GW - 80

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VOLUME 2

APPENDICES

PREPARED FOR

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LIST OF APPENDICES

Appendix A: Measured Stratigraphic Sections

(25)

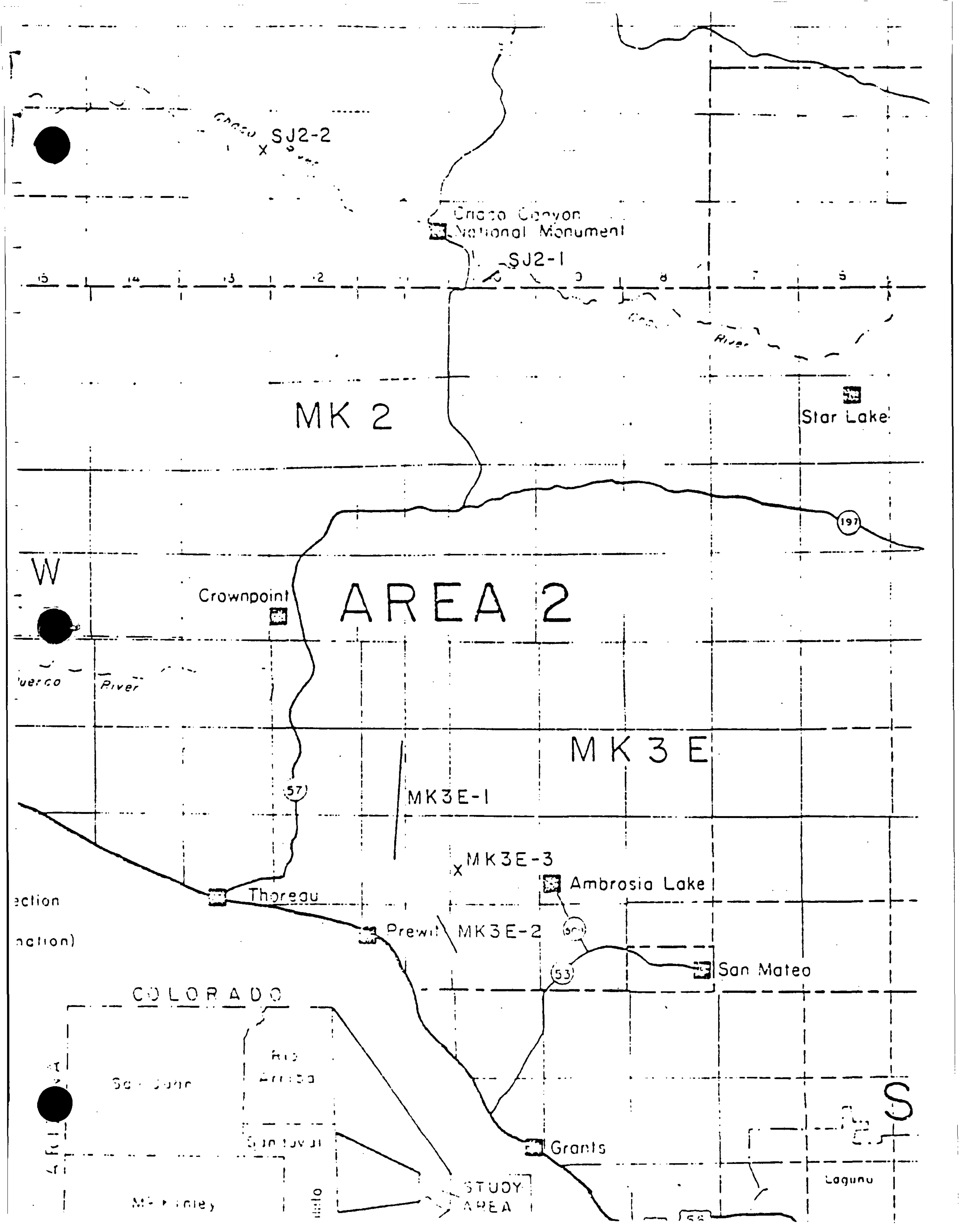
New Mexico Bureau of Mines & Mineral Resources

Open-File Report 90

Descriptions of Sections Measured for Hydrogeologic Study of the San Juan Basin, Northwest New Mexico

William J. Stone, Hydrogeologist

June 1979



SJ2-2
Chaco Canyon National Monument
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SECTION MK3E - 1, BORREGO PASS (Casamero Lake and Borrego Pass 7½' Quads.). Measured outcrops along road from Prewitt to Borrego Pass Trading Post; line of section (from south to north) involves exposures in sec's. 24, 20, and 17, T14N, R11W and sec's. 21, 9, and 4, T15N, R11W, McKinley County; section measured by Robert C. Brod, 23 June - 1 July 1977.

Unit	Lithology	Thickness: m(ft)
POINT LOOKOUT SANDSTONE HOSTA TONGUE		
54	SANDSTONE--grayish orange (10 YR 7/4) weathered, very light gray (N8) fresh; beds medium - thick, regular, even with thin planar, discontinuous, parallel laminae; large-scale, tangential, low-angle, grouped, tabular-planar cross bedding; grains fine, well sorted, subrounded; composed mainly of quartz, clay matrix, not calcareous; caps mesa.	50.3 (166.0)
53	SANDY SHALE--very light gray (N8) weathered, light greenish gray (5 GY 8/1) fresh; beds thin - medium, irregular, uneven with thin, planar laminae, interval structure poorly shown; grains include fine sand - silt, very poorly sorted, angular; composed mainly of quartz in silt and clay matrix; similar to unit 51 below; contact with above gradational, coarsening upward(?).	4.8 (15.8)
CREVASSE CANYON FORMATION GIBSON COAL MEMBER		
52	CARBONACEOUS SHALE AND COAL--light gray (N7) - brownish black (5 YR 2/1) weathered and fresh; mostly covered, COAL exposed at base; contact with above sharp(?).	19.2 (63.4)
51	SANDY SILTSTONE--grayish orange (10 YR 7/4) weathered, dark yellowish orange (10 YR 6/6) fresh; sand occurs in SILTSTONE and as SANDSTONE lenses up to 1 dcm thick; sand grains fine - very fine, like unit 44 below; contact with above poorly exposed.	8.0 (26.4)
50	SHALE--some noncarbonaceous, light gray (N7), some carbonaceous, brownish black (5 YR 2/1); clinker lag on slope; contact with above covered.	14.3 (47.2)

49 COVERED INTERVAL 4.8 (15.8)

CREVASSE CANYON FORMATION
DALTON SANDSTONE MEMBER

48 SANDSTONE--grayish orange (10 YR 7/4) weathered, dusky yellow (5 Y 6/4) fresh; beds thick - very thick, regular, even with thin - medium, curved, discontinuous, parallel laminae; large-scale, tangential, low-angle, grouped, wedge-planar(?) cross bedding; grains fine sand and silt, very poorly sorted, angular; composed mainly of quartz with silt and clay matrix, not calcareous; contact with above sharp. 33.6 (110.9)

MANCOS SHALE
MULATTO TONGUE

47 COVERED SLOPE--SHALE(?); measured from topo sheet. 3.5 (11.6)

CREVASSE CANYON FORMATION
BORREGO PASS LENTIL (formerly "STRAY SANDSTONE")

46 SANDSTONE--grayish orange (10 YR 7/4) weathered and fresh; mottled with light brown (5 YR 5/6) on fresh surfaces; beds medium - thick, regular, even with thin, planar, continuous, parallel laminae; large-scale, tangential - discordant, high-angle (some low-angle), grouped, tabular-planar (some trough) cross bedding displaying opposing dip directions in places; grains fine - medium, poorly sorted, subangular; composed mainly of quartz in silt - clay matrix, not calcareous; contact with above sharp. 17.6 (58.1)

CREVASSE CANYON FORMATION
DILCO COAL MEMBER

45 CARBONACEOUS SHALE--like unit 37 below. 1.8 (5.9)

44	SANDSTONE--grayish orange (10 YR 7/4) weathered, dark yellowish orange (10 YR 6/6) fresh; beds thin - medium, irregular, uneven with thin - medium, wavy, discontinuous, convergent laminae; small-scale, tangential, low-angle, solitary, tabular-planar cross bedding; grains fine - medium, poorly sorted, subangular; composed mainly of quartz in silt and clay matrix, not calcareous; numerous carbonaceous plant fragments; thin shale lenses in upper half; contact with above gradational.	1.4 (4.6)
43	INTERBEDDED CARBONACEOUS SHALE AND SANDSTONE--like unit 38 below.	1.2 (4.0)
42	SANDSTONE--grayish orange (10 YR 7/4) weathered and fresh; beds thin - medium, irregular, uneven with thin, curved, discontinuous, convergent laminae; large-scale, tangential, low-angle, grouped, trough cross bedding displaying opposing dips locally; grains medium, moderately sorted, angular; composed mainly of quartz with silt matrix, not calcareous; contact with above sharp.	7.2 (23.8)
41	CARBONACEOUS SHALE--like unit 37 below; contact with above gradational.	8.4 (27.7)
40	SANDSTONE--like unit 36 below.	1.0 (3.3)
39	CARBONACEOUS SHALE--like unit 37 below.	10.5 (34.7)
38	INTERBEDDED SANDSTONE AND SHALE--SHALE is like unit 37 below; SANDSTONE occurs as thin, irregular, uneven beds (up to 1 cm thick); forms cliff; contact with above sharp.	2.0 (6.6)
37	CARBONACEOUS SHALE--light bluish gray (5 B 7/1) weathered and fresh with dark greenish gray (5 G 4/1) carbonaceous plant material on laminar surfaces; contact with above sharp.	8.0 (26.4)
36	SANDSTONE AND CARBONACEOUS SHALE--SANDSTONE like unit 31 below but thinly bedded, occurs as 2 ledges: 0.7 m and 1.0 m thick; SHALE like unit 32 below, occurs in 2 slope-forming intervals: 0.9 m and 0.8 m thick; contact with above concealed.	3.4 (11.2)

35	SANDSTONE--like unit 27 below.	2.5 (8.3)
34	CLINKER--forms thin parting and produces lag on top of unit 33 below.	0.1 (0.3)
33	SANDSTONE--like unit 27 below.	1.5 (5.0)
32	CARBONACEOUS SHALE--color not recorded; contains few lenses of SANDSTONE like unit 31 below; largest seen approximately .5 m thick and 50 m across; contact with above sharp.	6.4 (21.1)

GALLUP SANDSTONE
GALLEGO SANDSTONE MEMBER(?)

31	SANDSTONE--grayish orange (10 YR 7/4) weathered, white (N9) fresh; beds medium - very thick (thicker at top), regular, uneven with thin, planar, continuous, parallel laminae; large-scale, tangential, low- and high-angle (mostly high-angle), solitary, tabular-planar cross bedding; grains fine, well sorted, subangular; composed mainly of quartz, clay matrix, not calcareous; contact with above sharp.	26.7 (88.1)

MANCOS SHALE
D-CROSS TONGUE(?)

30	SHALE--brownish gray (5 YR 4/1) - light brownish gray (5 YR 6/1) - medium gray (N5) weathered and fresh; carbonaceous with very thin lenses of well sorted SANDSTONE at top; mostly covered except at base of overlying unit; contact with above gradational.	27.8 (91.7)

GALLUP SANDSTONE
"BED A"(?)

29	SANDSTONE--grayish orange (10 YR 7/4) weathered, light greenish gray (5 G 8/1) fresh; beds medium - thick, irregular, uneven with some thin, planar - curved, discontinuous, parallel - convergent laminae but mostly massive; small-scale,	13.1 (43.2)

tangential, low-angle, solitary, trough cross bedding; some large-scale, high-angle, tabular-planar; in places opposing dips noted; grains fine, moderately sorted, angular; composed mainly of quartz, clay matrix, not calcareous; vertical burrows common, average diameter 1 cm; lower 2 m silty including thin, discontinuous lenses of siltstone; contact with above sharp.

MANCOS SHALE (main body)

28	SHALE--color not recorded; silty; contains lenses of SANDSTONE up to 1 dcm thick; contact with above gradational; thickness determined from topo sheet; Abney set at 3 3/4^{o} for units 28 - 54.	53.3 (175.9)

DAKOTA SANDSTONE (undivided)

27	SANDSTONE--light red (10 R 6/6) weathered, moderate orange pink (5 YR 8/4) fresh; beds medium, regular, even with obscure medium, wavy, discontinuous, convergent laminae; grains very fine, moderately sorted, angular; composed mainly of quartz, minor clay matrix(?), not calcareous; contact with above concealed.	2.7 (8.9)
26	COVERED SLOPE--SHALE(?)	6.4 (21.1)
25	SANDSTONE--like unit 23 below but cross bedding is high angle, discordant, grouped.	4.6 (15.2)
24	COVERED SLOPE--CARBONACEOUS SHALE(?)	3.5 (11.6)
23	SANDSTONE--moderate reddish orange (10 R 6/6) and moderate orange pink (10 R 7/4) weathered moderate orange pink (5 YR 8/4) fresh; beds medium - thick, irregular, uneven with thin, curved, continuous, parallel laminae; large-scale, tangential, low-angle, solitary, tabular-planar cross bedding; grains medium, well sorted, rounded; composed almost entirely of quartz, not calcareous; scattered wood fragments.	6.4 (21.1)

MORRISON FORMATION
BRUSHY BASIN MEMBER

22	COVERED SLOPE--small exposure of green SHALE.	30.1 (99.3)
21	SANDSTONE--grayish orange (10 YR 7/4) weathered, white (N9) fresh; beds medium - thick, irregular, uneven with thin - medium, planar, continuous, parallel laminae; large-scale, discordant, low-angle, solitary, tabular-planar cross bedding; grains fine, moderately sorted, subangular - angular; composed largely of quartz with a minor amount of some mafic mineral, not calcareous.	4.8 (15.8)
20	VARIEGATED SHALE--various shades of red, green, purple, and yellow; contact with above sharp.	8.0 (26.4)

MORRISON FORMATION
WESTWATER CANYON MEMBER

19	SANDSTONE--like unit 16 below; forms slope, mostly covered; contact with above sharp(?).	14.4 (47.5)
18	SANDSTONE--like unit 16 below; forms cliff; contact with above sharp.	10.4 (34.3)
17	SHALE--like unit 12 below; with SANDSTONE lenses up to .75 m thick.	13.8 (45.5)
16	SANDSTONE--moderate orange pink (10 R 7/4) weathered, pale reddish brown (10 R 5/4) fresh; beds medium - thick, irregular, uneven with medium, curved, discontinuous, convergent laminae; large-scale, tangential, low-angle, grouped, trough cross bedding; grains medium - coarse, poorly sorted, angular - rounded; composed of quartz and feldspar, not calcareous; arkosic gravel up to 1 cm in diameter associated with cross bed troughs; lenses of moderately sorted, medium, quartz SANDSTONE near top.	19.2 (63.4)
15	INTERBEDDED SANDSTONE, SILTSTONE, AND SHALE--colors as in units 12 and 14 below; all layers are discontinuous laterally; SANDSTONE beds range to 1 m in thickness, less abundant in middle 10 m of unit.	34.1 (112.5)

14 SANDSTONE--moderate orange pink (10 R 7/4) mottled with light greenish gray (5 GY 8/1) weathered and fresh; beds thin - thick, irregular, uneven with thin planar, continuous, parallel laminae; grains very fine - fine, poorly sorted, angular; composed of quartz and approximately 5% unidentified mafic mineral, not calcareous; contact with above sharp. 4.4 (14.5)

13 SHALE--red; like in unit 12 below; also includes lenses of fine SANDSTONE. 1.1 (3.6)

12 SANDSTONE AND SHALE--very light gray (N8) weathered, light greenish gray (5 GY 8/1) fresh; SANDSTONE consists of fine - medium (fines upward ?), poorly sorted, subangular, quartz grains; SHALE is dark reddish brown (10 R 3/4), occurs as lenses approximately 1 m long and 0.1 m thick, especially common in upper 10 m of unit; forms slope, largely covered. 32.0 (105.6)

BLUFF SANDSTONE

11 SANDSTONE--white (N9) - light gray (N7) weathered, white (N9) fresh; beds thin, irregular, uneven with thin - medium, planar, discontinuous(?), parallel laminae; small-scale, tangential(?), low-angle, solitary(?), tabular-planar cross bedding; grains medium, moderately sorted, rounded; composed of quartz with trace of black and orange grains, not calcareous; similar to white bands at top of unit below but parallel bedding more distinct in this unit. 3.0 (9.9)

10 "BANDED" SANDSTONE--white bands white (N9) - light gray (N7) weathered white (N9) fresh; 0.3 - 1.0 m thick; red bands pale reddish brown (10 R 5/4) weathered, moderate reddish orange (10 R 6/6) fresh; 1.0 - 5.0 m thick; beds thick - very thick, regular, uneven with thin - medium, curved, continuous, parallel laminae; conspicuous, large-scale, discordant and tangential, high-angle, grouped, tabular-planar cross bedding; grains in white bands medium - coarse, well sorted, subrounded - rounded; composed of quartz with trace of black and 45.8 (151.1)

orange minerals, clay matrix, not calcareous, iron stained; small spherical concretions (average diameter 0.75 cm) form rough surface on uppermost red band; contact with above sharp.

9	SANDSTONE AND MUDSTONE--like unit 7 below.	7.7 (25.4)
8	SANDSTONE--moderate orange pink (10 R 7/4) - pale yellowish orange (10 YR 8/6) weathered, moderate orange pink (5 YR 8/4) fresh; beds medium (regularity/eveness obscured) with thin - medium, planar, discontinuous, parallel or curved, discontinuous, convergent laminae; large-scale, tangential, high-angle, grouped, tabular(?)-planar cross bedding, dips opposed in places; grains fine, moderately sorted, subrounded; composed largely of quartz with trace of dark grains, no matrix, not calcareous; weathers like wrinkled skin; white chert nodules at basal contact; contact with above sharp.	2.4 (7.9)

SUMMERVILLE FORMATION

7	SANDSTONE--moderate orange pink (10 R 7/4) weathered, moderate orange pink (5 RY 8/4) fresh; beds medium - very thick, irregular, uneven with obscure thin, wavy, discontinuous, convergent laminae; grains fine - medium, well sorted, subangular - subrounded; composed of quartz with minor black grains(?), no matrix, not calcareous; high density of vertical joints and fine texture leads to Knobby weathering habit; contact with above sharp.	17.6 (58.1)
6	COVERED SLOPE	37.3 (123.1)

TODILTO LIMESTONE

5	LIMESTONE--light olive gray (5 Y 6/1) - medium light gray (N6) weathered, olive gray (5 Y 4/1) fresh; beds thin - medium, regular, uneven with thin planar, continuous, parallel or wavy discontinuous, convergent laminae; planar laminae occur between	3.6 (11.9)

massive beds in middle of unit, wavy laminae common at top and bottom of unit; microcrystalline with some silt; bioclastic fragments (?) associated with base of some beds locally. Abney set at 4.5° for units 5 - 27.

4 SILTSTONE--color not recorded; beds very thin - thin, irregular, uneven with thin, wavy, discontinuous, convergent laminae; symmetrical ripple marks (seen in cross section only); grains silt - fine sand, moderately sorted, subrounded; composed mainly of quartz, not calcareous; contact with above gradational. 1.6 (5.3)

ENTRADA SANDSTONE
UPPER SANDSTONE MEMBER

3 SANDSTONE--moderate orange pink (10 R 7/4) mottled with medium gray (N5) weathered, moderate reddish orange (10 R 6/6) - moderate orange pink (10 R 7/4) fresh; beds very thick, regular, even with thin, curved - planar, continuous, parallel laminae; very-large-scale, tangential, high-angle, grouped, trough cross bedding; grains fine, well sorted, rounded; composed exclusively of quartz, no matrix, calcareous; contact with above gradational. 41.1 (135.6)

ENTRADA SANDSTONE
MIDDLE SILTSTONE MEMBER

2 SILTSTONE--pale reddish brown (10 R 5/4) - moderate orange pink (10 R 7/4) weathered and fresh with some irregular blebs of light greenish gray (5 GY 8/1) fresh; beds medium - very thick, regular, uneven with some discernible thin laminae, mostly massive; grains silt, poorly sorted, angular; composed of quartz, calcareous; dense vertical joints yields Knobby weathering habit; contact with above sharp, irregular. 18.0 (59.4)

ENTRADA SANDSTONE
LOWER SANDSTONE MEMBER

1	SANDSTONE--moderate reddish brown (10 R 4/6) weathered and fresh; beds very thick(?), with thin, planar, continuous, parallel laminae (regularity/eveness of beds indistinct); very-large-scale, tangential, high-angle, grouped trough cross bedding; grains medium, well sorted, well rounded; composed of quartz, iron stained, calcareous; base covered by talus; contact with above sharp, marked by relatively resistant white clay(?) zone at top of lower Entrada.	12.4 (40.9)
	Total section thickness =	718.8 (2,372.1)

Base is base of exposed lower Entrada. Section traversed parallel to dip as determined from Dakota Sandstone in sec. 31, T15N, R11W: 4°, N48°E. Abney set accordingly.

Stratigraphy and Origin of the Chinle Formation and Related Upper Triassic Strata in the Colorado Plateau Region

By J. H. STEWART, F. G. POOLE, *and* R. F. WILSON

With a section on SEDIMENTARY PETROLOGY
By R. A. CADIGAN

and a section on CONGLOMERATE STUDIES
By WILLIAM THORDARSON, H. F. ALBEE, *and* J. H. STEWART

GEOLOGICAL SURVEY PROFESSIONAL PAPER 690

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San Andres Limestone—Continued | Feet

Limestone member—Continued

to form vertical cliffs along sides of wash .... Unmeasured

Base of section; base of exposure. Base of section in wash bottom.

NM–1b. CHAVEZ-PREWITT SECTION B

Units 1–10 measured starting at point about 2 miles west of Prewitt and 500 ft south of U.S. Highway 66 in central part of sec. 11, T. 13 N., R. 12 W., NMPM, continuing along a N. 30° W. line for 2 miles and ending on a prominent point on the cliffs about 1½ miles north of U.S. Highway 66 in east-central part of sec. 34, T. 14 N., R. 12 W.; units 11–20 measured starting at point 2 miles northeast of Chavez in east-central part of sec. 30, T. 14 N., R. 12 W., continuing for 1⅛ miles northwest, and ending on prominent point about 4 miles east-northeast of Thoreau in southwestern part of sec. 19, T. 14 N., R. 12 W., McKinley County

[Measured by J. H. Stewart and R. F. Wilson, April and May 1956]

Top of section; top of accessible exposure. Top of section is about 500 ft northeast of tip of promontory developed on Entrada Sandstone. Top of section is N. 57° W. of oil refinery near Chavez and Prewitt and N. 65° E. of Thoreau. | Feet

Entrada Sandstone (incomplete):

Upper sandy member:

20. Sandstone, light brown (5*YR* 6/4) and moderate reddish orange (10*R* 6/6), weathering same colors, very fine grained, sparse disseminated fine to medium grains; well sorted; composed of subrounded to rounded reddish-stained quartz and sparse black accessory mineral; poorly cemented, calcareous; horizontally laminated in basal 5 ft and composed of thin to very thick planar sets of medium- to large-scale cross-laminae in rest of unit; weathers to form vertical cliff. Basal 2 ft of unit is yellowish gray (5*Y* 8/1), and this lighter color forms continuous color band on the vertical cliff. Only basal 25 ft of unit examined .... Unmeasured

Medial silty member:

19. Siltstone (80 percent) to silty sandstone (20 percent), pale reddish brown (10*R* 5/4), abundant light greenish gray (5*GY* 8/1) mottling, weathering same colors and light brown (5*YR* 6/4), grades from fine- to medium-grained siltstone to silty very fine grained sandstone, in places sandstone contains a few fine to medium grains disseminated in the siltstone or silty sandstone; well cemented, calcareous; horizontally laminated to thick bedded, stratification has slight waviness; weathers to form vertical cliff continuous with that of overlying unit. Unit forms horizontally stratified and wavy bedded interval

Entrada Sandstone (incomplete)—Continued | Feet

Medial silty member—Continued

at base of cliff developed on Entrada Sandstone 44.2

Total of medial silty member 44.2

Total of incomplete Entrada Sandstone 44.2

Contact of Entrada Sandstone and Wingate Sandstone sharp and placed at change from cross-stratified sandstone below to horizontally stratified siltstone above.

Wingate Sandstone (Lukachukai Member):

18. Sandstone, light brown (5*YR* 6/4) to moderate reddish orange (10*R* 6/6), weathering same colors, fine grained, minor fine- to medium-grained parts, fair to well sorted; composed of subrounded to rounded reddish-stained quartz, sparse black accessory minerals and white chert(?); poorly cemented calcareous; horizontally laminated in parts and composed of thick, possibly planar sets of low- and high-angle medium-scale cross-laminae in other parts; weathers to form steep slope. Sandstone contains common medium to coarse rounded to subrounded reddish-stained quartz grains in a finer grained matrix. Basal 10 ft of unit contains minor amounts of fine to coarse grains, locally very coarse grains to granules, of white chert(?). Cross-stratified parts of unit are from 3 to 23 ft, 44 to 61 ft, and 75 to 80 ft. Rest of unit is horizontally laminated; possibly very thick bedded in a few places 80.0

Total of Wingate Sandstone (Lukachukai Member) 80.0

Contact of Wingate Sandstone and Chinle Formation sharp and marks change from purplish siltstone below to brownish sandstone above. In places, Wingate Sandstone fills clastic dikes extending as much as 5 ft down into the Chinle Formation. These clastic dikes are irregular in shape, and some are several feet wide.

Chinle Formation (incomplete):

Owl Rock Member:

17. Siltstone and limestone. Siltstone, pale red purple (5*RP* 6/2) to grayish red purple (5*RP* 4/2), weathering same colors, fine to medium silt; firmly cemented, calcareous; structureless, a few thin horizontal beds. Limestone, same colors as siltstone, dense; well cemented; present as limestone nodules and thin lenses in basal 9 ft and as thick horizontal bed from 4.1 to 7.1 ft. Thick bed of limestone contains abundant small masses of chert. Unit as whole weathers to form steep slope with persistent ledge developed on the limestone bed. Limestone bed

Chinle Formation (incomplete)—Continued *Feet*

Owl Rock Member—Continued

forms conspicuous thin purplish band along exposure. Most of unit probably does not contain swelling clays; locally, however, swelling clays may be present ... 30.7

Total of Owl Rock Member ... 30.7

Petrified Forest Member:

Upper part:

16. Siltstone (80 percent) to silty claystone (20 percent), pale reddish brown (10*R* 5/4), sparse grayish red (5*R* 4/2), weathering same colors, probably swelling clays; firmly to well cemented, calcareous; dominantly structureless, minor horizontally laminated parts; weathers to form steep slope. Some of unit weathers with a frothy surface ... 108.8
15. Limestone and siltstone. Limestone, light gray (*N* 7), weathering dark yellowish orange (10*YR* 6/6), dense; well cemented; present as two thin horizontal beds separated by 0.3-in.-thick horizontal bed of siltstone. Siltstone, light gray (*N* 7), weathering same color, firmly cemented, calcareous. Unit as whole weathers to form small ledge. Unit persistent along exposure and marks change from purplish rocks below to reddish rocks above ... 1.3
14. Silty claystone and minor clayey siltstone and siltstone, very light gray (*N* 8) in basal 10 ft and grayish red (5*R* 4/2), pale red (5*R* 6/2), and minor grayish red purple (5*RP* 4/2) in rest of unit, weathering same colors, swelling clays, firmly to well cemented, calcareous; structureless; weathers to form steep frothy-surfaced slope. From a distance unit appears as purplish interval between reddish rocks above and below ... 55.8
13. Siltstone to silty sandstone, and limestone pebble conglomerate. Siltstone to silty sandstone, pale reddish brown (10*R* 5/4) and pale red (10*R* 6/2 and 5*R* 6/2), weathering same colors, grades from medium siltstone to silty very fine grained sandstone. Sandstone is fair sorted and composed of subangular grains (composition of grains is masked). Siltstone to silty sandstone contains common medium-grained accessory white mica and is firmly to well cemented, calcareous. They are horizontally laminated and contain some medium-scale cross-strata on nearby exposures and possibly along line of section. Limestone pebble conglomerate, grayish red purple (5*RP* 4/2), weathering same color, composed of coarse grains to cobbles of limestone or limy siltstone in a limy silty or clay matrix; poorly cemented; structureless, possibly some very thin horizontal beds. Limestone pebble conglomerate is present as a 3-ft bed at base of unit and as 2-ft bed at top of unit. Basal bed is mostly composed of coarse grains to granules and minor pebbles. Top bed is composed mainly of granules and pebbles. Top bed contains cobbles as large as 6 in. in maximum diameter. Unit as whole weathers to form steep slope. Locally top limestone pebble conglomerate forms ledge. Position and amount of limestone pebble conglomerate in unit is highly variable along exposure ... 23.0

Chinle Formation (incomplete)—Continued *Feet*

Petrified Forest Member—Continued

Upper part—Continued

12. Siltstone to silty claystone, pale reddish brown (10*R* 5/4), minor grayish red (10*R* 4/2 and 5*R* 4/2), and sparse pale red (10*R* 6/2), weathering same colors, silt fraction is fine to medium silt, clay fraction is composed of swelling clay; firmly to well cemented, calcareous; structureless; weathers to form frothy-surfaced badlands. Contains many horizons and thin intervals of limestone nodules ... 69.7
11. Covered, forms ¾-mile-wide flat with minor hills and knolls ... 92.1

Long offset in section so that overlying units measured about 2½ miles, N. 65° W. of underlying units.

10. Sandstone, pale red purple (5*RP* 6/2) and minor light greenish gray (5*GY* 8/1), weathering pale red (5*R* 6/2) and pale brown (5*YR* 5/2), very fine to fine grained, fair sorted; composed of subangular milky quartz(?) and 20 percent dark-gray and sparse orange grains; firmly to well cemented, calcareous; composed of thin to thick tabular planar sets of small- to medium-scale cross-laminae; weathers to form prominent vertical cliff and underlies bench. Unit is most prominent cliff and bench-forming unit in the Chinle Formation above the Sonsela Sandstone Bed. Basal 3.3 ft of unit is limestone pebble conglomerate. Limestone pebble conglomerate, light greenish gray (5*GY* 8/1), composed of rounded coarse grains to pebbles as large as 2 in. in maximum diameter of gray limestone, limy silt matrix, firmly to well cemented; very low angle cross-strata; intertongues with rest of unit. Thick-

Chinle Formation (incomplete)—Continued — *Feet*

Petrified Forest Member—Continued

Upper part—Continued

ness of unit appears to be maximum for local area. Units 6–10 measured up prominent point N. 50° W. of Prewitt 39.2

9. Sandstone, pale red purple (5*RP* 6/2), subordinate light-greenish-gray (5*GY* 8/1) mottling, weathering same colors, very fine grained, well sorted; composition mostly masked, 10 percent of rock is orange or black grains, common coarse-grained accessory white and dark mica; well indurated, noncalcareous; horizontally laminated and minor thin shallow trough sets of very low angle small- to medium-scale cross-laminae; weathers to form ledgy slope 21.8
8. Siltstone (70 percent), silty sandstone (20 percent), and silty claystone (10 percent), all lithologies intergrading, pale reddish brown (10*R* 5/4) and minor pale red (10*R* 6/2), weathering same colors, silty sandstone is similar to that in unit 6, swelling clays in both the siltstone and silty claystone; firmly to well indurated, noncalcareous; mostly structureless, a few thin sets of horizontal laminae, many horizontal stratification planes; weathers to form steep slope, locally slope weathers with a frothy surface. Unit contains a few thin lenses of limestone-grain sandstone similar to that in unit 6 except that some are light greenish gray (5*GY* 8/1) 108.6
7. Silty sandstone to sandy siltstone, pale red (10*R* 6/2 and 5*R* 6/2), weathering same colors, grades from silty, very fine grained sandstone to very fine grained sandy siltstone, sparse coarse-grained accessory white mica; well indurated, noncalcareous; horizontally laminated and minor amounts of thin to very thin shallow trough sets of very low angle small-scale cross-laminae; weathers to form ledge. Locally along exposure ledges similar in lithology to this one are found in the underlying unit and as high as 15 ft up in the overlying unit 13.0
6. Siltstone to silty sandstone, pale red (10*R* 6/2) and pale reddish brown (10*R* 5/4), weathering same colors, grades from siltstone to silty fine-grained sandstone, all gradations of lithology, probably 60 percent of unit is silty sandstone, 30 percent sandy siltstone and 10 percent siltstone, composition masked; firmly to well cemented, noncalcareous to slightly calcareous; structureless (40 percent), horizontally laminated (30 percent), and medium- to large-scale very low angle cross-strata (30 percent). Cross-strata are in sets from a few feet to 20 ft thick. Probably both shallow trough sets and tabular planar sets are present. Unit as whole weathers to form steep slope. About 5 percent of unit is pale-red (10*R* 6/2) limestone-grain sandstone. The limestone-grain sandstone is coarse to very coarse grained and locally grades to limestone granule conglomerate. The limestone-grain sandstone and limestone granule conglomerate occur as thin to thick lenses interstratified with the rest of the unit 78.4
5. Covered, weathers to form mile-wide flat. Measured along a N. 30° W. line 308.0
4. Sandstone (70 percent) and siltstone (30 percent). Sandstone, pale red purple (5 *RP* 6/2), weathering same color, very fine grained, well sorted; composition mostly masked (about 20 percent of grains are either dark gray or orange); well cemented, slightly calcareous; composed of thin trough sets of very low angle small- to medium-scale cross-laminae, subordinate horizontal laminae. Siltstone, grayish red (10*R* 4/2), weathering same color, about 20 percent of rock is coarse grains to granules of light-gray siltstone; poorly cemented, calcareous; structureless; present as thin to thick lenses interstratified with thin to thick sets or cosets of sandstone. Unit as whole weathers to form small irregular ledge and underlies bench .... 8.0±
3. Clayey siltstone to sandy siltstone, grayish red (5*R* 4/2) and minor grayish purple (5*P* 4/2), common light-greenish-gray (5*GY* 8/1) mottling, weathering same colors, sandy (very fine grained) in part, probably swelling clays; firmly cemented, calcareous, structureless, exposed in roadcut 16.8
2. Covered, weathers to form flat between Sonsela Sandstone Bed and unit 3 .... 11.2

Total of upper part of Petrified Forest Member 955.7

Sonsela Sandstone Bed:

1. Sandstone, same as that in unit 14 of Chavez-Prewitt section A. Contains a few scattered granules and pebbles of chert, quartzite, and quartz, stratification is not distinct but appears to be mostly low-angle medium-scale cross-laminae. Only 10 ft of unit ex-

Chinle Formation (incomplete)—Continued *Feet*

Petrified Forest Member—Continued

Sonsela Sandstone Bed—Continued

posed. Weathers to form lowest part of dip slope developed on Sonsela Sandstone Bed. Observation suggests that the incomplete thickness of the Sonsela in Chavez-Prewitt section A is within 50 ft of being the complete thickness .... Unmeasured

Total of incomplete Chinle Formation 986.4

Base of section; base of exposure. Base of section about 500 ft south of U.S. Highway 66 and about 2 miles west of Prewitt.

