Monsanto

DETERGENT/MATERIAL DIVISION

Monsanto Chemical Company
P.O. Box 816
Soda Springs, Idaho 83276
Phone: (208) 547-3391

April 3, 1987

Mr. Jeffrey M. Whidden
Field Investigator
Ecology and Environment, Inc.
101 Yesler, 6th Floor
Seattle, Washington 98104

Dear Jeff,

During your visit to our facility on March 23, 1987, Tim Oliver agreed to provide you with the following information in order for you to complete the CERCLA site inspection:

I. Summary of Regional Geology and Hydrology

II. Water Flow Contour Maps of Plant Site.

III. Groundwater Information

a) Construction and lithologic diagrams of plant perimeter monitoring wells. Test wells 30, 41 and plant well 3 which is the primary production well for process and drinking water.

b) Two year analysis record of the above wells.

IV. Analysis Record of Effluent Discharge Water.

V. Diagram of Plant with Ponds Identified.

VI. Petroleum Storage Tank Inventory.

a) Above ground tanks.

b) Underground tanks all having been removed prior to the May 8, 1986 reporting deadline.

VII. Approximate volumes of asbestos, solvents and waste oil disposed of on site, during last 5 years.

6283

rlg33/RLG

DUPLICATE

VIII. Results of EP Toxicity Test for Slag.

IX. Name and Address of Previous Landowner.

X. Photos taken During Inspection Visit

As was discussed during your inspection, Monsanto would like the opportunity to review your inspection report prior to it being submitted to the EPA. A letter directed to Ms. Deborah Flood of the EPA will be sent outlining this request.

I might also mention that since your inspection, Tim Oliver has resigned his position with Monsanto. I will be able to assist in providing any future information that you may require.

Regards,

R. L. Geddes

RLG/jw

cc: J. P. Hyland - G4WT
K. V. Lott
C. M. McCullough

rlg33/RLG

2.2 Geology

2.2.1 Geological Setting

The Monsanto plant at Soda Springs, Idaho, is located at the southern end of the Blackfoot Lava Field in Southeastern Idaho, Figure 2.1a. The Blackfoot Lava Field occupies a generally north-northwest to south-southeast trending basin bordered on the west by the Chesterfield Range and the Soda Springs Hills, and to the east by the Aspen Range. The average elevation of the basin floor is approximately 6100 ft. Elevations of the surrounding ranges vary from over 6800 ft to nearly 7400 ft. A few scattered topographic highs occur on the basin floor as cinder cones, rhyolite domes, or up-faulted blocks. China Hat (a rhyolite dome), located at the north end of the Blackfoot Lava Field, is the most prominant topographic feature in the basin, with a summit elevation of 7164 ft. Threemile Knoll, located immediately northeast of the site appears to be an up-faulted block (horst structure). The knoll has a summit elevation of 6475 ft.

2.2.2 Stratigraphy

2.2.2.1 Regional

The Blackfoot Lava Field (Figure 2.1a) is a thick sequence of basalts of probable mid-Pleistocene age. Well logs indicate the basalt to be at least several hundred feet thick in the center of the Field, but thinning at the edge of the Field where the basalt laps onto older rocks (e.g. Threemile Knoll). Armstrong (1969) and Mabey and Oriel (1970) indicate that the basalt may be locally as much as 1000 ft thick.

The basalt lies unconformably over the Salt Lake Formation of Tertiary age (Armstrong, 1969). This formation is known to consist of sandstones, conglomerates and limestones, all of which may be tuffaceous.

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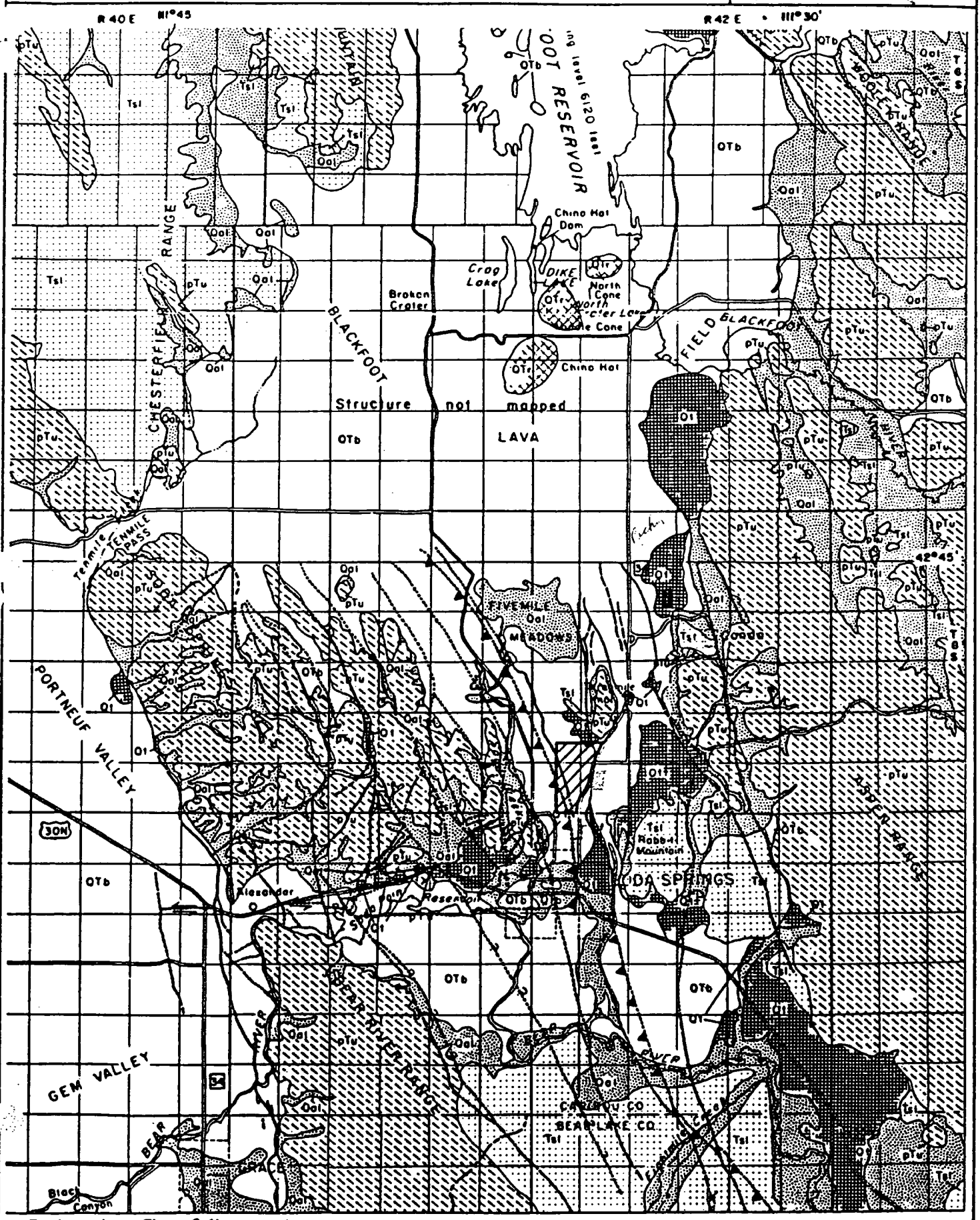
GEOLOGY OF THE SODA SPRINGS REGION

Figure 2.1a



For legend see Figure 2.1b

0 1 2 3 4 5 MILES

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LEGEND FOR GEOLOGY MAP

Figure 2.1b

STRATIGRAPHY

EXPLANATION

QUATERNARY

- Qal — Alluvium
- Ql — Tufa

TERTIARY AND QUATERNARY

- QTb — Basalt
- QT — Rhyolite

TERTIARY

- Tsl — Salt Lake Formation

PRE-TERTIARY

- pTu — Bedrock, undifferentiated

Contact

Fault

Dashed where approximately located or inferred; dotted where covered; queried where doubtful.

Concealed thrust fault

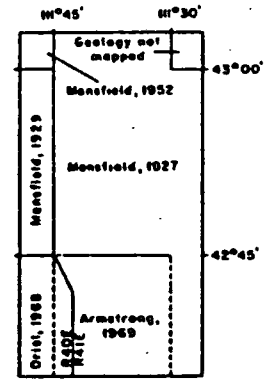
Sawteeth on side of upper plate

Linear feature on photograph

May coincide with or be extensions of mapped faults; all are interpreted as faults

MONSANTO PLANT SITE

MAP INDEX



INDEX TO GEOLOGIC MAPPING (NOT TO SCALE)

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Source: United States Dept. of Interior, Geological Survey and Idaho Dept. of Water Administration. Map modified from Dion, 1974.

PROJECT NO. 842-1543 DRAWN - REVIEWED DATE June 85

The Salt Lake Formation in turn overlies rocks of Permian and Carboniferous age. These older rocks are exposed along the flanks of the Blackfoot Lava Field: limestones and sandstones of the Chesterfield Range Group to the west and the calcareous sandstones and limestones of the Wells Formation to the east (Aspen Range). A generalized stratigraphic column for the Bear River Range of Southeastern Idaho is shown in Table 2.1.

2.2.2.2 Local

Subsurface data from well drilling carried out prior to 1984 at the Monsanto plant site indicates that the site is underlain by 3 to 18 ft of clayey overburden. Beneath the overburden, possibly four distinct basalt flows totalling nearly 240 ft are present. The basalt flows appear to be separated by 2 to 10 ft thick cinder zones. Individual basalt flows appear to range from nearly 100 ft thick to less than 10 ft thick. Data from TW1 and TW2 indicate that the basalt thins towards the northeast as it laps onto Threemile Knoll. Test well TW2 encountered 224 ft of basalt and cinders overlying "a white and yellow formation", inferred to represent the Salt Lake Formation. TW1 encountered 45 ft of basalt and cinders overlying 255 ft of sandstone, shale and clay.

2.2.3 Structural Geology

2.2.3.1 Regional

The study area is situated in a transition zone between two distinct structural geological provinces. To the east lies the overthrust belt which is part of the Cordilleran Mountain system in Western Wyoming, Southeastern Idaho and Northern Utah. The overthrust belt is characterized by folds overturned to the east and gently west dipping thrust faults. The structural province to the west is the Basin and Range Province, which extends to Eastern California and Oregon. The Basin and Range Province is characterized by generally north striking, high angle normal faults which have produced major horst ranges and graben valleys.

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TABLE 2.1

STRATIGRAPHIC COLUMN FOR BEAR RIVER RANGE AND SURROUNDING AREAS, SOUTHEASTERN IDAHO

(After Ralston et al., 1983)

SYSTEM	GROUP OR FORMATION	THICKNESS (m)	LITHOLOGY
Quaternary	Stream alluvium Terrace gravels Landslide debris Alluvial fan deposits Coluvium Diamictite	0-100	Unconsolidated, well to poorly sorted, gravel, sand, silt and clay.
	Travertine		
	Gentile Valley Group Gem Valley basalt	0-1000(?)	Dark grey, vesicular, porphyritic, massive olivine basalt.
	Basalt cinders		Loose scoriaceous red-weathering cinders.
	Main Canyon formation	0-20	Poorly consolidated silt and marl, grades into sand and gravel.
	Lake Bonneville Group Provo Formation	0-30	Unconsolidated gravel and sand deposited along shoreline of Lake Bonneville in the Provo stage.
	Pink silt	?	Unconsolidated, thinly bedded silt and clay in deeper parts of Lake Bonneville.
	Bonneville and Alpine Formations, undifferentiated	0-30	Poorly consolidated gravel and sand deposited along shoreline of Lake Bonneville in the Alpine and Bonneville stages.
	Rhyolite domes	?	Tan weathering, partly devitrified glass, Quarternary and Tertiary.
Tertiary	Salt Lake Formation	0-3000(?)	Conglomerate, volcanic ash, marl, calcareous clay and sandstone.
	Wasatch Formation	0-450	Red conglomerate and sandstone interbedded with tan limestone.
Upper Jurassic	Stump Formation	50-100	Grey-green silty limestone, calcareous siltstone and sandstone.
	Pruess Formation	0-200	Red shaley sandstone and siltstone.
	Stump/Pruess Formations, undifferentiated		
Middle Jurassic	Twin Creek Formation	200-500	Dark grey shaley limestone, oolitic limestone and siltstone.
Lower Jurassic	Nugget Formation	100-500	Reddish-brown, well-sorted, fine grained sandstone.
Upper Triassic	Ankareh Formation	90-200	Red calcareous shale and siltstone.
Lower Triassic	Thaynes Formation	250-300	Upper Member - grey limestone interbedded with brownish-grey siltstone; Middle Member - brownish-grey siltstone and silty limestone; Lower Member - black to grey shale and siltstone.
	Woodside Formation	100-400	Reddish-brown siltstone and shale.
	Dinwoody Formation	100-600	Upper Member - grey limestone interbedded with olive-brown siltstone; Lower Member - olive-brown calcareous siltstone interbedded with grey limestone.
Permian	Phosphoria Formation	70-100	Rex Chert Member - black to white chert interbedded with black cherty mudstone; Phosphatic Shale Member - dark-brown to black mudstone, limestone and oolitic phosphate rock.
Pennsylvanian	Wells Formation	300-900	Upper Member - light grey to reddish-brown sandstone interbedded with light brown limestone; Lower Member - grey limestone and silty limestone with interbedded sandstone.
Mississippian	Mission Canyon Formation	300-800	Light to dark grey cherty limestone and dolomite.
	Lodgepole Formation	200-400	Dark grey limestone and dolomite.

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2.2.3.2 Local

The plant site is located within a structural depression known as the Bear River Valley graben. A series of north-northwest striking normal faults (Armstrong, 1969; Oriel and Platt, 1980) extend from just south of the Monsanto site to that portion of the Blackfoot Lava Field located between Reservoir Mountains and Blackfoot Reservoir. These normal faults exhibit both west-side-down and east-side-down relative displacements. The westernmost fault within this zone apparently enters the Monsanto site near the northwest property corner and appears to exit the property approximately 600 ft west of the southeast corner. The apparent fault is expressed on the surface as a southwest facing scarp which extends from the southwest corner of Fivemile Meadow southeastwards to an area approximately 1/2 mile south of the site (Figure 2.1a).

Armstrong (1969) indicates that the Monsanto site may be underlain at depth by an extension of the Paris Thrust Fault. The fault apparently does not displace the Pleistocene basalts, nor the underlying Salt Lake Formation.

2.3 Hydrogeology

2.3.1 Hydrogeological Setting

The plant site is located within the Bear River drainage basin. The northern boundary of this drainage basin is the Blackfoot reservoir, located some 12 miles north of the plant site. Soda Creek drains the basin and has its source in the area of Fivemile Meadow, some 3 miles northwest of the Monsanto plant site. Soda Creek drains southwards close to the western edge of the Blackfoot Lava Field, entering Soda Point Reservoir west of the town of Soda Springs. Numerous springs exist on both the eastern and western edge of the Blackfoot Lava Field. Some springs are carbonated and have been termed "soda" by local inhabitants.

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In general, the Pleistocene basalts occupying the valley floor are a very productive aquifer (Dion, 1974), yielding large amounts of ground water (500 to 3000 gpm). The underlying sandstone, conglomerate and limestones of the Salt Lake Formation and the surrounding Permian and Carboniferous rocks yield varying amounts of ground water (0 to 1500 gpm) but are highly unpredictable as a source for water supply.

2.3.2 Regional Ground Water Systems

Studies by Dion (1974), Hutsinpiller (1979), Ralston et al. (1983) and Seitz et al. (1979) have inferred three dominant flow systems in the Soda Springs region. The three flow systems are:

(1) The Shallow Ground Water System moving locally through the upper elevations of the basaltic lithologies,

(2) The Mead Thrust Aquifer System which discharges along the eastern margins of the valley, and

(3) The Chesterfield Range Aquifer System which discharges along the western portions of the valley.

Each flow system passes through unique stratigraphy and has different contact time with the rock and, as a result, has unique hydrochemical characteristics.

2.3.2.1 Shallow Ground Water System

This system flows through the upper stratigraphic unit of the basalts and surficial Quaternary alluvium. Ground water flow within the basalts is considered to be principally between the individual lava flows, where rubbly cinder zones or interflow sediments at the top of a flow were not filled completely by the succeeding flow. However, fault zones, vertical joints and fractures provide permeable pathways within and between the individual basalt flows. Ground water flow in the alluvial deposits is limited, since the soils are predominantly silty and often unsaturated.

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The shallow ground water system is recharged principally by infiltration of meteoric water and by leakage from the Blackfoot Reservoir. Dion (1974) estimated that approximately 5000 gpm of reservoir water was leaking into the underlying basalt aquifer and moving southward. Discharge from this flow system is to Soda Creek, Soda Point Reservoir and downvalley within the basalt sequence itself towards the Bear River.

The ground water within this flow system comes into contact with surface soils and basaltic stratigraphic units. The water quality is characterized by low dissolved solids (generally <500 mg/l), low P_{CO_2}, moderately oxidizing, calcium/magnesium ratios greater than 1.0 and generally elevated nitrate concentrations (>5 mg/l). The water is considered to be young due to the suspected local flow system and the low total dissolved solids.

2.3.2.2 The Mead Thrust Aquifer System

This system is apparently recharged by precipitation over the mountains to the east of the Monsanto plant site, which include the Aspen Range, Schmid Ridge, Dry Ridge and Webster Range (Ralston et al., 1983). Ground water flow is apparently westward along permeable sedimentary beds with the Mead Thrust Fault possibly acting as a hydraulic conduit for much of the flow. Discharge from the flow system is apparently along the eastern side of the Blackfoot Lava Field via deep, high-angle vertical extension faults. Numerous springs exist on the eastern margin of the Lava Field and, apparently, mixing occurs with ground water of the shallow ground water system.

Carbon 14 dating of spring water obtained from the eastern margin of the Blackfoot Lava Field indicates that the ground water is approximately 10 to 20 thousand years old. The discharging ground water is

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calcium-bicarbonate type (high P_{CO_2}) water which results from the limestone country rock and long contact times. Most of these springs are saturated with respect to calcite. Fluoride ranges from 0.1 to 1.7 mg/l and total dissolved solids range from 600 to 1700 mg/l. (Ralston et al., 1983).

2.3.2.3 The Chesterfield Range Aquifer System

The recharge for this flow system is unknown, but it probably receives recharge from the Chesterfield Range to the west of the Monsanto plant site. These mountains have a dominant limestone lithology, but are not the same formations composing the mountains to the east of the plant site. Ground water within this flow system probably flows eastwards, discharging along the western side of the Blackfoot Lava Field through deep, high-angle vertical extension faults, where it may mix with ground water of the shallow ground water system.

Spring discharges along the western side of the Blackfoot Lava Field are characterized by magnesium-bicarbonate type (high P_{CO_2}) water with dissolved solids contents around 900 to 1300 mg/l. These waters usually contain elevated concentrations of iron (greater than 5 mg/l), have fluoride concentrations of between 0.1 amd 0.4 mg/l, and are weakly oxidizing in nature. Age dating of this water has not been done. However, since the flow system is considered to be regional and the total dissolved solids is relatively high, the water is likely old.

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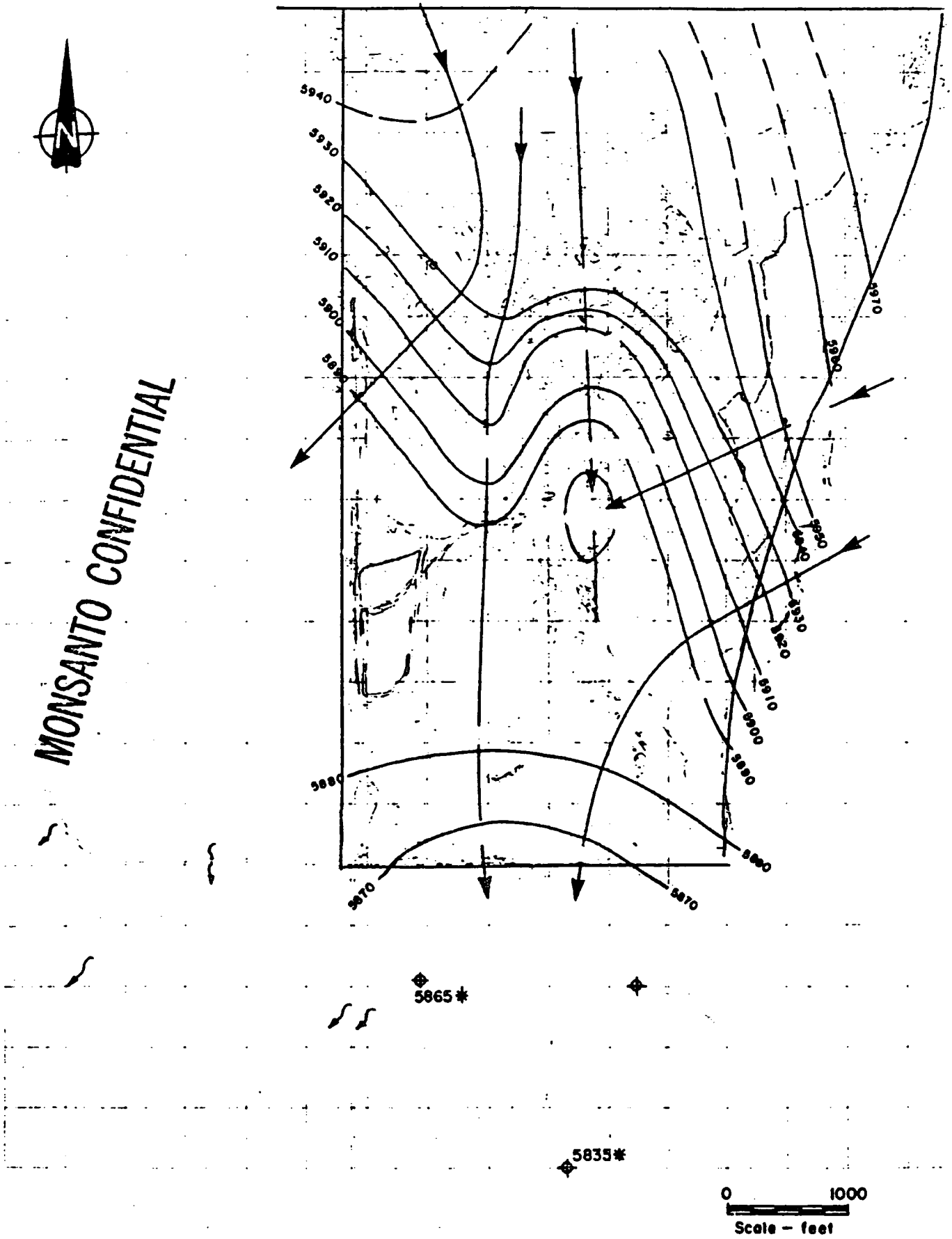
UPPER BASALT ZONE
GROUND WATER FLOW DIRECTIONS
(NO STRUCTURAL INFLUENCE)

