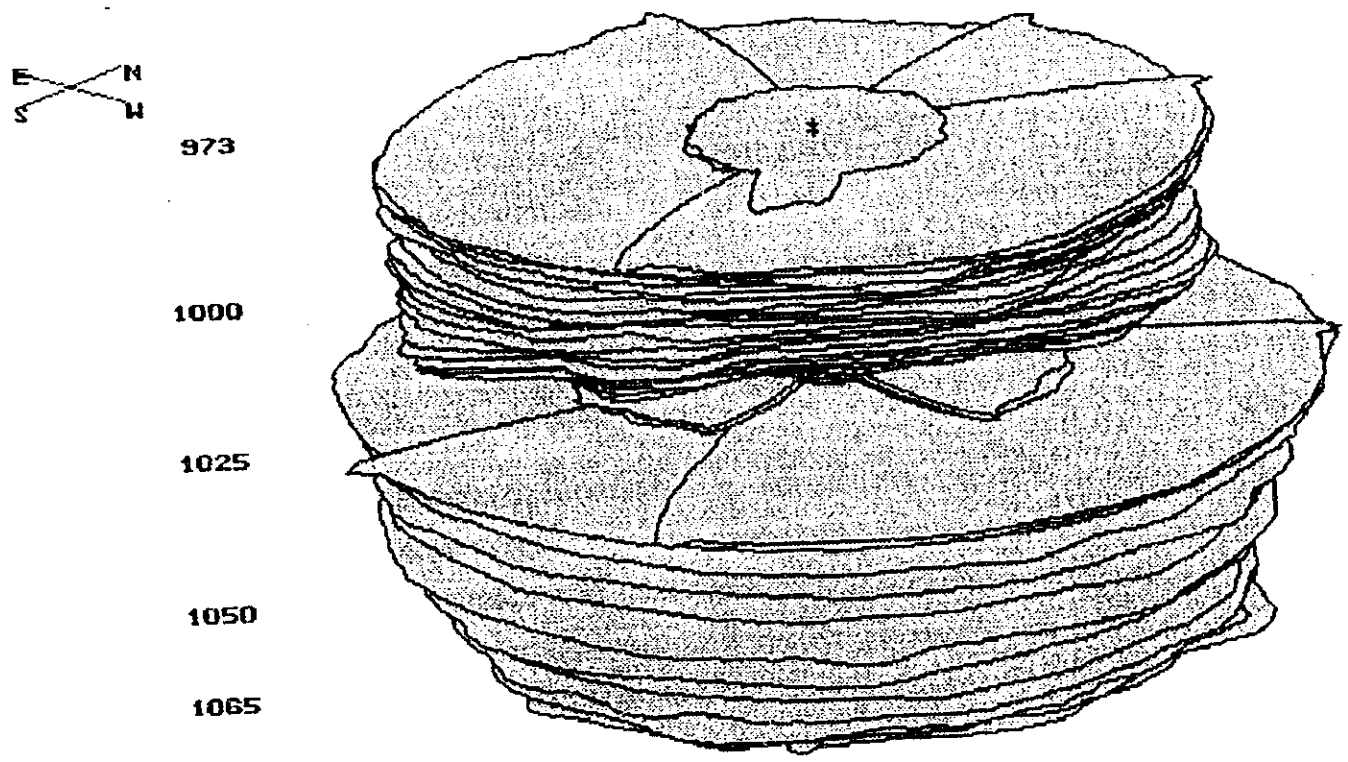

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3/20/92

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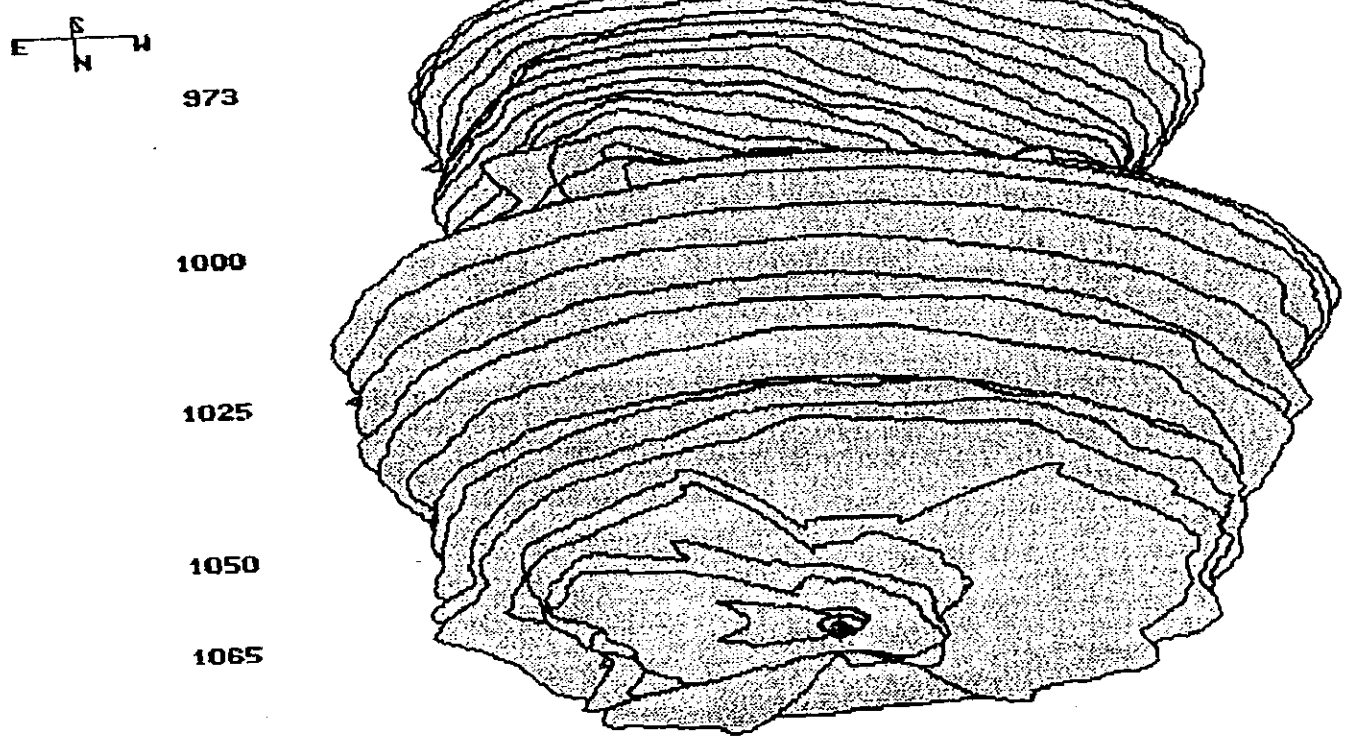

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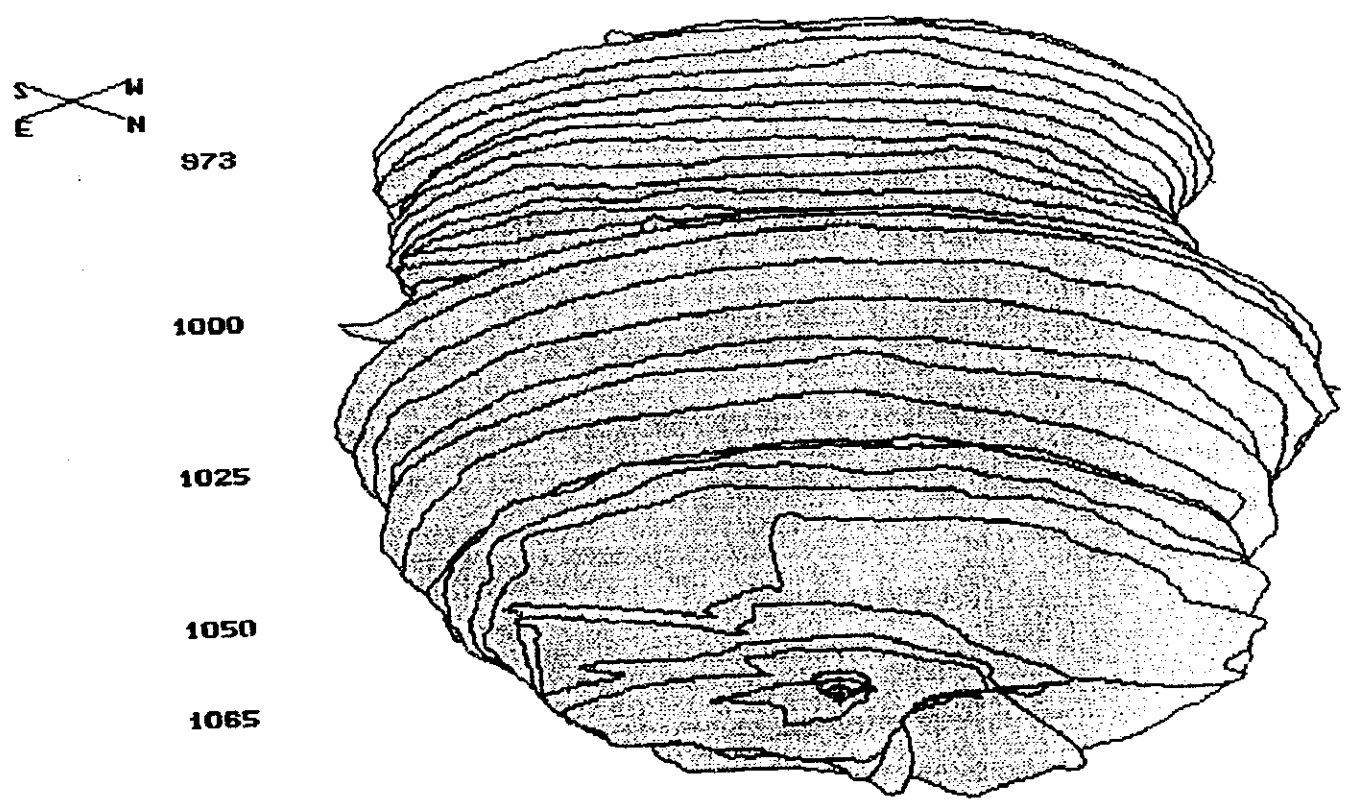

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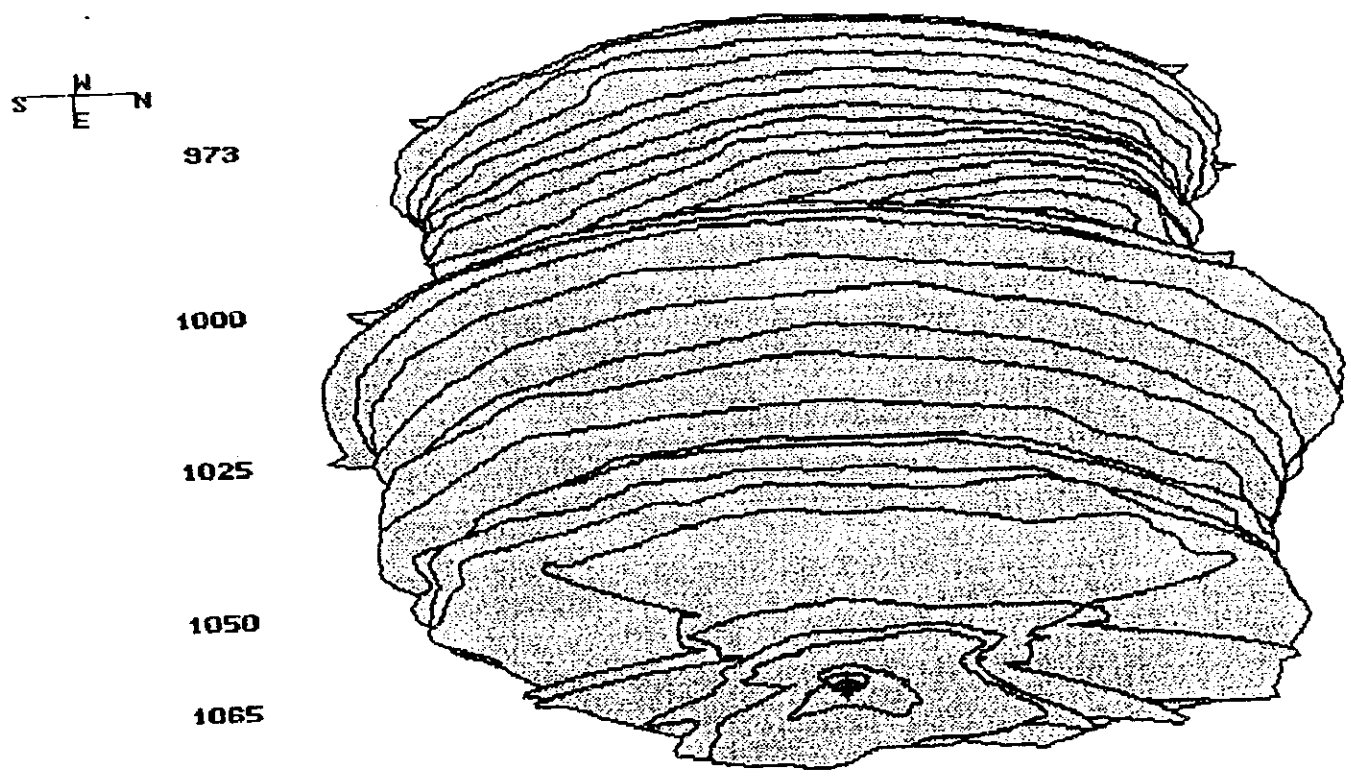

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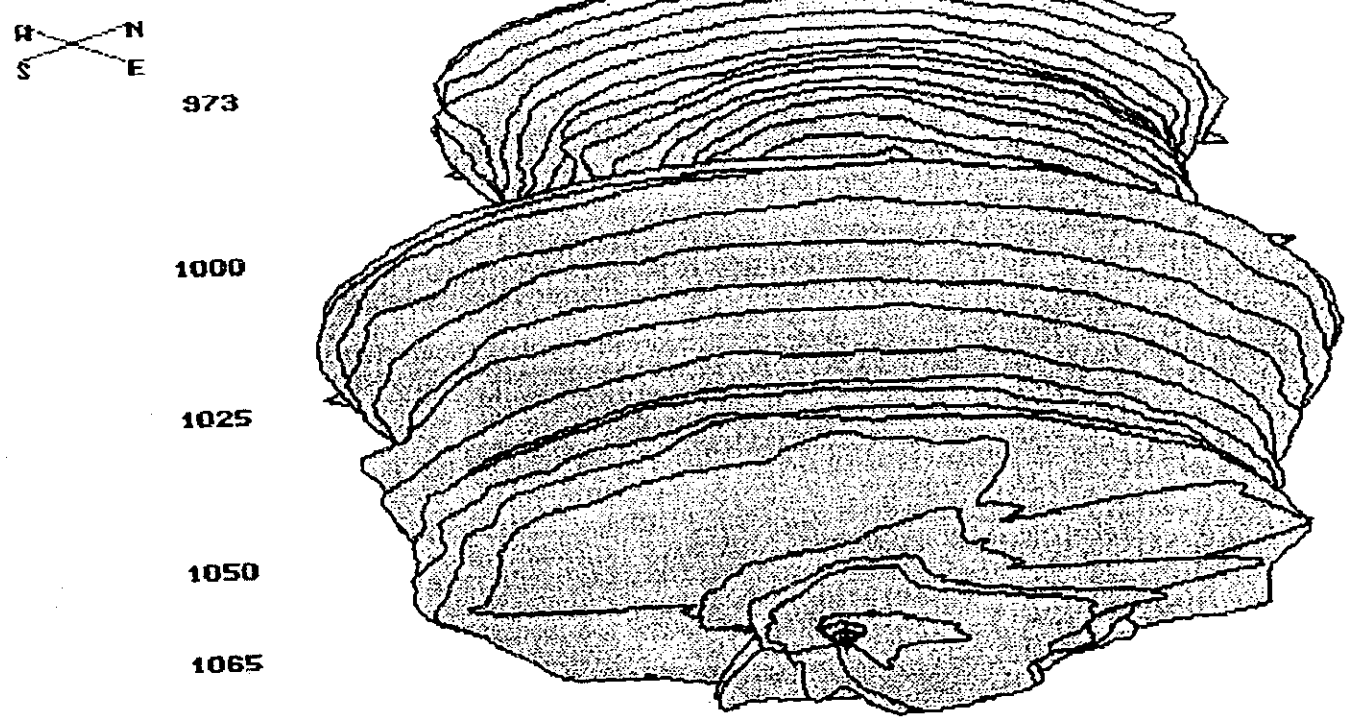

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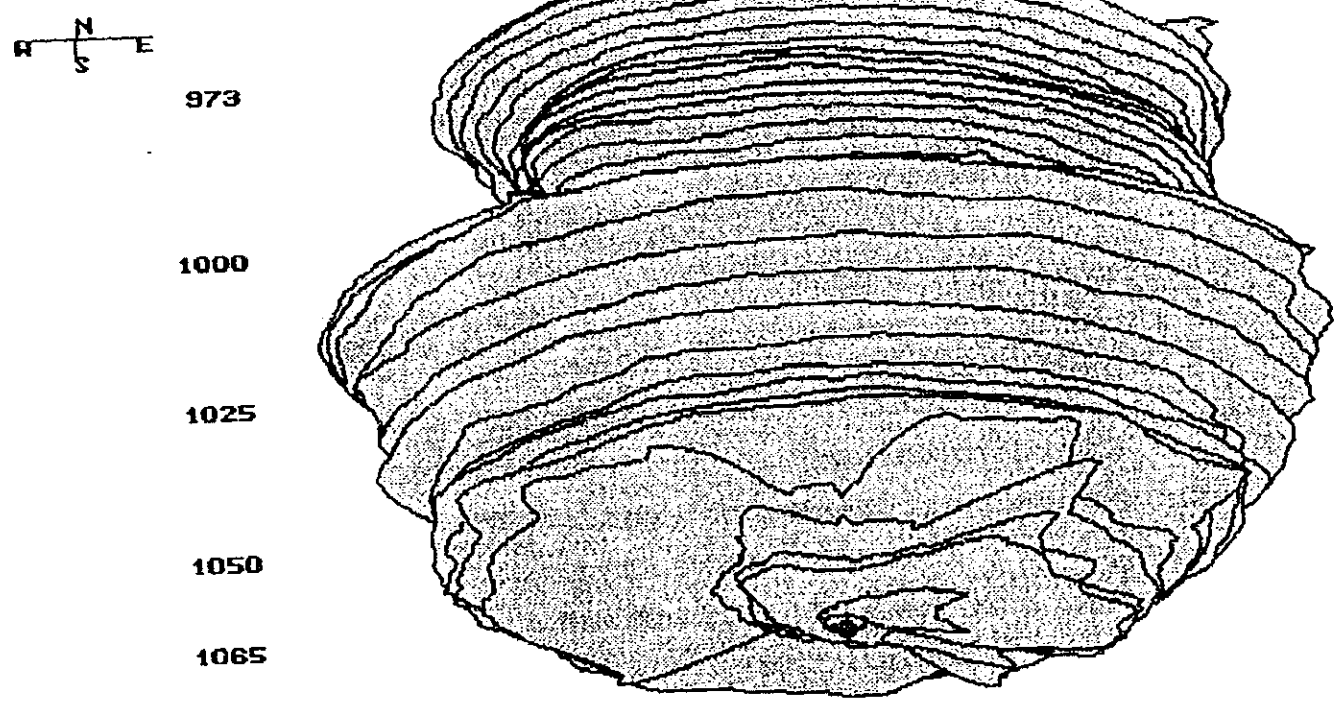

