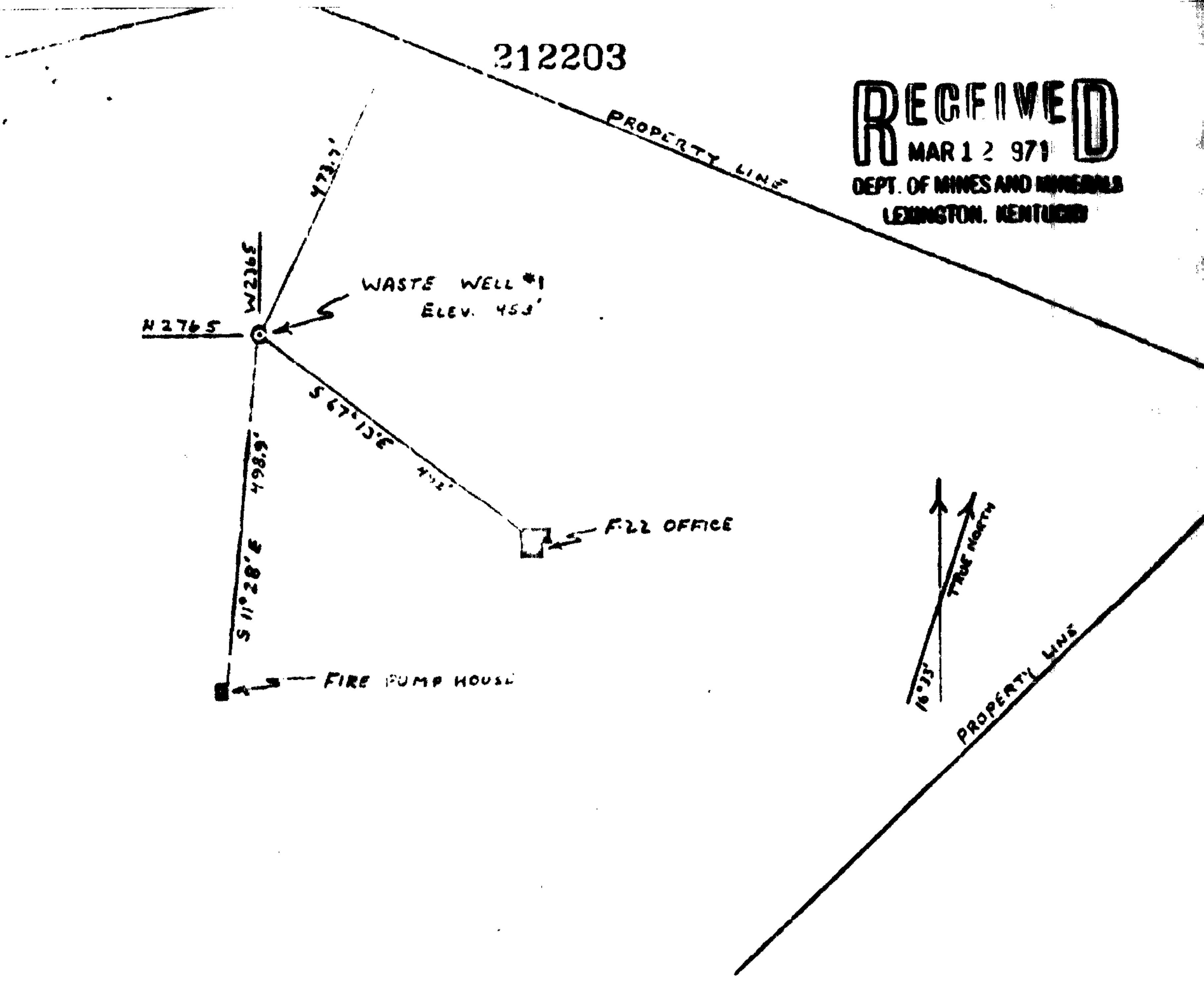
212203



PLAT FOR WASTE WELL NO. 1

SCALE 100'/1"

OWNER OPERATOR: E. I. du Pont de Nemours & Co. Inc.

LOCATION: JEFFERSON COUNTY, KY.

CARTER COORD: SECT. 11 LETTER U No 44
921.9' FSL 2763.4' FWL

I HEREBY CERTIFY THAT THE ABOVE PLAT IS ACCURATE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF

Thurlow W. [illegible] - ENGINEER
PO Box 1378
LOUISVILLE 40201, Ky
3/12/71

PERMIT NO. 25476
LOCATION
ELEVATION
ADDED BY

Record No: 11169 Permit No: 24576
Farm Name: E I DUPONT DE NEMOURS & CO, INC
Well No: 1WAD
Operator: E I DUPONT DE NEMOURS & CO, INC
Location: 922 FSL x 2763 FWL 10- U-44
County: JEFFERSON Elevation: 452

VII. Description of Materials in Monitor Well Construction

1. 430 ft. of 9-5/8 inch O.D., Type H-40, seamless, coupled, steel casing weighing 36 lb./ft.
2. 2500 ft. of 7 inch O.D., Type H-40, seamless, coupled, steel casing weighing 20 lb./ft.
3. Centralizers, float guide shoes, and other necessary equipment for attachment to casings.
4. Water pump

VIII. Chronological Log of Drilling and Testing Waste Disposal Well No. 1

2/6/71 - 2/19/71 Drill 17 inch surface hole to 438 ft. Cement in 432 ft. of 42 lb./ft. 11-3/4 inch O.D. coupled casing with 187 sacks of Class "A" common cement with 2% gel and 2% calcium chloride.

2/19/71 - 3/30/71 Drill 8-3/4 inch hole from 432 ft. to 5338 ft.
Cores taken at:

Trenton/Black River,	1153 ft. - 1175 ft.	22 ft.	Recovered
St. Peter S.S/ Knox Dolomite	1671 ft. - 1721 ft.	50 ft.	Recovered
Knox Dolomite	1721 ft. - 1750 ft.	29 ft.	Recovered
Knox "	1750 ft. - 1776 ft.	26 ft.	Recovered
Knox "	1776 ft. - 1814 ft.	38 ft.	Recovered
Knox "	2498 ft. - 2531 ft.	33 ft.	Recovered
Knox "	2575 ft. - 2577 ft.	2 ft.	Recovered
Knox "	2715 ft. - 2731 ft.	13 ft.	Recovered
Knox "	2805 ft. - 2822 ft.	15 ft.	Recovered
Knox "	2823 ft. - 2835 ft.	12 ft.	Recovered
Eau Claire	4409 ft. - 4459 ft.	50 ft.	Recovered
Eau Claire	4842 ft. - 4871 ft.	29 ft.	Recovered
Mt. Simon S.S.	5335 ft. - 5335.2 ft.	.2 ft.	Recovered
Mt. Simon S.S.	5336 ft. - 5337 ft.	1 ft.	Recovered
		320.2 ft.	Recovered

3/31/71 - 4/2/71 Hole logged by Schlumberger -
Dual Induction, Sidewall Neutron, Sonic, Density, Temperature, Gamma-Ray, Micro-Log.

4/3/71 - 4/5/71 Drill Stem Testing.
No. 1 4300 ft - 4500 ft.
No. 2 4130 ft.- 4330 ft.
No. 3 3850 ft.- 4050 ft.
No. 4 3350 ft.- 3550 ft.
No. 5 2970 ft.- 3170 ft.
No. 6 2690 ft.- 2890 ft.
No. 7 1600 ft.- 1800 ft.
No. 8 2975 ft.- 3175 ft.

4/7/71 - 4/26/71	Ream 8-3/4 inch hole to 10-5/8 inch from 439 ft. to 4500 ft.
4/26/71 - 5/8/71	Stabilize Eau Claire shale with cement squeezes and 7 inch casing.
5/11/71 - 5/20/71	Deepen hole from 5338 ft. to 6008 ft. with 6-3/4 inch rock bit. Cores taken at:

Mt. Simon	5718 ft. - 5748 ft.	30 ft.	Recovered
Basement Rock	5993 ft. - 6008 ft.	15 ft.	Recovered
		45 ft.	Recovered

5/20/71 - 5/21/71	Hole logged by Birdwell - Induction Electric, Caliper, Density, Gamma-Ray - Neutron. Drill stem test taken 5400 ft. - 6008 ft.
5/22/71 - 5/23/71	Conduct injection test into Mt. Simon sandstone.

Test No. 1 using 5% HCl;
  Pumped 150 gallons per min. at 1800 psi for 4 hours.

Test No. 2 using 10% HCl;
  Pumped 150 gallons per min. at 1800 psi for 51 minutes.

5/24/71 - 6/7/71	Down waiting on orders.
6/8/71	Conduct injection test into Mt. Simon sandstone.

Test No. 3 using fresh water;
  Pumped 150 gallons per min. at 1800 psi for 2 hours 10 min.

Attempted to get flow profile with Dresser Atlas Spinner Survey with no success.

6/11/71 Conduct injection test into Mt. Simon sandstone.

Test No. 4 using fresh water;
  Pumped 150 gallons per min. at 1800 psi for 30 min.
  (Short test, no chart)

Attemped to get flow profile with dresser Atlas Nuclear flow log with no success.

6/12/71 Conduct injection test into Mt. Simon sandstone.

Test No. 5 using fresh water;
  Pumped 150 gallons per min. at 1800 psi for 2 hrs. 45 min.

Schlumberger ran nuclear flow profile of Mt. Simon from 5900 ft. to 5125 ft.

5900
5240
660

6/12/71 - 6/17/71 Down waiting on orders.

6/17/71 - 6/18/71 Install 4-1/2 inch O.D. fiberglass liner from 5900 ft. to 5240 ft. Cement liner with 86 sacks of Class "A" common cement.

6/18/71 - 6/20/71 Wait on cement to harden.

6/21/71 Place 20-40 mesh sand inside of glass liner from 5900 ft. to 5580 ft. Perforate glass liner, 2 holes per ft., 5518 ft. - 5524 ft., 5506 ft. - 5509 ft., 5488 ft. - 5498 ft., 5469 ft. - 5475 ft.

Spot 150 gallons of 7-1/2% HCl over perforations.

Fracture Mt. Simon sandstone. Used 25,600 gallons of gelled fresh water.
Maximum rate 7.5 barrels per min.
Maximum sand injection 1 lb. per gallon.
Maximum pressure 6000 psi.

6/23/71 Flush out sand from 4-1/2 inch fiberglass liner. Perforate liner with 4 holes per ft.

5422 ft. - 5432 ft.
5469 ft. - 5475 ft.
5488 ft. - 5494 ft.
5504 ft. - 5510 ft.
5518 ft. - 5524 ft.
5537 ft. - 5543 ft.
5555 ft. - 5561 ft.
5568 ft. - 5578 ft.
5585 ft. - 5595 ft.
5673 ft. - 5679 ft.
5683 ft. - 5693 ft.
5703 ft. - 5713 ft.
5765 ft. - 5785 ft.

Spot 1000 gallons of 10% acid over perforations.

6/24/71 Conduct injection test into Mt. Simon sandstone.

Test No. 6 using fresh water;
Pumped 150 gallons per min. at 1800 psi for 1 hr. 40 min.

Schlumberger ran Nuclear flow profile of Mt. Simon

6/24/71 - 6/26/71 Set Baker Retrievable Bridge plug in 7 inch casing at 4644 ft. Cut off and pull 4502 ft. of 7 inch casing. Spot 5500 gallons of 5% HCl over Knox Dolomite from 3350 ft. - 4497 ft.

Record No: 11169 Permit No: 24576
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Location: 922 FSL x 2763 FWL 10- U-44
County: JEFFERSON Elevation: 452

6/27/71 Conduct pumping test in Knox 3350 ft. - 4497 ft.

Test No. 7 using fresh water;
Pumped 150 gallons per minute at 1350 psi for 2 hrs. 35 min.

Test No. 8 (2650 ft. - 4497 ft.) using fresh water;
Pumped 150 gallons per minute at 175 psi for 2 hr. 25 min.

Install retrievable bridge plug in 11-3/4 inch surface casing at 300 ft.

Well placed in stand-by condition.

Record No: 11169 Permit No: 24576
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County: JEFFERSON Elevation: 452

Chevron

Chevron Oil Field Research Company
A Chevron Corporation Subsidiary
1300 Beach Boulevard, La Habra, California
Mail Address: P.O. Box 446, La Habra, CA 90633-0446

December 20, 1990

Mr. David C. Harris
Kentucky Geological Survey
228 Mining and Mineral Resources Building
University of Kentucky
Lexington, Kentucky 40506-0107

Dear Dave:

I feel like I am reliving my life through revisiting the basement. Thank you for the inventory of thin sections.

In regard to the Bateman and McGregor wells, I should have remembered to discuss them (but I didn't). Regardless, they are wells in westernmost Tennessee that bottomed in feldspar-rich material. My samples (cuttings only) came from the Missouri Geological Survey, where their records spoke of Paleozoic. Stearns (GSA Bulletin, 1957, p. 1081) gave tops of the "Paleozoic." More detailed descriptions can be found in "Well Logs in Tennessee" (H. C. Milhous, Tennessee Division of Geology, Bull. 62, 1959, p. 1-606; Bateman on p. 518-19; McGregor on p. 555-57). Milhous too speaks of "Paleozoic."

The well names, locations, etc., are: Lion Oil Co. Bateman #1, NE,SE,SW 14-15S-5W, elevation 250', TD 2860', date 1941, and Pure Oil Co. #1 R. R. McGregor, SE,SE,SW 14-11S-2W, elevation 270', TD 2753', date 1940.

My study could not confirm igneous rock as such. I found no angular, polygranular cuttings. Rather, feldspar-rich samples, with some mafic minerals and variable quartz admixtures, sand to granule grain size, larger grains commonly rounded. I doubt that wear from the bit could produce the rounding. I infer highly feldspathic, essentially unconsolidated arkoses derived from nearby exposures of highly weathered igneous rocks that, at the surface, were reduced essentially to a gruss. K-feldspar dominates (I'm not sure that I saw plagioclase; you can check that in the thin sections). My guess is that the source terranes were syenites of the Arkansas and Gulf Coast types, probably Cretaceous in age. The mafic minerals (mica, and, as I recall, amphibole and/or pyroxene) are not inconsistent with alkaline igneous rocks. The quartz is probably from other sources, unless the syenites(?) were seamed by hydrothermal quartz veins.

There are numerous other wells in western Tennessee and possibly western Kentucky and southeastern Missouri from which are reported similar igneous rocks or sediments derived from them (see various publications by Al Kidwell). These rocks may include kimberlites as well as syenites, trachytes and possibly various lamprophyres and alkaline dike rocks of the types described in Arkansas. Most or all are of Cretaceous age, I suspect. Evidently the New Madrid and related fault systems were active in the Cretaceous as well as the late Precambrian, Cambrian and Devonian. The extension of the Mississippi Embayment into southern Illinois is in part related to this Cretaceous (and possibly Cenozoic) activity, and the igneous activity is undoubtedly related to the opening of the Gulf of Mexico, later though the igneous rocks are.

I made no attempt to track down the numerous other reported occurrences of alkaline rocks or their detritus in wells in Tennessee and Kentucky. That would be a major project in itself.

The Dupont waste disposal well in Jefferson County stumped me for a while. In 1971, when Ed Wilson sent those samples, I was at the Manned Spacecraft Center (now Johnson Space Center). My personal and professional lives shared a certain confusion and transitional state. My boxes of samples were in not-easily-accessible storage. So I dumped random samples and thin sections in various boxes, hoping that I could one day retrieve them when needed, which depended more on my memory than on any danger of disposal (I am a pack rat). My memory paid off in this case. I opened every "random" box within reach, and fingered every thin section in those boxes that contained them. The second such box yielded the Dupont sections, one of a sandstone from 5714 feet, two of a medium-grained gabbro from 6000 feet. I had not done a detailed petrographic examination, but I had done a cursory thin-section analysis, coupled with X-ray analysis (my obsession) and binocular microscopy. Notes from those studies yielded the following: dominant plagioclase and clinopyroxene (augite); minor amphibole, magnetite, hematite, ilmenite and chlorite; and traces of mica, smectite and either talc or a zeolite. The average plagioclase composition by X-ray parameters is about An_{63}. The augite commonly has a bronzy luster of the type indicative of exsolution lamellae (I saw no orthopyroxene peaks in the X-ray patterns; you may see orthopyroxene or clinopyroxene lamellae in thin section). The magnetite was originally titaniferous. It now contains octahedral exsolution lamellae of ilmenite. Some of the magnetite is partly altered to hematite. Other hematite pseudomorphs are possibly after olivine, but I could not confirm this. The chlorite is probably concentrated in the interstitial green matrix that is visible in thin section.

I detected no serpentine. Wilson's serpentinite may refer to a chloritic shear zone or chlorite-coated fracture surface. The mineral serpentine and the rock serpentinite are unlikely in the sample sent to me. Perhaps serpentinite occurred elsewhere in the core.

The three Dupont thin sections are on their way to you under separate cover. Good luck. Merry Christmas. Happy New Year.

Sincerely,

Manny Bass

Manuel N. Bass

MNB:jl

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Well No: 1WAD
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Location: 922 FSL x 2763 FWL 10- U-44
County: JEFFERSON Elevation: 452

SDR #24576

0011169027

ATLANTIC RICHFIELD CO.
ARCO EXPLORATION AND PRODUCTION TECHNOLOGY
EXTERNAL CORRESPONDENCE

DATE: 6 October 1993

TO: Jim Drahovzal & Patrick Gooding
Kentucky Geological Survey
ph 606-257-5500 fax 257-1147

Jim - here is The scoop - hope it helps. cheers, Steve

FROM: Steve Bergman PRC D3136
ARCO Exploration & Production Technology
2300 Plano Pkwy
Plano TX 75075
ph. 214-754-6264, fax 214-754-6807

SUBJECT: **Middle Proterozoic Gabbro Geochronology DuPont #1 WDW well, Kentucky**

This memo provides petrographic, K-Ar, and Sr-isotope data and preliminary interpretations of gabbro cores from the DuPont #1 WDW well (Louisville Neoprene Works Field), Jefferson County, KY. The well is located in sec. 10, Twp U, R44 and was spudded in May, 1971 at an elevation of 452' above sea level. These analyses were performed as part of the 1992 Proterozoic plate tectonic framework study of the Mid continent. These data constrain the nature of the "basement" rock assemblage in a Proterozoic rift sequence of the Mid continent. The gabbro crystallized during or prior to the Middle Proterozoic (1.5 ± 0.2 Ga, based on Sr-isotope data) and cooled through 200 °C during the late Proterozoic (0.60 ± 0.02 Ga, based on K-Ar data). The gabbro possesses an initial Sr-isotope ratio typical of rift-related melts of the asthenospheric upper mantle.