NM-2. FORT DEFIANCE SECTION

Measured on cliff about 5½ miles north-northeast of Fort Defiance, about 3 miles north of Clay Springs Wash, and about 1 mile south of Twin Buttes Wash, long 109°01'50" W., lat 35°49'25" N., McKinley County

[Measured by J. H. Stewart and R. F. Wilson, April 1956]

Top section; top of accessible exposure. *Feet*

Entrada Sandstone (incomplete):

Upper sandy member (unmeasured):

10. Sandstone, light brown (5*YR* 6/4) and pale reddish brown (10*R* 5/4), weathering same colors, very fine grained, common medium to coarse well-rounded quartz and minor chert(?) grains, well sorted; composed of subrounded reddish-stained quartz and 2 percent black minerals; poorly to firmly cemented, calcareous; composed dominantly of wedge and some tabular(?) planar sets of high-angle medium- to large-scale cross-laminae, but some trough sets of low-angle medium-scale cross-laminae are present in basal 10 ft of unit; weathers to form vertical cliff. Only basal 10 ft of unit examined. Unit about 300 ft thick. Basal contact distinct and is the only distinct contact in the section between the top of the medial ledge of the Rock Point Member to the top of the Entrada Sandstone .... Unmeasured

Medial silty member:

9. Sandy siltstone to silty sandstone, light brown (5*YR* 6/4) and pale reddish brown (10*R* 5/4), weathering same colors, composed of particles ranging from coarse silt to very fine sand; well sorted; composed of reddish-stained quartz and 2 percent black grains; firmly cemented, slightly calcareous; horizontally laminated, slight waviness to laminae suggests ripple laminae in places, ripple laminae common in top 15 ft; sparse thin trough sets of low-angle small-scale cross-laminae; weathers to form vertical cliff. Locally a thin lens of white (*N* 9) sandstone is present away

Entrada Sandstone (incomplete)—Continued *Feet*

Medial silty member—Continued

from line of section, either at the base or in the basal 5 ft of the unit. This sandstone is composed of well-rounded coarse quartz grains. Basal 10 ft of unit contains a few percent of medium to coarse well-rounded clear quartz and white chert(?) grains. Unit weathers with a knobby or hoodoo appearance. Unit very similar to underlying unit but contains medium to coarse grains in basal 10 ft, weathers with a more hoodoo-type cliff, and possibly contains more ripple laminae than underlying unit. From a distance unit can be differentiated from one below by hoodoo weathering 54.0

Total of medial silty member........ 54.0

Total of incomplete Entrada Sandstone 54.0

Wingate Sandstone:

Rock Point Member:

8. Sandstone, light brown (5*YR* 6/4) and minor pale reddish brown (10*R* 5/4), weathering same colors, very fine grained, well sorted; composed of subrounded amber-stained quartz and about 2 percent black minerals; poorly cemented, calcareous; horizontally laminated, some wavy laminae suggesting ripple laminae in places, sparse thin trough sets of low-angle small-scale cross-laminae; weathers to form steep slope or vertical cliff. Unit very similar to underlying unit but is somewhat coarser grained, contains better developed laminae, and contains some cross-strata........ 24.0

7. Sandstone to sandy siltstone, light brown (5*YR* 6/4) and a few light greenish gray (5*GY* 8/1) color bands, weathering same colors, grades from coarse silt to very fine grained sand, well sorted; composed of subrounded clear quartz and abundant black accessory minerals; horizontally laminated to thick bedded; weathers to form slope 65.0

6. Sandstone, light brown (5*YR* 6/4), weathering same color, very fine to fine grained, sparse disseminated coarse grains, fair sorted; composed of subrounded to rounded clear quartz and common black accessory minerals, coarse grains commonly white chert(?); poorly cemented, calcareous; composed of thin to very thick wedge planar sets of low- and high-angle medium- and possibly large-scale cross-laminae, abundant horizontally laminated sets in top 15

TECHNICAL REPORT 35

New Mexico State Engineer
Santa Fe, New Mexico

Geology and Ground-Water Occurrence in Southeastern McKinley County, New Mexico

By
James B. Cooper & Edward C. John

United States Geological Survey

1968

REPRINTED 1978

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.11.3.334 Adrian Berryhill		
Casing record: 5-inch pipe to 645 feet; perforated 485 to 525 feet, 565 to 625 feet		
Stratigraphic correlation by: Kermac Nuclear Fuels Corp.		
UPPER CRETACEOUS:		
Mancos Shale	263	263
CRETACEOUS:		
Dakota Sandstone	93	356
UPPER JURASSIC:		
Morrison Formation:		
Brushy Basin Member	105	461
Westwater Canyon Member	136	597
Recapture Member	56	653
14.12.14.142 Elkins Ranch, Inc.		
Casing record: 8-inch pipe to 65 feet; record incomplete		
Soil	10	10
Clay, sandy	10	20
UPPER JURASSIC:		
San Rafael Group:		
Todilto Limestone:		
Shale, sandy	10	30
Sand, tan	10	40
Shale, sandy	10	50
Entrada Sandstone:		
Quick sand	10	60
Rock, red	220	280
Sand, (water)	20	300
Shale, red, sandy	50	350
UPPER TRIASSIC:		
Glen Canyon Group:		
Wingate Sandstone:		
Sand, red	30	380
Sand, (water)	30	410
Sand, red	20	430

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.20.414 Transwestern Pipeline Co. Compresser Station No. 5 Well 1		
Casing record: 8-inch pipe to 681 feet, cemented inside 664 feet of 10-inch pipe; 6-inch pipe 653 to 746 feet, slotted from 686 to 736 feet		
Hydrologic data: Pumped 22 hours at 20 gpm; pumping water level, 666 feet		
Soil, sandy	60	60
UPPER TRIASSIC:		
Chinle Formation:		
Upper part:		
Shale, red	194	254
Shale, red; hard ledges	24	278
Shale, red	262	540
Mudstone, brown	20	560
Shale, red	50	610
Mudstone, hard	25	635
Shale, red	34	669
Mudstone, hard	11	680
Middle part:		
Sand, white	15	695
Sand, brown	5	700
Sandstone	8	708
Sand, white	22	730
Sand; water	10	740
Lower(?) part:		
Shale, sandy	5	745
Shale, blue, sandy	5	750
14.13.27.342 (16T-352) U.S. Bureau of Indian Affairs; Thoreau Chapter House		
Casing record: 8-inch pipe to 435 feet, perforated 400 to 435 feet		
Hydrologic data: Bailed 1 hour at 50 gpm; bailing water level, 270 feet		
Sand and red clay	30	30
UPPER TRIASSIC:		
Chinle Formation:		
Upper part:		
Shale, red	65	95
Sand and boulders	65	160
Shale, red	95	255

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.27.342 (16T-352) U.S. Bureau of Indian Affairs; Thoreau Chapter House (concluded)		
UPPER TRIASSIC (continued):		
Chinle Formation (continued):		
Middle part:		
Sand and rock	95	350
Rock, red, hard	10	360
Rock, brown and sandstone	50	410
Sandstone, gray, (water)	25	435
14.13.28.123 (16B-39) U.S. Bureau of Indian Affairs		
Casing record: 12-inch pipe to 95 feet, 16-inch pipe to 637 feet, 7-inch liner pipe 625 to 730 feet		
Hydrologic data: Bailed at 9 gpm; bailing water level, 600 feet		
UPPER TRIASSIC:		
Chinle Formation:		
Upper part:		
Shale, red	88	88
Shale, red, sandy	357	445
Shale, dark-red	110	555
Sand; water	14	569
Shale, red	36	605
Middle part:		
Sand; water	27	632
Sand, fine, dry	19	651
Sand; water	45	696
Shale, dark, sticky	18	714
Shale, dark, sandy	16	730
14.13.33.124 (16K-302) U.S. Bureau of Indian Affairs; Thoreau Boarding School Well No. 1		
Casing record: 10-inch pipe to 365 feet, perforated 343 to 363 feet		
Hydrologic data: Pumped for 6 hours at 13 gpm; pumping water level, 199 feet		
QUARTERNARY:		
Alluvium:		
Blowsand	23	23
Quicksand	107	130

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.33.124 (16K-302) U.S. Bureau of Indian Affairs; Thoreau Boarding School Well No. 1 (concluded)		
UPPER TRIASSIC:		
Chinle Formation:		
Upper part:		
Shale, dark-red	18	148
Shale, light-red	55	203
Shale, light-gray	34	237
Middle part:		
Sand; water	5	242
Shale, purple	46	288
Sand, hard	12	300
Shale, light-gray	43	343
Sand; water	20	363
Shale, brown	18	381
Shale, gray, sandy	26	407
Lower part:		
Shale, dark-gray	68	475
Sand, hard	4	479
Shale, gray	26	505

14.13.33.124a (16K-302A) U.S. Bureau of Indian Affairs;
Thoreau Boarding School Well No. 3

Casing record: 6-inch pipe to 1,080 feet, cemented 0 to 1,079 feet; open hole 1,080 to 1,250 feet

Hydrologic data: Flows 6 gpm. Pumped for 1 hour at 17 gpm; pumping water level, 310 feet

Samples described by: P. R. Stevens

Stratigraphic correlation by: J. T. Callahan, J. W. Harshbarger, and C. A. Repenning (Note: The terminology used by the stratigraphers for divisions of the Chinle Formation is shown in parentheses on the following log beneath the terminology as used in this report.)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
QUARTERNARY:		
Alluvium(?):		
Eolian sand, light-brown, coarse to very fine, silty, calcareous; poorly sorted quartz	20	20
Sand, light-brown, very coarse to very fine, silty, calcareous; poorly sorted quartz with limestone fragments	60	80
Sand, grayish-orange pink, very coarse to very fine, silty, calcareous; poorly sorted limestone fragments	50	130

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.33.124a (16K-302A) U.S. Bureau of Indian Affairs; Thoreau Boarding School Well No. 3 (continued)		
UPPER TRIASSIC:		
Chinle Formation:		
Upper part (Petrified Forest Member):		
Siltstone, pale-red (10R-6/2), sandy, calcareous with mudstone fragments	40	170
Sand, pale-red (5R-6/2), medium to fine, sorting fair, quartz	10	180
Sand, pale-red (5R-6/2), coarse to very fine, silty, calcareous; poorly sorted quartz with limestone fragments	20	200
Siltstone, pale-red (10R-6/2), sandy, calcareous; limestone fragments	10	210
Sand, pale-red (10R-6/2), medium to very fine, silty, calcareous; poorly sorted quartz with limestone fragments	20	230
Siltstone, pale-red (10R-6/2), sandy, calcareous..	30	260
Middle part (Sonsela Sandstone bed of Petrified Forest Member):		
Sand, pale-red (10R-6/2), medium to very fine, calcareous; quartz with limestone fragments	20	280
Sand, pale-red (10R-6/2), medium to very fine, calcareous; poorly sorted quartz with fragments of limestone and siltstone	40	320
Mudstone, pale-red (10R-6/2), silty, calcareous ..	10	330
Siltstone, pale-red (10R-6/2), sandy with mudstone fragments	10	340
Sand, pale-red (10R-6/2), medium to fine, calcareous; fairly well sorted quartz with fragments of siltstone and limestone	20	360
Sand, pale-red, coarse to very fine, calcareous; poorly sorted quartz with limestone fragments ...	10	370
Siltstone, pale-red (10R-6/2), sandy; fragments of mudstone and limestone	10	380
Sand, pale-red (10R-6/2), very coarse to very fine, silty, calcareous; poorly sorted quartz with limestone fragments	10	390
Sand, pale-red (10R-6/2), very coarse to very fine, silty, calcareous; poorly sorted quartz with fragments of chert	30	420
Lower part (Sonsela Sandstone bed of Petrified Forest Member):		
Claystone, grayish-red to purple, calcareous	10	430
Siltstone, pale-red (10R-6/2), sandy, calcareous; limestone fragments	20	450
Mudstone, light-brownish-gray, silty, calcareous..	40	490
Sand, pale-red (10R-6/2), medium to fine, calcareous; fairly well-sorted quartz with fragments of chert and limestone	10	500

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.33.124a (16K-302A) U.S. Bureau of Indian Affairs; Thoreau Boarding School Well No. 3 (concluded)		
UPPER TRIASSIC (continued):		
Chinle Formation (continued):		
Lower part (Sonsela Sandstone bed of Petrified Forest Member) (continued):		
Mudstone, pale-red (10R-6/2), silty, sandy, calcareous	30	530
Siltstone, grayish-red, calcareous	10	540
Mudstone, grayish-red-purple, silty, calcareous..	30	570
Siltstone, grayish-red (5R-4/2), calcareous	40	610
Lower part (Petrified Forest Member):		
Mudstone, pale-red (10R-6/2), silty, calcareous..	50	660
Mudstone, and claystone, pale-red (5R-6/2), silty, calcareous	40	700
Siltstone, pale-red (5R-6/2), sandy; claystone fragments	20	720
Mudstone and claystone, pale-red (5R-6/2), sandy.	110	830
Mudstone, pale-red (5R-6/2),silty, calcareous; muscovite and limestone fragments	50	880
Mudstone, pale-red (5R-6/2), silty, calcareous; fragments of claystone, limestone, sand, and gypsum	160	1,040
Lower part (Shinarump Member):*		
Sand, very pale orange, fine to very fine; well-sorted quartz, calcareous	10	1,050
Mudstone and claystone, pale-red (5R-6/2), silty, calcareous with sand grains	30	1,080
PERMIAN:		
Glorieta Sandstone:		
Sand, very pale orange, medium to very fine; well-sorted quartz, calcareous	20	1,100
Sand, very pale orange, coarse to very fine; poorly sorted quartz, calcareous	10	1,110
Sand, very pale orange, medium to very fine; fairly well-sorted quartz, calcareous	20	1,130
Siltstone, pale red (10R-6/2), sandy, calcareous with biotite	10	1,140
Sand, very pale orange, fine to very fine; fairly well-sorted quartz, silty, calcareous	20	1,160
Mudstone, grayish-orange-pink, silty with biotite ..	10	1,170
Yeso Formation:		
Siltstone, pale-reddish-brown, sandy, calcareous ...	10	1,180
Siltstone, pale-red (10R-6/2), sandy, calcareous with gypsum	10	1,190
Siltstone, pale-red (10R-6/2), sandy, calcareous ...	60	1,250

* The section from 1,040 to 1,080 feet may be a silty phase of the San Andres Limestone.

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.33.132a Elmer Bowman		
Casing record: 5-inch pipe to 280 feet, perforated 180 to 280 feet; gravel packed in 8-inch hole 130 to 280 feet		
Sand	80	80
UPPER TRIASSIC:		
Chinle Formation:		
Upper part:		
Sandstone with shale	85	165
Shale, red, sticky	15	180
Sandstone, blue and red shale	10	190
Sandstone, colored, and shale	37	227
Shale, red	41	268
Middle part:		
Sandstone, colored, and shale	12	280

14.13.33.211 (16K-326) U.S. Bureau of Indian Affairs; Thoreau Boarding School Well No. 2

Casing record: 6-inch pipe to 420 feet, perforated 240 to 263 feet, 365 to 397 feet

Hydrologic data: Pumped for 5 hours at 12 gpm; pumping water level, 360 feet

Samples described by: Sally Schminke

Stratigraphic correlation by: C. A. Repenning (Note: The terminology used by the stratigrapher for divisions of the Chinle Formation is shown in parentheses on the following log beneath the terminology as used in this report.)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
QUATERNARY:		
Alluvium:		
Sand, bright-brown, fine, poorly sorted, quartz, calcareous	50	50
Sand, light-brown, medium, poorly sorted, quartz, calcareous	10	60
Sand, light-brown, fine, poorly sorted quartz, calcareous with limestone	40	100
UPPER TRIASSIC:		
Chinle Formation:		
Upper part (Petrified Forest Member):		
Claystone, pale-red, silty, calcareous	80	180
Siltstone, pale-red, clayey, calcareous	20	200
Clay siltstone, grayish-red-purple, and limestone	10	210
Siltstone, pale-red, clayey, and limestone	20	230
Claystone, pale-red, silty, calcareous	20	250

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.33.211 (16K-326) U.S. Bureau of Indian Affairs; Thoreau Boarding School Well No. 2 (concluded)		
UPPER TRIASSIC (continued):		
Chinle Formation (continued):		
Middle part:		
Sand, pale-red, medium, fairly well sorted, calcareous, and claystone and limestone fragments	20	270
Sand, pale-red, fine, silty, fairly well sorted, quartz, calcareous	10	280
Sand, pale-red-purple, medium, fairly well sorted, quartz, calcareous, and claystone fragments	10	290
(Sonsela Sandstone bed of Petrified Forest Member)		
Sand, pale-red, coarse, poorly sorted, calcareous	10	300
Sand, light-gray, medium, poorly sorted, quartz, calcareous	30	330
Claystone and limestone, light-brown-gray, calcareous	20	350
Sand, pinkish-gray, fine, fairly well sorted, quartz, calcareous, and claystone	30	380
Sand, light-olive-gray, medium, silty, poorly sorted, quartz, calcareous	30	410
Lower part (Petrified Forest Member):		
Siltstone, medium-light-gray, sandy, calcareous	10	420

14.13.33.334 El Paso Natural Gas Co.;
Bluewater Compressor Station Well No. 2

Casing record: 12-inch pipe cemented to 120 feet; 8-inch pipe cemented from 4 feet above ground to 616 feet

Hydrologic data: Flow 40 gpm; pumped at 120 gpm; pumping water level, 300 feet

Samples described by: El Paso Natural Gas Co. Geology Dept., Farmington, N. Mex

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
No sample	125	125
UPPER TRIASSIC:		
Chinle Formation:		
Upper part:		
Shale, grayish-red (10R-4/2), with some medium to coarse sand	30	155

TABLE 5 (continued)

Stratigraphic unit and material	Thickness (feet)	Depth (feet)
14.13.33.333 El Paso Natural Gas Co.; Bluewater Compressor Station Well No. 1 (concluded)		
UPPER TRIASSIC (continued):		
Chinle Formation (continued):		
Middle part:		
Sand, white, coarse, frosted, subangular and subrounded with red, brown, and black chert (a few gpm of water between 155 and 161 feet)..	40	195
Coal and medium sand	10	205
Sand, medium	20	225
Lower part:		
Shale, grayish-red (5RP-4/2), and medium-gray (N4).	30	255
Sand, medium, with streaks of grayish-red-purple (5RP3/2) shale	50	305
Sand, medium and fine; trace mica	10	315
Alternating beds of sand and shale; shales vary from red-purple (5RP3/2) to red-brown (10R4/4) to dusky grayish-red (10R3/2); sands are fine to coarse, white, subangular to subrounded, clear to milky, slightly calcareous with traces of siltstone	190	505
Shale, dark-reddish-brown (10R3/4) to blackish-red (5R2/2) with trace of white sand	60	565
Sand, fine to medium, subrounded to subangular, and blackish-red shale (5R2/2)	40	605
Sand, very fine to coarse, slightly calcareous; streaks of grayish-red (10R4/2) shale	23	628
PERMIAN:		
Glorieta(?) Sandstone:		
Sand, as above (water from 628 to 685 feet)	67	695
Glorieta Sandstone:		
Sand, well-rounded, fine to medium, slightly micaceous, and calcareous	120	815
Yeso Formation:		
Sand, well-rounded, fine to medium, slightly micaceous and calcareous; trace of gypsum	57	872

15.6.4.411 Richfield Oil Corp. No. 1,
Drought-Booth, oil-test well

Stratigraphic correlation: modified from log No. 5,028, N. Mex. School of Mines, State Bur. Mines and Mineral Res., Well-Log Division

Appendix B: Geologic Logs and Completion Records of Production Wells at the Thoreau Compressor Station

FORM NO. 58

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

WELL LOG

REPORT NO 5538
S O 8005-1-59
PAGE 1
FILE NO. 2482
DATE 4-7-60

CUSTOMER LOCATION	WELL DATA TH #2
FOR GULF INTERSTATE CO. (AGENTS FOR TRANSWESTERN	NAME WELL STA. NO. 5 WELL NO. 1
	ELEVATION DATUM
LOCATION WELL SW¼ OF SEC. 20, T-14-N, R-13-W	RT C GR
	TEST HOLE SIZE 12½" x 10" TO 750'
SURVEY FIELD	DATE STARTED DRILLING 6-29-59
	DATE FINISHED DRILLING 7-17-59
COUNTY MCKINLEY STATE NEW MEXICO	DRILLER OWEN PORTER RIG NO 28-L #1
	TYPE MUD NAT. NO. SACKS
OTHER LAND MARKS 2.5 MILES NORTH OF HWY. 66	ELECTRIC LOG NONE TYPE
NEAR THOREAU, NEW MEXICO	SURVEY TYPE
	OTHER

DEPTH STRATA	EACH STRATUM	DESCRIPTION FORMATION	SAMPLES DEPTH	SAMPLES TYPE	SAMPLES NUMBER
0		SURFACE			
60	60	SANDY SOIL			
254	195	RED SHALE			
278	24	RED SHALE WITH HARD LEDGES			
540	262	RED SHALE			
560	20	BROWN MUD STONE			
610	50	RED SHALE			
635	25	MUD STONE (HARD)			
669	34	RED SHALE			
680	11	HARD MUD STONE			
695	15	WHITE SAND			
700	5	BROWN SAND			
708	8	SANDSTONE			
730	22	WHITE SAND			
740	10	WATER SAND			
745	5	SANDY SHALE			
750	5	BLUE SHALE (SANDY)			
		TOTAL DEPTH 750'			
		NOTE: TH#1 ABANDONED AND PLUGGED WHEN 10" SURFACE CASING PARTED IN THE HOLE.			
		TH#2 WAS DRILLED ADJACENT TO #1.			
		8" pipe Hold 2½ gal per ft.			

WATER WELL #1 SUMMARY

July 1, 1974 - Tested 16.1 GPM and 2nd test was 16.09 G.P.M.

WATER WELL #1 SUMMARY

May 25, 1972 - Water level in well #1 (middle well)
Shut in for 30 minutes 22psi X 2.309 = 50 ft. of water
Shut in for 1:30 minutes 40 psi X 2.309 = 92 ft. of water

WATER WELL #1 SUMMARY

June 18, 1971 - Installed low water shut off, tested June
28, 1971 - Tested flow after 30 minutes was 20 GPM

May 25, 1972 - Water level in well #1 (middle well)
Shut in for 30 minutes 22psi X 2.309 = 50 ft. of water
Shut in for 1:30 minutes 40 psi X 2.309 = 92 ft. of water

June 28, 1972 - Acidized started and finished July 2, 1972
Shut in with 100# pump discharge and delivered 15 G.P.M.

July 1, 1974 - Tested 16.1 GPM and 2nd test was 16.09 G.P.M.

March 29, 1979 - Removed 15 hp Reda Pump and installed 5 hp Grund.
Water depth 729', Pump setting 680', Tube size 1¼" and
flowed 24.5 G.P.M. (see DMJ 2-79-18)

March 9, 1984 Removed/5 H.P. Grundfos and installed/5 H.P. Franklin. Grundfos shorted out in motor and blew a hole in side of pump.

1 1/4 water column

Water depth - 402.21 FT

1

REPORT NO.
S. O. 8005-59
PAGE 2
FILE NO 2482
DATE 2-24-60

LAYNE TEXAS COMPANY,

HOUSTON -:- DALLAS

WATER WELL TEST

CUSTOMER LOCATION

TEST FOR Gulf Interstate Company

LOCATION OF WELL Compressor Station No. 5

SURVEY FIELD

COUNTY McKinley STATE New Mexico

DESCRIPTION OF LAND MARKS 2.5 miles north of Hwy. 66 near Thoreau, New Mexico

WELL DATA

NAME WELL Compressor Station No. 5 WELL NO. 1

ELEVATION 7310.33' DATUM G.L.

WELL SIZE x x

TOTAL DEPTH TOP SCREEN

GRAVEL WELL STRAIGHT WELL

TYPE SCREEN GAGE

TEMPERATURE OF WATER

WATER CONDITION

WATER MEASURING DEVICE

ORIFICE SIZE 5 gallon LENGTH

OTHER bucket

TEST PUMP DATA

DEPTH SETTING TOP OF BOWL 679'

LENGTH AIR LINE 679' SIZE 1/8"

TYPE BOWL 4" NO. STAGES 27

LENGTH BOWL 8.08 SUCTION LT Motor

SAND CONTENT OZ. PER 100 GAL.

ACTIVE STATIC HEAD AFTER PUMP STOPPED

5 MIN.	613 FT.	20 MIN.	545 FT.
10 MIN.	577 FT.	25 MIN.	534 FT.
15 MIN.	558 FT.	30 MIN.	522 FT.

WATER SAMPLE TAKEN Yes NO. SAMPLES

BACTERIOLOGICAL SAMPLE TAKEN

DRAWDOWN SPECIFIC CAPACITY

DATE HOUR	AIR LINE GAGE	PUMPING LEVEL	DISCH. PRESS.	HEAD ON ORIFICE INCHES	GPM	RPM	OPERATOR	REMARKS
12:00 Noon	15	664	17.5		5 gallons 16 seconds			
1:00 P.M.	15	664	17.5		5 gallons 16 seconds			
2:00	15	664	17.5		5 gallons 16 seconds			
3:00	15	664	17.5		5 gallons 16 seconds			
4:00	15	664	17.5		5 gallons 16 seconds			
5:00	15	664	17.5		5 gallons 16 seconds			
6:00	15	664	17.5		5 gallons 16 seconds			
7:00	15	664	17.5		5 gallons 16 seconds			
8:00	15	664	17.5		5 gallons 16 seconds			
9:00	15	664	17.5		5 gallons 16 seconds			
10:00	15	664	17.5		5 gallons 16 seconds			Shut down

12 HOUR RECOVERY TEST

		TIME	W.L.	TIME	W.L.
10:05	613	11:30	450	4:00	371
10:10	577	11:40	444	4:30	368
10:15	558	11:50	438	5:00	365
10:20	545	12:00	433	5:30	363
10:25	534	12:15	424	6:00	359
10:30	522	12:30	419	6:30	355
10:35	512	12:45	414	7:00	352
10:40	504	1:00	409	7:30	350
10:45	497	1:20	403	8:00	348
10:50	490	1:40	396	8:30	346.5
10:55	487	2:00	392	9:00 AM	345
11:00	497	2:30	387	9:30	344
[illegible]:10	466	3:00	380	10:00	343
[illegible]20	459	3:30	376		

OBSERVERS

FOR OWNER FOR LAYNE TEXAS CO.

FORM NO. 28

FORM NO. 1802

#1

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

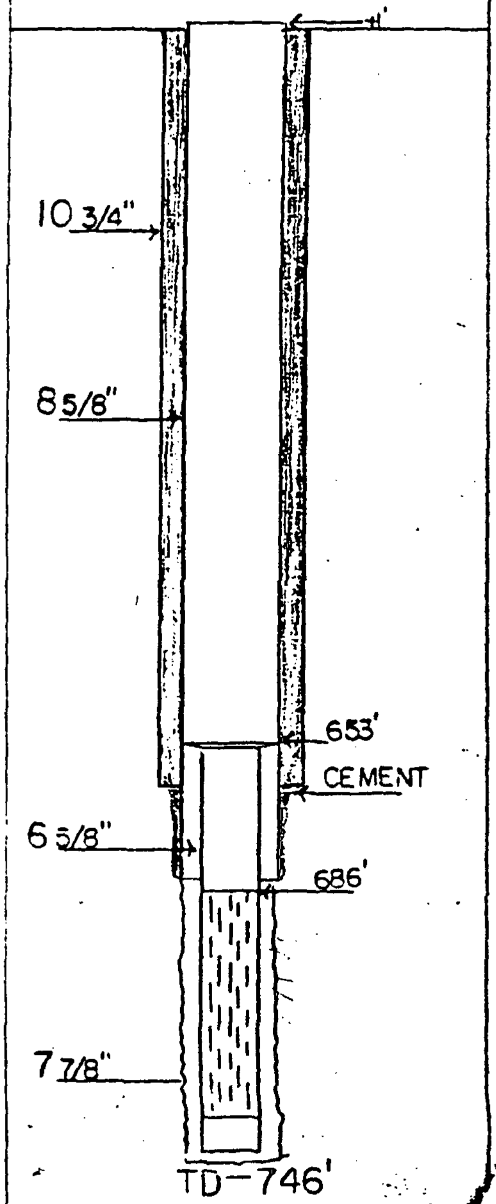
MATERIAL SETTING

REPORT NO 5466
S. O. 8005-1-59
PAGE 1 OF 1
FILE NO. 2482
DATE 4-7-60

CUSTOMER LOCATION	WELL DATA
FOR GULF INTERSTATES COMPANY, AGENTS FOR TPL	NAME WELL STA. NO.5 WELL NO. 1
	ELEVATION DATUM
LOCATION WELL SW¼ OF SEC.20, T-14N, R-13-W	TYPE WELL STRAIGHT
	SURFACE CASING CEMENTED YES NO. SACKS 110 APPROX.
SURVEY FIELD	SIZE HOLE UNDERREAMED 7-7/8 DEPTH 746'
	GRAVEL TYPE NONE NO. CU. YDS.
COUNTY MCKINLEY STATE NEW MEXICO	TYPE SCREEN MILL SLOTTED GAGE 1/8"
	DRILLER E.W.DAVIS RIG NO. 18
OTHER LAND MARKS 2.5 MILES NORTH OF HWY. 66 NEAR THOREAU, NEW MEXICO	OTHER V.E. MATUS

DEPTH	LENGTH	SIZE, KIND, WEIGHT MATERIAL
+ 1'		TOP OF 8-5/8" O.D. CASING
0		SURFACE
664	664	10-3/4" O.D. SURFACE CASING - NOT CEMENTED
653		TOP OF 6-5/8" O.D. LINER
682	682	8-5/8" O.D. CASING - CEMENTED
686	33	6-5/8" O.D. BLANK LINER
736	50	6-5/8" O.D. MILL SLOTTED 1/8 GA. SCREEN
746	10	6-5/8" O.D. BLANK
		TOTAL DEPTH - 746'

SKETCH



Acidized # 1(cont) started June 28-72
finished ~~June~~ July 2-72

well #1 delivered 15 G.P. Min. Pump Discharge PSI 100#
with well shot in.

#3 well (west) Acidized June 28-72 Finished ~~June 2-7~~ July
3 well Delivered 15 GP Min. with a Pump Discharge PSI #4-
with well shot in.

#2 well (East) Delivered 19 G.P.M. ~~with~~ To The surface
But would not Break The Head Press. Max P.S.I. 20#
with well shot in. 495 ft water standing in
The well. This well has To Be Pulled & Pump
overhauled. Done

Water Well #1
3-29-79

Removed 15 H.P. Reda pump Mod. 61546D31
Installed 5 HP GrundFOS #SP4-42 5HP 460V
Water Depth. From Top 347'
Well Depth. 729'
Silt Depth 17'
Pump setting 680'
Origional well depth 746'
Tube size 1¼"
new cable 12/3 neprene bonded
Amp at start up 8.5
24½ gal per min.

T.P. Pump.

WATER WELL #1 SUMMARY

March 29, 1979 - Removed 15 hp Reda Pump and installed 5 hp Grund at 680 ft. on 1¼" tubing, static depth 347 ft. in depth (from the top) and delivered 24½ gpm.

WATER WELL #1 SUMMARY

June 28, 1972 - Acidized started and finished July 2, 1972
Shut in with 100# pump discharge and delivered 15 G.P.M.

WATER WELL #1 SUMMARY

June 18, 1971 - Installed low water shut off, tested June 28, 1971 - Tested flow after 30 minutes was 20 GPM

#2

FORM NO. 50

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

WELL LOG

REPORT NO. 5467
S. O. 8005-2-59
PAGE 1
FILE NO. 2482
DATE 4-7-60

CUSTOMER LOCATION	WELL DATA
FOR GULF INTERSTATE CO. (AGENTS FOR TPL)	NAME WELL STA. NO. 5 WELL NO. 2 - EAST WELL
LOCATION WELL 400' EAST OF WELL NO. 1	ELEVATION DATUM
SURVEY FIELD	RT C GR
COUNTY McKINLEY STATE NEW MEXICO	TEST HOLE SIZE 11" TO 670 TD 7-7/8" - 730 TD
OTHER LAND MARKS 500' EAST OF WATER TANK	DATE STARTED DRILLING 1-21-60
	DATE FINISHED DRILLING 2-1-60
	DRILLER E.W. DAVIS RIG NO 18
	TYPE MUD NAT. & AQUAGEL NO SACKS
	ELECTRIC LOG NONE TYPE
	SURVEY TYPE
	OTHER V.E. MATUS

DEPTH STRATA	EACH STRATUM	DESCRIPTION FORMATION	SAMPLES DEPTH	SAMPLES TYPE	SAMPLES NUMBER
0		SURFACE			
4	4	SURFACE SOIL			
40	36	SAND, CLAY AND GRAVEL STREAKS			
70	30	RED SHALE AND GRAVEL			
571	501	RED SHALE AND BOULDERS			
618	47	ROCK AND SHALE STREAKS			
641	23	BOULDERS AND RED SHALE			
656	15	ROCK AND SHALE			
671	15	ROCK SAND AND BLUE SHALE			
721	50	SAND			
730	9	BLUE SANDY SHALE			
		TOTAL DEPTH - 730'			

WATER WELL #2 Summary

May 25, 1972 - Water in #2 (east well) level was 210 psi by 2.309 = 485 ft. of water in casing. Continuous flow of 15.7 gpm.

June 28, 1972 - Delivered 10 gpm to the surface but would not make head pressure (Max. psi of 20# with well shut in. 495 ft. of water standing in the well (overhaul needed).

July 9, 1972 - Checked well to find it was pumping 10 gpm with 10 psi at the well head, shut in pressure to 20 psi. Tubing and pump was pulled and a new pump, pipe, cable, wiring and test line installed. The pump hung up at 630 ft., it was pulled and checked and reset at 609 ft. 18 hrs. of pumping continuously tested 10 gpm.

September 19, 1973 - Layne Texas Co. pulled the pump and ran a sub scope into the well, fished out fish air line from the well and reinstalled the pump at 777 ft.

July 1 , 1974 - Well Tested out at 55 gpm.

July 26, 1979 - Removed inoperative Berkeley Pump, the bearing housing was missing and all check valves broken. July 27, 1979, a new 15 hp Reda Pump was installed with 2 new check valves and wiring on same 2" galvanized piping at 778 ft. and tested to 41 gpm with 302 ft. static pressure.

July 12, 1985- Removed 15 HP Reda Pump, the bottom 7" of the motor was missing. the motor was replaced with a 15 HP Hitachi Motor. The pump after installation was pumping 38 gallons of water a minute. Meter reading at time if installation was: 19471.5oo.

May 6, 1988 Pulled well for Skip Wassell. He had it logged on May 7, 1988.
New pump and motor was installed May 9, 1988.
Installed 15 H.P. Franklin motor with a Red Devil Liquid end. W.). 80469 paid for this work.

2

FORM NO. 1202

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

MATERIAL SETTING

REPORT NO. 6348
S. O. 8065-62
PAGE 1 OF 1
FILE NO 2482
DATE 4/30/63

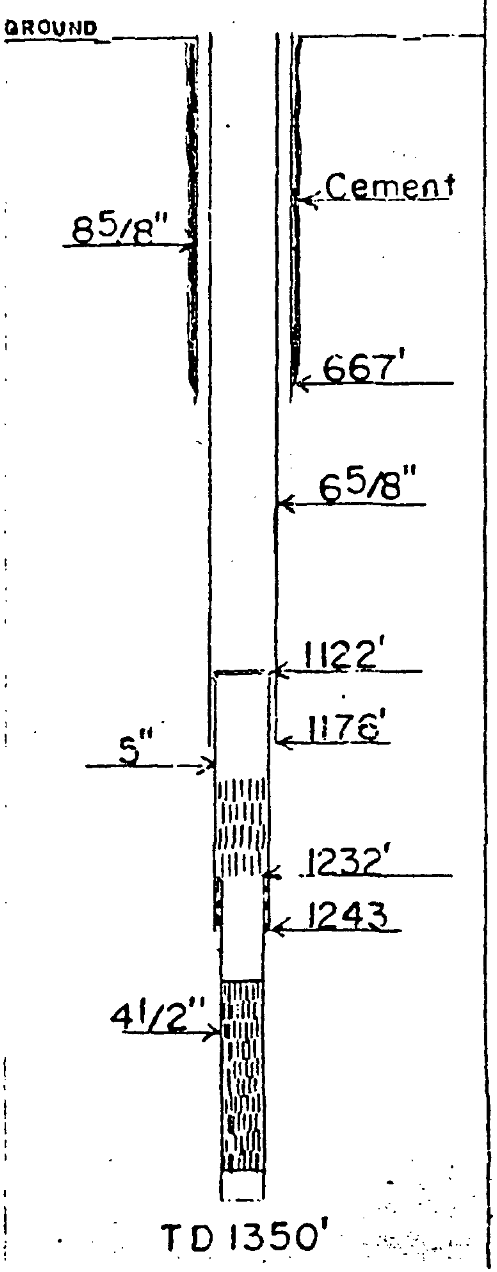
CUSTOMER LOCATION	WELL DATA
FOR GULF INTERSTATE COMPANY (AGENTS FOR TRANS-WESTERN PIPELINE COMPANY)	NAME WELL STA. NO. 5 WELL NO 2
LOCATION WELL 400' EAST OF WELL #1, STA. #5	ELEVATION DATUM
	TYPE WELL STRAIGHT
	SURFACE CASING CEMENTED YES NO. SACKS 175
SURVEY FIELD	SIZE HOLE UNDERREAMED DEPTH
	GRAVEL TYPE NONE NO. CU YDS
COUNTY McKINLEY STATE NEW MEXICO	TYPE SCREEN TORCH SLOTTED GAGE
	DRILLER R. BARBER RIG NO 28L #3
OTHER LAND MARKS 500' EAST OF WATER TANK	OTHER D. PARNELL & JOHN LANIER
	WELL ORIGINALLY 730' DEEP. NOW 1350' DEEP.

DEPTH	LENGTH	SIZE, KIND, WEIGHT MATERIAL
EXISTING MATERIALS:		
+1'		8-5/8" O.D. SURFACE CASING 1' ABOVE GROUND
0		SURFACE
667'	668'	8-5/8" O.D. SURFACE CASING
MATERIALS USED IN DEEPENING WELL:		
+1'		6-5/8" O.D. LINER 1' ABOVE GROUND
0		SURFACE
1122'		TOP OF 5" O.D. LINER
1232'		TOP OF 4-1/2" O.D. LINER
1176'	1177'	6-5/8" O.D. BLANK LINER
1197'	75'	5" O.D. BLANK LINER
1243'	46'	5" O.D. TORCH SLOTTED PIPE
1282'	56'	4-1/2" O.D. BLANK LINER
1344'	62'	4-1/2" O.D. TORCH SLOTTED PIPE
1350'	6'	4-1/2" O.D. BLANK PIPE

TOTAL DEPTH 1350 FT.

NOTE: WORK STARTED 2/23/63,
FINISHED 4/21/63

SKETCH



HI 5 5575

MICROBIOLOGY SERVICE LABORATORIES

analytical chemists . . . microbiologists

Telephone WAlnut 6-2746

5420 Calhoun

Houston 23, Texas

2/22/60

8805-2-59

To: Layne Texas Company
Houston, Texas

Sample Marked: Well No. 2, Gulf Interstate Co., agents for Transwestern Pipeline Company, McKinley County, New Mexico. Taken 2-17-60 after 55 hrs pumping at 15 gpm with Layne pump. Static Head: 390'. Pumping Level: 680'. Screened: 670 -720. E. H. Davis.
Received: 2-20-60.