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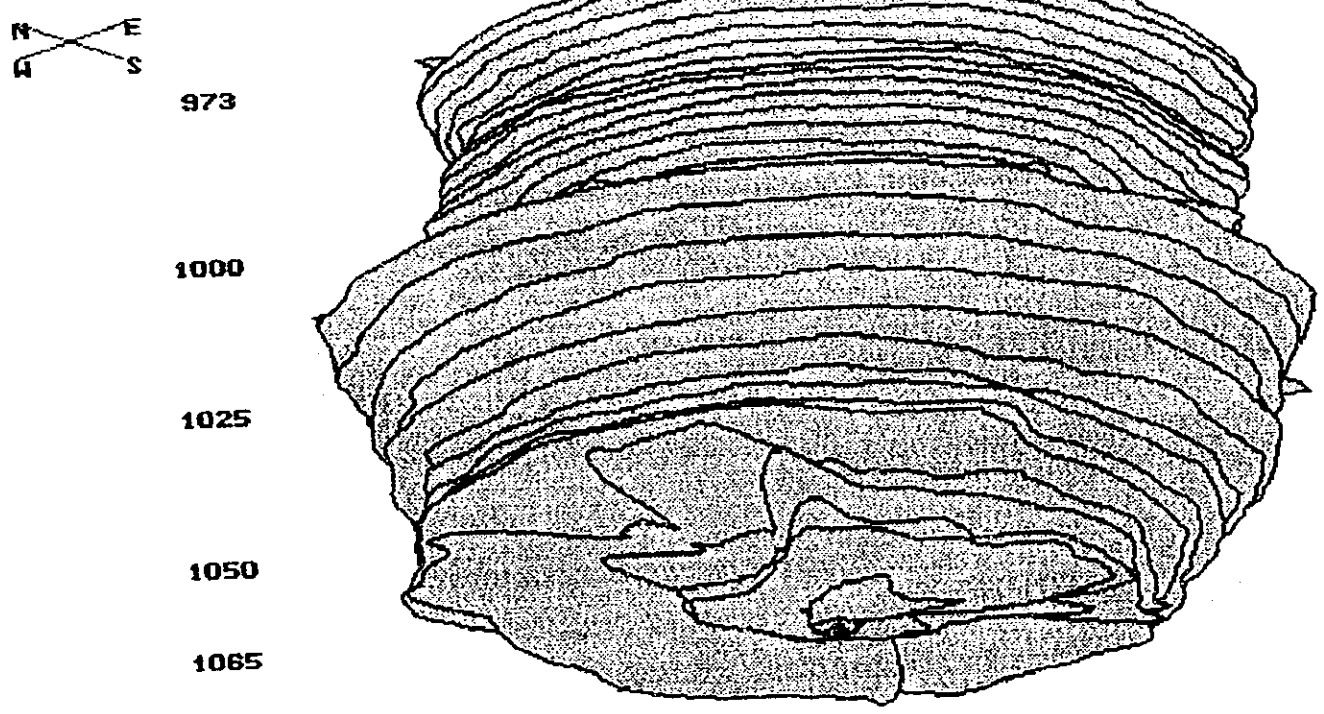

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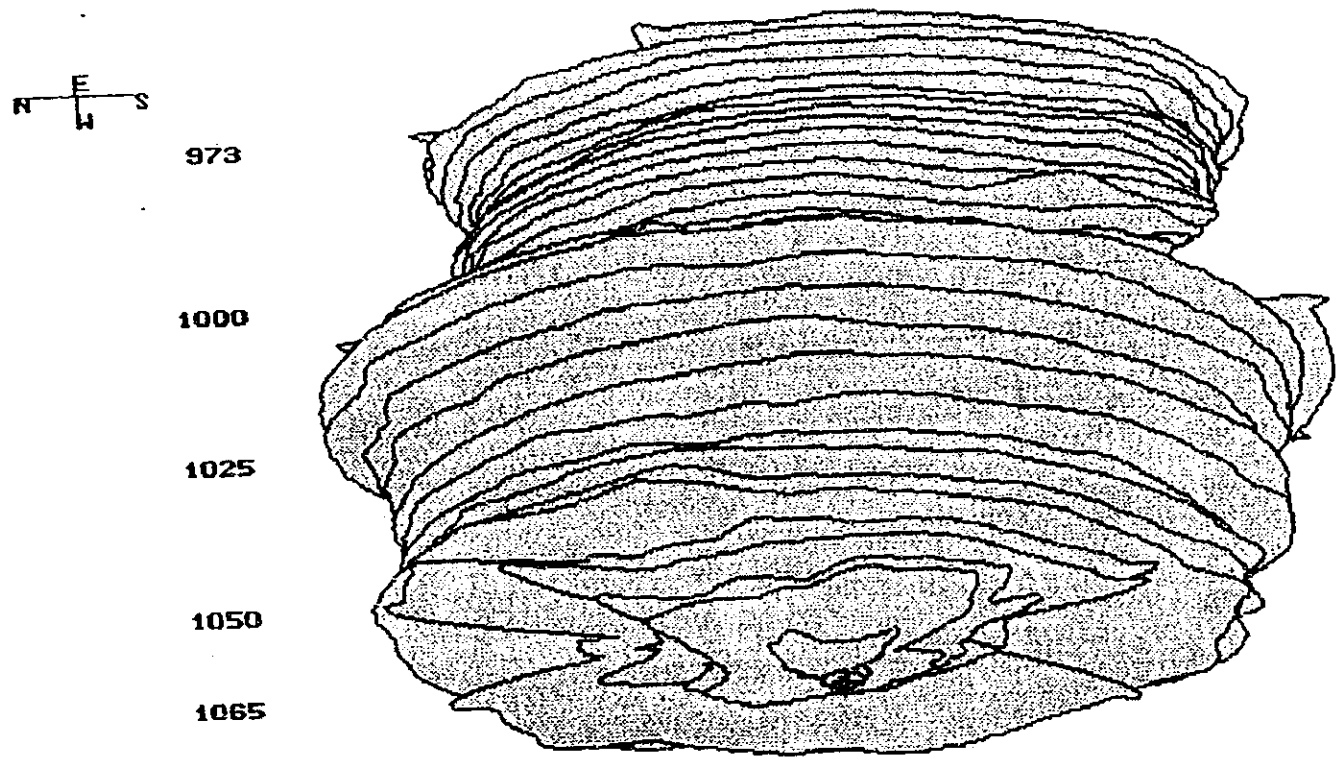

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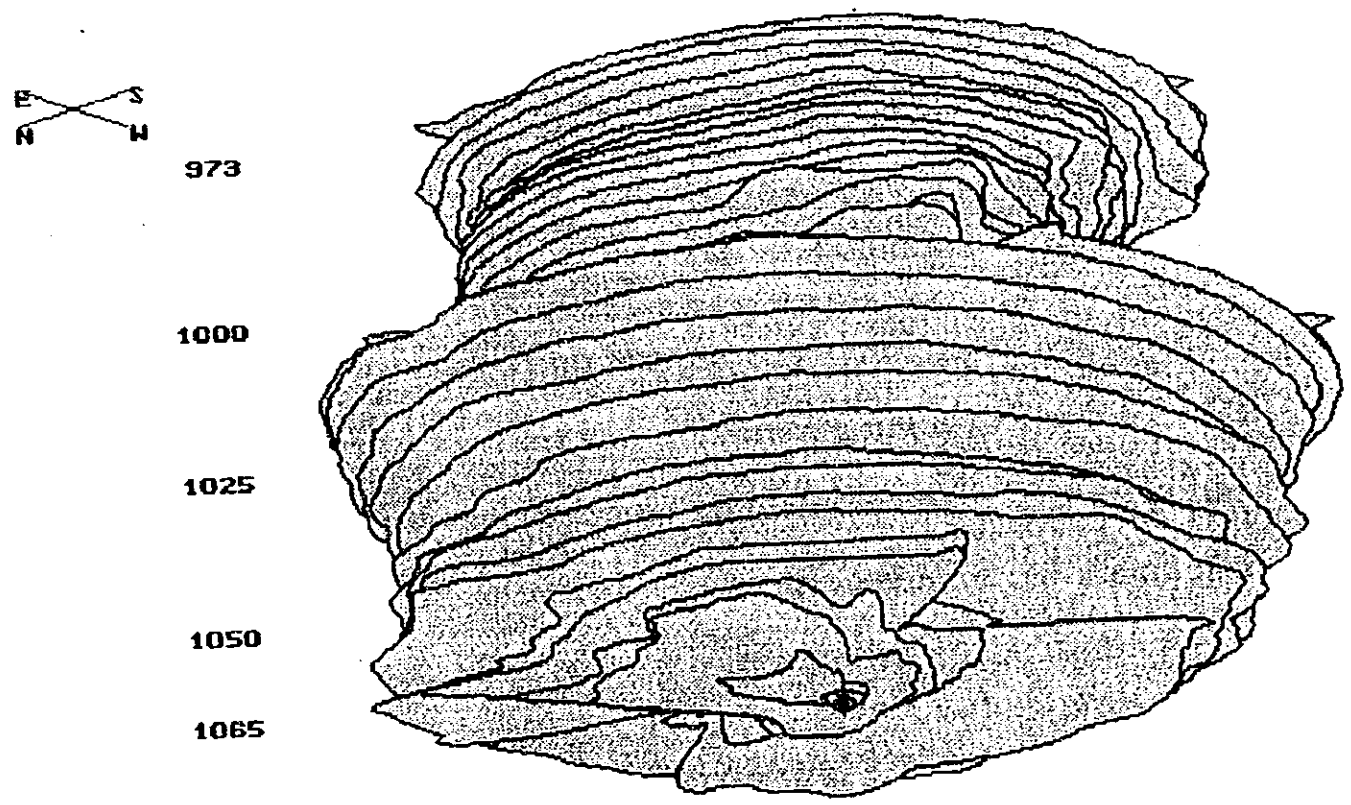

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DIGITAL SURVEYS, INC.

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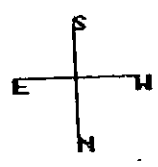

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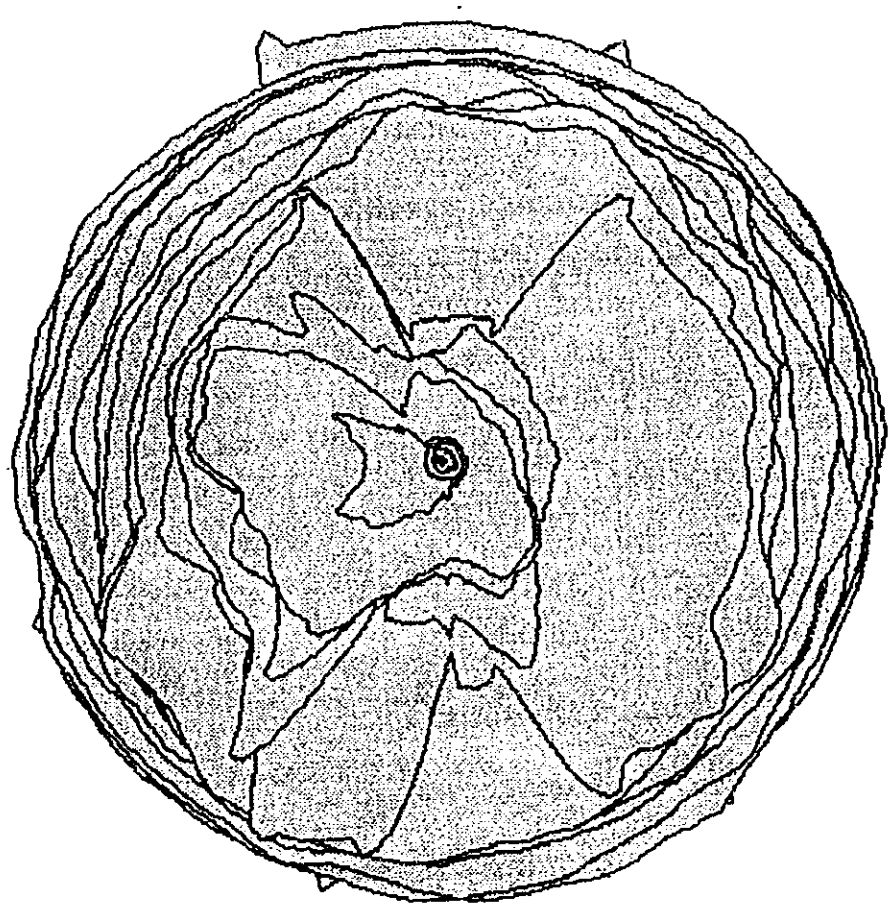


No.: 9

DOWELL

BULKLEY GAS PRODUCTS COMPA
WELL NO. 9
ABANDONED GAS TERMINAL
APRIL 13, 1980

SONAR CALIPER REPORT

DOWELL SONAR CALIPER SURVEY

TREATMENT NO: 11-42-499 JOB NO: 384

WELL DATA

T.D. DOWELL:	1060 FT	T.D. OPERATOR:	1061 FT
CASING SIZE:	9-5/8 IN	CASING DEPTH:	933 FT
INTERMEDIATE SIZE:	7 IN	INTER. DEPTH:	913 FT
TUBING SIZE:	4-1/2 IN	TUBING DEPTH:	OUT

BUCKEYE GAS PRODUCTS COMPANY
WELL NO. 9
ADAMANA UGS TERMINAL
APRIL 13,1980

648

GENERAL COMMENTS:

WAS UNABLE TO SURVEY ABOVE 999 FEET DUE TO WELL CONDITIONS.
FLUID LEVEL IN WELL AT THE TIME OF THE SURVEY WAS 600 FEET.
WELL WAS MAKING EXTREME AMOUNTS OF GAS.

MAILING ADDRESS:

PO BOX 849
HOLBROOK, ARIZONA
86025
ATTENTION: MR. ARMANDO PADILLA

CUSTOMER REP:

MR. GREG GREER

DOWELL ENGINEER:

HL VAN METRE

B

DOWELL SONAR CALIPER SURVEY

APRIL 13,198Ø

BUCKEYE GAS PRODUCTS COMPANY

JOB NO: 384

WELL NO. 9

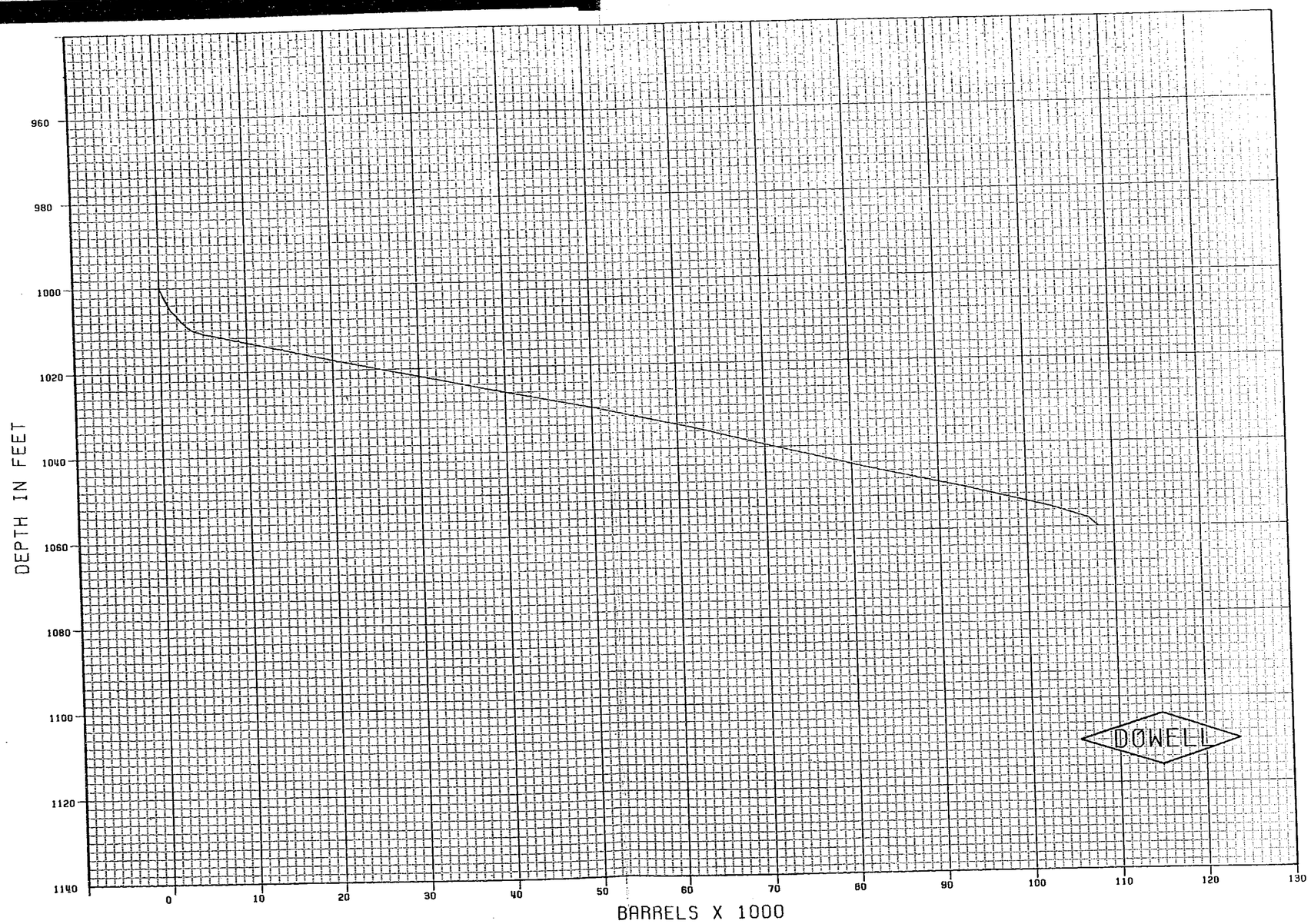
ADAMANA UGS TERMINAL

VOLUME CALCULATIONS

DEPTH	INCR CU FT	TOTAL CU FT	INCR BBLS	BBLS
999	Ø.	Ø.	Ø.	Ø.
1ØØØ	114.	114.	2Ø.	2Ø.
1ØØ5	6967.	7Ø61.	1241.	1261.
1ØØ8	7372.	14453.	1313.	2574.
1Ø1Ø	61Ø8.	2Ø561.	1Ø88.	3662.
1Ø11	7944.	28ØØ5.	1415.	5Ø77.
1Ø15	5ØØ88.	78593.	8921.	13998.
1Ø2Ø	65371.	143964.	11643.	25641.
1Ø25	67552.	211516.	12Ø32.	37673.
1Ø3Ø	69732.	281248.	1242Ø.	5ØØ92.
1Ø35	63928.	345175.	11386.	61478.
1Ø4Ø	54379.	399554.	9685.	71164.
1Ø45	56927.	456481.	1Ø139.	813Ø3.
1Ø5Ø	6279Ø.	519272.	11183.	92486.
1Ø55	56455.	575726.	1ØØ55.	1Ø2541.
1Ø58	25726.	6Ø1453.	4582.	1Ø7123.
1Ø6Ø	6167.	6Ø762Ø.	1Ø98.	1Ø8222.