Sample Background & Methodology

The DuPont #1 well encountered a mafic igneous rock at 5954' beneath a sequence containing the Maynardsville Limestone, Eau Claire Fm., Rome Fm., Mt. Simon Sandstone, and a red sandstone similar to Middle Run Formation sandstones which occur in the Warren County, OH well. Based on the stratigraphic position in the DuPont well, the mafic igneous rock may represent a dike or a sill which intruded the clastic sequence, or a volcanic flow which underlies the clastic rocks. The stratigraphy in the well supports an unconformity at the gabbro-sandstone contact due to the presence of a basal conglomerate in the sandstone. This suggests that the igneous body was exposed at the surface prior to deposition of the overlying Middle Run-Mt. Simon sequence. Therefore, basic geologic constraints indicate that the age of the gabbro is pre Late Proterozoic, assuming the Middle Run Formation is Late Proterozoic.

Six conventional core slabs at 5993', 5995.3', 5998.1', 6003.3', 6005.3', and 6008.8' (core depths) were obtained by Steve Rowley from Patrick Gooding at the Kentucky Geological Survey core facility in 1992. Thin sections were prepared of each interval and found to petrographically identical, so an aggregated sample was made, totalling 3.5 kg in mass. Core slabs were crushed and plagioclase, clinopyroxene, and apatite concentrates were prepared using conventional magnetic and density techniques. K-Ar dating of plagioclase was performed by Tom Bills at Geochron Laboratories in Cambridge, MA. Rb and Sr isotope analyses were performed on apatite plagioclase, and clinopyroxene separates by Bob Stern at the Univ. Texas Dallas geochronology laboratory using conventional isotope dillution mass spectrometry techniques.

Results (see Plate 1, Table 1)

Petrography: The cores are holocrystalline, equigranular, medium to coarse grained, slightly altered gabbros composed of 50-60% plagioclase, 30-40% clinopyroxene (both in variable degrees of alteration to phyllosilicates), 10% Fe-Ti oxides, and <1% biotite and accessory phases. Millimeter thick chlorite veins and fracture filings occur throughout the rock. Grain size ranges from 0.5-3 mm (average 1-2 mm). There is no apparent systemmatic change in grain size or texture with depth. The gabbro petrography is typical of slightly alkaline gabbros which occur in rift settings. The medium to coarse grain size indicates a relatively thick lavva flow or a thick dike or sill which cooled slowly.

K-Ar dating: Conventional ^{40}K-^{40}Ar dating of a fresh plagioclase concentrate gives an age of 599±17 Ma. Two replicates were analyzed and the uniform K contents of 0.501 and 0.514 wt% indicate feldspar homogeneity and a slightly alkaline character. Radiogenic ^{40}Ar proportions of 70.9 and 73.8% further attest to sample homogeneity and indicate a minimum of atmospheric ^{40}Ar contamination. This Late Proterozoic age reflects the time since cooling through the blocking temperature of plagioclase, approximately 200±50 °C.

Sr isotopes: Three clinopyroxene separates of variable magnetic susceptibility, a plagioclase, and an apatite separate were analyzed for Rb, Sr contents and $^{87}Sr/^{86}Sr$. The Rb/Sr and $^{87}Sr/^{86}Sr$ values define an isochron (errorchron) with an age of 1.5±0.2 Ga and an initial $^{87}Sr/^{86}Sr$ of 0.7023. This age is interpreted as a minumum age for the crystallization of this gabbro; it may represent primary crystallization or a post-crystallization metamorphic event. There is scatter among the various pyroxene and feldspar values, and the apatite and most radiogenic pyroxene lie on the errorchron. The anomalously low $^{87}Sr/^{86}Sr$ value of the felspar can be explained by a Rb-enrichment event which may have occurred during a Late Proterozoic post-crystallization thermal or alteration event, also evidenced by the low K-Ar feldspar age. The initial $^{87}Sr/^{86}Sr$ of 0.7023 indicates that the gabbro represents an upper mantle asthenospheric melt which had little interaction with or contamination by crustal rocks, a feature shared by rift related basaltic melts from the Mid-continent Keweenawan rift in Minnesota and Michigan.

Conclusions: The DuPont #1 gabbro represents a Middle Proterozoic or older rift-related mantle melt which crystallized at or prior to 1.5 ± 0.2 Ga and subsequently cooled through 200±50 °C near the end of the Proterozoic (599 ± 17 Ma). It is not clear whether the gabbro represents an intrusive or thick lava, although an intrusive origin is most favored by this author. The age of the gabbro is similar to anorogenic granitic rocks and associated mafic rocks of the Eastern Granite Rhyolite Province of the eastern mid continent, such as the syenite at the bottom of the Amerada #1 Edwards well (24-H-60, Pulaski County, KY), which gives a zircon U-Pb age of 1457±4 Ma (Randy Van Schmus, pers. comm, 1992). In addition, Beck and Rama Murthy (1991:USGS Bulletin 1904-I)) reported basaltic rocks from the Quinnesec Formation of the Lake Superior region which give 1.8-1.9 Ga crystallization Nd-Sm and U-Pb ages and 1.5 Ga metamorphic ages (Sr-errorchrons), so it is possible that the DuPont gabbro is Early Proterozoic. The DuPont gabbro represents rift-related magmatism which preceeding or was associated with deposition of the Middle Run Formation clastic sequence and probably predates the main phase Mid-Continent Keweenawan Rift magmatism which occurred at 1.1-1.2 Ga.

0011169029

Table 1. Rb-Sr Isotope and ^{40}K-^{40}Ar analytical and age data for plagioclase, pyroxene, and apatite concentrates from 5993-6008' cores, DuPont #1 well, Jefferson County, Kentucky.

Rb-Sr data

Sample*	Rb (ppm)	Sr (ppm)	$^{87}Rb/^{86}Sr$ (atomic)	$^{87}Sr/^{86}Sr$ (atomic)
apatite	0.76	155.6	0.0142	0.70267
clinopyroxene 1	0.79	19.7	0.116	0.70472
clinopyroxene 2	0.34	22.0	0.0451	0.70315
clinopyroxene 3	0.31	22.3	0.0404	0.70364
plagioclase	5.39	485	0.0321	0.70263

* Analytical uncertainties are ±0.1% for Sr, ±0.4% for Rb, 0.00004 for $^{87}Sr/^{86}Sr$ and ±0.5% for $^{87}Rb/^{86}Sr$. Measured $^{87}Sr/^{86}Sr$ ratios were normalized assuming normal Sr with $^{86}Sr/^{88}Sr$=0.1194; $^{87}Sr/^{86}Sr$ are adjusted for an E&A $SrCO_3$ standard of 0.70800. The isochron age of 1500±116 Ma is based on all five fractions, but a similar age is calculated using only the apatite and clinopyroxene 1 separate. The ^{87}Rb decay rate of 1.42×10^{-11} yr^{-1} was used in the age calculations. (R.J. Stern, UTD, analyst)

K-Ar data

Sample@	$^{40}Ar^*$ (ppm)	$^{40}Ar^*$/total Ar (wt. ratio)	K (wt. %)	Age (Ma)
plagioclase	0.02500	0.724	0.508	599±17

@ K-Ar notes: Two replicates of each sample were analyzed; the above values represent averages. The plagioclase separate represents a -80/+200 mesh concentrate that was judged to be >95% pure; the separate was washed in dilute HF and HNO_3 prior to analysis to remove alteration. The age was calculated using a negatron emission decay constant (^{40}K->^{40}Ca) of $4.962 \times 10^{-10}yr^{-1}$, a combined electron capture and positron emission constant (^{40}K->^{40}Ar) of $0.581 \times 10^{-10}yr^{-1}$, and a $^{40}K/K$ ratio of 1.193×10^{-4} g/g. $^{40}Ar^*$ refers to radiogenic ^{40}Ar. (T. Bills, analyst)

PLATE 1

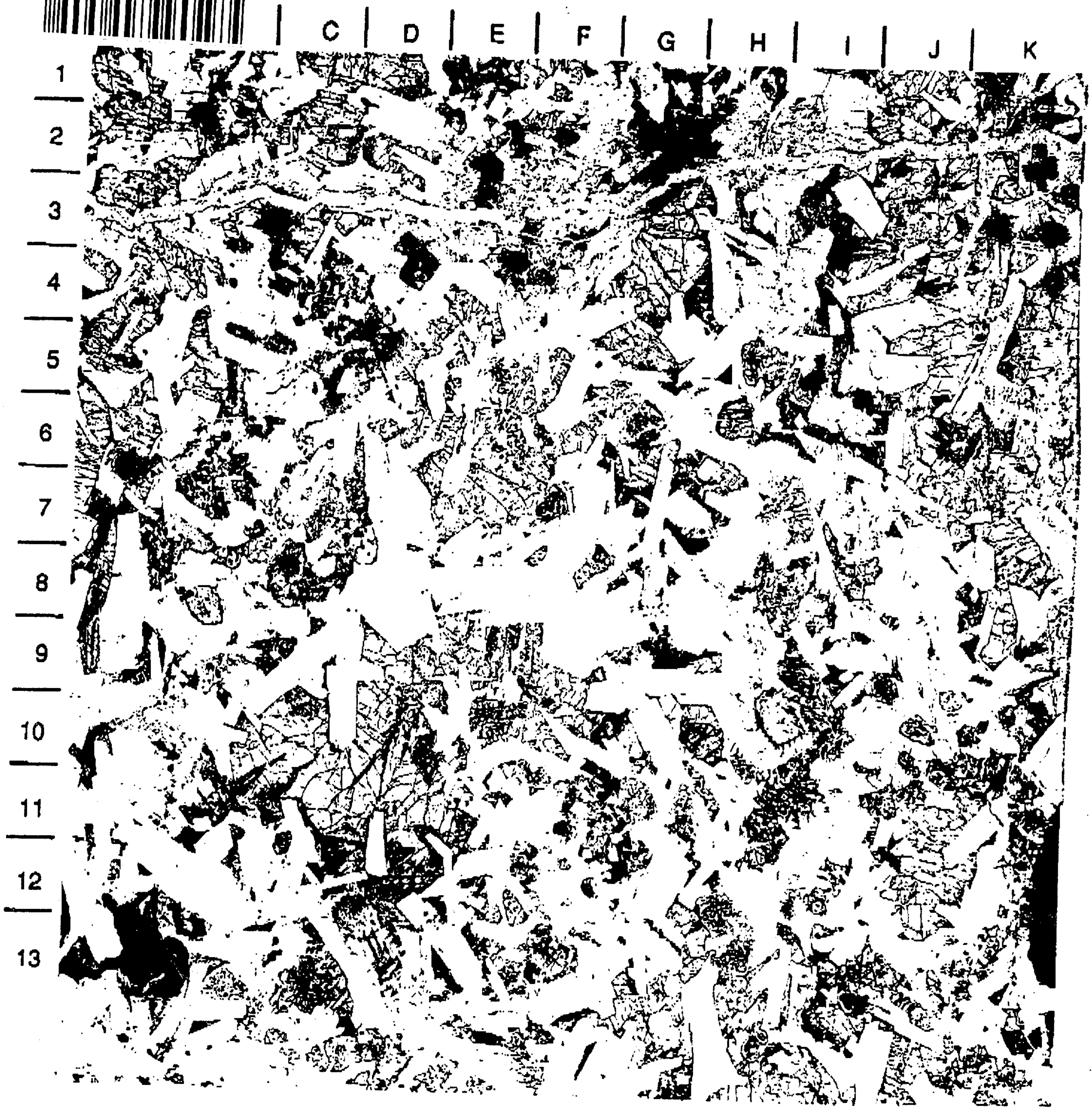
5 mm

DuPont #1 WDW

5995.3' core

Proterozoic Gabbro
Jefferson County, KY

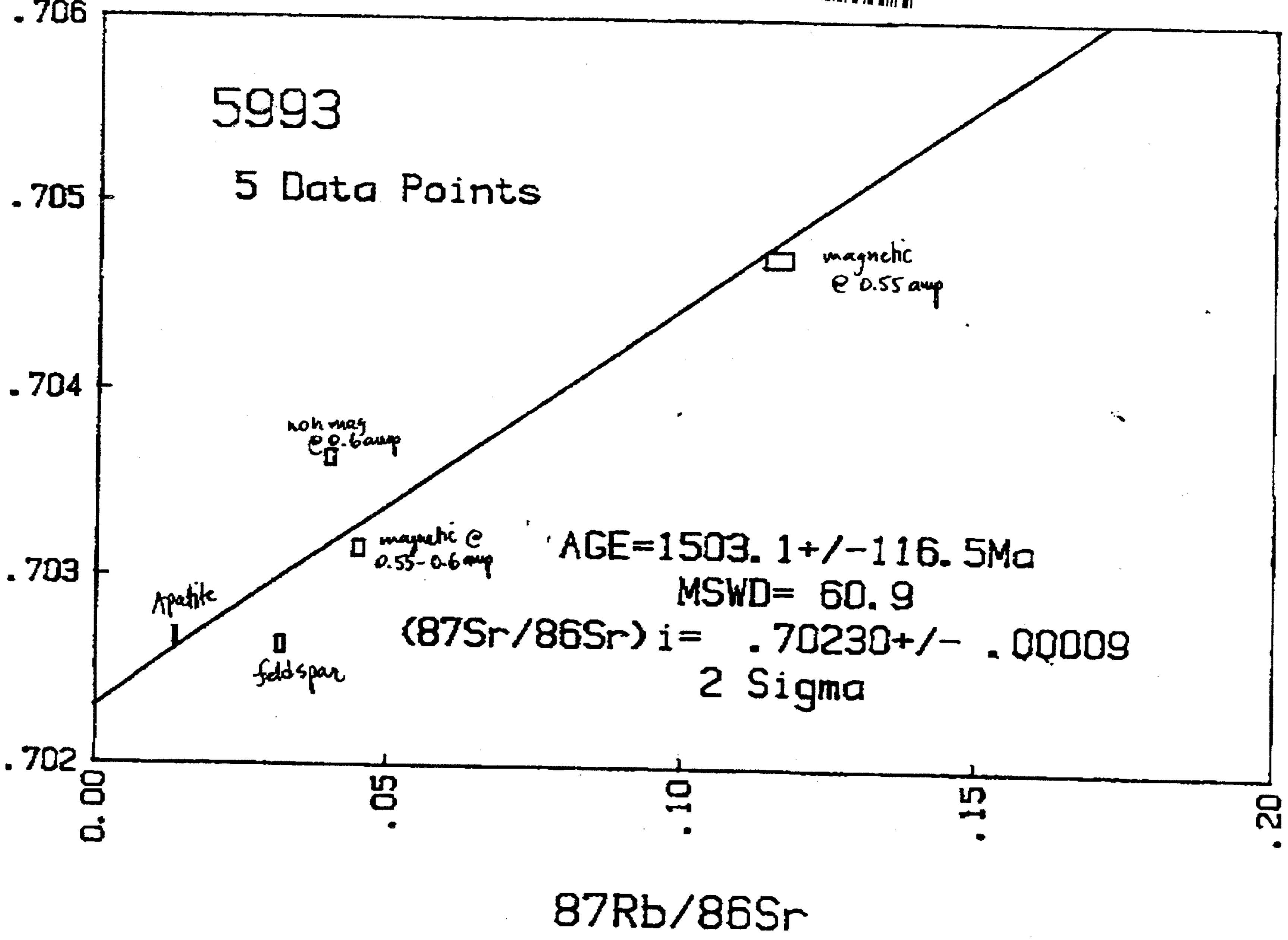
0011169030



Medium to coarse grained, equigranular, slightly alkaline gabbro containing subequal amounts of 1-3 mm long euhedral plagioclase(clear) and subhedral to euhedral clinopyroxene (grey) grains with <5-10% biotite, Fe-Ti oxides, and apatite; feldpars are mostly fresh with minor clay alteration; pyroxene is variably altered to chlorite and chlorite veins sporatically occur.

AEPT Geochemical Analysis, Migration & Basin Evolution, Plano, Texas

0011169031



P#24576

SDR

...., Permit #24576
Jefferson County (Louisville West q) 10-U-44
E. I. DuPont de Nemours #1 (WAD) FEE (L'ville Neoprene 922' FSL x 2763' FWL Sec
Wks (Waste Acid Disposal)
Elev. 452 Gr. Assumed datum elev, per Chronologic Log by DuPont, 464; but #2 & #3, drilled with same rig, had KB = GL + 13'. Note discrepancies in datum elevations on different log suites. For stratigraphy use 465KB.

Commenced 2/6/71
Comp. Drlg. 5/20/71 @ 6008 DTD, 6011 LTD.
Completed 11/6/71 at 4470 PBTD as Principal Waste Acid Disposal well.

0011169032

STRATIGRAPHY FROM LOG SUITES
Interps by ENW

Log Suite by Schlumberger, LTD 438, DTD435

2/17/71	GR/N	30-437
	Caliper	140-435
	Ind	140-427

Data Source: GR/N Datum Elev. 465KB

Base Alluvium	125
New Albany Shale	125
Jeffersonville Ls	161
Silurian: Brownsport-Dixon	217
Le... Ls	261
Waldron Sh	305
Laurel Dol	315
Osgood Sh	345
Brassfield Dol	359
Ordovician System	379
FIRST READING 437	

Log Suite by Schlumberger, DTD 5338, but LTDs never reached bottom due to caving of Rome Fm. Note shallowing LTD's

3/31/71	DIL/LAT 440-5256	LTD5260
	MLL-ML-CAL 433-5246	" 5247
	Temp 50-5244	" 5244?
4/1/71	BHC Sonic 446-5240	" 5243
4/2/71	FDC-GR 434-5235	" 5236
	SNP-GR 432-5229	" 5230
4/4/71	Coriband Synergetic	" 5220

Data Source GR-Cal-Snp & Coriband
Datum Elev=Gl + 10' (sic)=462KB

Garrard Siltstone?	604
... Gp	653
Kimmswick (Lexington) Ls	1003
Decorah Sh?	1102
...stone Ls	1135
Pencil Cave ? bent	1142-1143
...2 ? bent	1151-1154
Joachim Dol?	1579
Wells Creek ?	1640
...	1647-1657
Wells Creek Dol	167...
Porosity 8%	167?-.7.