Figure 5.8



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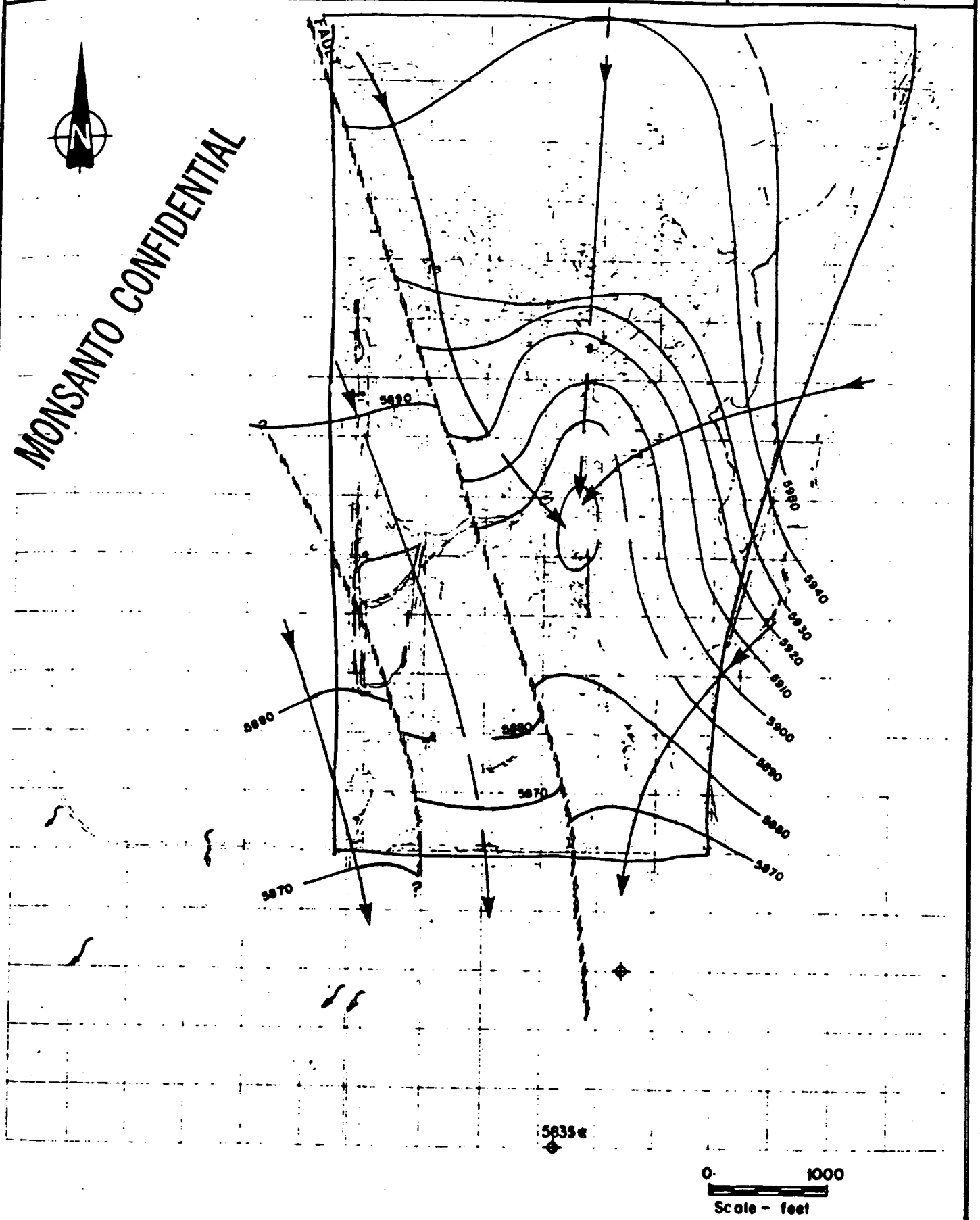
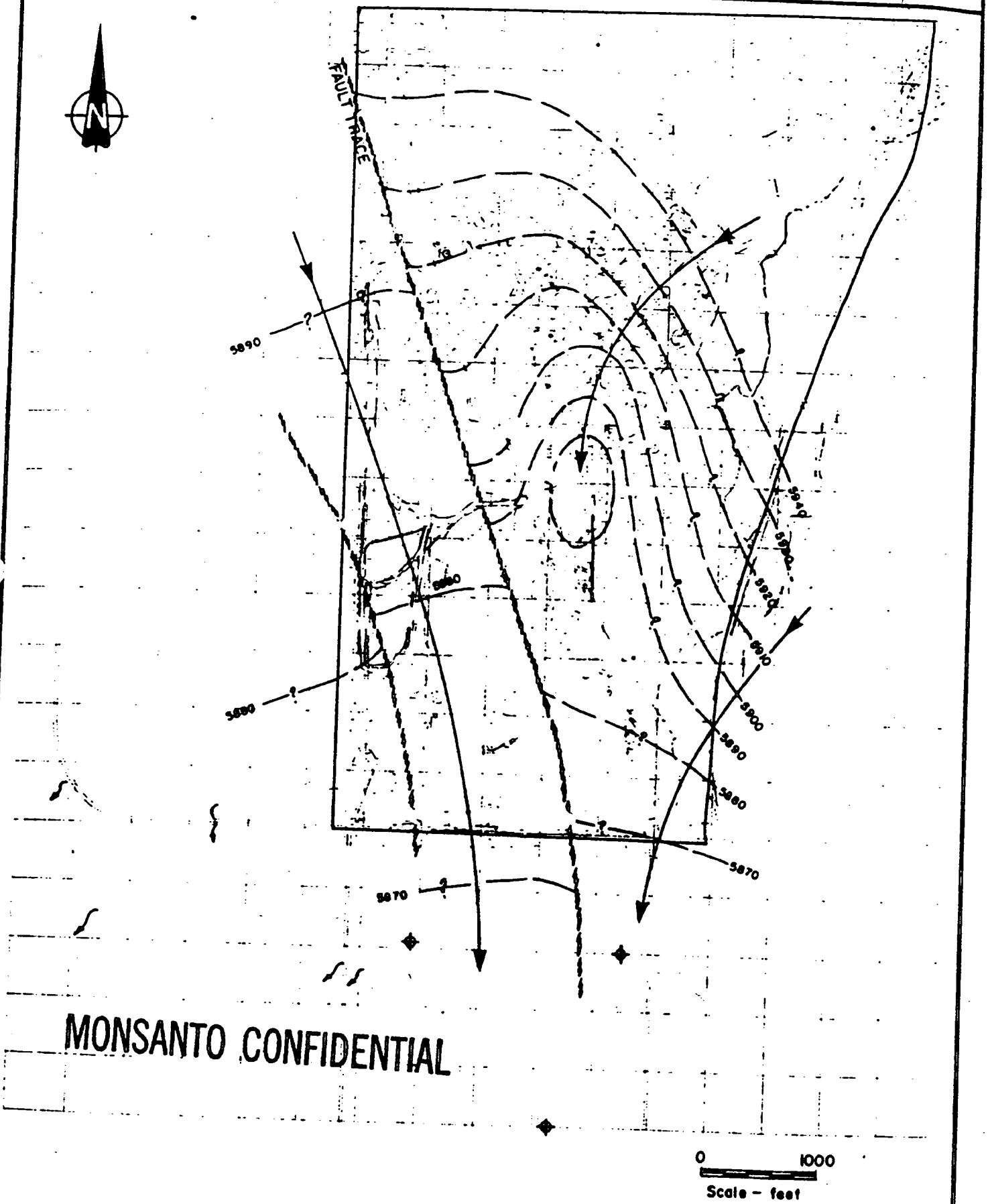
UPPER BASALT ZONE
GROUND WATER FLOW DIRECTIONS
(ASSUMING STRUCTURAL INFLUENCE)

Figure 5.15



LOWER BASALT ZONE GROUNDWATER FLOW DIRECTIONS (ASSUMING STRUCTURAL INFLUENCE)

Figure 5.23



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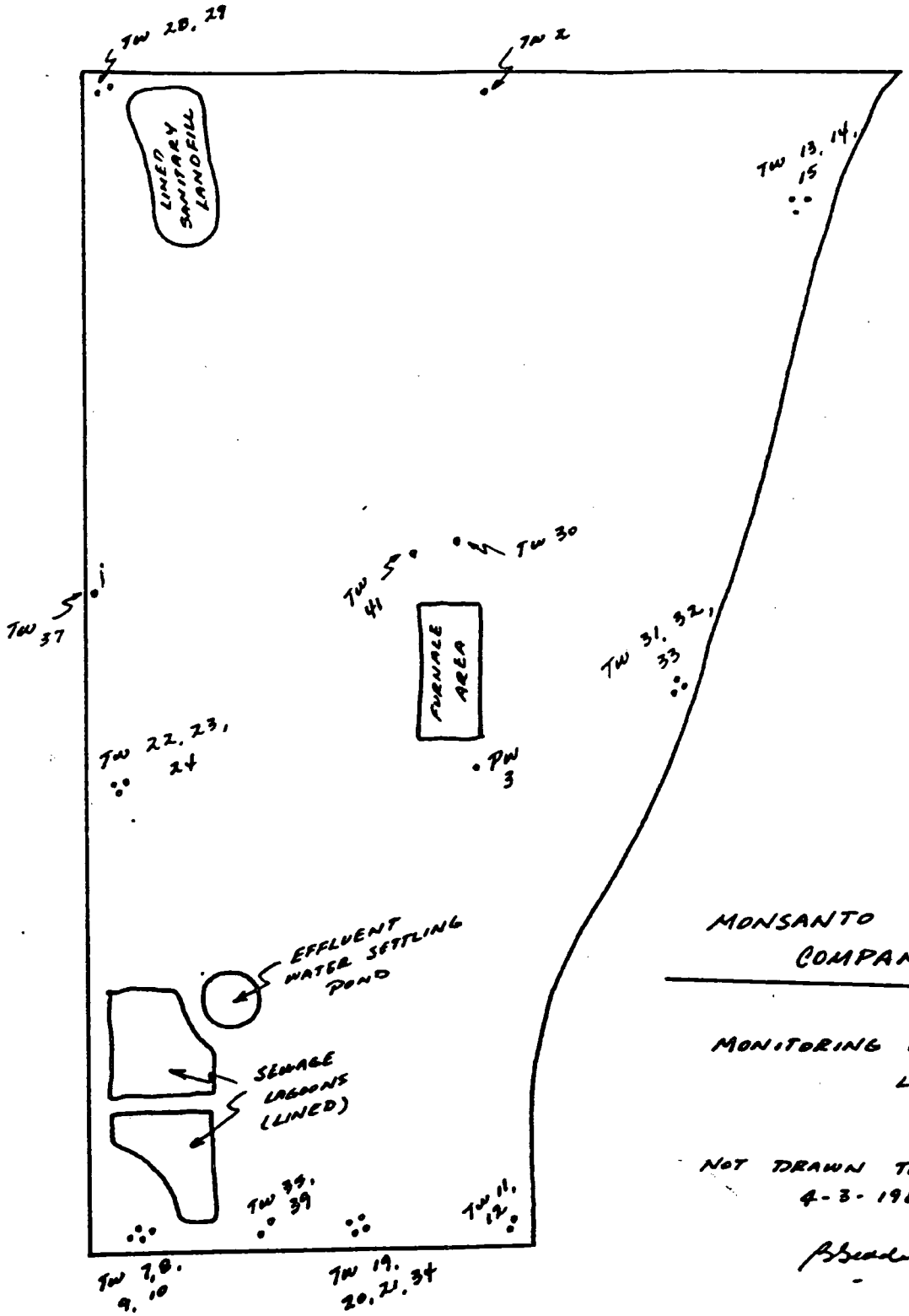

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MONITORING WELL LOCATIONS

NOT DRAWN TO SCALE
4-3-1987

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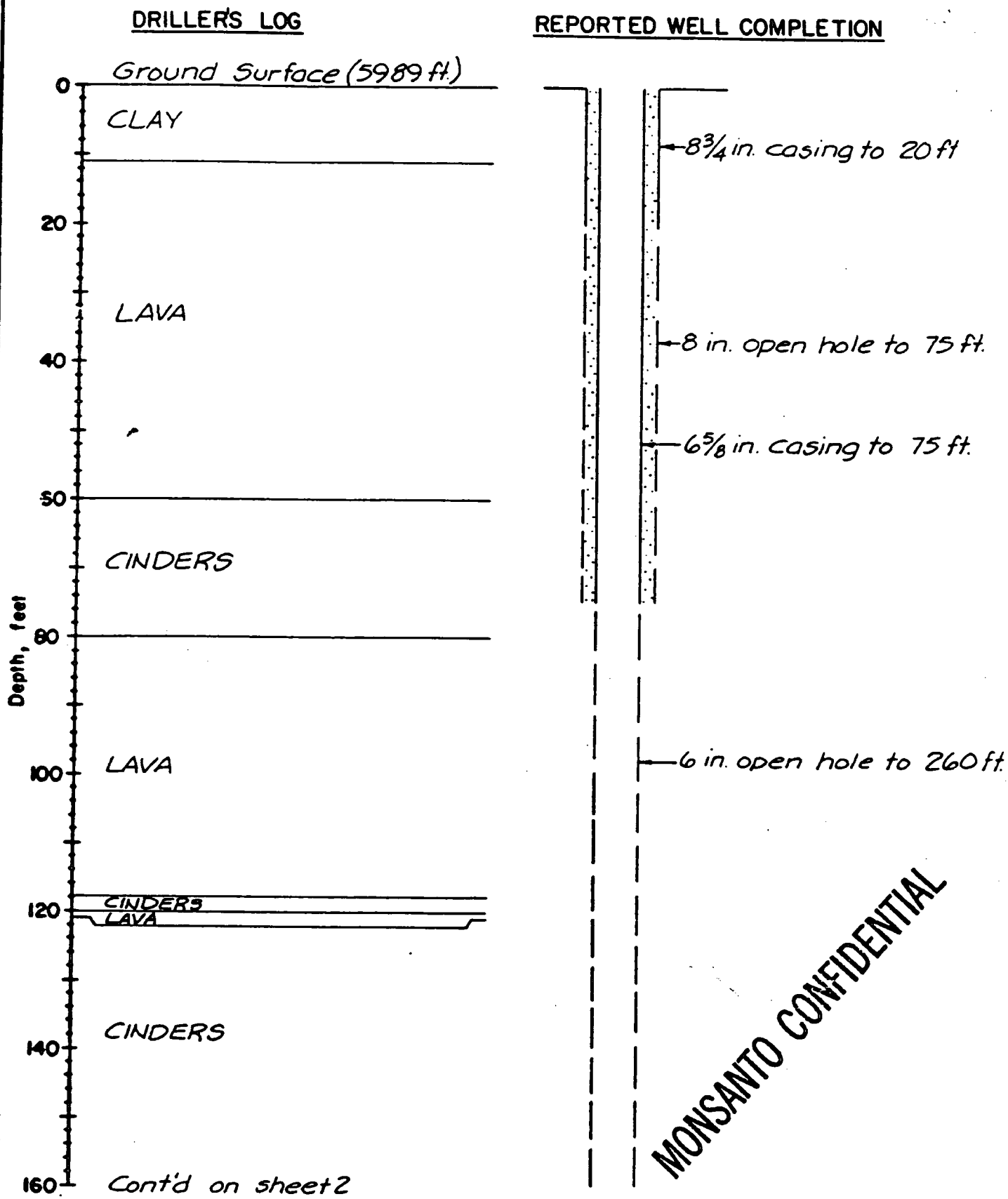
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 2

Figure A-2



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Scale 1 in. to 20 ft

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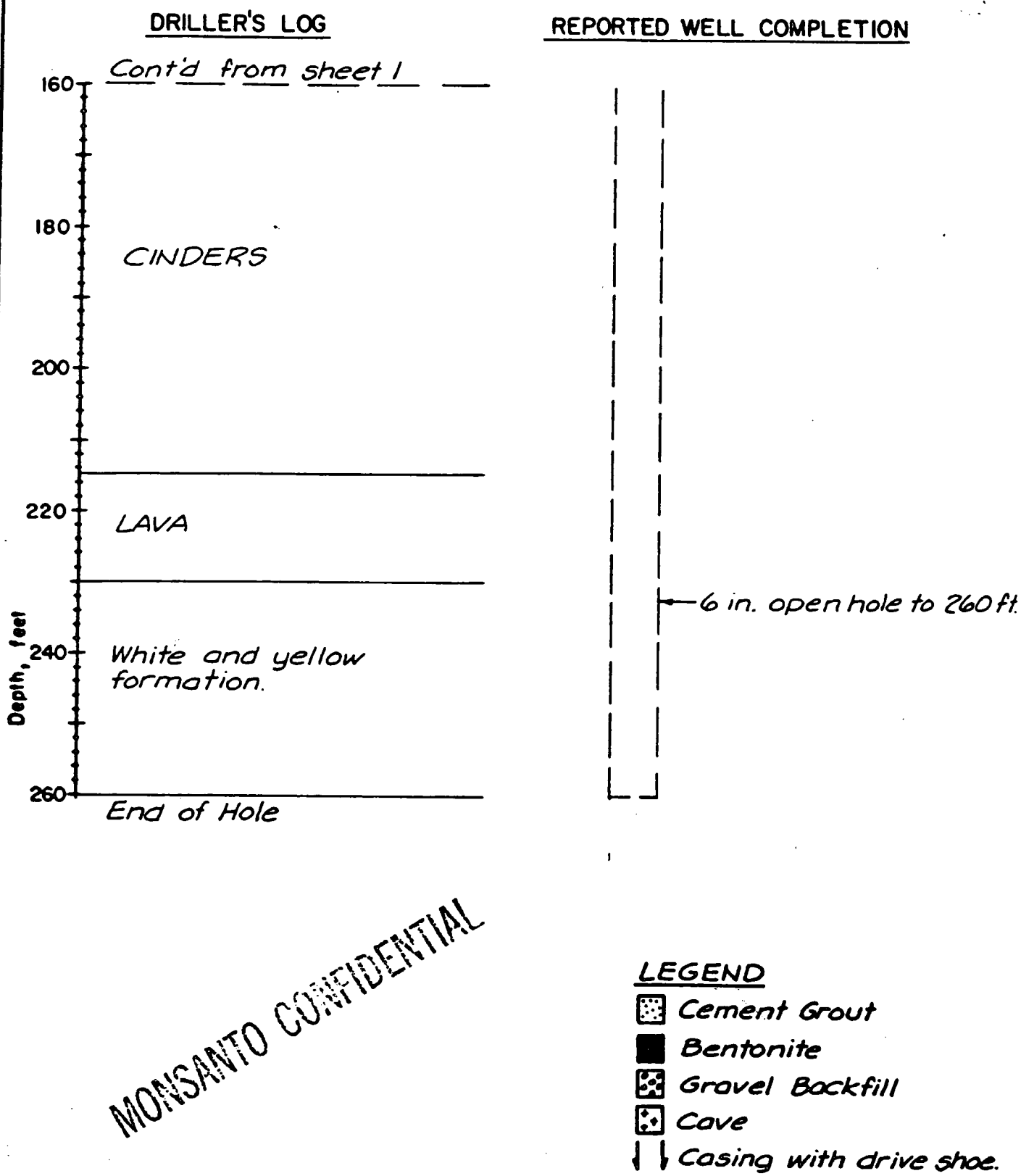
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 2

Figure



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Scale 1 in. to 20 ft

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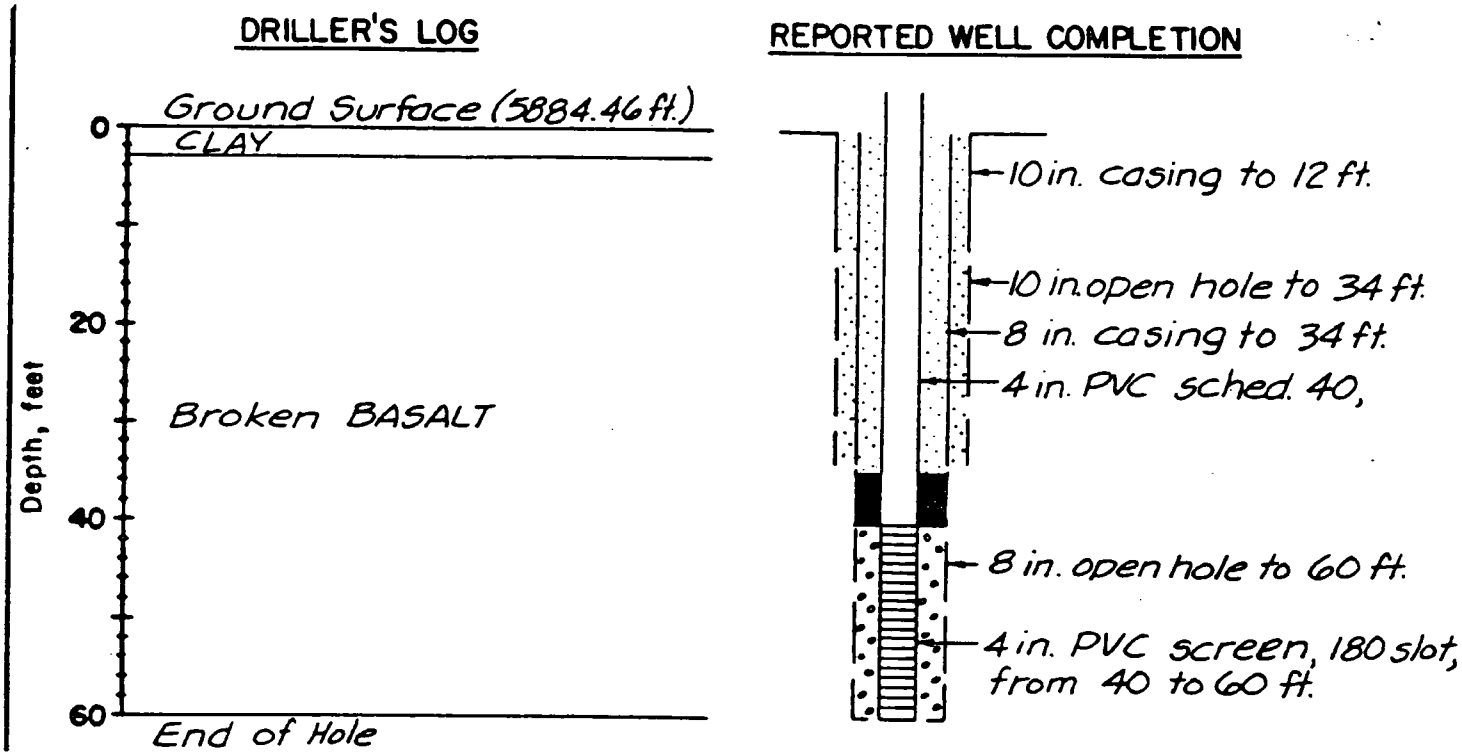
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 7

Figure A-7



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LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

Scale 1 in. to 20 ft.

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TEST WELL No. 7

	11-10-84	2-27-85						
pH, Standard units	6.4	7.3						
CONDUCTIVITY, umhos/cm	1870	1820						
TOTAL DISSOLVED SOLIDS mg/l	1130	1210						
SODIUM ADSORPTION RATIO	0.61	0.53						
TOTAL HARDNESS AS $CaCO_3$	976	1065						
CALCIUM AS Ca	109	100						
MAGNESIUM AS Mg	171	198						
SODIUM AS Na	44	40						
POTASSIUM AS K	23	20						
TOTAL ALKALINITY AS $CaCO_3$	960	979						
BICARBONATE ALKALINITY	1172	1195						
CHLORIDE AS Cl	41	40						
NITRATE + NITRITE AS N	0.06	0.05						
SULFATE AS SO_4	84	98						
COPPER AS Cu	–	-0.02						
IRON AS Fe	5.61	4.03						
MANGANESE AS Mn	0.3	0.23						
SILVER AS Ag	-0.2	-0.02						
VANADIUM AS V	0.032	-0.05						

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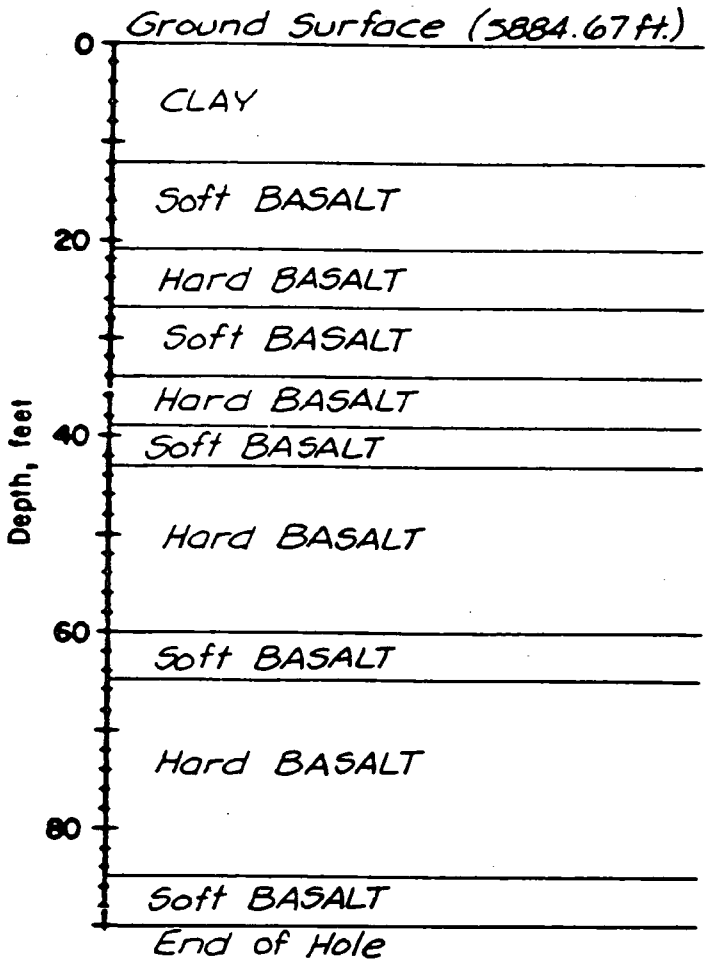
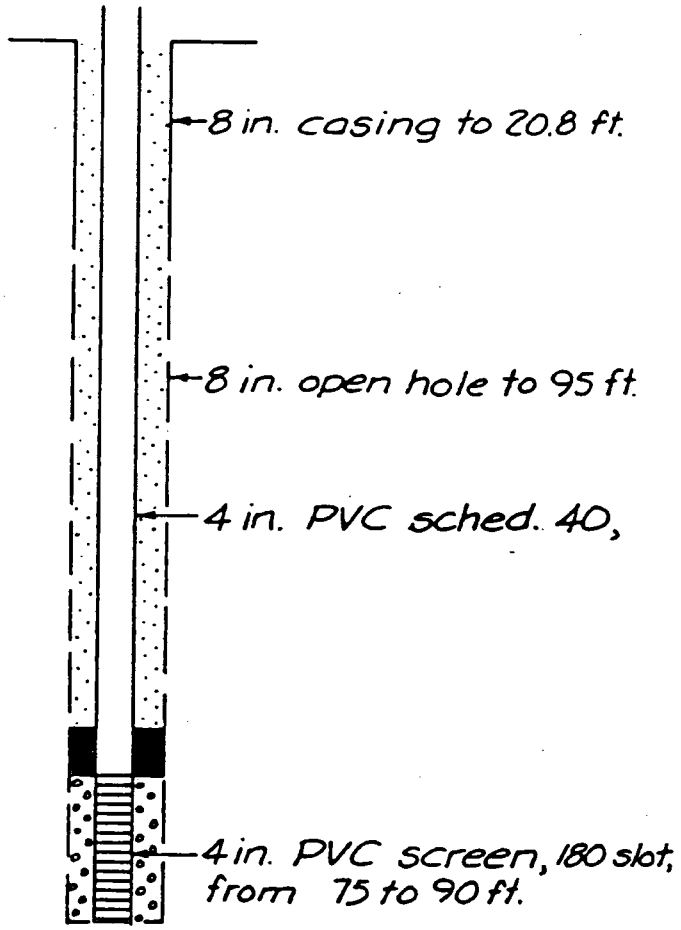
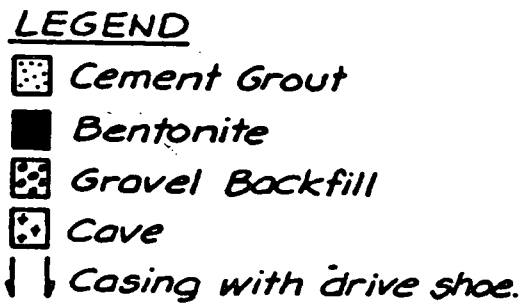
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 8