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C		374	Conductance, micromhos/cm, 25°C	625
Total Dissolved Solids, actual†		505	Color, units	3
Total Dissolved Solids, calc.		506	Turbidity, units	0
Silica	SiO_2	10	As Calcium Carbonate, $CaCO_3$:	
and Aluminum Oxides	R_2O_3	0	Phenolhpthalein Alkalinity	24
Calcium	Ca	0.5	Total Alkalinity	260
Magnesium	Mg	0.5	Total Hardness	3
Sodium (diff.) Na+K as	Na	149	Free Carbon Dioxide CO_2	0
Carbonate	CO_3	29	pH . . 9.0	
Bicarbonate	HCO_3	259		
Sulfate	SO_4	41		
Chloride	Cl	17		
Total Iron	Fe	0.10		

HYPOTHETICAL COMBINATIONS

Calcium Bicarbonate	2
Magnesium Bicarbonate	3
Sodium Carbonate	51
Sodium Bicarbonate	352
Sodium Sulfate	60
Sodium Chloride	28
$SiO_2 + R_2O_3$	10
Total Dissolved Solids, calc.	506

† Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion

Microbiology Service Laboratories

By: Edna Wood

2040

Acidized # 1(cont) started June 28-72
finished ~~June~~ July 2-72
well # 1 delivered 15 G.P.Min. Pump Discharge PSI 100#
~~with well shot in~~

3 well (west) Acidized June 28-72- Finished ~~June~~ July 2-7
3 well Delivered 15 GPMin. with a Pump Discharge PSI #4
with well shot in.

2 well (EAST) Delivered 19 GPM. ~~with~~ To The surfac
But would not Back the Head Press. Max P.S.I. 20#
with well shot in. 495 ft water standing in
The well. This well has To Be Pulled & Pum
overhauled. Done

7-11-73

WELL # 2 – EAST WELL

Pump Setting – 777'

Static Water Level – 302'

Total Depth – 1350'

Pipe 2" Galvanized

RI 7-7271
BL7-0170

MICROBIOLOGY SERVICE LABORATORIES

analytical chemists . . . microbiologists

10 April 1963

5420 Calhoun Road
Houston 21, Texas

To: Layne Texas Company
Houston, Texas

SO 8065

Sample marked: Well No. 2, Sample #1, Transwestern Pipeline Co., Thoreau, McKinney Cty, N. Mex. Taken: 4-3-63 after 12 hours pumping at 30 gpm with Layne Pump. Static Head: 225'. Pumping Level: 630'. Screened: 1190-1247'. Turbid. Ralph Barber.

Received: 4-8-63. Sample filtered for analysis.

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C		268	Conductance, micromhos/cm, 25°C	455
Total Dissolved Solids, actual†		395	Color, units	ND
Total Dissolved Solids, calc.		399	Turbidity, units	ND
Silica	SiO_2	8	As Calcium Carbonate, $CaCO_3$:	
Iron and Aluminum Oxides	R_2O_3	2	Phenolhpthalein Alkalinity	0
Calcium	Ca	9	Total Alkalinity	204
Magnesium	Mg	3	Total Hardness	36
Sodium (diff.) Na+K as	Na	94	Free Carbon Dioxide CO_2	5
Carbonate	CO_3	0	pH . . . 7.85	
Bicarbonate	HCO_3	249	HYPOTHETICAL COMBINATIONS	
Sulfate	SO_4	29	Calcium Bicarbonate	36
			Magnesium Bicarbonate	20
			Sodium Bicarbonate	282
Chloride	Cl	5	Sodium Sulfate	43
Total Iron	Fe	0.38	Sodium Chloride	8
			$SiO_2+R_2O_3$	10
Iron, filtered sample	Fe	< 0.05	Total Dissolved Solids, calc.	399

† Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion

Microbiology Service Laboratories

By: Edna Wood

3320

MICROBIOLOGY SERVICE LABORATORIES

RI 7-7271 ~~RI 7-9170~~

analytical chemists . . . microbiologists

5420 Calhoun Road
Houston 21, Texas
4320 Old Spanish Trail

25 April 1963

To: Layne Texas Company
Houston, Texas

SO 8065-62

Sample marked: Well # 2, Sample #2 -
Transwestern Pipeline Co., Sta. #5, Thoreau, McKinney Cty, N. Mex.
Taken: 4-21-63; pumping at 60 gpm with Layne Pump. Static Head: 185'.
Pumping Level: 695'. Screened: 1190-1350'.

Rec'd: 4-23-63. Sample filtered for analysis.

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C		274	Conductance, micromhos/cm, 25°C	475
Total Dissolved Solids, actual†		410	Color, units	0
Total Dissolved Solids, calc.		413	Turbidity, units	140
Silica	SiO_2	8	As Calcium Carbonate, $CaCO_3$:	
Iron and Aluminum Oxides	R_2O_3	1	Phenolhpthalein Alkalinity	0
Calcium	Ca	41	Total Alkalinity	220
Magnesium	Mg	11	Total Hardness	147
Sodium (diff.) Na+K as	Na	50	Free Carbon Dioxide CO_2	6
Carbonate	CO_3	0	pH . . . 7.85	
Bicarbonate	HCO_3	268	HYPOTHETICAL COMBINATIONS	
Sulfate	SO_4	29	Calcium Bicarbonate	166
Chloride	Cl	5	Magnesium Bicarbonate	65
Dissolved Iron ~~Total Iron~~	Fe	0.06	Sodium Bicarbonate	122
			Sodium Sulfate	43
			Sodium Chloride	8
Iron filtered sample	Fe	<0.05	$SiO_2+R_2O_3$	9
			Total Dissolved Solids, calc.	413

† Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion

Microbiology Service Laboratories

By: Edna Wood

Edna Wood

3836

#2

MICROBIOLOGY SERVICE LABORATORIES RI 7-7271 RI 7-9179

analytical chemists . . . microbiologists

5420 Calhoun Road
Houston 21, Texas
4330 Old Spanish Trail

25 April 1963

To: Layne Texas Company
Houston, Texas

SO 8065-62

Sample marked: Well # 2, Sample #2 -
Transwestern Pipeline Co., Sta. #5, Thoreau, McKinney Cty, N. Mex.
Taken: 4-21-63; pumping at 60 gpm with Layne Pump. Static Head: 185'.
Pumping Level: 695'. Screened: 1190-1350'.

Rec'd: 4-23-63. Sample filtered for analysis.

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C		274	Conductance, micromhos/cm, 25°C	475
Total Dissolved Solids, actual†		410	Color, units	0
Total Dissolved Solids, calc.		413	Turbidity, units	140
Silica	SiO_2	8	As Calcium Carbonate, $CaCO_3$:	
Iron and Aluminum Oxides	R_2O_3	1	Phenolhpthalein Alkalinity	0
Calcium	Ca	41	Total Alkalinity	220
Magnesium	Mg	11	Total Hardness	147
Sodium (diff.) Na+K as	Na	50	Free Carbon Dioxide CO_2	6
Carbonate	CO_3	0	pH 7.85	
Bicarbonate	HCO_3	268	**HYPOTHETICAL COMBINATIONS**	
Sulfate	SO_4	29	Calcium Bicarbonate	166
Chloride	Cl	5	Magnesium Bicarbonate	65
Dissolved Iron ~~Total Iron~~	Fe	0.06	Sodium Bicarbonate	122
Iron filtered sample	Fe	<0.05	Sodium Sulfate	43
			Sodium Chloride	8
			$SiO_2+R_2O_3$	9
			Total Dissolved Solids, calc.	413

† Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion

Microbiology Service Laboratories

By: Edna Wood

Edna Wood

3836

#2

FORM NO. 28

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

WELL LOG

REPORT NO 6347
S O 8005-2-59
PAGE 1 OF 1
FILE NO. 2482
DATE 4-7-63

CUSTOMER LOCATION

FOR GULF INTERSTATE COMPANY (AGENTS FOR TRANSWESTERN PIPELINE COMPANY)

LOCATION WELL 400' EAST OF WELL #1, STA. 5

SURVEY FIELD

COUNTY McKINLEY STATE NEW MEXICO

OTHER LAND MARKS 500' EAST OF WATER TANK

WELL DATA

NAME WELL STA. NO. 5 WELL NO. 2

ELEVATION DATUM

RT C GR

TEST HOLE SIZE 11" TO 670 TD 7-7/8" TO 730 T.D.

DATE STARTED DRILLING 1-21-60

DATE FINISHED DRILLING 2- 1-60

DRILLER E.W. DAVIS RIG NO 18

TYPE MUD AQUAGEL NO. SACKS

ELECTRIC LOG NONE TYPE

SURVEY TYPE

OTHER DRILLER: V. E. MATUS

DEPTH STRATA	EACH STRATUM	DESCRIPTION FORMATION	SAMPLES DEPTH	SAMPLES TYPE	SAMPLES NUMBER
0		SURFACE			
4	4	SURFACE SOIL			
40	36	SAND, CLAY & GRAVEL STREAKS			
70	30	RED SHALE & GRAVEL			
571	501	RED SHALE & BOULDERS			
618	47	ROCK & SHALE STREAKS			
641	23	BOULDERS & RED SHALE			
656	15	ROCK & SHALE			
671	15	ROCK SAND & BLUE SHALE			
721	50	SAND			
730	9	BLUE SANDY SHALE - ORIGINAL DEPTH			
809	79	GRAY SANDSTONE			
818	9	PINK SHALE			
1080	262	CHINLE SHALE			
1082	2	HARD RIB LIME — LS			
1171	89	CHINLE SHALE			
1230	59	CHINLE SHALE (SANDY)			
1233	3	CHINLE SHALE (HARD)			
1236	3	HARD GRAY SAND			
1240	4	HARD RIB LIME — LS			
1243	3	CHINLE SHALE			
1244	1	HARD RIB LIME — LS			
1247	3	SHALE			
1249	2	HARD SANDSTONE			
1254	5	LIME AND SHALE STREAKS			
1280	26	SHALE			
1350	70	SANDSTONE			
T.D. 1350 FT.					

NOTE: WELL WAS ORIGINALLY 730 FT. DEEP. PULLED LINER OUT AND DRILLED WELL TO 1350 FT. WORK STARTED 2/23/63 AND FINISHED 4/9/63.

RI 7-7271
~~RI 7-9170~~

MICROBIOLOGY SERVICE LABORATORIES

analytical chemists . . . microbiologists

10 April 1963

5420 Calhoun Road
Houston 21, Texas
4320 Old Spanish Trail

To: Layne Texas Company
Houston, Texas

SO 8065

Sample marked: Well No. 2, Sample #1, Transwestern Pipeline Co., Thoreau, McKinney Cty, N. Mex. Taken: 4-3-63 after 12 hours pumping at 30 gpm with Layne Pump. Static Head: 225'. Pumping Level: 630'. Screened: 1190-1247'. Turbid. Ralph Barber.

Received: 4-8-63. Sample filtered for analysis.

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C	268	Conductance, micromhos/cm, 25°C	455
Total Dissolved Solids, actual†	395	Color, units	ND
Total Dissolved Solids, calc.	399	Turbidity, units	ND
Silica SiO_2	8	As Calcium Carbonate, $CaCO_3$:	
Iron and Aluminum Oxides R_2O_3	2	Phenolhpthalein Alkalinity	0
Calcium Ca	9	Total Alkalinity	204
Magnesium Mg	3	Total Hardness	36
Sodium (diff.) Na+K as Na	94	Free Carbon Dioxide CO_2	5
Carbonate CO_3	0	pH . . . 7.85	
Bicarbonate HCO_3	249	**HYPOTHETICAL COMBINATIONS**	
Sulfate SO_4	29	Calcium Bicarbonate	36
Chloride Cl	5	Magnesium Bicarbonate	20
Total Iron Fe	0.38	Sodium Bicarbonate	282
Iron, filtered sample Fe	<0.05	Sodium Sulfate	43
		Sodium Chloride	8
		$SiO_2+R_2O_3$	10
		Total Dissolved Solids, calc.	399

† *Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion*

Microbiology Service Laboratories

By: Edna Wood
Edna Wood

3823

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

WATER WELL TEST

REPORT NO. 6349
8065-62
PAGE 1 OF 2
2482
DATE 4/30/63

CUSTOMER LOCATION

GULF INTERSTATE COMPANY (AGENT FOR TRANSWESTERN PIPELINE CO.)

400' EAST OF WELL #1, STA. #5

McKINLEY — STATE NEW MEXICO

500' EAST OF WATER TANK

WELL DATA

STA. NO. 5 — 2

8-5/8" · 6-5/8" · 5"x4"

1350' — 1197'

NONE — YES

WATER MEASURING DEVICE

TEST PUMP DATA

786'-3"

9'-9"

STATIC LEVEL BEFORE START 185 FT.

4/20/63 STARTED PUMP AT 5:30 P.M.

5:45 PM	595	65	
6:00	620	60	SHUT DOWN PUMP FOR 20 MIN.
6:25 RECOVERY	490		STARTED PUMP
6:45	615	60	
7:00	640	60	
7:15	645	60	
7:30	645	60	
8:00	650	60	
8:30	655	60	
9:00	655	60	
10:00	660	60	
11:00	665	60	
12:00 AM	670	60	4/21/63
1:00	670	60	
2:00	675	60	
3:00	675	60	
4:00	680	60	
5:00	680	60	
6:00	685	60	
7:00	685	60	
8:00	685	60	
9:00	685	60	
10:00	685	60	

OBSERVERS

FOR OWNER

RALPH BARBER & D. R. PARNELL
FOR LAYNE TEXAS CO.

2

6349
8065-62
2 OF 2
2482
4/30/63

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

WATER WELL TEST

CUSTOMER LOCATION

GULF INTERSTATE COMPANY (AGENTS FOR TRANSWESTERN PIPELINE CO.)

400' EAST OF WELL 1, STA. #5

McKINLEY NEW MEXICO

500' EAST OF WATER TANK

WELL DATA

STA. No. 5 2

8-5/8" 6-5/8" 5" x 4"

1350' 1197'

NONE YES

WATER MEASURING DEVICE

OTHER

TEST PUMP DATA

783'-3"

9'-9"

4/21/63		
11:00 AM	685	60
12:00 N	685	60
1:00 PM	685	60
2:00	685	60
3:00	685	60
4:00	685	60

1 HOUR PUMPING AT 30 LB. DISCHARGE PRESSURE, 50 GALLONS PER MINUTE, WATER LEVEL 660 FT.

1 HOUR PUMPING AT 40 LB. DISCHARGE PRESSURE, 42.5 GALLONS PER MINUTE, WATER LEVEL 650 FT.

WELL RECOVERY

10:52	685
10:54	630
10:56	575
10:58	520
11:05	395
11:30	350

OBSERVERS

FOR OWNER

RALPH BARBER & D. R. PARNELL

FOR LAYNE TEXAS CO.

FORM NO. 1202

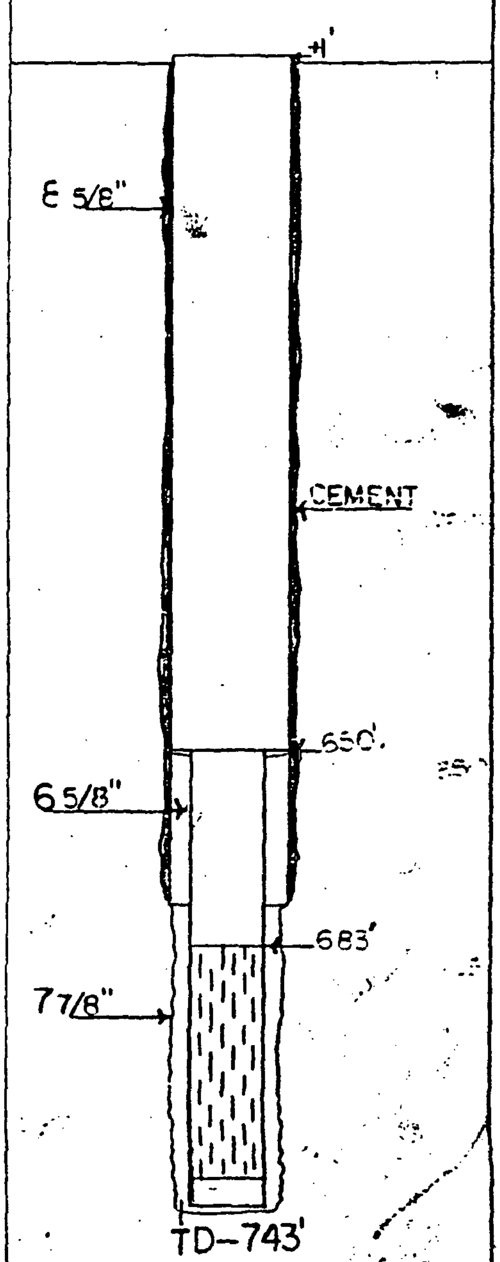
LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

MATERIAL SETTING

REPORT NO. 5468
S. O. 8005-2-59
PAGE OF 1
FILE NO. 2482
DATE 4-7-60

CUSTOMER LOCATION	WELL DATA
FOR GULF INTERSTATE CO. (AGENTS FOR TPL)	NAME WELL STA. NO. 5 WELL NO. 2
LOCATION WELL 400' EAST OF WELL NO. 1	ELEVATION DATUM
	TYPE WELL STRAIGHT
SURVEY FIELD	SURFACE CASING CEMENTED YES NO. SACKS 175
	SIZE HOLE UNDERREAMED 7-7/8 DEPTH 667
COUNTY MCKINLEY STATE NEW MEXICO	GRAVEL TYPE NONE NO. CU. YDS.
	TYPE SCREEN MILL SLOTTED GAGE 1/8"
OTHER LAND MARKS 500' EAST OF WATER TANK	DRILLER E.W. DAVIS RIG NO. 18
	OTHER V.E. MATUS

DEPTH	LENGTH	SIZE, KIND, WEIGHT MATERIAL	SKETCH
+ 1		TOP OF 8-5/8" O.D. SURFACE CASING	
0		SURFACE	
650		TOP OF 6-5/8" O.D. BLANK LINER WITH LEAD SEAL ON TOP	
667	668	8-5/8" O.D. SURFACE CASING	
683	33	6-5/8" O.D. BLANK LINER	
733	50	6-5/8" O.D. MILL SLOTTED 1/8 GA. SCREEN	
743	10	6-5/8" O.D. BLANK	
		TOTAL DEPTH - 743'	

REPORT NO.
S. O. 8005-59
PAGE 2
FILE NO 2482
DATE 2-25-60

LAYNE TEXAS COMPANY.

HOUSTON -:- DALLAS

WATER WELL TEST

CUSTOMER LOCATION

TEST FOR GULF INTERSTATE COMPANY

LOCATION OF WELL 400' EAST OF WELL NO. 1

SURVEY FIELD

COUNTY MCKINLEY STATE TEXAS

DESCRIPTION OF LAND MARKS 500' EAST OF WATER TANK

WELL DATA

NAME WELL SAME WELL NO. 2

ELEVATION 7302.22 DATUM

WELL SIZE x x

TOTAL DEPTH TOP SCREEN

GRAVEL WELL STRAIGHT WELL

TYPE SCREEN GAGE

TEMPERATURE OF WATER 69°

WATER CONDITION

WATER MEASURING DEVICE

ORIFICE SIZE BUCKET LENGTH

OTHER

TEST PUMP DATA

DEPTH SETTING TOP OF BOWL 706'

LENGTH AIR LINE 715' SIZE 1/8"

TYPE BOWL 3" NO. STAGES 31

LENGTH BOWL 9.20 SUCTION LT MOTOR 3:00

SAND CONTENT 0 OZ. PER 100 GAL.

ACTIVE STATIC HEAD AFTER PUMP STOPPED

5 MIN. FT. 20 MIN. FT.

10 MIN. FT. 25 MIN. FT.

15 MIN. FT. 30 MIN. FT.

WATER SAMPLE TAKEN YES NO. SAMPLES

BACTERIOLOGICAL SAMPLE TAKEN

DRAWDOWN SPECIFIC CAPACITY

DATE HOUR	AIR LINE GAGE	PUMPING LEVEL	DISCH. PRESS.	HEAD ON ORIFICE INCHES	GPM	RPM	OPERATOR	REMARKS
10:00	35	680	63		15			
11:00	35	680	63		15			
12:00 NOON	35	680	63		15			
1:00 P.M.	35	680	63		15			
2:00	35	680	63		15			
3:00	35	680	63		15			
4:00	35	680	63		15			
5:00	35	680	63		15			
6:00	35	680	63		15			
7:00	35	680	63		15			
8:00	35	680	63		15			

OBSERVERS

JACK CAMPBELL
FOR OWNER

E. W. DAVIS
FOR LAYNE TEXAS CO.

FORM NO. 25

REPORT NO.
S. O. 8005-59
PAGE 1
FILE NO. 2482
DATE 2-25-60

LAYNE TEXAS COMPANY.

HOUSTON -:- DALLAS

WATER WELL TEST

CUSTOMER LOCATION

TEST FOR Gulf Interstate Company

LOCATION OF WELL 400' East of Well No. 1

SURVEY

FIELD

COUNTY McKinley

STATE New Mexico

DESCRIPTION OF LAND MARKS 500' East of Water Tank

WELL DATA

NAME WELL Same

WELL NO. 2

ELEVATION 7302.22

DATUM

WELL SIZE x x

TOTAL DEPTH

TOP SCREEN

GRAVEL WELL

STRAIGHT WELL

TYPE SCREEN

GAGE

TEMPERATURE OF WATER 69°

WATER CONDITION

WATER MEASURING DEVICE

ORIFICE SIZE Bucket

LENGTH

OTHER

TEST PUMP DATA

DEPTH SETTING TOP OF BOWL 706'

LENGTH AIR LINE 715'

SIZE 1/8"

TYPE BOWL 3"

NO. STAGES 31

LENGTH BOWL 9.20

SUCTION LT. Motor 3:00

SAND CONTENT 0 OZ. PER 100 GAL.

ACTIVE STATIC HEAD AFTER PUMP STOPPED

5 MIN. FT. 20 MIN. FT.

10 MIN. FT. 25 MIN. FT.

15 MIN. FT. 30 MIN. FT.

WATER SAMPLE TAKEN Yes

NO. SAMPLES

BACTERIOLOGICAL SAMPLE TAKEN

DRAWDOWN

SPECIFIC CAPACITY...___

DATE HOUR	AIR LINE GAGE	PUMPING LEVEL	DISCH. PRESS.	HEAD ON ORIFICE INCHES	GPM	RPM	OPERATOR	REMARKS
8:00 A.M.	Started	Test 2-16-60		S.L. Before Start	338'			
9:00	70	645	75#		20			
10:00	31	684	60		20			
11:00	29	686	61		15			
12:00 Noon	29	686	63		15			
1:00 P.M.	29	686	63		15			
2:00	30	685	65		15			
3:00	35	680	63		15			
4:00	36	679	63		15			
5:00	36	679	63		15			
6:00	35	680	62		15			
7:00	35	680	62		15			
8:00	35	680	62		15			
9:00	35	680	62		15			
10:00	35	680	62		15			
11:00	35	680	62		15			
12:00 Mid	34	681	62		15			
1:00 A.M.	33	682	61		15			2-17-60
2:00	34	681	62		15			
3:00	35	680	63		15			
4:00	35	680	63		15			
5:00	35	680	63		15			
6:00	35	680	63		15			
7:00	35	680	64		15			
8:00	35	680	64		15			
9:00	35	680	63		15			

OBSERVERS

FOR OWNER

FOR LAYNE TEXAS CO.

MI 5 5575
Telephone XXXXXXXXX

MICROBIOLOGY SERVICE LABORATORIES

analytical chemists . . . microbiologists

5420 Calhoun
XXXXXXXXXXXXXXXX
Houston 2B, Texas

2/22/60

8005-2-59

To: Layne Texas Company
Houston, Texas

Sample Marked: Well No. 2, Gulf Interstate Co., agents for Transwestern Pipeline Company, McKinley County, New Mexico. Taken 2-17-60 after 35 hrs pumpimg at 15 gpm with Layne pump. Static Head: 338'. Pumpkng Level: 680'. Screened: 670 -720. E. W. Davis.
Received: 2-20-60.

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C		374
Total Dissolved Solids, actual†		506
Total Dissolved Solids, calc.		506
Silica	SiO_2	10
and Aluminum Oxides	R_2O_3	0
Calcium	Ca	0.5
Magnesium	Mg	0.5
Sodium (diff.) Na+K as	Na	149
Carbonate	CO_3	29
Bicarbonate	HCO_3	259
Sulfate	SO_4	41
Chloride	Cl	17
Total Iron	Fe	0.10

Conductance, micromhos/cm, 25°C		625
Color, units		3
Turbidity, units		0
As Calcium Carbonate, $CaCO_3$:		
Phenolhpthalein Alkalinity		24
Total Alkalinity		260
Total Hardness		3
Free Carbon Dioxide	CO_2	0
pH . . . 9.0		

HYPOTHETICAL COMBINATIONS

Calcium Bicarbonate	2
Magnesium Bicarbonate	3
Sodium Carbonate	51
Sodium Bicarbonate	352
Sodium Sulfate	60
Sodium Chloride	28
$SiO_2 + R_2O_3$	10
Total Dissolved Solids, calc.	506

† Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion

Microbiology Service Laboratories
By: Edna Wood

2840

3

FORM NO. 28

LAYNE TEXAS COMPANY

HOUSTON -:- DALLAS

REPORT NO. 5469
S O 8005-3-59
PAGE 1
FILE NO 2482
DATE 4-7-60

WELL LOG

CUSTOMER LOCATION	WELL DATA
FOR Gulf Interstate Co. (Agents for TPL)	NAME WELL Sta. No. 5 WELL NO. 3
LOCATION WELL Station No. 5 - Thoreau Site	ELEVATION DATUM
	RT C GR
SURVEY FIELD	TEST HOLE SIZE 11x7-5/8 TO 735
	DATE STARTED DRILLING 3-1-60
COUNTY McKinley STATE New Mexico	DATE FINISHED DRILLING 3-14-60
	DRILLER V.E. Matus RIG NO 18
OTHER LAND MARKS 600' southwest of Well No. 1	TYPE MUD Jell NO SACKS 10
	ELECTRIC LOG None TYPE
	SURVEY None TYPE
	OTHER

DEPTH STRATA	EACH STRATUM	DESCRIPTION FORMATION	SAMPLES DEPTH	SAMPLES TYPE	SAMPLES NUMBER
0		Surface			
4	4	Surface soil			
19	15	Hard sandstone and gravel			
72	53	Hard sand, gravel and rock			
103	31	Red shale and boulders			
109	6	Rock			
647	538	Red shale and boulders			
654	7	White and gray sticky clay			
665	11	Rock and red shale			
672	7	Rock and hard sand			
730	58	Hard sand			
735	5	White and blue soft sandy clay			
		Total Depth - 735'			

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LAYNE TEXAS COMPANY.

HOUSTON -:- DALLAS

WATER WELL TEST

REPORT NO. S.O. 8005-59
PAGE 1
FILE NO 2482
DATE 2-24-60

CUSTOMER LOCATION

TEST FOR Gulf Interstate Company

LOCATION OF WELL Compressor Station No. 5

SURVEY FIELD

COUNTY McKinley STATE New Mexico

DESCRIPTION OF LAND MARKS 2.5 miles north of Hwy. 66 near Thoreau, New Mexico

WELL DATA

NAME WELL Compressor Station No. 5 WELL NO. 1

ELEVATION 7310.33' DATUM G.L.

WELL SIZE x x

TOTAL DEPTH TOP SCREEN

GRAVEL WELL STRAIGHT WELL

TYPE SCREEN GAGE

TEMPERATURE OF WATER

WATER CONDITION

WATER MEASURING DEVICE

ORIFICE SIZE 5 gallon LENGTH

OTHER bucket

TEST PUMP DATA

DEPTH SETTING TOP OF BOWL 679'

LENGTH AIR LINE 679' SIZE 1/8"

TYPE BOWL 4" NO. STAGES 27

LENGTH BOWL 8.08 SUCTION LT. Motor

SAND CONTENT OZ PER 100 GAL.

(EFFE)CTIVE STATIC HEAD AFTER PUMP STOPPED

5 MIN.	613 FT.	20 MIN.	545 FT.		
10 MIN.	577 FT.	25 MIN.	534 FT		
15 MIN.	558 FT.	30 MIN.	522 FT.		

WATER SAMPLE TAKEN Yes NO SAMPLES

BACTERIOLOGICAL SAMPLE TAKEN

DRAWDOWN SPECIFIC CAPACITY

DATE HOUR	AIR LINE GAGE	PUMPING LEVEL	DISCH. PRESS.	HEAD ON ORIFICE INCHES	GPM	RPM	OPERATOR	REMARKS
1-11-60		S.L. before start 309'						
10:00 A.M.	55	624	34		20			
11:00	55	624	34		20			
12:00 Noon	52	627	32		20			
1:00 P.M.	47	632	30		20			
2:00	40	639	30		20			
3:00	35	644	27		20			
4:00	32	645	26		20			
5:00	32	645	26		20			
6:00	30	647	22		20			
7:00	15	664	18		20			
8:00	15	664	18		20			
9:00	15	664	18		20			
10:00	15	664	18		20			
11:00	13	666	18		20			
12:00 Mid	13	666	18		20			
1:00 A.M.	13	666	18		20	1-12-60		
2:00	13	666	18		20			
3:00	13	666	18		20			
4:00	13	666	18		20			
5:00	13	666	18		20			
6:00	13	666	18		20			
7:00	13	666	18		20			
8:00	15	664	18		20			
9:00	15	664	17.5		5 gallons 16 seconds			
10:00	15	664	17.5		5 gallons 16 seconds			
		664	17.5		5 gallons 16 seconds			

/

MICROBIOLOGY SERVICE LABORATORIES

analytical chemists . . . microbiologists

Telephone WAlnut 6-2700
5420 Calhoun
Houston 21, Texas

1-19-60

To: Layne Texas Company
Houston, Texas

Sample Marked: Well No. 1, Sta 5, Gulf Interstate Company agents for Transwestern Pipeline Company, McKinley County, New Mexico. Taken: 1-12-60 after 35 hours pumping at 20 gpm with Layne pump. Pumping level: 665'. Screened: 686-736. Water temperature 62°F. Clear. V. E. Metus.
Received: 1-16-60

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C		340	Conductance, micromhos/cm, 25°C	540
Total Dissolved Solids, actual†		449	Color, units	0
Total Dissolved Solids, calc.		439	Turbidity, units	0
Silica	SiO_2	11	As Calcium Carbonate, $CaCO_3$:	
Iron and Aluminum Oxides	R_2O_3	1	Phenolhpthalein Alkalinity	20
Calcium	Ca	< 0.05	Total Alkalinity	216
Magnesium	Mg	< 0.05	Total Hardness	< 0.05
Sodium (diff.) Na+K as	Na	129	Free Carbon Dioxide CO_2	0
Carbonate	CO_3	24	pH . . . 9.2	
Bicarbonate	HCO_3	215		
Sulfate	SO_4	48		
Chloride	Cl	11		
Total Iron	Fe	< 0.05		

HYPOTHETICAL COMBINATIONS

Sodium Carbonate	42
Sodium Bicarbonate	296
Sodium Sulfate	71
Sodium Chloride	18
$SiO_2 + R_2O_3$	12
Total Dissolved Solids, calc.	439

† Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion

Microbiology Service Laboratories

By: Edna Wood

2821

WATER WELL #3 (West well)

June 27, 1972 - No water level in #3 (west well), shut in time 6 hrs. The well was acidized thru July 2, 1972 and tested delivering 15 gpm at 43 psi shut in.

July 9, 1973 - pump was pulled, repaired and reinstalled at 705 ft., 521 ft. static and delivering 34 gpm.

July 1, 1974 - Tested at 35 and 37 gpm in seperate tests.

August 31, 1976 - Layne Well Co. pulled the well to replace the pump. The drilled depth was 735, bottom now 725 ft. and pump was reset at 713 ft., it then tested at 60 gpm with pressure of 160 lbs.

June 3, 1987 Frontier Drilling, Milan, New Mexico pulled and replaced pump and motor. The well was reset at 705 ft. The well was not tested for pulldown. We replaced 17 joints of pipe and replaced wire from pump house to well.
The new pump is a Hitachi, 15 H.P.. The pump is a five stage RED JACKET.

Acidized # 1(cont) started June 28-72
Finished ~~June~~ July 2-72
well #1 dilivered 15 G.P. Min. Pump Discharge PSI 100#
with well shot in.

3 well (west) Acidized June 28-72- Finished ~~June 2~~ July -72
3 well Delivered 15 GP Min. with A Pump Discharge PSI #45
with well shot in.

2 well (East) Delivered 19 GP.M. ~~with~~ To The surface
But would not Back The Head Press. Max P.S.I. 20#
with well shot in. 495 ft water standing in
The well. This well has To Be Pulled + Pump
overhauled. Done

Took off State Records

3'-4" Galvanized

Distribution Line

5-26-83

R [illegible]

#3

LAYNE TEXAS COMPANY.

HOUSTON -:- DALLAS

WATER WELL TEST

REPORT NO. 5471-
S O 8005-3-59
PAGE 1
FILE NO. 2482
DATE 4-7-60

CUSTOMER LOCATION

TEST FOR GULF INTERSTATE CO. (AGENTS FOR TPL)
LOCATION OF WELL STA.NO.5 - THOREAU SITE
SURVEY FIELD
COUNTY McKINLEY STATE NEW MEXICO
DESCRIPTION OF LAND MARKS 600' SOUTHWEST OF WELL NO. 1

WELL DATA

NAME WELL STA. NO.5 WELL NO 3 West
ELEVATION DATUM
WELL SIZE 8-5/8" x 6-5/8" x 735'
TOTAL DEPTH 735' TOP SCREEN 665'
GRAVEL WELL STRAIGHT WELL YES
TYPE SCREEN MILL SLOTTED GAGE 1/8
TEMPERATURE OF WATER
WATER CONDITION

WATER MEASURING DEVICE

ORIFICE SIZE LENGTH
OTHER MEASURED WITH A 50 GALLON DRUM

TEST PUMP DATA No.40929

DEPTH SETTING TOP OF BOWL 705
LENGTH AIR LINE 705'1" SIZE 1/8" BRASS
TYPE BOWL REC 4" NO. STAGES 31
LENGTH BOWL 3' SUCTION LT.

SAND CONTENT OZ. PER 100 GAL.

ACTIVE STATIC HEAD AFTER PUMP STOPPED

5 MIN. 555 FT. 20 MIN. 495 FT.
10 MIN. 531 FT. 25 MIN. 482 FT.
15 MIN. 511 FT. 30 MIN. 471 FT.

WATER SAMPLE TAKEN NO. SAMPLES
BACTERIOLOGICAL SAMPLE TAKEN
DRAWDOWN SPECIFIC CAPACITY

AIR LINE + 1' ABOVE GROUND LEVEL

DATE HOUR	AIR LINE GAGE	PUMPING LEVEL	DISCH. PRESS.	HEAD ON ORIFICE INCHES	GPM	RPM	OPERATOR	REMARKS
3-28-60	BEGAN TESTING 7:30 AM - FIRST READING 8:00 AM SL BEFORE START 317'							
8:00 AM	145	560	50		40+			
9:00	121	584	50		40-			
10:00	120	585	50		35+			
11:00	115	590	50		35+			
12:00 NOON	112	593	50		35+			
1:00 PM	107	598	50		35-			
2:00	105	600	50		35-			
3:00	102	603	50		35-			
4:00	100	605	50		34			
5:00	99	606	50		30+			
6:00	99	606	50		30+			
7:00	99	606	50		30+			
8:00	99	606	50		30+			
9:00	98	607	50		30+			
10:00	98	607	50		30			
11:00	98	607	50		30			
12:00 MID	97	608	50		30			
1:00 AM	95	610	50		30			
2:00	95	610	50		30			
3:00	93	612	50		30			
4:00	93	612	50		30			
5:00	91	614	50		30			
6:00	89	616	50		30			
7:00	88	617	50		30			
8:00	88	617	50		30			
9:00	88	617	50		30			

OBSERVERS

FOR OWNER FOR LAYNE TEXAS CO.

FORM NO. 25 -

#3

REPORT NO 5471
S O 8005-3-59
PAGE 2
FILE NO. 2482
DATE 4-7-60

LAYNE TEXAS COMPANY,

HOUSTON -:- DALLAS

WATER WELL TEST

CUSTOMER LOCATION

TEST FOR GULF INTERSTATE CO. (AGENTS FOR TPL)

LOCATION OF WELL STA. NO. 5 - THOREAU SITE

SURVEY FIELD

COUNTY McKINLEY STATE NEW MEXICO

DESCRIPTION OF LAND MARKS 600' SOUTHWEST OF WELL NO. 1

WELL DATA

NAME WELL STA. NO. 5 WELL NO. 3

ELEVATION DATUM

WELL SIZE 8-5/8" x 6-5/8" x 735'

TOTAL DEPTH 735' TOP SCREEN 665'

GRAVEL WELL STRAIGHT WELL YES

TYPE SCREEN MILL SLOTTED GAGE 1/8

TEMPERATURE OF WATER

WATER CONDITION

WATER MEASURING DEVICE

ORIFICE SIZE LENGTH

OTHER MEASURED WITH A 50 GALLON DRUM

TEST PUMP DATA No. 40929

DEPTH SETTING TOP OF BOWL 705

LENGTH AIR LINE 705' 1" SIZE 1/8" BRASS

TYPE BOWL RE[illegible] 4" NO. STAGES 31

LENGTH BOWL 3' SUCTION LT.

SAND CONTENT OZ. PER 100 GAL.