WELL HISTORY

Date	Operation
2/6/71	MIRT
2/14?	Set 16" surf csg at 141 (see ...)
2/17/71	Drill to DTD 435
	Run Schlum GR/N, Ind, Cal to LTD 43.
2/19/71	Install 432' of 11-3/4" 42# csg w/ 187 sx Class A common w/ 2% ... 2% $CaCl_2$.
	Drill 8-3/4" hole below 432'
2/21?	¢1 1671-1721, rec. 22' (Trenton-...)
	¢2 1671-1721, rec. 50' (St. P.-Kno...)
	¢3 1721-1750, rec. 29' (Knox)
	¢4 1750-1776, rec. 26' (Knox)
	¢5 1776-1814, rec. 38' (Knox)
	¢6 2498-2531, rec. 33' (Copper ...)
3/4/71	Collect wtr sample at casing head while drilling 2475-2531. Anal by USGS: Dens. 1.006; TDS 15,900; pH 7.2; sp cond 20,000 Cl 7400. Flowing
	¢7 2575-2577, rec. 2' (Copper R...)
	¢8 2715-2731, rec. 13' (Copper Rid...)
	¢9 2805-2822, rec. 15' (Copper ...)
3/9/71	¢10 2823-2835, rec. 12' (Copper ...)
	Collect wtr sample at casing head while drilling at 3024. Anal by USGS: Dens. 1.010; TDS 9,000; pH 7.5; sp cond 14,600. Cl 5,000; Cl ... Flowing
	¢11 4409-4459, rec. 50' (Maynardv...)
	¢12 4842-4871, rec. 29' (Rome Ss. ...)
	¢13 5335-5335.2, rec. .2' (Mt. Simon)
	¢14 5336-5337, rec. 1' (Mt. Simon)
	¢15 5718-5748, rec 30' ... (also see core analyses)
3/31/71	Run Schlum DIL,ML-MLL/CAL, Temp log, DTD 5338
4/1/71	Run Schlum BHC Sonic
4/2/71	Run Schlum FDC, SNP to LTD 5220 (Coriband Synergetic to LTD 5220 run 4/4/71
4/3/71	DST#1(DWP) 4300-4500 (Conasauga) P Guage @ 4310. F 62 mins, FFP 108psi. CI 44 mins, FCIP 200psi. ... 240' SW. Tool pulled ...
	DST#2(DWP) 4130-4350 (Basal Copper Ridge) PGuage @ 4... F 237 mins, FCIP ... SI 90 mins, FCIP ...

E. I. DuPont de Nemours #1(WAD) FEE

STRATIGRAPHY FROM LOG SUITES (cont)
Interps by ENW

St. Peter Ss	1704-1711
Knox Dol Gp	1713
Rose Run Fm	2359
Rose Run Ss	2409-2441
Copper Ridge Dol	2442
or	2472
Possible cavernous porosity zone	2692-2735
Coriband zone, max 12%	2699-2704
" " , av 23%	2730-2734
" " , 10%	2985-2995
" " , 10%	3005-3009
Possible cavernous zone, 27%	3146-3152
Possible cavernous zone, 27%	3154-3158
Conasauga Gp (Maynardville Ls)	4311
Eau Claire (of Ind G.S.)	4340
Nolichucky (?) Sh	4470
L. Conasauga sh unit	4510
Rome Fm (top caving fm)	4569
Rome Ss	5078-5088
	5095-5154
Mt. Simon (?) Ss	5193-5229
FIRST READING 5229	

Log Suite by Birdwell, DTD 6009, LTD 6011, after setting pipe, stabilizing hole, and drilling deeper. Note overlap of Birdwell and previous Schlumberger suites, in which Birdwell typically reads 10' deeper.

5/20/71 Ind-Elec 5125-6009 LTD 6011
5/20/71 Cal-Dens 5200-6009 LTD 6011
5/21/71 GR/N 4300-6009 LTD 6011

Data source GR/N, Datum Elev 462KB

Conasauga Gp(Maynardville Ls)	4320
Eau Claire Fm of Ind. G.S.	4349
Nolichucky (?) Sh	4479
L. Conasauga Sh unit	4519
Rome Fm	4578
Rome Ss	5088
Mt. Simon Ss	5203
Assumed potential receiving zones	5421-5792
Basal gravel	5943-5949
Precambrian dunite-serpentine Basement	5954
FIRST READING 6009	
LOG TOTAL DEPTH 6011	

WELL HISTORY (cont)

Date	
	DST#2 (cont) 4160' sulf wtr. Fill-up complete by end of flow period. Analysis by USGS: Dens. 1.038; TDS 49,500; pH 7.0; sp cond 60,100; Cl 26,000.
4/3/71	DST#3(DWP) 3850-4050 (L. Copper Ridge) P Guage @ 3860 F 78 mins,FFP 375psi(slow even fill- CI 57 mins, FCIP 1686psi. Recover 915' sulf wtr. Anal by USGS: Dens. 1.031; TDS 40,000; pH 7.2; sp cond 50,400; Cl 21,000.
4/4/71	DST#4(DWP) 3350-3550 (M. Copper Ridge) P Guage @ 3360 F 178 mins, FFP 892psi(Steady fill-u CI 88 mins, FCIP 1481psi. Calc recovery 2025' sulf wtr. Tool pulled and reset for DST#5(DWP) 2970-3170 (M. Copper Ridge) P Guage @ 2980. for ... F 63 mins, FFP 1338psi(immed.fill-... CI 61 mins, FCIP 1339psi. Calc recovery (DST#5) 1015' sulf wtr, ... total recovery, both tests, is 2940' sulf wtr. Anal by USGS:(to # Dens. 1.018; TDS 22,100; pH 7.0; sp cond 29,900; Cl 10,000
4/4/71	DST#6 (DWP) 2690-2890 (U. Copper Ridge) P Guage @ 2700 F 121 mins., FFP 797 (even fill-up CI 59 mins., FCIP 1199. Recovery 1710' sulf wtr. Anal by USGS: Dens. 1.015; TDS 17,000; pH 7.1; sp cond 24,800; Cl 8,300.
4/4/71	DST#7 (DWP) 1600-1800 (St. Peter-To Knox) P Guage @ 1610 F 180 mins., FFP 158psi (slow fill CI 90 mins., FCIP 653psi. Recover 310' sulf wtr. Anal by USGS: Dens. 1.017; TDS 18,100; pH 7.3; sp cond 25,800; Cl 8,600.
4/5/71	DST#8 (DWP) 2978-3178 (M. Copper Ridge) P Guage @ 2988 F 180 mins., FFP 1310psi(flow in 1 CI 103 mins., FCIP 1310psi. Recov 2963' sulf wtr. Anal by USGS: Dens. 1.017; TDS 19,400; pH 7.4; sp cond 26,400; Cl 8700.
4/6/71	Shut down.
4/26/71	Ream to 10-5/8" to Reamed TD 4500

E. I. DuPont de Nemours #1(WAD) FEE

WELL HISTORY (cont)

Date	Operation
5/4?/71	Ream to 10-5/8" diam to 5130 (TD 5338) Set 5125' of 7" csg w/ ___ sx Portland cem
5/11/71	Drill ahead w/ 6-3/4" hole below 5338.
5/16?/71	¢15 5718-5748, rec 30' tight Mt. Simon Ss. Also see core anal.
5/19?/71	¢16 5993-6008, rec 15' serpentine and dunite basement rock. DTD 6008
5/20/71	Run Birdwell TES 5125-6009 and Density/Caliper 5200-6009.
5/21/71	Run Birdwell GR/N 4300-6009, depths about 10' deeper than Schlum where overlapped
	DST#9 (SP) 5408-6008 (Mt. Simon Ss)
	P Guage @ 5420 (Wtr Anal by USGS: Dens. 1.14;
	F 182 mins, FFP 2573psi. Fill-up comp in 40 mins. TDS 212,000; pH 3.7; sp cond. 150,000; Cl 130,000)
	CI 88 mins, FCIP 2574psi. Rec. 5153' salt wtr
5/22/23	Injection Test #1, using 5% HCl through 3½" (I.D.) drill pipe into Mt. Simon:
	Inject 130 gpm @ 1600psig for 15 mins;
	" 150 gpm @ 1800-1900psig for 2 hrs 20 mins;
	" 320 gpm @ 2100psig for 3 mins;
	Total injection 23,910 gals. (SEE INJECTION CHART #1)
	Instantaneous SIP 1100psig
	After 11 mins SIP 625psig
	" 20 " SIP 600psig
	" 40 " SIP 525 "
	" 45 " SIP 500 "
	" 600 " SIP 350 "
	" 665 " SIP 375 "
5/23/71	Injection Test #2, using 10% HCl through 3½" drill pipe into Mt. Simon:
	Inject 150gpm @ 1400-1500psig for 12 mins;
	" 320gpm @ 2800psig for 7 mins;
	" 150gpm @ 1400-1600psig for 13 mins;
	" 150gpm flush water @ 1600-1900psig for 100 mins;
	Instantaneous SIP 1200psig
	Injection 20,990 gals, cumulative total 44,900 gals. (SEE INJECTION CHART
5/24/71	Shut down
6/7/71	Waiting on orders
6/8/71	Injection Test #3, using fresh water through 3½" drill pipe into Mt. Simon:
	Inject 150gpm @ 2000psig for 9 mins; 1350 gals
	Instantaneous SIP 1000psig
	After 20 mins SIP 600psig
	" 58 " SIP 500psig: released pressure, well flowed back
	Killed well by pumping in $CaCl_2$ brine--about 2 hrs injection. Volume unknown
	(SEE INJECTION CHART #3) Plugged back to 5906 w/ densified cement.
6/11/71	Injection Test #4, using fresh water through 3½" drill pipe into Mt. Simon, attempting to get a Dresser-Atlas nuclear flow profile; unsuccessful:
	Inject 150gpm @ 1800psig for 30 mins. NO CHART.

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E.I. DuPont de Nemours #1(WAD) FEE

0011169035

WELL HISTORY (cont)

Date	Operation
6/12/71	Injection Test #5, using fresh water through 3½" drill-pipe into Mt. Simon, running Schlum Gr R/A Tracer Survey (SEE SURVEY--CORRECTED COPY) Injected 150gpm @ 1800psig for 2 hrs 45 mins 26,400 gals All fluid entered Mt. Simon between 5540 & 5800.

@ Depth (ft)	Flow-by rate (gpm)	Interval	Injection rate (gpm)
5150	150		
5540	150		
5560	100	5540-5560	50
5580	90	5560-5580	10
5600	74	5580-5600	16
5620	25	5600-5620	49
5660	25	5620-5660	0
5680	23	5660-5680	2
5700	21	5680-5700	2
5720	18	5700-5720	3
5760	18	5720-5760	0
5780	13	5760-5780	5
5800	0	5780-5800	13
5895	0	5800-5895	0

6/18/71	Install 4½" O.D. fiberglass liner 5240'-5900' with 86 sx Class A common. Run Schlum temp log 440'-5900'. Max rec. temp. 122.4° F. @ 5895. Log shows zones injected with fresh water as cooler.
6/21/71	Fill back liner to 5580 w/ 20-40 mesh sand. Perforate 2 holes per foot 5518-5524, 5506-5509, 5488-5498, 5469-5475. Spot 150 gals 7½% HCl over perforations. Fracture Mt. Simon Ss w/25,600 gals gelled FW; max inj pressure 6000psi; max inj rate 7½ gpm; max sand ratio 1 lb gal. (1 distinct pressure break noted: behind liner to permeable zone? cnw)
6/23/71	Flush sand from liner. Reperforate 4 holes per foot 5422-5432; 5469-5475; 5488-5494; 5504-5510; 5518-5524; 5537-5543; 5555-5561; 5568-5578; 5585-5595; 5673-5679; 5683-5693; 5703-5713; 5765-5785. Spot 1000 gals 10% acid over perf
6/24/71	Injection Test #6, using fresh water into Mt. Simon: Inject 150gpm @ 1600-1800psig for 1 hr 48 mins. (SEE CHART) Then kill well. Run Schlum GR R/A Tracer Survey through perforations 5100-5895 (SEE INJECTIO PROFILE FROM SURVEY).

@ Depth (ft)	Flow-by rate (gpm)	Interval	Injection rate (gpm)
5300	150		
5460	150		
5480	150	5460-5480	0
5500	75	5480-5500	75
5550	75	5500-5550	0
5565	50	5550-5565	25
5580	50	5565-5580	0
5598	5	5580-5598	45
5650	5	5598-5650	0
5700	3	5650-5700	2
5750	0	5700-5750	3
5800	0	5750-5800	0

This performance deemed unsatisfactory, so

E. I. DuPont de Nemours #1(WAD) FEE

0011169036

WELL HISTORY (cont)

Date	Operation
6/26/71	Set Baker retreivable plug in 7" csg at 4644, cut off and pulled 4502' of 7", spot 5500 gals 5% HCL over Knox Dol 3350-4497. Ran Schlum Caliper 431-4494.
6/27/71	Injection Test #7 using fresh water into L. Copper Ridge & Conasauga, through 3½" drill pipe on packer at 3352. Injected 150gpm at 1350psig for 2 hours 35 mins (SEE CHART) Ran Schlum Gr R/A Tracer Survey as follows:

@ Depth (ft)	Flow-by rate (gpm)	Interval	Injection rate (gpm)
3400	150	3400-3660	0
3660	150	3660-3700	12
3700	138	3660-3700	12
4000	138	3700-4000	0
4100	125	4000-4100	13
4230	125	4100-4230	0
4250	100	4230-4250	25
4270	95	4250-4270	5
4290	0	4270-4290	95 (Cavern?)4280-42

Injection Test #8, using fresh water into Copper Ridge, through 3½" drill pipe on packer set at 2650. Injected 150gpm at 175psig for 2 hrs 27 mins, pressure declining to near-zero precisely at end of tracer test. (SEE CHART) Ran Schlum GR R/A Tracer Survey as follows:

@ Depth (ft)	Flow-by rate (gpm)	Interval	Injection rate (gpm)
2700	150		
2740	132	2700-2740	18
2780	120	2740-2780	12
3140	120	2780-3140	0
3160	112	3140-3160	8
3200	0	3160-3200	112 (prob into caver zone 3146-49, 3 52, and 3154-58
3320	0	3200-3320	0

Install retrievable bridge plug @ 300' in 11-3/4" csg, and place well in stand-by condition.

Date	Operation
10/26/71	Re-enter, retrieve bridge plug at 4644.
10/27/71	Plug back with 2.5 bbls Halliburton MYF-1 5237-5206; 195 sx 50/50 Pozmix 5206-4894; 14 bbls bentonite gel 4894-4526; 107 gals Halliburton LR-11 cement 4526-4470.
10/28/71	Set drillable bridge plug at 3120.
10/29/71	Install 8-5/8" H-40 to 3115'. Pump 940 gals Halliburton Epseal, but hole bridged after getting 150' material behind casing. Circulated out excess Epseal resin thru DV valve at 2677.
10/30/71	Drill out 330' of Epseal.
10/31/71	Run Birdwell 3-D cement bond log. Dump 83 sx sand; perforate csg for squeeze at 2870. Break circulation through perfs.
11/1/71	Pump 800 sx 50/50 Pozmix plus 82 sx latex cement. Plug pumped down to 2840.
11/4/71	Drill out cement 2819-3379. Run Birdwell 3-D cement bond log 10-3180.
11/5/71	Mount well-head
11/6/71	Set Texas Iron Works Ha[illegible]loy packer at 3065 on 4½" O.D. fiberglass injection tubing. Shut in well.

COMMONWEALTH OF KENTUCKY
Department of Mines & Minerals
Division of Oil & Gas
P. O. Box 14090
Lexington, Kentucky 40512-4090

(Type or Print)

AFFIDAVIT TO TIME AND MANNER OF PLUGGING AND FILLING WELL AS REQUIRED BY LAW

OP

E. I. DUPONT DE NEMOURS & CO., INC.
Name and Address of Last Operator

E. I. DUPONT DE NEMOURS & CO., 4200 CAMP GROUND ROAD LOUISVILLE, KY.
Name and Address of Original Operator Who First Permitted and Drilled This Well

Name and Address of Coal Operator

24576

Permit No. KYI 0001, Elevation 452.0 F, County JEFFERSON, Total Depth 6011 FT

Carter Coordinates 921.9 FNL FSL 2769.9 FEL FWL, Sec. 10, Letter U, Number 44

Farm Owner (Lessor) ______ Well Number WDW No. 1

Affidavit to be made in triplicate, one copy to be mailed to the Department of Mines and Minerals, one copy to be retained by the Well Operator and the third copy to be mailed by registered mail to each Coal Operator named at their respective addresses.

AFFIDAVIT

0011169037

STATE OF KENTUCKY,
COUNTY OF JEFFERSON } SS:

______, Operator of the above captioned well does hereby swear that the plugging of said wells was completed according to instructions from the oil and gas inspector and according to Chapter 353 of the Kentucky Revised Statutes on NOVEMBER 22, 19 93, record of which is listed below or shown on the back of this form.

PLUGGED:

From	To	With (Plug Description)
2588 FT	SURFACE	CLASS H PREMIUM CEMENT
3052 FT	2588 FT	EPSEAL PLUG
3056 FT	3052 FT	CAST IRON BRIDGE PLUGS
4470 FT	3056 FT	OPEN BOREHOLE
5237 FT	4470 FT	CEMENT PLUG
5338 FT	5237 FT	HALLIBURTON MYF - 7 GEL
6011 FT	5338 FT	CEMENT SURROUNDING 4½" TUBING FILLED WITH DRILLING MUD

Indicate below the size and interval of all casing left in the well and if and where it was shot off.

Casing Size	Interval	Shot Off At	Bottom of Casing At
16 in	UPPER CONDUCTOR CASING	SURFACE	140 FT
11 3/4 in	UPPER SURFACE CASING	SURFACE	432 FT
8 5/8 in	INJECTION TUBE PROTECTIVE CASING	SURFACE	3115 FT

If casing was NOT left in the well, indicate the bore hole size and interval.