Figure · A-8







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Scale 1 in. to 20 ft

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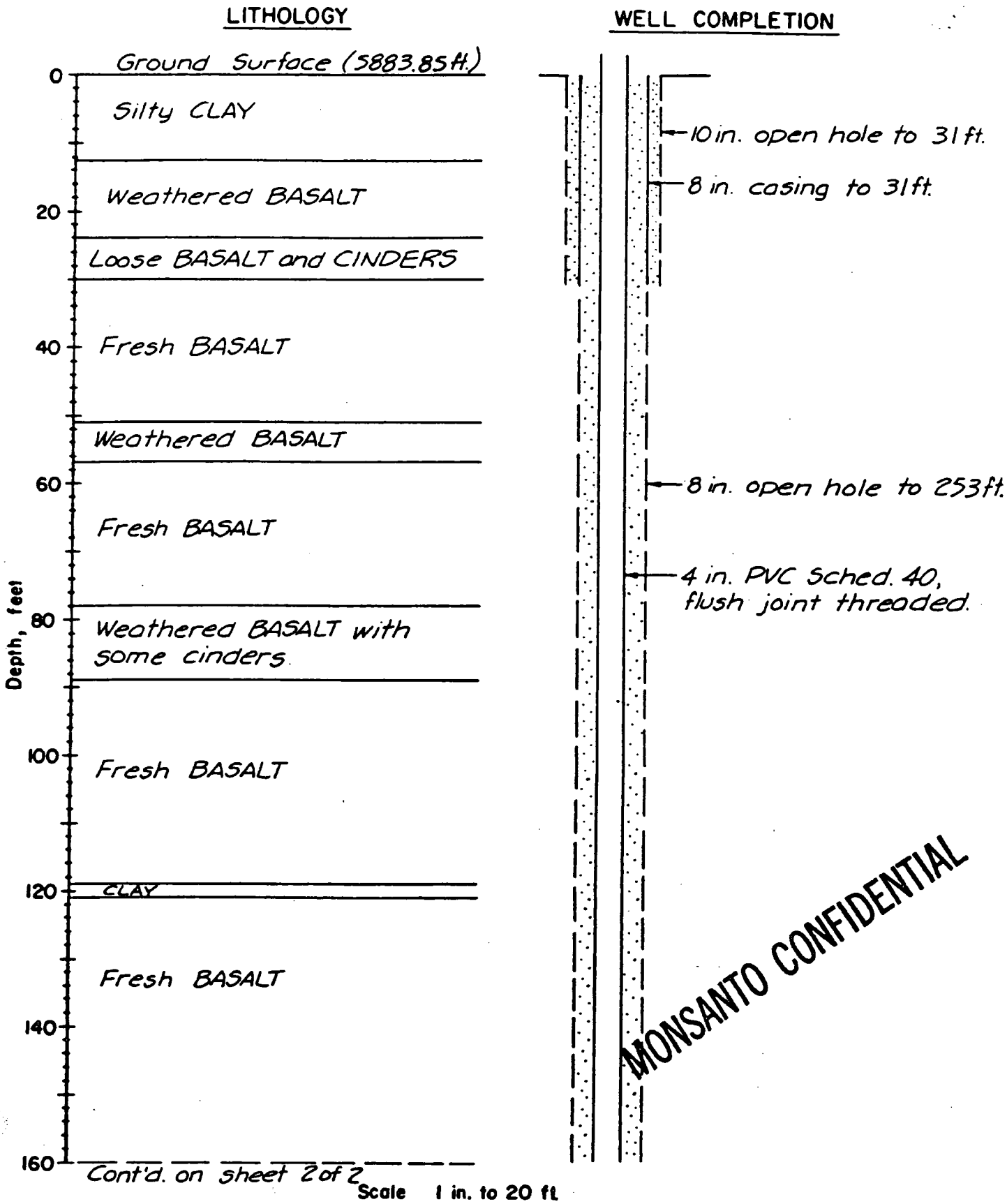
TEST WELL No. 8

	11-10-84	2-27-85						
pH. Standard units	7.1	7.3						
CONDUCTIVITY, umhos/cm	2410	2430						
TOTAL DISSOLVED SOLIDS mg/l	1590	1620						
SODIUM ADSORPTION RATIO	0.49	0.59						
TOTAL HARDNESS AS $CaCO_3$	1663	1439						
CALCIUM as Ca	46	54						
MAGNESIUM as Mg	376	317						
SODIUM as Na	46	51						
POTASSIUM as K	22	21						
TOTAL ALKALINITY as $CaCO_3$	1660	1490						
BICARBONATE ALKALINITY	2026	1810						
CHLORIDE as Cl	14	16						
NITRATE + NITRITE as N	-0.05	-0.05						
SULFATE as SO_4	75	44						
COPPER as Cu	-	-0.02						
IRON as Fe	-0.05	0.98						
MANGANESE as Mn	-0.02	-0.02						
SILVER as Ag	-0.02	-0.02						
VANADIUM as V	0.05	-0.05						

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 9

Figure A-9

Sheet 1 of 2



Cont'd. on sheet 2 of 2

Scale 1 in. to 20 ft.

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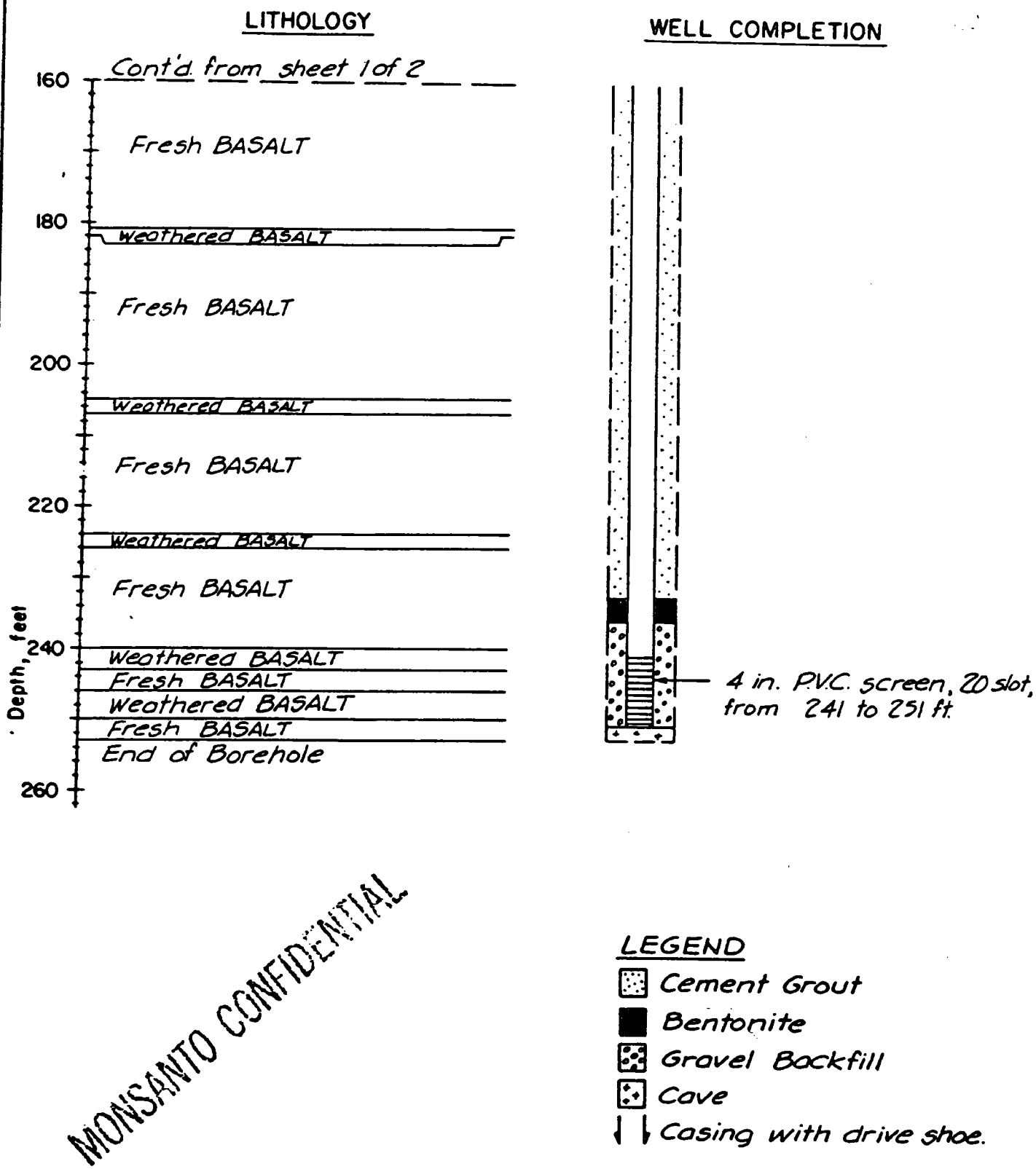
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 9

Figure

Sheet 2 of 2



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Scale 1 in. to 20 ft.

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NO. 842-1543 DRAWN ..... REVIEWED ..... DATE Dec. '84

TEST WELL No. 9

	11-9-84	2-27-85						
pH, Standard units	6.2	6.7						
CONDUCTIVITY, umhos/cm	1940	1930						
TOTAL DISSOLVED SOLIDS mg/l	1260	1270						
SODIUM ADSORPTION RATIO	0.50	0.52						
TOTAL HARDNESS AS $CaCO_3$	11.62	11.02						
CALCIUM as Ca	169	150						
MAGNESIUM as Mg	180	177						
SODIUM as Na	39	40						
POTASSIUM as K	18	16						
TOTAL ALKALINITY as $CaCO_3$	1160	1060						
BICARBONATE ALKALINITY	1460	1294						
CHLORIDE as Cl	29	27						
NITRATE + NITRITE as N	0.05	-0.05						
SULFATE as SO4	103	102						
COPPER as Cu	–	-0.02						
IRON as Fe	10.1	8.76						
MANGANESE as Mn	0.58	0.42						
SILVER as Ag	-0.02	-0.02						
VANADIUM as V	-0.02	-0.02						

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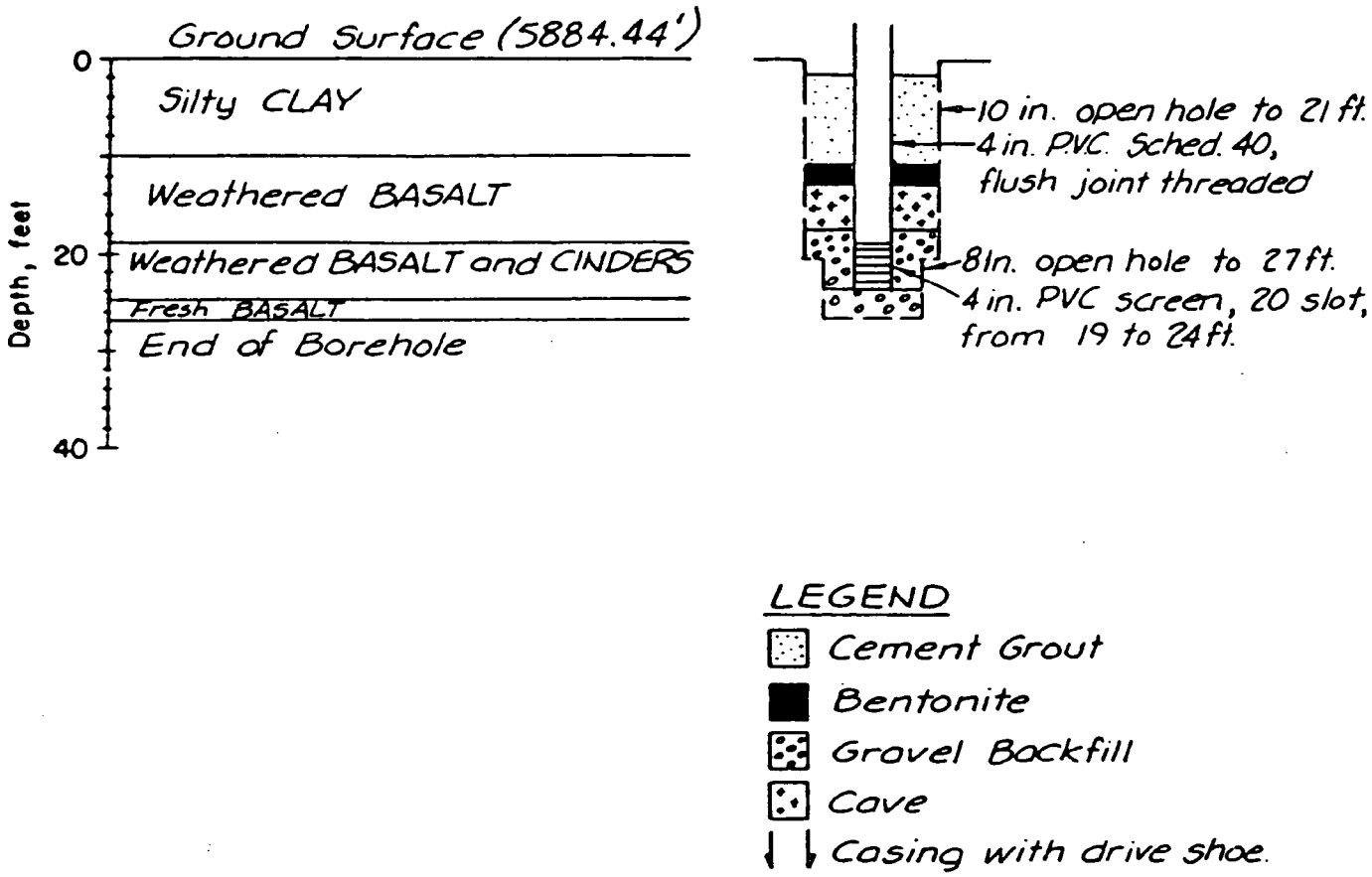
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 10

Figure A-10



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Scale 1 in. to 20 ft

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PROJ NO. 842-1343 DRAWN REVIEWED DATE Dec. '84

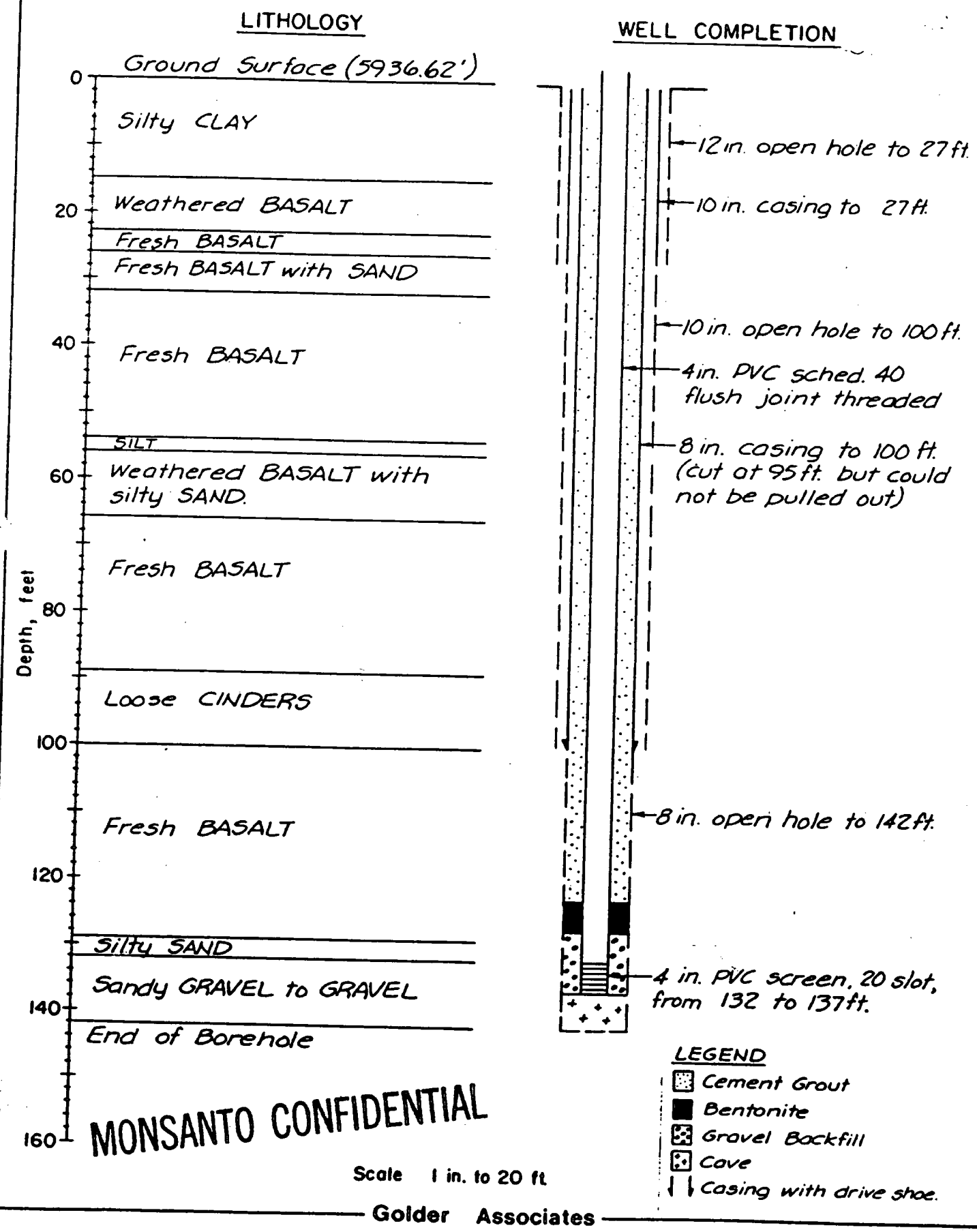
TEST WELL No. 10

	11-9-84	2-21-85	7-10-85	10-11-85	2-6-86	6-3-86	9-17-86	12-12-86
pH, Standard units	6.7	7.6	6.9	6.3	7.1	7.1	7.7	7.7
Conductivity, umhos/cm	1680	1320	1199	1230	1180	1010	1180	1240
Total Dissolved Solids mg/l	1080	1020	786	884	648	688	852	912
Sodium Adsorption Ratio	0.66	0.84	1.58	1.44	1.32	1.23	1.27	1.29
Total Hardness as $CaCO_3$	876	774	548	497	477	562	524	524
Calcium as Ca	125	114	94	87	74	103	93	88
Magnesium as Mg	137	119	76	68	71	74	71	74
Sodium as Na	45	54	85	74	76	67	67	65
Potassium as K	15	14	15	11	9	11	8	9
Total Alkalinity as $CaCO_3$	849	641	480	164	416	429	415	491
Bicarbonate Alkalinity	1036	791	586	200	508	524	506	477
Chloride as Cl	71	107	99	76	84	95	99	101
Nitrate + Nitrite as N	2.03	2.46	5.28	–	2.75	4.67	4.73	4.84
Sulfate as SO_4	43	101	124	96	98	119	119	103
Copper as Cu	–	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Iron as Fe	1.27	-0.05	-0.05	-0.05	0.13	-0.05	-0.05	0.09
Manganese as Mn	2.0	0.33	0.05	-0.02	0.07	-0.02	0.02	0.11
Silver as Ag	-0.02	-0-	-0.02	-0.02	-0.02	-0.005	-0.02	-0.02
Vanadium as V	-0.02	-0.05	-0.02	0.06	-0.02	-0.02	-0.2	-0.02

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 11

Figure A-11



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

Golder Associates

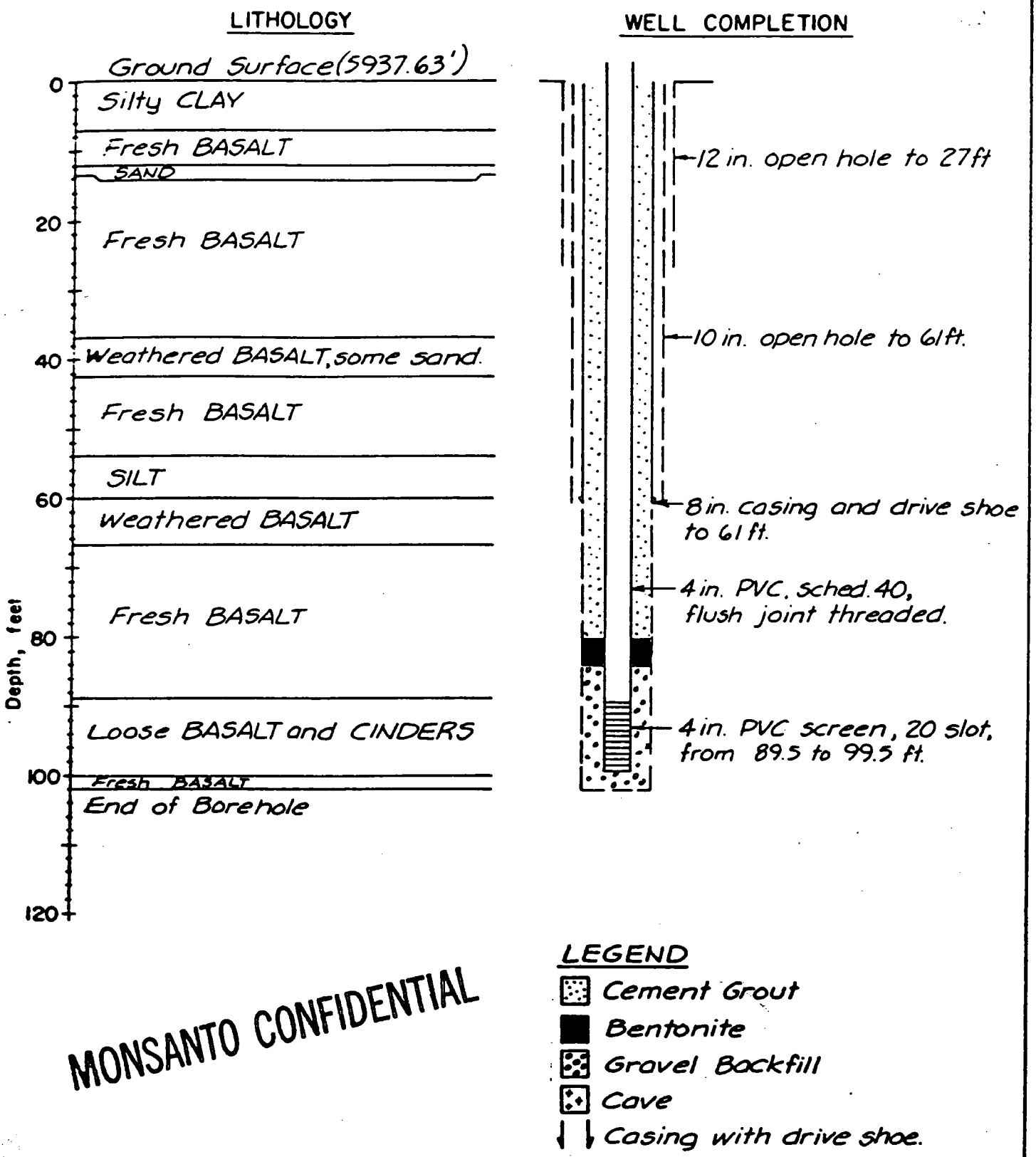
TEST WELL No. 11

	11-13-84	2-28-85						
pH, Standard units	7.4	7.7						
Conductivity, umhos/cm	1340	1450						
Total Dissolved Solids mg/l	993	1020						
Sodium Adsorption Ratio	1.86	1.78						
Total Hardness as $CaCO_3$	647	606						
Calcium as Ca	167	147						
Magnesium as Mg	56	58						
Sodium as Na	109	101						
Potassium as K	6	7						
Total Alkalinity as $CaCO_3$	473	422						
Bicarbonate Alkalinity	577	515						
Chloride as Cl	114	107						
Nitrate + Nitrite as N	5.5	4.53						
Sulfate as SO_4	264	195						
Copper as Cu	-	-0.02						
Iron as Fe	-0.05	-0.05						
Manganese as Mn	-0.02	-0.02						
Silver as Ag	-0.02	-0.02						
Vanadium as V	-0.02	-0.05						