ACTIVE STATIC HEAD AFTER PUMP STOPPED

5 MIN. 555 FT. 20 MIN. 495 FT.

10 MIN. 531 FT. 25 MIN. 482 FT.

15 MIN. 511 FT. 30 MIN. 471 FT.

WATER SAMPLE TAKEN NO. SAMPLES

BACTERIOLOGICAL SAMPLE TAKEN

DRAWDOWN SPECIFIC CAPACITY

AIR LINE + 1' ABOVE GROUND LEVEL

DATE HOUR	AIR LINE GAGE	PUMPING LEVEL	DISCH. PRESS	HEAD ON ORIFICE INCHES	GPM	RPM	OPERATOR	REMARKS
10:00 AM	88	617	50		30			
11:00	87	618	50		30			
12:00 NOON	87	618	50		30			
1:00	86	619	50		30			
2:00	85	620	50		30			
3:00	83	622	50		30			
4:00	82	623	50		30			
5:00	81	624	50		30			
6:00	79	626	50		30			
7:00	78	627	50		30			
8:00	77	628	50		30			
24 HOUR	RECOVERY		TIME	WL		TIME	WL	
TIME	WL		9:30	421		2:30	380	
8:05	555		9:40	417		3:00	379	
8:10	531		9:50	415		3:30	378	
8:15	511		10:00	412		4:00	376	
8:20	495		10:15	409		4:30	375	
8:25	482		10:30	405		5:00	373	
8:30	471		10:45	403		5:30	371	
8:35	464		11:00	401		6:00	370	
8:40	455		11:20	398		6:30	369	
8:45	459		11:40	395		7:00	368	
8:50	445		12:00	393		7:30	367	
8:55	440		12:30	391		8:00	366	
9:00	435		1:00	388				
9:10	429		1:30	385				
9:20	425		2:00	383				

OBSERVERS

FOR OWNER FOR LAYNE TEXAS CO.

FORM NO. 25

#3

MICROBIOLOGY SERVICE LABORATORIES

analytical chemists . . . microbiologists

Telephone MI 5 5575

Houston 23 Texas

5420 Calhoun
April 4, 1960

To: Layne Texas Company
Houston, Texas

Sample Marked: Gulf Interstate Co., agents for Transwestern Pipe Line Co. Well No. 3, Thoreau, New Mexico. Taken 3-29-60 after 36 hrs pumping at 30 gpm with Layne pump. Static Head: 317. Pumping Level: 628. Screened: 665 - 725. Clear. V. E. Martin.
Received: 4-1-60.

WATER ANALYSIS

results in parts per million (mg/l) except as noted

Dissolved Residue at 105°C		397	Conductance, micromhos/cm, 25°C	680
Total Dissolved Solids, actual†		524	Color, units	0
Total Dissolved Solids, calc.		516	Turbidity, units	0
Silica	SiO_2	8	As Calcium Carbonate, $CaCO_3$:	
Iron and Aluminum Oxides	R_2O_3	1	Phenolhpthalein Alkalinity	30
Calcium	Ca	0	Total Alkalinity	265
Magnesium	Mg	0	Total Hardness	0
Sodium (diff.) Na + K as	Na	157	Free Carbon Dioxide CO_2	0
Carbonate	CO_3	36	pH . . . 9.2	
Bicarbonate	HCO_3	250	HYPOTHETICAL COMBINATIONS	
Sulfate	SO_4	38	Sodium Carbonate	64
Chloride	Cl	26	Sodium Bicarbonate	344
Total Iron	Fe	0.16	Sodium Sulfate	56
			Sodium Chloride	43
			$SiO_2 + R_2O_3$	9
			Total Dissolved Solids, calc.	516

† Total Dissolved Solids, actual = Dissolved Residue + 50.8% of bicarbonate (HCO_3) ion

Microbiology Service Laboratories

By: Edna Wood

2895

Appendix C: **Report on Aquifer Tests, Transwestern Pipeline Company, Thoreau, New Mexico by J.W. Shomaker, June 1981**

REPORT ON AQUIFER TESTS
TRANSWESTERN PIPELINE COMPANY
Thoreau, New Mexico

by
John W. Shomaker
Consulting Geologist

prepared for

TRANSWESTERN PIPELINE COMPANY

June 1981

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ILLUSTRATIONS

REPORT OF AQUIFER TESTS,
TRANSWESTERN PIPELINE COMPANY,
Thoreau, New Mexico

by
John W. Shomaker
Consulting Geologist

INTRODUCTION

This report summarizes the results of aquifer tests of the three water-supply wells at Transwestern Pipeline Company Station 5, Thoreau, New Mexico. The location and construction of each of the wells is also described, based on information furnished by Transwestern. The purpose of the report is to provide basic information concerning the wells in their present condition, and to estimate their present production capacities.

The aquifer tests were requested by Mr. M. L. Reed, District Superintendent, Transwestern Pipeline Company. Mr. Robert Anderson, Station Superintendent, coordinated the work on behalf of Transwestern and arranged for company personnel to assist in data collection. Information as to well construction and locations were taken from company records.

The locations of the three wells are shown on Figure 1.

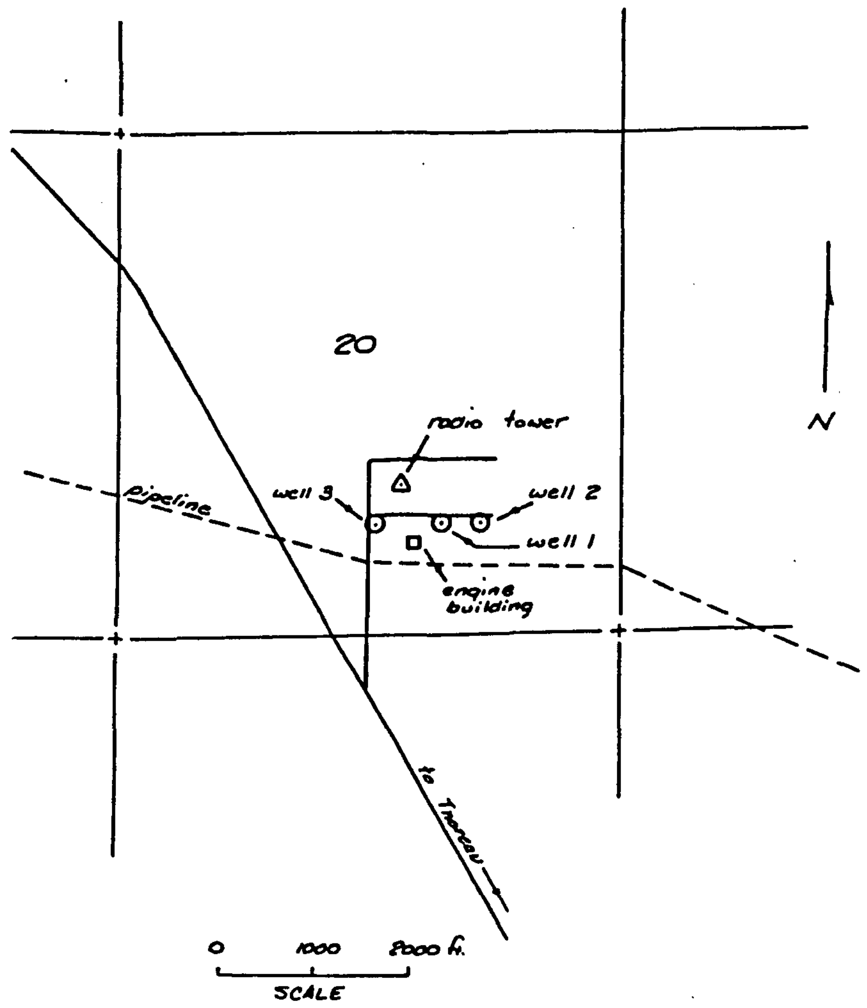

Figure 1. Index map of section 20, T.14N., R.13W., showing locations of Transwestern Pipeline Company water wells.

WELL 1

Well Location and Construction

Well 1 is located in the NW/4 NE/4 SW/4 SE/4 of section 20, T. 14 N., R. 13 W., NMPM, approximately 1150 feet from the south line and 1875 feet from the east line of the section. The land-surface elevation at the well is 7307.7 feet.

The well was drilled in 1959 to an original total depth of 746 feet; it seems to have been the second or possibly the third hole at the location, the first having been abandoned because the surface casing parted. (A second test hole seems to have been drilled to 750 feet.) A 12-1/2-inch(?) hole was drilled to 664(?) feet; 10-3/4-inch surface casing was set but not cemented at 664 feet. Drilling was continued to 682 feet and 8-5/8-inch casing was set at 682 feet and carried to about 1. foot above ground level, and cemented. A 7-7/8-inch hole was drilled from 682 to total depth of 746 and a 6-5/8-inch liner installed from 653 to 746; the liner is mill-slotted with 1/8-inch slots from 686 to 736. The well is completed in the upper part of the Sonsela Sandstone bed of the Triassic-age Chinle Formation.

The log of a 750-foot test hole, which was drilled near the present well 1, shows a "blue shale" from 745 to 750; the logs of wells 2 and 3 indicate a similar unit at about the same depth, and the log of well 2, as deepened, shows 79 feet of "gray sandstone" below it. It appears that well 1 did not penetrate the Sonsela fully.

At the time the present production pump was installed, March 29, 1979, the depth of the well was measured at 729 feet. It thus appears that 17 feet of fill-up had occurred and that 7 feet of the slotted section is no longer producing.

Aquifer Test

All of the wells at the station were shut in at 13:00 hrs. on May 19, 1981, to allow water levels to recover. The aquifer test began at 9:44 on May 21, about 44 hours later. The pump used was the production pump, a 5 hp Grundfos submersible set at 680 on 1-1/4-inch tubing. Discharge was measured with an orifice tube and manometer, and water levels were measured by means of nitrogen pressure in an airline whose end is reported to be at 680. It was not possible to reach the pumping water level with an electric probe either in the airline or outside it.

The pre-pumping water level was 397 feet, which was 53 feet below the level measured before the test of well 2 on April 25, about a month before. This disparity is probably partly the result of heavier pumping of all three wells during the interim than prior to April 25; because well 2 is open to both the Sonsela and the San Andres-Glorieta aquifer, which though deeper, contains water at higher head, well 2 feeds water from the San Andres-Glorieta into the Sonsela during periods when it is not pumping, and thus raises water levels in the Sonsela, and draws water from the Sonsela when pumping, lowering the levels.

Earlier water-level measurements seem to support this supposition. The earliest measurements found for well 1 was 309 feet in January 1960, before well 2 was drilled. In March 1979, again probably before summer water demand caused heavy pumping of the wells, the level in well 1 was measured at 347 feet.

The unexpected low "static" level in well 1 may also reflect some residual drawdown from pumping from other wells in and near Thoreau in the same aquifer. The "static" level in well 3 seems to have kept pace with well 1, and both may represent general lowering due to pumping of both the Transwestern wells and others in the vicinity, partly offset by movement of water into the aquifer from the Glorieta.

Well 1 was pumped for a total of 598 minutes. Great difficulty was experienced in regulating the discharge during the first hour because tubing pressures up to 150 psi were required to throttle the flow to the desired rate. The pumping level reached the pump bowls at about 400 minutes, so that the test data are not of good quality. Water level measurements are shown as Figure 2. Between 60 minutes and 406 minutes the discharge was regulated within about 0.2 gpm at a rate of 16.1 gpm; a straight-line-method approximation of transmissivity[1/] indicates a value of about 34 gpd/ft.

Recovery measurements were taken for 692 minutes after pumping stopped; the measurements are shown on Figure 3. The transmissivity suggested by the latest plotted points (i.e., T/T' less than about 2.2) is on the order of 10 gpd/ft, but the position of the pre-pumping level seems to indicate that the curve would flatten, and that the transmissivity is somewhat greater.

Water levels were measured in wells 2 and 3 during the test. Well 3, also completed in the upper Sonsela only, varied erratically over a range of about 1.9 feet and it is believed that the effects

1/ Cooper, H. H., and Jacob, C. E., 1946, A generalized graphical method for evaluating formation constants and summarizing well-field history: Transactions, Amer. Geophysical Union, v. 27, p. 526-534.

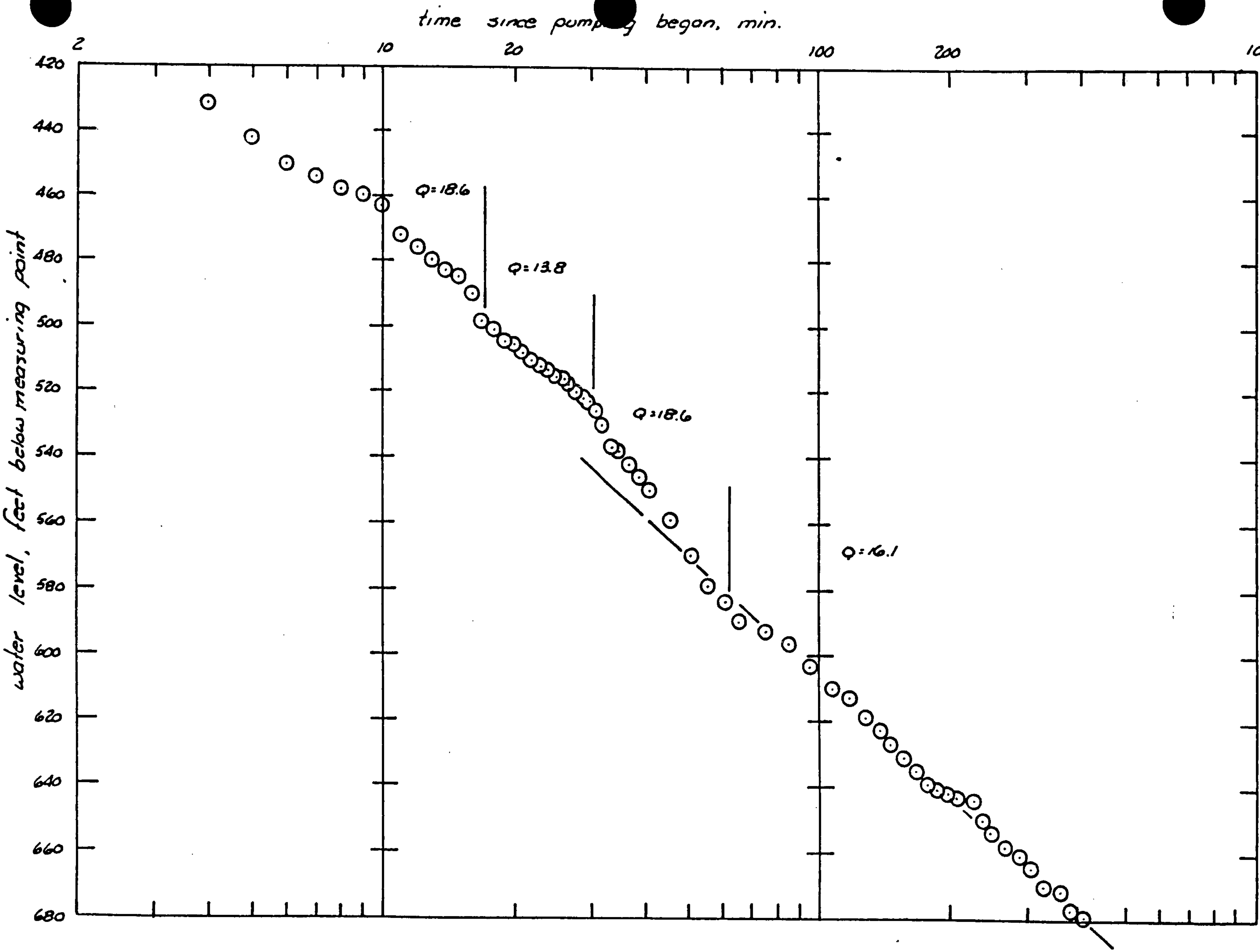

Figure 2. Water level measurements during pumping, well 1.

6-16

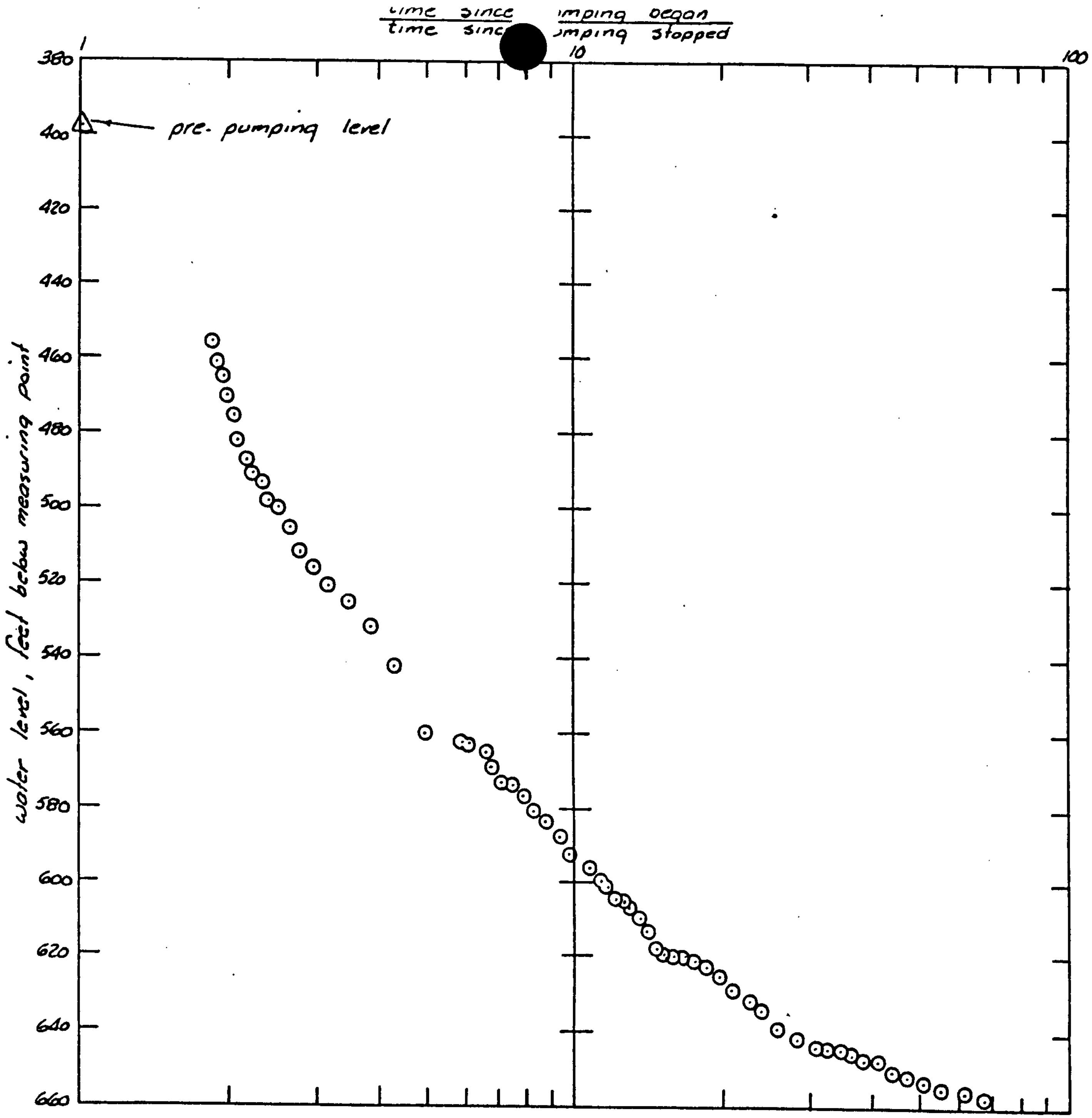

Figure 3. Water level measurements during recovery, well 1.

of pumping well 1 were superimposed on a pattern of rising levels in well 3 and did not provide useful data. The level in well 2 rose for about 2 hours, then drew down about 1. foot in response to pumping of well 1. The response of well 2 is also considered of little value since the test was so short.

Present Capacity of Well

It is difficult to draw conclusions about the performance of well 1. Several factors cause confusion, among them the apparent low permeability of the aquifer, the large and variable influence of leakage into (and from, during pumping) the Sonsela through well 2, and the fact that the pump presently in the well is much too large.

In order to conduct a satisfactory test of well 1 as it presently exists, a considerably smaller pump would be desirable so that a longer test could be done without either restricting the discharge excessively, and thus causing surging and erratic measurements, or pumping the well down to the pump intake. A pump designed for about 10 gpm from 680 feet would probably permit the well to produce almost continuously for a number of days, although it may be that the well has declined in productivity for reasons having nothing to do with the aquifer, and that rehabilitation would be in order rather than a change of pump.

Comparison with the test made by Layne Texas Company in January 1960 seems to show that not only the change in static level is influencing the well's performance. The apparent transmissivity of the aquifer, as interpreted from that test, was much higher, and it seems probable that the well itself has also lost efficiency and that the effect is being seen as a decrease in transmissivity. Several possibilities suggest themselves.

The well was known to have lost about 7 feet of producing section by 1979 because of fill-up, and more may have occurred since. It is also possible that the fill-up is higher outside the casing than inside, particularly if the slots in the liner are extensively corroded or scaled. The short interval in which the casing is actually cemented in the hole, between 664 and 682 (recalling that the 8-5/8-inch casing is cemented inside the 10-3/4-inch surface pipe, but that the 10-3/4-inch pipe, to 664, is not cemented) seems to provide a doubtful barrier to sloughing of shale from higher in the hole.

Effects of Other Pumping

The water level in well 1 seems to have declined in response to several factors, as suggested above, and will probably continue to do so. It will be most directly affected by pumping from wells in the Sonsela, but a large decline in the potentiometric surface associated with the Glorieta will affect it also by causing a larger share of well 2 production to be drawn from the Sonsela, and eventually by reversing the relationship of heads in the two aquifers so that water moves from the Sonsela into the Glorieta through well 2.

WELL 2

Well Location and Construction

Well 2 is located in the NE/4 NE/4 SW/4 SE/4, section 20,

T. 14 N., R. 13 W., NMPM; it is about 1150 feet from the south line of section 20, and about 1475 feet from the east line, and is at an elevation of about 7302.2 feet.

The well was drilled in 1960 to an original depth of 743 feet 2/; hole diameter was 11 inches to 670 feet, and 7-7/8 inches to total depth. Casing was 8-5/8 inches OD to 667 feet, and a 6-5/8-inch OD liner was set from 650 feet to total depth of 743 feet. The 8-5/8-inch casing was cemented. The original completion was in a part of the Triassic-age Sonsela sandstone bed of the Chinle Formation, which was open to the well between 657 and 743; the 6-5/8-inch liner was mill-slotted between 683 and 733.

In 1963, the 6-5/8-inch liner was pulled and the well was deepened to 1350 feet, probably a 7-7/8-inch hole at least in part. Three liners were then set, as follows:

6-5/8-inch	OD	+ 0.5		1176.
5-inch	OD	1122.	to	1243.
4-1/2-inch	OD	1226. 3/	to	1350.

The liners were torch-slotted as follows:

5-inch	liner	1197.	to	1243.
5-1/2-inch	liner	1282.	to	1344.

The new completion is in the San Andres Limestone and Glorieta Sandstone of Permian age, and part of the basal Chinle Formation. There is no record that the 6-5/8-inch liner was cemented, and it was suspected that the entire section below 667, including the

2/ There are conflicting records of total depth; the casing record gives 743 feet

3/ or 1232

original completion in the Sonsela, remains open to the well. That was found to be the case by the response of a Sonsela well (well 1) which was measured from time to time during the test.

Aquifer Test

In preparation for the test of well 2, pumping of all the wells at the station was stopped at about 14:00 hrs on April 23, 1981. About 45 hours later, at 10:59 on April 25, a constant-discharge test was begun in well 2 with the production pump. The pump is a 15 hp Reda submersible set on 778 feet of 2-inch line pipe. Discharge was measured with an orifice tube and manometer, and was regulated to within about 2 percent of the nominal rate at all times. The test was begun at a rate of 48 gpm, but after about 12 minutes it was found that the pump was not capable of sustaining that rate; the discharge was adjusted to 40.7 gpm, and the test continued for a total pumping time of 1435 minutes. Recovery was then measured for 1146 minutes after the pump was stopped. The water level measurements during drawdown and recovery are shown on Figures 4 and 5.

The water level in well 1, 400 feet to the west of well 2 and completed in the upper Sonsela bed only, was measured at irregular intervals before, during, and after the pump test to determine whether well 2 produces in part from the Sonsela. The measurements are shown in Figure 6.

Present Capacity of Well 2

Because the well is open to two aquifers with water at considerably different heads, the "static" level in the well

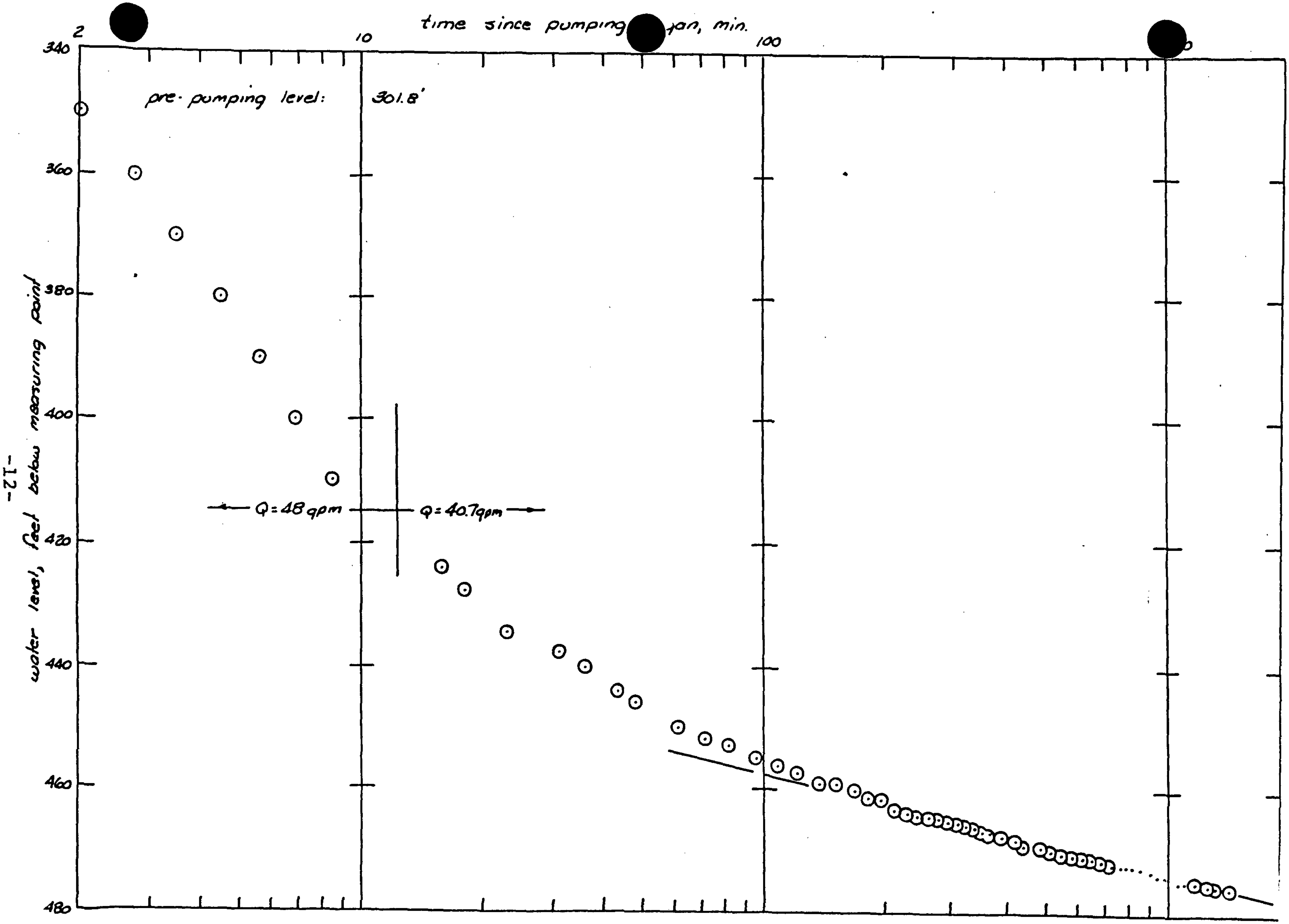

Figure 4 Water level measurements during pumping, well 2.

5-4-81

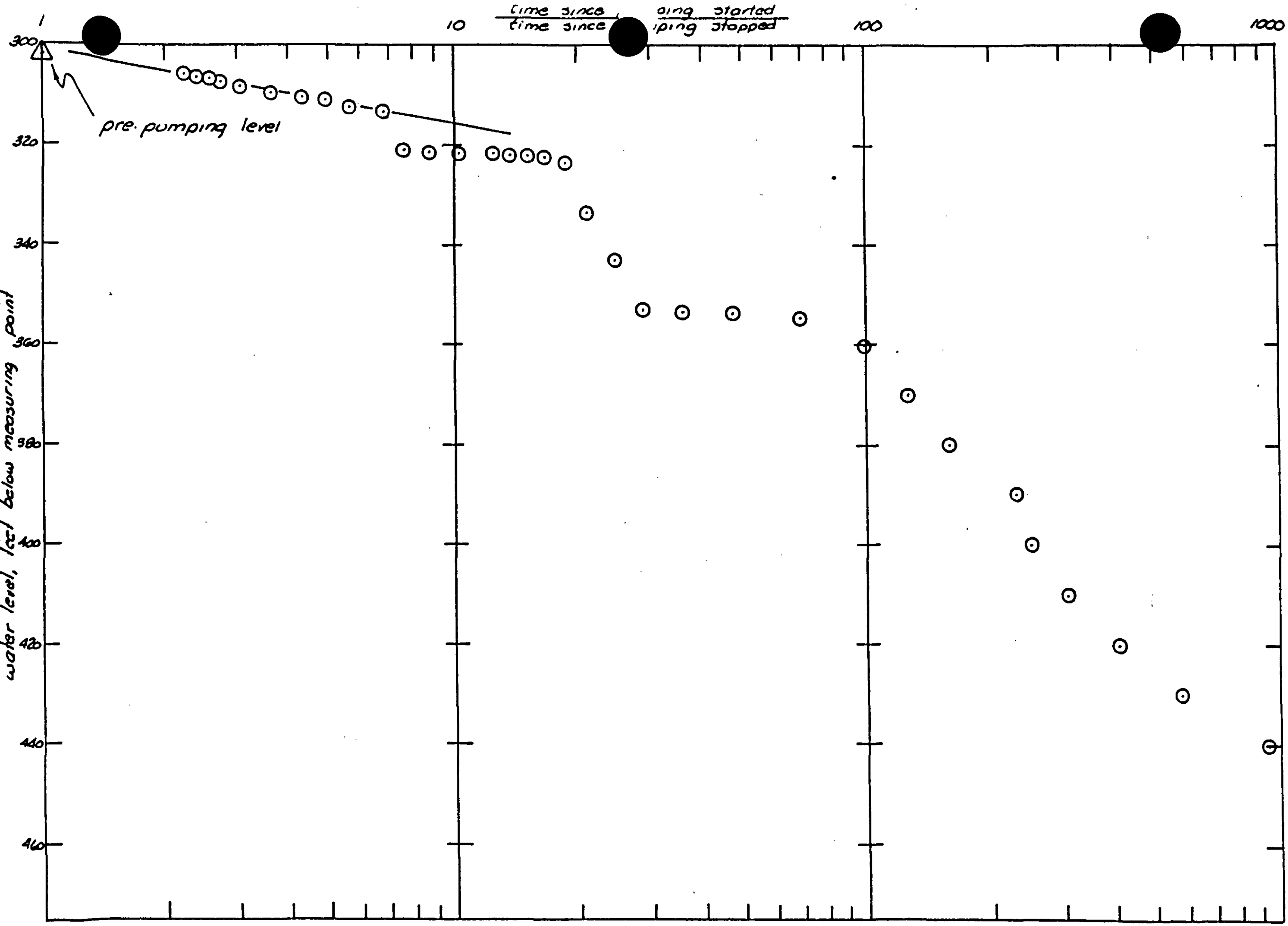

Figure 5. water level measurements during recovery, well 2.

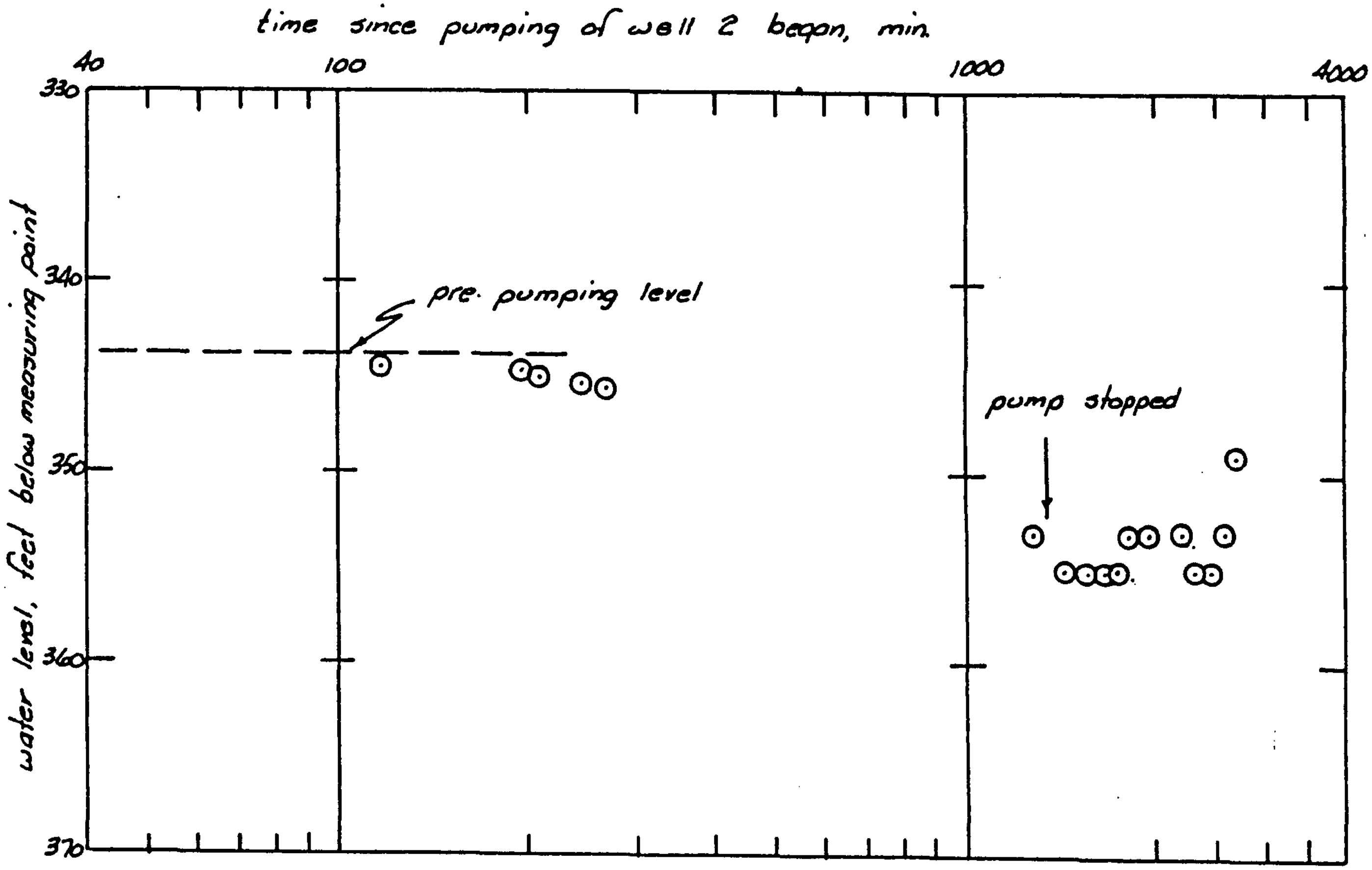

Figure 6. Water level measurements in well 1 during pumping of well 2.

represents an equilibrium between them. The water levels in the upper zone, the Sonsela bed, are some 120 feet below those in the lower zone, the Glorieta, in Thoreau4/; a well open to both zones would permit water to flow upward from the Glorieta into the Sonsela, causing a depression in the potentiometric surface for the Glorieta and a "mound" in the potentiometric surface for the Sonsela. Such appears to be the case for well 2. That the water level in the well is a sort of compromise between the original positions of the potentiometric surface is indicated by the fact that the level, at about 7000 feet elevation, is much below that for nearby wells finished in the Glorieta alone, yet at the time of the test was still some 38 feet above that of well 1, which is open to the Sonsela only. Wells in the Glorieta in Thoreau have water level elevations above 7100 feet, as does a well in section 19, T. 14 N., R. 13 W. (from U.S.G.S. Water Resources Division well records), and Transwestern well 2 lies between them. Further, the record of an aquifer test conducted in well 2 in 1963, just after it was deepened, gives a "static level" of 185 feet, or 117 feet above the present level. It does appear that the equilibrium has prevailed for a number of years; a depth-to-water of 302 feet was measured in 1973 and 1979, and was approximately that of the aquifer test described in this report.

During pumping, the well produces from both the Glorieta and the Sonsela. A distance-drawdown analysis based on the drawdown

4/ Geohydrology Associates, Inc., 1979, Hydrologic assessment of the Sonsela Sandstone, West-Central New Mexico: consulting report prepared for Phillips Uranium Co.

in well 1 at the end of 24 hours of pumping from well 2, and assuming a transmissivity of about 10 ft^2/day or 75 gpd/ft (as suggested by Geohydrology Associates[5/]), and approximately the mean of values found for wells 1 and 3, indicates that at 40.7 gpm total production, about 7.5 gpm may be furnished by the Sonsela. Efficiency of 100 percent is also assumed for well 2; lower well efficiency would result in a smaller proportion furnished by the Sonsela. The distance-drawdown plot is shown as Figure 7. At greater pumping rates, the proportion of the total that would be furnished by the Sonsela also would be less, because of the considerably higher transmissivity of the Glorieta.