Bore Hole Size 7 in ~~4½ in~~ Interval LOWER PROTECTIVE CASING 4502 FT 5125 FT ~~LOWER INJECTION CASING~~ 5240 FT 5950 FT

Bore Hole Size ______ Interval ______

State whether or not other steel or junk was left in the well and describe: PACKER - LOST IN HOLE

RECEIVED FEB 2 1 1994 DEPT. OF MINES AND MINERALS DIVISION OF OIL AND GAS

RECEIVED JAN 0 2 1996 DEPT. OF MINES AND MINERALS DIVISION OF OIL AND GAS

(Optional) Signature of Contractor responsible for above plugging ______ Title

(Required) Sheldon M. McCullum Signature of Operator responsible for above plugging ENVIRONMENTAL SUPERINTENDENT Title

Sworn to and subscribed before me this 19th day of December, 19 95

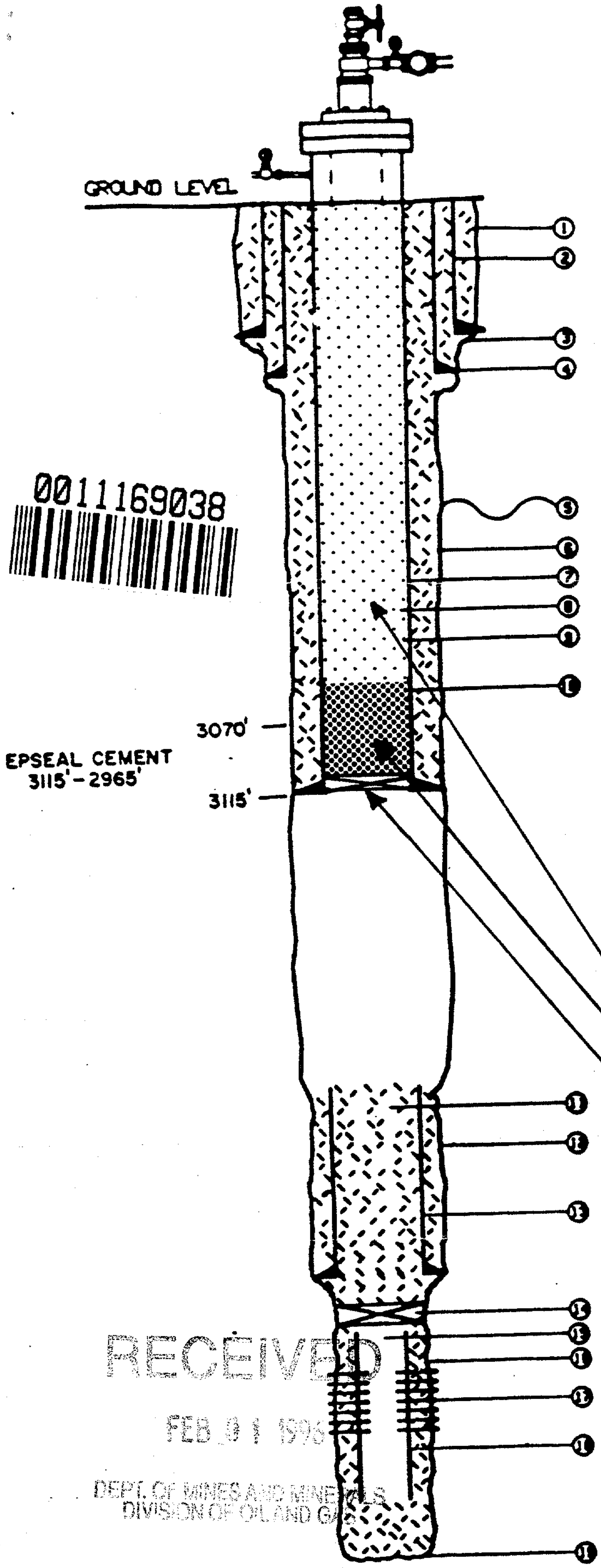
Notary Public

My commission expires: 1/22/99

All Blanks must be completed. Incomplete affidavits will be rejected.
Revised 2-84

LOUISVILLE WORKS
WASTE WELL 1

KELLY BUSHING (KB): 466 FT. M.S.L.
GROUND LEVEL (GL): 453 FT. M.S.L.



0011169038

COMPLETION DETAIL

1. BOREHOLE - 20 IN.
2. CONDUCTOR CASING - 140 FT., 16 IN.
3. BOREHOLE - 14 3/4 IN.
4. SURFACE CASING - 432 FT., 11 3/4 IN., 42 #/FT., H-40.
5. CONSERVATIVE BASE OF USDW - 1700 FT.
6. BOREHOLE - 10 5/8 IN.
7. PROTECTIVE CASING - 3115 FT., 8 5/8 IN., 32 #/FT., K-55, HASTELLOY CASING 3060-70 FT.
8. INJECTION TUBING - Removed
9. ANNULAR FLUID - Pumped into well
10. PACKER - Lost in hole
11. CEMENT PLUG - 4470 FT. - 5237 FT.
12. BOREHOLE - 8 3/4 IN.
13. PROTECTIVE CASING - 4502 FT. - 5125 FT., 7 IN.
14. HALLIBURTON MYF - 7 GEL - 5237 FT.
15. DRILLING MUD - 10 LB/GAL.
16. BOREHOLE - 5330 FT. - 6011 FT., 6 1/4 IN.
17. PERFORATIONS - 5422 FT. - 5785 FT., 4 SPF.
18. TUBING - 5240 FT. - 5950 FT., 4 1/2 IN.
19. TOTAL DEPTH - 6011 FT.

NOTE: DIAGRAM NOT DRAWN TO SCALE

Class H Premium Cement - 2,588 feet to Surfa

Epseal Plug - 3,052 to 2,588 feet.

Cast Iron Bridge Plugs - 3,056 and 3,052 fee

CORE ANALYSIS ☆ DEVELOPMENT OF WATER FLOOD PROJECTS OIL & GAS EVALUATIONS

COVER LETTER PHYSICALLY TELESCOPED TO SINGLE PAGE enw

OILFIELD RESEARCH, INC.

1204 FIRST AVENUE • EVANSVILLE, INDIANA 47710 • TELEPHONE 424-2907 (DAY OR NIGHT)

WALDO, OHIO

April 10, 1971

0011169039

E. I. Du Pont de Nemours & Company
Louisville Du Pont Works
Neoprene Plant
Camp Ground Road
Louisville, Kentucky

IN RE: Fee-Neoprene Plant Lease
Well No. 1
10 - U - 44
Jefferson County, Kentucky

ATTN: Mr. Charles Sherman

Gentlemen:

There were a total of 13 cores taken from the subject well, representing various formations from Chazy-Black River to Mt. Simon sandstone. These cores were adequately sampled to reflect the characteristics of the cored sections. Both whole core and plug techniques were utilized by our Evansville laboratory. The purpose of testing was to locate and define any reservoir rock which might have potential for liquid waste disposal.

The attached tables present the results of core analysis. The data is tabulated by depth from Core No. 2 through Core No. 11. All tested formations exhibit low to negligible permeability and porosity. Noticeable permeability occurred in the St. Peter Sandstone.

It is our opinion none of the formations tested have potential for waste disposal.

Five samples from the Chazy-Black River Formation are being tested for potential to serve as caprock. These results will be presented and forwarded under separate cover.

If we may be of further assistance in the evaluation of this well, contact our office at your convenience.

Very truly yours,

OILFIELD RESEARCH, INC.

Ben Ross Oates

Ben Ross Oates

Marlin F. Krieg

Marlin F. Krieg

0011169040

OILFIELD RESEARCH, INC.

CORE ANALYSIS REPORT

Company: E. I. Du Pont de Nemours & Company — Elevation: 452 GL — File No. 71E4029
Lease: Fee-Neoprene Plant — Well: 1 — Formation: See Below — Date Cored: March, 197
Field: Wildcat-Disposal — Drlg. Fluid: FWB — Date Report: 4/10/71
County: Jefferson — State: Kentucky — Type Of Core: Diamond — Permit No. 24576
Location: 921.9 SL 2763.4 WL 10-U-44 — Remarks: Sampled by OR-BRO

LITHOLOGICAL ABBREVIATIONS

SAND-SD, SHALE-SH, LIME-LM, DOLOMITE-DOL, CHERT-CH, GYPSUM-GYP, ANHYDRITE-ANHY, CONGLOMERATE-CONG, FOSSILIFEROUS-FOSS, SANDY-SDY, SHALEY-SHY, LIMEY-LMY, FINE-FN, MEDIUM-MED, COARSE-CSE, CRYSTALLINE-XLN, GRAIN-GRN, GRANULAR-GRNL, BROWN-BRN, GRAY-GY, VUGGY-VGY, FRACTURED-FRAC, LAMINATION-LAM, STYLOLITIC-STY, SLIGHT[…], VERY-V[…], WITH-W[…]

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS HORIZONTAL		PERMEABILITY MILLIDARCYS VERTICAL	POROSITY PERCENT	LITHOLOGY AND REMARKS
	CHAZY-BLACK RIVER FORMATION					
	ST. PETER FORMATION					
	Core No. 2 1671.0 - 1721.0					
1	1697.5	<0.10		<0.10	3.1	
2	1698.5	<0.10		<0.10	6.4	
3	1699.5	<0.10		<0.10	3.4	
4	1700.5	<0.10		<0.10	6.2	
5	1701.5	64.		35.	12.7	
6	1702.5	4.3		4.4	8.6	
7	1703.5	<0.10		<0.10	5.7	
8	1704.5	<0.10		<0.10	4.0	
9	1705.5	<0.10		<0.10	4.2	
10	1706.5	0.20		<0.10	3.5	
11	1707.5	3.0		0.35	5.7	
12	1708.5	1.7		2.0	4.8	
13	1709.5	3.7		0.61	5.5	
14	1710.5	11.		2.1	6.9	
15	1711.5	4.2		6.3	6.4	
16	1712.5	1.9		3.0	6.9	
	KNOX FORMATION					
		MAX.	90°			
17	1714.6-15.3	0.34	0.20	0.17	8.2	
18	1715.3-16.3	1.0	0.73	<0.10	6.9	
19	1716.3-17.1	<0.10	<0.10	<0.10	5.2	
20	1717.1-18.1	<0.10	<0.10	<0.10	4.9	
21	1718.1-19.3	0.52	<0.10	<0.10	5.1	
22	1719.3-20.5	0.38	<0.10	<0.10	7.4	

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CORE ANALYSIS REPORT

Lease Fee-Neoprene Plant Well No. WD-1

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS HORIZONTAL	PERMEABILITY MILLIDARCYS VERTICAL	POROSITY PERCENT	LITHOLOGY AND REMARKS
	Core No. 3 1721.0 - 1741.0				
23	1722.5	<0.10	<0.10	3.6	
24	1724.5	0.30	<0.10	9.9	
25	1726.5	<0.10	<0.10	3.0	
26	1728.5	0.12	<0.10	5.1	
27	1730.5	<0.10	<0.10	5.9	
28	1732.5	<0.10	<0.10	8.4	
29	1734.5	<0.10	<0.10	<3.0	
30	1736.5	<0.10	<0.10	4.7	
31	1738.5	<0.10	<0.10	3.6	
32	1740.5	<0.10	<0.10	4.7	
	Core No. 4 1750.0 - 1775.0				
33	1750.5	<0.10	<0.10	4.0	
34	1752.5	<0.10	<0.10	4.5	
35	1754.5	<0.10	<0.10	<3.0	
36	1756.5	<0.10	<0.10	4.4	
37	1758.5	<0.10	<0.10	8.4	
38	1760.5	<0.10	<0.10	5.8	
39	1762.5	<0.10	<0.10	5.7	
40	1764.5	<0.10	<0.10	5.6	
41	1766.5	<0.10	<0.10	<3.0	
42	1768.5	<0.10	<0.10	<3.0	
43	1770.5	<0.10	<0.10	<3.0	
44	1772.5	<0.10	<0.10	6.6	
45	1774.5	<0.10	<0.10	<3.0	
	Core No. 5 1775.0 - 1808.0				
46	1776.5	<0.10	<0.10	6.5	
47	1778.5	<0.10	<0.10	<3.0	
48	1780.5	<0.10	<0.10	<3.0	
49	1782.5	<0.10	<0.10	<3.0	
50	1784.5	<0.10	<0.10	6.2	
51	1786.5	<0.10	<0.10	4.8	
52	1788.5	<0.10	<0.10	3.7	
53	1790.5	<0.10	<0.10	<3.0	
54	1792.5	<0.10	<0.10	4.1	
55	1794.5	<0.10	<0.10	3.9	
56	1796.5	2.6	<0.10	5.6	
57	1798.5	<0.10	<0.10	4.8	
58	1800.5	<0.10	<0.10	6.8	
59	1802.5	<0.10	<0.10	3.9	
60	1804.5	<0.10	<0.10	4.9	
61	1806.5	<0.10	<0.10	<3.0	

CORE ANALYSIS REPORT

Lease Fee-Neoprene Plant Well No. WD-1

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS HORIZONTAL	PERMEABILITY MILLIDARCYS VERTICAL	POROSITY PERCENT	LITHOLOGY AND REMARKS
	Core No. 6 2497.0 - 2531.0				
62	2497.5	<0.10	<0.10	<3.0	
63	2499.5	<0.10	<0.10	<3.0	
64	2501.5	<0.10	<0.10	<3.0	
65	2503.5	<0.10	<0.10	<3.0	
66	2505.5	<0.10	<0.10	<3.0	
67	2507.5	<0.10	<0.10	<3.0	
68	2509.5	<0.10	<0.10	<3.0	
69	2511.5	<0.10	<0.10	3.6	
70	2513.5	<0.10	<0.10	<3.0	
71	2515.5	<0.10	<0.10	<3.0	
72	2517.5	<0.10	<0.10	<3.0	
73	2519.5	<0.10	<0.10	4.7	
74	2521.5	<0.10	<0.10	3.9	
75	2523.5	<0.10	<0.10	3.5	
76	2525.5	<0.10	<0.10	<3.0	
77	2527.5	<0.10	<0.10	<3.0	
78	2529.5	<0.10	<0.10	<3.0	
	Core No.7 2575.0 - 2577.0				
79	2576.5	<0.10	<0.10	<3.0	
	Core No. 8 2714.0 - 2727.0				
80	2714.5	<0.10	<0.10	<3.0	
81	2716.5	<0.10	<0.10	<3.0	
82	2718.5	<0.10	<0.10	<3.0	
83	2720.5	<0.10	<0.10	<3.0	
84	2722.5	<0.10	<0.10	<3.0	
85	2724.5	<0.10	<0.10	<3.0	
86	2726.5	<0.10	<0.10	<3.0	
	Core No. 9 2804.0 - 2822.0				
87	2804.5	<0.10	<0.10	<3.0	
88	2806.5	<0.10	<0.10	<3.0	
89	2808.5	<0.10	<0.10	<3.0	
90	2810.5	<0.10	<0.10	<3.0	
91	2812.5	<0.10	<0.10	<3.0	
92	2814.5	<0.10	<0.10	5.3	
93	2816.5	<0.10	<0.10	<3.0	
94	2818.5	<0.10	<0.10	<3.0	
95	2820.5	<0.10	<0.10	<3.0	

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CORE ANALYSIS REPORT

Lease Fee-Neoprene Plant Well No. WD-1

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS HORIZONTAL	PERMEABILITY MILLIDARCYS VERTICAL	POROSITY PERCENT	LITHOLOGY AND REMARKS
	Core No. 10 2822.0 - 2834.0				
96	2822.5	<0.10	<0.10	<3.0	
97	2824.5	<0.10	<0.10	<3.0	
98	2826.5	<0.10	<0.10	<3.0	
99	2828.5	<0.10	<0.10	<3.0	
100	2830.5	<0.10	<0.10	<3.0	
101	2832.5	<0.10	<0.10	<3.0	

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WHOLE CORE ANALYSIS REPORT

Lease Fee-Neoprene Plant Well No. WD-1

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS HORIZONTAL MAX.	PERMEABILITY MILLIDARCYS HORIZONTAL 90°	PERMEABILITY MILLIDARCYS VERTICAL	POROSITY PERCENT	LITHOLOGY AND REMARKS Percent Oil	LITHOLOGY AND REMARKS Percent Water
	EAU CLAIRE FORMATION (MAYNARDVILLE LS)						
	Core No. 11 4409.0 - 4460.0						
102	4409.0-10.2	<0.10	<0.10	<0.10	1.7		
103	4410.2-11.2	<0.10	<0.10	<0.10	1.3		
	4410.7					0.0	27.8
104	4411.2-12.5	<0.10	<0.10	<0.10	5.1		
	4411.6					0.0	64.7
105	4412.5-12.8	0.27	<0.10	<0.10	5.4		
106	4412.8-13.6	0.22	0.18	<0.10	4.8		
	4412.8					0.0	58.6
107	4413.6-14.4	0.20	0.17	<0.10	1.2		
108	4414.4-15.0	<0.10	<0.10	<0.10	<1.0		
	4414.6					0.0	40.9
109	4415.0-16.0	<0.10	<0.10	<0.10	<1.0		
	4415.9					0.0	26.3
110	4416.0-17.0	<0.10	<0.10	<0.10	<1.0		
111	4417.0-17.9	<0.10	<0.10	<0.10	<1.0		
	4417.6					0.0	47.8
112	4417.9-18.9	<0.10	<0.10	<0.10	<1.0		
	4418.7					0.0	37.5
113	4418.9-19.8	<0.10	<0.10	<0.10	1.0		
114	4419.8-21.0	<0.10	<0.10	<0.10	1.6		
	4420.5					0.0	31.6
115	4421.0-22.0	<0.10	<0.10	<0.10	<1.0		
116	4422.0-23.0	<0.10	<0.10	<0.10	<1.0		
	4422.0					0.0	54.2
117	4423.0-24.0	<0.10	<0.10	<0.10	<1.0		
	4423.9					0.0	41.7
118	4424.0-25.0	<0.10	<0.10	<0.10	<1.0		
119	4425.0-25.4				<1.0		
120	4425.8-27.1			<0.10	<1.0		
121	4427.1-28.0			<0.10	<1.0		
122	4428.0-29.0			<0.10	<1.0		
123	4429.0-29.7			<0.10	<1.0		
124	4429.7-30.7			<0.10	<1.0		
125	4430.7-31.6			<0.10	<1.0		
126	4431.6-32.5			<0.10	<1.0		
127	4432.5-33.9			<0.10	<1.0		
128	4433.9-34.9			<0.10	<1.0		
129	4434.9-35.9			<0.10	<1.0		
130	4435.9-37.0			<0.10	<1.0		

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WHOLE CORE ANALYSIS REPORT

Lease Fee-Neoprene Plant Well No. WD-:

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS HORIZONTAL MAX.	90°	VERTICAL	POROSITY PERCENT	LITHOLOGY AND REMARKS Percent Oil	Percent Water
131	4437.0-38.0			<0.10	<1.0		
132	4438.0-38.8			<0.10	<1.0		
133	4438.8-39.7			<0.10	<1.0		
	4439.6					0.0	36.4
134	4439.7-40.7			<0.10	1.3		
	4440.6					0.0	68.0
135	4440.7-41.5			<0.10	1.4		
136	4441.5-42.4			<0.10	<1.0		
	4442.3					0.0	31.8
137	4442.4-43.1			<0.10	<1.0		

MT. SIMON FORMATION
Core No. 15 5718-5748, recovered 30' tight Mt. Simon Ss

SAMPLE NUMBER	DEPTH FEET	MAX.	90°	VERTICAL	POROSITY PERCENT	LITHOLOGY AND REMARKS
138	5719.5	4.4		7.3	7.4	PLUG ANALYSIS
139	5721.5	4.0		5.6	9.4	
140	5723.5	<0.10		<0.10	4.4	
141	5725.5	0.14		<0.10	5.3	
142	5727.5	<0.10		<0.10	<3.0	
143	5729.5	0.24		0.11	3.7	
144	5731.5	3.9		0.12	<3.0	
145	5733.5	0.22		1.6	3.2	
146	5735.5	35.		4.3	6.0	
147	5737.5	41.		1.3	5.0	
148	5743.5	<0.10		<0.10	4.9	
149	5745.5	<0.10		<0.10	<3.0	
150	5747.5	<0.10		<0.10	<3.0	

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#132

2GW

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER ANALYSIS

Permit #24576 Louisville West q.
10-U-44 9238FSL x 2763' FWL sec
Datum Elev. 465KB
Datum Elev. 465KB

Location: Louisville, Kentucky (Southwest)(381308N-0855027.1) County: Jefferson
Source: Drilled well DuPont #1(WAD) FEE Depth (ft) 2,531 Diam (in.)
Cased to (ft) Date drilled March 4, 1971 Point of coll. Discharge to shale shaker
Owner: Dupont #(WAD) Du Pont de Nemours, E.I. & Co, Inc.
Treatment Use: Test well
WBF: Knox, 2475-2531 ft. WL: Flowing Yield: 40-50 GPM flow est.
Temp (°C): 4.5 Appear. when coll.: Sediment
Collected: March 4, 1971 By: D. V. Whitesides
Remarks: Continuous pumping. Samples for iron and manganese filtered clear when collected.