DEPTH VS. VOLUME

PUCKETT GAS PRODUCTION COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980



Keye Gas Prod.)
Sec 6-T18N.R24E. Apache Cty 648

DOWELL SONAR CALIPER SURVEY

BUCKEYE GAS PRODUCTS COMPANY — APRIL 13,1980

WELL NO. 9 — JOB NO: 384

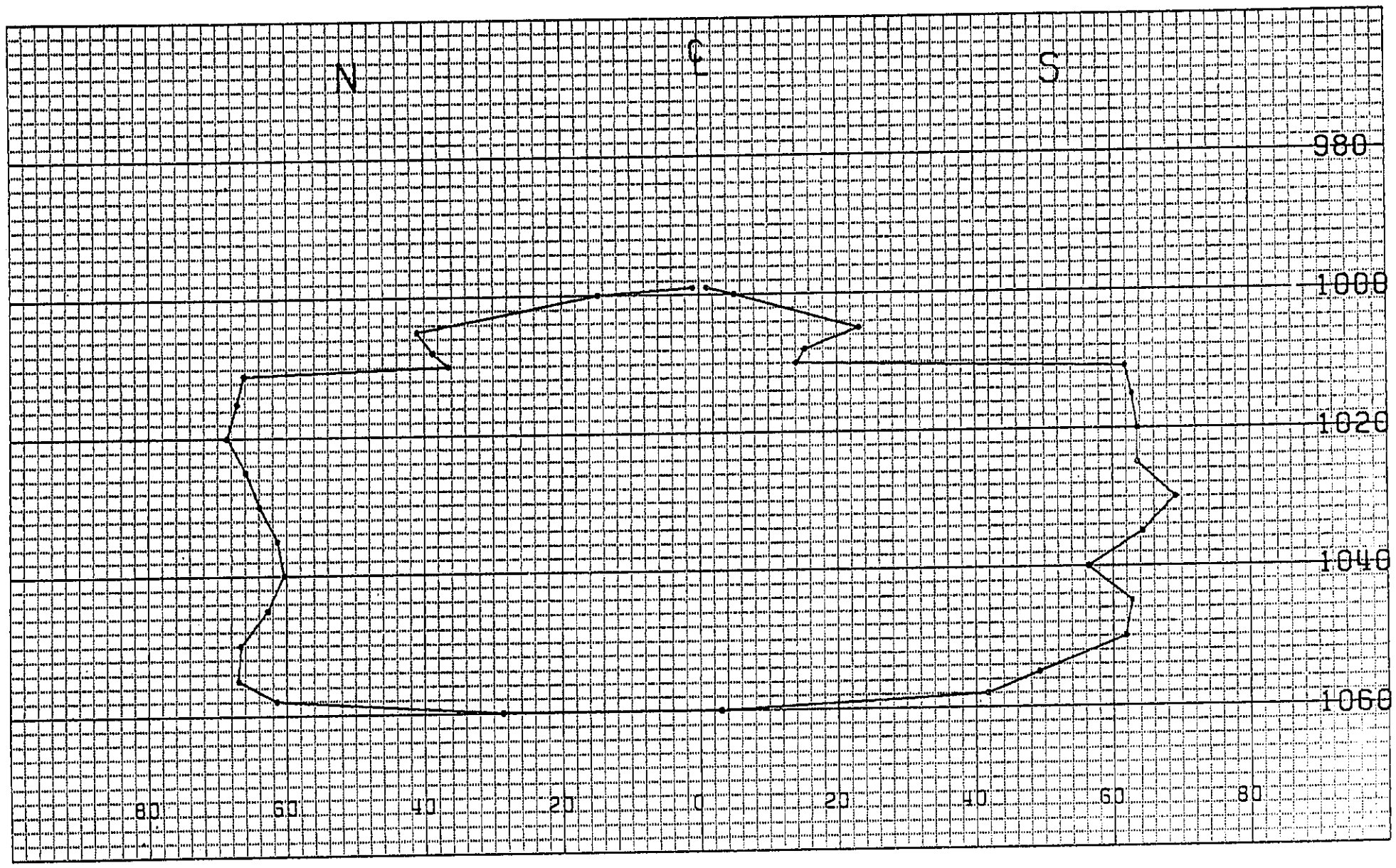
RADII IN FEET

DEPTH	ANGLE	N	S	E	W	NE	SW	SE	NW
999	90	0.9	1.1	1.0	1.0	0.9	1.2	1.1	0.9
1000	90	14.7	5.1	2.4	15.2	3.1	8.5	3.2	15.7
1005	90	41.1	23.2	10.2	33.8	25.8	39.8	12.2	38.6
1008	90	38.7	15.4	5.1	28.8	6.7	35.9	7.4	34.2
1010	90	36.5	14.1	62.1	26.9	62.6	34.8	5.4	32.1
1011	90	66.2	61.9	62.6	62.6	63.0	60.5	62.2	63.1
1015	90	67.2	62.8	63.2	63.8	64.4	60.9	62.6	63.6
1020	90	68.6	63.6	66.4	65.6	66.9	61.5	67.3	64.8
1025	90	65.9	63.6	67.1	65.3	66.5	62.0	67.8	62.8
1030	90	63.9	69.1	70.6	67.5	67.6	65.1	69.6	65.0 ✓ max radius
1035	90	61.3	64.3	59.4	61.9	51.3	58.6	62.8	62.8
1040	90	60.4	56.4	57.8	63.7	50.2	58.7	62.3	59.2
1045	90	62.7	62.8	60.6	62.4	63.3	64.0	62.2	63.1
1050	90	66.6	61.9	62.1	64.8	64.6	62.9	63.2	64.8
1055	90	67.0	49.2	50.6	52.0	63.6	51.6	48.4	58.3
1058	90	61.4	41.7	43.7	46.6	60.5	30.2	42.8	53.3
1060	90	28.7	3.0	5.0	3.8	10.4	3.3	3.3	5.3

21-APR-80 11:07:54

BUCKEYE GAS PRODUCTS COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980
HORZ SCALE: 1 IN. = 20 FEET
VERT SCALE: 1 IN. = 20 FEET

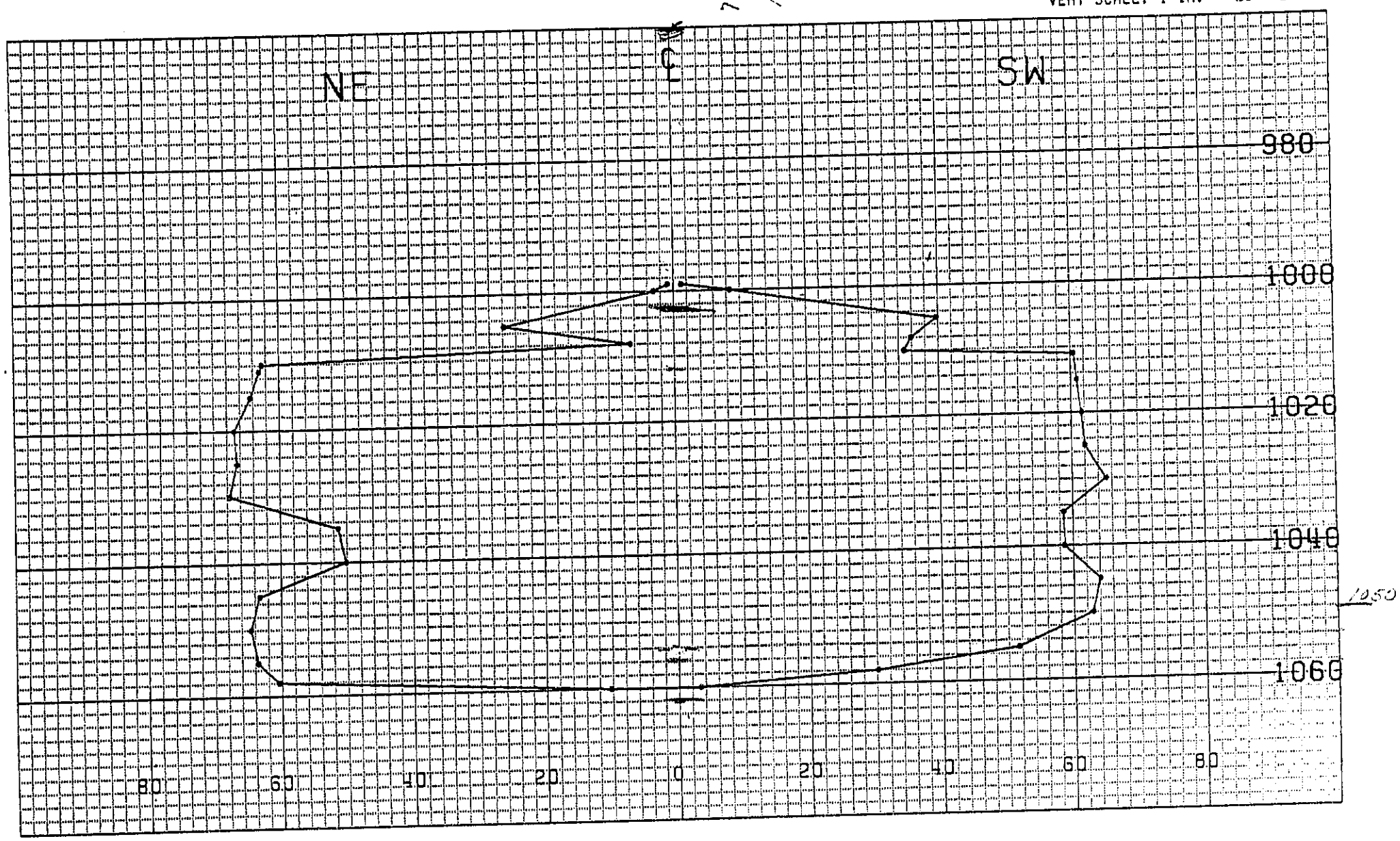
VERTICAL CROSS SECTION



21-APR-80 11:13:27

BUCKEYE GAS PRODUCTS COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980
HORZ SCALE: 1 IN. = 20 FEET
VERT SCALE: 1 IN. = 20 FEET

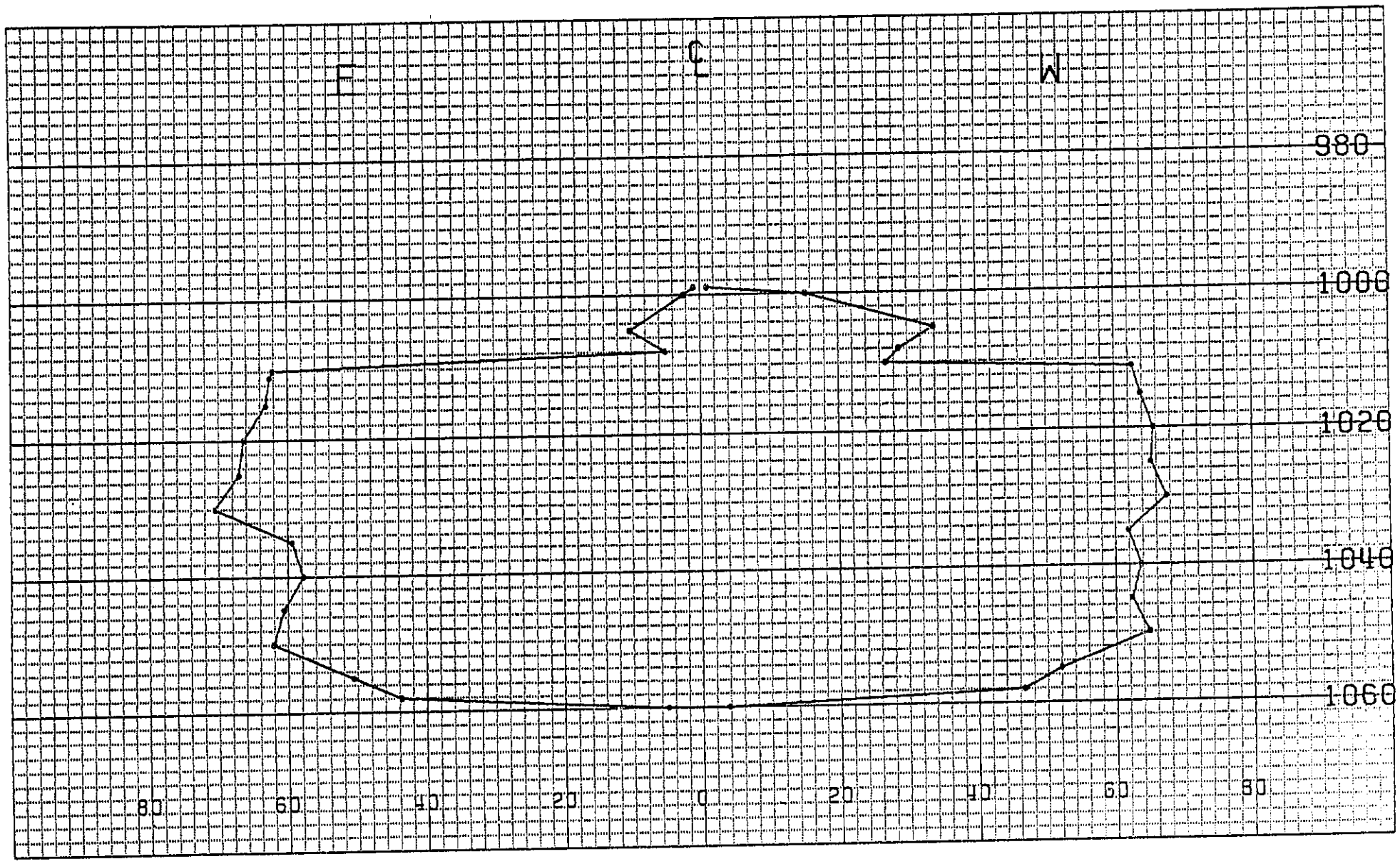
VERTICAL CROSS SECTION



21-APR-80 11:12:02

BUCKEYE GAS PRODUCTS COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980
HORZ SCALE: 1 IN. = 20 FEET
VERT SCALE: 1 IN. = 20 FEET

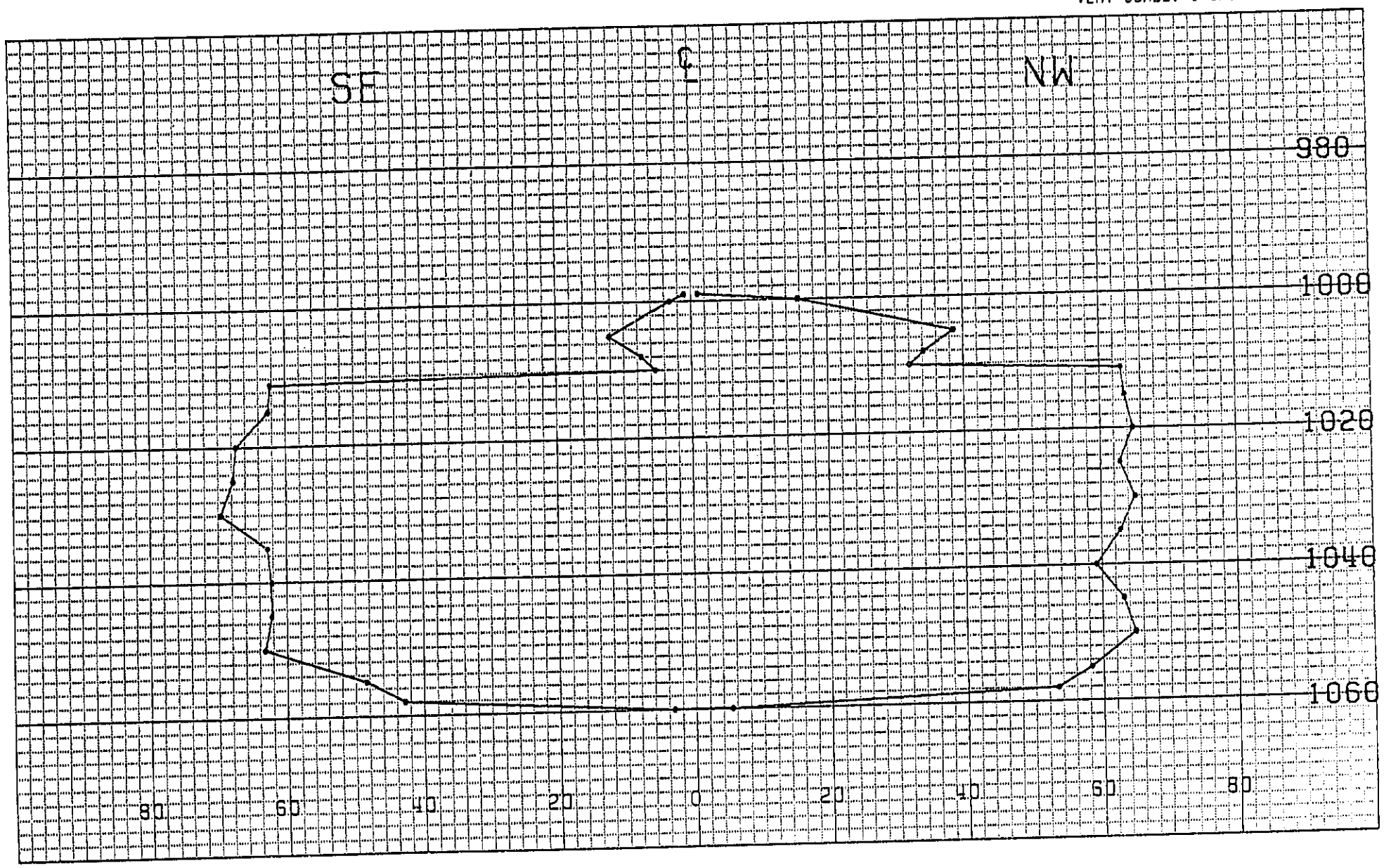
VERTICAL CROSS SECTION



21-APR-80 11:14:45

BUCKEYE GAS PRODUCTS COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980
HORZ SCALE: 1 IN. = 20 FEET
VERT SCALE: 1 IN. = 20 FEET