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 12

Figure A-12



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

Golder Associates

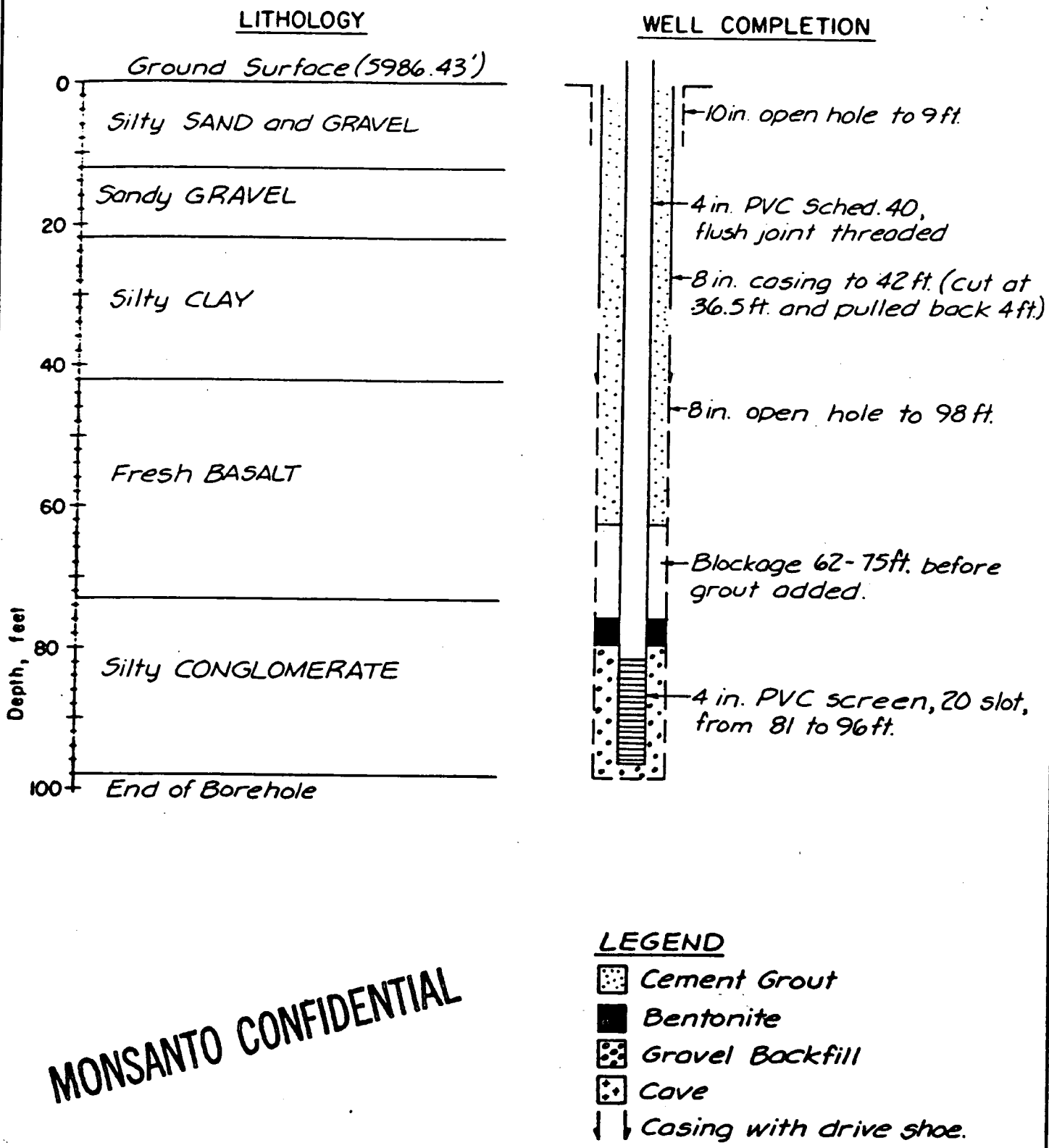
TEST WELL No. 12

	11-13-84	2-28-85	7-13-85	10-10-85	2-6-86	6-3-86	9-17-86	12-12-86
pH, Standard units	8.0	7.7	7.3	7.2	7.7	7.2	7.3	7.8
Conductivity, umhos/cm	2440	2770	2756	2790	3130	2970	2950	2990
Total Dissolved Solids mg/l	1440	1770	1730	1750	1820	1700	2050	1940
Sodium Adsorption Ratio	3.76	5.14	5.45	5.73	4.89	5.93	6.23	5.94
Total Hardness as $CaCO_3$	672	724	712	699	786	670	703	665
Calcium as Ca	167	173	178	173	188	168	173	169
Magnesium as Mg	62	68	68	65	77	61	66	59
Sodium as Na	224	318	334	348	315	353	380	352
Potassium as K	10	8	15	11	13	21	14	11
Total Alkalinity as $CaCO_3$	456	414	471	398	411	179	335	416
Bicarbonate Alkalinity	557	505	675	486	502	218	409	508
Chloride as Cl	233	302	270	314	332	366	336	319
Nitrate + Nitrite as N	9.23	5.66	9.57	8.06	5.47	16.6	12.9	12.0
Sulfate as SO_4	475	574	660	681	731	706	800	777
Copper as Cu	-	-.002	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Iron as Fe	-0.05	-0.05	-0.05	-0.05	0.14	0.28	-0.05	0.07
Manganese as Mn	0.01	0.08	0.15	0.04	0.2	0.18	0.15	0.13
Silver as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Vanadium as V	0.61	0.67	0.92	0.59	0.2	0.9	1.00	0.90

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 13

Figure A-13



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

Golder Associates

TEST WELL No. 13

	11-7-84	2-19-85						
pH, Standard units	7.9	7.4						
CONDUCTIVITY, umhos/cm	867	900						
TOTAL DISSOLVED SOLIDS mg/l	542	512						
SODIUM ADSORPTION RATIO	0.43	0.12						
TOTAL HARDNESS AS $CaCO_3$	438	489						
CALCIUM as Ca	102	120						
MAGNESIUM as Mg	44	46						
SODIUM as Na	71	6						
POTASSIUM as K	3	3						
TOTAL ALKALINITY as $CaCO_3$	434	411						
BICARBONATE ALKALINITY	530	502						
CHLORIDE as Cl	16	10						
NITRATE + NITRITE as N	4.18	3.79						
SULFATE as SO_4	36	43						
COPPER as Cu	-	-0.02						
IRON as Fe	-0.05	-0.05						
MANGANESE as Mn	0.03	0.06						
SILVER as Ag	-0.02	-0.02						
VANADIUM as V	0.04	0.05						

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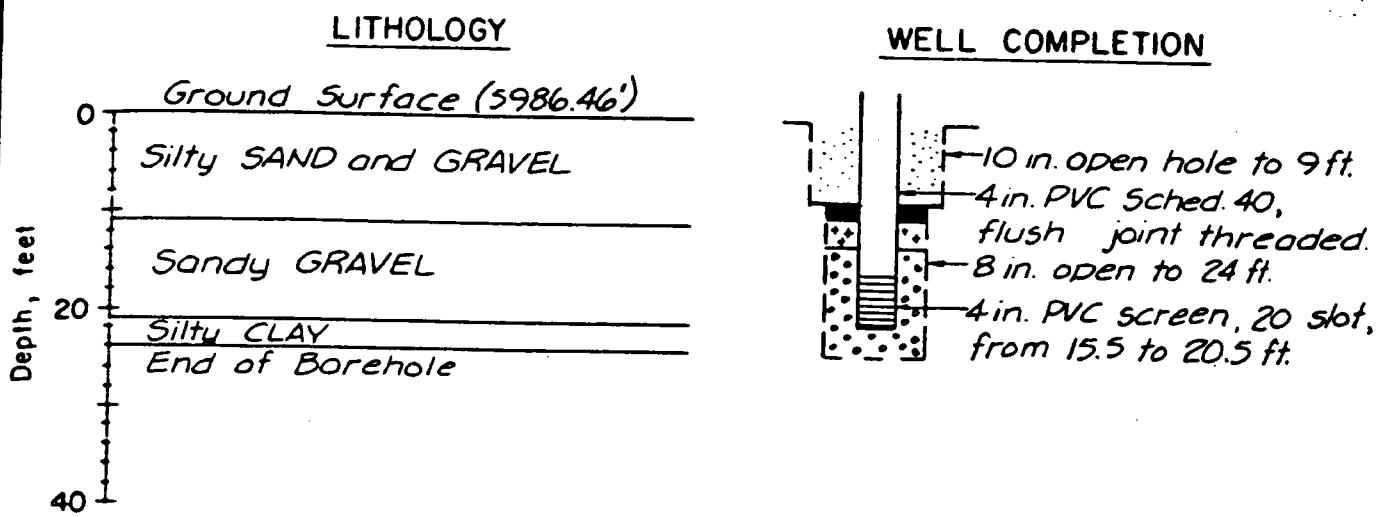
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 14

Figure A-14



LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

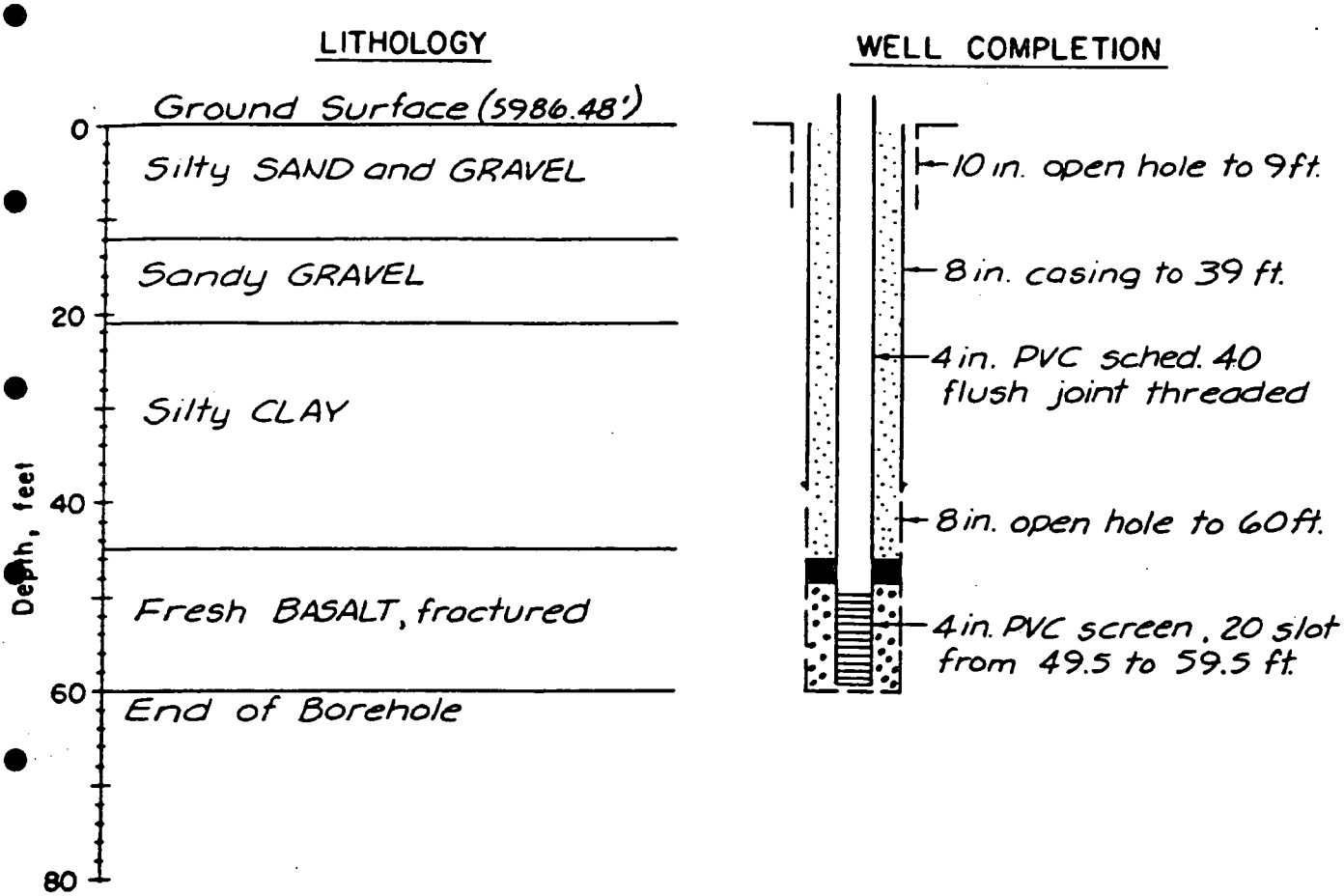
Golder Associates

TEST WELL No. 14

	11-7-84	2-19-85						
pH, Standard units	7.2	7.4						
CONDUCTIVITY, umhos/cm	879	900						
TOTAL DISSOLVED SOLIDS mg/l	526	512						
SODIUM ADSORPTION RATIO	0.42	0.12						
TOTAL HARDNESS as $CaCO_3$	475	489						
CALCIUM as Ca	126	120						
MAGNESIUM as Mg	39	46						
SODIUM as Na	21	6						
POTASSIUM as K	3	3						
TOTAL ALKALINITY as $CaCO_3$	446	411						
BICARBONATE ALKALINITY	544	502						
CHLORIDE as Cl	7	10						
NITRATE + NITRITE as N	3.36	3.79						
SULFATE as SO_4	58	43						
COPPER as Cu	-	-0.02						
IRON as Fe	-0.05	-0.05						
MANGANESE as Mn	-0.02	0.06						
SILVER as Ag	-0.02	-0.02						
VANADIUM as V	-0.02	-0.05						

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 15

Figure A-15



LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft.

Golder Associates

TEST WELL No. 15

	11-7-84	2-19-85	7-10-85	10-10-85	2-4-86	6-3-86	9-16-86	12-11-86
pH, Standard units	7.3	8.1	7.2	7.0	7.7	7.4	7.7	7.9
Conductivity, umhos/cm	864	867	924	790	828	613	720	644
Total Dissolved Solids mg/l	512	480	496	504	476	469	608	508
Sodium Adsorption Ratio	0.38	0.12	0.20	0.39	0.15	0.29	0.11	0.19
Total Hardness as $CaCO_3$	480	509	472	787	304	277	421	438
Calcium as Ca	123	133	115	119	51	44	101	103
Magnesium as Mg	42	43	45	46	43	41	41	44
Sodium as Na	19	6	10	20	6	11	5	9
Potassium as K	3	3	3	-1	2	4	3	3
Total Alkalinity as $CaCO_3$	427	426	490	422	245	231	392	391
Bicarbonate Alkalinity	521	520	598	515	249	282	478	477
Chloride as Cl	13	11	12	11	10	10	14	12
Nitrate + Nitrite as N	4.23	3.79	3.57	3.16	3.55	2.58	3.24	3.08
Sulfate as SO_4	62	43	14	62	36	34	41	34
Copper as Cu	–	-0.02	-0.02	-0.02	0.13	-0.02	-0.02	-0.02
Iron as Fe	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	0.12
Manganese as Mn	-0.02	-0.02	0.03	-0.02	0.04	-0.02	-0.02	0.04
Silver as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Vanadium as V	0.07	-0.05	-0.02	-0.02	-0.02	-0.2	-0.2	-0.2

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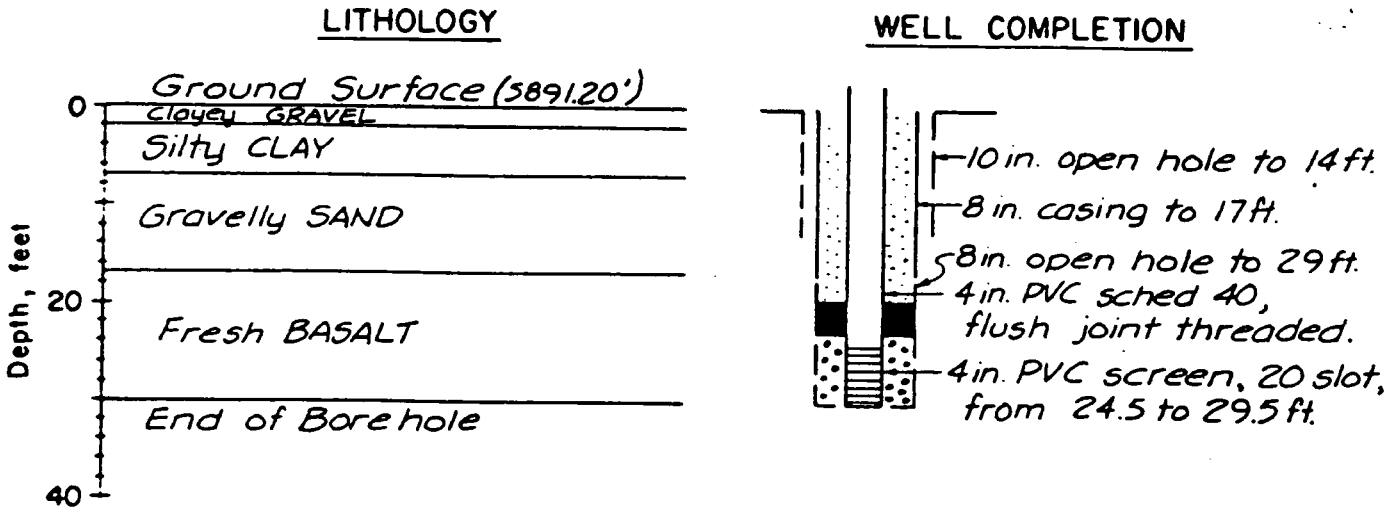
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 19

Figure A-19



LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

Golder Associates

TEST WELL No. 19

	11-14-84	2-20-84						
pH. Standard units	7.4	7.5						
CONDUCTIVITY, umhos/cm	1330	1300						
TOTAL DISSOLVED SOLIDS mg/l	972	942						
SODIUM ADSORPTION RATIO	0.81	0.72						
TOTAL HARDNESS AS $CaCO_3$	671	619						
CALCIUM as Ca	137	121						
MAGNESIUM as Mg	80	77						
SODIUM as Na	48	41						
POTASSIUM as K	9	6						
TOTAL ALKALINITY as $CaCO_3$	342	341						
BICARBONATE ALKALINITY	417	404						
CHLORIDE as Cl	77	69						
NITRATE + NITRITE as N	9.72	7.71						
SULFATE as SO_4	286	266						
COPPER as Cu	–	-0.02						
IRON as Fe	0.16	-0.05						
MANGANESE as Mn	-0.02	-0.02						
SILVER as Ag	-0.02	-0.02						
VANADIUM as V	-0.05	-0.05						

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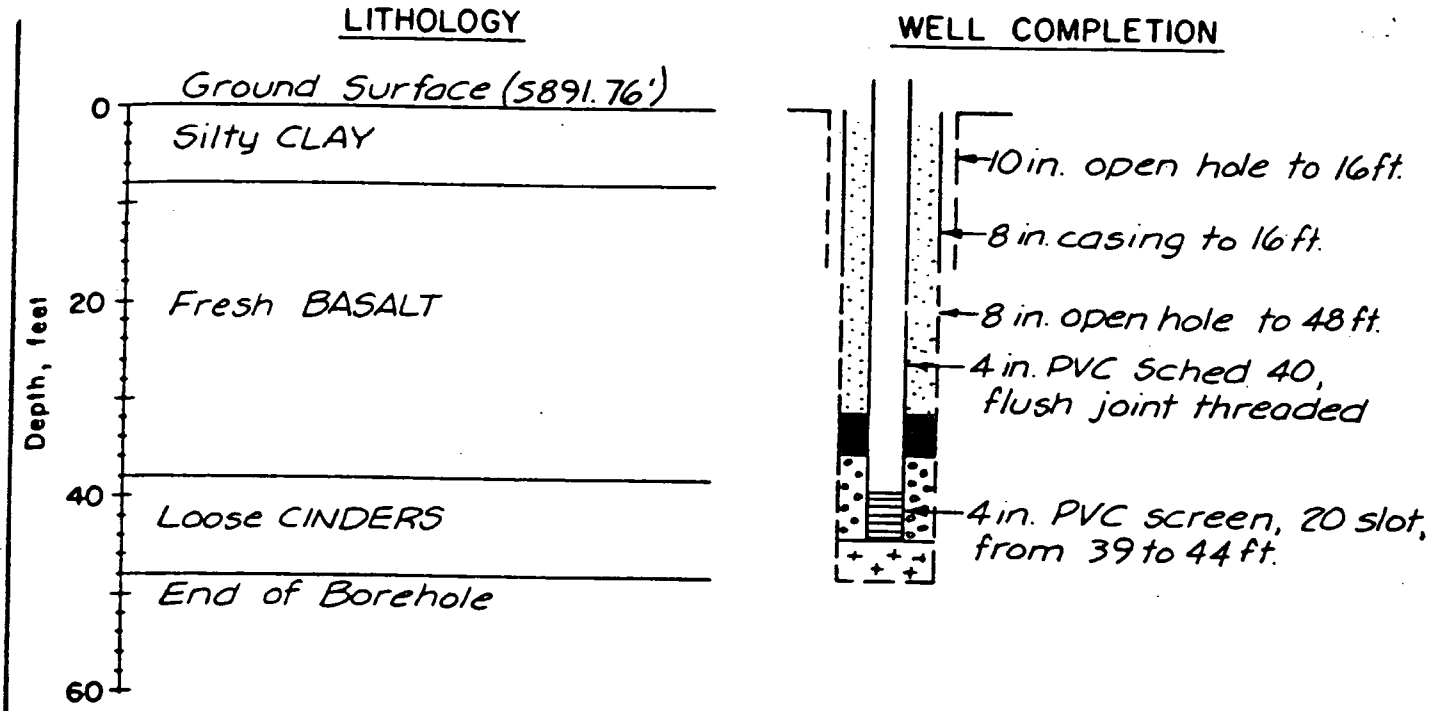
LITHOLOGY AND WELL COMPLETION
MONSANTO TW 20

Figure A-20



MONSANTO CONFIDENTIAL

LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

Scale 1 in. to 20 ft

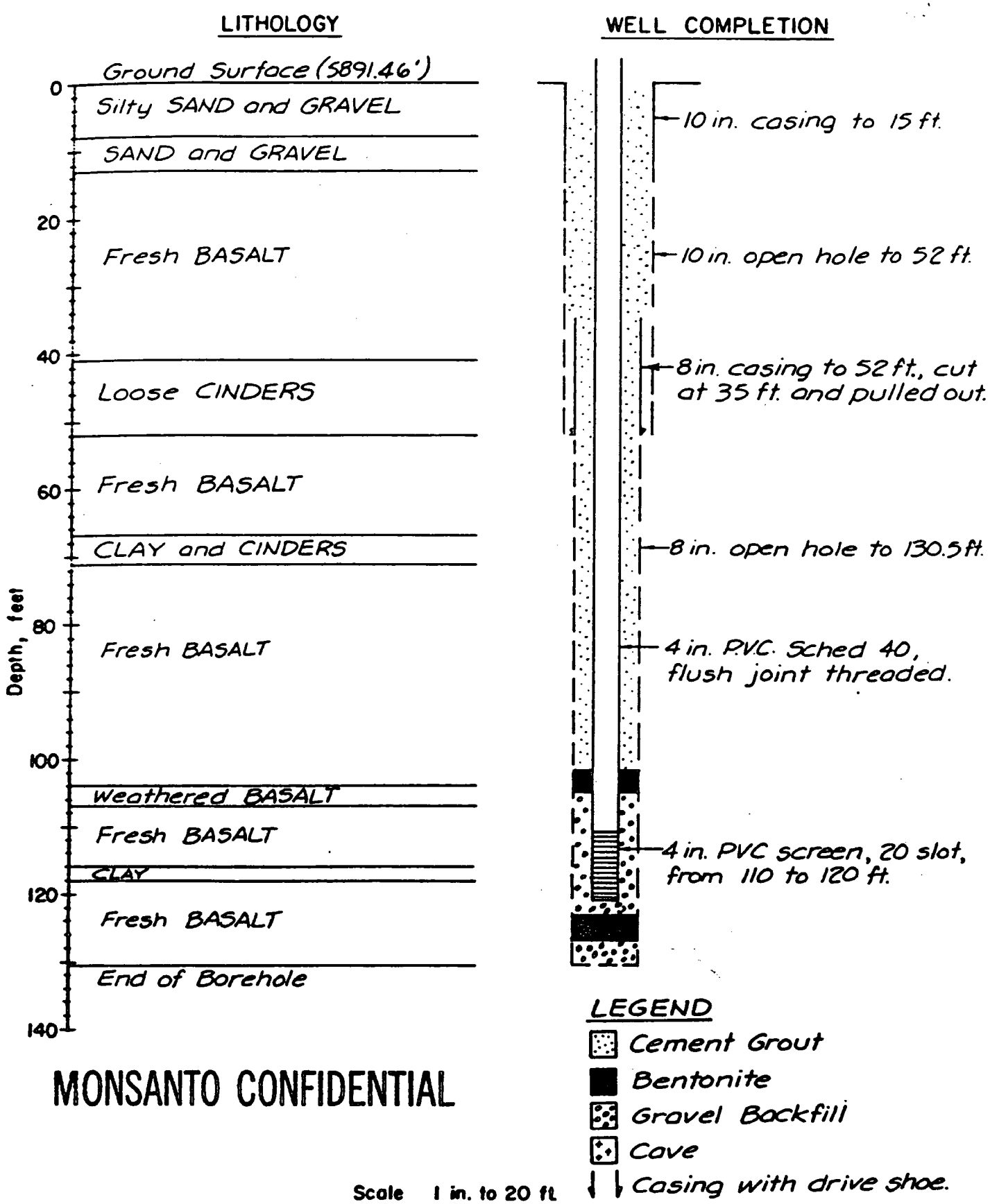
Golder Associates

TEST WELL No. 20

	11-14-84	2-24-85	7-11-85	10-10-85	2-6-88	6-3-86	9-17-86	12-11-86
pH, Standard units	7.8	7.6	7.1	7.2	7.4	7.1	7.3	7.6
CONDUCTIVITY, umhos/cm	1110	1190	1112	1110	1270	1140	1170	1420
TOTAL DISSOLVED SOLIDS mg/l	800	868	756	732	836	983	1080	1030
SODIUM ADSORPTION RATIO	0.78	0.88	0.86	0.86	0.95	0.90	0.75	1.01
TOTAL HARDNESS AS $CaCO_3$	370	513	540	541	609	632	618	683
CALCIUM as Ca	113	105	119	126	135	158	143	149
MAGNESIUM as Mg	70	61	59	55	66	64	64	76
SODIUM as Na	43	46	46	46	54	53	43	61
POTASSIUM as K	8	24	13	16	15	18	14	20
TOTAL ALKALINITY as $CaCO_3$	346	269	311	262	300	284	269	298
BICARBONATE ALKALINITY	422	328	380	320	366	347	328	364
CHLORIDE as Cl	58	63	54	57	62	96	80	66
NITRATE + NITRITE as N	7.56	6.78	4.37	3.84	5.80	3.79	3.96	6.96
SULFATE as SO4	210	244	253	264	302	331	349	368
COPPER as Cu	–	–	-0.02	-0.02	0.06	-0.02	-0.02	-0.02
IRON as Fe	-0.05	-0.05	-0.05	-0.05	0.11	-0.05	0.07	0.09
MANGANESE as Mn	-0.02	-0.02	0.03	-0.02	-0.02	-0.02	-0.02	0.10
SILVER as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
VANADIUM as V	-0.02	0.06	0.03	0.07	0.14	0.15	0.14	0.16

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 21

Figure A-21



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft.