The transmissivity of the combined aquifers open to the well may be estimated in several ways. If it is assumed that leakage is so small as to be ignored, then the straight-line parts of the semilogarithmic water level vs. time plots for drawdown and recovery can be used to estimate transmissivity, following the methods of Jacob[5/]. The values derived in this way are about 895 gpd/ft for the late drawdown measurements and about 760 gpd/ft for the late recovery measurements. If leakage from the enclosing rocks is significant, as it probably is, then the values determined for the aquifers themselves are probably too high; on the other hand, a significant amount of leakage will cause the drawdown to stabilize at some level, rather than continue to increase. Thus, projections

5/ Cooper, H. H., and Jacob, C. E., 1946, A generalized graphical method for evaluating formation constants and summarizing well-field history: Transactions, Amer. Geophysical Union, v. 27, p. 526-534.

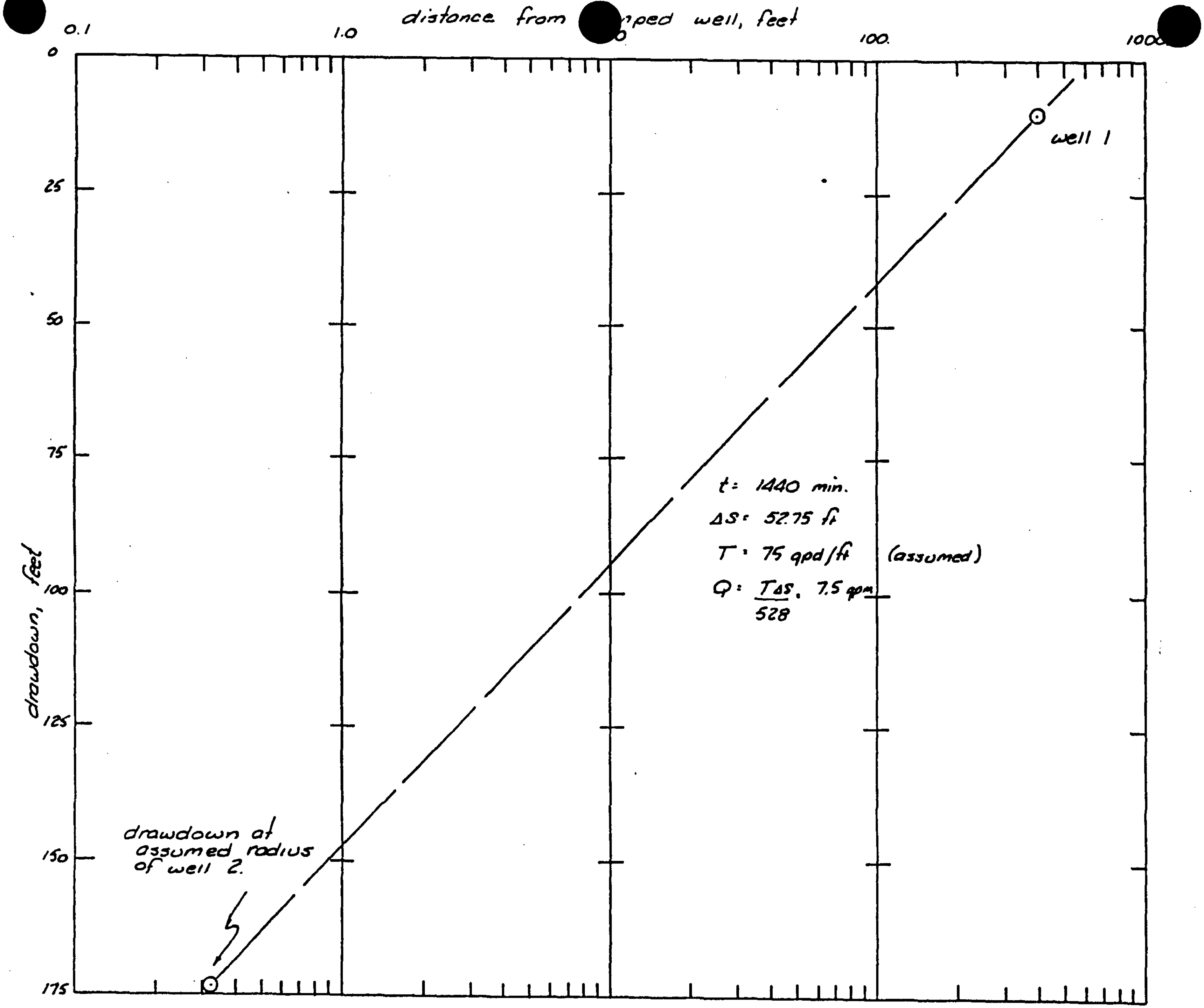

Figure 7. Distance-drawdown plot, Sonsela Sandstone bed.

of future pumping levels which assume no leakage are to be considered conservative.

Effects of Other Pumping

At present, the rate at which well 2 can be produced is governed by the capacity of the pump. It was found during the early part of the test that a rate of 48 gpm could not be sustained beyond about 12 minutes; the pumping water level at that time was projected to be about 422 feet (see Fig. 4), which represents a drawdown of about 120 feet. The continuation of the test at 40.7 gpm produced a pumping level of 475.5 feet in 24 hours, or a drawdown of about 174 feet. The available drawdown to the top of the Glorieta aquifer is about 900 feet, representing a pumping level of about 1200 feet. Figure 8 gives estimates of pumping levels at various continuous production rates over time, based on a simple projection of the results of the drawdown test at 40.7 gpm. This procedure is thought to be conservative, since, with time, the effects of leakage from confining beds that enclose both the Sonsela and the Glorieta should result in flattening of the water level decline curves. Estimated pumping levels for rates up to 70 gpm are shown, although the greatest depth projected is less than 700 feet at the end of 30 years.

Clearly the decrease in production from the present rate that would result from a lowering of the Glorieta potentiometric surface of some 160 feet, as has been estimated for the year 2021, as a consequence of pumping by Plains Electric's Escalante plant[6/], could

6/ Geohydrology Associates, Inc., 1981, Hydrologic evaluation of the north flank of the Zuni Uplift, West-Central New Mexico; consulting teport for Plains Electric Generation and Transmission Cooperative, Inc., Figure 11.

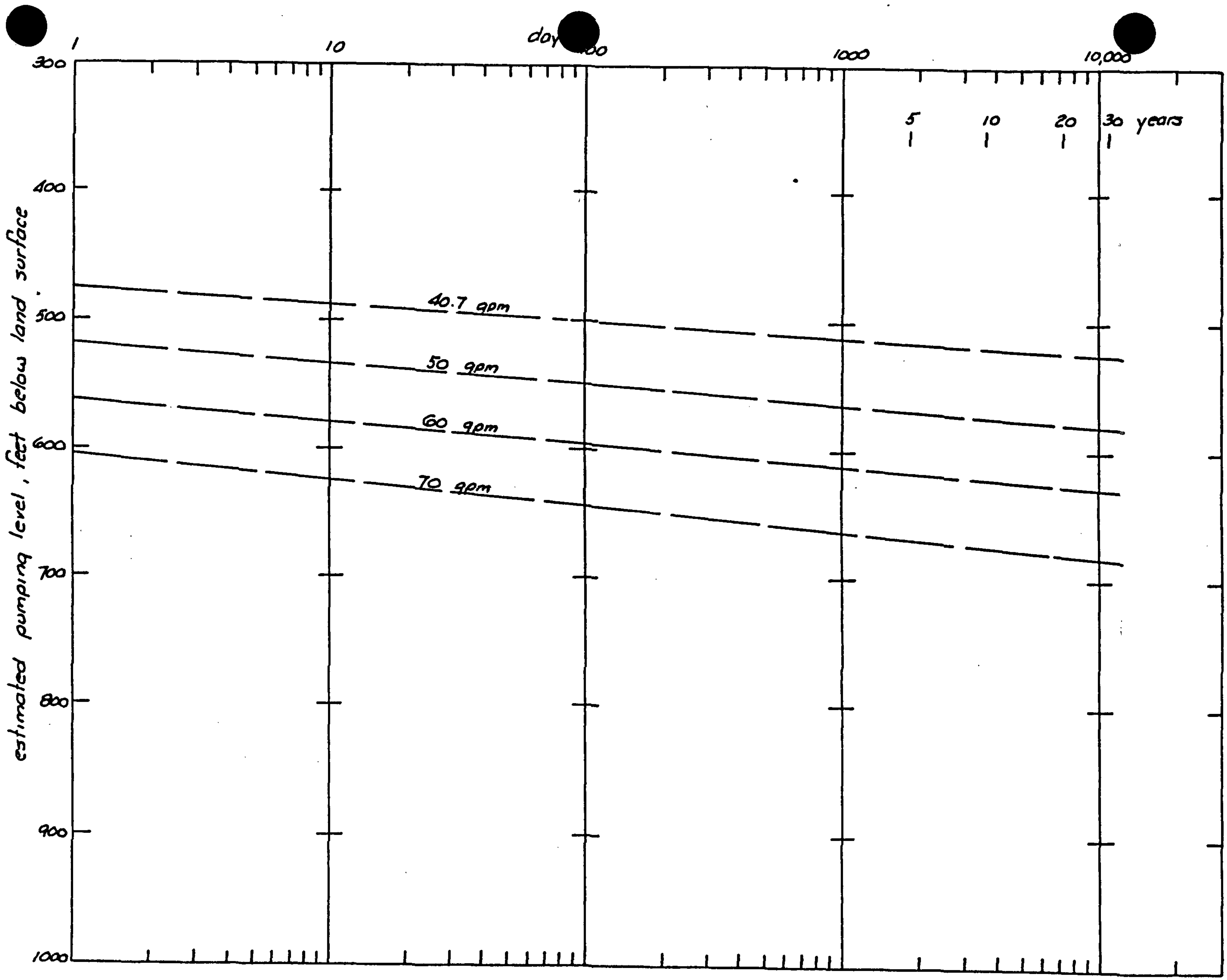

Figure 8. Estimated pumping levels for various rates.

be offset by installing a larger pump at a deeper setting.

WELL 3

Well Location and Construction

Well 3 is located just inside the station gate, in the NW/4 NW/4 SW/4 SE/4 of section 20, T. 14 N., R. 13 W., about 1150 feet from the South F.S. ~~north~~ line and 2590 feet from the east line (see Fig. 1). Ground level elevation is about 7311.8 feet.

The well was drilled in 1960. An 11-inch hole was drilled to 665 feet, and 8-5/8-inch, 24-pound, pipe was set and cemented from 1 foot above ground level to 665. A 7-7/8-inch hole was drilled to 735, and a 6-5/8-inch liner set from 631 to 735. The liner is slotted with 1/8-inch mill-cut slots from 665 to 725 in about the same zone as well 1, the upper part of the Sonsela. It is probable that the sandstone described in well 2, below the position of the bottom of well 3, is also present at the location of well 3.

Aquifer Test

The aquifer test was begun May 2, 1981, after all three wells had been shut in about 24 hours. The well was tested with the production pump, a 15 hp Franklin submersible. Discharge was held at 25 gpm, as measured with an orifice weir and manometer, for 1433 minutes and recovery was measured for 1440 minutes after the pump was stopped. Water levels during pumping and recovery are shown on Figures 9 and 10. The pre-pumping level was 383.8 feet, again considerably deeper than earlier levels.

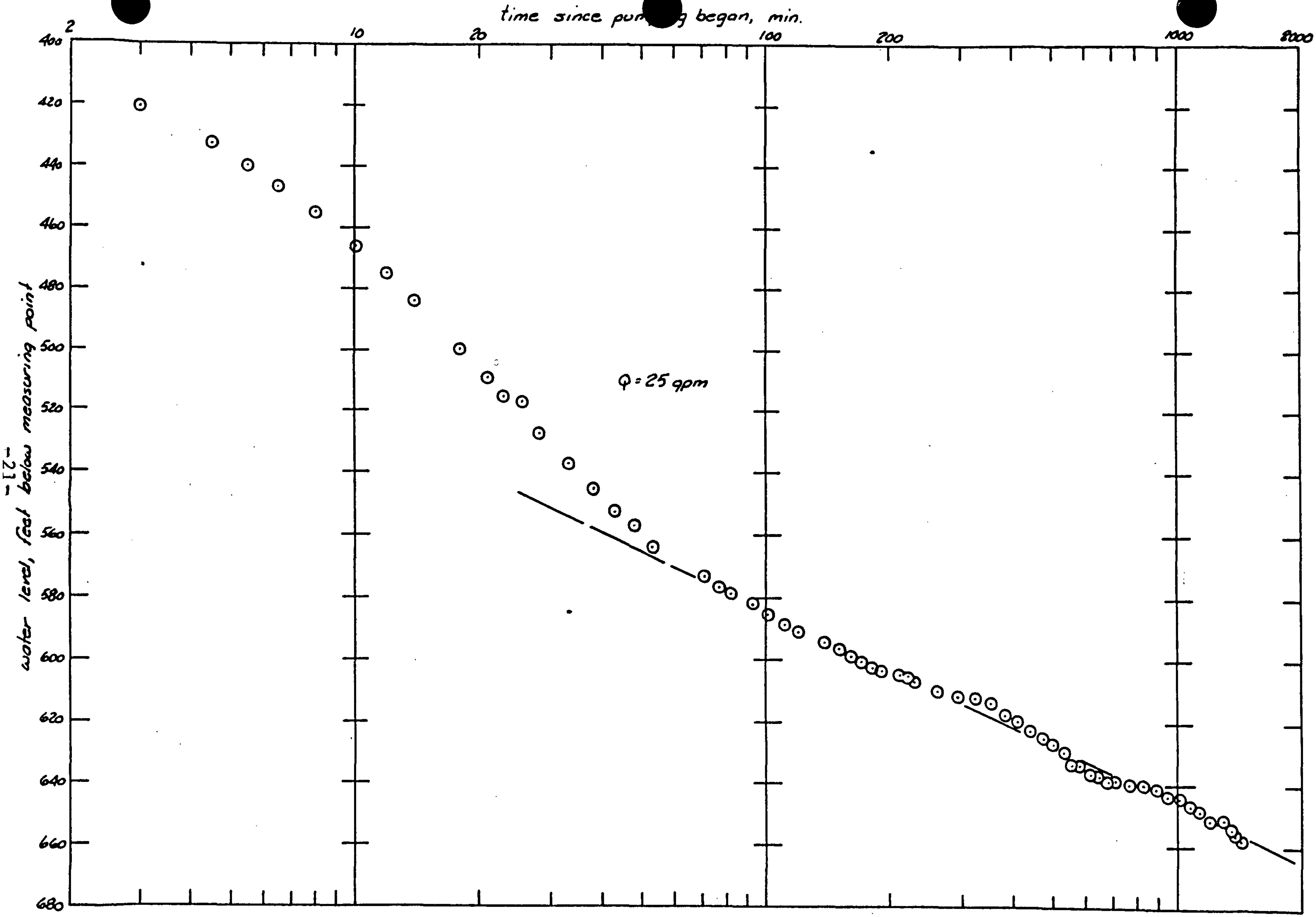

Figure 9 . Water level measurements during pumping, well 3.

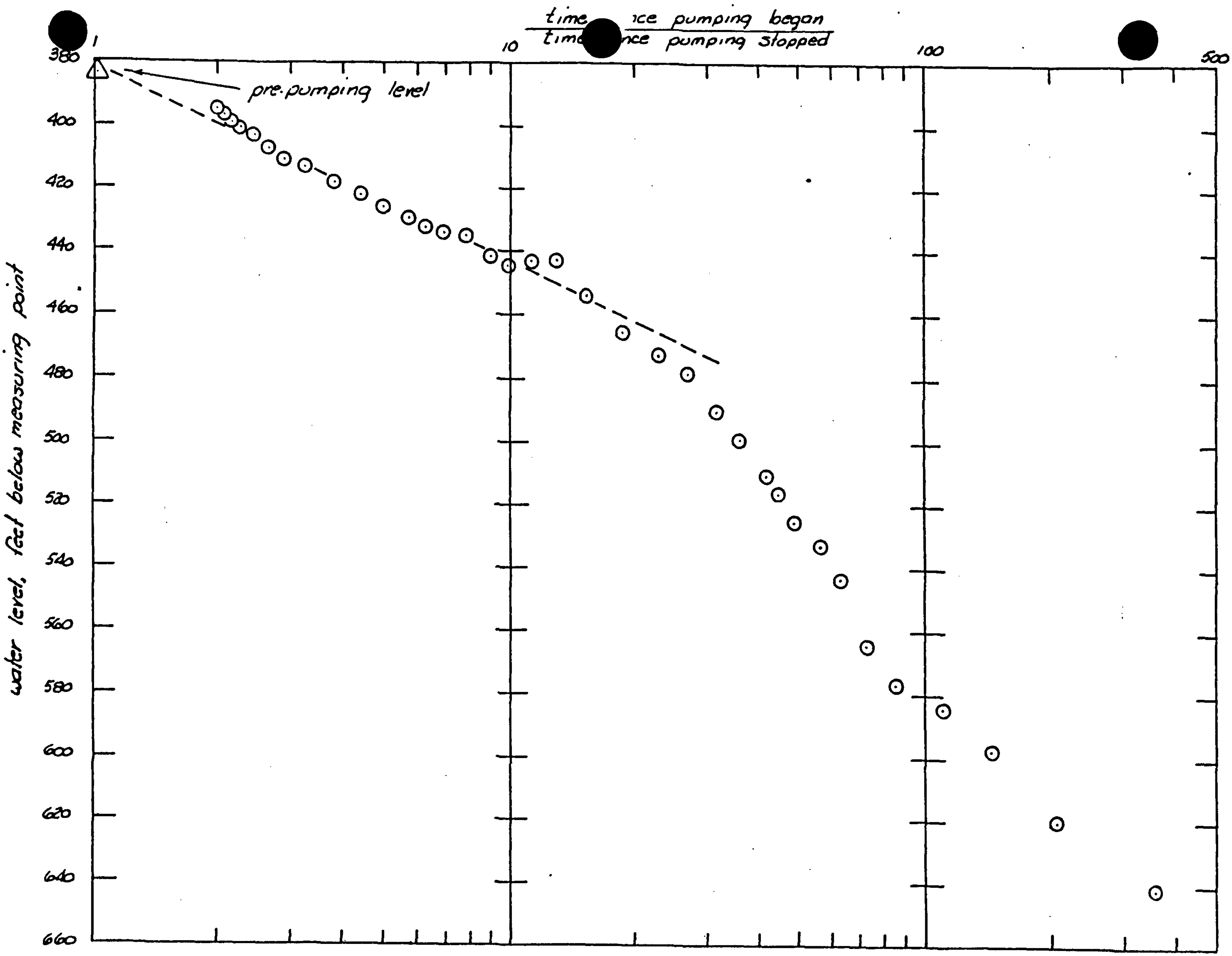

Figure 10. Water level measurements during recovery, well 3.

Present Capacity of Well 3

The specific capacity of the well, in gallons per minute per foot of drawdown, seems to have remained roughly constant since the well was completed, and transmissivity values are in fair agreement for the three known tests, as follows:

		Rate, gpm	24-hr specific capacity, gpm/ft	Apparent trans-missivity, gpd/ft
Layne-Texas	1960	30	0.10	80-93
Geohydrology Assoc.	1979	22	0.08	50-75 7/
Shomaker	1981	25	0.09	105±

The static level, however, has declined in about the same way as for well 1. The original level in 1960 was reported as 317 feet, which compares fairly well with the level of 338 feet for well 2 (before it was deepened) and 309 feet for well 1 at about the same time. The influence of well 2, the general heavy pumping from all the wells in the summer, and an area-wide lowering are probably all factors. Transmissivity, estimated by the straight-line method from both drawdown and recovery curves, seems to be near 105 gpd/ft.

Well 1 was observed during the test of well 3; the measurements taken in well 1 are shown on Figure 11. Although the data do not present a clear pattern of drawdown response, they do fit fairly well with the results given by Geohydrology Associates, and are commensurate with a transmissivity in the range 150 to 200 gpd/ft and a storativity of approximately 4×10^{-5}.

7/ late drawdown and recovery data; Geohydrology Associates, 1979, p. 10.

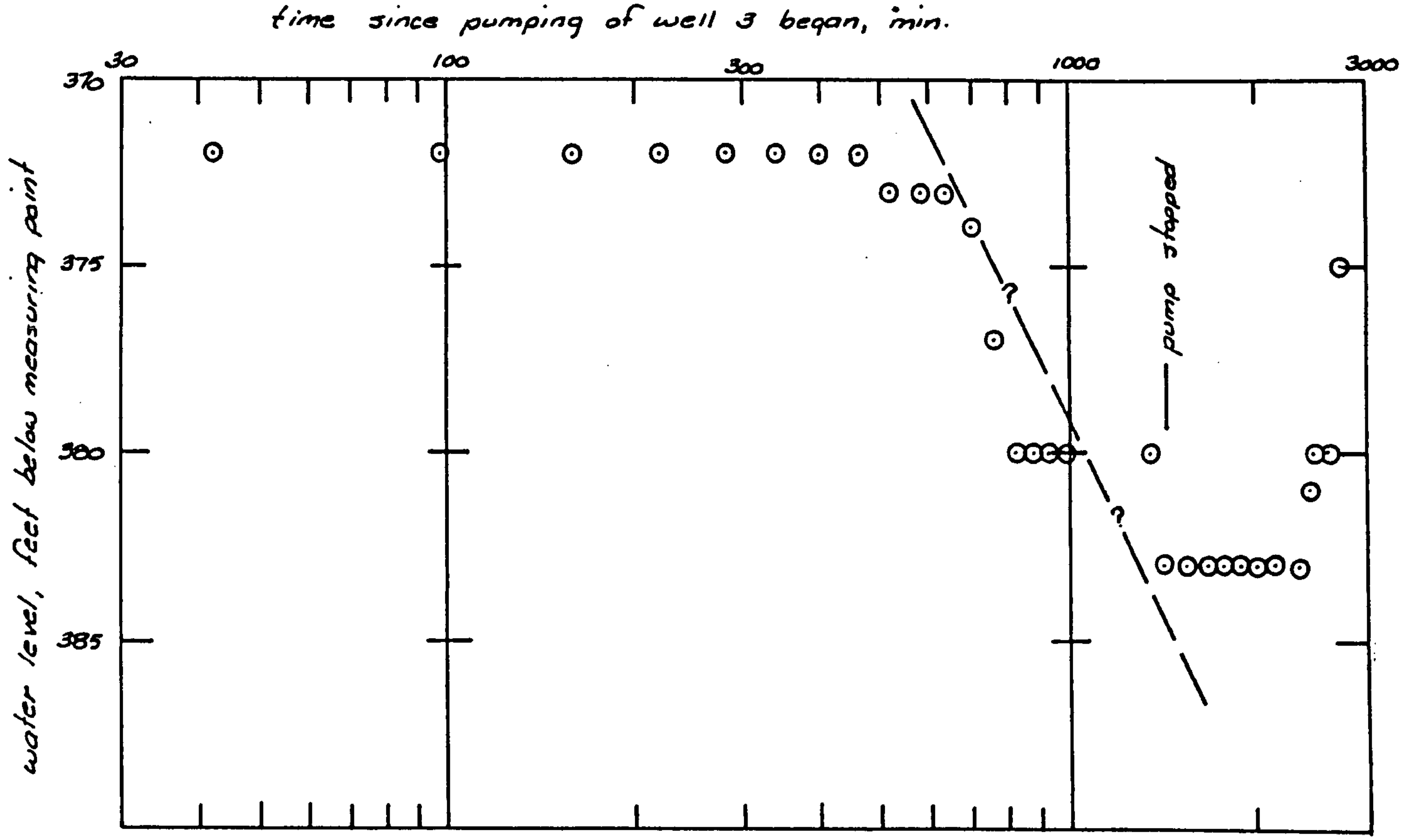

Figure 11. Water level measurements in well 1 during pumping of well 3.

At present, the pump in well 3 seems to be appropriately sized, and a capacity of 25 gpm on an intermittent basis is reasonable. There seems little reason to believe that rehabilitation work on the well is needed.

Effects of Other Pumping

The comments made with respect to well 1 would apply also to well 3.

ALTERNATIVES FOR AUGMENTING THE STATION'S WATER SUPPLY

Several possibilities exist for increasing the supply available, or offsetting the effects of pumping from other wells. The withdrawal from well 2 could be raised considerably by installing a more powerful pump at a deeper setting, as mentioned above. The withdrawal could not be increased beyond the appropriation already declared (if any) without a permit from the State Engineer Office.

The capacity of well 1 could probably be increased, though perhaps not restored to its original value because of decline in the potentiometric surface, by cleaning out the well, acidizing, and jetting the perforations. Even so, the most straightforward way to augment production, if it should prove to be necessary because of much greater drawdown effects than anticipated in the Glorieta, or for other reasons, would be to deepen wells 1 and 3. Each well could be deepened about 85 feet to penetrate the lower Sonsela sandstone. If the 6-5/8-inch liners presently in the wells could be pulled, then the 7-7/8-inch hole could be continued to the new total depths and a longer 6-5/8-inch slotted liner installed.

If the liners could not be pulled, the wells could be deepened with a 5-5/8 - or 5-7/8-inch bit and a 4-1/2-inch or 5-inch liner installed. The deepening could probably be done without a new permit to appropriate from the State Engineer.

If well 1 is to be deepened and the older liner is pulled, an effort should be made to cement the top of the new liner to shut off cavings from behind the 10-3/4-inch surface casing.

A part of the pressure in the Glorieta which has been lost because of movement of water into the Sonsela could be restored, in time, by cementing the 6-5/8-inch liner in well 2. This could be done by pulling the smaller liners, setting a retrievable bridge plug just below the 6-5/8-inch liner, and circulating cement to surface between the liner and the 8-5/8-inch casing. Thus the Sonsela would be sealed behind cemented casing. While this procedure would allow the potentiometric surface to rise, and thus offset some or all of the effect of other pumping in the Glorieta, it probably would not be worthwhile because the contribution to the well from the Sonsela would be cut off. At the low rates of production now in effect, the Sonsela contributes a significant proportion, perhaps 20 percent. There is also some question about the safety of such an extensive workover in a 21-year-old-well.

John W. Shomaker
John W. Shomaker
Consulting Geologist

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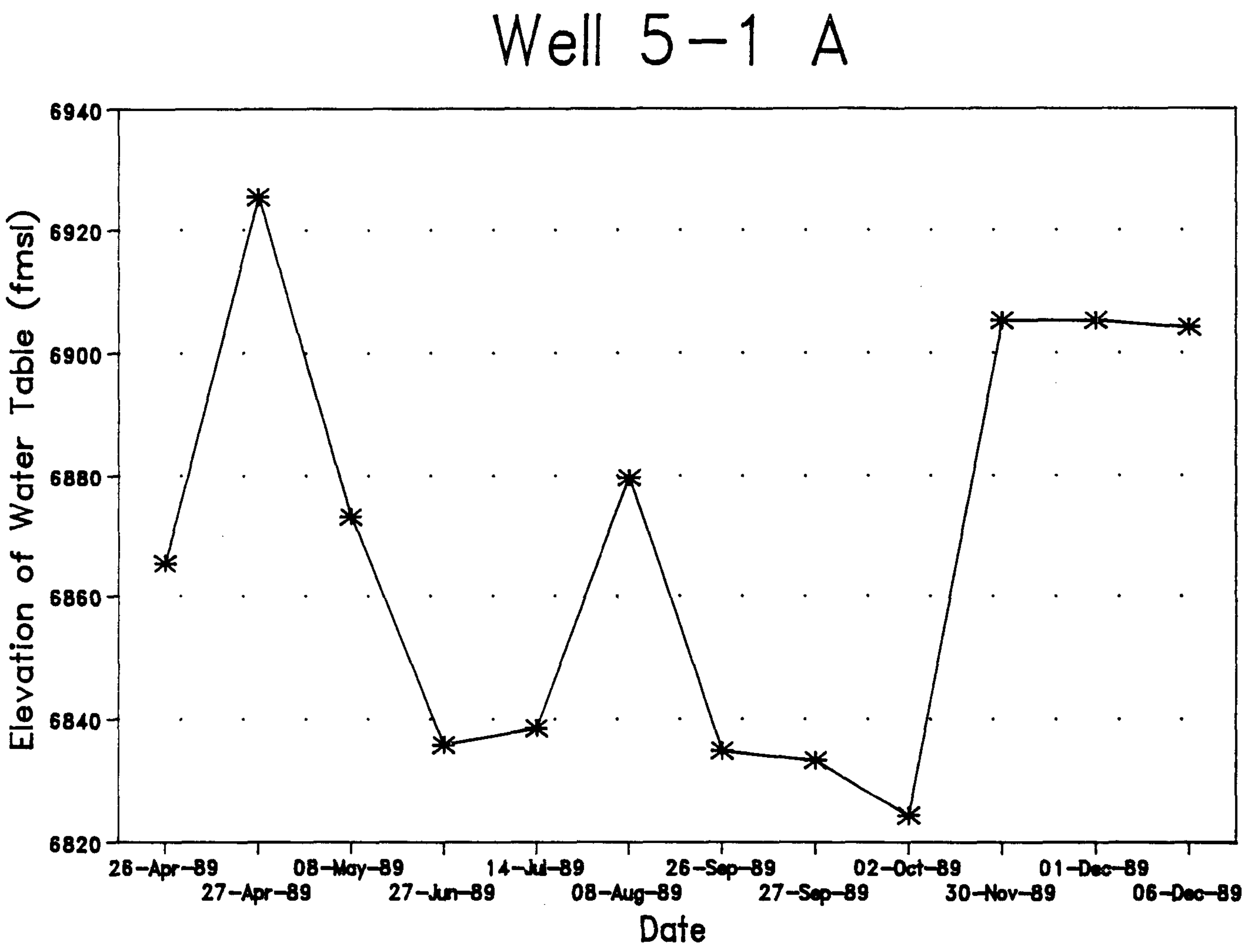
Appendix D: Water Levels in On Site Wells During 1989

Depth to Water On Site Well

Well	Top of Casing * Elevation (fmsl)	Date	Time	Depth to Water (feet)	Elevation of Water Table (fmsl)
5-1 A	7289.72	26-Apr-89	1730	424.23 +	6865.49
		27-Apr-89	920	364.21	6925.51
		08-May-89		416.53	6873.19
		27-Jun-89		453.82	6835.90
		14-Jul-89	1628	451.08	6838.64
		08-Aug-89	1320	410.00 +	6879.72
		26-Sep-89	1445	454.63	6835.09
		27-Sep-89	1115	456.17	6833.55
		02-Oct-89	1829	465.25	6824.47
		30-Nov-89		384.31	6905.47
		01-Dec-89	746	384.31	6905.41
		06-Dec-89		385.41	6904.31

* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault

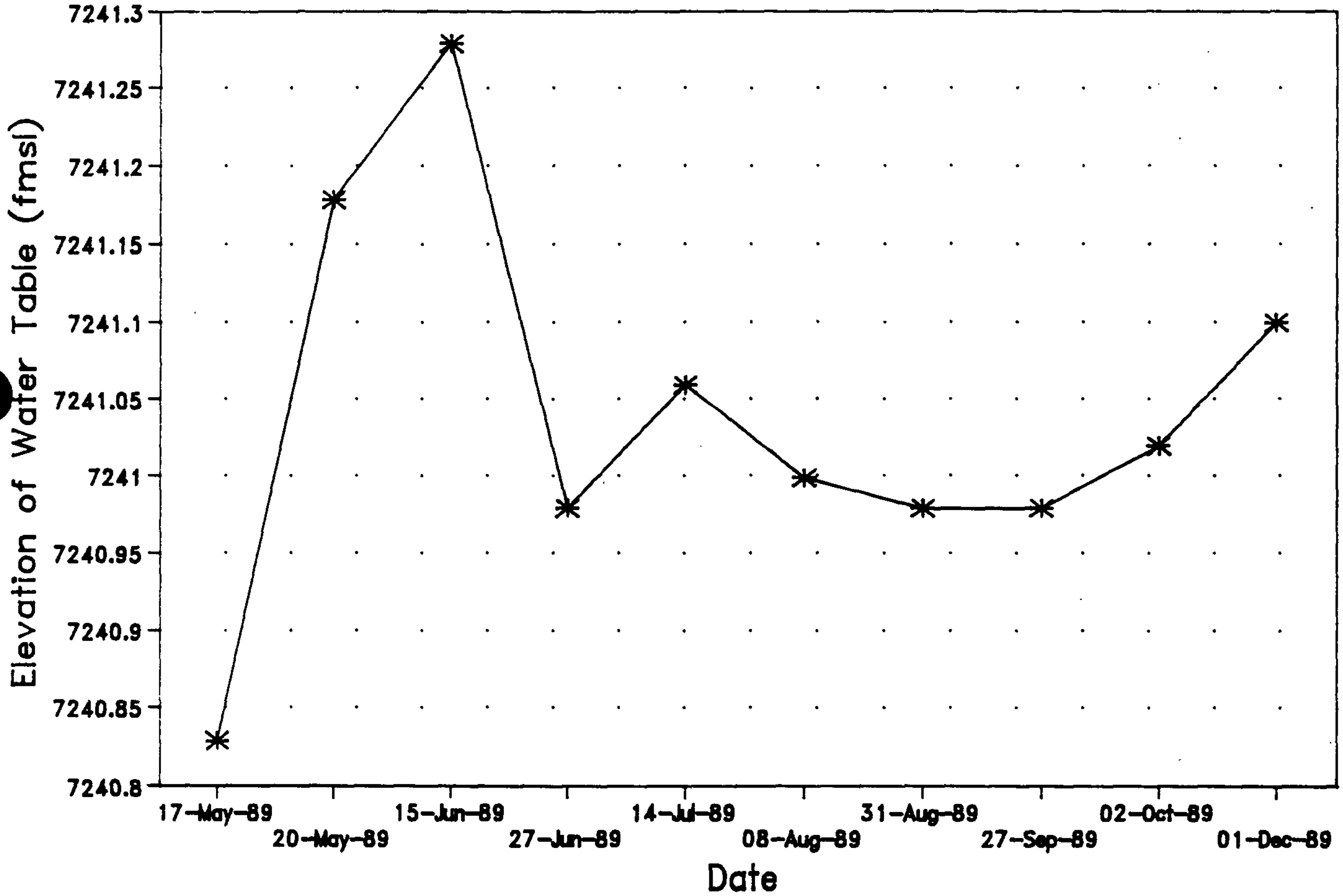
+ Accuracy of Water Level and/or reference in question


Well 5-1 A
Elevation of Water Table (fmsl)
6940
6920
6900
6880
6860
6840
6820
26-Apr-89
27-Apr-89
08-May-89
27-Jun-89
14-Jul-89
08-Aug-89
26-Sep-89
27-Sep-89
02-Oct-89
30-Nov-89
01-Dec-89
06-Dec-89
Date

Depth to Water On Site Well					
Well	Top of Casing * Elevation (fmsl)	Date	Time	Depth To Water (feet)	Elevation of Water Table (fmsl)
5-1 B	7286.08	17-May-89	915	45.25	7240.83
		20-May-89	1617	44.90	7241.18
		15-Jun-89	900	44.80	7241.28
		27-Jun-89		45.10	7240.98
		14-Jul-89	1640	45.02	7241.06
		08-Aug-89	1100	45.08	7241.00
		31-Aug-89	1353	45.10	7240.98
		27-Sep-89	1115	45.10	7240.98
		02-Oct-89	1741	45.06	7241.02
		01-Dec-89	1112	44.98	7241.10

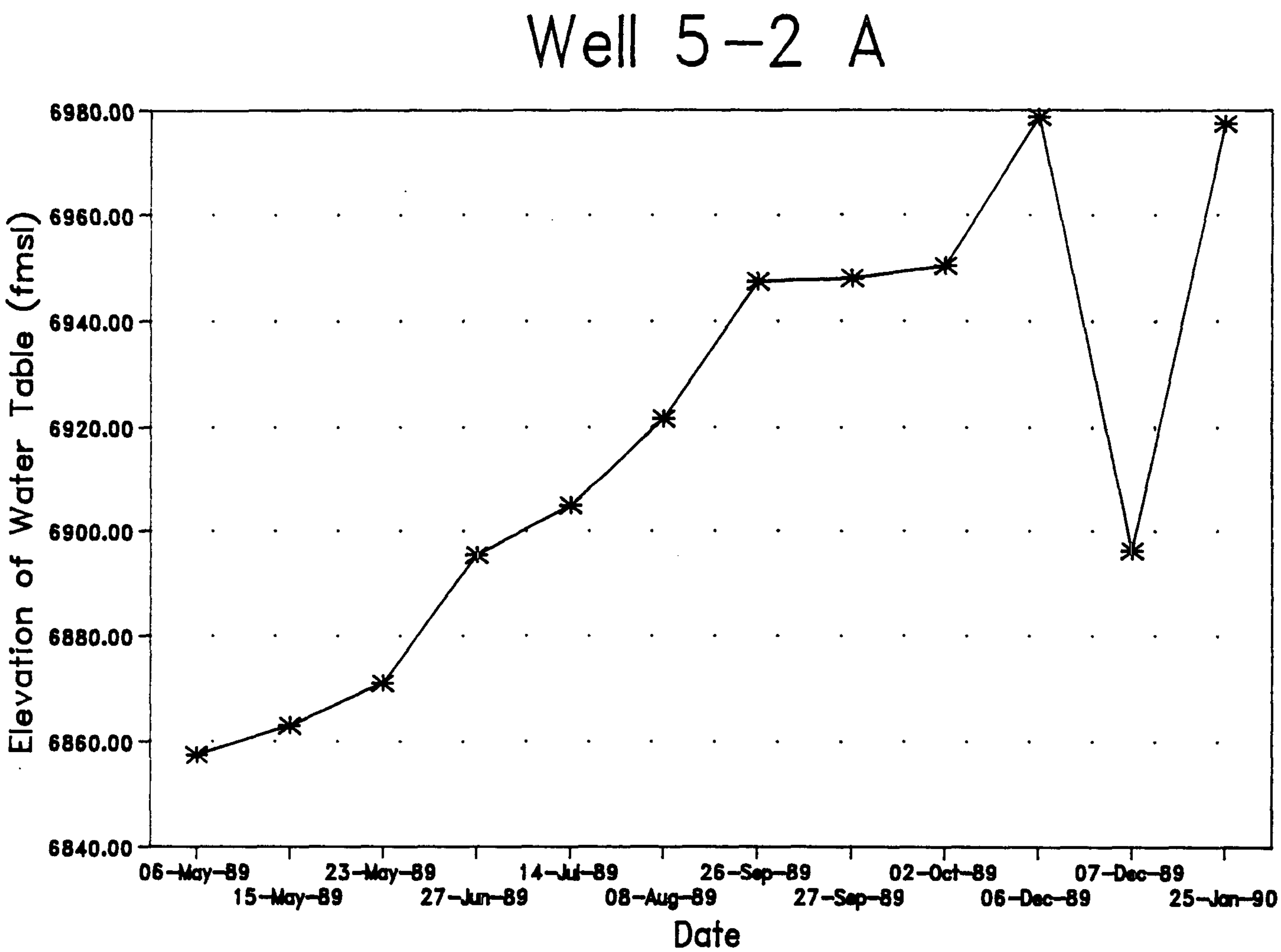
* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault

Well 5-1 B


Elevation of Water Table (fmsl)
7241.3
7241.25
7241.2
7241.15
7241.1
7241.05
7241
7240.95
7240.9
7240.85
7240.8
17-May-89
20-May-89
15-Jun-89
27-Jun-89
14-Jul-89
08-Aug-89
31-Aug-89
27-Sep-89
02-Oct-89
01-Dec-89
Date

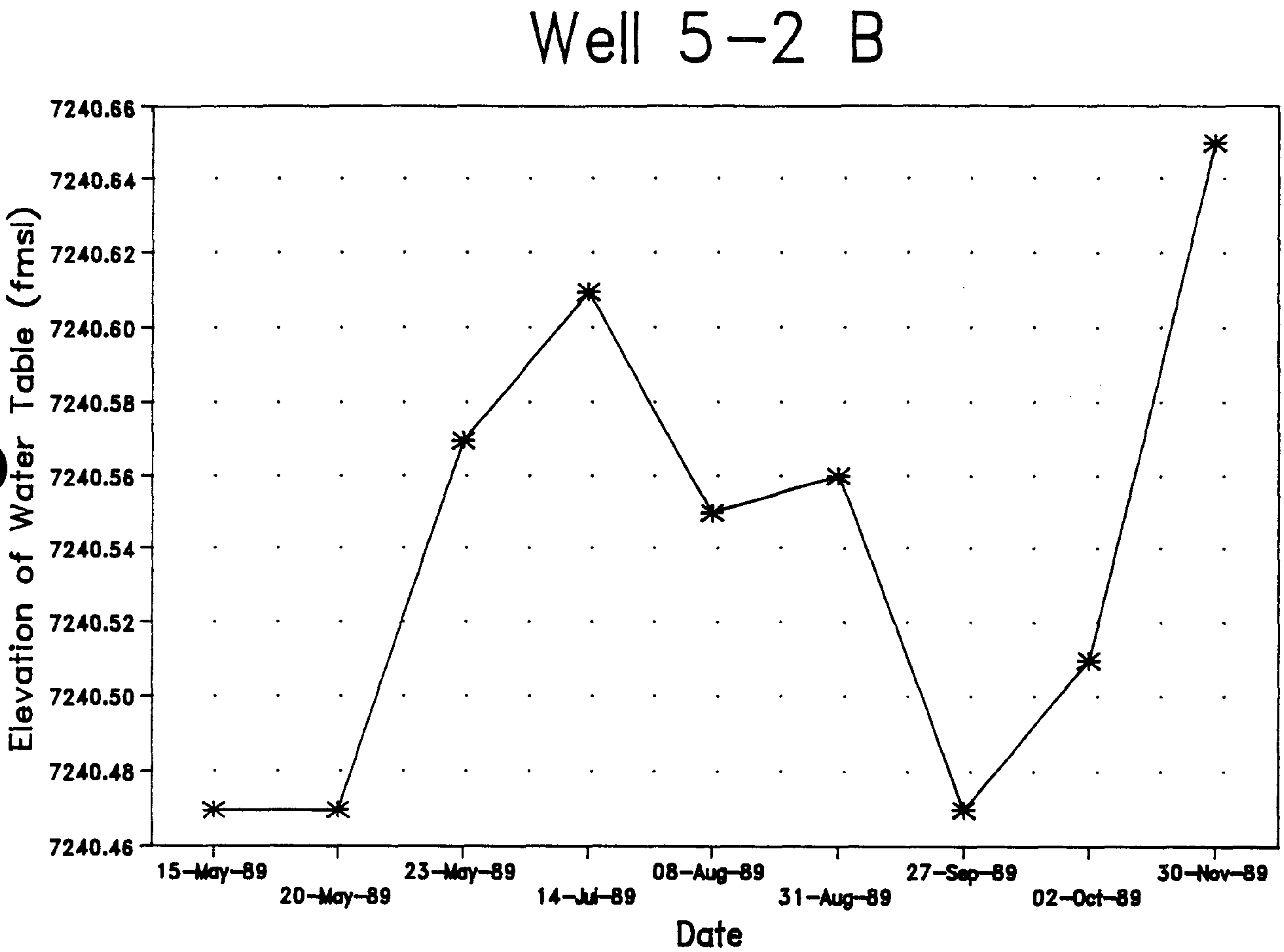
Depth to Water On Site Well					
Well	Top of Casing * Elevation (fmsl)	Date	Time	Depth to Water (feet)	Elevation of Water Table (fmsl)
5-2 A	7290.40	06-May-89		432.83	6857.57
		15-May-89	1909	427.30	6863.10
		23-May-89		419.40	6871.00
		27-Jun-89		394.90	6895.50
		14-Jul-89	1535	385.16	6905.24
		08-Aug-89	1020	368.60	6921.80
		26-Sep-89	1430	342.74	6947.66
		27-Sep-89	1050	342.26	6948.14
		02-Oct-89	1816	339.98	6950.42
		06-Dec-89	1200	311.70	6978.70
		07-Dec-89	1321	393.88	6896.52
		25-Jan-90		313.00	6977.40

* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault


Well 5-2 A
Elevation of Water Table (fmsl)
6980.00
6960.00
6940.00
6920.00
6900.00
6880.00
6860.00
6840.00
06-May-89
15-May-89
23-May-89
27-Jun-89
14-Jul-89
08-Aug-89
26-Sep-89
27-Sep-89
02-Oct-89
06-Dec-89
07-Dec-89
25-Jan-90
Date

Depth to Water On Site Well					
Well	**Top of Casing * Elevation** (fmsl)	**Date**	**Time**	**Depth to Water** (feet)	**Elevation of Water Table** (fmsl)
5-2 B	7288.47	15-May-89	1824	48.00	7240.47
		20-May-89	1658	48.00	7240.47
		23-May-89		47.90	7240.57
		14-Jul-89	1650	47.86	7240.61
		08-Aug-89	955	47.92	7240.55
		31-Aug-89	1735	47.91	7240.56
		27-Sep-89	1050	48.00	7240.47
		02-Oct-89	1726	47.96	7240.51
		30-Nov-89	1303	47.82	7240.65

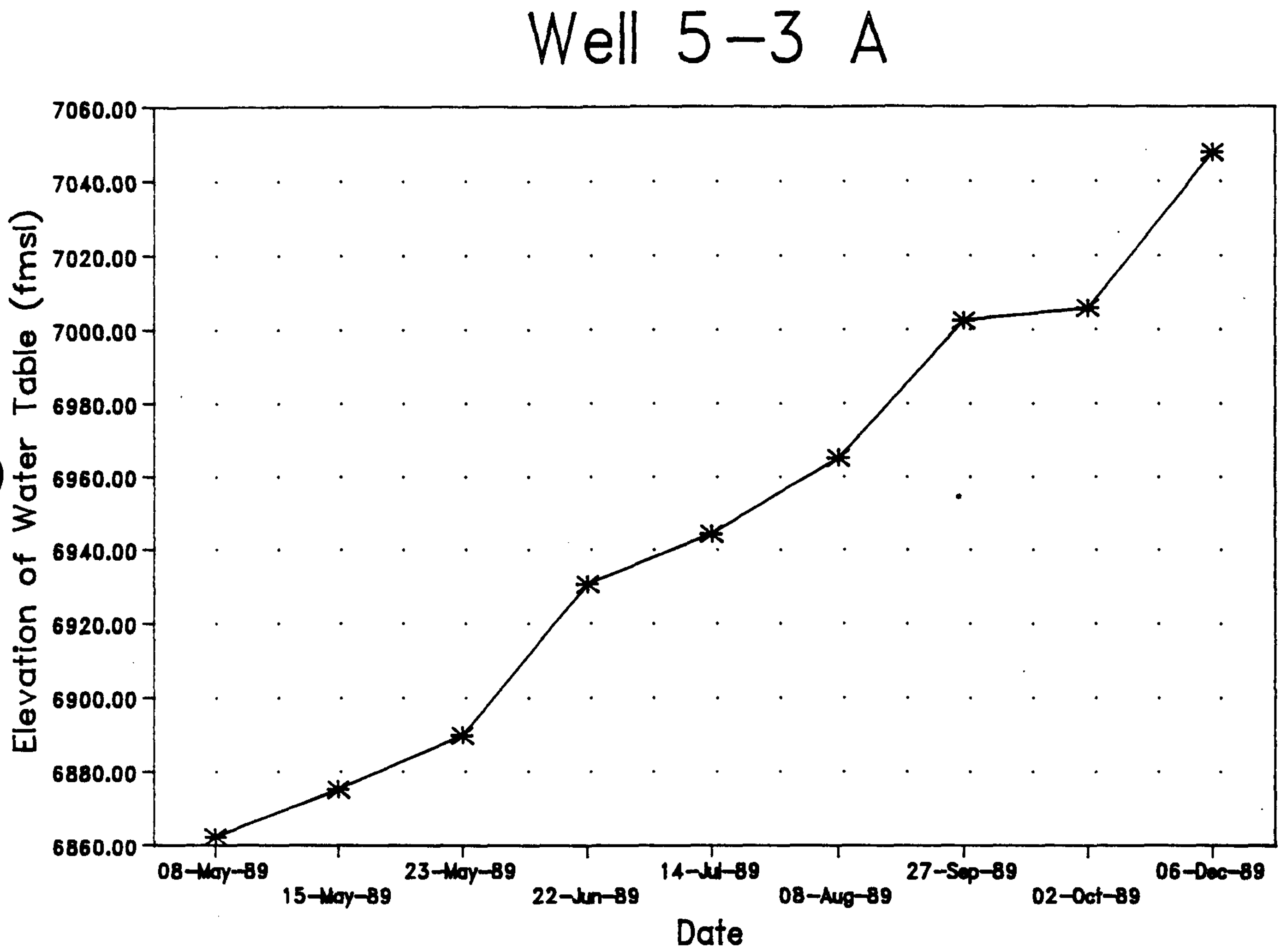
* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault



Well 5-2 B
Elevation of Water Table (fmsl)
7240.66
7240.64
7240.62
7240.60
7240.58
7240.56
7240.54
7240.52
7240.50
7240.48
7240.46
15-May-89
20-May-89
23-May-89
14-Jul-89
08-Aug-89
31-Aug-89
27-Sep-89
02-Oct-89
30-Nov-89
Date

Depth to Water On Site Well					
Well	Top of Casing * Elevation (fmsl)	Date	Time	Depth to Water (feet)	Elevation of Water Table (fmsl)
5-3 A	7301.84	08-May-89		439.37	6862.47
		15-May-89	1120	426.58	6875.26
		23-May-89		411.83	6890.01
		22-Jun-89		371.00	6930.84
		14-Jul-89	1505	357.66	6944.18
		08-Aug-89	1415	336.90	6964.94
		27-Sep-89	1020	299.52	7002.32
		02-Oct-89	1800	296.17	7005.67
		06-Dec-89	920	254.20	7047.64

* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault

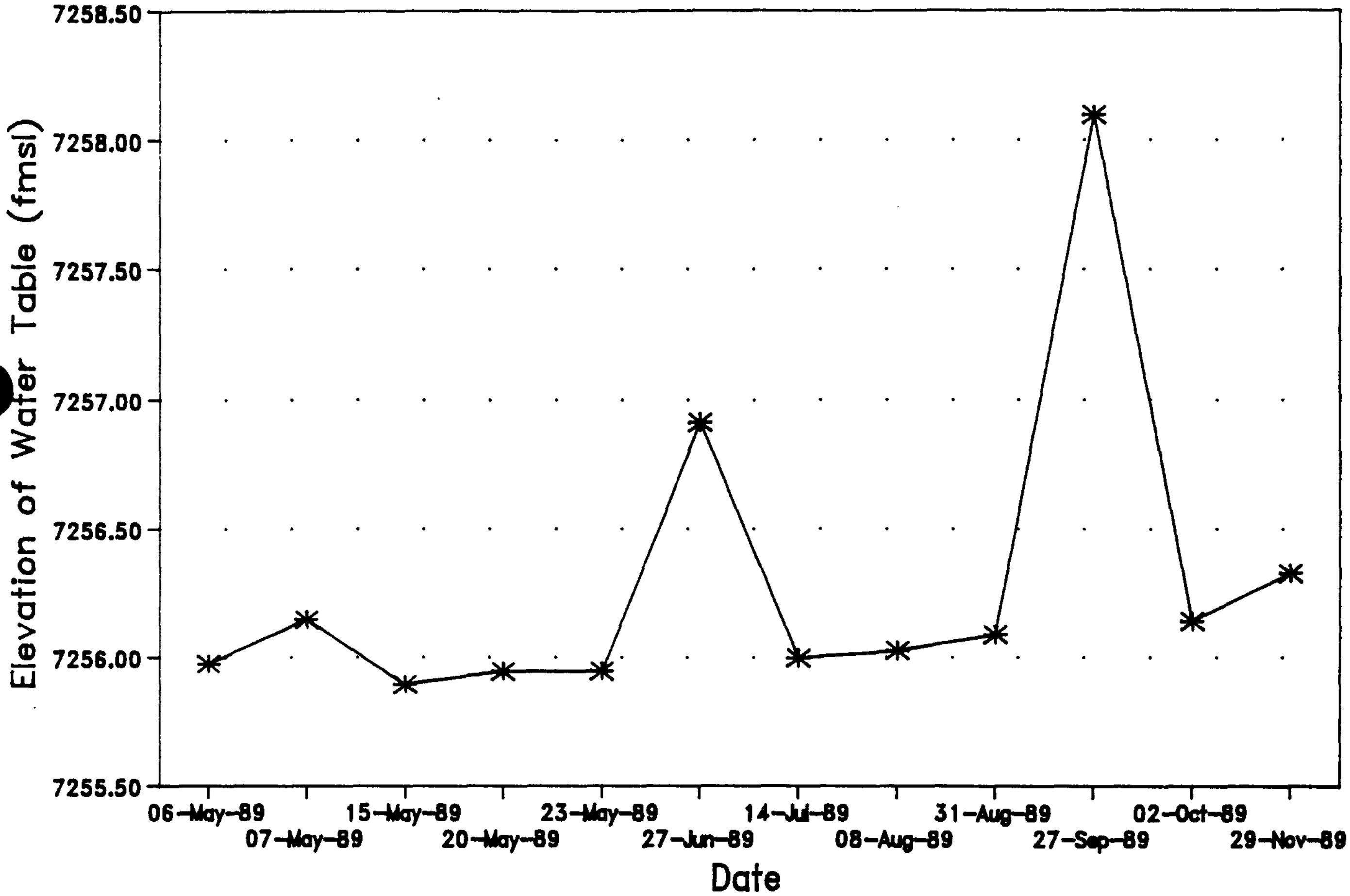

Well 5-3 A
7060.00
7040.00
7020.00
7000.00
6980.00
6960.00
6940.00
6920.00
6900.00
6880.00
6860.00
Elevation of Water Table (fmsl)
08-May-89
15-May-89
23-May-89
22-Jun-89
14-Jul-89
08-Aug-89
27-Sep-89
02-Oct-89
06-Dec-89
Date

Depth to Water On Site Well					
Well	Top of Casing * Elevation (fmsl)	Date	Time	Depth to Water (feet)	Elevation of Water Table (fmsl)
5-3 B	7300.15	06-May-89	850	44.17 +	7255.98
		07-May-89	1010	44.00 +	7256.15
		15-May-89	1109	44.25	7255.90
		20-May-89	1453	44.20	7255.95
		23-May-89		44.20	7255.95
		27-Jun-89		43.24	7256.91
		14-Jul-89	1522	44.15	7256.00
		08-Aug-89	1410	44.12	7256.03
		31-Aug-89	1608	44.06	7256.09
		27-Sep-89	1020	42.05 +	7258.10
		02-Oct-89	1752	44.01	7256.14
		29-Nov-89	1409	43.82	7256.33

* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault

+ Accuracy of Water Level and/or reference in question

Well 5-3 B

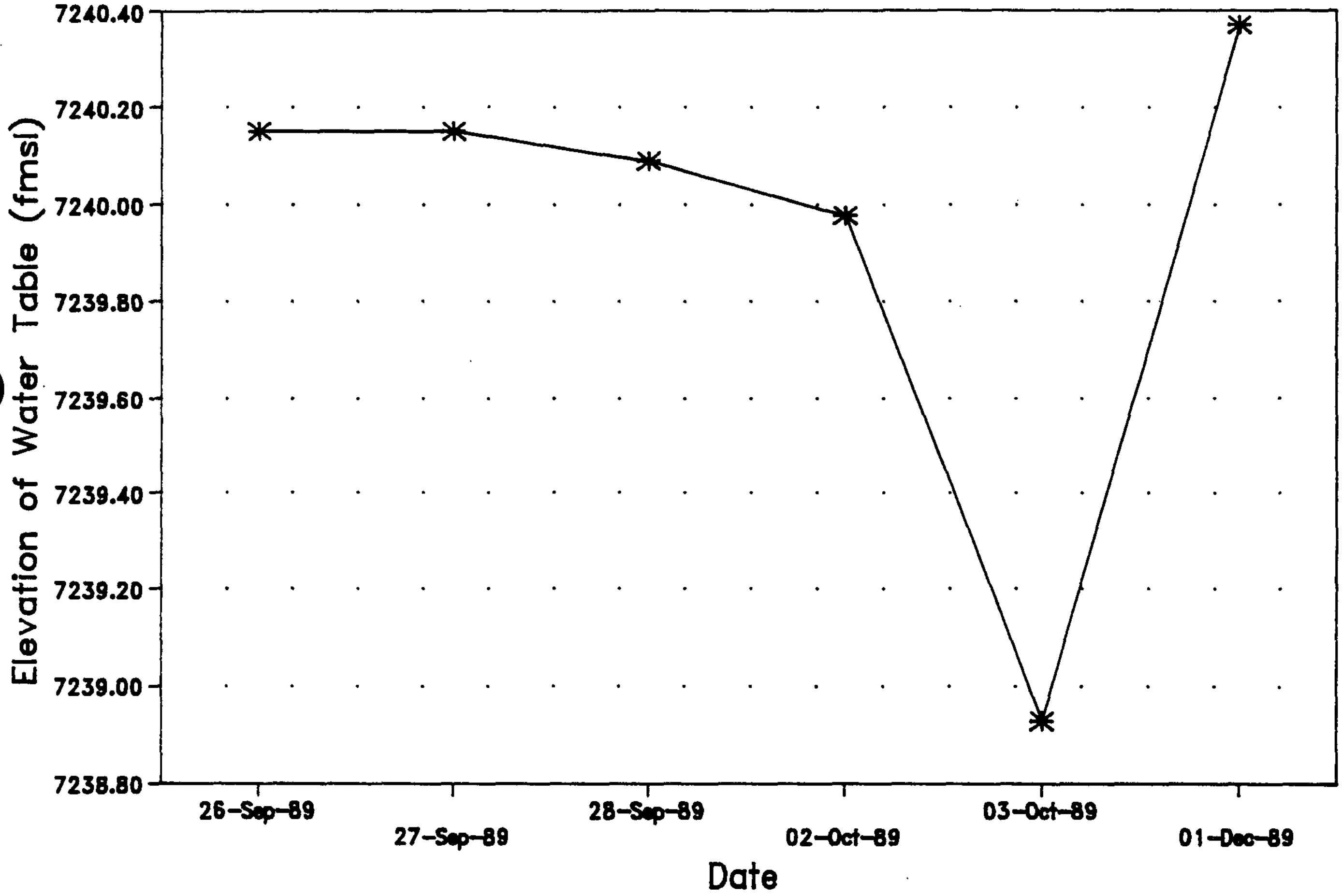


Elevation of Water Table (fmsl)
7258.50
7258.00
7257.50
7257.00
7256.50
7256.00
7255.50
06-May-89
07-May-89
15-May-89
20-May-89
23-May-89
27-Jun-89
14-Jul-89
08-Aug-89
31-Aug-89
27-Sep-89
02-Oct-89
29-Nov-89
Date

Depth to Water On Site Well					
Well	**Top of Casing * Elevation** (fmsl)	**Date**	**Time**	**Depth to Water** (feet)	**Elevation of Water Table** (fmsl)
5-4 B	7288.79	26-Sep-89	1640	48.64	7240.15
		27-Sep-89	1200	48.64	7240.15
		28-Sep-89	800	48.70	7240.09
		02-Oct-89	1610	48.81	7239.98
		03-Oct-89	854	49.86	7238.93
		01-Dec-89	1223	48.42	7240.37

* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault

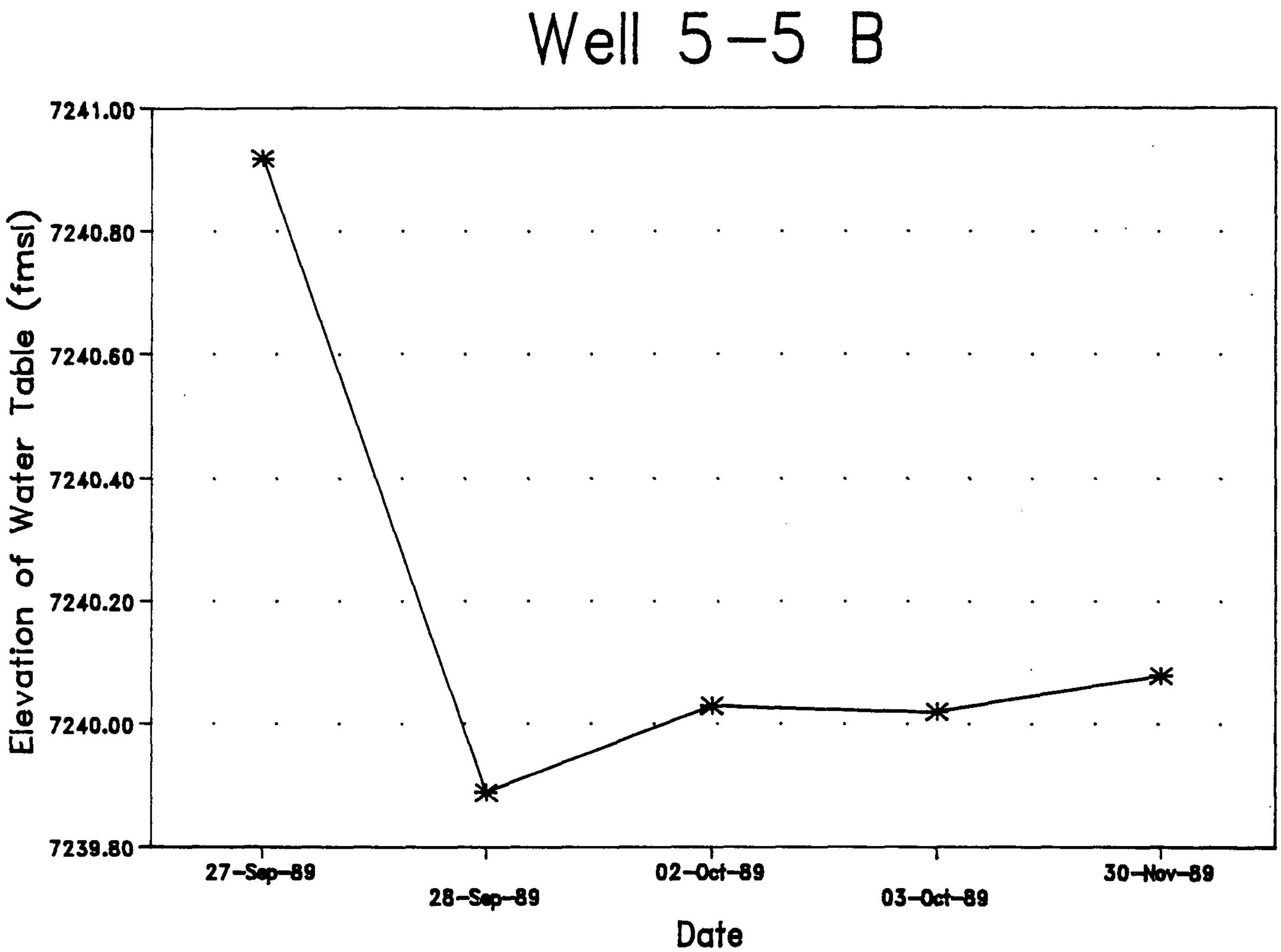
Well 5-4 b



7240.40
7240.20
7240.00
7239.80
7239.60
7239.40
7239.20
7239.00
7238.80
Elevation of Water Table (fmsl)
26-Sep-89
27-Sep-89
28-Sep-89
02-Oct-89
03-Oct-89
01-Dec-89
Date

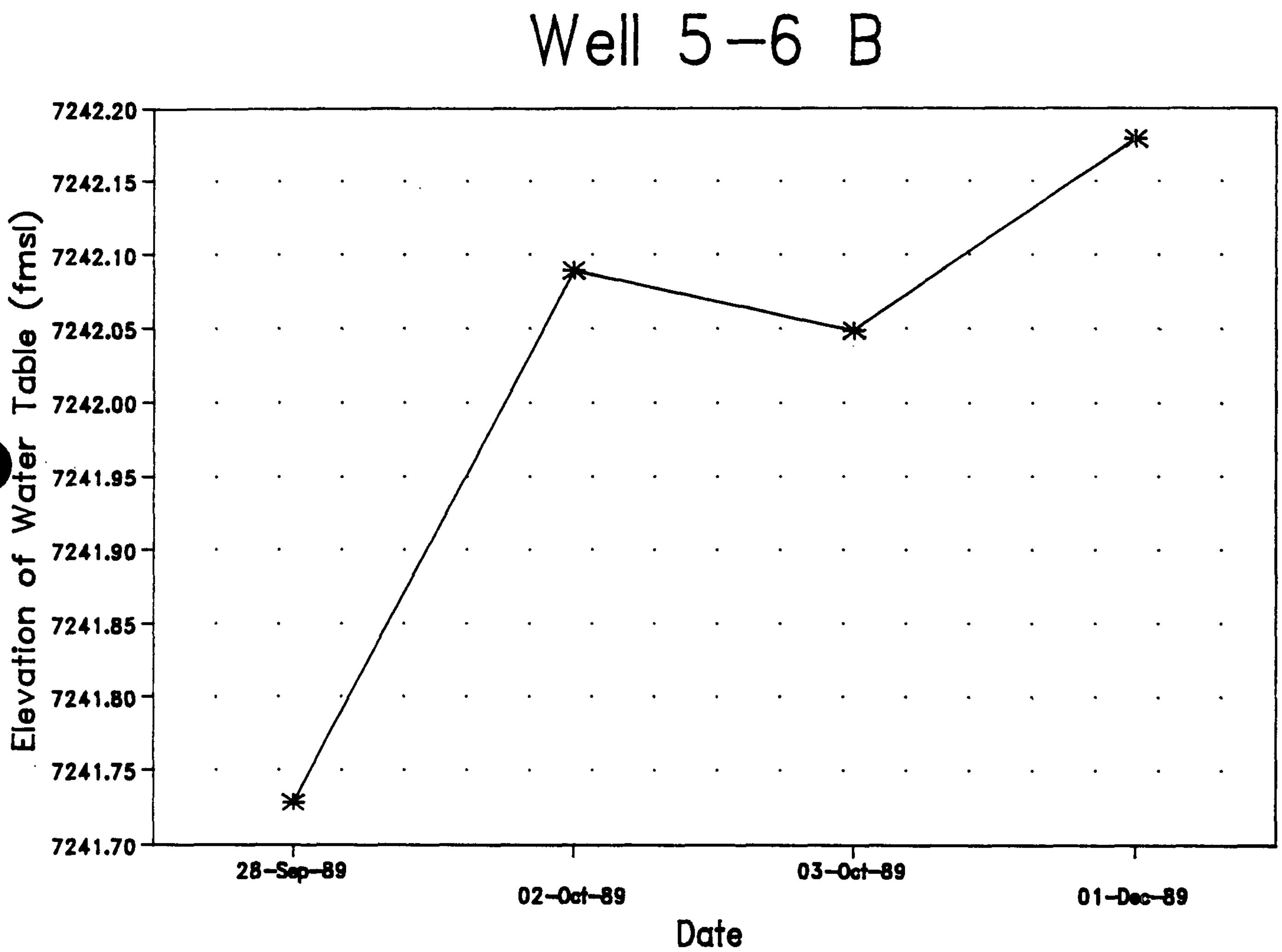
Depth to Water On Site Wells					
Well	Top of Casing * Elevation (fmsl)	Date	Time	Depth to Water (feet)	Elevation of Water Table (fmsl)
5-5 B	7287.23	27-Sep-89	1220	46.31	7240.92
		28-Sep-89	800	47.34	7239.89
		02-Oct-89	1734	47.20	7240.03
		03-Oct-89	1405	47.21	7240.02
		30-Nov-89	904	47.15	7240.08

* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault


Well 5-5 B
Elevation of Water Table (fmsl)
7241.00
7240.80
7240.60
7240.40
7240.20
7240.00
7239.80
27-Sep-89
28-Sep-89
02-Oct-89
03-Oct-89
30-Nov-89
Date

Depth to Water On Site Well					
Well	Top of Casing * Elevation (fmsl)	Date	Time	Depth to Water (feet)	Elevation of Water Table (fmsl)
5-6 B	7285.71	28-Sep-89	800	43.98	7241.73
		02-Oct-89	1837	43.62	7242.09
		03-Oct-89	1017	43.66	7242.05
		01-Dec-89	1249	43.53	7242.18

* Based on 1989 Condor Survey. b- Series Wells corrected for 0.25 foot difference from TOC to Top of Vault


Well 5-6 B
7242.20
7242.15
7242.10
7242.05
7242.00
7241.95
7241.90
7241.85
7241.80
7241.75
7241.70
Elevation of Water Table (fmsl)
28-Sep-89
02-Oct-89
03-Oct-89
01-Dec-89
Date

Appendix E: Test Well and Soil Boring Completion Reports at the Thoreau Compressor Station

WELL COMPLETION SUMMARY

Well designation: 5-1A
Location: ENRON Pumping Station No. 5
Thoreau, New Mexico
Client: ENRON
Drilling contractor: Joe I. Salazar Drilling, Inc.
Rig type: Gardner Denver 2000 with 1500 cfm compressor
Drilling fluids: Water/Foam/Polymer

Elevation of land surface: ---
Elevation of measuring point: ---

BOREHOLE DIAMETER SCHEDULE
14-inch Diam. borehole from 0´ to 82´ BLS (Below Land Surface)

8 3/4-inch Diam. borehole from 82´ to 690´ BLS

Total depth drilled - 690´ BLS

CASING SCHEDULE
10-inch nom. blank steel from 0´ to 77.5´ BLS

6-inch nom. blank steel from 0´ to 627.1´ BLS

6-inch nom. well screen from 627.1´ to 667.1´ BLS
(Johnson "Hi-Cap," wire-wrap, 0.060-inch slot opening)

Note: All joints welded with Lincoln # 7018 rod

SUMMARY OF CONSTRUCTION - 5-1A

Date	Time	Action
4/11/89	14:30	Begin drilling 14-inch borehole with air
	15:30	Added foam at 25´ BLS due to lack of returns
	18:00	Complete drilling to 82´ BLS
4/12/89	07:30	Make wiper run to clean borehole and run 10-inch surface casing; attach centralizers at 75´ and 35´ BLS
	14:30	Cement casing in place by pumping through top of casing and chasing with water; Cement is Zia Type I & II without additives mixed at 50 sacks per 295 gals. of water
4/13/89	10:00	Start drilling 8 3/4-inch diam. borehole
	19:00	Completed drilling to 500´ BLS; Blow with air to clean borehole
	19:30	Trip out rod and run geophysical logs

	23:00	Prepared to run casing but rejected casing
4/14/89	18:30	Bailed 5-1A
4/20/89	07:00	Measured water level at 402.87´ BLS
	09:45	Measured water level at 401.97´ BLS
	13:42	Measured water level at 400.83´ BLS
	16:30	Measured water level at 400.13´ BLS
	19:20	Measured water level at 399.43´ BLS
4/21/89	07:50	Measured water level at at 397.25´ BLS
4/22/89	08:30	Determined that borehole has caved to 394.6´ BLS and that previous water levels were probably affected by the caving situation and were probably not representative of the water level in the formation
4/23/89	13:30	Re-entered borehole to drill to 480´ BLS
	16:20	Decided to drill borehole to 500´ BLS to try and encounter water
	17:00	Finished drilling to 500´ BLS, blowing hole to remove cuttings
	18:30	Begin running 6-inch casing, bottom three joints are two 20´ joints of screen separated by 22.5´ section of blank casing; Bottom of screen at 488.9´BLS
	23:30	Added 25 5-gal. buckets of #4-#12 gravel
4/24/89	09:40	Measured fluid level at 478.6´ BLS
	10:30	Begin bailing well with 4-inch bailer; filled 50-gal. drum with water and foam
	11:12	Measured fluid level at 487.1´ BLS
	11:36	Measured fluid level at 487.0´ BLS
	12:05	Measured fluid level at 487.1´ BLS
	13:10	Measured fluid level at 487.0´ BLS
	14:13	Measured fluid level at 487.0´ BLS Determined that borehole is in fact dry and the only fluid in the casing is residual drilling fluid; Decided to pull casing and deepen borehole to the Sonsela Sandstone

	16:00	Started pulling casing
	18:00	Finished pulling casing
4/25/89	09:30	Start drilling to Sonsela Sandstone with 8 3/4 -inch bit
	15:00	Encountered Sonsela Sandstone at approximately 640´ to 650´ BLS; Not producing much cuttings above Sonsela, only sporadic explosions of foam, after hitting Sonsela the borehole produced water continuously inducating that the water level was rising in the borehole, i.e. the water in the Sonsela is under considerable confining pressure; Stopped drilling at 675´ BLS; Continued to blow air to clean hole until 15:40 without adding any water and borehole produced continuous 5 to 15 gpm
	16:30	Start geophysics, Water encountered at 390´ BLS but borehole was blocked at 652´ BLS
4/26/89	07:15	Re-entered borehole; encountered some caving at 500´; Because of severe caving situation decided to overdrill borehole to 690´ BLS to ensure that we would get screen set in the Sonsela interval
	10:15	Finished drilling to 690´ BLS
	10:55	Run geophysics; Obstruction encountered at 675´ BLS
	12:30	Begin running 6-inch casing with 40´ of screen on bottom; Casing encountered bottom at 667.1´ BLS; Decided not to push on casing to avoid collapsing screen
	16:30	Finnished running casing
	17:30	Measured water level at 421.85´ BLS
	18:00	Begin air development with bottom of rod at 600´ BLS; Continued air development until 18:45 with continuous discharge of 5-15 gpm
4/27/89	09:20	Measured water level at 361.33´ BLS
	09:30	Start air development; milky discharge; Discharged water to mudpit and pumped from mudpit to outside south fence
	11:15	Took PCB sample from discharge using plastic jug
	11:55	K = 1900 umhos, pH = 8.76, T = 12.3 deg. C.