VERTICAL CROSS SECTION



MAX RADII REPORT

BUCKEYE GAS PRODUCTS CORP.
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980

THRU DEPTH-1080

AZM	RANGE	DEPTH	AZM	RANGE	DEPTH	AZM	RANGE	DEPTH	AZM	RANGE	DEPTH	AZM	RANGE	DEPTH	AZM	RANGE	DEPTH	AZM	RANGE	DEPTH	AZM	RANGE	DEPTH
0	68.6	1020	45	67.6	1030	90	70.6	1030	135	69.6	1030	180	69.1	1030	225	65.1	1030	270	67.5	1030	315	65.0	1030
1	68.6	1020	46	67.8	1030	91	70.6	1030	136	69.7	1030	181	68.9	1030	226	65.3	1030	271	67.9	1030	316	64.9	1030
2	68.4	1020	47	67.9	1030	92	70.5	1030	137	69.4	1030	182	68.9	1030	227	65.3	1030	272	68.3	1030	317	65.0	1020
3	68.5	1020	48	67.8	1030	93	70.6	1030	138	69.4	1030	183	68.5	1030	228	65.5	1030	273	68.9	1030	318	65.1	1030
4	68.5	1020	49	68.0	1030	94	70.7	1030	139	69.4	1030	184	68.5	1030	229	65.5	1030	274	69.6	1030	319	65.3	1020
5	68.4	1020	50	68.1	1030	95	70.7	1030	140	69.3	1030	185	67.9	1030	230	65.6	1030	275	69.9	1030	320	65.4	1015
6	68.4	1020	51	68.3	1030	96	70.7	1030	141	69.2	1030	186	67.7	1030	231	66.0	1030	276	69.8	1030	321	65.5	1015
7	68.6	1050	52	68.3	1030	97	70.6	1030	142	69.1	1030	187	67.4	1030	232	66.1	1030	277	69.4	1030	322	65.7	1020
8	68.8	1050	53	68.3	1030	98	70.5	1030	143	68.3	1030	188	67.0	1030	233	66.5	1030	278	69.0	1030	323	66.1	1020
9	69.0	1050	54	68.3	1030	99	70.4	1030	144	67.9	1030	189	66.8	1030	234	66.7	1030	279	68.5	1030	324	66.4	1020
10	69.0	1050	55	68.5	1030	100	70.2	1030	145	67.6	1030	190	66.5	1030	235	66.9	1030	280	67.2	1030	325	66.6	1020
11	69.3	1050	56	68.8	1030	101	70.0	1030	146	67.2	1030	191	66.3	1030	236	67.0	1030	281	66.7	1030	326	67.0	1020
12	69.5	1050	57	69.0	1030	102	70.1	1030	147	66.8	1030	192	66.1	1030	237	67.0	1030	282	66.5	1025	327	67.3	1020
13	69.6	1050	58	68.9	1030	103	69.9	1030	148	66.9	1025	193	65.9	1030	238	66.7	1030	283	66.2	1025	328	67.6	1020
14	69.6	1050	59	69.1	1030	104	69.5	1030	149	67.1	1025	194	65.8	1030	239	66.7	1030	284	66.2	1025	329	67.8	1020
15	69.4	1050	60	69.0	1030	105	69.2	1030	150	67.5	1030	195	65.8	1030	240	66.5	1030	285	66.0	1025	330	67.7	1020
16	68.9	1050	61	69.2	1030	106	68.9	1030	151	68.0	1030	196	65.9	1030	241	66.2	1030	286	65.9	1025	331	67.9	1020
17	68.6	1050	62	69.2	1030	107	68.6	1030	152	68.6	1030	197	65.7	1030	242	66.0	1030	287	65.7	1020	332	67.8	1020
18	68.7	1030	63	69.4	1030	108	68.3	1030	153	69.2	1030	198	65.9	1030	243	65.8	1030	288	65.5	1025	333	67.9	1020
19	69.2	1030	64	69.4	1030	109	68.3	1025	154	69.5	1030	199	65.8	1030	244	65.5	1030	289	65.3	1020	334	68.2	1020
20	69.6	1030	65	69.5	1030	110	68.4	1025	155	69.9	1030	200	65.9	1030	245	65.4	1030	290	65.1	1020	335	68.1	1020
21	69.8	1030	66	69.6	1030	111	68.2	1025	156	70.3	1030	201	65.7	1030	246	65.4	1030	291	64.9	1020	336	68.4	1020
22	70.1	1030	67	69.4	1030	112	68.2	1030	157	70.5	1030	202	65.7	1030	247	65.3	1030	292	64.6	1020	337	68.5	1020
23	70.9	1030	68	69.4	1030	113	68.4	1030	158	70.8	1030	203	65.4	1030	248	65.4	1030	293	64.5	1020	338	68.5	1020
24	71.0	1030	69	69.2	1030	114	68.9	1030	159	71.1	1030	204	65.4	1030	249	65.7	1030	294	64.6	1050	339	68.5	1020
25	71.1	1030	70	69.2	1030	115	69.4	1030	160	71.1	1030	205	65.3	1030	250	65.7	1030	295	64.6	1050	340	68.3	1020
26	71.3	1030	71	69.0	1030	116	69.9	1030	161	71.4	1030	206	65.2	1030	251	66.1	1030	296	65.0	1030	341	68.0	1020
27	71.4	1030	72	68.8	1030	117	70.2	1030	162	71.4	1030	207	65.5	1030	252	66.6	1030	297	65.2	1030	342	68.1	1020
28	71.5	1030	73	69.0	1030	118	70.3	1030	163	71.4	1030	208	65.8	1030	253	67.1	1030	298	65.3	1030	343	68.3	1020
29	71.5	1030	74	68.8	1030	119	70.6	1030	164	71.5	1030	209	65.7	1030	254	67.5	1030	299	65.2	1030	344	68.2	1020
30	71.4	1030	75	68.7	1030	120	70.9	1030	165	71.3	1030	210	65.7	1030	255	67.9	1030	300	65.1	1030	345	68.4	1020
31	71.6	1030	76	68.8	1030	121	71.0	1030	166	71.4	1030	211	65.6	1030	256	68.2	1030	301	64.9	1030	346	68.3	1020
32	71.5	1030	77	68.8	1030	122	71.2	1030	167	71.3	1030	212	65.4	1030	257	68.5	1030	302	64.7	1030	347	68.4	1020
33	71.5	1030	78	68.8	1030	123	71.2	1030	168	71.2	1030	213	65.3	1030	258	68.5	1030	303	64.6	1050	348	68.7	1020
34	71.5	1030	79	68.8	1030	124	71.2	1030	169	71.2	1030	214	65.3	1030	259	68.2	1030	304	64.9	1050	349	68.8	1020
35	68.7	1030	80	68.8	1030	125	71.0	1030	170	71.0	1030	215	65.3	1030	260	67.9	1030	305	65.0	1050	350	68.6	1020
36	68.4	1030	81	68.9	1030	126	70.9	1030	171	70.7	1030	216	65.4	1030	261	67.7	1030	306	65.0	1050	351	68.7	1020
37	68.0	1030	82	69.2	1030	127	71.0	1030	172	70.6	1030	217	65.4	1030	262	67.5	1030	307	65.1	1050	352	68.6	1020
38	67.7	1030	83	69.6	1030	128	71.1	1030	173	70.7	1030	218	65.5	1030	263	67.3	1030	308	65.1	1050	353	68.5	1020
39	67.7	1020	84	69.6	1030	129	70.9	1030	174	70.5	1030	219	65.4	1030	264	67.2	1030	309	65.0	1050	354	68.7	1020
40	67.5	1030	85	69.6	1030	130	70.3	1030	175	70.4	1030	220	65.4	1030	265	67.0	1030	310	65.0	1030	355	68.7	1020
41	67.4	1030	86	69.9	1030	131	70.1	1030	176	70.3	1030	221	65.2	1030	266	66.7	1030	311	65.0	1030	356	68.7	1020
42	67.4	1030	87	70.0	1030	132	69.8	1030	177	70.1	1030	222	65.2	1030	267	66.7	1030	312	64.9	1030	357	68.6	1020
43	67.4	1030	88	70.3	1030	133	69.5	1030	178	69.9	1030	223	65.1	1030	268	66.7	1030	313	65.1	1030	358	68.5	1020
44	67.5	1030	89	70.5	1030	134	69.6	1030	179	69.6	1030	224	65.3	1030	269	67.0	1030	314	65.0	1030	359	68.6	1020

...keye Gas Prod.)
...c-118N.R24E. Apache Cty 648

PR-[illegible] 10[illegible]7

[illegible]UCK[illegible]GAS [illegible]UCTS [illegible]PANY

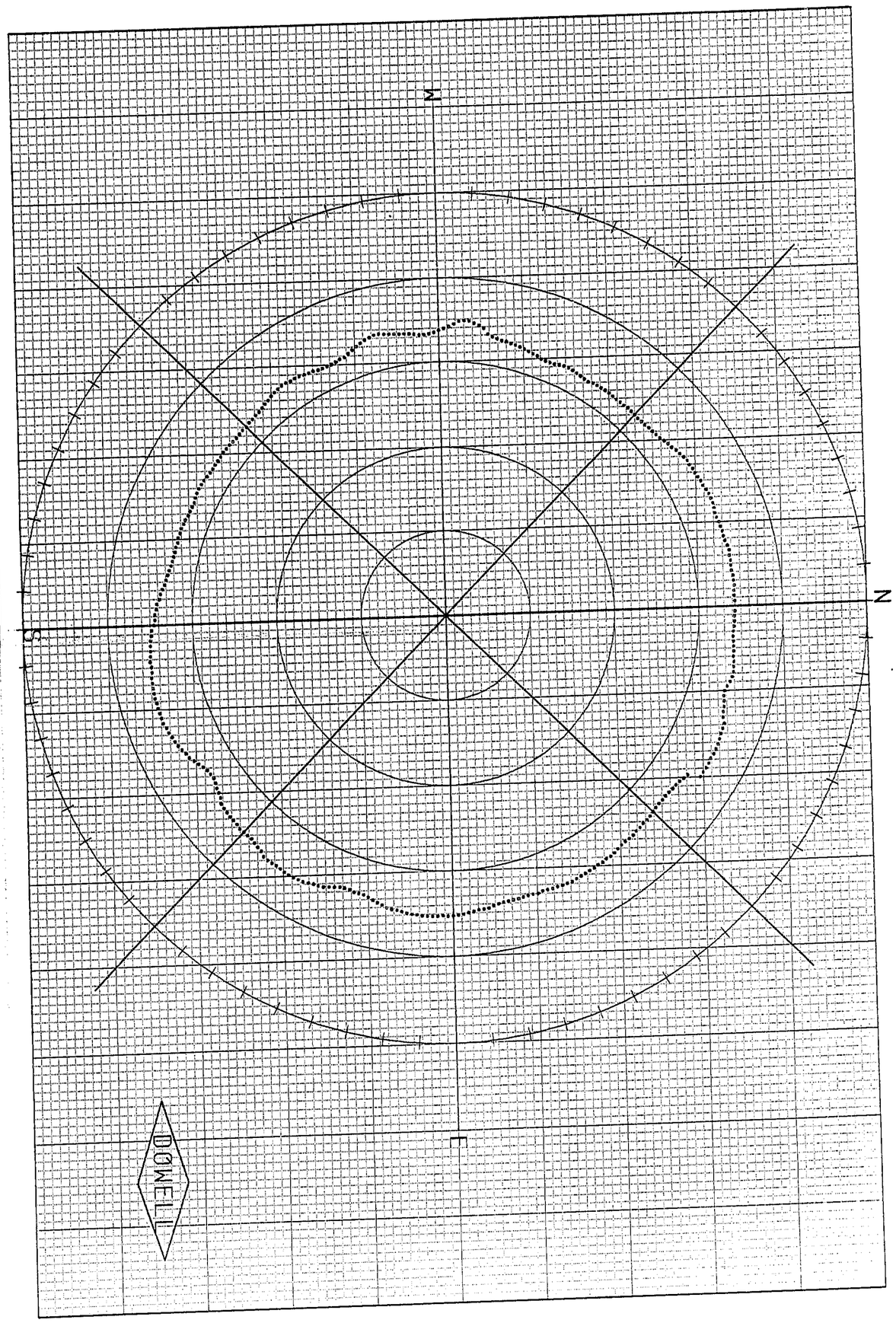
ROAMANA UGS TERMINAL

WELL NO. 9

APRIL 13,1980

SCALE: 1 IN. = 20 FEET

MAXIMUM RADII



[illegible]keye Gas Prod.)

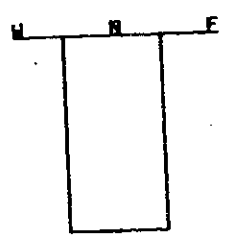
[illegible] C-T18N.R24E. Apache Cty 648

CUSTOMER INFORMATION
ISOMETRIC VIEW

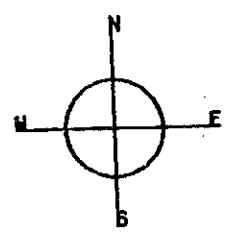
THE FOLLOWING PLOTS, WHICH WE CALL 'ISOMETRIC VIEWS', ARE A METHOD OF SHOWING A 3-DIMENSIONAL OBJECT ON 2-DIMENSIONAL PAPER. OUR GOAL IS TO ILLUSTRATE ON PAPER THE SAME SURVEY INFORMATION AND PERSPECTIVE THAT YOU WOULD GET FROM VIEWING ONE OF OUR PLASTIC MODELS.

TO DEMONSTRATE WHAT THE ISOMETRIC VIEW IS SHOWING, IMAGINE HOW YOU COULD PLOT A CYLINDER:

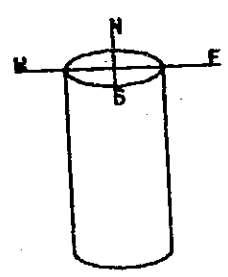
A VERTICAL CROSS SECTION (VIEWED FROM THE SOUTH) WOULD LOOK LIKE:



A TOP VIEW (WE CALL THEM 'PLAN VIEWS') WOULD LOOK LIKE:



IF YOU STOOD BACK AND VIEWED THE CYLINDER FROM ABOVE AND DOWNWARD, (FROM THE SOUTH), IT WOULD LOOK LIKE:



THIS IS AN 'ISOMETRIC VIEW'

THE ISOMETRIC VIEW OF THE CAVITY IS COMPUTER GENERATED FROM INTERPRETED SONAR SURVEY DATA. DOWELL USES AN INTERACTIVE GRAPHICS SYSTEM TO REVIEW AND PROCESS THE ISOMETRIC IMAGES, WHICH ARE THEN PLOTTED. THE DETAILS ABOUT THIS PRESENTATION THAT YOU SHOULD BE AWARE OF:

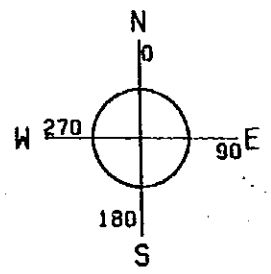
VIEW SELECTION - THE SONAR ENGINEER THAT PERFORMED THE SURVEY, WILL SELECT THE 'VIEWING ANGLE' TO BEST ILLUSTRATE THE FEATURES OF THE CAVITY. THE IMAGE CAN BE ROTATED AROUND THE CAVITY CENTER LINE, AS WELL AS VIEWED FROM NUMEROUS ANGLES.

DATA PRESENTED - TYPICALLY ALL OF THE 'HORIZONTAL' SURVEY DATA ARE INCLUDED IN THE ISOMETRIC. THEY WILL APPEAR AS HORIZONTAL SLICES LIKE THE CYLINDER'S TOP OR BOTTOM.

SCALE - YOU CAN'T EASILY MEASURE THE ISOMETRIC VIEW FOR REAL DIMENSIONS, HOWEVER, THE RELATIVE SCALES USED ARE PRINTED IN THE UPPER LEFT HAND CORNER. ALSO, YOU MAY REFERENCE THE COMPASS CYLINDER WHICH APPEARS IN THE UPPER LEFT HAND CORNER. THIS CYLINDER IS 1 INCH LONG BY 1/2 INCH DIAMETER, SO YOU CAN GET A SENSE FOR REAL DIMENSION. IN SOME CASES WE WILL EXPAND OR COMPRESS THE SCALE (FOR EXAMPLE: HORZION EQUAL 150 FEET/INCH, VERTICAL EQUAL 50 FEET/INCH) TO BETTER ILLUSTRATE CAVITY FEATURES.

ORIENTATION - THE ORIENTATION OF THE ISOMETRIC VIEW (WITH REFERENCE TO MAGNETIC NORTH) IS SHOWN BY THE COMPASS CYLINDER AND THE VALUE OF 'VIEWING AZIMUTH' IN THE UPPER LEFT-HAND CORNER.

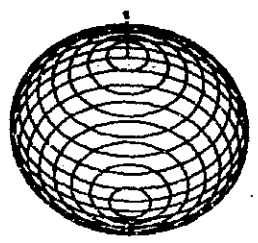
THE AZIMUTH VALUE IS THE COMPASS DEGREE AT THE FRONT OF THE ISOMETRIC IMAGE. THIS IS A TOP-VIEW REFERENCE FOR OUR NUMBERING SYSTEM:



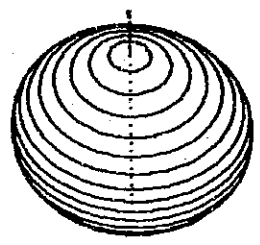
CENTER LINE - WE WILL SHOW THE PLUMB LINE OF THE SURVEY AS A SOLID CENTERLINE ABOVE THE CAVITY ISOMETRIC. INSIDE THE CAVITY, WE WILL MARK THE CENTERLINE OF EACH 'HORIZONTAL' SECTION WITH A DOT.

HIDDEN LINES - WE HAVE REMOVED THE LINES OF THE ISOMETRIC THAT YOU COULD NOT SEE IF THE SECTIONS WERE MADE OF OPAQUE PLASTIC.