2 oz. broken in transit.	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	11	--	Bicarbonate (HCO_3)	390	6.39
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe)					
			Sulfate (SO_4) *	1100	22.90
			Chloride (Cl)	7400	208.75
			Fluoride (F)	2.7	.14
Calcium (Ca)	650	32.44	* DuPont reports Sulfur	275	
Magnesium (Mg)	240	19.74	Nitrate (NO_3)	.1	.00
Sodium (Na)	4000	174.00			
Potassium (K)	120	3.07			
Total		229.25	Total		238.18

0011169046

	mg/l		
Dissolved solids:		Specific conductance (micromhos at 25° C)	20,000
Calculated	13,700	pH	7.2
Residue on evaporation at 180°C	13,900	Color	
Hardness as $CaCO_3$	2,600	Density at 20°C.	1.006
Noncarbonate	2,300		

Lab. No. Col 56238 Field No. Project KY WRD GW - BRINE

PROVISIONAL RECORDS, SUBJECT TO REVISION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW

Permit #24576
10-U-44
9221SL x 2763' WL

WATER ANALYSIS
Datum Elev. 465KB

Location Louisville, Kentucky (Southwest)(381308N-0855027.1) County Jefferson
Source Drilled well DuPont #1 (WAD) Fee Depth (ft) Diam (in.)
Cased to (ft) 500 Date drilled March 9, 1971 Point of coll. Well head
Owner Dupont, Louisville
Treatment Use Test
WBF ~~Knox~~, 3,024 (Copper Ridge) WL 15 ft. above Yield 20-40 GPM flow est.
Temp (°C) 21.0 Appear. when coll.
Collected March 9, 1971 By D. S. Mull
Remarks Sample for iron and manganese filtered clear when collected. Field cond. 14,000.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	9.9	--	Bicarbonate (HCO_3)	218	3.57
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) (ug/l)	240	--			
Zinc (Zn) (ug/l)	450	--	Sulfate (SO_4)	780	16.24
			Chloride (Cl)	4,600	129.77
			Fluoride (F)	.9	.05
Calcium (Ca)	430	21.46			
Magnesium (Mg)	160	13.16	Nitrate (NO_3)	3.0	.05
Sodium (Na)	2,700	117.45			
Potassium (K)	81	2.07			
Total		154.14	Total		149.68

0011169047

	mg/l		
		Specific conductance (micromhos at 25° C)	14,600
Dissolved solids: Calculated	8,890	pH	7.5
Residue on evaporation at 180°C	9,060	Color	10
Hardness as $CaCO_3$	1,700	Density at 20°C.	1.010
Noncarbonate	1,500		

Lab. No. Col 56779 Field No. Project KY WRD GW - BRINE

PROVISIONAL RECORDS, SUBJECT TO REVISION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW

Permit #24576
10-U-44
922'SL x 2763'WL

WATER ANALYSIS
Datum Elev. 465KB

Location Louisville, Kentucky (381308N-0855027.1) County Jefferson
Source Drilled well (Dupont ~~XXXXXX~~ 1 (WAD) Fee Depth (ft) 5,338 Diam (in.)
Cased to (ft) Date drilled March 1971 Point of coll. Drill pipe DST#2
Owner E. I. DuPont de Nemours, Louisville
Treatment 4130-4330 Use
WBF Bottom of Copper Ridge Dolomite, WL Flows above surface Yield 150 GPM flow est.
Temp (°C) 38.5 Appear. when coll. Blackish
Collected April 3, 1971 By R. V. Cushman
Remarks Sample from drill stem test No. 2. Strong sulfur odor. Field cond. 60,000.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	12	--	Bicarbonate (HCO_3)	345	5.65
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) Diss. (ug/l)	6,700	--			
Zinc (Zn) (ug/l)	1,400	--	Sulfate (SO_4)	3,400	70.79
			Chloride (Cl)	26,000	733.46
			Fluoride (F)	1.8	.09
Calcium (Ca)	2,600	129.74			
Magnesium (Mg)	690	56.76	Nitrate (NO_3)		
Sodium (Na)	14,000	609.00			
Potassium (K)	360	9.20			
Total		804.70	Total		809.99

0011169048

	mg/l		
		Specific conductance (micromhos at 25° C)	60,100
Dissolved solids: Calculated	47,200	pH	7.0
Residue on evaporation at 180° C	49,500	Color	1
Hardness as $CaCO_3$	9,300	Density at 20°C.	1.038
Noncarbonate	9,000		

Lab. No. Col 56775 Field No. Project KY WRD GW - BRINE

PROVISIONAL RECORDS, SUBJECT TO REVISION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW
Permit #24576
10-U-44
922'SL x 2763'WL

WATER ANALYSIS
Datum Elev. 465KB

Location Louisville, Kentucky (Southwest)(381308N-0855027.1) County Jefferson
Source Drilled well TDW No. 1 DuPont #1 (WAD) Fee Depth (ft) 5,338 Diam (in.)
Cased to (ft) Date drilled March 1971 Point of coll. Drill stem test DST#3
Owner Dupont
Treatment Use Test
WBF Copper Ridge, 3,850-4,050 ft. WL Flows above land surface Yield 150 GPM flow est.
Temp (°C) Appear. when coll.
Collected April 3, 1971 By R. V. Cushman
Remarks 84.8-88.1°F. No iron sample. Field cond. 51,800.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	13	--	Bicarbonate (HCO_3)	322	5.28
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) a/ (ug/l)	330	--			
Zinc (Zn) (ug/l)	1,100	--	Sulfate (SO_4)	3,400	70.79
			Chloride (Cl)	21,000	592.41
			Fluoride (F)	1.8	.09
Calcium (Ca)	2,200	109.78			
Magnesium (Mg)	580	47.71	Nitrate (NO_3)		
Sodium (Na)	11,000	478.50			
Potassium (K)	500	12.78			
Total		648.77	Total		668.57

0011169049

	mg/l		
		Specific conductance (micromhos at 25° C)	50,400
Dissolved solids: Calculated	38,800	pH	7.2
Residue on evaporation at 180° C	40,000		
Hardness as $CaCO_3$	7,900	Color	2
Noncarbonate	7,600	Density at 20°C.	1.031

Lab. No. Col 56781 Field No. Project KY WRD GW - BRINE

a/ In solution when analyzed.

PROVISIONAL RECORDS, SUBJECT TO REVISION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW
Permit #24576
10-U-44
922'SL x 2763'WL

WATER ANALYSIS
Datum Elev. 465KB

Location Louisville, Kentucky (Southwest)(381308N0855027.1) County Jefferson
Source Drilled TW No. 1 DuPont #1 (WAD) Fee Depth (ft) 5,338 Diam (in.)
Cased to (ft) Date drilled March 1971 Point of coll. Drill stem test (#4 & #5) Recovery ascribed to #4 on basis of major fill-up. Owner Dupont
Treatment Use
WBF Copper Ridge, 3,350-3,550 ft. WL flows above surface Yield 150 GPM flow est.
Temp (°C) Appear. when coll.
Collected April 3, 1971 By R. V. Cushman
Remarks 79.2-81.4°F. No iron sample.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	9.6	--	Bicarbonate (HCO_3)	298	4.88
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) a/ (ug/l)	60	--			
Zinc (Zn) (ug/l)	1,100	--	Sulfate (SO_4)	3,100	64.54
			Chloride (Cl)	10,000	282.10
			Fluoride (F)	1.7	.09
Calcium (Ca)	1,400	69.86			
Magnesium (Mg)	380	31.26	Nitrate (NO_3)	.7	.01
Sodium (Na)	6,000	261.00			
Potassium (K)	180	4.60			
Total		366.72	Total		351.62

0011169050

	mg/l		
		Specific conductance (micromhos at 25° C)	29,900
Dissolved solids: Calculated	21,200	pH	7.0
Residue on evaporation at 180°C	22,100	Color	2
Hardness as $CaCO_3$	5,100	Density at 20°C.	1.018
Noncarbonate	4,800		

Lab. No. Col 56780 Field No. Project KY WRD GW - BRINE

a/ In solution when analyzed.

PROVISIONAL RECORDS, SUBJECT TO REVISION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER ANALYSIS
Datum Elev. 465KB

2GW
Permit #24576
10-U-44
922'SL x 2763'WL

Location: Louisville, Kentucky (Southwest)(381308N-0855027.1) County: Jefferson
Source: Drilled well - test DuPont #1 (WAD) Fee Depth (ft): 5,338 Diam (in.):
Cased to (ft): Date drilled: March 9, 1971 Point of coll.: Drill stem test DST #6
Owner: Dupont
Treatment: Use: Test
WBF: Copper Ridge, 2,690-2,890 ft. WL: Yield:
Temp (°C): Appear. when coll.:
Collected: April 4, 1971 By: Charlie Sherman
Remarks: 77.0-77.6°F No iron sample. Field cond. 18,500.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	12	--	Bicarbonate (HCO_3)	312	5.11
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) a/ (ug/l)	130	--			
Zinc (Zn) (ug/l)	860	--	Sulfate (SO_4)	1,600	33.31
			Chloride (Cl)	8,300	234.14
			Fluoride (F)	1.7	.09
Calcium (Ca)	840	41.92			
Magnesium (Mg)	290	23.86	Nitrate (NO_3)	.0	.00
Sodium (Na)	5,000	217.50			
Potassium (K)	140	3.58			
Total		286.86	Total		272.65

0011169051

	mg/l		
		Specific conductance (micromhos at 25° C)	24,800
Dissolved solids: Calculated	16,300	pH	7.1
Residue on evaporation at 180°C	17,000	Color	3
Hardness as $CaCO_3$	3,300	Density at 20°C.	1.015
Noncarbonate	3,000		

Lab. No. Col 56777 Field No. Project KY WRD GW - BRINE

a/ In solution when analyzed.

PROVISIONAL RECORDS, SUBJECT TO REVISION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW
Permit #24576
10-U-44
922'SL x 2763'WL

WATER ANALYSIS

Datum Elev. 465KB

Location Louisville, Kentucky (Southwest)(381308N-0855027.1) County Jefferson
Source Test well, drilled DuPont #1 (WAD) Fee Depth (ft) 5,338 Diam (in.)
Cased to (ft) Date drilled March 9, 1971 Point of coll. Drill stem test DST #7
Owner DuPont
Treatment Use Test
WBF St. Peter-top of Knox, 1600-1800' WL Yield
Temp (°C) Appear. when coll.
Collected April 5, 1971 By Charlie Sherman
Remarks 73.9-74.2°F. Field cond. 19,500. No iron sample.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	12	--	Bicarbonate (HCO_3)	310	5.08
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) a/ (ug/l)	50	--			
Zinc (Zn) (ug/l)	1,300	--	Sulfate (SO_4)	2,200	45.80
			Chloride (Cl)	8,600	242.61
			Fluoride (F)	1.8	.09
Calcium (Ca)	1,100	54.89			
Magnesium (Mg)	340	27.97	Nitrate (NO_3)	.0	.00
Sodium (Na)	5,000	217.50			
Potassium (K)	140	3.58			
Total		303.94	Total		293.58

0011169052

	mg/l		
		Specific conductance (micromhos at 25° C)	25,800
Dissolved solids:			
Calculated	17,500	pH	7.3
Residue on evaporation at 180°C	18,100		
		Color	3
Hardness as $CaCO_3$	4,100		
Noncarbonate	3,800	Density at 20°C.	1.017

Lab. No. Col 56776 Field No. Project KY WRD GW - BRINE

a/ In solution when analyzed.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW
Permit #24576
10-U-44
922'SL x 2763' WL

WATER ANALYSIS
Datum Elev. 465KB

Location: Louisville, Kentucky (Southwest)(381308N-0855027.1) County: Jefferson
Source: Drilled well - test DuPont #1 (Wad) Fee Depth (ft): 5,338 Diam (in.):
Cased to (ft): Date drilled: March 9, 1971 Point of coll.: Drill stem test DST #8
Owner: Dupont
Treatment: Use: Test
WBF: Copper Ridge, 2,970-3,170 ft. WL: Yield:
Temp (°C): Appear. when coll.:
Collected: April 4, 1971 By: Charlie Sherman
Remarks: 77.6-77.5°F. Sample for iron filtered clear when collected. Field cond. 63,000. Sample description tab reveals sample collector wrote over original figures. Field cond. of 63,000 seems unreliable.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)	14	--	Bicarbonate (HCO_3)	326	5.34
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) Diss. (ug/l)	1,200	--			
Zinc (Zn) (ug/l)	810	--	Sulfate (SO_4)	2,600	54.13
			Chloride (Cl)	8,700	245.43
			Fluoride (F)	1.7	.09
Calcium (Ca)	1,200	59.88			
Magnesium (Mg)	340	27.97	Nitrate (NO_3)	.2	.00
Sodium (Na)	5,100	221.85			
Potassium (K)	140	3.58			
Total		313.28	Total		304.99

0011169053

	mg/l		
		Specific conductance (micromhos at 25° C)	26,400
Dissolved solids: Calculated	18,200	pH	7.4
Residue on evaporation at 180°C	19,400	Color	2
Hardness as $CaCO_3$	4,400	Density at 20°C.	1.017
Noncarbonate	4,100		

Lab. No. Col 56778 Field No. Project KY WRD GW - BRINE

-145 DVD

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW
Permit #24576

WATER ANALYSIS

10-U-44

Location Louisville, Kentucky (381308N-0855027.1) 972'FSL X 2163 FWL Datum Elev 465 KB County Jefferson
Source Drilled well DuPont #1 (WAD) Depth (ft) 6,008 Diam (in.)
Cased to (ft) Date drilled May 17, 1971 Point of coll. Drill pipe DST #9
Owner E. I. Dupont, Louisville, Kentucky
Treatment Use
WBF Simon sandstone, 5408-6008 WL Yield
Temp (°C) Appear. when coll. Turbid, reddish color
Collected May 21, 1971 By Charles Sherman
Remarks $130^{\circ}F$. est. after 2 days. Drill stem test. Field cond. 130,000. Mud filtered from sample.

	mg/l	me/l		mg/l	me/l
Silica (SiO_2)			Bicarbonate (HCO_3)	0	0.00
Aluminum (Al)			Carbonate (CO_3)	0	.00
Iron (Fe) (ug/l)	76,000	--			
Zinc (Zn) (ug/l)	42,000	--	Sulfate (SO_4)	510	10.62
			Chloride (Cl)	130,000	3667.30
			Fluoride (F)	6.5	.34
			Iodide (I)	11	.09
Calcium (Ca)	25,000	1247.50	Bromide (Br)	ND*	
Magnesium (Mg)	3,100	255.01	Nitrate (NO_3)		
Sodium (Na)	47,000	2044.50			
Potassium (K)	1,500	38.36			
Total		3585.37	Total		3678.26

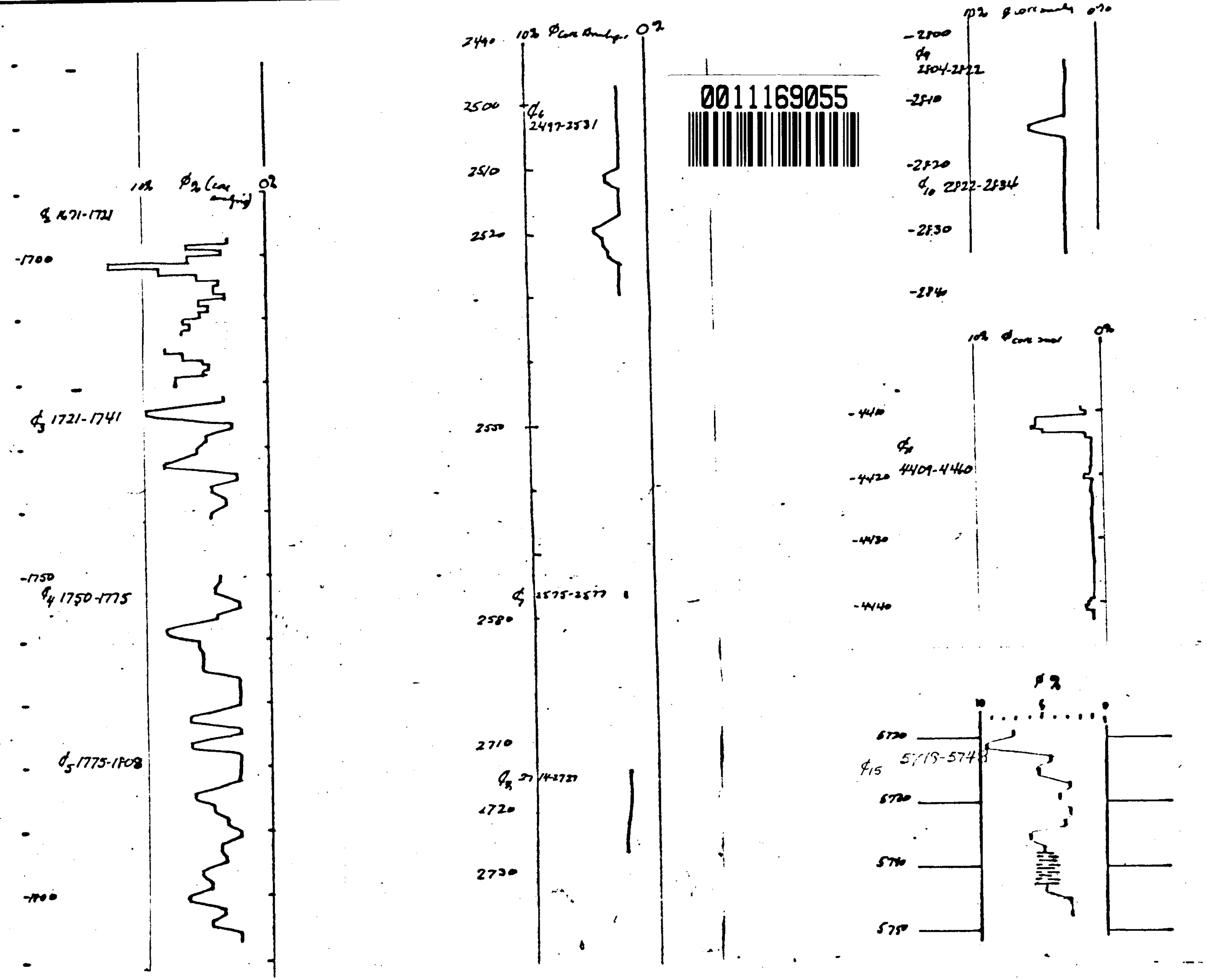
0011169054

	mg/l		
		Specific conductance (micromhos at 25° C)	150,000
Dissolved solids:			
Calculated	207,000	pH	3.7
Residue on evaporation at 180° C	212,000		
Hardness as $CaCO_3$	75,000	Color	3
Noncarbonate	75,000	Density at 20°C.	1.140