12:30 Took PCB sample; Stopped air development, discharge still milky but continuous rate of 5-15 gpm

WELL COMPLETION SUMMARY

Well designation: 5-2A
Location: ENRON Pumping Station No. 5
Thoreau, New Mexico
Client: ENRON
Drilling contractor: Joe I. Salazar Drilling, Inc.
Rig type: Gardner Denver 1500 with 750 cfm compressor
Drilling fluids: Water/Foam/Polymer

Elevation of land surface: ---
Elevation of measuring point: ---

BOREHOLE DIAMETER SCHEDULE
14-inch Diam. borehole from 0´ to 80´ BLS (Below Land Surface)

8 3/4-inch Diam. borehole from 80´ to 450´ BLS

Total depth drilled - 450´ BLS

CASING SCHEDULE
10-inch nom. blank steel from 0´ to 78.4´ BLS

6-inch nom. blank steel from 0´ to 415.2´ BLS

6-inch nom. well screen from 415.2´ to 435.2´ BLS
(Johnson "Hi-Cap," wire-wrap, 0.060-inch slot opening)

Note: All joints welded with Lincoln # 7018 rod

SUMMARY OF CONSTRUCTION - 5-2A

Date	Time	Action
4/18/89	07:00	Start drilling 13 3/8-inch diam. borehole
4/19/89	12:30	Finish drilling to 80´ BLS
	14:00	Begin running 10-inch casing, set centralizers at 40´ and 75´ BLS
	15:20	Cement casing with Zia Type II mixed at 50 sacks per 7.25 barrels of water
4/20/89	07:00	Top of cement is 10´ BLS outside casing
	07:30	Topped off cement to land surface outside casing
	10:45	Start drilling 8 3/4-inch diam. borehole
	17:00	Drilled to 402´ BLS
	17:40	Start geophysical logging of unsaturated portion of 5.B but had problems with Century

		computer and left site at 20:00
4/22/89	09:30	Geophysical tool indicates that borehole has caved to 332´ BLS
	10:30	Finished geophysical logging of borehole
4/29/89	09:30	Begin drilling to 450´ BLS
	10:30	Finished drilling to 450´ BLS
	12:00	Start geophysics
	13:45	Begin running 6-inch casing with 20´ screen on bottom and centralizers every 45´
	17:20	Poured gravel pack from surface, 44 5-gal buckets of #4-#12 gravel

WELL COMPLETION SUMMARY

Well designation: 5-3A
Location: ENRON Pumping Station No. 5
Thoreau, New Mexico
Client: ENRON
Drilling contractor: Joe I. Salazar Drilling, Inc.
Rig type: Gardner Denver 1500 with 750 cfm compressor
Drilling fluids: Water/Foam/Polymer

Elevation of land surface: ---
Elevation of measuring point: ---

BOREHOLE DIAMETER SCHEDULE
14-inch Diam. borehole from 0´ to 80´ BLS (Below Land Surface)

8 3/4-inch Diam. borehole from 80´ to 450´ BLS

Total depth drilled - 450´ BLS

CASING SCHEDULE
10-inch nom. blank steel from 0´ to 79.6´ BLS

6-inch nom. blank steel from 0´ to 423.8´ BLS

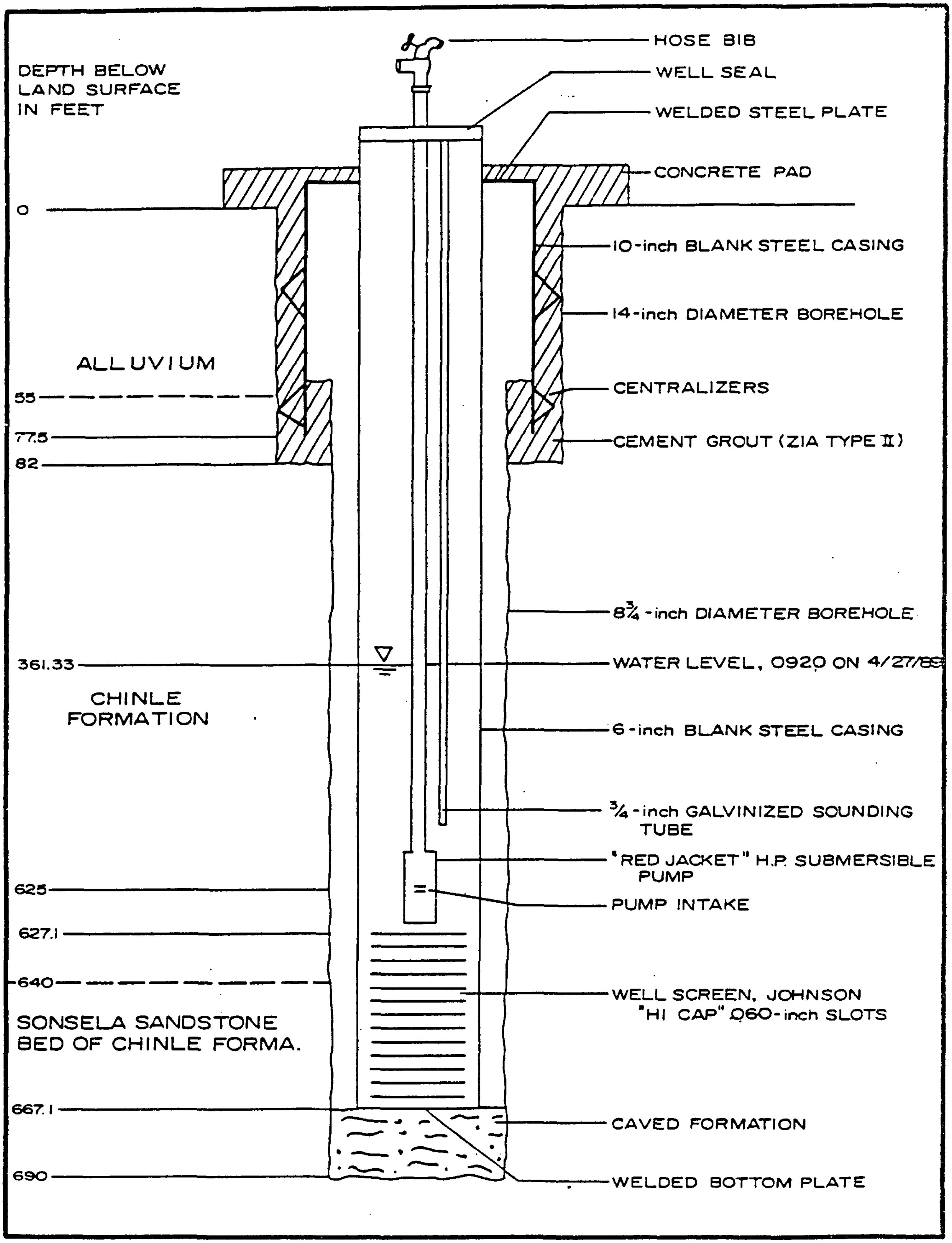
6-inch nom. well screen from 423.8´ to 443.8´ BLS
(Johnson "Hi-Cap," wire-wrap, 0.060-inch slot opening)

Note: All joints welded with Lincoln # 7018 rod

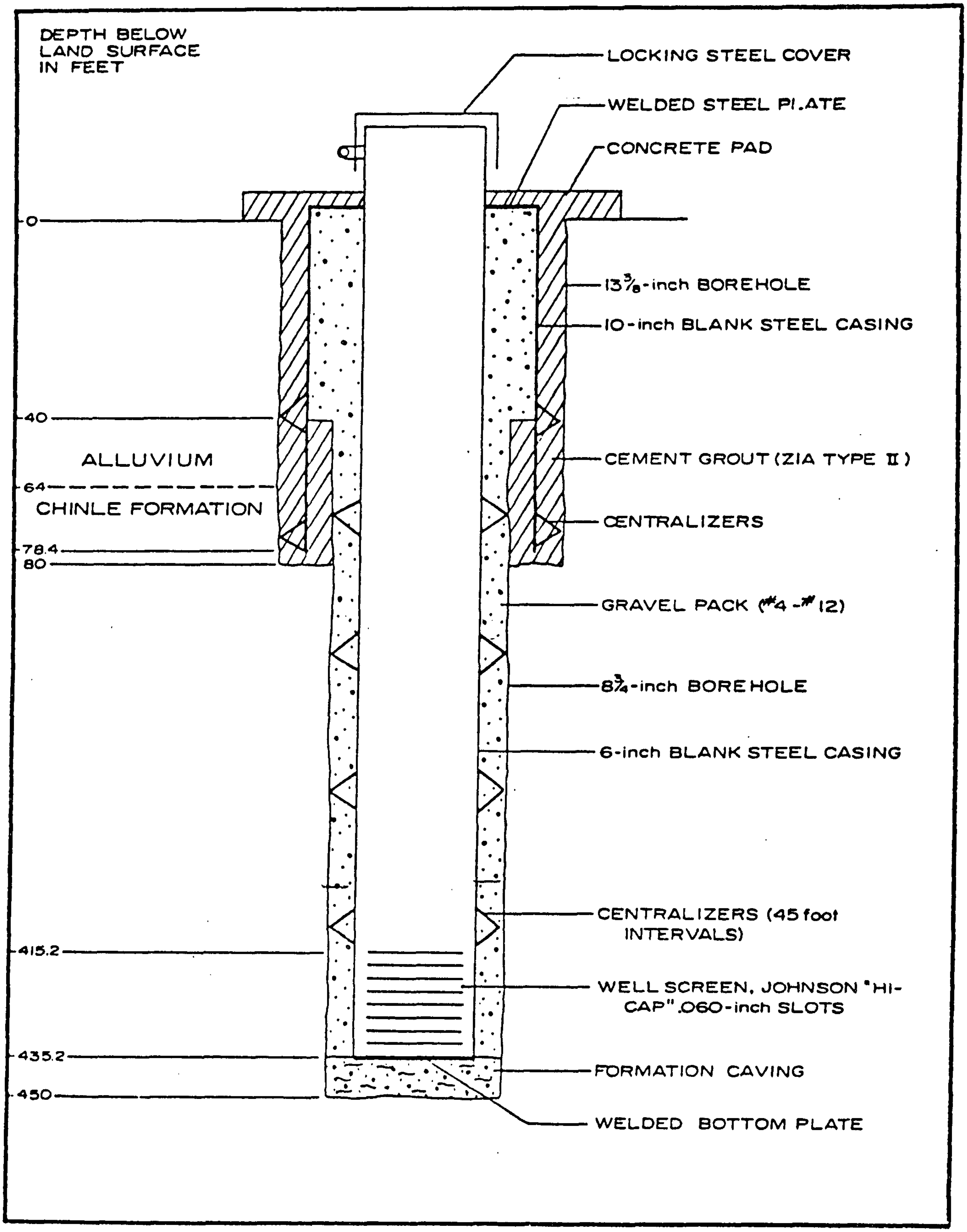
SUMMARY OF CONSTRUCTION - 5-3A

Date	Time	Action
4/17/89	12:30	Begin drilling 14-inch diam. borehole
	16:00	Complete drilling 14-inch borehole, run 10-inch casing, centralizers at 75, and 35´ BLS
	18:15	Cement 14-inch casing with Zia Type I & II mixed at 50 sacks per 8 barrels of water
4/20/89	07:30	Cement is 6´ BLS outside casing; topped off cement to land surface outside casing
4/21/89	12:30	Begin drilling 8 3/4-inch diam. borehole
	19:30	Finish drilling to 415´ BLS
4/22/89	09:30	Borehole has caved to 360´ BLS
4/23/89	09:20	Borehole has caved to 324´ BLS, no water
4/27/89	15:30	Begin lowering rods to deepen borehole; Encountered caving to approx. 350´ BLS

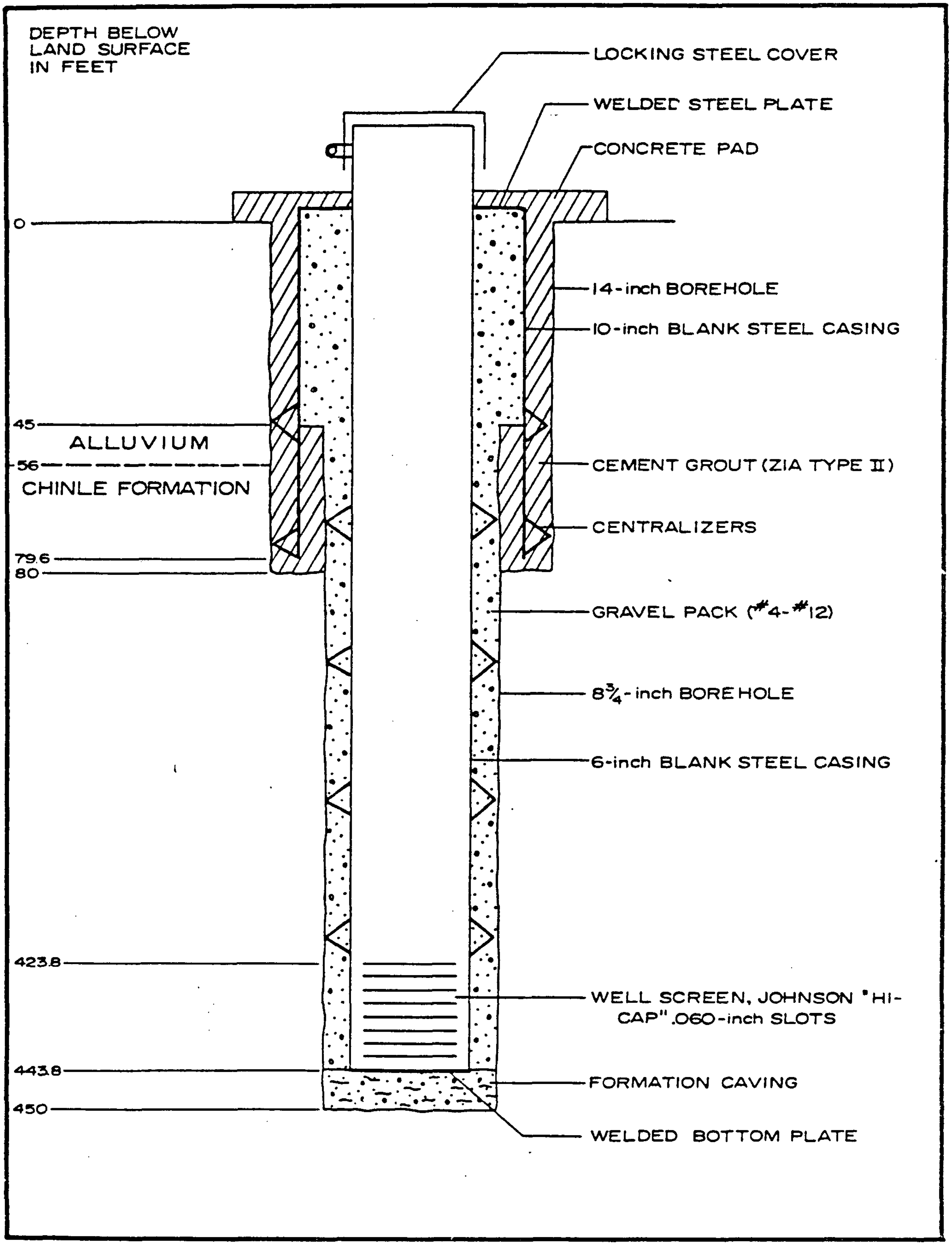
	18:00	Finished drilling to 450´ BLS
4/28/89	08:00	Re-entered borehole to clean it before geophysical logging and running casing; Encountered obstruction at 420´ BLS
	10:00	Run geophysics; got tool to 448´ BLS
	12:15	Set 6-inch casing to 443.8´ BSL with 20´ screen section on bottom and centralizers every 45´
	17:30	Poured gravel pack from surface, 51 5-gal. buckets of #4-#12 gravel