IF THE HIDDEN LINES OF A SPHERE WERE NOT REMOVED, IT WOULD BE CONFUSING:



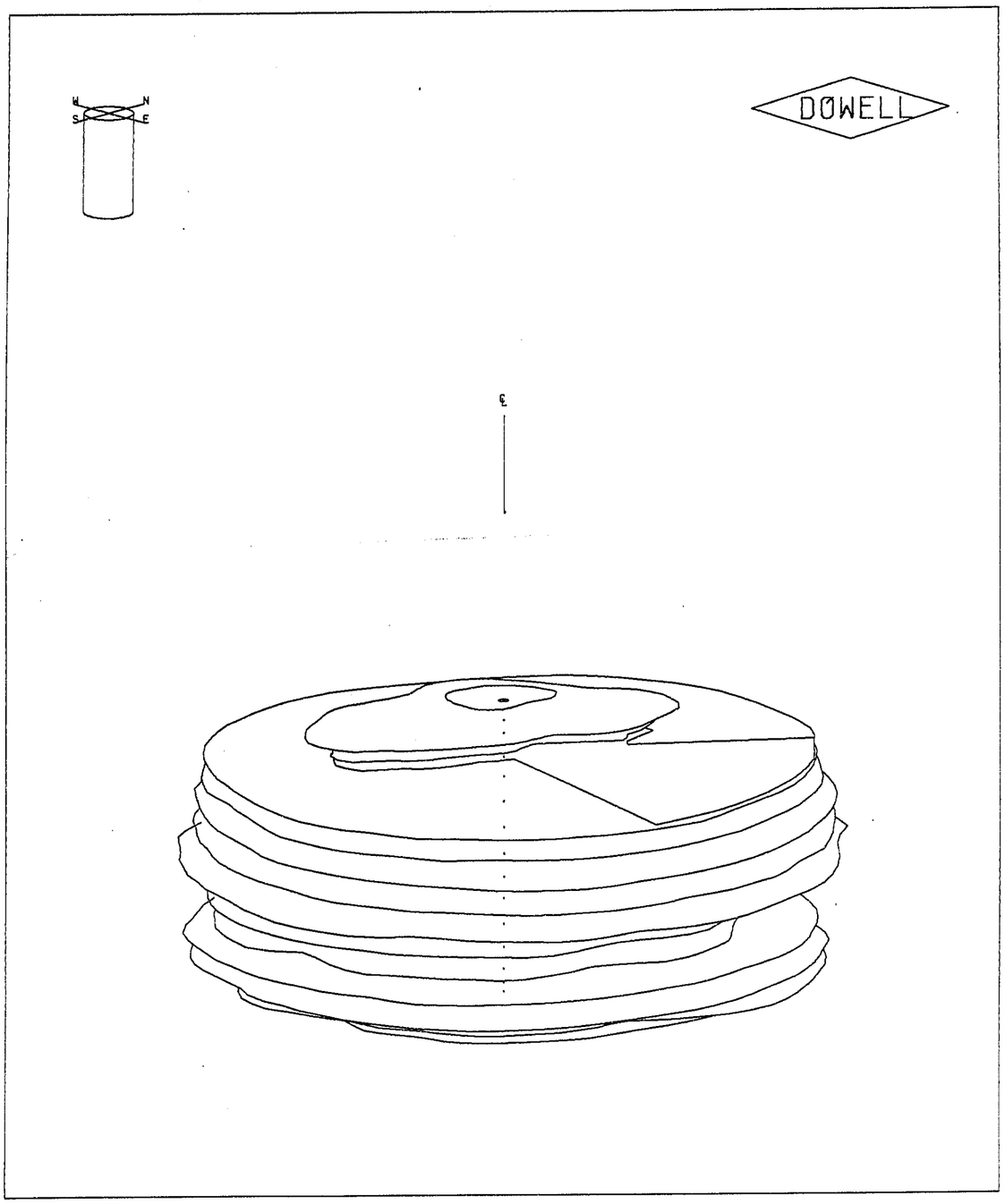
BUT WITH THE HIDDEN LINES REMOVED, IT BECOMES VISIBLE:



21-APR-80 10:43
FROM DEPTH: 960
THRU DEPTH: 1080
VIEWING AZIMUTH: 135
HORZ SCALE: 1 IN.=20 FT.
VERT SCALE: 1 IN.=20 FT.

ISOMETRIC VIEW

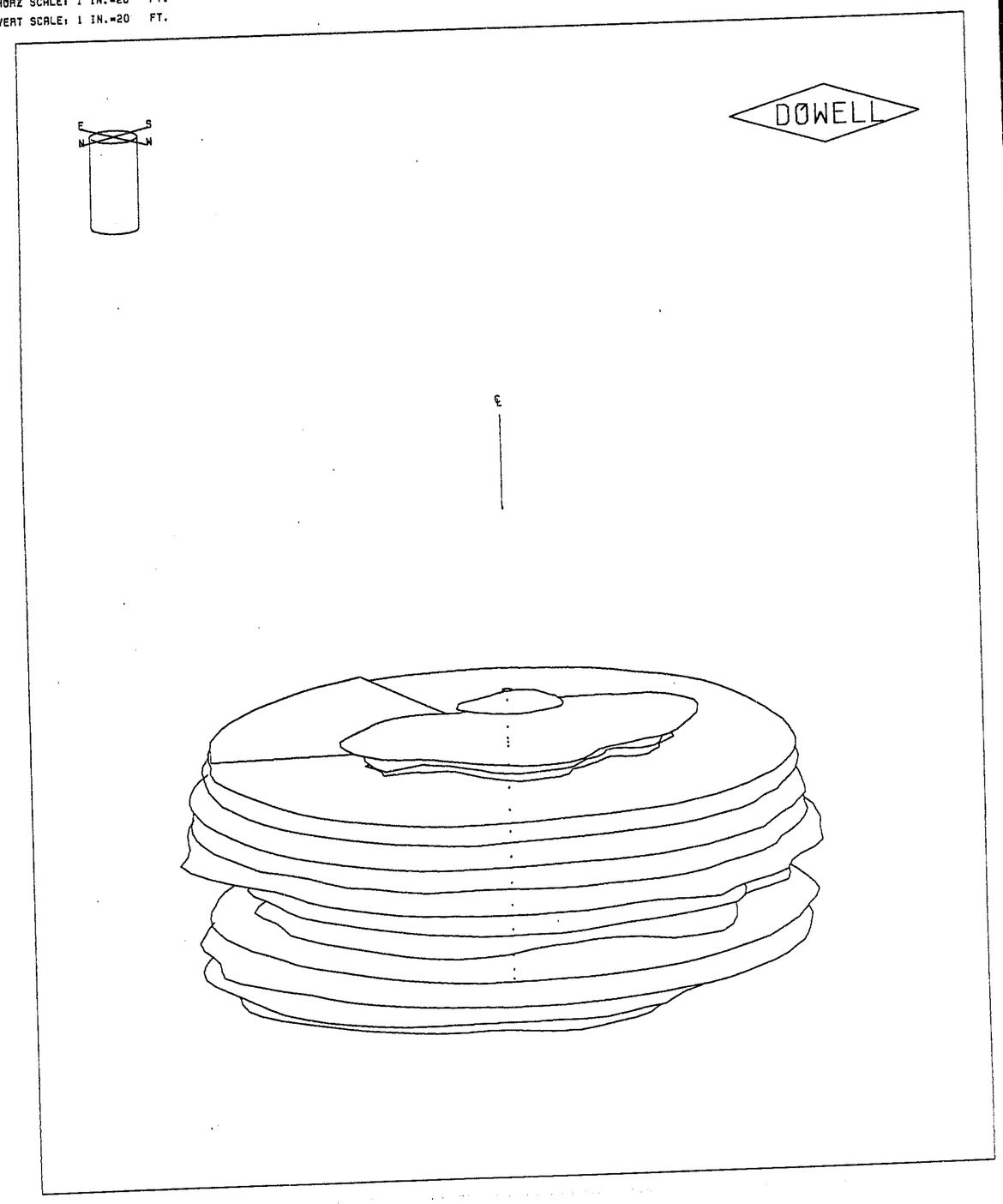
BUCKEYE GAS PRODUCTS COMPANY
ADAHANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980



21-APR-80 10:45
FROM DEPTH: 960
THRU DEPTH: 1080
VIEWING AZIMUTH: 315
HORZ SCALE: 1 IN.=20 FT.
VERT SCALE: 1 IN.=20 FT.

ISOMETRIC VIEW

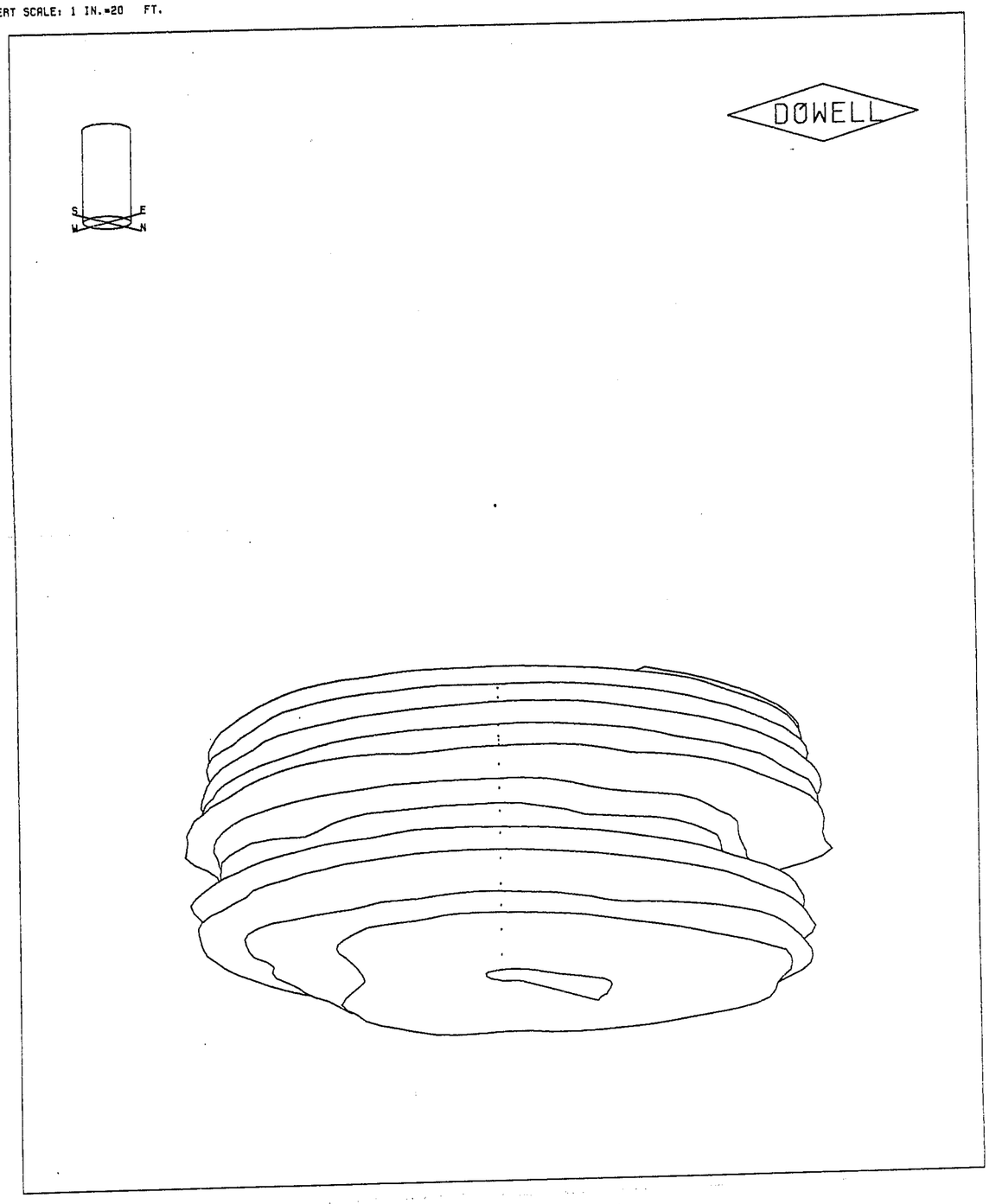
BUCKEYE GAS PRODUCTS COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980



21-APR-80 10:48
FROM DEPTH: 960
THRU DEPTH: 1080
VIEWING AZIMUTH: 135
HORZ SCALE: 1 IN.=20 FT.
VERT SCALE: 1 IN.=20 FT.

ISOMETRIC VIEW

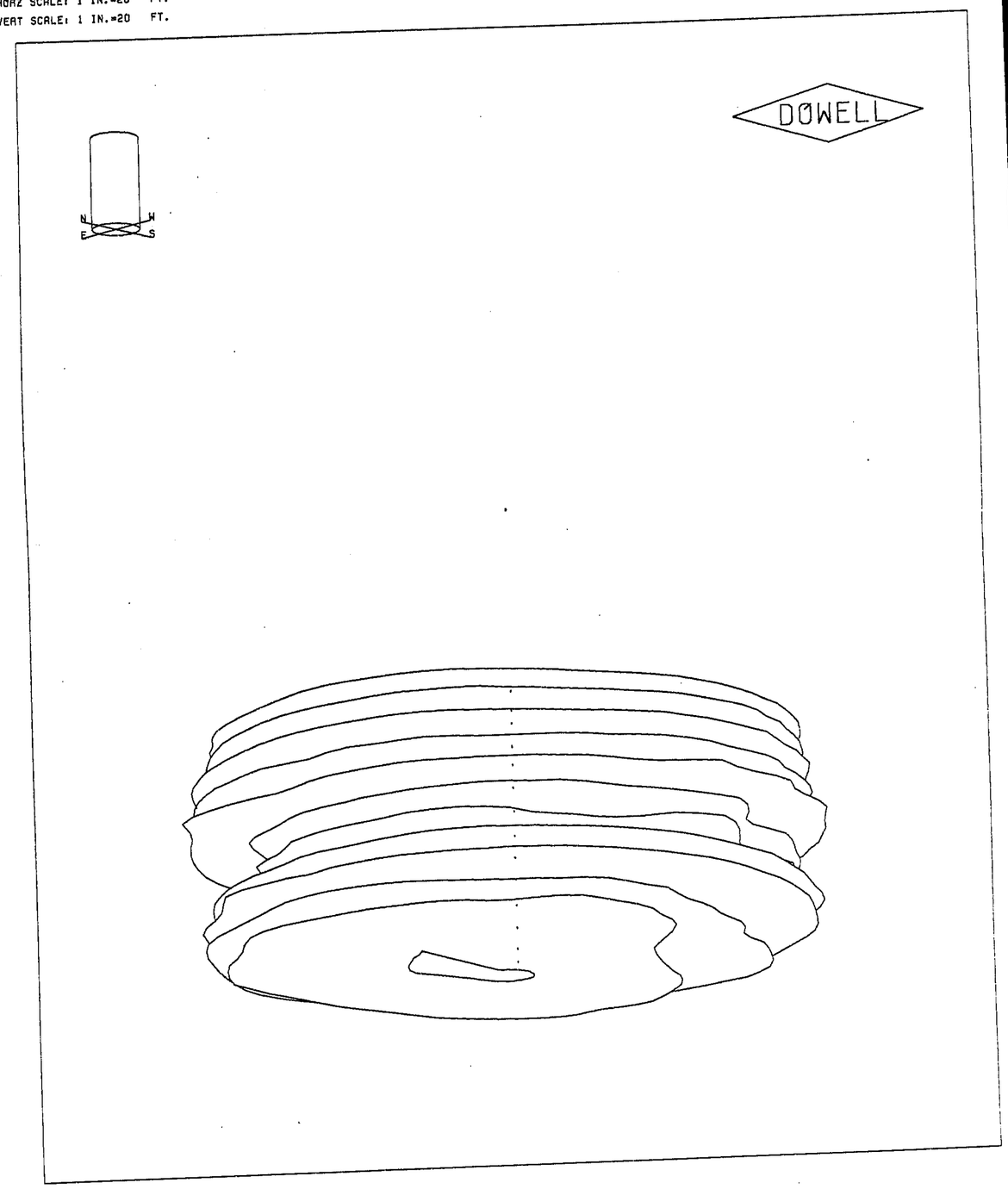
BUCKEYE GAS PRODUCTS COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 13,1980

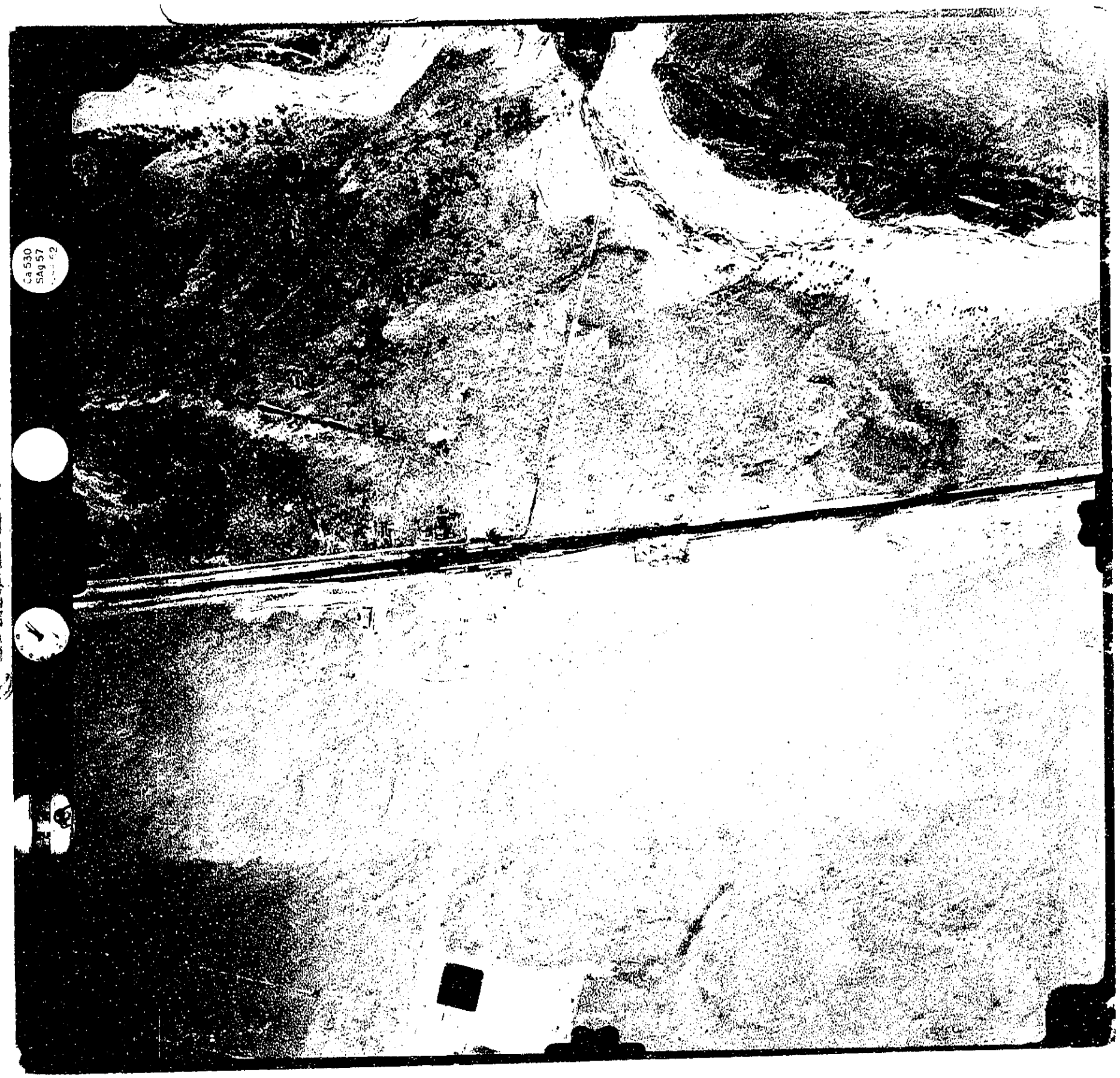


21-APR-80 10:51
FROM DEPTH: 960
THRU DEPTH: 1080
VIEWING AZIMUTH: 315
HORZ SCALE: 1 IN.=20 FT.
VERT SCALE: 1 IN.=20 FT.