Golder Associates

NO. 842-1543 DRAWN REVIEWED DATE Dec. '84

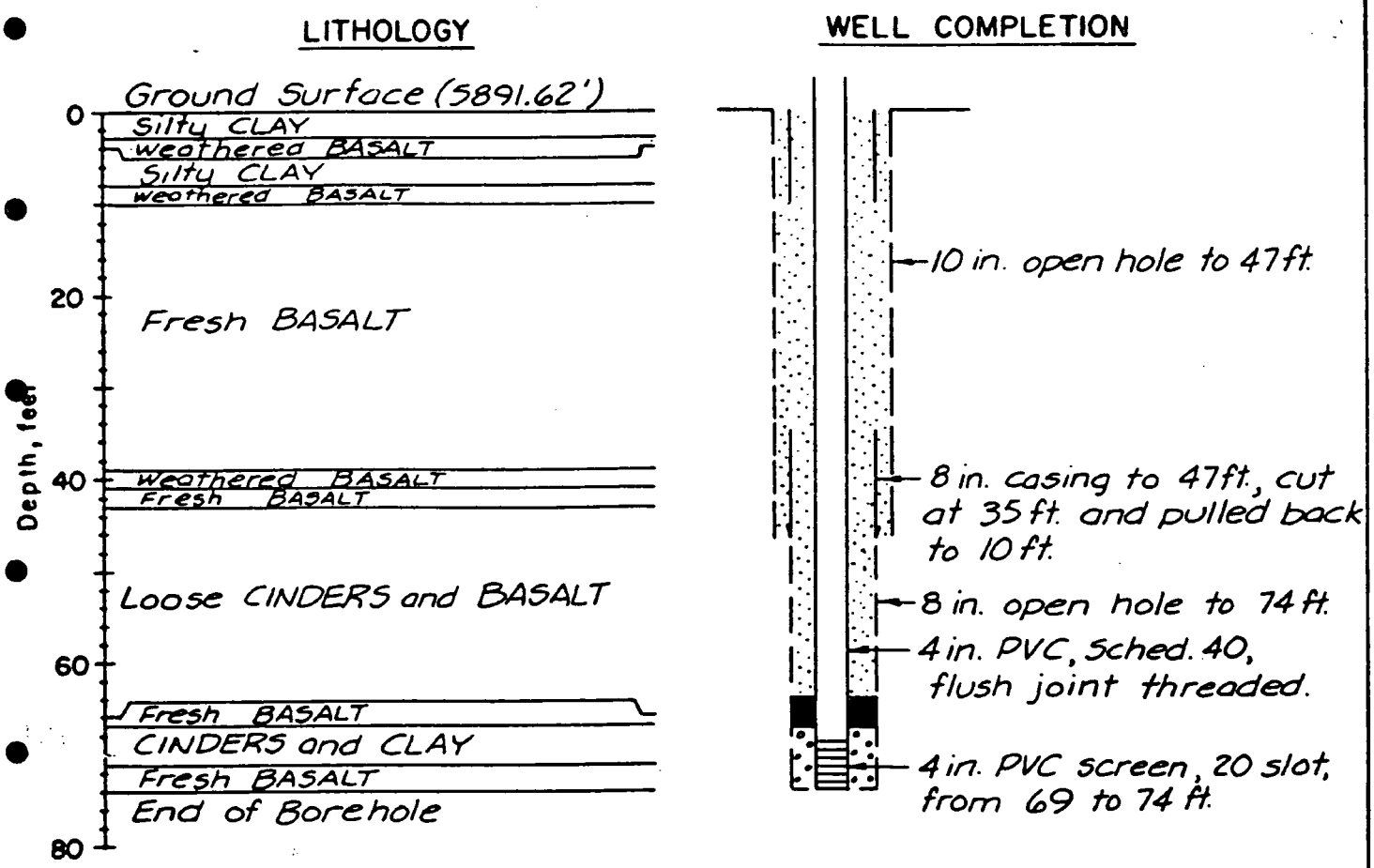
TEST WELL No. 21

	11-14-84	2-25-85						
pH, Standard units	6.8	7.0						
CONDUCTIVITY, umhos/cm	1900	1930						
TOTAL DISSOLVED SOLIDS mg/l	1210	1220						
SODIUM ADSORPTION RATIO	0.49	0.42						
TOTAL HARDNESS AS $CaCO_3$	1116	1090						
CALCIUM AS Ca	53	51						
MAGNESIUM AS Mg	239	234						
SODIUM AS Na	38	32						
POTASSIUM AS K	22	16						
TOTAL ALKALINITY AS $CaCO_3$	1100	1090						
BICARBONATE ALKALINITY	1342	1330						
CHLORIDE AS Cl	14	20						
NITRATE + NITRITE AS N	0.22	0.07						
SULFATE AS SO_4	84	22						
COPPER AS Cu	–	-0.02						
IRON AS Fe	3.01	4.98						
MANGANESE AS Mn	0.14	-0.02						
SILVER AS Ag	-0.02	-0.02						
VANADIUM AS V	0.04	-0.05						

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 34

Figure A-34



MONSANTO CONFIDENTIAL

LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

Scale 1 in. to 20 ft.

Golder Associates

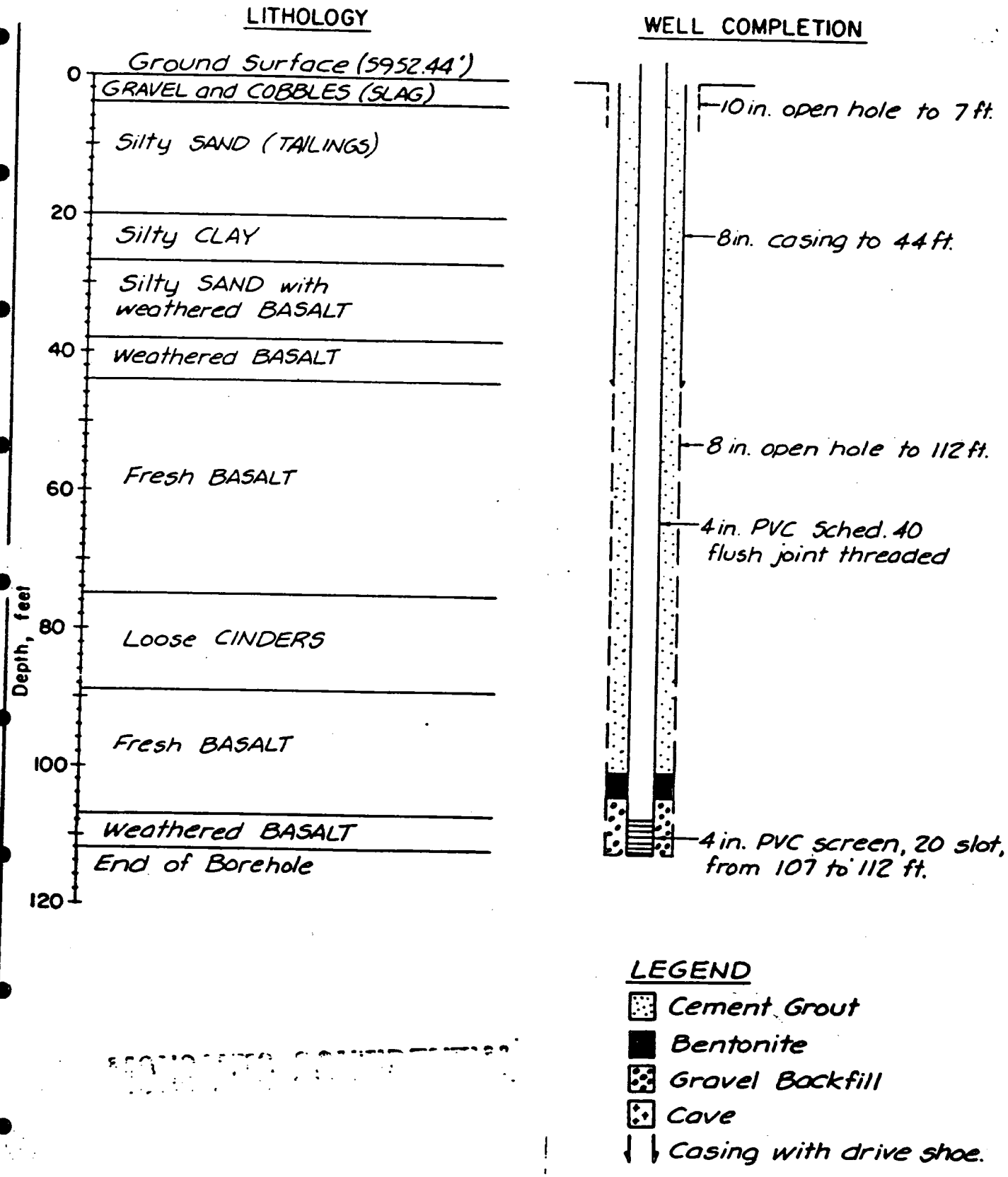
TEST WELL No. 34

	13-14-84	2-26-85						
pH. Standard units	7.6	7.4						
CONDUCTIVITY, umhos/cm	1100	1190						
TOTAL DISSOLVED SOLIDS mg/l	806	852						
SODIUM ADSORPTION RATIO	0.18	0.30						
TOTAL HARDNESS AS $CaCO_3$	590	698						
CALCIUM as Ca	88	123						
MAGNESIUM as Mg	90	95						
SODIUM as Na	10	18						
POTASSIUM as K	8	6						
TOTAL ALKALINITY as $CaCO_3$	422	402						
BICARBONATE ALKALINITY	314	491						
CHLORIDE as Cl	44	64						
NITRATE + NITRITE as N	0.62	0.65						
SULFATE as SO_4	100	215						
COPPER as Cu	—	-0.02						
IRON as Fe	0.21	0.16						
MANGANESE as Mn	0.01	0.27						
SILVER as Ag	-0.02	-0.02						
VANADIUM as V	-0.02	-0.05						

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 22

Figure A-22



Scale 1 in. to 20 ft.

TEST WELL No. 22

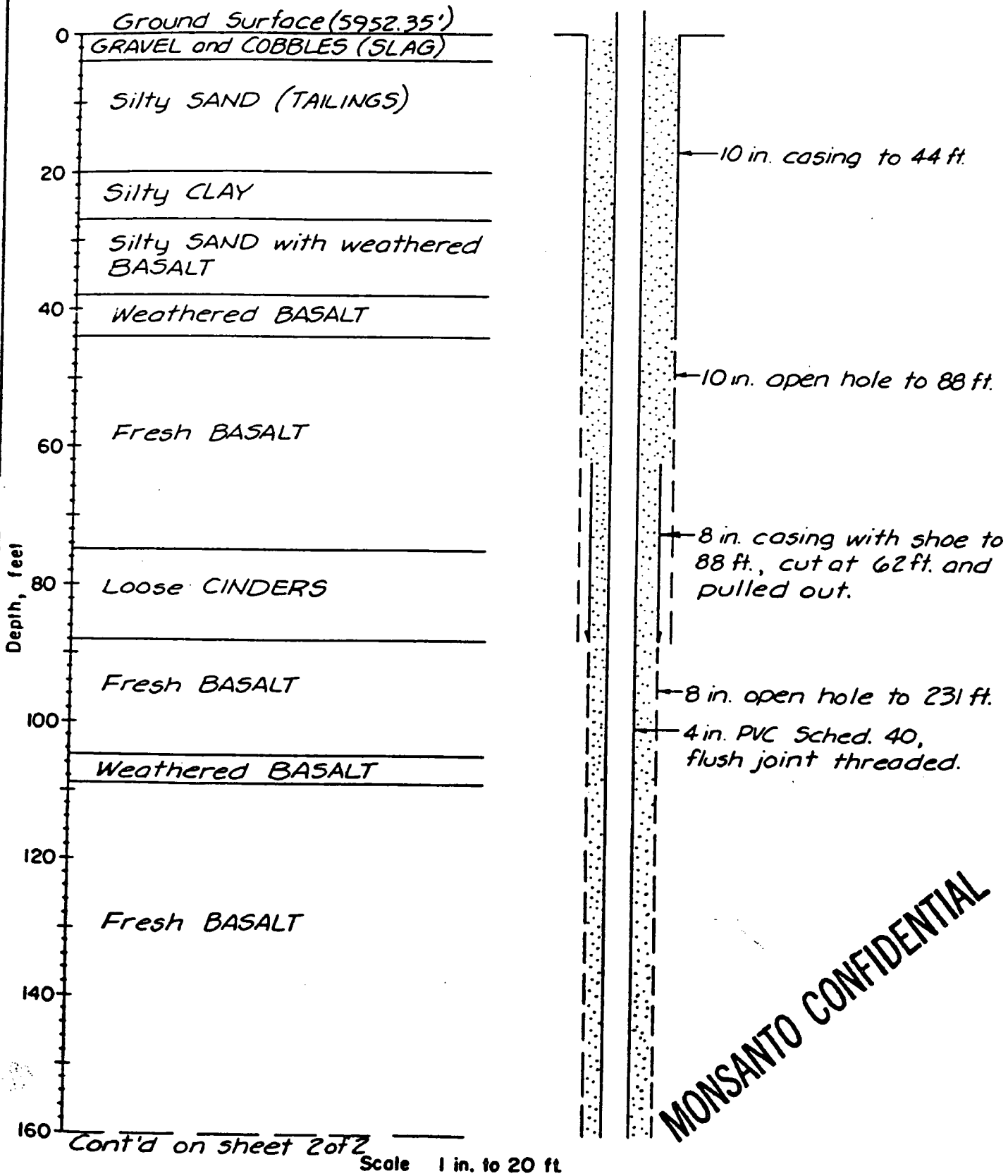
	11-8-84	2-18-85	7-10-85	2-4-86	6-3-86	9-16-86	12-11-86	
pH, Standard units	7.5	8.0	6.5	7.1	6.5	7.4	7.7	
CONDUCTIVITY, umhos/cm	2930	2840	2435	2500	2140	2150	2200	
TOTAL DISSOLVED SOLIDS mg/l	2200	2120	1970	1710	1770	1840	1720	
SODIUM ADSORPTION RATIO	2.34	2.13	2.45	2.24	2.30	2.22	2.31	
TOTAL HARDNESS as $CaCO_3$	1166	1139	1143	973	891	879	944	
CALCIUM as Ca	253	250	207	192	174	171	182	
MAGNESIUM as Mg	130	125	123	120	111	110	119	
SODIUM as Na	184	165	132	161	158	151	163	
POTASSIUM as K	17	84	81	60	95	41	28	
TOTAL ALKALINITY as $CaCO_3$	224	240	265	245	262	277	271	
BICARBONATE ALKALINITY	273	298	323	299	321	338	331	
CHLORIDE as Cl	313	282	241	208	200	193	175	
NITRATE + NITRITE as N	15.4	12.6	11.4	10.80	10.5	10.6	11.3	
SULFATE as SO_4	847	912	841	746	707	748	744	
COPPER as Cu	—	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
IRON as Fe	0.17	-0.05	-0.05	0.17	-0.05	-0.05	0.11	
MANGANESE as Mn	1.13	0.40	1.72	1.20	1.67	1.57	1.44	
SILVER as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
VANADIUM as V	0.13	0.07	-0.02	-0.02	-0.02	-0.02	-0.02	

CONFI

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 23

Figure A-23

Sheet 1 of 2



Cont'd on sheet 2 of 2

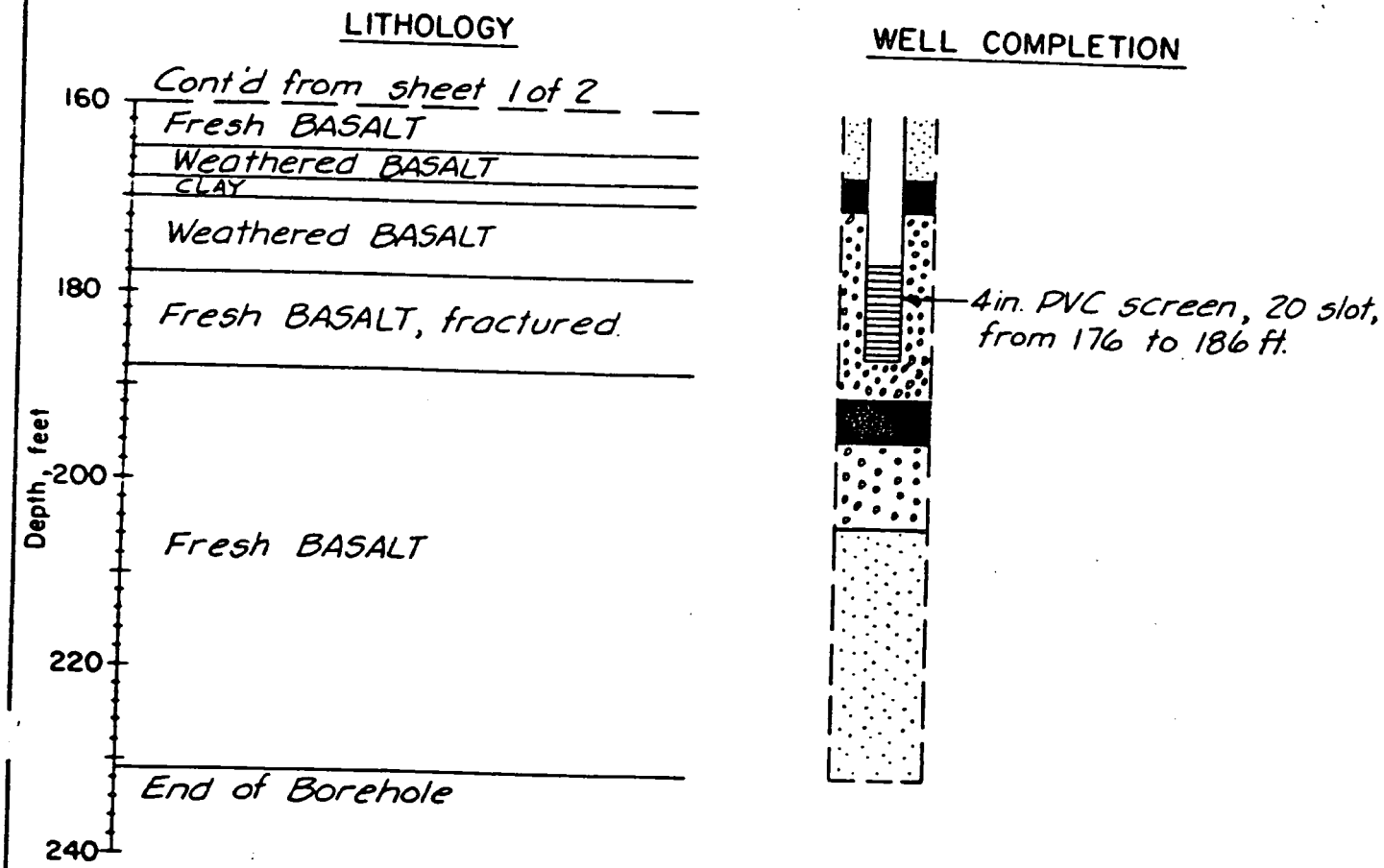
Scale 1 in. to 20 ft.