Lab. No. Col 57537 Field No. Project KY WRD GW - BRINE

ok MTT

CORE ANALYSIS VS. LOG INTERPRETATION, DUPONT #1(WAD) Jefferson County, Ky. 10-U-44



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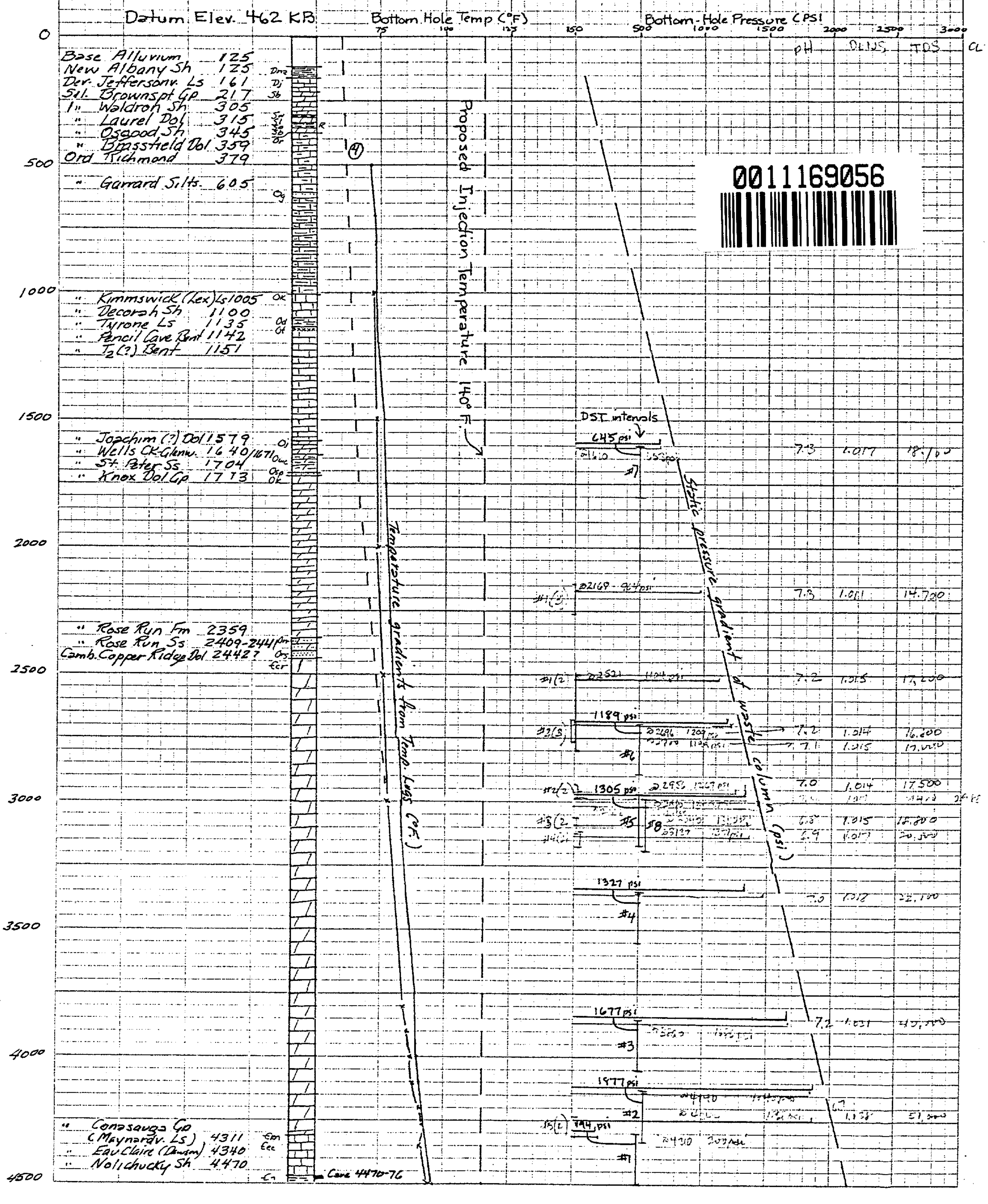
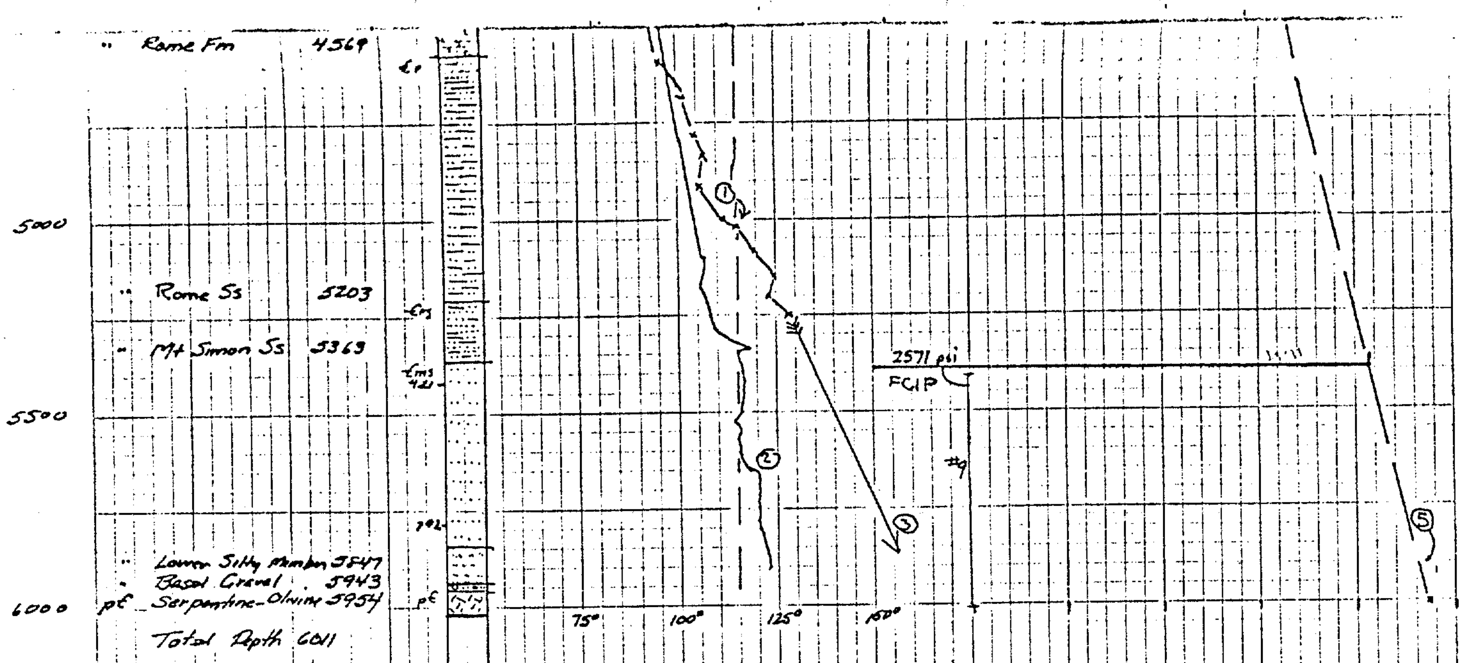
Jefferson County, Ky. 11-U-44

SUBSURFACE ENVIRONMENTS IN DUPONT #1-WDW



10 Squares to the Inch



① Temp Log #1 36'-5244', 3-31-71 at temporary TD 5338', hole flowing sulfur water prob. from zones 2195, 2570, and/or 2984.

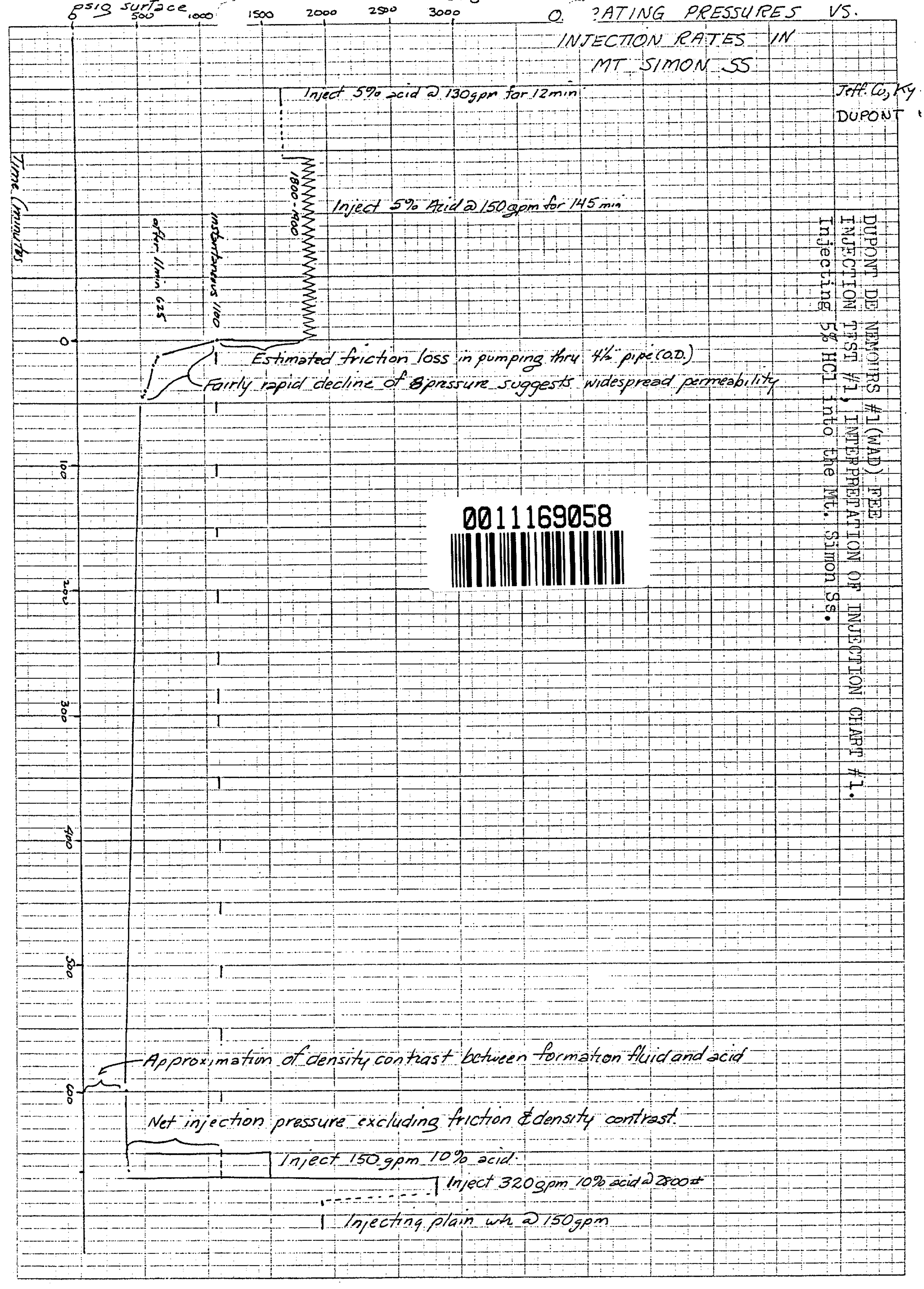
② Temp Log #2 450'-5897', 6-18-71 after Injection Test #4 into Mt. Simon Ss of 6-12-71

③ Projected BHT unaffected by injected cool fluids.

④ Presumed gradient without water flows from 2000-3000'

⑤ Static BHP gradient for waste density of 1.106 (@6000', BHP is 2874 psi

Figure 2



10 Squares to the Inch

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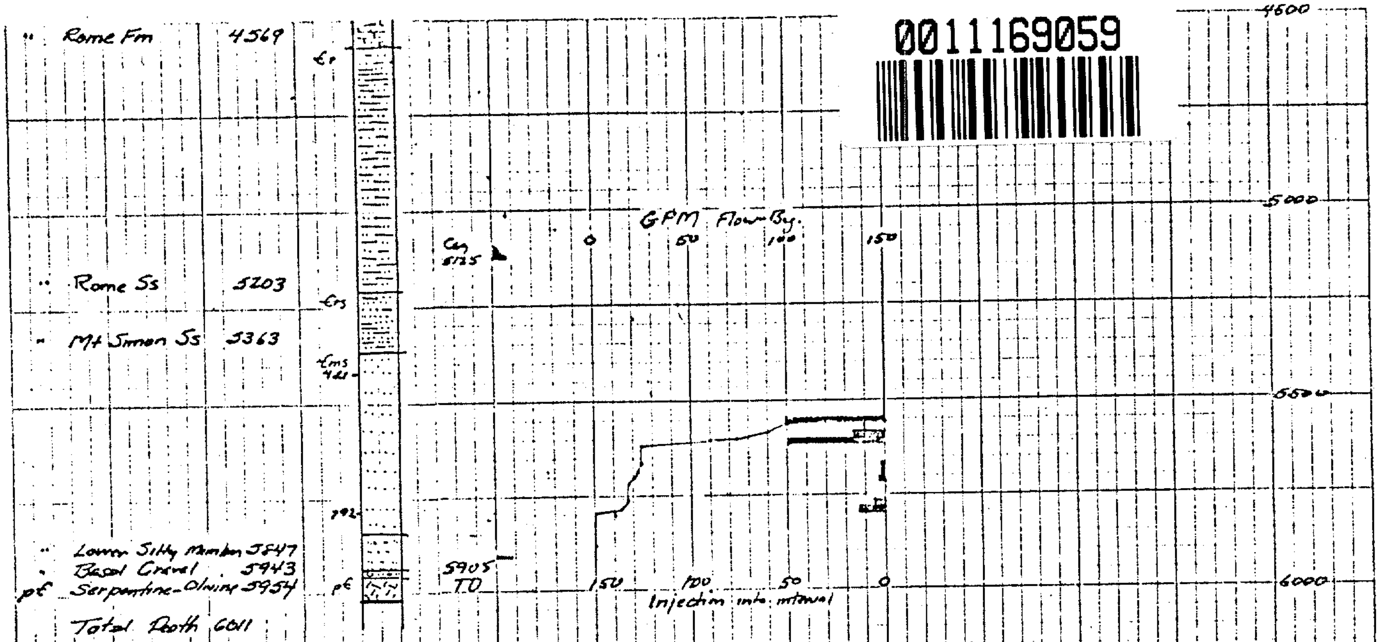


INJECTION TEST #5. Inject 150gpm fresh water into Mt. Simon Ss 5125-5905
@ 1800psig for 2 hrs 45 mins. Schlum GR-R/A Survey summary below

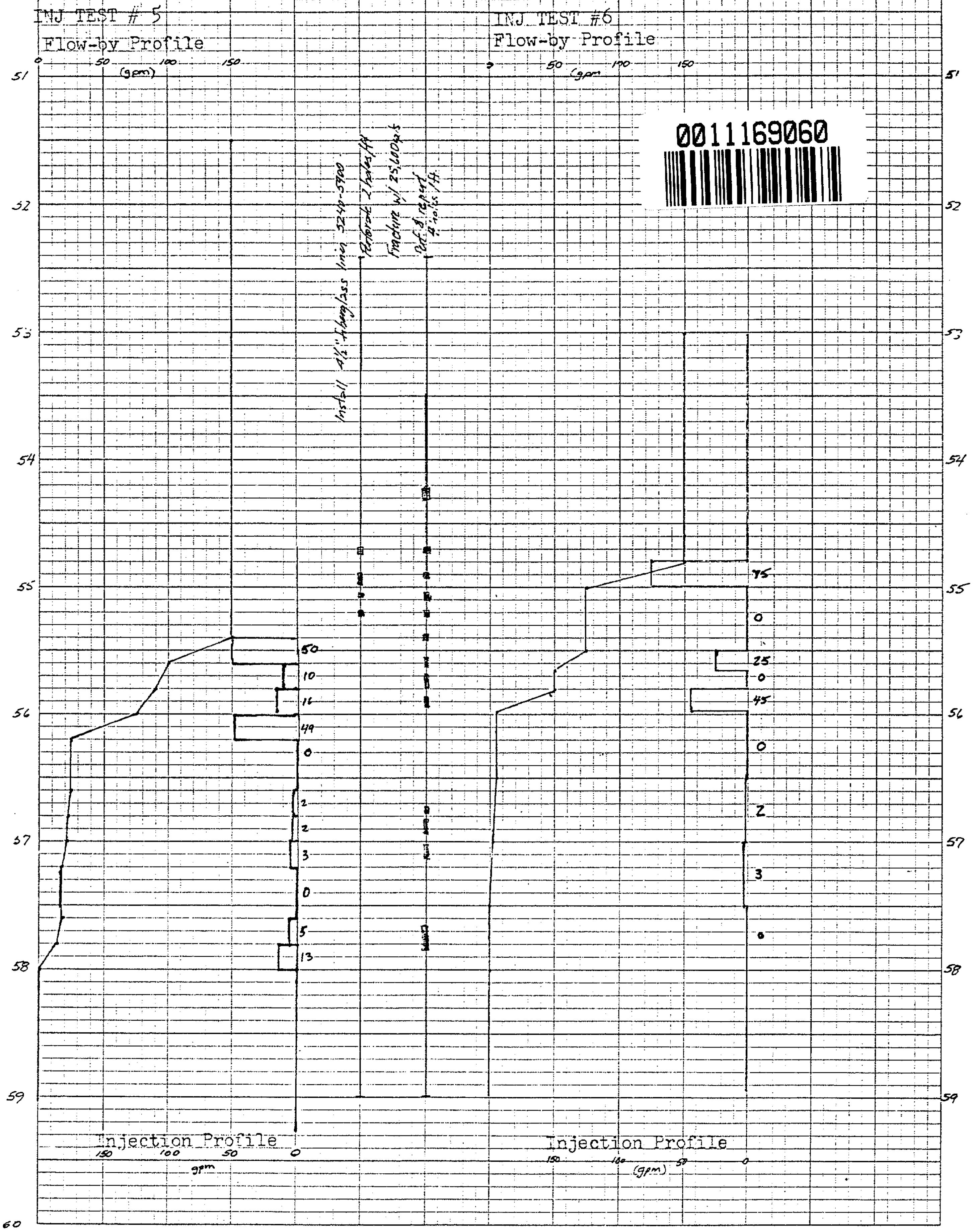
@ Depth(ft)	Flow-by rate(gpm)	Interval	Injection rate (gpm)
5150	150		
5540	150		
5560	100	5540-5560	50
5580	90	5560-5580	10
5600	74	5580-5600	16
5620	25	5600-5620	49
5660	25	5620-5660	0
5680	23	5660-5680	2
5700	21	5680-5700	2
5720	18	5700-5720	3
5760	18	5720-5760	0
5780	13	5760-5780	5
5800	0	5780-5800	13
5895	0	5800-5895	0

INJECTION TEST #6. Inject 150gpm freshwater into Mt. Simon through perforations
in liner, after fracturing.