ISOMETRIC VIEW

BUCKEYE GAS PRODUCTS COMPANY
ADAMANA UGS TERMINAL
WELL NO. 9
APRIL 19,1980





Ca 530
SAg 57

FERRELLGAS LPG FACILITY

Operator: Ferrellgas Inc.

Bond Company: Travelers Casualty and Surety Co. of America

Bond No.: 030 S 103626358 BCM

Amount: $25,000.00

Date approved: 8/01/96

Permits covered by this bond:

556 (Cavern 01)
557 (Cavern 02)
562 (Water well)
602 (Cavern 03)
603 (Cavern 04)
606 (Cavern 05)
607 (Cavern 06)
646 (Cavern 07)
647 (Cavern 08)
✓ 648 (Cavern 09)
671 (Cavern 10)
672 (Cavern 11)
776 (Cavern 12 -- not developed)
777 (Expired)
778* (Expired)

* Bond in Permit #778

May 20, 1996

Memo to Ferrellgas files
From: Steve Rauzi SR
Re: Discussion of volume verification in May 17, 1996 Commission meeting

All of the Commissioners present agreed that the sonar method was the best available technology to determine cavity shapes. They agreed that accepting volumetric measurements would be appropriate as long as sonar measurements continued to be used. Dr. Nations noted that sonar determinations could be waived in individual cases in appropriate situations.

State of Arizona
Arizona Geological Survey
416 W. Congress, Suite 100
Tucson, Arizona 85701
(520) 770-3500

Fife Symington
Governor

Larry D. Fellows
Director and State Geologist

May 1, 1996

Memo: Dale Thompson, Ferrellgas, Adamana — 9 pages total
Fax #: 524-2635
From: SR Steve Rauzi, Oil & Gas Administrator
Re: Volume verification surveys pursuant to A.A.C. R12-7-182(D)

I examined the sonar surveys on several of your storage wells after receiving the three sonar surveys run in March 1996. My analysis indicates that sonar surveys do not provide an exact picture of the shape and change of shape from survey to survey. On the other hand, sonar surveys, even when run by different companies and tools, do provide a good picture of the general shape and change in shape of a cavity as shown on the attached Exhibits 3 through 8.

The increase then decrease in sonar-determined volume for cavities 3 and 6 on Exhibit 1 is of special concern to me. I'm not sure if the discrepancy is due to running sonar in open hole versus through-pipe, different companies and tools, differences in tool design or calculation parameters, or improved technology through time. One way to verify sonar-determined volumes would be to complement them with volumetric measurements. The generally consistent cavity shape, change in shape, and rate of maximum radius increase over the last 16 years shown by the sonar survey results on the attached Exhibits 2 through 8 confirms the general integrity of the shape your caverns.

However, in light of the increase then decrease in sonar-determined volume in cavities 3 and 6 shown on Exhibit 1, it would be beneficial and appropriate to complement the sonar-determined volume verifications with volumetric measurements. As a result, I plan to recommend that the Oil and Gas Conservation Commission accept volumetric measurements and sonar surveys run on alternate five year cycles to provide a more accurate tracking and verification of cavity volumes; alternatively, to accept volumetric measurements annually complemented with sonar surveys at least every ten years or whenever a cavity is reentered and worked over, starting a new ten-year cycle.

Please feel free to comment on any aspect my analysis or reasoning. Also, I look forward to receiving your latest volumetric measurements pursuant to our discussion before the Commission's next meeting on May 17.

ADAMANA SONAR METHOD VOLUME VERIFICATION HISTORY

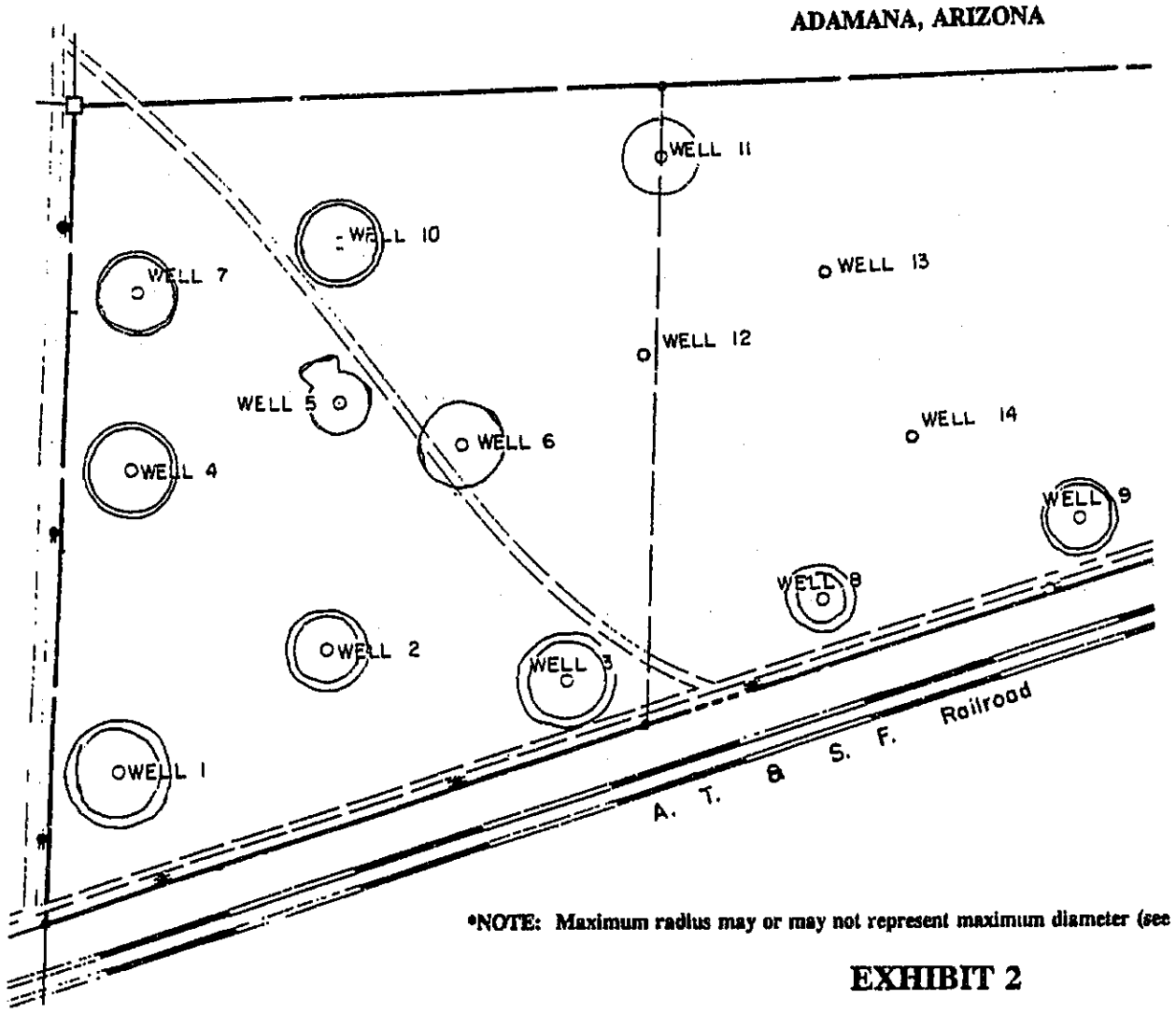
Permit	Well No.	TD	Cavern	Initial Sonar	Max Radius	Sonar Volume	Second Sonar	Max Radius	Sonar Volume	Third Sonar	Max Radius	Sonar Volume
556	1	1101'	900-985'	4/79 Dowell	99'@942'	150,532 bbls	3/92 Digital*	118'@944'	176,119 bbls			
557	2	1112'	906-995'	4/79 Dowell	74'@958'	149,008 bbls	2/89 MicroGage	90'@970'	193,563 bbls	2/95 Sonarwire**	89'@938'	197,559 bbls
602	3	1140'	944-1008'	4/79 Dowell	87'@995'	145,550 bbls	5/91 Digital*	104'@986'	195,355 bbls	3/96 Sonarwire*	104'@982'	185,607 bbls
603	4	1120'	950-1007'	4/80 Dowell	97'@945'	158,244 bbls	3/92 Digital	102'@978'	189,616 bbls			
606	5	1119'	938-1035'	---		---	3/89 MicroGage	100'@1026'	165,922 bbls	3/95 Sonarwire**	101'@1026'	169,615 bbls
607	6	1120'	924-1027'	4/80 Dowell	93'@952'	146,458 bbls	5/91 Digital*	94'@964'	200,659 bbls	3/96 Sonarwire*	90'@1006'	176,893 bbls
646	7	1152'	951-1079'	4/80 Dowell	84'@1055'	171,283 bbls	5/91 Digital	90'@1074'	179,122 bbls	3/96 Sonarwire**	90'@1066'	199,654 bbls
647	8	1132'	956-1069'	4/80 Dowell	57'@1060'	110,892 bbls	3/92 Digital*	72'@1054'	140,952 bbls			
648	9	1125'	973-1065'	4/80 Dowell	71'@1030'	108,222 bbls	3/92 Digital*	81'@1015'	168,797 bbls			
671	10	1150'	978-1042'	4/79 Dowell	85'@988'	128,541 bbls	3/89 MicroGage	99'@990'	164,567 bbls	2/95 Sonarwire**	98'@988'	168,792 bbls
672	11	1176'	960-1101'	---		---	3/89 MicroGage	84'@1070'	227,718 bbls	3/95 Sonarwire**	84'@1070'	244,537 bbls
776	12	1200'	Cavern not developed									
TOTAL CAPACITY							2,031,123 bbls 85,307,166 gallons					

* Sonar through one string of pipe
** Sonar through two strings of pipe

EXHIBIT 1

CAVERN MAXIMUM RADIUS* PLOT, FERRELLGAS LPG-STORAGE FACILITY

ADAMANA, ARIZONA



INDICATED RADIUS INCREASE THROUGH TIME BY SONAR MEASUREMENT

Well No.	TD	Cavern	Initial Sonar	Max Radius	Latest Sonar	Max Radius	Sonar Volume	Indicated net Increase
1	1101'	900-985'	4/79	99'@942'	3/92	118'@944'	176,119 bbls	19'/13yr (1.5'/yr)
2	1112'	906-995'	4/79	74'@958'	2/95	89'@938'	197,559 bbls	15'/16yr (1'/yr)
3	1140'	944-1008'	4/79	87'@995'	3/96	104'@982'	185,607 bbls	17'/17yr (1'/yr)
4	1120'	950-1007'	4/80	97'@945'	3/92	102'@978'	189,616 bbls	5'/12yr (.5'/yr)
5	1119'	938-1035'	3/89	100'@1026'	3/95	101'@1026'	169,615 bbls	1'/6yr (.2'/yr)
6	1120'	924-1027'	4/80	93'@952'	3/96	94'@1006'	176,893 bbls	1'/16yr (.06'/yr)
7	1152'	951-1079'	4/80	84'@1055'	3/96	90'@1066'	199,654 bbls	6'/16yr (.4'/yr)
8	1132'	956-1069'	4/80	57'@1060'	3/92	72'@1054'	140,952 bbls	39'/12yr (3'/yr)
9	1125'	973-1065'	4/80	71'@1030'	3/92	81'@1015'	168,797 bbls	10'/12yr (.8'/yr)
10	1150'	978-1042'	4/79	85'@988'	2/95	98'@988'	168,792 bbls	13'/16yr (.8'/yr)
11	1176'	960-1101'	3/89	84'@1070'	3/95	84'@1070'	244,537 bbls	0'/6yr (—/yr)
12	1200'	Cavern not developed						

*NOTE: Maximum radius may or may not represent maximum diameter (see Well 5 above & Exhibits 3-5)

EXHIBIT 2

SLR APR '96

SCALE : 1" = 50'