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 23

Figure

Sheet 2 of 2



LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

Golder Associates

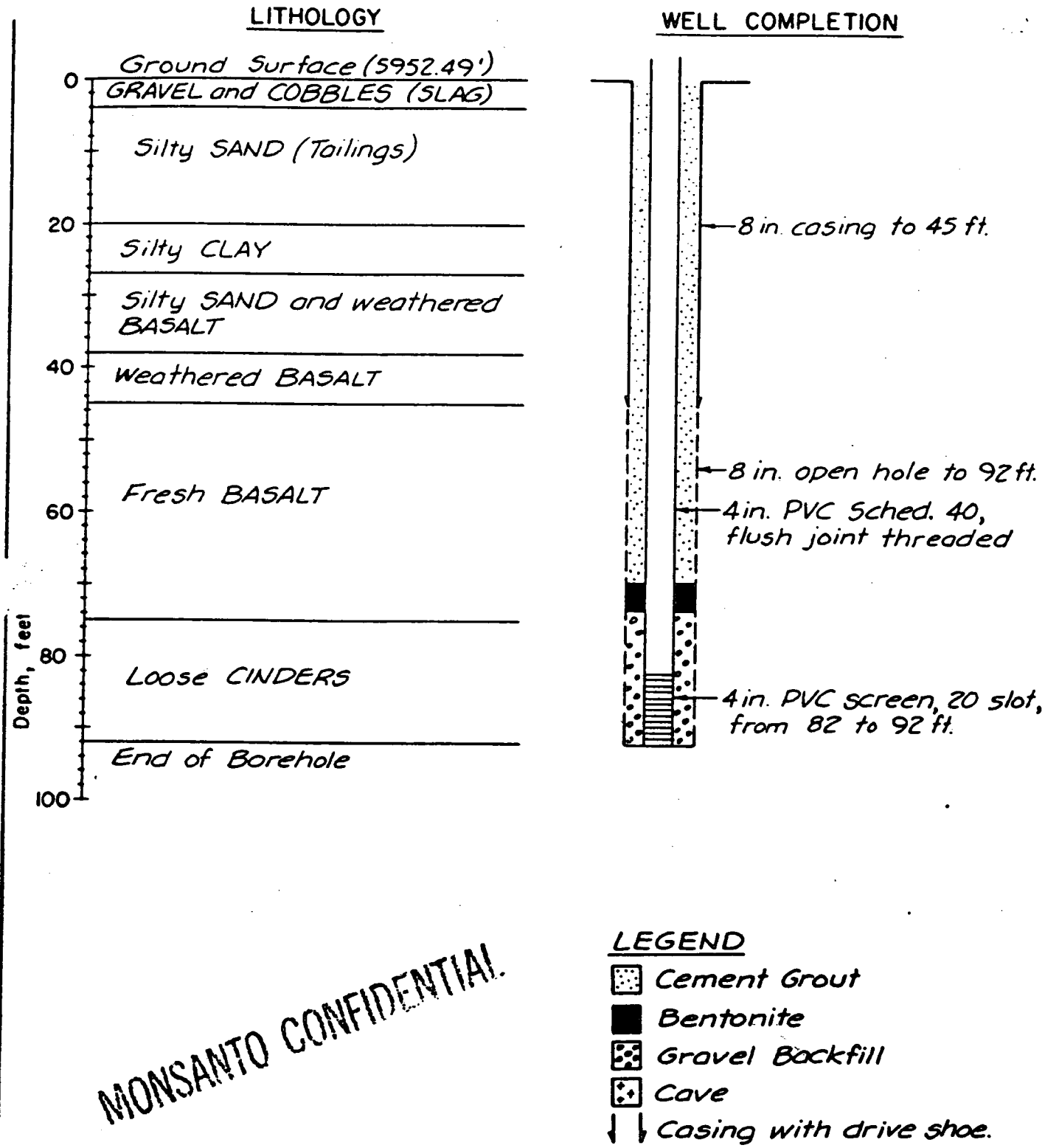
TEST WELL No. 23

	11-8-84	2-18-85	7-10-85	10-10-85	2-4-86	6-3-86	9-16-86	12-11-86
pH, Standard units	6.3	6.8	6.0	6.4	6.9	6.5	6.7	6.9
Conductivity, umhos/cm	2010	2000	1935	1900	2120	1890	1530	1990
Total Dissolved Solids mg/l	1470	1430	1390	1360	1560	1740	2030	1560
Sodium Adsorption Ratio	0.70	0.34	0.31	0.63	0.61	0.32	0.36	0.32
Total Hardness as $CaCO_3$	1095	1104	1124	1045	1104	1216	1171	1152
Calcium as Ca	182	180	165	102	162	159	169	163
Magnesium as Mg	152	159	173	192	170	199	182	181
Sodium as Na	33	41	39	47	48	42	44	44
Potassium as K	26	20	21	17	15	15	16	16
Total Alkalinity as $CaCO_3$	659	618	743	562	437	471	508	474
Bicarbonate Alkalinity	804	754	907	686	366	575	620	581
Chloride as Cl	112	83	98	108	167	104	156	139
Nitrate + Nitrite as N	-0.2	-0.05	-0.05	0.06	0.28	0.05	-0.05	-0.05
Sulfate as SO_4	455	421	413	447	602	621	570	549
Copper as Cu	—	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Iron as Fe	5.3	5.28	-0.05	-0.05	4.1	6.56	4.87	7.72
Manganese as Mn	-0.02	0.19	0.34	0.24	1.05	0.35	0.43	0.66
Silver as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Vanadium as V	0.12	0.09	0.03	0.03	0.08	0.05	0.02	-0.02

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 24

Figure A-24



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

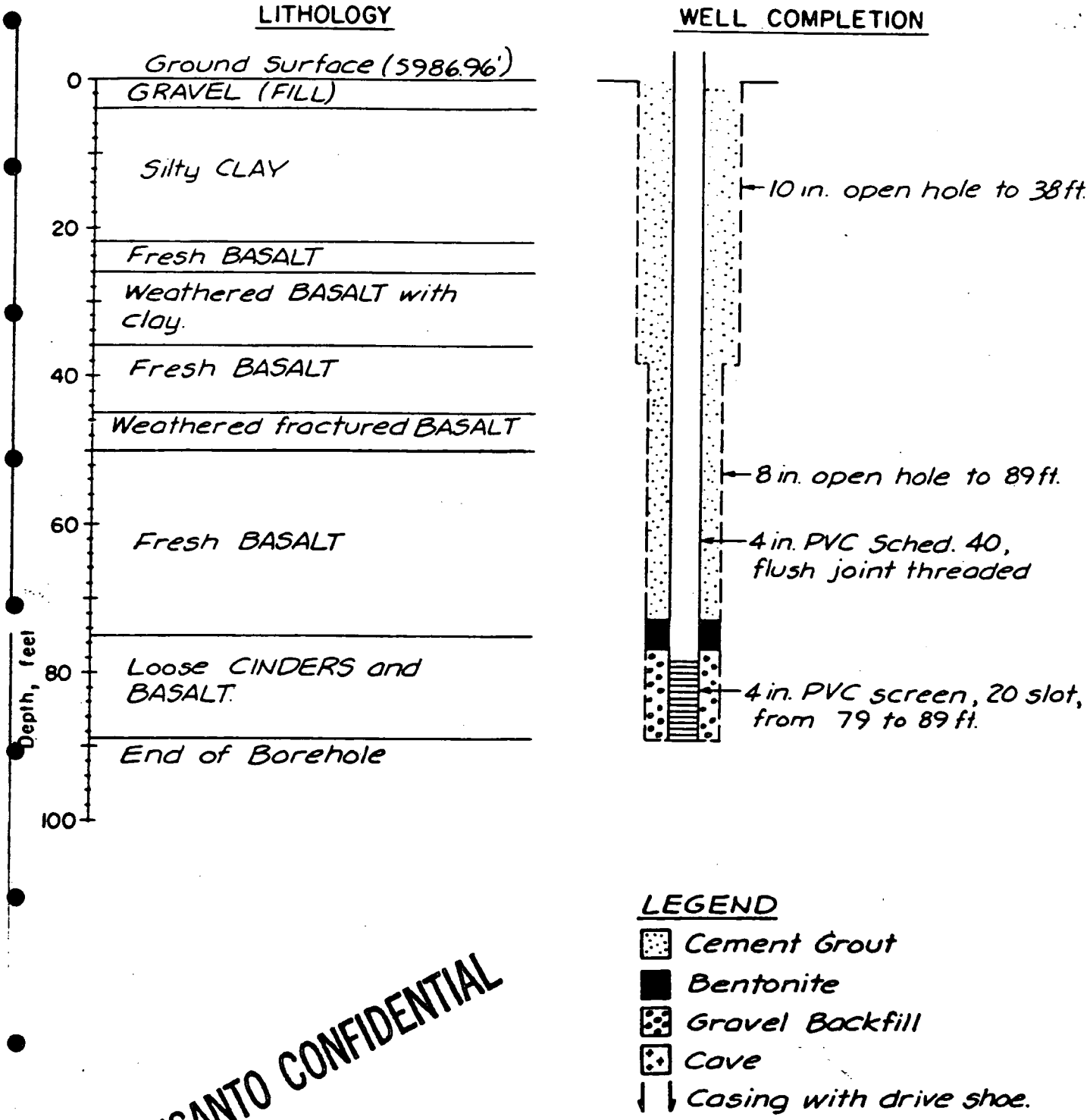
Golder Associates

TEST WELL No. 24

	11-8-84	2-18-85						
pH, Standard units	10.1	11.3						
CONDUCTIVITY, umhos/cm	2150	2110						
TOTAL DISSOLVED SOLIDS mg/l	1410	1710						
SODIUM ADSORPTION RATIO	2.55	2.69						
TOTAL HARDNESS AS $CaCO_3$	689	877						
CALCIUM AS Ca	225	348						
MAGNESIUM AS Mg	31	2						
SODIUM AS Na	154	183						
POTASSIUM AS K	14	47						
TOTAL ALKALINITY AS $CaCO_3$	172	275						
BICARBONATE ALKALINITY	179	—						
CHLORIDE AS Cl	233	227						
NITRATE + NITRITE AS N	11.1	9.27						
SULFATE AS SO_4	464	641						
COPPER AS Cu.	—	0.22						
IRON AS Fe	0.25	0.06						
MANGANESE AS Mn	0.04	-0.02						
SILVER AS Ag	-0.02	-0.02						
VANADIUM AS V	0.19	0.08						

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 28

Figure A-28



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

Golder Associates

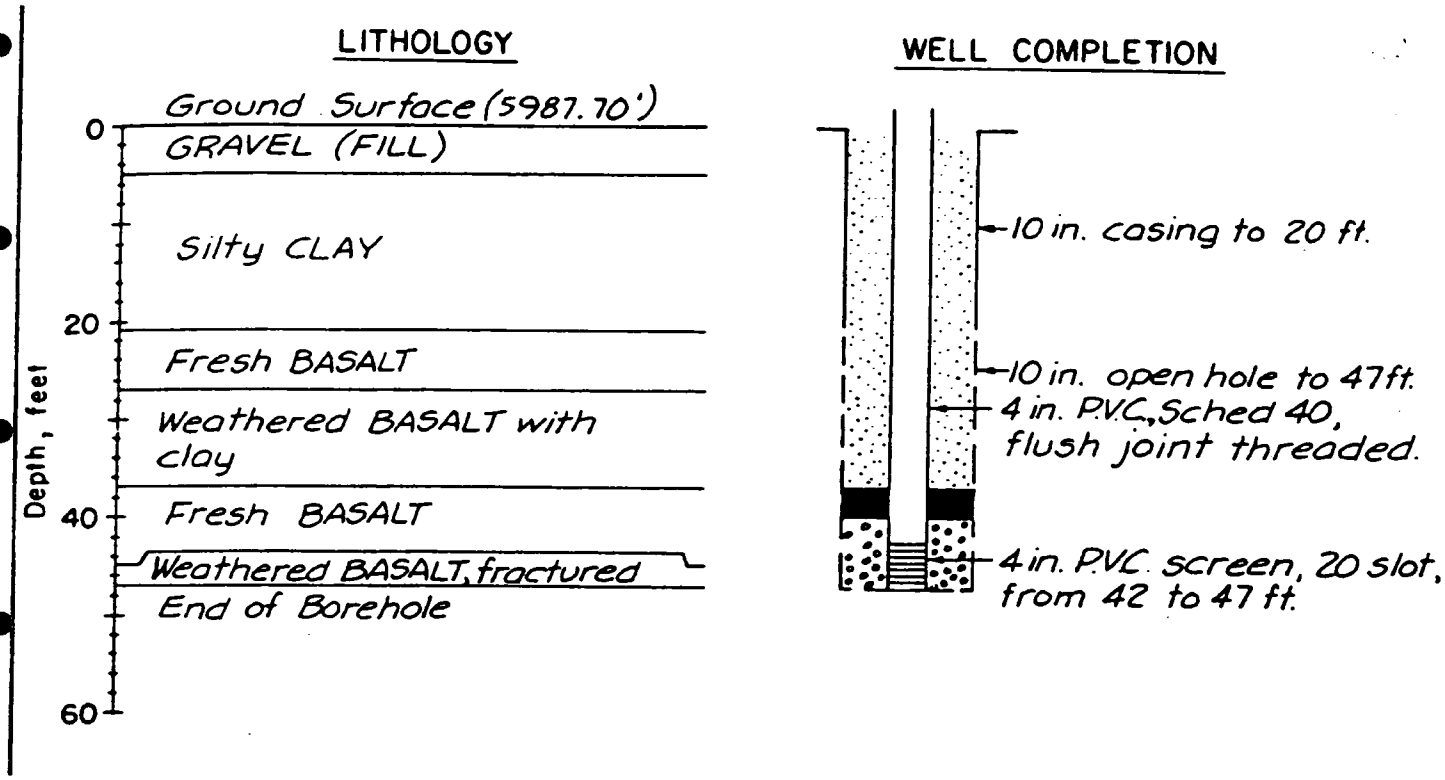
TEST WELL No. 28

	11-12-84	2-23-85	7-12-85	10-10-85	2-4-86	6-2-86	9-16-86	
pH, Standard units	6.3	7.1	6.3	6.3	7.0	6.4	7.0	
Conductivity, umhos/cm	1320	1460	1373	1410	1400	[illegible]	897	
Total Dissolved Solids mg/l	920	1080	824	928	836	838	956	
Sodium Adsorption Ratio	0.38	0.29	0.41	0.31	0.45	0.46	0.35	
Total Hardness as $CaCO_3$	812	821	811	860	739	501	747	
Calcium as Ca	177	182	170	183	149	54	149	
Magnesium as Mg	90	89	94	98	89	89	91	
Sodium as Na	36	19	27	21	28	24	22	
Potassium as K	8	6	8	7	7	7	6	
Total Alkalinity as $CaCO_3$	842	736	870	791	746	421	677	
Bicarbonate Alkalinity	1028	898	1062	965	910	514	814	
Chloride as Cl	22	27	27	26	24	23	21	
Nitrate + Nitrite as N	3.93	3.68	4.37	2.83	3.40	3.39	4.47	
Sulfate as SO_4	11	78	76	78	48	72	66	
Copper as Cu	–	-0.02	-0.02	-0.02	-0.02	-0.02	0.07	
Iron as Fe	-0.05	-0.05	-0.05	-0.05	0.22	-0.05	-0.05	
Manganese as Mn	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	0.02	
Silver as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Vanadium as V	-0.02	-0.05	-0.02	0.07	-0.02	-0.02	-0.02	

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 29

Figure A-29



LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

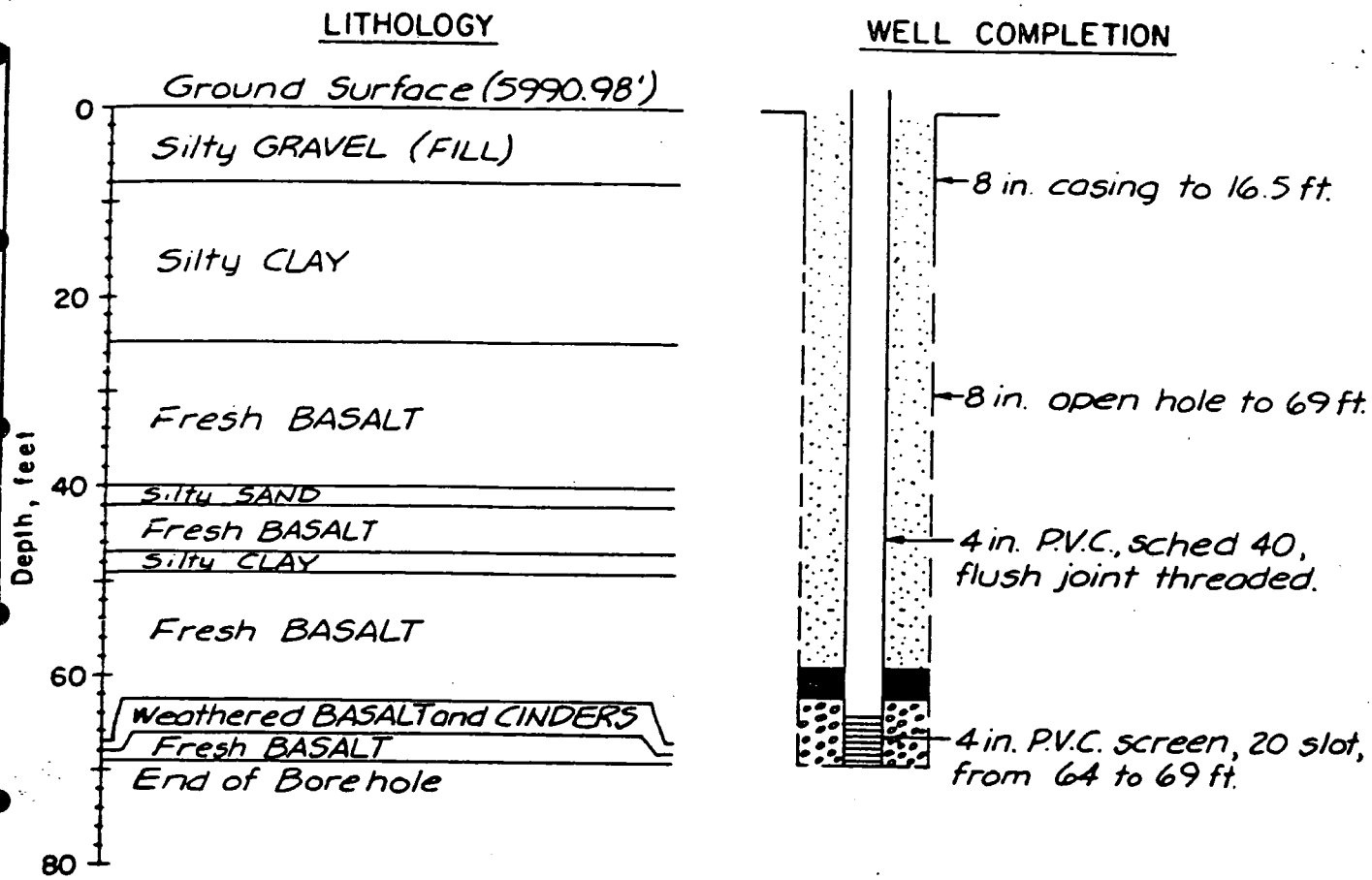
Golder Associates

TEST WELL No. 29

	11-12-84	2-20-85						
pH. Standard units	6.7	7.0						
CONDUCTIVITY, umhos/cm	1360	1190						
TOTAL DISSOLVED SOLIDS mg/l	828	700						
SODIUM ADSORPTION RATIO	0.46	0.39						
TOTAL HARDNESS AS $CaCO_3$	708	671						
CALCIUM AS Ca	155	150						
MAGNESIUM AS Mg	78	72						
SODIUM AS Na	28	23						
POTASSIUM AS K	6.	4						
TOTAL ALKALINITY AS $CaCO_3$	705	547						
BICARBONATE ALKALINITY	860	668						
CHLORIDE AS Cl	21	17						
NITRATE + NITRITE AS N	5.99	5.10						
SULFATE AS SO_4	11	96						
COPPER AS Cu	—	-0.02						
IRON AS Fe	-0.05	-0.05						
MANGANESE AS Mn	0.03	-0.02						
SILVER AS Ag	-0.02	-0.02						
VANADIUM AS V	-0.02	-0.05						

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 30

Figure A-30



LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

TEST WELL No. 30

	11-14-84	2-21-85	7-11-85	10-9-85	2-5-86	9-19-86		
pH. Standard units	7.1	7.2	7.2	6.3	7.3	7.5		
CONDUCTIVITY, umhos/cm	2240	2090	2017	1810	2020	1360		
TOTAL DISSOLVED SOLIDS mg/l	1440	1410	1350	1360	1360	1650		
SODIUM ADSORPTION RATIO	2.91	2.47	2.78	2.16	2.38	2.18		
TOTAL HARDNESS AS $CaCO_3$	675	735	725	740	752	770		
CALCIUM as Ca	130	149	147	148	148	152		
MAGNESIUM as Mg	85	89	87	90	93	95		
SODIUM as Na	174	134	172	135	150	139		
POTASSIUM as K	11	33	50	43	21	20		
TOTAL ALKALINITY as $CaCO_3$	400	377	460	337	420	385		
BICARBONATE ALKALINITY	488	484	561	411	513	714		
CHLORIDE as Cl	141	189	192	200	218	232		
NITRATE + NITRITE as N	1.5	982	112	—	120	13.6		
SULFATE as SO_4	389	367	344	334	351	392		
COPPER as Cu	-0.02	-0.02	-0.02	-0.02	-0.02	0.05		
IRON as Fe	-0.05	-0.05	-0.05	0.06	0.19	0.15		
MANGANESE as Mn	-0.02	-0.02	0.05	-0.02	0.15	0.14		
SILVER as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02		
VANADIUM as V	0.07	-0.05	0.03	0.07	-0.02	-0.02		

MONSANTO CONFIDENTIAL

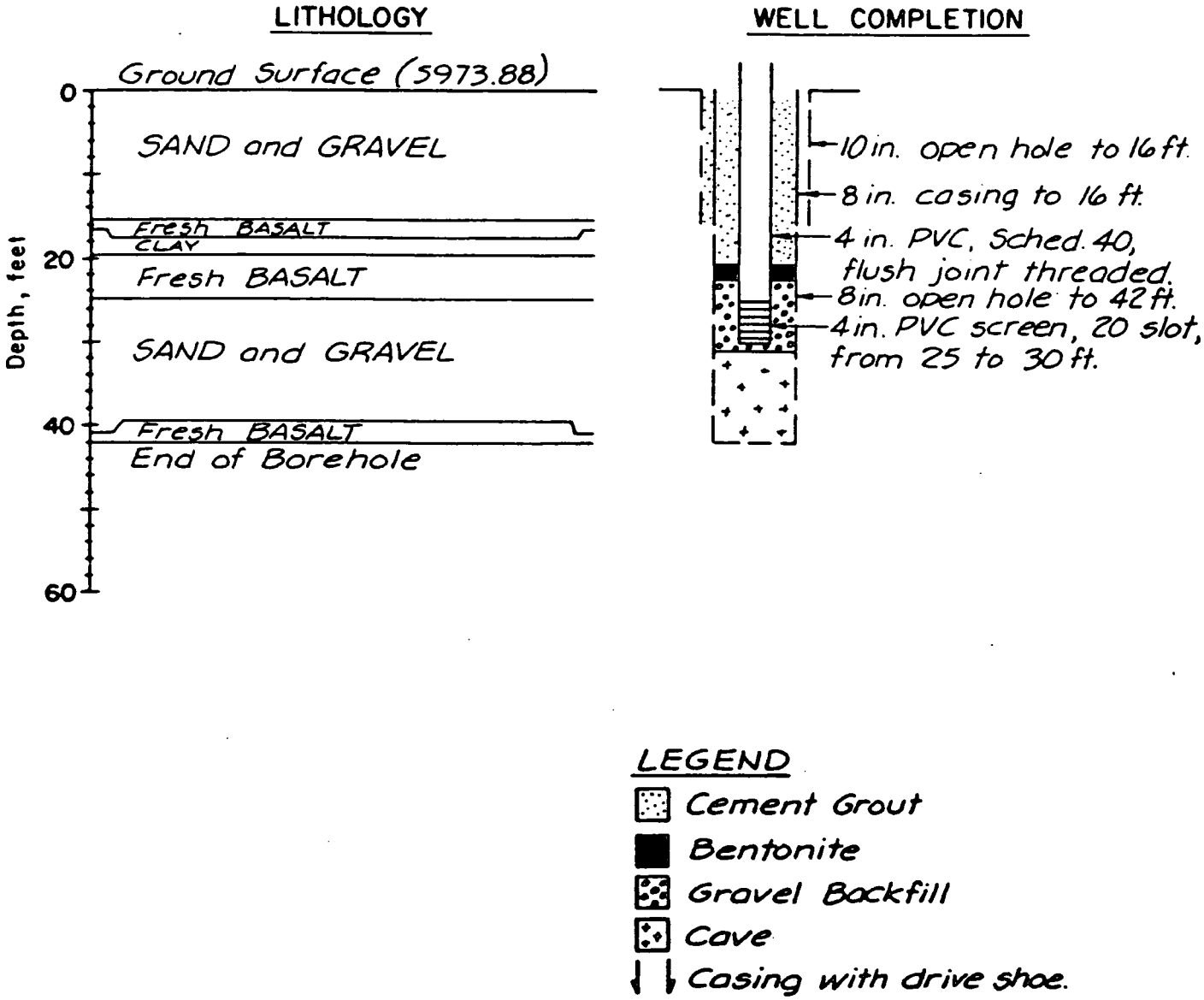
#41 well completion log available
Similar to TW 30

TEST WELL No. 41

	7-11-85	10-9-85	2-5-86					
pH, Standard units	7.4	7.1	7.4					
CONDUCTIVITY, umhos/cm	1800	1720	1770					
TOTAL DISSOLVED SOLIDS mg/l	1230	988	1160					
SODIUM ADSORPTION RATIO	2.38	2.25	2.31					
TOTAL HARDNESS AS $CaCO_3$	716	672	627					
CALCIUM as Ca	165	147	129					
MAGNESIUM as Mg	74	74	74					
SODIUM as Na	140	134	133					
POTASSIUM as K	32	34	22					
TOTAL ALKALINITY as $CaCO_3$	440	407	457					
BICARBONATE ALKALINITY	537	497	558					
CHLORIDE as Cl	143	149	146					
NITRATE + NITRITE as N	10.7	—	12.8					
SULFATE as SO_4	332	263	249					
COPPER as Cu	-0.02	-0.02	-0.02					
IRON as Fe	-0.05	-0.05	0.12					
MANGANESE as Mn	0.06	0.05	0.12					
SILVER as Ag	-0.02	-0.02	-0.02					
VANADIUM as V	0.22	-0.05	-0.02					

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 31

Figure A-31



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft.