@ Depth (ft)	Flow-by rate(gpm)	Interval	Injection rate(gpm)
5300	150		
5460	150		
5480	150	5460-5480	0
5500	75	5480-5500	75
5550	75	5500-5550	0
5565	50	5550-5565	25
5580	50	5565-5580	0
5598	5	5580-5598	45
5650	5	5598-5650	0
5700	3	5650-5700	2
5750	0	5700-5750	3
5800	0	5750-5800	0

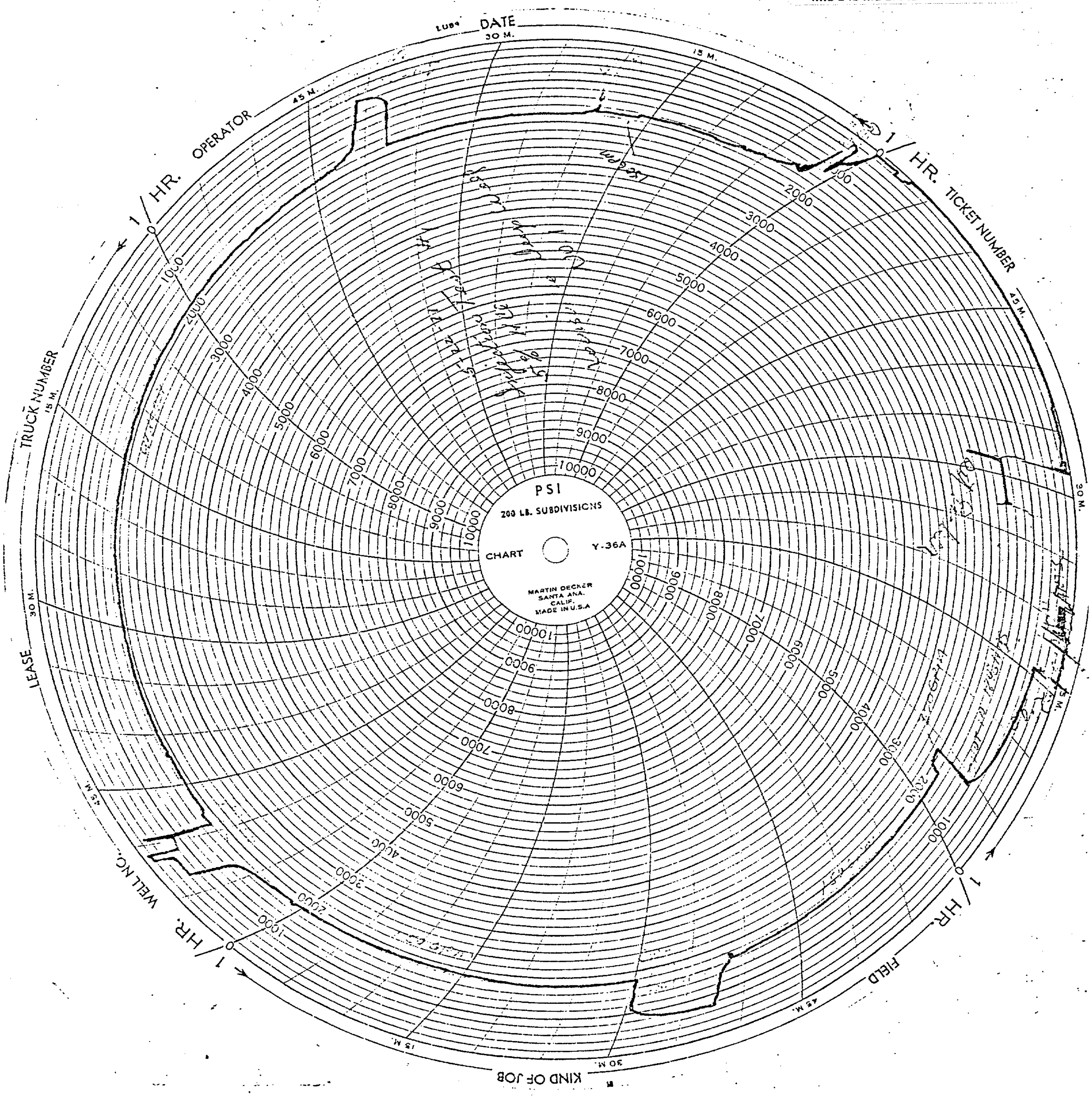
DuPont de Nemours #1(...D) FEE

INJECTION TESTS OF MT. SIMON SS BEFORE & AFTER FRACTURING



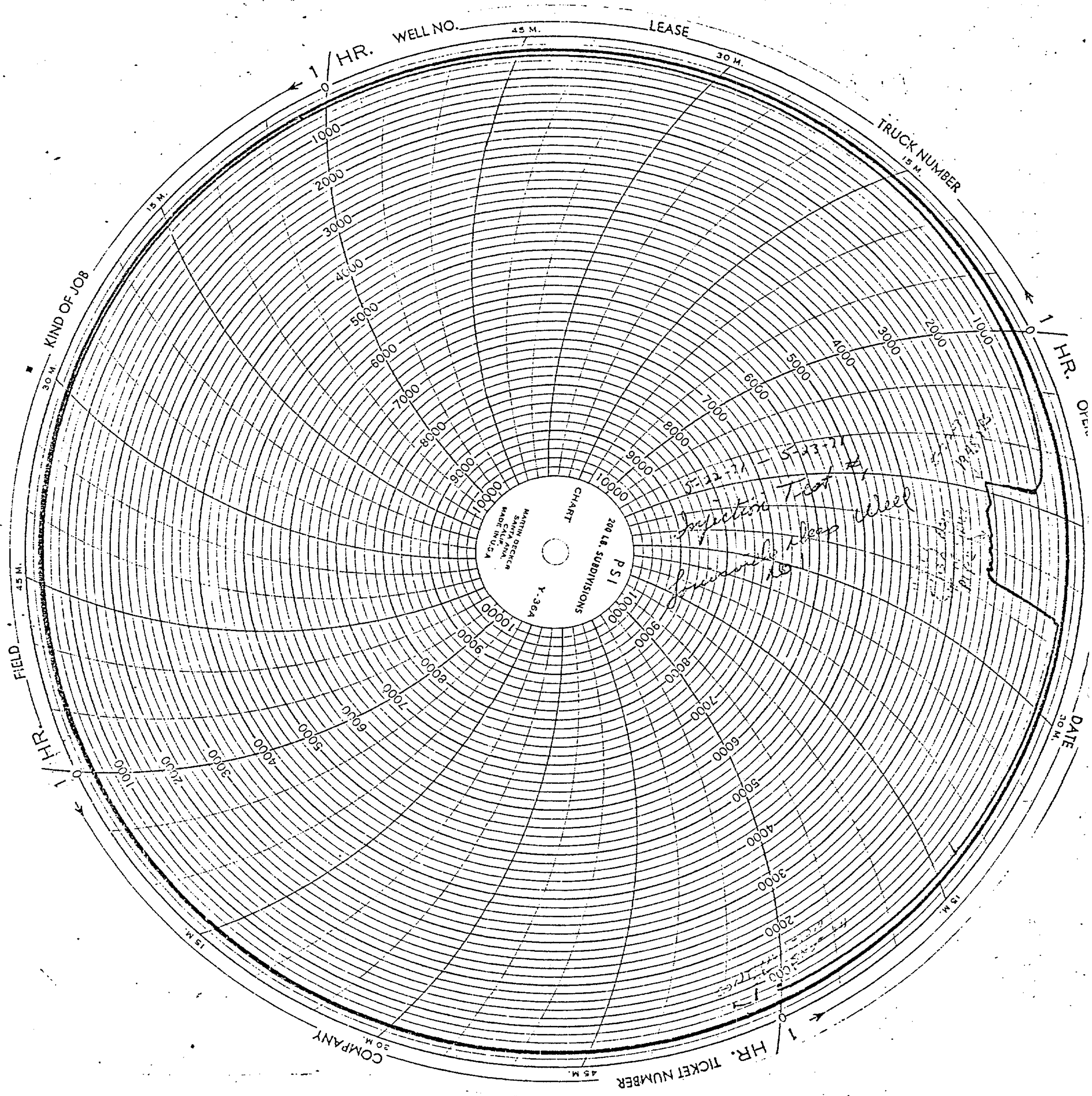
DuPont #1(WAD) Injection Test #1 pg 1 of 2

0011169061



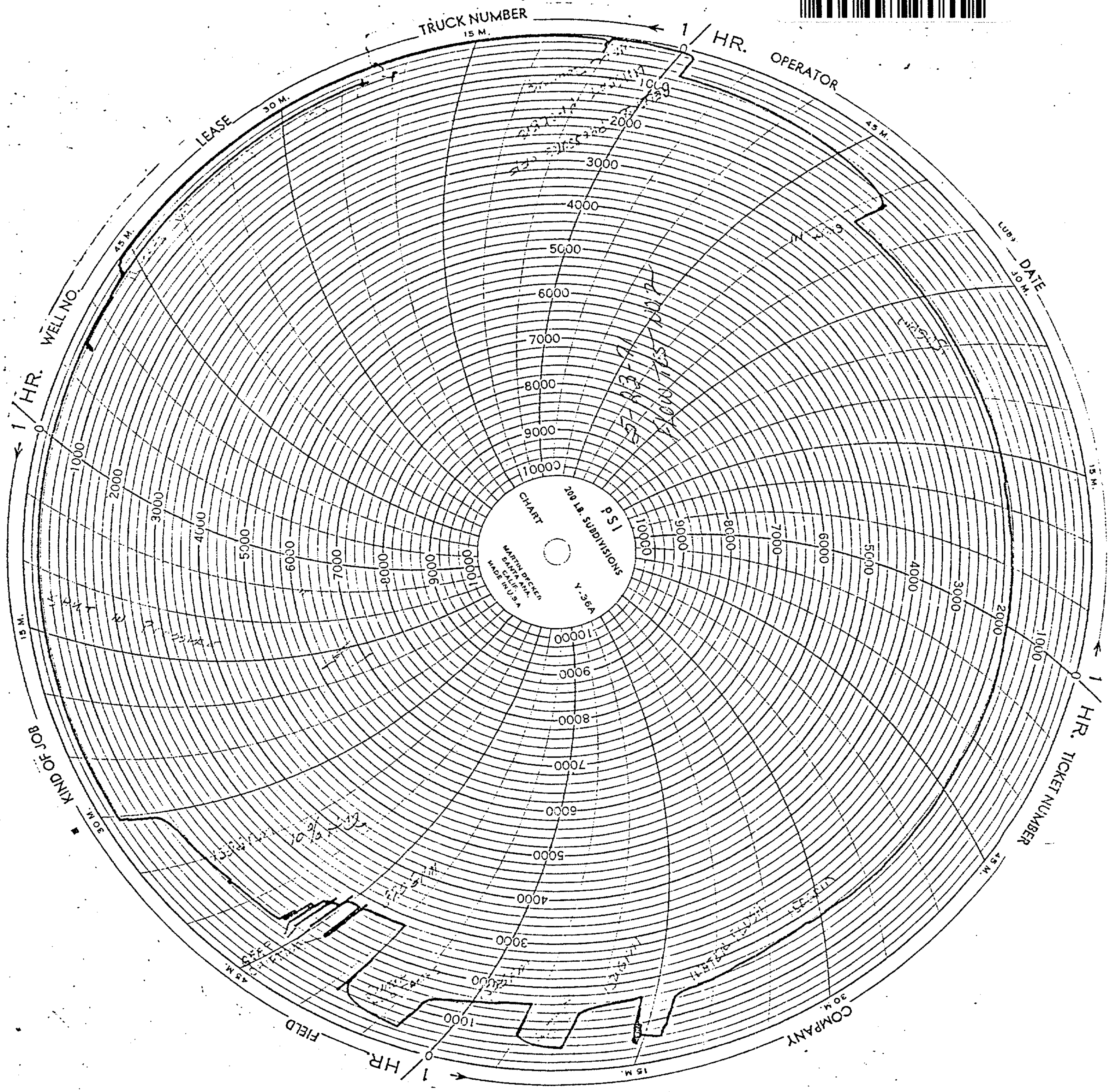
DuPont #1(WAD) Injection Test #1 pg 2 of 2