MAXIMUM RADIUS PLOT

FERRELLGAS WELL 5

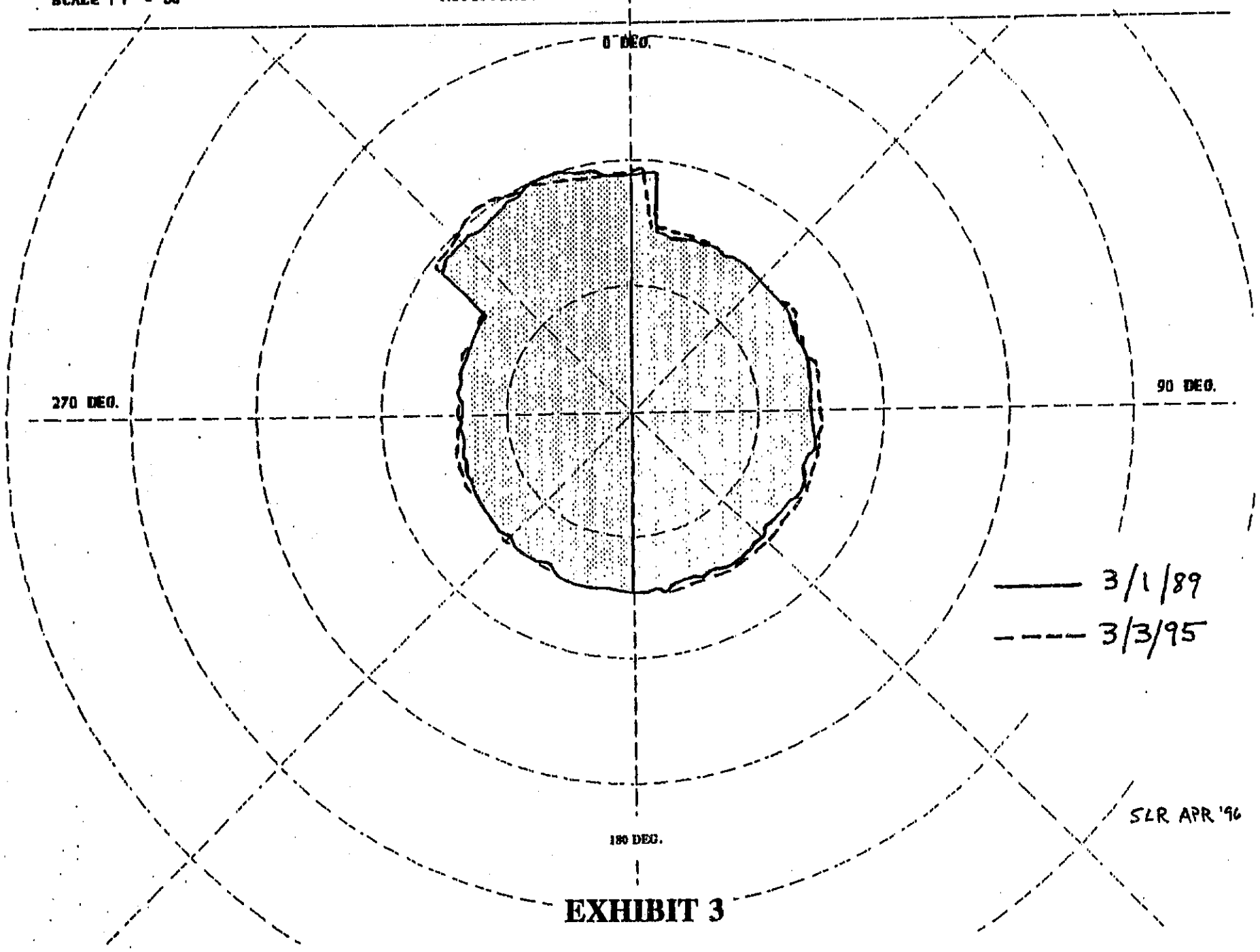


EXHIBIT 3

VERTICAL CROSSECTION

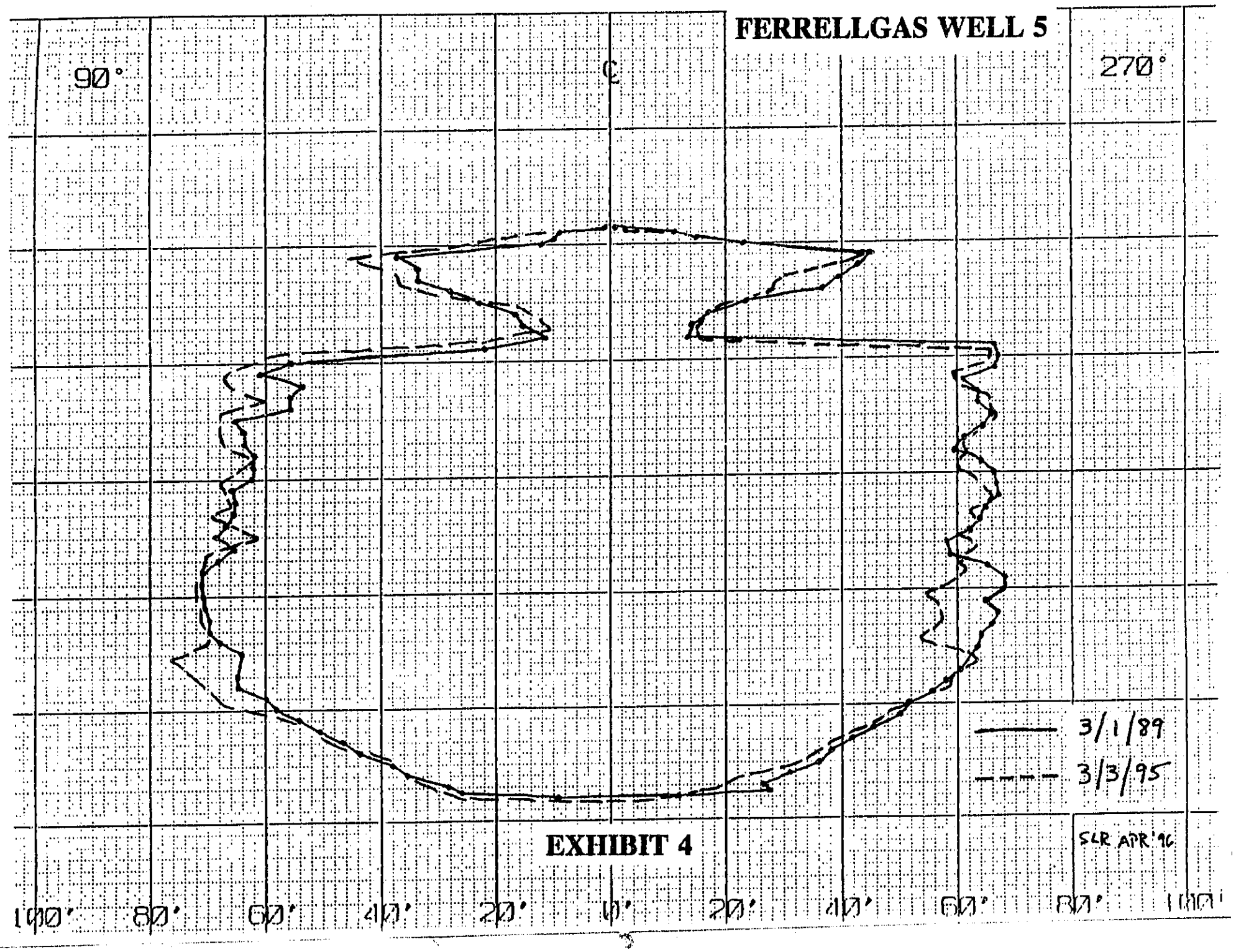


EXHIBIT 4

VERTICAL CROSSECTION

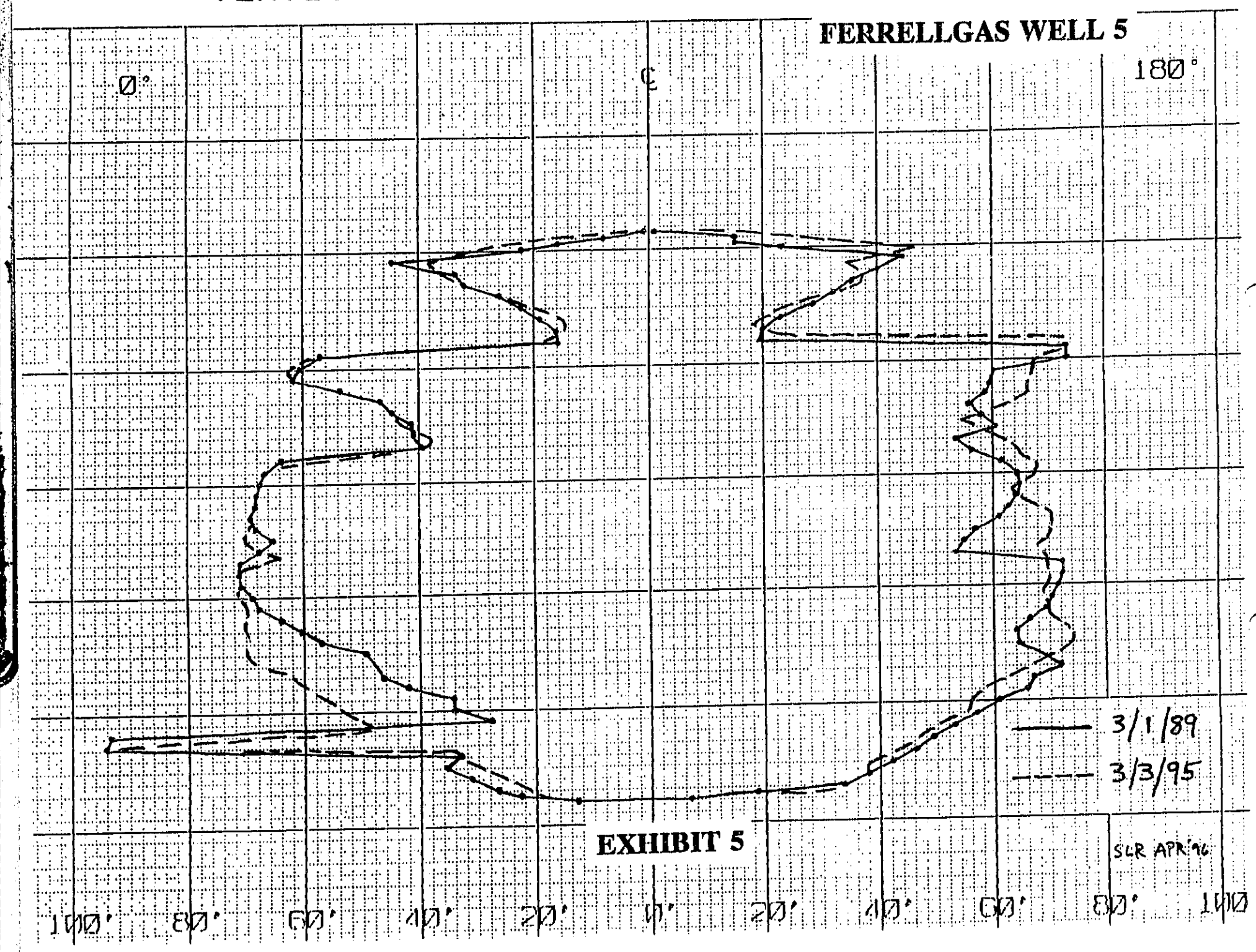


EXHIBIT 5

SCALE : 1" = 50'

MAXIMUM RADIUS PLOT

FERRELLGAS WELL 6

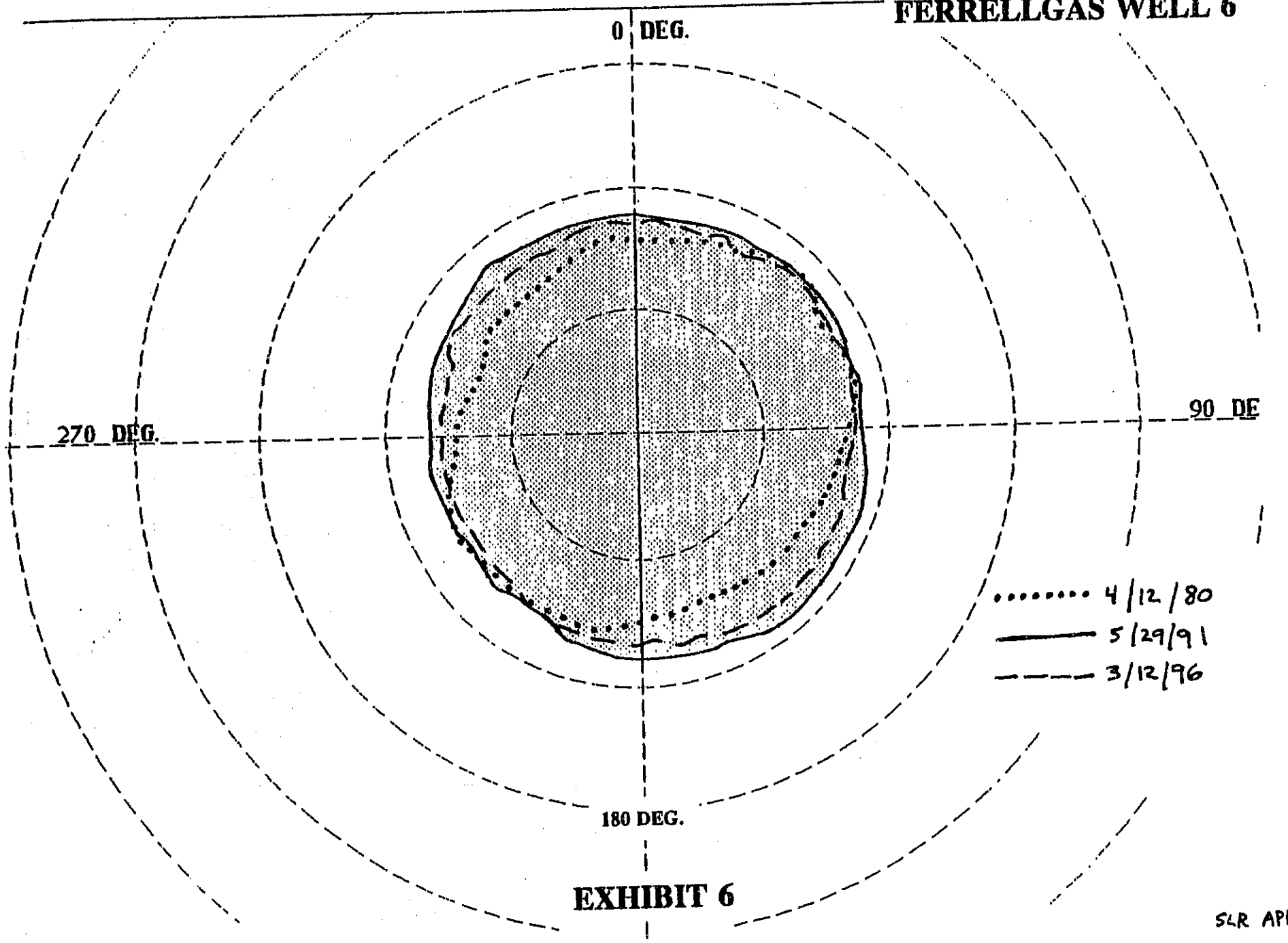


EXHIBIT 6

SLR APR '96

FERRELLGAS WELL 6

180 DEG. **0 DEG.**

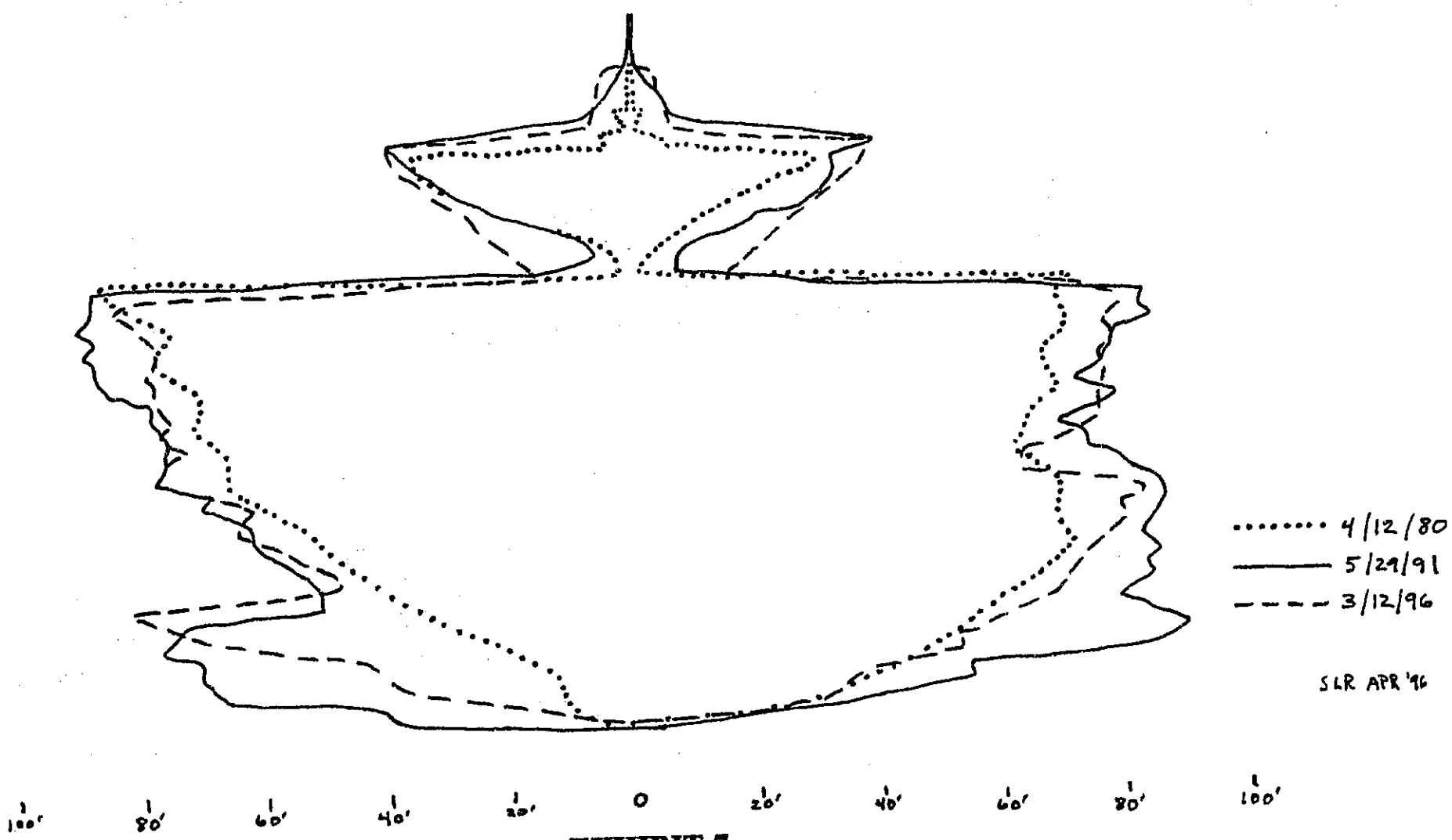


EXHIBIT 7

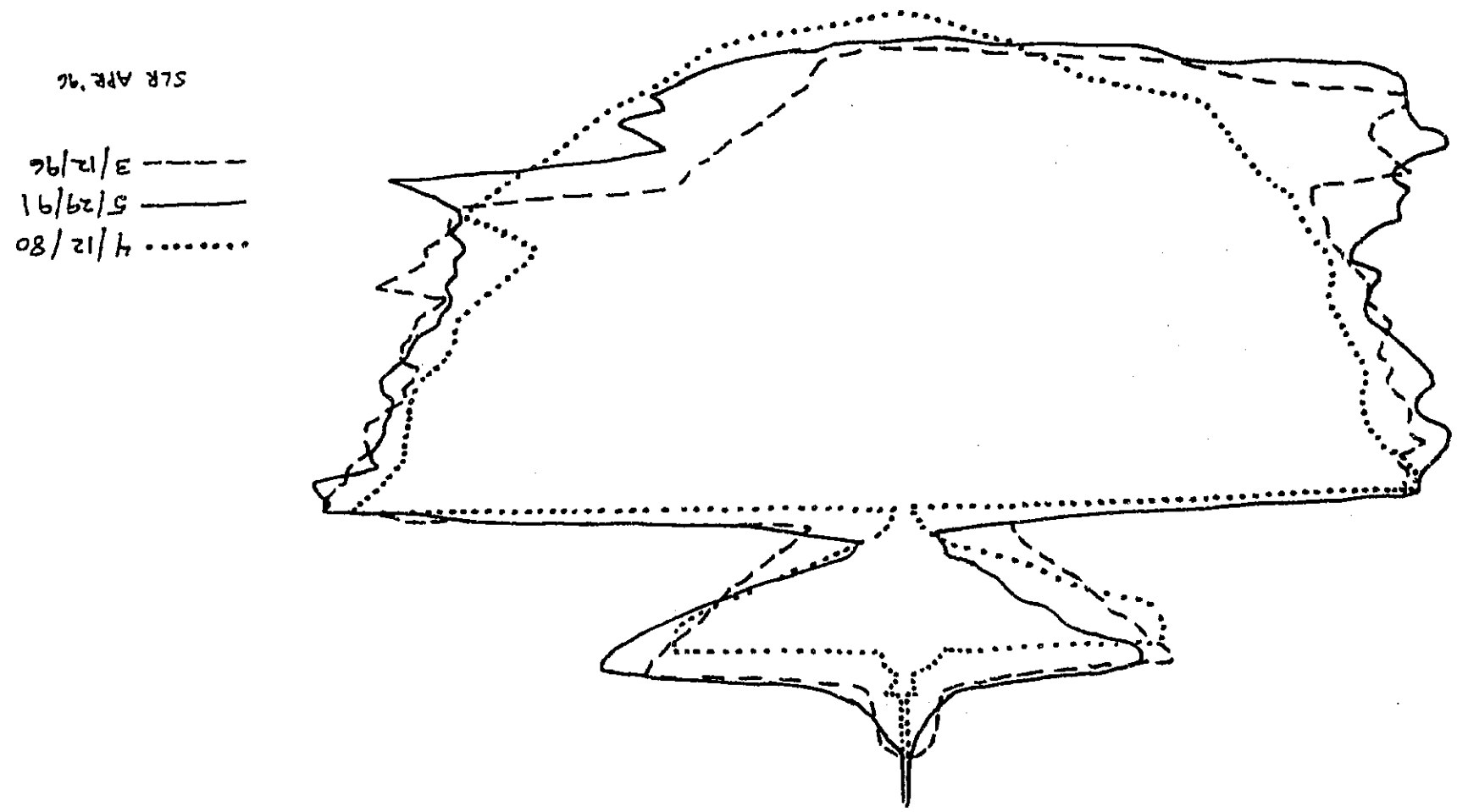

FERRELLGAS WELL 6
90 DEG.
270 DEG.
100'
80'
60'
40'
20'
0
20'
40'
60'
80'
100'
4/12/80
5/29/91
3/12/96
SLR APR.'96

EXHIBIT 8

Ferrellgas

April 24, 1996

To: Steve Rauzi
Arizona Geological Survey

From: Dale Thompson
Ferrell North America

Subject: Cavern Capacities

Steve, as of October 30, 1996 these are the last known capacities on all the Caverns at the Adamana Storage Facility. (Capacities are in gallons).

Cavern #1	8,496,730
Cavern #2	6,900,978
Cavern #3	7,368,738
Cavern #4	8,676,071
Cavern #5	6,884,626
Cavern #6	7,886,657
Cavern #7	8,068,158
Cavern #8	6,349,044
648 Cavern #9	6,969,816
Cavern #10	7,792,578
Cavern #11	10,601,992

If we can be of further assistance please contact us at (520) 524-3229.

Sincerely,

Dale Thompson

Adamana Road • P.O. Box 1624 • Holbrook, Arizona 86025 • 602-524-3229

Ferrellgas

April 9, 1996

file 648

Steve L. Rauzi, Administrator
Oil and Gas Program
5150 N. 16th St., Ste. B141
Phoenix, Arizona 85016

APR 1996
ARIZONA GEOLOGICAL SURVEY

Dear Steve,

After our discussion on March 11, 1996 about "volumetric measurement" of our storage caverns I did some research.