Golder Associates

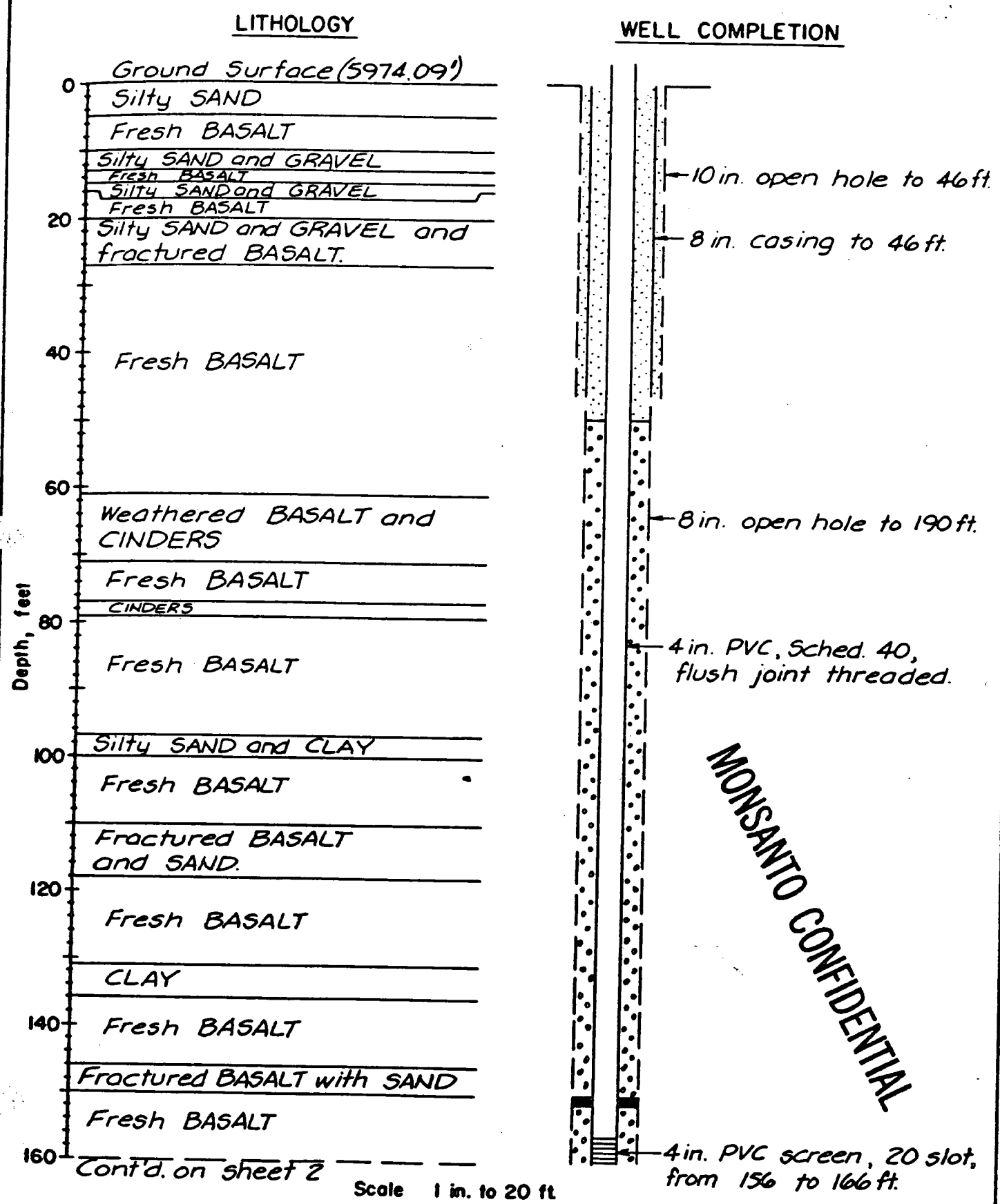
TEST WELL No. 31

	12-14-84	2-20-85						
pH, Standard units	7.3	7.7						
CONDUCTIVITY, umhos/cm	440	824						
TOTAL DISSOLVED SOLIDS mg/l	274	460						
SODIUM ADSORPTION RATIO	0.6	0.45						
TOTAL HARDNESS AS $CaCO_3$	169	416						
CALCIUM AS Ca	38	109						
MAGNESIUM AS Mg	18	35						
SODIUM AS Na	18	21						
POTASSIUM AS K	9	3						
TOTAL ALKALINITY AS $CaCO_3$	131	355						
BICARBONATE ALKALINITY	160	413						
CHLORIDE AS Cl	18	18						
NITRATE + NITRITE AS N	1.36	4.79						
SULFATE AS SO_4	40	45						
COPPER AS Cu	-	-0.02						
IRON AS Fe	0.56	-0.05						
MANGANESE AS Mn	0.04	-0.02						
SILVER AS Ag	-0.02	-0.02						
VANADIUM AS V	0.12	0.16						

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 32

Figure A-32



Scale 1 in. to 20 ft

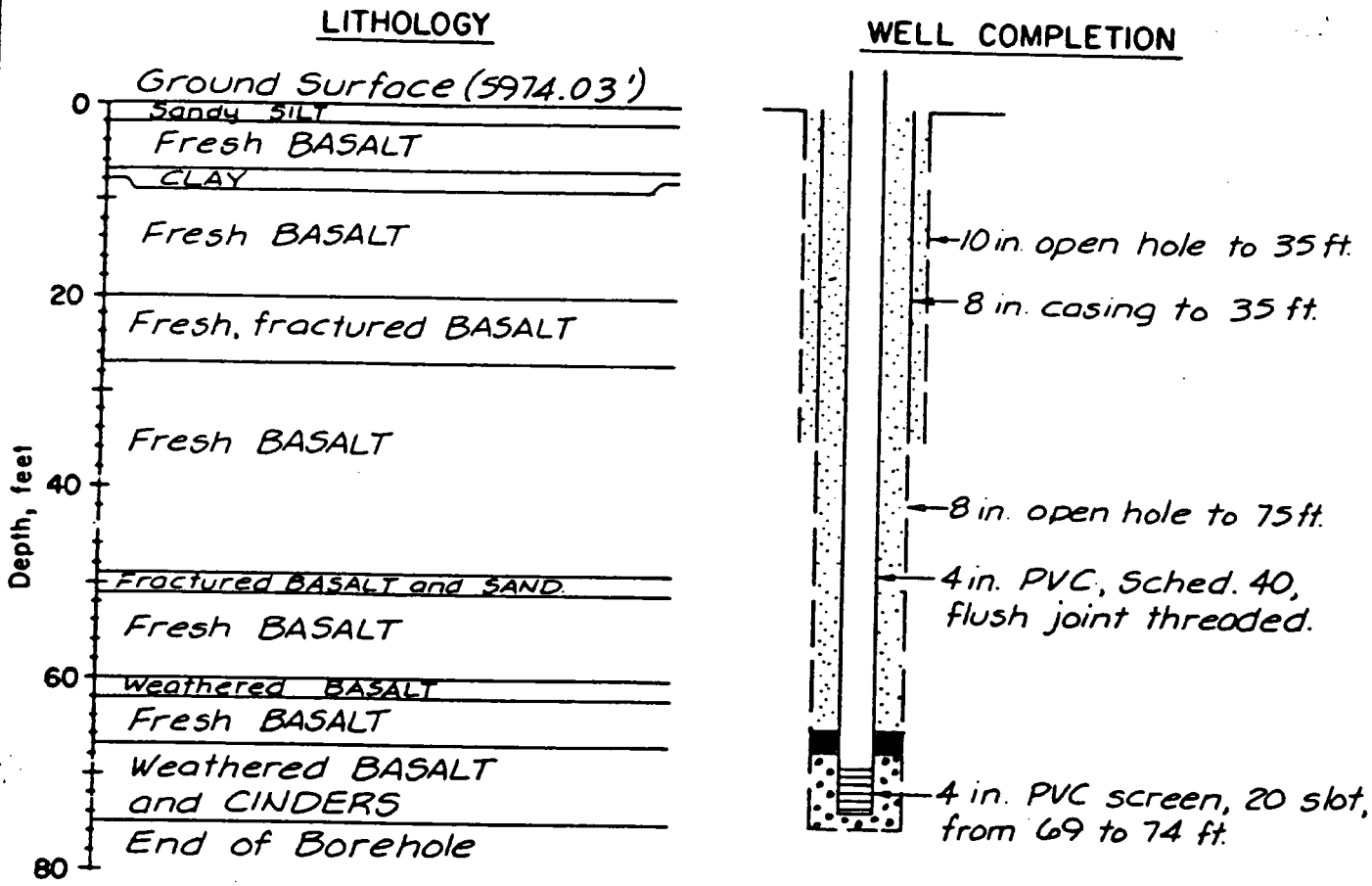
Golder Associates

TEST WELL No. 32

	12-14-84	2-28-85						
pH, Standard units	11.19	8.7						
CONDUCTIVITY, umhos/cm	1000	464						
TOTAL DISSOLVED SOLIDS mg/l	440	294						
SODIUM ADSORPTION RATIO	0.31	0.90						
TOTAL HARDNESS AS $CaCO_3$	329	170						
CALCIUM as Ca	142	17						
MAGNESIUM as Mg	-1	31						
SODIUM as Na	22	27						
POTASSIUM as K	27	10						
TOTAL ALKALINITY as $CaCO_3$	352	154						
BICARBONATE ALKALINITY	429	164						
CHLORIDE as Cl	18	22						
NITRATE + NITRITE as N	5.9	7.11						
SULFATE as SO_4	36	45						
COPPER as Cu	—	-0.02						
IRON as Fe	-0.05	.0.05						
MANGANESE as Mn	-0.02	-0.02						
SILVER as Ag	-0.02	-0.02						
VANADIUM as V	0.03	0.31						

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 33

Figure A-33



MONSANTO CONFIDENTIAL

LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

Scale 1 in. to 20 ft

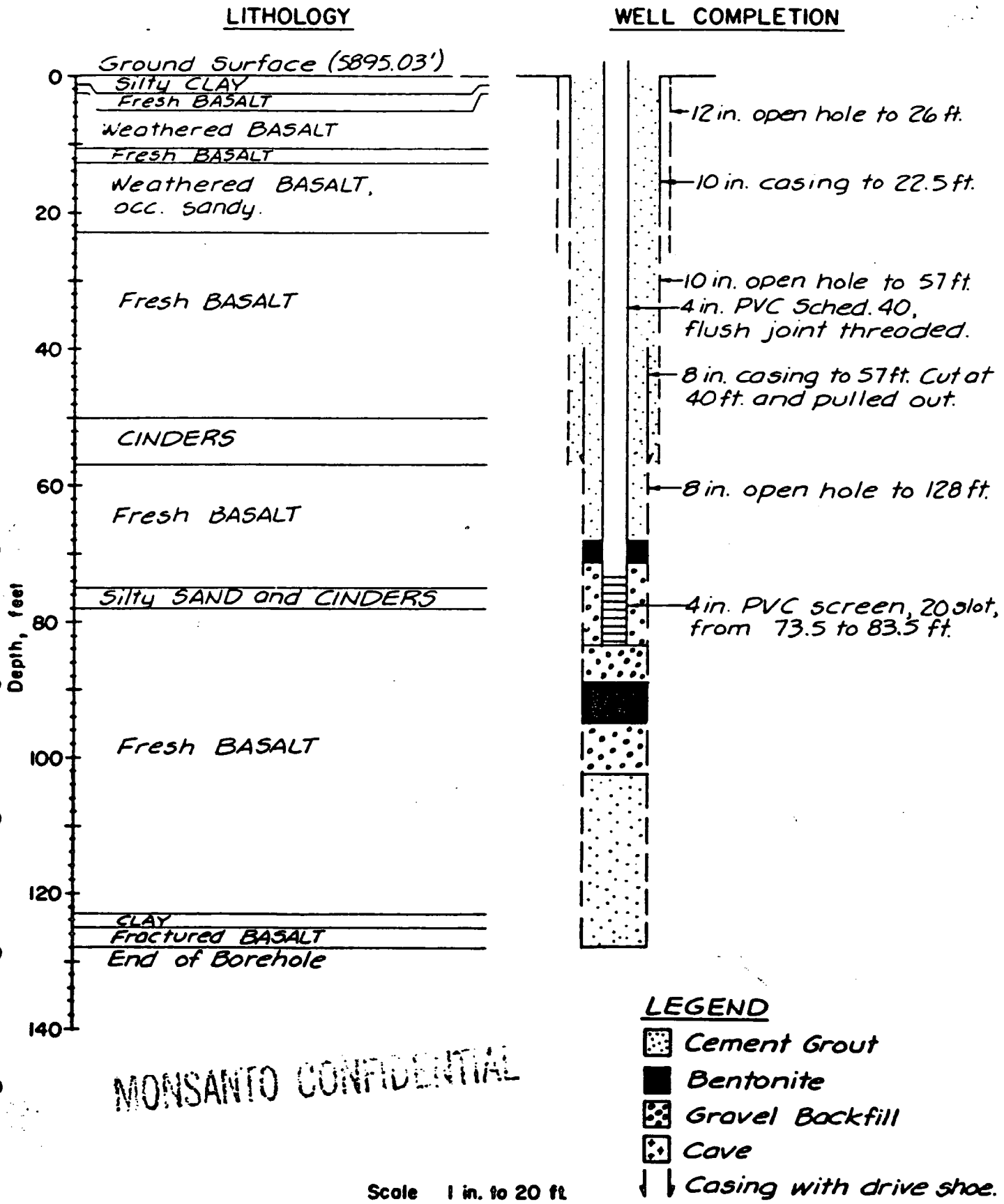
Golder Associates

TEST WELL No. 33

	12-14-84	2-28-85	7-13-85	10-10-85	6-3-86	9-17-86	12-11-86	
pH, Standard units	8.2	7.6	7.6	7.4	7.5	7.8	8.0	
Conductivity, umhos/cm	640	894	924	812	740	791	892	
Total Dissolved Solids mg/l	431	562	506	464	547	624	568	
Sodium Adsorption Ratio	0.37	0.32	0.44	0.70	0.66	0.49	0.49	
Total Hardness as $CaCO_3$	312	479	473	474	311	459	442	
Calcium as Ca	69	126	120	124	57	118	111	
Magnesium as Mg	34	40	42	40	41	40	40	
Sodium as Na	15	16	22	35	27	24	24	
Potassium as K	4	2	3	-1	3	2	3	
Total Alkalinity as $CaCO_3$	253	402	442	459	231	400	402	
Bicarbonate Alkalinity	308	491	539	560	282	488	491	
Chloride as Cl	80	23	22	28	39	41	29	
Nitrate + Nitrite as N	5.78	2.60	5.16	1.92	6.94	5.81	5.48	
Sulfate as SO_4	53	43	44	42	44	50	42	
Copper as Cu	—	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Iron as Fe	0.11	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	
Manganese as Mn	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	0.07	
Silver as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Vanadium as V	0.27	0.30	0.28	0.34	0.3	0.4	0.4	

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 35

Figure A-35



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft.

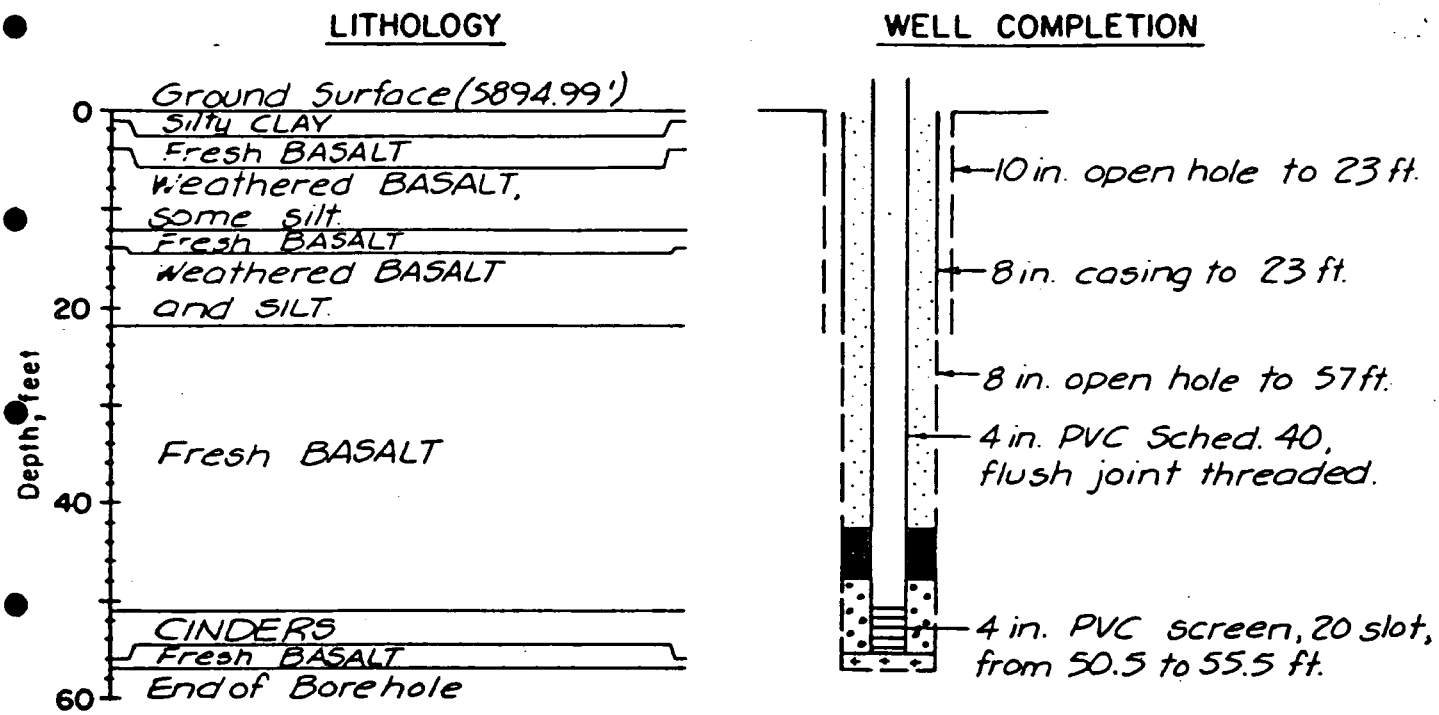
Golder Associates

TEST WELL No. 35

	2-26-85	7-13-85	10-11-85	2-6-86	6-3-86	9-17-86	12-12-86	
pH, Standard units	7.7	6.3	6.8	7.2	6.7	7.8	5.0	
CONDUCTIVITY, umhos/cm	1990	1749	1790	1830	1540	1650	1890	
TOTAL DISSOLVED SOLIDS mg/l	1320	1080	1200	1140	1210	1280	1220	
SODIUM ADSORPTION RATIO	0.44	0.41	0.27	0.43	0.34	0.30	0.34	
TOTAL HARDNESS as $CaCO_3$	1299	929	1232	807	1056	946	1122	
CALCIUM as Ca	100	59	78	46	6	69	67	
MAGNESIUM as Mg	255	190	257	168	253	188	232	
SODIUM as Na	36	29	22	28	25	21	26	
POTASSIUM as K	16	15	14	11	14	13	14	
TOTAL ALKALINITY as $CaCO_3$	1000	1270	1074	1150	970	928	1140	
BICARBONATE ALKALINITY	1464	1550	1311	1403	1184	1133	1391	
CHLORIDE as Cl	32	18	21	25	18	18	17	
NITRATE + NITRITE as N	-0.05	0.09	0.13	0.16	-0.05	-0.05	-0.05	
SULFATE as SO_4	88	92	82	67	71	58	71	
COPPER as Cu	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.02	
IRON as Fe	0.51	0.68	-0.05	3.11	2.79	3.79	2.62	
MANGANESE as Mn	0.21	0.19	0.17	0.58	0.18	0.16	0.26	
SILVER as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
VANADIUM as V	-0.05	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 39

Figure A-39



LEGEND

- Cement Grout
- Bentonite
- Gravel Backfill
- Cave
- Casing with drive shoe.

MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft.

Golder Associates

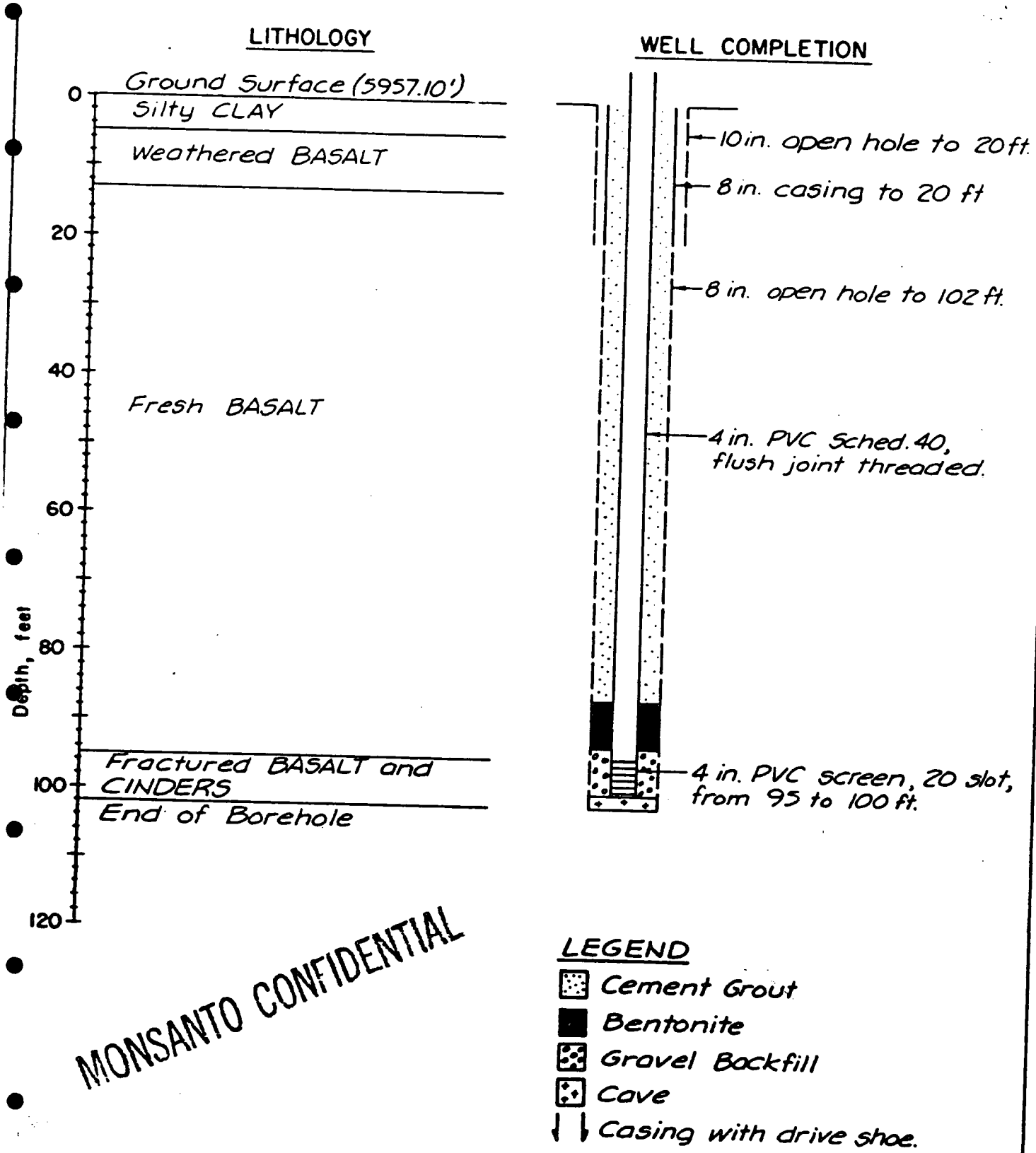
TEST WELL No. 39

	2-28-85	7-13-85	10-11-85	2-6-86	6-3-86	9-17-86	12-12-86	
pH, Standard units	5.5	7.3	7.0	7.4	7.0	7.3	7.2	
Conductivity, umhos/cm	1240	1500	1440	1460	1320	1440	1520	
Total Dissolved Solids mg/l	874	1040	1060	1030	1130	1300	1050	
Sodium Adsorption Ratio	1.33	1.32	1.28	1.10	1.03	0.99	1.05	
Total Hardness as $CaCO_3$	499	678	702	696	757	691	752	
Calcium as Ca	73	115	118	114	126	112	120	
Magnesium as Mg	77	95	99	100	108	100	110	
Sodium as Na	71	79	78	67	65	60	67	
Potassium as K	32	28	24	18	26	24	21	
Total Alkalinity as $CaCO_3$	176	454	351	381	383	380	389	
Bicarbonate Alkalinity	215	559	428	465	467	464	475	
Chloride as Cl	87	5	95	87	97	72	78	
Nitrate + Nitrite as N	7.49	5.95	6.90	4.31	0.14	5.50	5.7	
Sulfate as SO_4	306	346	326	324	341	348	366	
Copper as Cu	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Iron as Fe	-0.05	-0.05	-0.05	0.15	-0.05	0.11	0.12	
Manganese as Mn	-0.02	-0.05	-0.02	0.09	0.04	0.03	0.16	
Silver as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Vanadium as V	-0.05	0.03	-0.02	-0.02	-0.2	-0.2	-0.2	

MONSANTO CONFIDENTIAL

LITHOLOGY AND WELL COMPLETION
MONSANTO TW 37

Figure A-37



MONSANTO CONFIDENTIAL

Scale 1 in. to 20 ft

Golder Associates

TEST WELL No. 37

	2-19-85	7-10-85	10-10-85	2-4-86	6-3-86	9-16-86	12-11-86	
pH, Standard units	7.5	6.2	6.4	7.0	6.7	7.1	7.7	
Conductivity, umhos/cm	2660	2017	2230	1380	1740	1990	2100	
Total Dissolved Solids mg/l	1860	1390	1640	1020	1420	1650	1490	
Sodium Adsorption Ratio	2.21	2.09	2.45	1.12	1.61	1.37	2.04	
Total Hardness as $CaCO_3$	992	643	771	517	735	767	809	
Calcium as Ca	244	179	159	118	151	159	161	
Magnesium as Mg	93	75	91	74	87	90	99	
Sodium as Na	160	177	156	97	100	119	133	
Potassium as K	103	94	109	47	81	35	19	
Total Alkalinity as $CaCO_3$	432	384	290	373	365	358	346	
Bicarbonate Alkalinity	527	467	354	480	445	437	422	
Chloride as Cl	214	276	271	105	164	211	175	
Nitrate + Nitrite as N	11.4	9.43	25.5	8.44	8.86	10.7	10.4	
Sulfate as SO_4	600	438	507	271	463	449	455	
Copper as Cu	-0.02	-0.02	-0.02	0.03	0.02	-0.02	-0.02	
Iron as Fe	-0.05	-0.05	0.04	0.09	0.05	0.87	0.76	
Manganese as Mn	2.50	2.59	2.83	1.61	3.02	2.75	3.86	
Silver as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Vanadium as V	0.15	0.14	0.19	2.54	0.1	-0.2	0.3	

South Well (No. 3)

LAYNE & BOWLER PUMP COMPANY

FIELD TEST REPORT

Owner: Monsanto Chemical Co. Well No. 3

Pump Mfr. Layne & Bowler Ser. No. D-11521 Well Dia. [illegible] Depth 2255

Motor Mfr. General Electric Ser. No. Frame

H.P. 200 HP RPM 1770 Volts 480 Amps 235 Cycle 60

Power Co. Utah Power Meter No. Kh C.T. Ratio

Engine Mfr.