0011169062



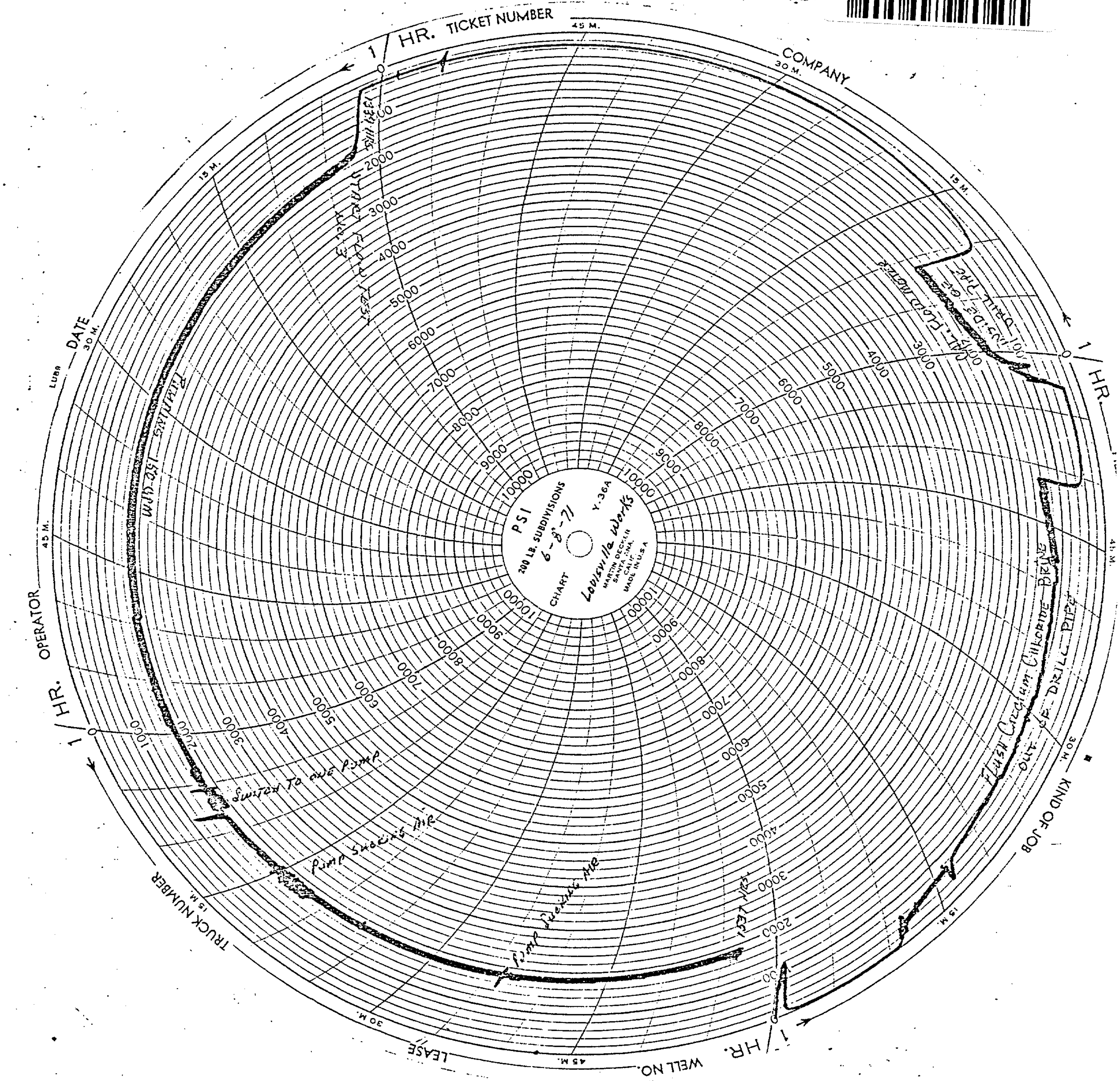
DuPont #1(WAD) Injection Test #2

0011169063



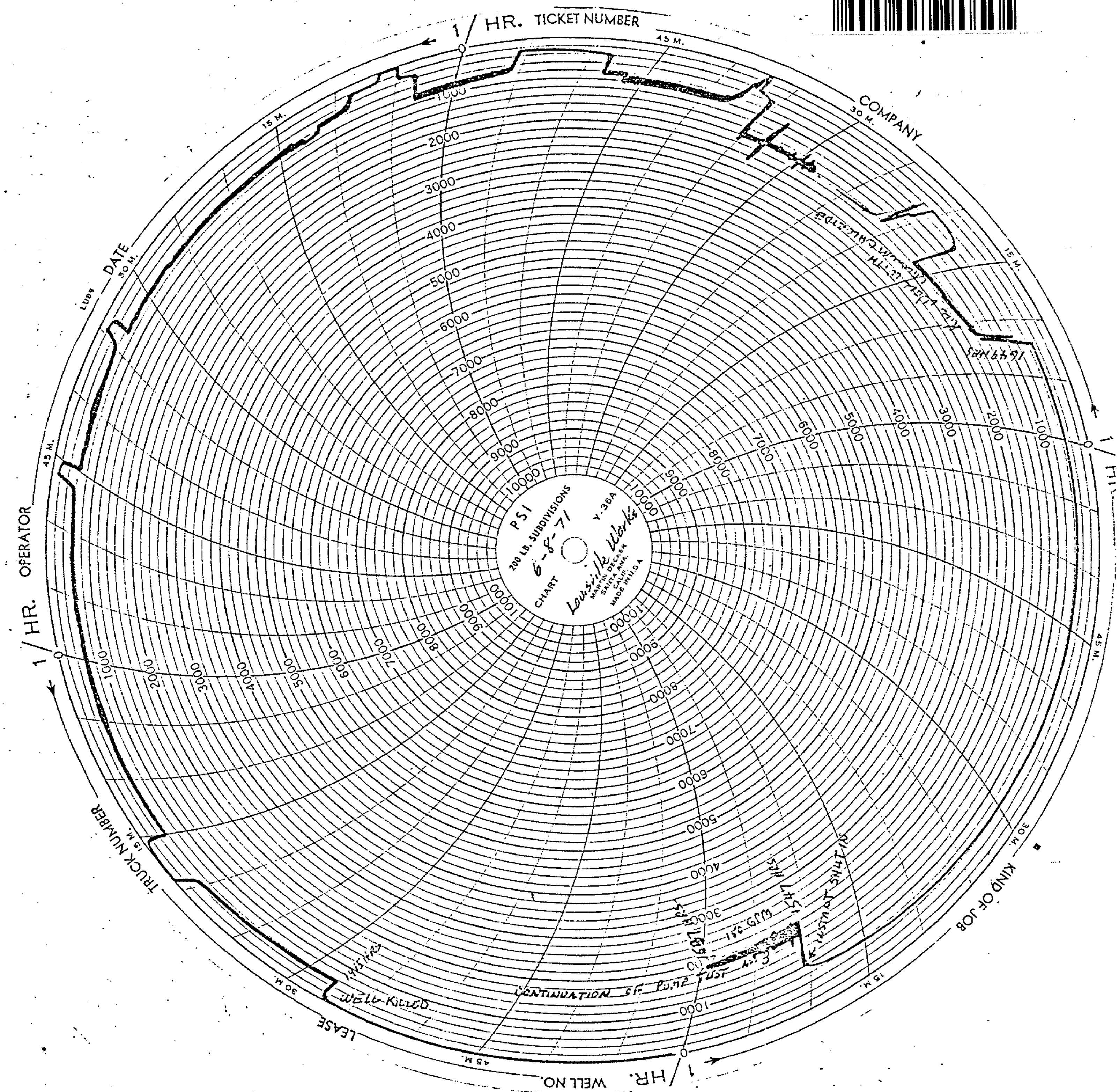
DuPont #1(WAD) Injection Test #3 pg 1 of 2

0011169064



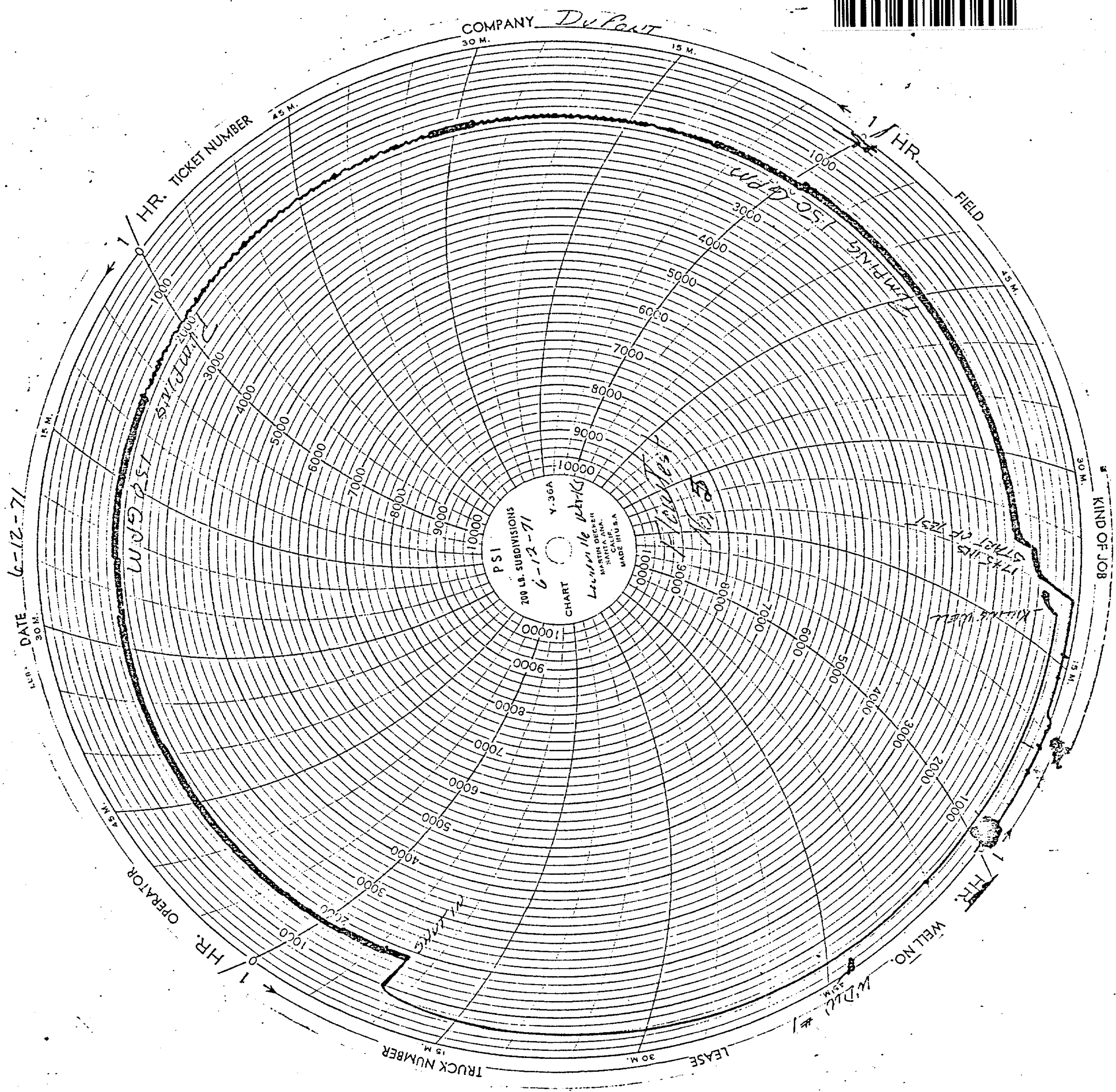
DuPont #1(WAD) Injection Test #3 pg 2 of 2

0011169065



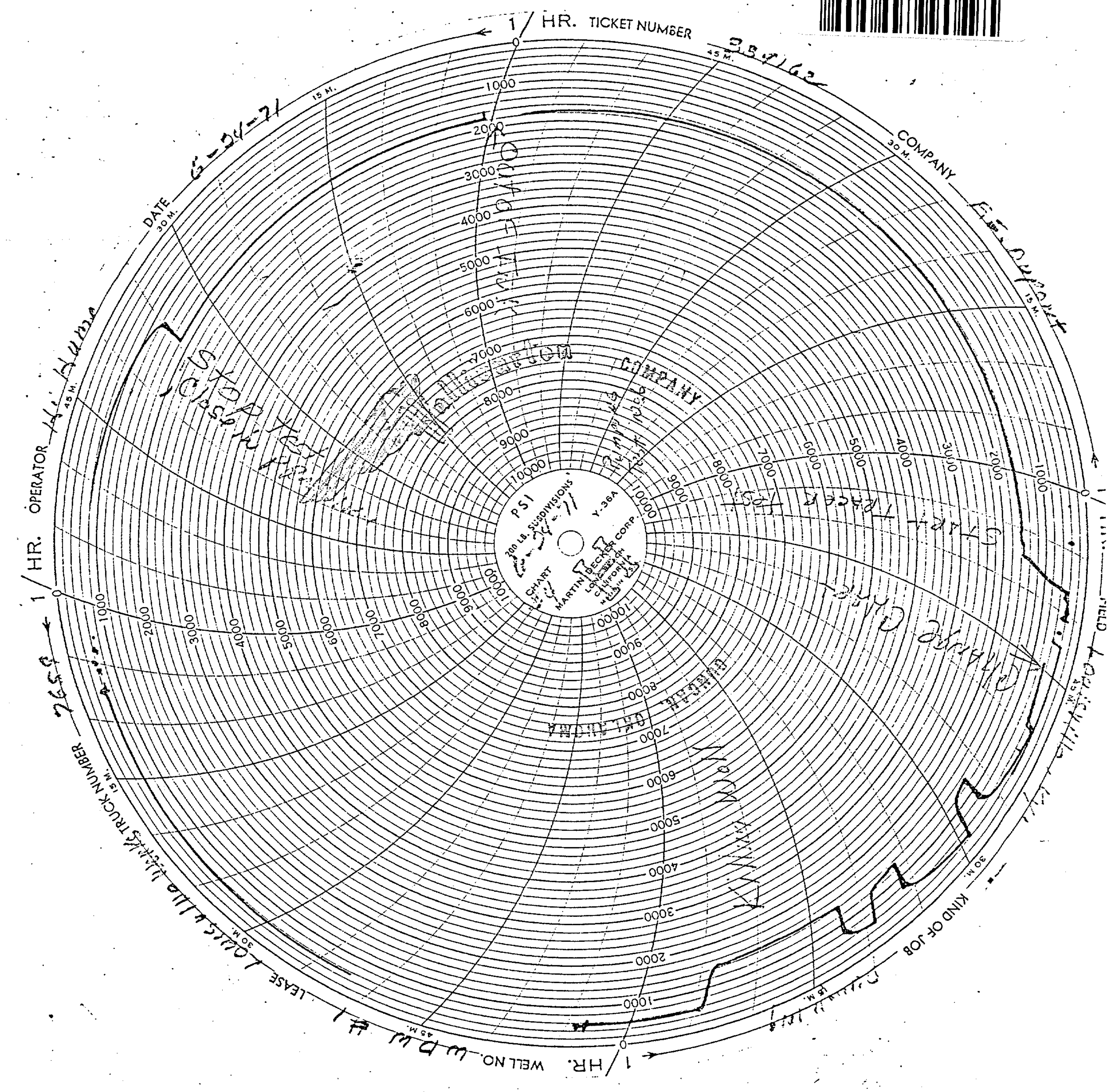
DuPont #1(WAD) Injection Test #5

0011169066



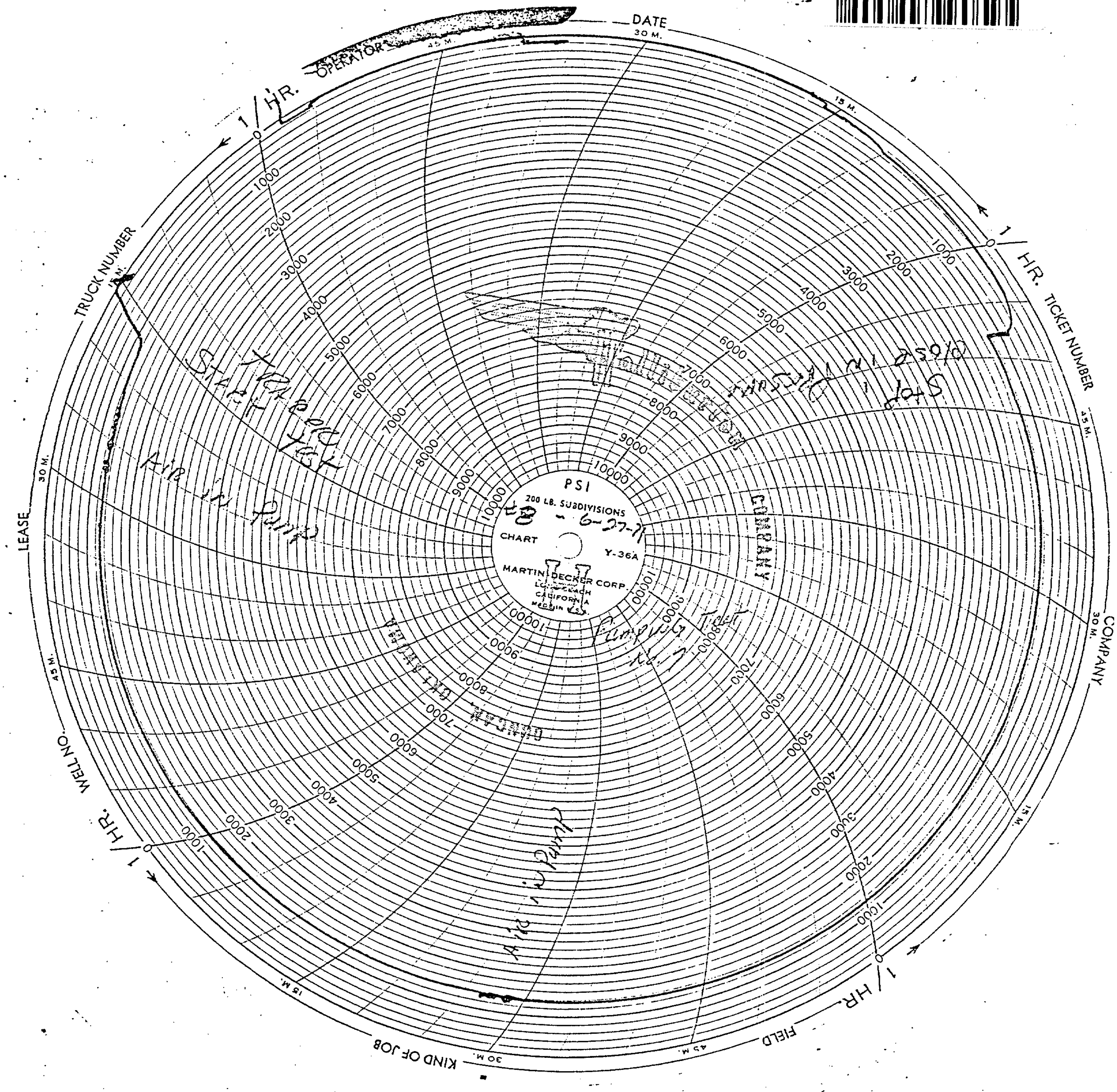
DuPont #1(WAD) Injection Test #6

0011169067



DuPont #1(WAP) Injection Test #7

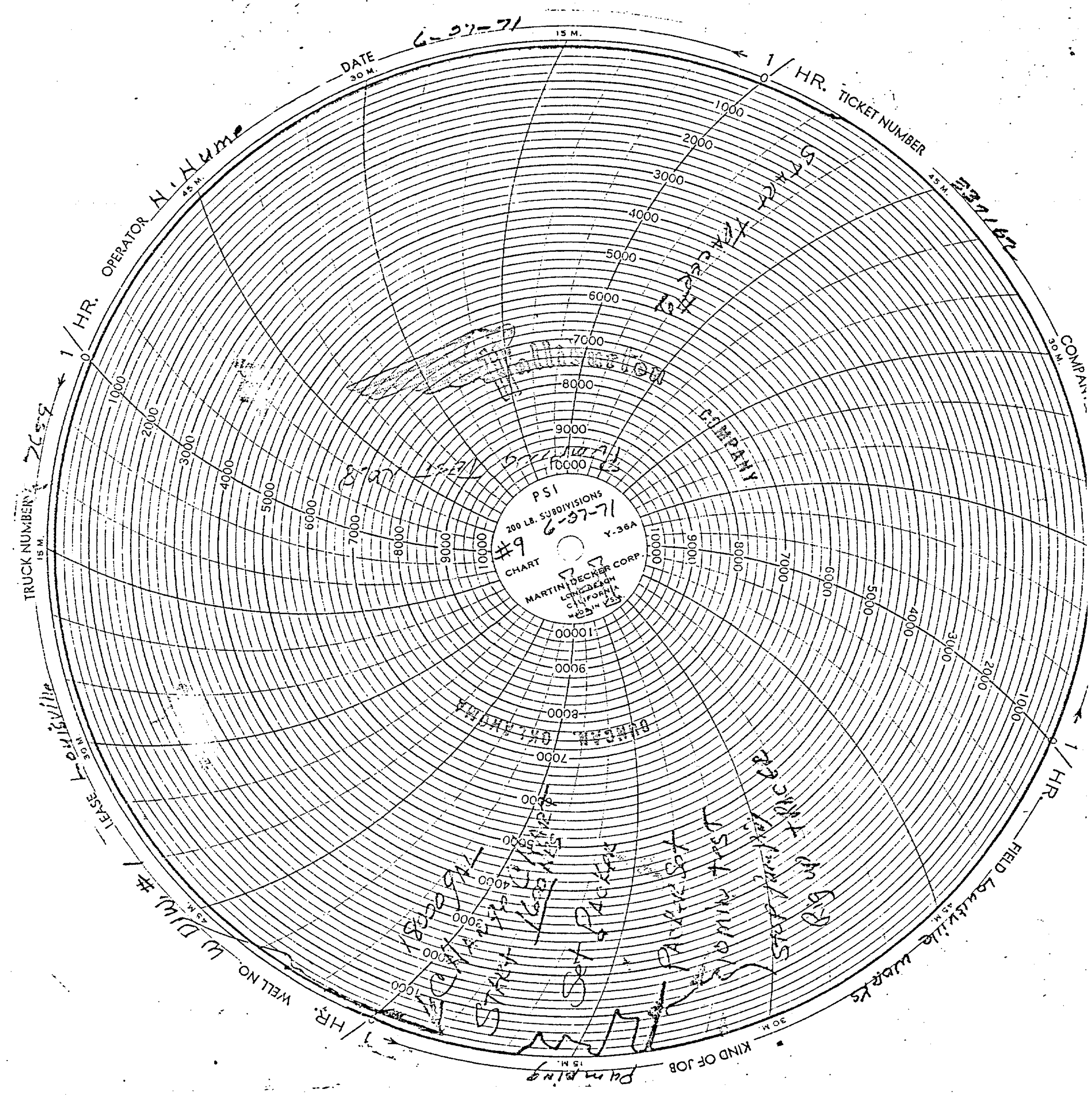
0011169068



Inj T. #7

DuPont #1(WAD) Injection Test #8 pg 1 of 2

0011169069



DuPont #1(WAD) Injection Test #8 pg 2 of 2

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