Our past records on last known capacities indicate a more exact method of yearly cavern measurement. Due to the fact that almost all of our caverns are filled and emptied on a yearly basis, I feel this would be more accurate and more often a "yearly" measurement program.

Considering the reasons stated above, I would like to request the Adamana Facility perform the volumetric measurement program on a yearly basis and sonar measurement method every "ten years".

Steve, as you can see by our past sonar reports any increase in size has been very minute over the years. With the acceptance of the commission, my plan would be to sonar any cavern that had to be worked over; otherwise, all caverns would receive the sonar method on a "ten year" basis. All "volumetric measurement" information on our Adamana caverns can be submitted to your office on a yearly or five and/or ten year basis whichever you and the commission would prefer.

Steve, please let me know what you think and how to resolve this matter. Thank you for your time and consideration.

Sincerely,

Dale Thompson

Dale Thompson
Terminal Manager

Adamana Road • P.O. Box 1024 • Holbrook, Arizona 86025 • 602-524-3229

State of Arizona
Arizona Geological Survey
845 North Park Avenue, #100
Tucson, Arizona 85719
(602) 882-4795

Fife Symington
Governor

Larry D. Fellows
Director and State Geologist

July 13, 1993

Ms. Brenda Davis, Mail Drop 5
Ferrellgas
One Liberty Plaza
Liberty, Missouri 64068

Re: Ferrellgas wells in Arizona
Approval of blanket bond #U1665522, United Pacific Insurance Company
Release of blanket bond #400 GV 7009, St. Paul Fire and Marine Insurance Company

Dear Ms. Davis:

I have enclosed an approved copy of the referenced blanket bond #U1665522 effective July 16, 1993, for all wells operated by Ferrellgas in Arizona.

This letter represents the Oil and Gas Conservation Commission's approval to release the referenced blanket bond #400 GV 7009 effective July 16, 1993.

Sincerely,

Steven L. Rauzi

Steven L. Rauzi
Oil & Gas Program Administrator

Enclosure

c Ms. Mary T. Flanigan, St. Paul Seaboard, Overland Park, Kansas

State of Arizona
Arizona Geological Survey
845 North Park Avenue, #100
Tucson, Arizona 85719
(602) 882-4795

Fife Symington
Governor

Larry D. Fellows
Director and State Geologist

June 29, 1993

648

Ms. Kathy Cordera
Martin Insurance
P. O. Box 8418
Prairie Village, Kansas 66208-0418

FAX 913-676-9145 one copy of bond form No 2 6/29 @ 7:20 am SLR

Dear Ms. Cordera:

In response to your telephone call this morning, I have enclosed two blank copies of the Oil and Gas Conservation Commission's Performance Bond. File two copies of the completed bond form to my attention at the letterhead address.

Our records show that Ferrellgas currently has twelve storage wells and one freshwater well under bond.

Let me know if I can be of further assistance.

Sincerely,

Steven L. Rauzi

Steven L. Rauzi
Oil & Gas Program Administrator

Enclosures

State of Arizona
Arizona Geological Survey
845 North Park Avenue, #100
Tucson, Arizona 85719
(602) 882-4795

Fife Symington
Governor

Larry D. Fellows
Director and State Geologist

May 20, 1993

Ms. Mary T. Flanigan
Attorney-in-Fact
St. Paul Seaboard
P. O. Box 935
Overland Park, Kansas 66201-0935

648

Re: Ferrellgas, Inc. blanket performance Bond No. 400 GV 7009

Dear Ms. Flanigan:

I received your certified letter No. P 105-228-862 requesting the St. Paul Fire and Marine Insurance Company's release from obligation under the captioned bond because the captioned bond is being replaced by United Pacific Insurance Company Bond #U1665502 effective June 25, 1993.

A.A.C. R12-7-103 requires a performance bond to remain in effect until (1) the wells under the bond have been plugged and abandoned as approved by the Oil and Gas Conservation Commission, or (2) the a new blanket bond is posted for the wells. I have not received or approved a replacement bond for the captioned bond.

As a result, I cannot release St. Paul Fire and Marine Insurance Company's obligation under the captioned bond until the United Pacific Insurance Company Bond #U1665502 is received by this office and approved.

Please let me know if I can be of further assistance in this matter.

Sincerely,

Steven L. Rauzi

Steven L. Rauzi
Oil & Gas Program Administrator

c Mr. Greg Greer, Ferrellgas, P.O. Box 4644, Houston, Texas 77216
Mr. Dale Thompson, Ferrellgas, P.O. Box 1024, Holbrook, Arizona 86025

State of Arizona
Arizona Geological Survey
845 North Park Avenue, #100
Tucson, Arizona 85719
(602) 882-4795

Fife Symington
Governor

Larry D. Fellows
Director and State Geologist

May 11, 1992

PIN 648

Mr. Dale Thompson
Terminal Manager
Ferrellgas
P.O. Box 1024
Holbrook, Arizona 86025

Re: **Sonar surveys of Ferrellgas Storage wells #1, #4, #8, and #9**

Dear Dale,

This letter will acknowledge our receipt of the sonar surveys on the referenced wells.

The attached listing shows that all wells are now in compliance with the capacity verifications required in A.A.C. R12-7-181.1.i.iv.

Sincerely,

Steven L. Rauzi

Steven L. Rauzi
Oil and Gas Program Administrator

Enclosure

ADAMANA VOLUME VERIFICATION SURVEYS
(all by the sonar method)

Permit	Well	Survey Date	Survey Date	Current Status
556	1	4/79	3/92	In compliance
557	2	4/79	2/89	In compliance
602	3	4/79	5/91	In compliance
603	4	4/80	3/92	In compliance
606	5	---	3/89	In compliance
607	6	4/80	5/91	In compliance
646	7	4/80	5/91	In compliance
647	8	4/80	3/92	In compliance
648	9	4/80	3/92	In compliance
671	10	4/79	3/89	In compliance
672	11	---	3/89	In compliance
776	12			CAVERN NOT DEVELOPED

State of Arizona
Arizona Geological Survey
845 North Park Avenue, #100
Tucson, Arizona 85719
(602) 882-4795

Fife Symington
Governor

Larry D. Fellows
Director and State Geologist

February 26, 1992

648

Mr. Dale Thompson
Terminal Manager
Ferrellgas
P.O. Box 1024
Holbrook, Arizona 86025

Re: **Sonaring of Ferrellgas Storage wells #1, #4, #8, and #9**

Dear Dale,

This letter is a reminder that the referenced wells are not in compliance with A.A.C. 12-7-181(i)(iv) which requires that capacity determinations on storage wells shall be verified every five years. The enclosed table summarizes our records on these determinations for your wells.

As we have previously discussed, and as Mr. R. M. Gehring has indicated in his letter of May 21, 1991, I anticipate that you will be scheduling these determinations as soon as possible after the winter outhaul season.

I would appreciate learning of your plans in regards to this matter at your earliest convenience.

Sincerely,

Steven L. Rauzi

Steven L. Rauzi
Oil and Gas Program Administrator

Enclosure

ADAMANA VOLUME VERIFICATION SURVEYS
(all by the sonar method)

Permit	Well	Survey Date	Survey Date	Current Status
556	1	4/79		NOT IN COMPLIANCE
557	2	4/79	2/89	In compliance
602	3	4/79	5/91	In compliance
603	4	4/80		NOT IN COMPLIANCE
606	5	---	3/89	In compliance
607	6	4/80	5/91	In compliance
646	7	4/80	5/91	In compliance
647	8	4/80		NOT IN COMPLIANCE
648	9	4/80		NOT IN COMPLIANCE
671	10	4/79	3/89	In compliance
672	11	---	3/89	In compliance
776	12			CAVERN NOT DEVELOPED

Ferrellgas

May 21, 1991

AZ OIL & GAS
CONSERVATION COMMISSION

MAY 24 1991

Mr. Dan Brennan
Executive Director
Oil & Gas Commission
State of Arizona
5150 N. 16TH ST.
Phoenix, Az 85016

Re: Sonaring of Ferrellgas Adamana, Arizona LPG Underground Storage Wells #3, #6 & #7

Dear Mr. Brennan:

Pursuant to our conversation of May 21, I have ordered the sonaring of Adamana Wells #3, #6 & #7 to commence as soon as possible. This work will be scheduled in the next 30 to 60 days. We will inform your office in advance of the exact date so that you can witness, if you so desire.

As discussed, wells #1, #4, #8 and #9 will be sonared at the earliest possible time. As you know these wells are currently active and we must wait for the winter outhaul season before the product can be removed. This should be done by next February 28 and we will schedule the sonar activity for these wells at that time.

If you have any questions please feel free to call me at (713)876-5515.

Best Regards,

Richard M. Gehring
Manager
Storage Operations

	Permit #
# 1	556
3	602
4	603
6	607
7	646
8	647
9	648

xc: Brad Mallory - Moab
Dale Thompson - Adamana

P.O. Box 4644, Houston, Texas 77210
16800 Greenspoint Park Drive • Suite 225 - South Atrium • Houston, Texas 77060 • Telephone: 713/874-9494

645

Oil and Gas Conservation Commission
STATE OF ARIZONA
3110 N. 19th AVENUE, SUITE 190
PHOENIX, ARIZONA 85015
PHONE: (602) 255-5161

January 11, 1989

Mr. Glenn Mace
Ferrellgas
Granada Building, Suite 216
3316 East 32nd Street
Tulsa, OK 74135

Dear Mr. Mace:

As we discussed during your visit yesterday, Oil and Gas Conservation Commission Rule 12-7-181.1.i requires that "...a flare or other safety system shall be installed at or near each brine pit..." As you know, the Ferrellgas facility at Adamana does not have a flare installed at present since the dismantling of the rusted-out older system.

Thus it appears that your operation is not in compliance with this rule. Therefore, it is necessary for Ferrellgas to install such a device to come into compliance. Failure to comply would cause the Commission to invoke R12-7-181.1.i which involves shutting down the operation.

You indicated that it will take some time to design, fabricate, and install the flare system. We would hope that this can be completed before the next scheduled inspection of the facility which will be around the end of May 1989.

Although we did not specifically discuss this issue, Rule 12-7-181.1.i.v requires verification of the capacity of each storage cavern every five years. This has not been accomplished since 1979 and 1980. Thus your operation is not in compliance with this rule. It will be necessary for Ferrellgas to begin to verify these capacities very soon. I realize this is the busy season, but as soon as activity declines and caverns are shut in for a few days, the logs can be run.

I was thinking about the possible problem with liquid propane in extremely cold weather. One way to solve the problem is to include an oil-water separator in the flow line from the caverns to the pits. A simple "drip" system might work, or an actual oil-water separator such as is used at gas-condensate wells. We sure don't want to burn up any pit liners.

We will expect to hear from you regularly concerning your progress in the matter of the flare and the sonar.

Very truly yours,

Daniel J. Brennan
Executive Director

March 28, 1978

Mr. Dan J. Dougherty
Manager of Storage Terminal
Williams Energy Company
P.O. Box 3478
Tulsa, Oklahoma 74101

Dear Dan:

Recent developments connected with the underground storage of LPG in Arizona have caused this Commission to make a study of various safety devices which would tend to prevent any accidents from occurring during the pumping of LPG into a storage reservoir. It has been concluded that a flare system, properly installed and operated in a proper manner, would be the safest and most economical of all safety systems.

These conclusions make it necessary that this Commission request all operators of LPG storage projects within the State to install a flare system at their respective storage sites as quickly as possible. The Commission does not intend to dictate to the operator the technical design of this system, but does retain the right to approve the system selected.

Your full and early cooperation in the installation of such a safety system is expected.

Very truly yours,

W. E. Allen
Director
Enforcement Section

WEA/vt

xxxxxxxxxxxxxxxx 8686 N. Central
xxxx Suite 106, 85020

January 5, 1976

Ms. Kay Waller
Petro-Well Libraries, Inc.
150 Security Life Building
1616 Glenarm Place
Denver, Co 80202

RE: December Current File Material

Dear Kay:

Enclosed you will find the following current material for December:

DATA: Completion report and miscellaneous reports for Williams Energy Wells #8 & #9. This is our Files #647, 648.

LOGS: Borehole Compensated Sonic Log for Files #647 & 648.

Thank you.

Sarelee Lorenzo
Secretary

Encls.

OFFICE OF

Oil and Gas Conservation Commission

STATE OF ARIZONA

~~4515 NORTH 7TH AVE.~~ 8686 N. Central

PHOENIX, ARIZONA ~~85013~~ Suite 106, 85020

PHONE: (602) 271-5161

January 5, 1976

Mr. Jim Webster
Photogrammetry & Mapping Services
Department of Transportation
1739 W. Jackson, Room 61
Phx., AZ 85007

Dear Mr. Webster:

Enclosed are the copies of the Application to Drill for Williams Energy Company's Well #8 & #9.

Please note that Well #8 was spudded August 23, 1975 and Well #9 was spudded September 17, 1975.

Very truly yours,

Saralee Lorenzo
Secretary

sl

Encls.

WILLIAMS ENERGY COMPANY
321 SOUTH BOSTON
P. O. BOX 3478
TULSA, OKLAHOMA 74101
PHONE: (918) 583-1711

December 24, 1975
DJD: 68:75
PRJ 1/Desk

Mr. W. E. Allen
Oil & Gas Conservation Comm.
State of Arizona
8686 N. Central, Suite 106
Phoenix, Arizona 85020

Dear Bill:

Enclosed we are forwarding the well completion reports (Form Nos. 8, 9) and copies of the open hole logs for wells #8 and 9 at Adamana, Arizona. These wells were drilled in accordance with permits Nos(647 and 648).

Sincerely,

Dan Dougherty

Dan. J. Dougherty
Operations Department

DJD/jh
encls.
cc: R. J. Wiruth
A. B. Erwin, K&A Inc.

RECEI

DOXOL UREGAS
Names in propane you can count on

William E. Allen
Activity Report
October 8, 1975
Page 2

Williams Energy has completed their 9th well for LPG storage at Adamana. Williams Energy had a bad primary cement job on their No. 8 well. I plan to check on the repair of this cementing job tomorrow and then go on to the Dineh-Bi-Keyah and check Kerr-McGee's progress on their waterflood installations.

648

August 14, 1975

Williams Energy Company
P. O. Box 3478
Tulsa, Oklahoma 74101

RE: Well No. 8
NE/NW Sec 8-T18N-R24E
Apache County, Permit #647

Well No. 9
NE/NW Sec 8-T18N-R24E
Apache County, Permit #648

Gentlemen:

This is to advise you that the above two permits will expire September 3, 1975 if not spudded.

Should you desire an extension, please advise prior to the expiration date.

Very truly yours,

Saralee Lorenzo
Secretary to W. E. Allen
Enforcement Section

SL/

Ron Dougherty
called 8-25-75 to ask
for 30 day extension on #649
#648 spudded 8-23-75

WILLIAMS ENERGY COMPANY
9 EAST FOURTH STREET
P. O. BOX 3478
TULSA, OKLAHOMA 74101
PHONE: (918) 583-1711

July 1, 1975
DJD:52:75
PRJ 1

Mr. W. E. Allen, Director
Enforcement Section
Oil and Gas Conservation Commission
State of Arizona
8686 North Central Avenue
Suite 106
Phoenix, Arizona 85020

RECEIVED
JUL 07 1975
O & G CONS. COMM.

Dear Mr. Allen:

In accordance with our telephone conversation regarding location changes for drilling permits on wells number 8 and 9 at Adamana, Arizona I am forwarding the following per your request.

- Permit No. 647 (Well No. 8)
- Permit No. 648 (Well No. 9)
- Copy of revised plat showing new location and elevation of wells 8 and 9.

The proposed new location of well No. 8 will be 1137.70' South and 1710.53' East of Northwest corner.

The proposed new location of well No. 9 will be 939.06' South and 2276.50' East of Northwest corner.

Your cooperation in processing these revisions is greatly appreciated.

Sincerely,

Wm J Dougherty

D. J. Dougherty
Operations Department

DJD/jh
cc: R. J. Wiruth
encls.

648

xxxxxxxxxxxxxx 8686 N. Central, Suite 106
xxx Phoenix, Arizona 85020

June 3, 1975

Mrs. Jo Ratcliff
Four Corners Sample Cut Association
P. O. Box 899
Farmington, New Mexico 87401

Dear Mrs. Ratcliff:

The following permits were issued this date:

Williams Energy No. 7	Williams Energy No. 8	Williams Energy No. 9
NW/NW Sec 8-T18N-R24E	NE/NW Sec 8-T18N-R24E	NE/NW Sec 8-T18N-R24E
Apache County	Apache County	Apache County
Permit No. 646	Permit No. 647	Permit No. 648

Very truly yours,

Mrs. Rhema Brandt
Secretary to W. E. Allen
Director, Enforcement Section

/rlb

xxxxxxxxxxxxxxxx
xxxx

8686 N. Central, Suite 106
Phoenix, Arizona 85020

June 3, 1975

Mr. Dan J. Dougherty
Operations Department
Williams Energy Company
Box 3478
Tulsa, Oklahoma 74101

Re: Williams Energy No. 7 NW/NW Sec 8-T18N-R24E Apache County Permit No. 646	Williams Energy No. 8 NE/NW Sec 8-T18N-R24E Apache County Permit No. 647	Williams Energy No. 9 NE/NW Sec 8-T18N-R24E Apache County Permit No. 648

Dear Mr. Dougherty:

Enclosed please find Receipt No. 0376 covering your $75 filing fee. Also enclosed are your approved applications for permit to drill and Permit to Drill Nos. 646, 647 and 648.

Please note our new address of 8686 North Central, Suite 106, Phoenix, Arizona 85020.

Very truly yours,

W. E. Allen, Director
Enforcement Section

WEA/rlb

Encs.

WILLIAMS ENERGY COMPANY
9 EAST FOURTH STREET
P. O. BOX 3478
TULSA, OKLAHOMA 74101
PHONE: (918) 583-1711

May 28, 1975
DJD:33:75
PRJ 1

Mr. W. E. Allen, Director
Enforcement Section
Oil and Gas Conservation Commission
State of Arizona
4515 North 7th Avenue
Phoenix, Arizona 85013

Dear Mr. Allen:

Enclosed are duplicate Applications to drill the #7, #8 and #9 storage wells at our Adamana LPG Terminal. Also enclosed is a check for $75.00 covering the application fee and a certified plat print showing the location of the wells in relation to the existing facilities.

I trust the enclosed provide the necessary data to allow you to proceed with processing the application.

Thank you for your cooperation.

Very truly yours,

Dan J. Dougherty

Dan J. Dougherty
Operations Department

DJD/jh
cc: R. J. Wiruth
encls.

RECEIVED
JUN 3 1975
O & G CONS. COMM.