TEST DATES: 8/10/67

Pressure Readings In Lbs.	Airline, Static	None				
	Airline, Pumping	None				
	Discharge Head	184.80 PSI				
Airline Length – Feet		None				
Airline Static Pressure – Feet		None				
STATIC WATER LEVEL		122'-7"				
Airline Length – Feet						
Airline Pumping Pressure – Feet						
PUMPING LEVEL		124'-3"				
Discharge Head – Feet		184'9"				
TOTAL HEAD – Feet		309'-0"				
Pumping Level – Feet		124'-3"				
Static Level – Feet		122'-7"				
DRAWDOWN		1'-8"				
Flow Reading	Pitot 7.5#	Collins	(4 readings average)			
	Orifice					
	Other					
CAPACITY	GPM	1950				
	Minous Inches	216.33				
GPM Per Foot Drawdown		1084				
METER DATA: Revs/Sec						
KW Input						
HP Input						
BHP Input to Pump @ % Motor eff.						
PUMP RPM						
LOAD Volts						
LOAD Amps						
Water Horsepower						
Pump Efficiency						
Overall Efficiency						
KWH per Acre Foot						

Pump Setting:

Column Size Discharge dia. 10½" I.D.

Bowl Assembly (Stages & Type) 14"R

Remarks:

Used electric draw down gauge to check both static water level and pumping level

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Tested By: T.M. Thompson - Layne & Bowler Pump Co.
Glen Furber - Mel Brown Co.

TEST WELL No. PLANT WELL 3

	11-13-84	2-23-85	7-10-85	10-9-85	2-3-86	6-5-86	9-17-86	12-9-86
pH. Standard units	7.2	7.2	7.1	6.6	7.3	6.9	7.2	7.9
CONDUCTIVITY, umhos/cm	1080	1040	1008	955	1010	894	986	964
TOTAL DISSOLVED SOLIDS mg/l	756	675	548	672	548	636	708	644
SODIUM ADSORPTION RATIO	0.61	0.54	0.37	0.57	0.63	0.45	0.41	0.42
TOTAL HARDNESS AS $CaCO_3$	313	551	495	515	486	530	494	481
CALCIUM as Ca	115	125	113	119	109	125	117	110
MAGNESIUM as Mg	56	58	51	53	52	53	49	50
SODIUM as Na	32	29	19	30	32	24	21	21
POTASSIUM as K	9	9	6	4	5	7	5	4
TOTAL ALKALINITY as $CaCO_3$	429	410	455	360	416	415	397	389
BICARBONATE ALKALINITY	524	500	559	366	505	506	484	475
CHLORIDE as Cl	45	45	22	30	34	40	35	27
NITRATE + NITRITE as N	10.	5.38	5.60	—	3.35	6.40	7.0	6.18
SULFATE as SO_4	84	84	55	81	95	82	84	78
COPPER as Cu	—	-0.02	-0.02	0.05	-0.02	-0.02	-0.03	-0.02
IRON as Fe	-0.05	-0.05	-0.05	-0.05	0.11	-0.04	-0.05	0.07
MANGANESE as Mn	-0.02	-0.02	-0.03	-0.03	0.04	-0.02	-0.02	0.29
SILVER as Ag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
VANADIUM as V	0.06	-0.05	0.04	0.08	-0.2	-0.2	-0.2	0.2

WELL EFFLUENT

	Initials	Date
Prepared by		
Approved by		

	1	2	3	4	5	6	7	8	9	10
	11-09-84	2-19-85	2-03-86	9-19-86						
pH	7.9	8.3	7.9	8.3						
CONDUCTIVITY, umhos/cm	1540	1220	1450	979						
TOTAL DISSOLVED SOLIDS mg/l	872	804	780	964						
SODIUM ADSORPTION RATIO	1.72	1.33	0.20	1.00						
TOTAL HARDNESS AS $CaCO_3$	503	556	554	558						
CALCIUM AS Ca	116	126	119	126						
MAGNESIUM AS Mg	53	57	68	54						
SODIUM AS Na	59	75	119	54						
POTASSIUM AS K	11	10	8	10						
TOTAL ALKALINITY AS $CaCO_3$	398	422	411	422						
BICARBONATE ALKALINITY AS HCO_3	486	515	508	515						
CARBONATE ALKALINITY AS CO_3	-0-	-0-	-0-	-0-						
HYDROXIDE ALKALINITY AS OH	-0-	-0-	-0-	-0-						
CHLORIDE AS Cl	132	75	170	95						
FLUORIDE AS F	0.69	1.02	0.76	0.76						
NITRATE & NITRITE AS N	6.78	5.68	4.71	7.09						
SULFATE AS SO4	110	130	110	117						
ACIDITY	-0-	-0-	-0-	-0-						
ARSENIC AS As	0.01	-0.005	0.014	0.009						
CADMIUM AS Cd (BY ICP)	0.004	0.004	0.002	/						
CADMIUM AS Cd (BY FURNACE)			0.004	0.004						
CHROMIUM AS Cr	-0.02	-0.02	-0.05	-0.02						
COPPER AS Cu		-0.02	0.02	-0.02						
IRON AS Fe	-0.05	-0.05	0.06	-0.05						
LEAD AS Pb	-0.02	-0.02	0.09	-0.02						
MANGANESE AS Mn	-0.02	-0.02	0.03	-0.02						
SELENIUM AS Se	0.006	-0.005	0.009	0.009						
SILVER AS Ag	-0.02	-0.02	-0.02	-0.02						
VANADIUM AS V	0.03	-0.05	0.3	-0.2						
ZINC AS Zn	0.03	-0.05	0.07	0.07						
STATIC WATER LEVEL										

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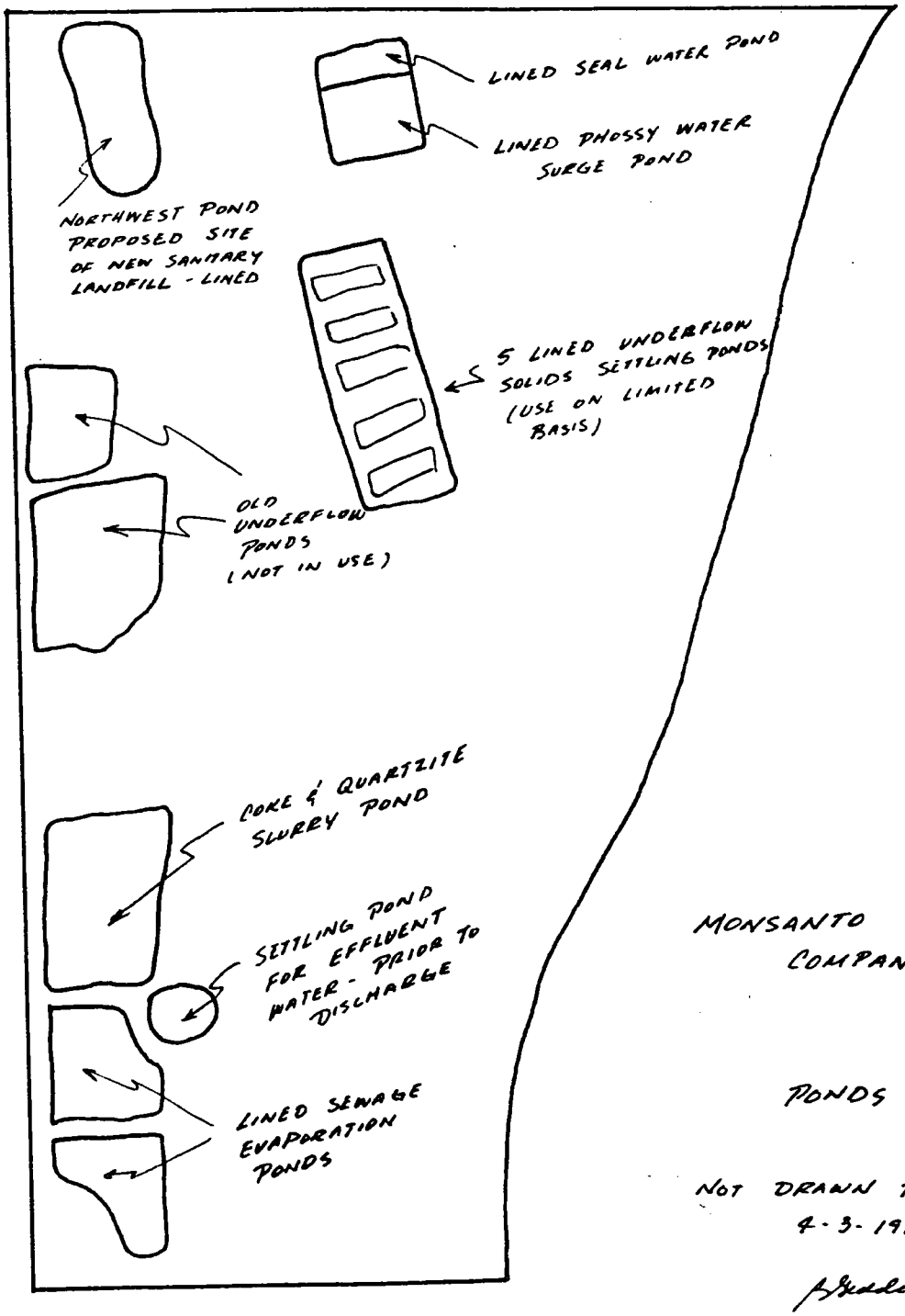

MONSANTO CHEMICAL COMPANY

PONDS

NOT DRAWN TO SCALE
4-3-1987

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PETROLEUM STORAGE TANK INVENTORY

(Above Ground)

LOCATION	NOMINAL CAPACITY (GALLONS)	CONTENTS	SPILL CONTAINMENT
Tank Farm	88,000	No. 2 Fuel Oil	Earthen Dike
Tank Farm	88,000	No. 2 Fuel Oil	Earthen Dike
Tank Farm	88,000	No. 2 Fuel Oil	Earthen Dike
Plant Well 1 & 3 Aux. Motors	500	Diesel Fuel	Catchment Basin
Tank Farm	1,000	Gasoline	Catchment Basin
Sub-Station	25,000	Transformer Oil	Catchment Basin
Sub-Station	14,300	Transformer Oil	Catchment Basin
Maintenance Shops	Varies	Lubricating Oils	Retention Pond
Oil Carts	900	Insulating Oil	Retention Pond
Oil & Grease	2,000	Lube Oils & Grease	Retention Pond
Furnaces	8,000	Insulating Oil	Catchment Basin
Furnaces	1,800	Insulating Oil	Retention Pond
Furnaces	2,600	Insulating Oil	Retention Pond
Salvage Yard	500	Stoddard Solvent	Catchment Basin
Salvage Yard	500	Kerosene	Catchment Basin

(Underground)

All underground storage tanks were removed and found to be in good condition prior to the May 8, 1986 reporting deadline. Above ground tanks with appropriate containment facilities were installed as replacements.

The tanks removed were:

LOCATION	NOMINAL CAPACITY (GALLONS)	CONTENTS
Dryer Building	14,000	#2 Fuel Oil
Yard	1,000	#2 Fuel Oil
Guard House	1,000	Gasoline
Boiler	30,000	#2 Fuel Oil

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SOLVENTS, WASTE OIL & ASBESTOS DISPOSAL

SOLVENTS

Since 1977, solvents used on the plant site have been contained in 6 Safety Kleen washers. The solvent, since that time, has been under contract with Safety Kleen and replaced on a monthly basis. The approximate usage is 600 lbs/month. Prior to 1977, spent solvent was used as a dust suppressant on the facility roads or dumped at the salvage yard. Monthly usage is estimated not to have exceeded the present usage.

WASTE OIL

Beginning in 1974, Cowboy Oil, Pocatello, Idaho, was contracted to purchase used oil for recycling. Waste oil is contained in a tank on the facility and collected on a regular basis by Cowboy Oil.

ASBESTOS

During the last 5 years, asbestos removal and disposal has been very limited at the plant. In 1985, approximately 20 lbs. of asbestos insulated electrical wiring was removed and disposed of in the plant landfill. In 1982, approximately 500 pounds of insulation was replaced. This material was also landfilled at the plant.

Currently, a written asbestos policy exists complying with the OSHA standards placed into effect on 7/21/87. Disposal of asbestos follows procedures of CFR plat 61.152.

MONSANTO CONFIDENTIAL

Northern
Engineering and Testing, Inc.
600 South 25th Street
P.O. Box 30615
Billings, MT 59107
(406) 248-9161

TECHNICAL REPORT

REPORT TO:

MONSANTO
ATTN: MR. BOB GEDDES
P O BOX 816
SODA SPRINGS, ID 83276

DATE: August 18, 1980
JOB NUMBER: 79-920
SHEET: 1 **OF** 1
INVOICE NO.: 8683

REPORT OF: Waste Analysis

Sample Identification:

On August 6, 1980, this sample was delivered to our laboratory with instructions to perform the following analyses. Tests were performed in accordance with procedures in the Federal Register, Volume 45, No. 98, May 19, 1980. A < sign indicates less than the reported value was present in the sample.

TEST RESULTS:

Lab No.:	43379
Identification:	Slag

Component, (mg/l in extract)	
Arsenic as As	<0.005
Barium as Ba	<0.5
Cadmium as Cd	<0.005
Chromium as Cr	0.09
Lead as Pb	<0.02
Mercury as Hg	<0.001
Selenium as Se	<0.005
Silver as Ag	<0.01

Reviewed by Deborah A. Gunn

rmr

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AS A MUTUAL PROTECTION TO CLIENTS THE PUBLIC AND OURSELVES ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF OUR CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL SAMPLES WILL BE DISPOSED OF AFTER TESTING IS COMPLETED UNLESS OTHER ARRANGEMENTS ARE AGREED TO IN WRITING

NAME & ADDRESS OF PREVIOUS LANDOWNER

Vernal Hopkins
81 North Main Street
Soda Springs, Idaho 83276
(208) 547-3958

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rlg33/RLG

LANDFILLS SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain as Necessary.

1. EVIDENCE OF SITE INSTABILITY *(Erosion, Settling, Sink Holes, etc)*
☐ YES ☐ NO

2. EVIDENCE OF IMPROPER DISPOSAL OF BULK LIQUIDS, SEMI-SOLIDS AND SLUDGES INTO THE LANDFILL
☐ YES ☐ NO

3. CHECK RECORDS OF CELL LOCATION AND CONTENTS AND BENCHMARK
☐ YES ☐ NO

4. WASTES SURROUNDED BY SORBENT MATERIAL
☐ YES ☐ NO

5. DIVERSION STRUCTURES ARE EFFECTIVELY CONSTRUCTED AND PROPERLY MAINTAINED
☐ YES ☐ NO

6. EVIDENCE OF PONDING OF WATER ON SITE
☐ YES ☐ NO

7. EVIDENCE OF IMPROPER/INADEQUATE DRAINING
☐ YES ☐ NO

8. ADEQUATE LEACHATE COLLECTION SYSTEM *(If "Yes", specify Type)*
☐ YES ☐ NO

8a. SURFACE LEACHATE SPRING
☐ YES ☐ NO

9. RECORDS OF LEACHATE ANALYSIS
☐ YES ☐ NO

10. GAS MONITORING
☐ YES ☐ NO

11. GROUNDWATER MONITORING WELLS
☐ YES ☐ NO

12. ARTIFICIAL MEMBRANE LINER INSTALLED
☐ YES ☐ NO

13. SPECIFIC CONTAINMENT MEASURES *(Clay Bottom, Sides, etc)*
☐ YES ☐ NO

14. FIXATION *(Stabilization)* OF WASTE
☐ YES ☐ NO

15. ADEQUATE CLOSURE OF INACTIVE PORTION OF FACILITY
☐ YES ☐ NO

16. COVER *(Type)*

16a. THICKNESS

16b. PERMEABILITY

16c. DAILY APPLICATION
☐ YES ☐ NO

AR 1.6 0004

EPA Form T2070-3E (10-79)

6285

STORAGE FACILITIES SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain as Necessary.

1. STORAGE AREA HAS CONTINUOUS IMPERVIOUS BASE
☐ YES ☒ NO

2. STORAGE AREA HAS A CONFINEMENT STRUCTURE
☐ YES ☒ NO

3. EVIDENCE OF LEAKAGE/OVERFLOW *(If "Yes", document where and how much runoff is overflowing or leaking from containment)*
☐ YES ☒ NO

4. ESTIMATE TYPE AND NUMBER OF BARRELS/CONTAINERS
55 gallon Drums 23 in present load that was shipped recently

5. GLASS OR PLASTIC STORAGE CONTAINERS USED
☐ YES ☒ NO

6. ESTIMATE NUMBER AND CAPACITY OF STORAGE TANKS
N/A

7. NOTE LABELING ON CONTAINERS
area is fenced off to limit entry. Prior to transport containers are labeled and placarded as flammable solid.

8. EVIDENCE OF LEAKAGE CORROSION OR BULGING OF BARRELS/CONTAINERS/STORAGE TANKS *(If "Yes", document evidence. Describe location and extent of damage. Take PHOTOGRAPHS)*
☐ YES ☒ NO

9. DIRECT VENTING OF STORAGE TANKS
☐ YES ☐ NO N/A

10. CONTAINERS HOLDING INCOMPATIBLE SUBSTANCES *(If "Yes", document evidence. Describe location and identity of hazardous waste. Take PHOTOGRAPHS.)*
☐ YES ☐ NO

11. INCOMPATIBLE SUBSTANCES STORED IN CLOSE PROXIMITY *(If "Yes", document evidence. Describe location and identity of hazardous waste. Take PHOTOGRAPHS.)*
☐ YES ☒ NO

12. ADEQUATE CONTAINER WASHING AND REUSE PRACTICES
☐ YES ☐ NO N/A

13. ADEQUATE PRACTICES FOR DISPOSAL OF EMPTY STORAGE CONTAINERS
☐ YES ☐ NO N/A Sent for storage prior to scrap recycling.

SURFACE IMPOUNDMENTS SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain as Necessary.

1. TYPE OF IMPOUNDMENT

2. STABILITY/CONDITION OF EMBANKMENTS

3. EVIDENCE OF SITE INSTABILITY *(Erosion, Settling, Sink Holes, etc.)*
☐ YES ☐ NO

4. EVIDENCE OF DISPOSAL OF IGNITABLE OR REACTIVE WASTE
☐ YES ☐ NO

5. ONLY COMPATIBLE WASTES ARE STORED OR DISPOSED OF IN THE IMPOUNDMENT
☐ YES ☐ NO

6. RECORDS CHECKED FOR CONTENTS AND LOCATION OF EACH SURFACE IMPOUNDMENT
☐ YES ☐ NO

7. IMPOUNDMENT HAS LINER SYSTEM
☐ YES ☐ NO

7a. INTEGRITY OF LINER SYSTEM CHECKED
☐ YES ☐ NO

7b. FINDINGS

8. SOIL STRUCTURE AND SUBSTRUCTURE

9. MONITORING WELLS
☐ YES ☐ NO

10. LENGTH, WIDTH, AND DEPTH
LENGTH WIDTH DEPTH

11. CALCULATED VOLUMETRIC CAPACITY

12. PERCENT OF CAPACITY REMAINING

13. ESTIMATE FREEBOARD

14. SOLIDS DEPOSITION
☐ YES ☐ NO

15. DREDGING DISPOSAL METHOD

16. OTHER EQUIPMENT

INCINERATORS SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain as Necessary.

1. INCINERATION OF ALL SUBSTANCES APPROVED BY REGULATORY AGENCY
☒ YES ☐ NO
LIST ALL SUBSTANCES INCINERATED, INDICATING WHETHER OR NOT APPROVAL EXISTS.

Theater oil collected in sump pumped back into Kiln for incineration. Kiln is part of calcining process prior to Electric furnace usage which produces elemental phosphorus

2. COMBUSTION EFFICIENCY MONITORED
☒ YES ☐ NO *(Explain)*

3. TEMPERATURE, GAS FLOW, RETENTION CALCULATIONS, AND COMBUSTION ZONE MONITORED
☒ YES ☐ NO

4. MONITORING EQUIPMENT FUNCTIONING PROPERLY
☒ YES ☐ NO

5. ADEQUATE MAINTENANCE OF EMISSION CONTROL EQUIPMENT
☒ YES ☐ NO

6. MONITORING PORTS IN INCINERATOR *(Indicate Position)*
☒ YES ☐ NO
Kiln has Monitoring ports for heat zone monitori

7. WASTE FLOW RATE MONITORED
☐ YES ☒ NO
feed rate of process materials is regulated

8. CUT-OFF DEVICE FUNCTIONING PROPERLY
☐ YES ☐ NO
and 5gpm of theater oil is sent to Kiln when fed.

9. STACK TEST
☒ YES ☐ NO

9a. EPA METHOD
Method 5

9b. AGENCY CONDUCTING TEST
Monsanto

9c. DATE
once a year

10. ADEQUATE METHOD FOR DISPOSAL OF SCRUBBER LIQUOR WASTEWATER *(Describe)*
☒ YES ☐ NO
Lime precipitation & clarification

11. ADEQUATE METHOD FOR DISPOSAL OF ASH QUENCHING WASTEWATER OR ASH *(Describe)*
☐ YES ☐ NO
N/A

12. TYPE OF SCRUBBER MEDIUM
Water & Lime

13. TYPE OF SCRUBBER
Wet Spray tower

14. MIST ELIMINATOR
☒ YES ☐ NO

Continued on reverse

15. OPACITY READING TAKEN

☒ YES ☐ NO VALUE: < 1 Ringlemann (20% opacity)

16. WET STACK

☒ YES ☐ NO

17. STACK HEIGHT

100'

18. STACK DIAMETER

20'

19. CONSTRUCTION MATERIAL OF STACK

20. PERMIT LIMITS

EMISSION LIMITS

267 tons per year particulate emissions

21. TYPE OF EQUIPMENT

21a. MAKE

21b. AGE

21c. CONDITION

LAND FARM SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain as necessary.

1. STATE PERMIT
☐ YES ☐ NO

2. AREA *(Dimensions of Site)*

3. APPLICATION RATE

4. IMPROPER DISPOSAL OF UNAUTHORIZED MATERIALS IN LAND FARM
☐ YES ☐ NO

5. DIVERSION STRUCTURES ARE EFFECTIVELY CONSTRUCTED AND PROPERLY MAINTAINED
☐ YES ☐ NO

6. EVIDENCE OF PONDING OF LIQUID ON SITE
☐ YES ☐ NO

7. ODORS *(especially hydrogen sulfide) (If YES, indicate)*
☐ YES ☐ NO

8. GENERAL PHYSICAL APPEARANCE OF SOIL *(Color, Sand/Silt/Clay Content)*

9. VEGETATION ON LAND FARM

10. pH