WELL SCHEMATIC
WELL 5-IA
THOREAU, NEW MEXICO



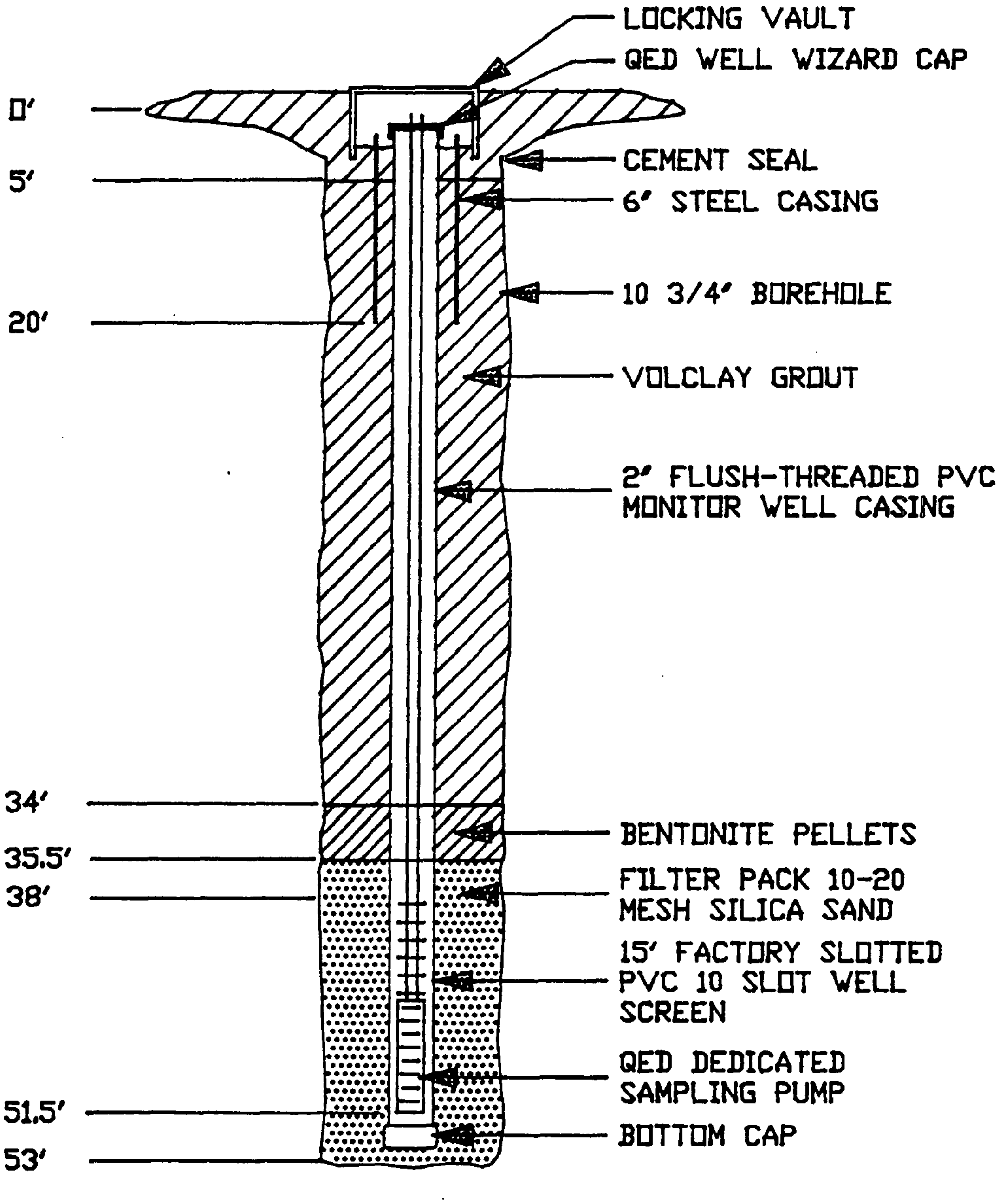
WELL SCHEMATIC
WELL 5-2A
THOREAU PUMPING STATION
THOREAU, NEW MEXICO



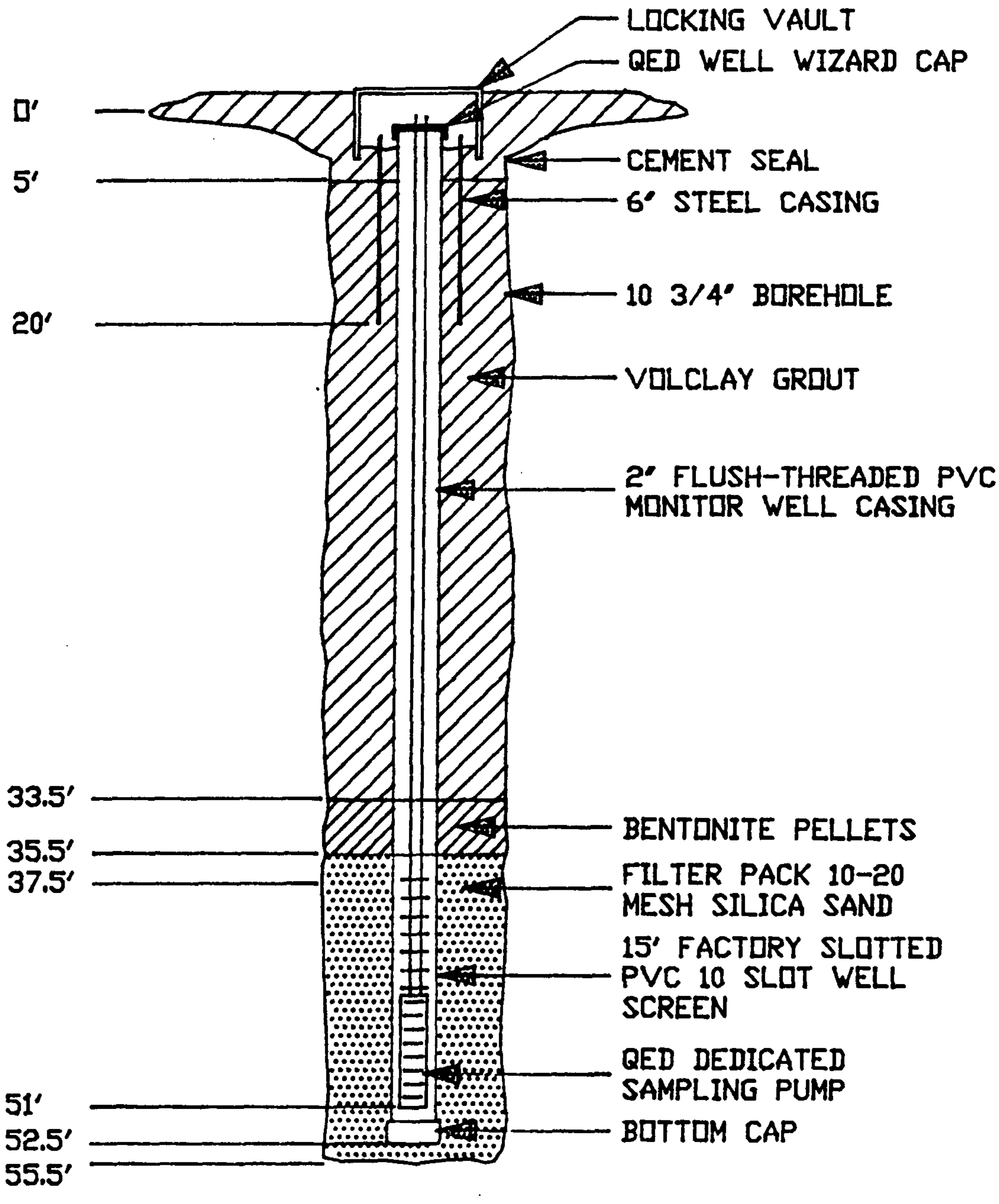
WELL SCHEMATIC
WELL 5-3A
THOREAU PUMPING STATION
THOREAU, NEW MEXICO

WELL SCHEMATIC

5–1B

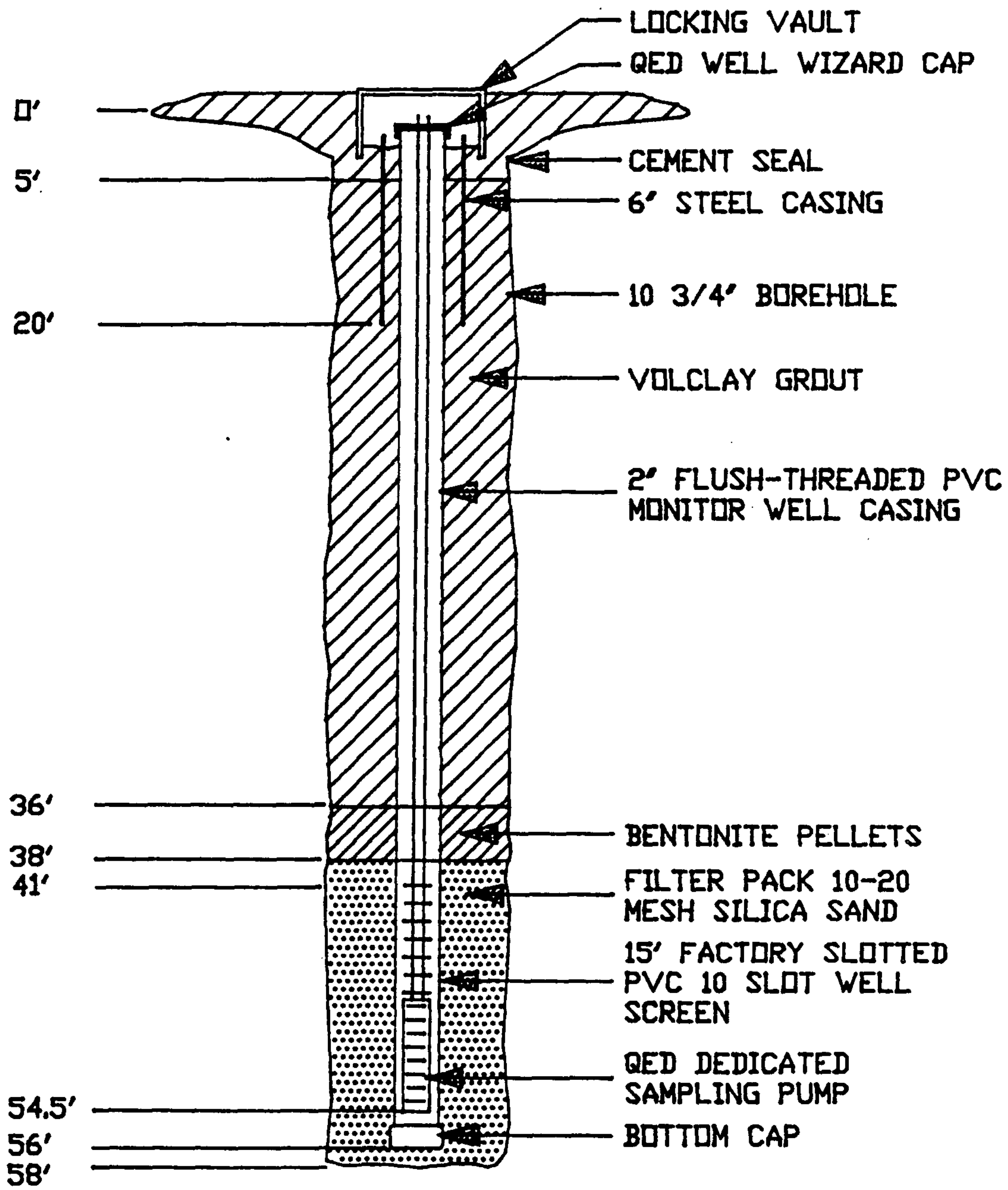


WELL SCHEMATIC
5-2B

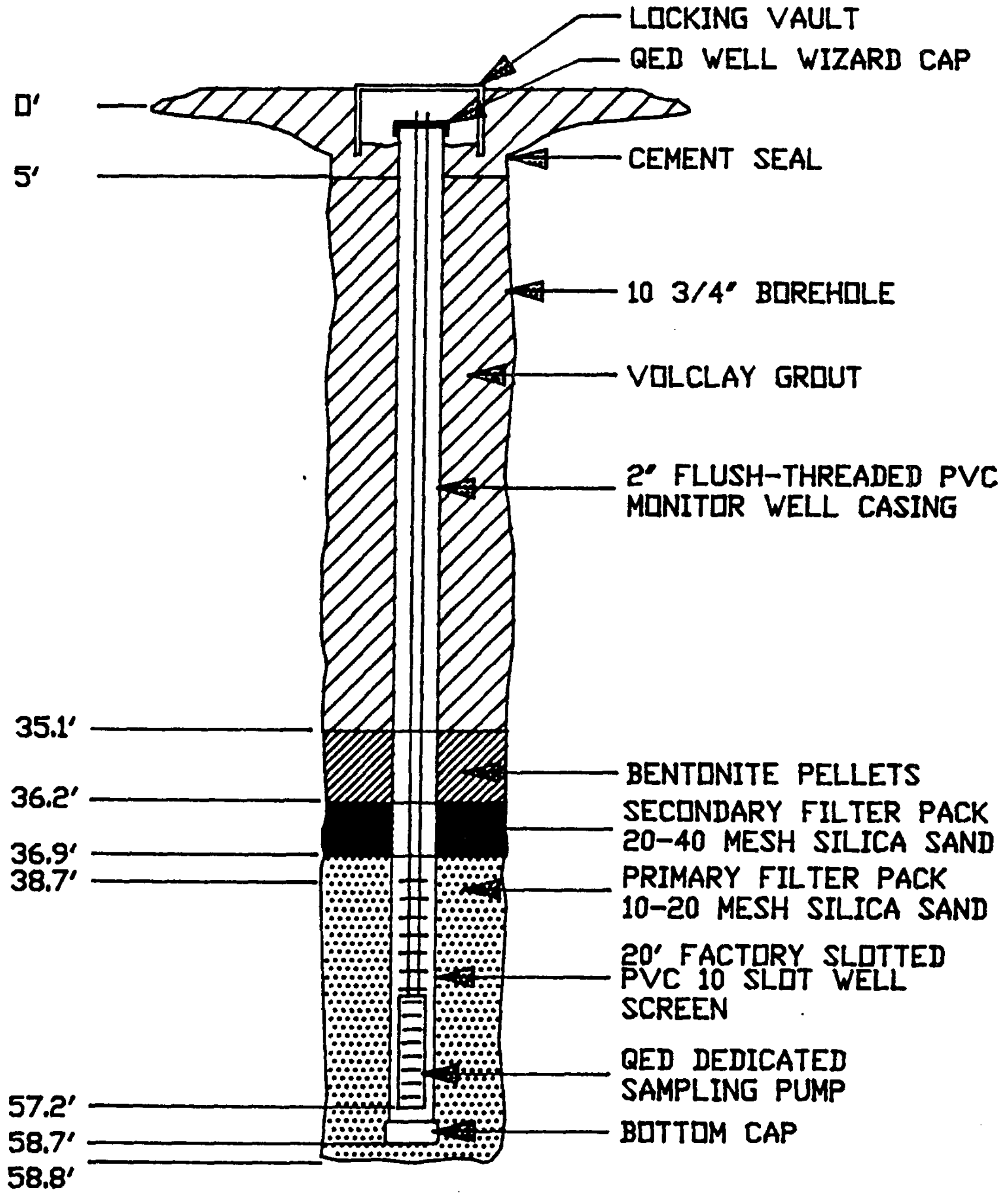


WELL SCHEMATIC

5-3B

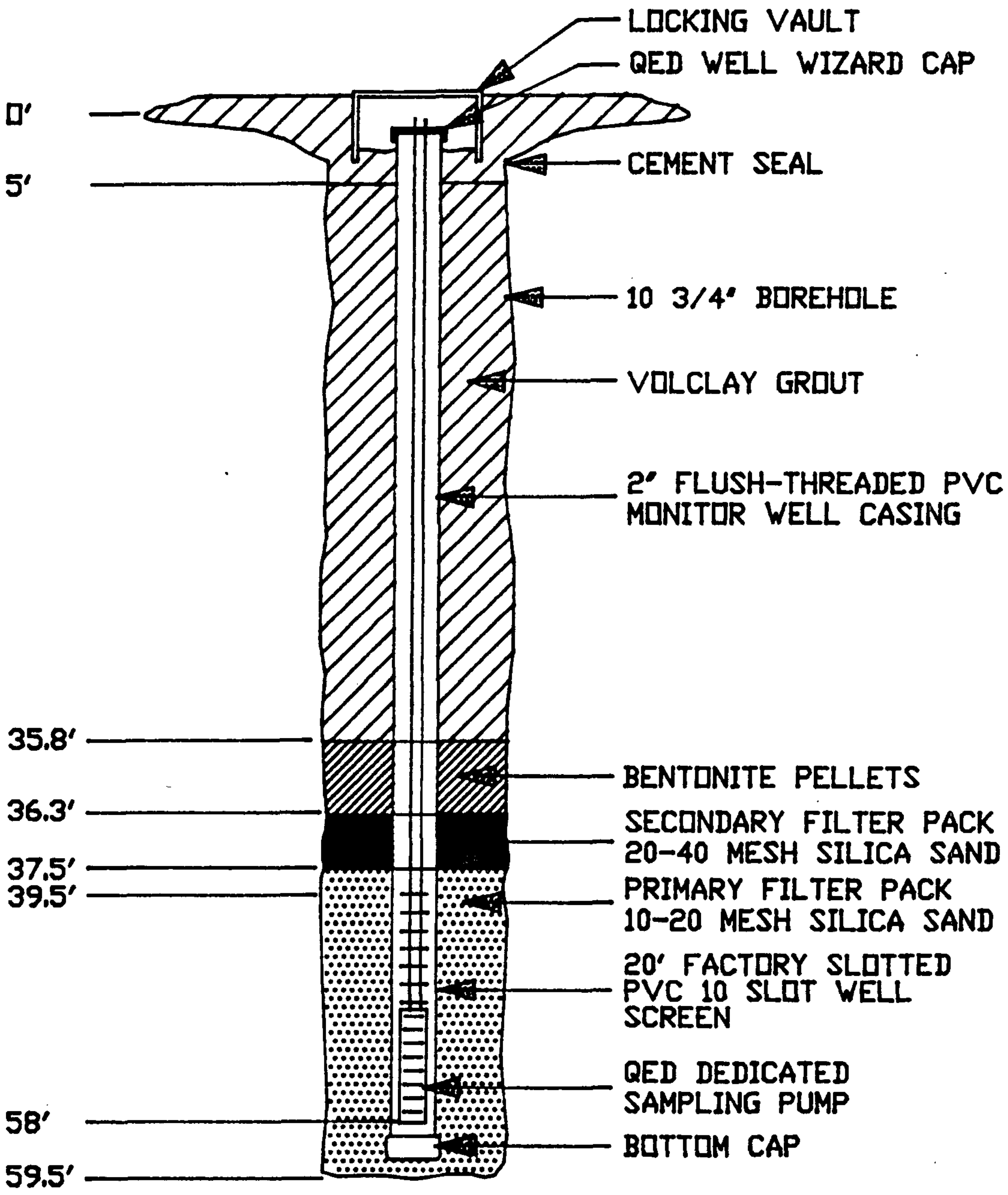


WELL SCHEMATIC
5-4B

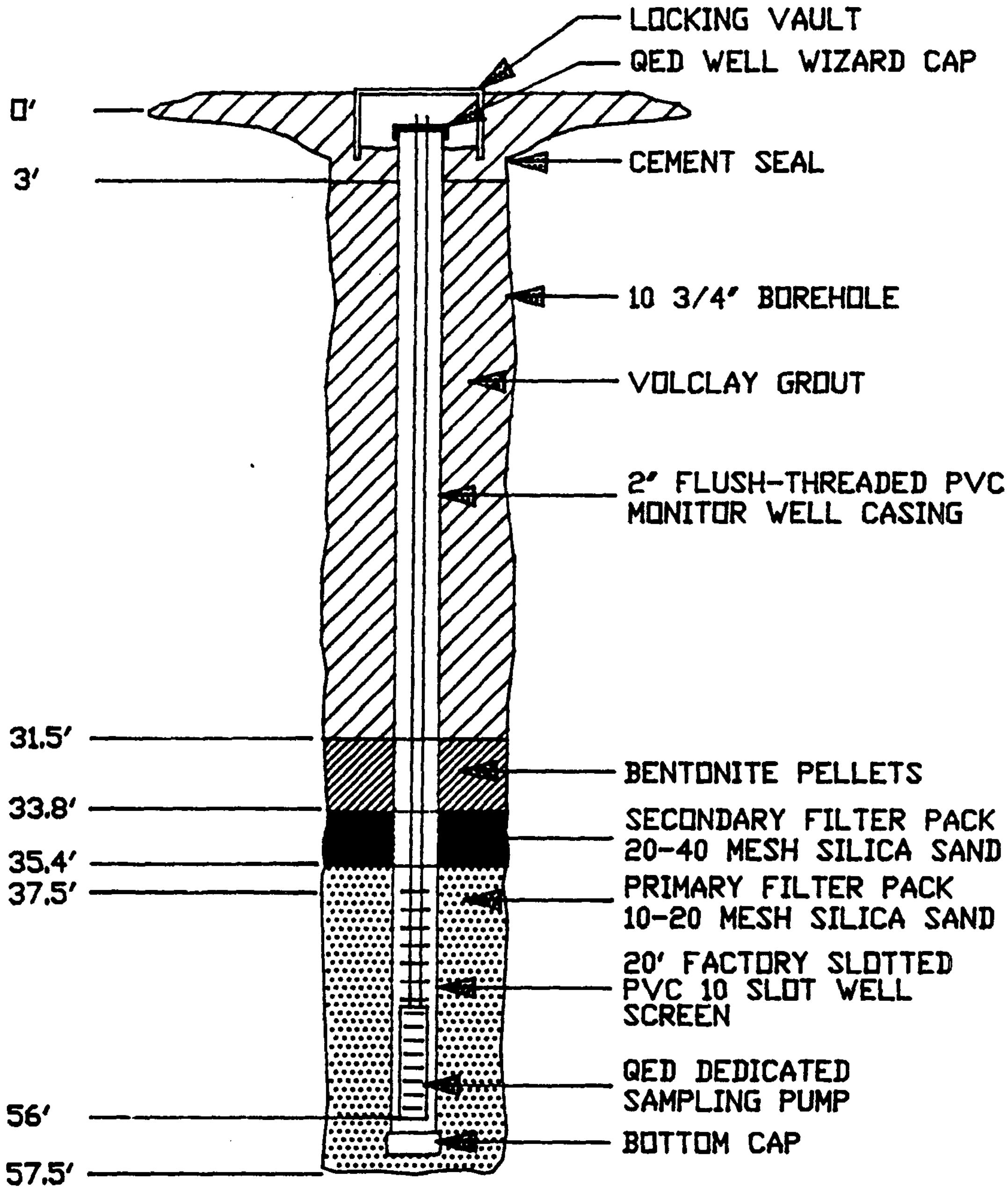


WELL SCHEMATIC

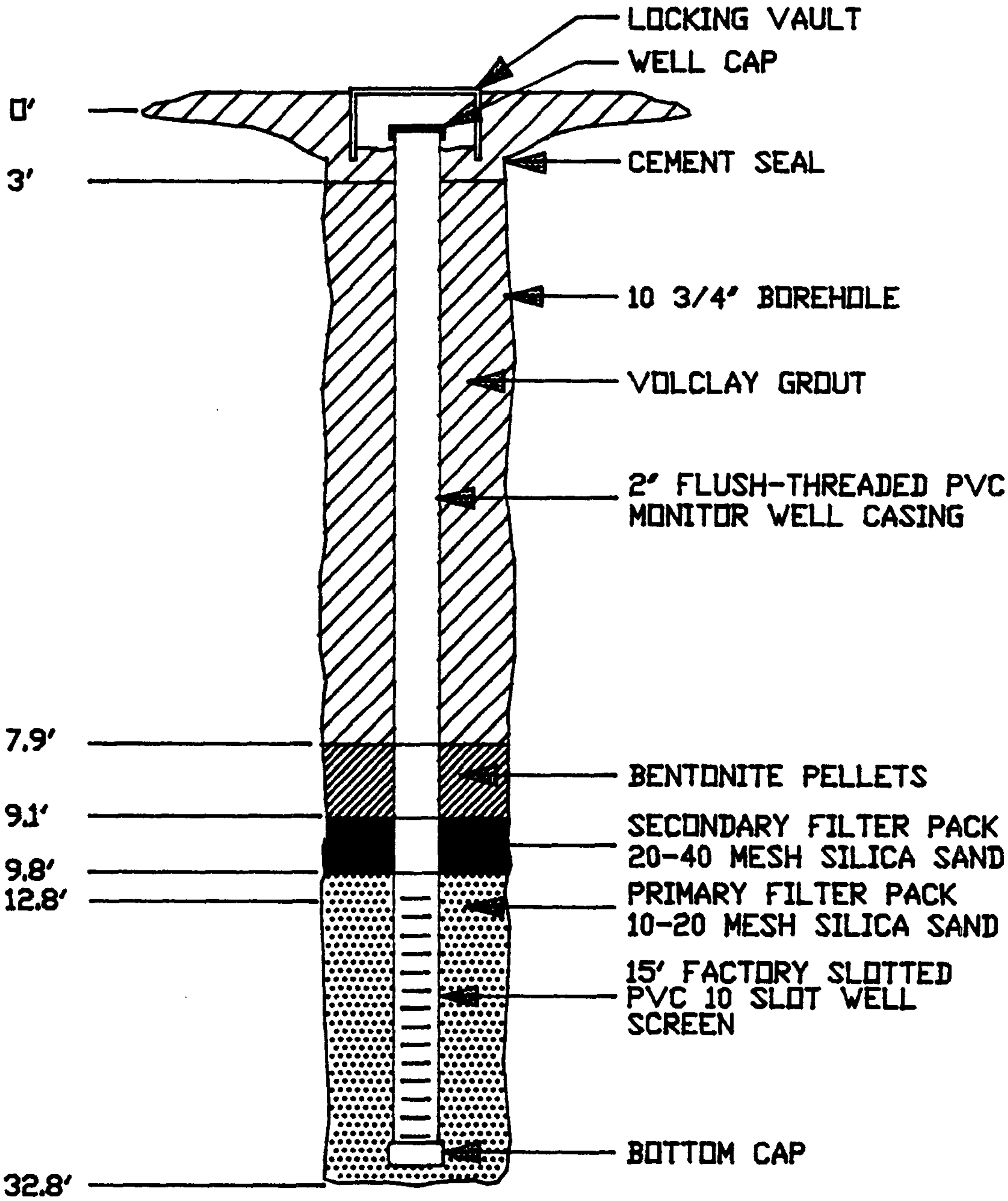
5–5B



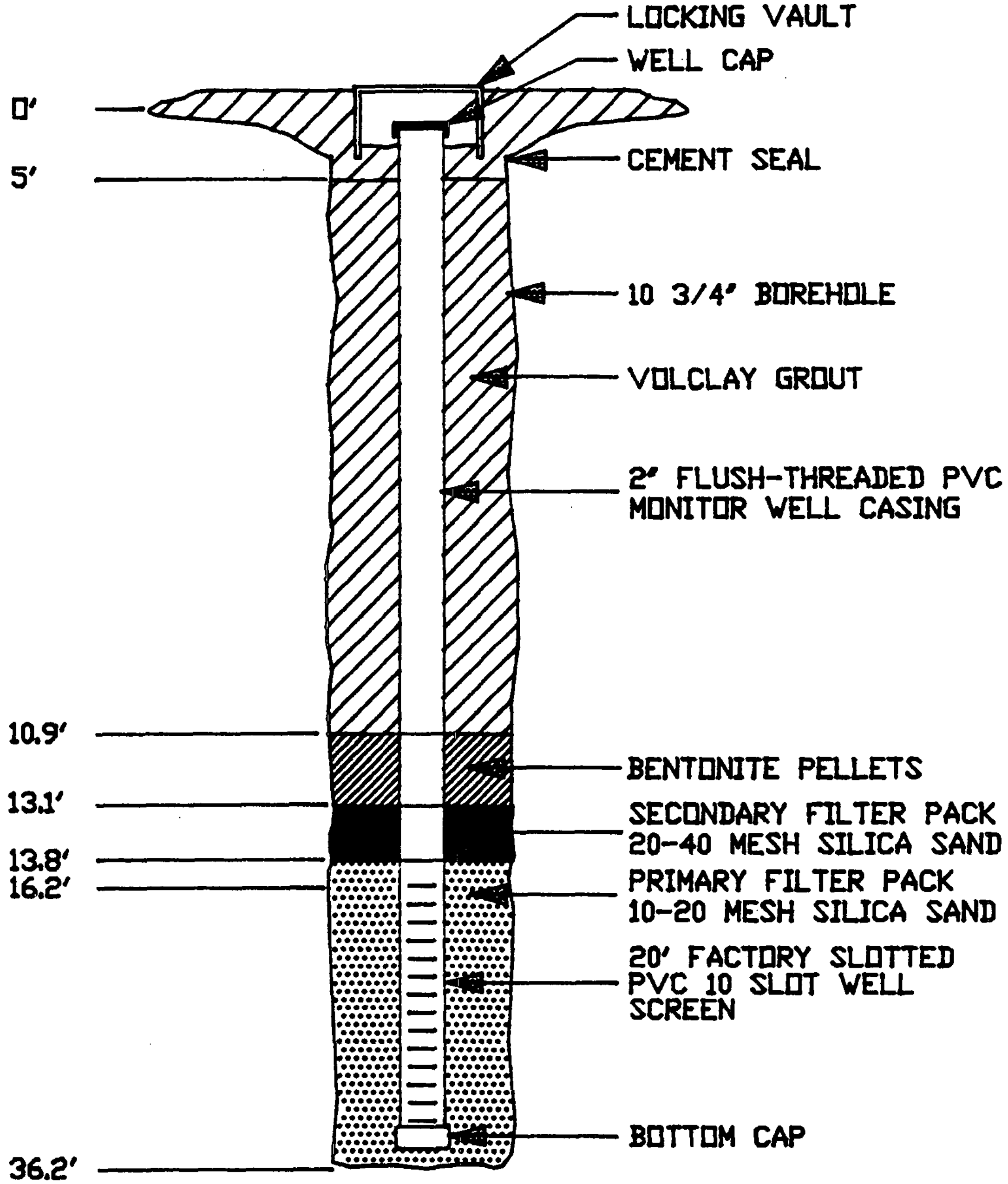
WELL SCHEMATIC
5-6B



WELL SCHEMATIC
5-7B



WELL SCHEMATIC
5-8B



Appendix F: Geologic and Geophysical Logs of Test Wells and Soil Borings at the Thoreau Compressor Station

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-1A **Drilling Method:** Air Rotary
Rig type: Gardner-Denver 2000 with dual 750 cfm air pack
Drilling fluids: Foam/water/polymer
Date Started: 04/11/89 **Date Finished:** 04/26/89
Total Depth Drilled: 690 feet
Drilling Contractor: Joe I. Salazar Drilling, Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
		ALLUVIUM
0 - 6	SANDY SILTY CLAY	Reddish brown, non-indurated.
6 - 55	SILTY SAND	Orange brown with some clay, non-indurated; some dampness at 8 feet; sand fraction is fine-grained. Drilled without foam to 25 feet; switched to foam at 25 feet. Clay content increases from 45 to 50 feet.
		CHINLE FORMATION
55 - 60	SILTSTONE AND MUDSTONE	Red, weakly cemented (WEATHERED CHINLE FORMATION).
60 - 82	SILTSTONE AND MUDSTONE	Red, moderately cemented. Contains some sandstone interlayers.
82 - 94	MUDSTONE	Red, weakly cemented with some fine non-calcareous gravel.
94 - 162	SILTSTONE	Red, moderately cemented with some fine sandstone layers and some thin mudstone layers. Some bluish discoloration at 128 feet. Some subrounded limestone gravel encountered from 142 to 147 feet.
162 - 188	MUDSTONE	Red, weakly cemented, non-calcareous with some fine sand and limestone gravel to 1/2 inches.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5.1A

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
188 - 208	SILTSTONE	Reddish brown, moderately cemented calcareous, with some sandstone and a trace of limestone gravel.
208 - 218	SILTY SANDSTONE	Reddish brown, weakly cemented sand fraction is very fine grained.
218 - 242	MUDSTONE	Red, weakly cemented, non-calcareous with some limestone gravel.
242 - 300	MUDSTONE AND SILTSTONE	Reddish brown interlayers of weakly cemented with some fine sand and trace of limestone gravel. Sandier interval from 258 feet to 260 feet.
300 - 322	SILTSTONE	Reddish brown, moderately cemented with some fine grained sandstone; contains very thin light blue layers.
322 - 428	MUDSTONE AND SILTSTONE	Reddish brown interlayers of weakly cemented with some fine-grained sandstone. No returns from 360 feet to 400 feet. Mudstone predominates section below 400 feet.
428 - 522	SILTSTONE	Reddish brown with trace sandstone fragments below 450 feet. NOTE: Well was originally drilled to 495 feet and subsequently deepened to a total depth of 690 feet. Attempted to drill without foam or water but had no returns from 500 feet to 520 feet; added foam at 520 feet.
522 - 578	MUDSTONE	Reddish brown with some fine-grained sandstone; trace of light blue-grey mudstone.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5.1A

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
		No returns from 540 feet to 556 feet and from 560 feet to 576 feet.
578 - 634	SANDSTONE	Light greyish brown fine- to medium-grained with reddish brown mudstone, some fragments are mottled blue.
		No returns from 582 feet to 596 feet, 602 feet to 606 feet, 612 feet to 616 feet, and 620 feet to 626 feet.
634 - 650	CLAY	Brown with some fine to medium grained greyish brown sandstone; interior of clay balls appears unsaturated.
		No returns from 638 feet to 650 feet but drilling is rapid indicating clay.
		SONSELA SANDSTONE BED OF CHINLE FORMATION
650 - 690	SANDSTONE	Cuttings are mixed but below 650 feet there is an increasing proportion of very light grey, medium grained sandstone; very friable.
		Continuous return of cuttings below 650 feet believed due to rise of water level in borehole resulting from penetrating confined zone.

TOTAL DEPTH OF BOREHOLE: 690 FEET

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-2A **Drilling Method:** Air Rotary
Rig type: Gardner-Denver 1500 with 750 cfm compressor
Drilling fluids: Foam/water/polymer
Date Started: 04/19/89 **Date Finished:** 04/29/89
Total Depth Drilled: 450 feet
Drilling Contractor: Joe I. Salazar Drilling, Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
		ALLUVIUM
0 - 8	SILTY SAND/SANDY SILT	Brown, loose, sand fraction is fine to very fine grained.
8 - 64	SILTY SAND/SANDY SILT	Orange brown, loose, sand fraction is fine to very fine grained.
		Trace of sandstone and limestone gravel noted at 10 feet, 26 feet, 40 feet, and 60 feet, gravel fraction is fine and sub-angular.
		CHINLE FORMATION
64 - 86	SILTSTONE, MUD-STONE, AND SAND-STONE	Reddish grey, moderately cemented, sand-stone fraction is fine to very fine grained.
86 - 96	MUDSTONE	Reddish brown, weakly cemented.
96 - 112	SILTY SANDSTONE	Reddish brown with white mottling, moder-ately cemented.
		Trace of light grey limestone gravel.
112 - 146	MUDSTONE	Orange red, with some fine grained sand-stone, weakly to moderately cemented.
		No returns from 142 feet to 146 feet.
146 - 156	MUDSTONE AND SILT-STONE	Reddish brown, weakly cemented.
156 - 166	SILTY SANDSTONE	Reddish brown and grey, moderately to strongly cemented.
166 - 170	SANDSTONE	Reddish brown and grey, coarse-grained, strongly cemented.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-2A

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
170 - 196	CLAY	Light reddish brown, uncemented, moderately plasticity. Poor cuttings returns in this interval.
196 - 206	SILTY SANDSTONE AND CLAY	Light reddish brown sandstone is moderately cemented, clay is un-cemented and moderately plastic.
206 - 226	SILTY SANDSTONE	Light reddish brown, with some siltstone, strongly cemented.
226 - 256	SILTY SANDSTONE	Dark reddish brown, with some siltstone, strongly cemented. Increasing proportion of uncemented, highly plastic clay from 234 feet to bottom of interval. No returns from 248 feet to 253 feet.
256 - 292	MUDSTONE	Dark reddish brown, with silty sandstone and clay.

NOTE: Cuttings returns below 292 feet were extremely sporadic consisted of explosions of drilling foam and cuttings separated by intervals of no returns. Therefore, descriptions are given for the depth at which cuttings were returned.

300	MUDSTONE	Reddish brown, with clay and silty sandstone.
306	MUDSTONE AND SILTSTONE	Reddish brown, with silty sandstone.
336	CLAY AND MUDSTONE	Reddish brown, with silty sandstone.
352	MUDSTONE AND SILTSTONE	Reddish brown.
386	SILTY SANDSTONE AND SILTSTONE	Reddish brown.
392	CLAY AND MUDSTONE	Reddish brown.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-2A

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
412	MUDSTONE AND SILTY SANDSTONE	Reddish grey and brown.
432	MUDSTONE AND SILTY SANDSTONE	Reddish brown.
446	MUDSTONE	Reddish brown, with silty sandstone.

TOTAL DEPTH OF BOREHOLE: 450 FEET

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-3A **Drilling Method:** Air Rotary
Rig type: Gardner-Denver 1500 with 750 cfm compressor
Drilling fluids: Foam/water/polymer
Date Started: 04/17/89 **Date Finished:** 04/28/89
Total Depth Drilled: 450 feet
Drilling Contractor: Joe I. Salazar Drilling, Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
		ALLUVIUM
0 - 6	CLAYEY SAND WITH SILT	Orange brown, loose. Contains concrete blocks and fill.
6 - 38	SILTY SAND WITH SOME FINE GRAVEL	Orange brown, loose, sand is predomin--ately fine-grained, gravel fraction is sub-angular. Becomes slightly coarser below 25 feet.
38 - 43	SANDY CLAY	Red brown, firm.
43 - 56	CLAYEY SAND	Reddish brown, contains a trace of fine gravel, loose.
		CHINLE FORMATION
56 - 67	MUDSTONE	Red, moderately cemented, friable (WEATHERED CHINLE FORMATION)
67 - 100	MUDSTONE AND CLAY WITH SOME FINE-GRAINED SANDSTONE	Red brown, with some blue mottling, mud-mudstone and sandstone fractions are mod-erately to strongly cemented with calcareous cement, clay is dense and moderately plastic.
100 - 120	SANDSTONE WITH MUDSTONE	Reddish-grey, with trace of clay (< 10%), strongly cemented, sandstone is fine to medium grained. Trace of limestone or limestone gravels at 112 feet.
120 - 126	MUDSTONE WITH FINE-GRAINED SANDSTONE	Reddish grey, strongly cemented.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-3A

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
126 - 146	SANDSTONE WITH MUDSTONE	Reddish-grey, strongly cemented, sandstone fraction is fine to medium grained.
146 - 172	CLAY	Reddish orange, with some mudstone and fine-grained sandstone, clay is moderately to highly plastic.
172 - 180	SANDSTONE	Light reddish grey, fine to medium grained.
180 - 190	SILTY SANDSTONE	Dark chocolate brown, moderately cemented, thin fissile layers.
190 - 196	SANDSTONE WITH MUDSTONE AND CLAY	Reddish brown, strongly cemented.
196 - 226	CLAY AND MUDSTONE	Orange brown, with some fine-grained sandstone, mudstone and sandstone are strongly cemented.
226 - 252	SANDSTONE AND MUDSTONE	Light reddish brown, strongly cemented.
252 - 296	CLAYSTONE AND MUDSTONE	Orange brown.
		Poor cuttings returns in this interval.
296 - 306	CLAY AND MUDSTONE	Red, with some clay.
306 - 326	CLAY AND MUDSTONE	Orange brown.
326 - 446	SILTY SANDSTONE AND MUDSTONE	Light grey, red dish brown fissile layers, strongly cemented.
		No returns from 346 feet to 356 feet, 360 feet to 372 feet, 396 feet to 406 feet, and 426 feet to 446 feet.
446 - 450	CLAY	Red, moderately compact and plastic.

TOTAL DEPTH OF BOREHOLE: 450 FEET

TABLE

LITHOLOGIC LOG

Location:	ENRON Pumping Station #5, Thoreau, N.M.
Boring No.:	5-1B
Drilling Method:	Hollow Stem Auger
Rig type:	CME 75
Drilling fluids:	None
Date Started:	5/15/89 **Date Finished:** 5/16/89
Total Depth Drilled:	53 feet
Drilling Contractor:	Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SILTY SAND	Fine to medium grained sand, with silt. Moderate Reddish Brown (10 R 4/6).
10	SAND	Fine to medium grained sand, minor silt. Moderate Reddish Brown (10 R 4/6).
15	GRAVELLY SAND	Damp sand and gravel. Moderate Reddish Brown (10 R 4/6).
20	SILTY SAND	Fine grained sand and silt. Bedding evident. Fine bands of clay. Moderate Reddish Brown (10 R 4/6).
25	SAND	Fine to medium grained sand. Some minor clay. Pale Reddish Brown (10 R 5/4).
30	CLAYEY SAND	Fine grained sand and clay. Moderate Reddish Brown (10 R 4/6).
35	SANDY CLAY	Fine grained sand, uniform texture. Moderate Reddish Brown (10 R 4/6).
40	SILTY SAND	Medium to coarse grained sands with silt and clay. Moist. Pale Reddish Brown (10 R 5/4).

TABLE
(continued)
LITHOLOGIC LOG

45	SAND	Coarse sands with limestone fragments. Minor amounts of silt and clay. More gravel down to 49 feet. Moist. Pale Red (10 R 6/2).
50	CLAY	Stiff plastic clay. Just penetrated top of Chinle. Moist. Moderate Reddish Brown (10 R 4/6).

T.D. = 53 Feet.

TABLE

LITHOLOGIC LOG

Location:	ENRON Pumping Station #5, Thoreau, N.M.
Boring No:	5-2B **Drilling Method:** Hollow Stem Auger
Rig Type:	CME75
Drilling Fluids:	None
Date Started:	5/12/89 **Date Finished:** 5/12/89
Total Depth Drilled:	55.5 Feet
Drilling Contractor:	Western Technologies Inc.

Depth Interval (feet)		DESCRIPTION OF MATERIAL
0 - 8	SILTY SAND	Reddish-brown; medium-grained; moist.
8 - 15.4	SILTY SAND	Reddish-brown; medium,-grained; Gravel up to 1" diameter; minor caliche seams; moist.
15.4 - 16.3	SANDY GRAVEL	Mottled reddish-brown and grayish yellow; coarse-grained sand and fine to medium-grained gravel; loose; damp.
16.3 - 17.5	SILTY SAND	Reddish-brown; medium-grained; moist.
17.5 - 18	SANDY CLAYEY SILT	Reddish-brown; minor caliche; damp.
18 - 20	SILTY SAND	Reddish-brown, medium to coarse-grained; damp.
20 - 22	SILTY SAND	Reddish-brown; medium-grained; some clay; damp.
22 - 24.5	SILTY SAND	Pale reddish-brown; medium-grained; damp.
24.5 - 28	CLAYEY TO SILTY SAND	Reddish-brown; medium-grained; more clayey and hard @ 27.8'; damp to moist.
	INTERLAYERED WITH: SAND	Light brown; medium to coarse-grained; damp to moist.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
	SLIGHTLY SILTY SAND	Brown to reddish-brown; medium-grained; damp to moist.
28 - 30.5	SLIGHTLY SILTY SAND	Reddish-brown; medium to coarse-grained; moist.
30.5 - 31.8	GRAVELLY SAND	Reddish-brown; medium-grained, damp.
31.8 - 33.5	SANDY CLAY	Reddish-brown; sand is fine-grained; moist.
33.5 - 34	GRAVELLY CLAY	Moderate to dark reddish-brown; some sand; moist.
34 - 34.8	CLAYEY GRAVELLY SAND	Moderate to dark reddish-brown; medium-grained; damp.
34.8 - 41	SILTY SAND	Reddish-brown; fine-grained; some gravel from 37.4 to 38; moist.
41 - 41.5	CLAYEY SAND TO SANDY CLAY	Dark reddish-brown; with chips of light greenish-gray sand; hard; moist.
41.5 - 42.6	SANDY CLAY	Moderate to dark reddish-brown; minor caliche seams; very hard; damp.
42.6 - 43	SILTY SAND	Orange to reddish-brown; fine to medium-grained; moist.
43 - 44	CLAYEY SAND	Reddish-brown; fine to medium-grained; moist.
44 - 46	CLAYEY SAND	Reddish-brown; fine to medium-grained; some limestone and sandstone gravel and cobbles; harder drilling from 45' to 46'; wet.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
46 - 48	CLAYEY SAND WITH GRAVEL	Reddish-brown; fine to medium-grained; saturated; soupy from 46' to 47'.
48 - 55.1	CLAYEY SILTY SAND	Reddish-brown; fine-grained; 1" to 2" seam of coarse sand and fine gravel at 52'; saturated.
55.1 - 55.5	CLAYEY SAND TO SANDY CLAY	Reddish-brown; minor caliche seams; saturated; refusal at 55.5'.

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-3B **Drilling Method:** Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 5/10/89 **Date Finished:** 5/11/89
Total Depth Drilled: 58 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
		ALLUVIUM
0 - 2	SILTY SAND	Dark brown; fine-grained; with rootlets and brick rubble; damp.
2 - 4.5	SILTY SAND	Brown; fine-grained; with fine gravel; rootlets replaced by caliche; dry.
4.5 - 8.5	SAND	Reddish-brown; fine to medium grained sand with silt and cobbles; minor white caliche specks; dry.
8.5 - 9	GRAVELLY SAND	Reddish-brown; with chert cobbles; damp.
9 - 12	SAND	Reddish-brown; fine to coarse grained sand with silt and fine gravel; damp.
12 - 13.5	SILTY SAND	Light reddish-brown; fine-grained; with minor white caliche specks; damp.
13.5 - 18.5	SAND	Reddish brown; fine-grained sand with silt; well-sorted; with gravel below 18 ft.; damp.
18.5 - 29.5	SILTY SAND	Reddish brown; fine-grained; well-sorted; minor gravel 21.5-24 ft.; damp.
29.5 - 34.5	SAND	Light reddish-brown; fine sand with silt and yellowish sandstone cobbles; damp.

TABLE
(continued)
LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
34.5 - 38.5	SAND CLAY	Reddish-brown; with gravel and cobbles; damp.
38.5 - 42.5	CLAY	Dark reddish-brown; with sand and minor gravel; moist.
42.5 - 45	SANDY CLAY	Dark reddish-brown; sand is fine-grained; moist to wet.
45 - 47.5	CLAY	Reddish-brown; with sand and some cobbles; wet.
47.5 - 48	CLAY	Reddish-brown; with sand and gravel; saturated (soupy).
48 - 49.5	SANDY CLAY	Reddish-brown; sand is coarse; with fine gravel; wet.
49.5 - 51.5	GRAVELY CLAY	Reddish-brown; with sand; some gravel is purple mudstone; wet.
51.5 - 55.25	SILTY SAND	Light reddish-brown; fine-grained, well-sorted; saturated.
		CHINLE FORMATION
55.25 - 58	CLAY	Dark reddish-brown; with gray mottling; moist to damp.

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-4B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/18/89 **Date Finished:** 9/18/89
Total Depth Drilled: 58.75 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SAND	Very fine grained sand, well sorted. Pale Red (10 R 6/2). BC = 3,4,3.
10	SAND	Very fine grained sand, minor silt. Moderate Reddish Brown (10 R 4/6). BC = 3,4,5.
15	SAND	Very fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,5,5.
20	SAND	Very fine and fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,4,6.
25	SAND	Very fine and fine grained sand. Some minor clay. Moderate Reddish Brown (10 R 4/6). BC = 3,4,6.
30	SILTY SAND	Silty very fine grained sand. Some minor clay. Moderate Reddish Brown (10 R 4/6). BC = 4,3,4.
35	SANDSTONE	Fine grained, not calcite cemented. Yellowish Grey (5 Y 7/12). BC = 22,14,18.
40	SILTY SAND	Medium to coarse grained sands in a silt and clay matrix. Calcite cemented. Pale Reddish Brown (10 R 5/4). BC = 2,12,18.

TABLE
(continued)
LITHOLOGIC LOG

45	SAND	Calcite cemented sand, limestone fragments. Minor amounts of silt and clay. Pale Red (10 R 6/2). BC = 5,22,30.
50	SAND	Very fine grained sand and silt, very minor clay. Moist. Moderate Reddish Brown (10 R 4/6). BC = 10,27,54.
55	SAND	Fine grained sand, with less silt and clay than above. Moist. Moderate Reddish Brown (10 R 4/6). BC = 8,16,27.
58	CLAY	Clay with silt. Moderate Reddish Brown (10 R 4/6).

T.D. = 58 Feet 9 Inches.

TABLE

LITHOLOGIC LOG

Location:	ENRON Pumping Station #5, Thoreau, N.M.
Boring No.:	5-5B
Drilling Method:	Hollow Stem Auger
Rig type:	CME 75
Drilling fluids:	None
Date Started:	9/19/89 **Date Finished:** 9/19/89
Total Depth Drilled:	59.5 feet
Drilling Contractor:	Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
30	SAND	Very fine to fine grained sand. Damp. Pale Reddish Brown (10 R 5/4). BC = 3,5,10.
35	SAND	Very fine grained sand and silt. Damp. Pale Reddish Brown (10 R 5/4). BC = 4,5,8.
40	SILTY CLAY	Silty clay with minor grains of limestone fragments. Damp. Pale Reddish Brown (10 R 5/4). BC = 2,3,8.
45	SAND	Very fine grained sand and minor silt. Moderate Reddish Brown (10 R 4/6). Saturated. BC = 4,7,15.
50	SAND	Very fine grained sand. Well sorted. Saturated. Moderate Reddish Brown (10 R 4/6). BC = 7,15,26.
55	SAND	Fine grained sand. Well sorted. Saturated. Moderate Reddish Brown (10 R 4/6). BC = 5,28,105.
59	CLAY	Dense massive clay. Moderate Reddish Brown (10 R 4/6). Damp. BC = 9,26,27. Chinle Fm. (?).

T.D. = 59.5 Feet.

TABLE

LITHOLOGIC LOG

Location:	ENRON Pumping Station #5, Thoreau, N.M.
Boring No.:	5-6B
Drilling Method:	Hollow Stem Auger
Rig type:	CME 75
Drilling fluids:	None
Date Started:	9/18/89 **Date Finished:** 9/18/89
Total Depth Drilled:	57 feet
Drilling Contractor:	Western Technologies Inc.

DEPTH INTERVAL (feet)		**DESCRIPTION OF MATERIAL**
5	SAND	Very fine grained sand, well sorted. Not calcite cemented. Moderate Reddish Brown (10 R 4/6). BC = 2,3,3.
10	SAND	Fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,4,5.
15	SAND	Fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 3,3,4.
20	SAND	Very fine grained sand, minor silt. Moderate Reddish Brown (10 R 4/6). BC = 2,4,5.
25	SAND	Very fine and fine grained sand. Moderate Reddish Brown (10 R 4/6). Well-site logger reports limestone gravel in cuttings. BC = 3,8,6.
30	SILTY SAND	Silty very fine grained sand. Some minor clay. Moderate Reddish Brown (10 R 4/6). Calcite cement. BC = 8,11,17.
35	SILTY SAND	Very fine grained sand, some silt. Moderate Reddish Brown (10 R 4/6). BC = 8,7,12.

TABLE
(continued)
LITHOLOGIC LOG

40	SILTY SAND	Very fine grained sand, with more silt and clay than above. Moderate Reddish Brown (10 R 4/6). BC = 6,8,11.
45	SILTY SAND	Very fine grained sand, with more silt and clay than above. Moderate Reddish Brown (10 R 4/6). Well-site logger reports limestone fragments in cuttings. BC = 5,10,18.
50	CLAY	Dense clay. Pale Reddish Brown (10 R 5/4). BC = 17,74,83.
51	CLAY	Clay with some gravel and limestone. Pale Reddish Brown (10 R 5/4). BC = 15,42,0.
55	CLAY	Clay with fine grained sand, lumps of massive clay. Pale Reddish Brown (10 R 5/4). BC = 100 for 5 inches.
57	CLAY	Dense clay. Dark Reddish Brown (10 R 3/4). BC = N.R.

T.D. = 57 Feet.

TABLE

LITHOLOGIC LOG

Location:	ENRON Pumping Station #5, Thoreau, N.M.
Boring No.:	5-7B
Drilling Method:	Hollow Stem Auger
Rig type:	CME 75
Drilling fluids:	None
Date Started:	9/27/89 **Date Finished:** 9/27/89
Total Depth Drilled:	32 feet
Drilling Contractor:	Western Technologies Inc.

DEPTH INTERVAL (feet)		**DESCRIPTION OF MATERIAL**
5	SAND	Very fine grained sand, well sorted. Pale Red (10 R 6/2). BC = 4,3,5.
10	SAND	Fine grained sand, well sorted. Moderate Reddish Brown (10 R 4/6). BC = 2,10,12.
15	CLAYEY SAND	Very fine grained sand and silt with clay. Moderate Reddish Brown (10 R 4/6). BC = 4,10,10.
20	SILTY SAND	Very fine grained sand with silt. Pale Reddish Brown (10 R 5/4). Drill-site logger reports caliche seams, hard drilling @ 17 & 22 feet. BC = 11,17,18.
25	SANDY SILT	Silt with very fine grained sand. Moderate Reddish Brown (10 R 4/6). BC = 10,16,27.
30	SAND	Calcite cemented fine to medium grained sand with minor silt and clay. Moderate Reddish Brown (10 R 4/6). BC = 12,22,35.
32	SILTY SAND	Fine grained to very fine grained sand, some minor coarse to medium grained sand. Calcite cement. Moderate Reddish Brown (10 R 4/6). BC = 6,8,10.

T.D. = 32 Feet.

TABLE

LITHOLOGIC LOG

Location: ENRON Pumping Station #5, Thoreau, N.M.
Boring No.: 5-8B
Drilling Method: Hollow Stem Auger
Rig type: CME 75
Drilling fluids: None
Date Started: 9/25/89 **Date Finished:** 9/25/89
Total Depth Drilled: 37 feet
Drilling Contractor: Western Technologies Inc.

DEPTH INTERVAL (feet)		DESCRIPTION OF MATERIAL
5	SILTY SAND	Very fine grained sand and silt. Moderate Reddish Brown (10 R 4/6). BC = 3,7,8. Dry.
10	SILTY SAND	Very fine grained sand and silt. Pale Reddish Brown (10 R 5/4). BC = 3,9,11. Dry.
15	SAND	Very fine grained sand and minor silt. Calcite cement. Moderate Reddish Brown (10 R 4/6). Damp. BC = 9,13,11.
20	SAND	Very fine grained sand and occasional pebbles of grey limestone. Moist. Moderate Reddish Brown (10 R 4/6). BC = 5,11,18.
24	SAND	Very fine grained calcite cemented sand. Very hard drilling. Moderate Reddish Brown (10 R 4/6).
25	SAND	Very fine grained calcite cemented sand and silt. Separate grey limestone fragments. BC = 18,31,36. Moderate Reddish Brown (10 R 4/6).
30	CLAYEY SILT	Calcite cemented clayey silt. Damp. Moderate Reddish Brown (10 R 4/6). BC = 7,18,30.

TABLE
(continued)
LITHOLOGIC LOG

35	CLAYEY SILT	Clayey silt with occasional fragments of grey limestone. Moderate Red (5 R 4/6). Moist. BC = 18,57 for 5 inches.
37	CLAY	Dense clay, some calcite cement. Alteration spots. Damp. Pale Red (10 R 6/2). BC = 1,3,31.

T.D. = 37 Feet.

TABLE

LITHOLOGIC LOG

Location:	ENRON Pumping Station #5, Thoreau, N.M.
Boring No.:	5SB-1
Drilling Method:	Hollow Stem Auger
Rig type:	CME 75
Drilling fluids:	None
Date Started:	9/29/89 **Date Finished:** 9/29/89
Total Depth Drilled:	35 feet
Drilling Contractor:	Western Technologies Inc.

DEPTH INTERVAL (feet)		**DESCRIPTION OF MATERIAL**
5	SILTY SAND	Sand is very fine grained and well sorted. Moderate Reddish Brown (10 R 4/6). BC = 3,4,4.
10	SAND	Medium to fine grained sand, occasional calcareous fragments up to 3 cm. Moderate Reddish Brown (10 R 4/6). BC = 2,3,4.
15	SAND	Medium to fine grained, less than 2% coarse sand and gravel. Damp. Moderate Reddish Brown (10 R 4/6). BC = 5,9,14.
20	SANDY SILT	Very fine grained sand and silt. Minor clay. Well sorted. Damp. Moderate Reddish Brown (10 R 4/6). BC = 7,10,13.
25	SAND	Graded sand from very coarse sand and small gravel to very fine grained sand and silt. Moist. Moderate Reddish Brown (10 R 4/6). BC = 6,7,8.
30	SAND	Very coarse sand and gravel to fine grained sand. Moist. Moderate Reddish Brown (10 R 4/6). BC = 6,8,10.
35	SANDY SILT	Medium to fine grained sandy silt with minor clay. Damp. Moderate Reddish Brown (10 R 4/6). BC = 10,27,32.

T.D. = 35 Feet.

Borehole Geophysical Logs

5-1 = 5-1A

5-2 = 5-2A

5-3 = 5-3A

NM OIL CONSERVATION DEPT

WELL LOG # 5-1

REMOVED FROM FILE

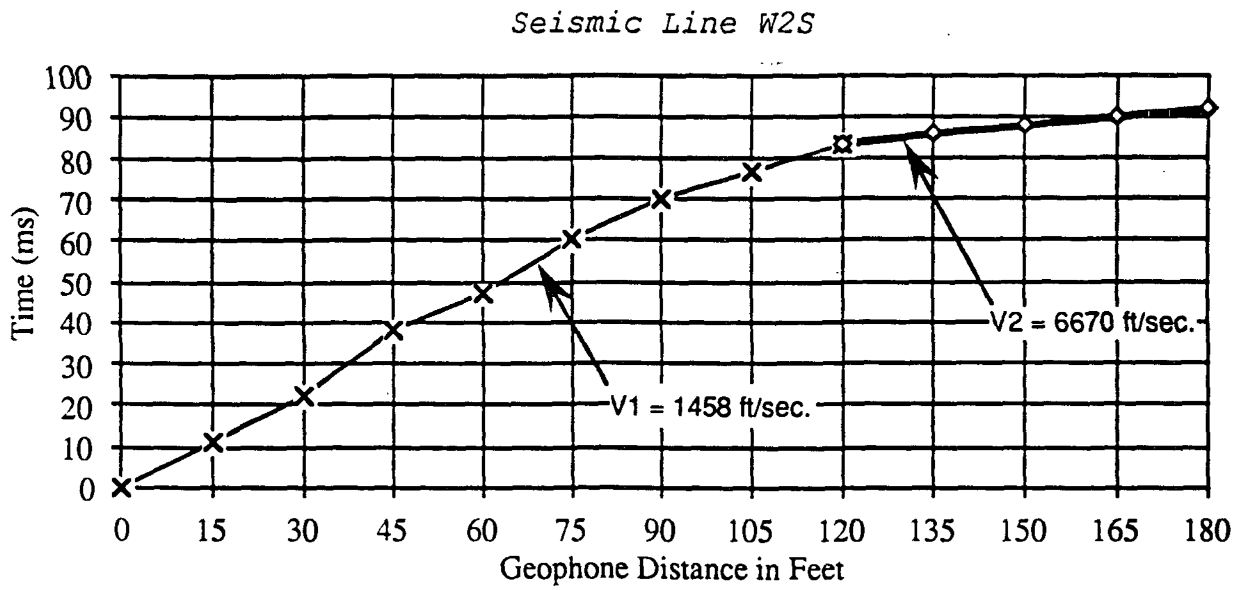
GW-80 Reports 1990 V. 2 **BOX**

NUMBER 11

RETURNED TO CUSTOMER

Appendix G: Surface Geophysical Data

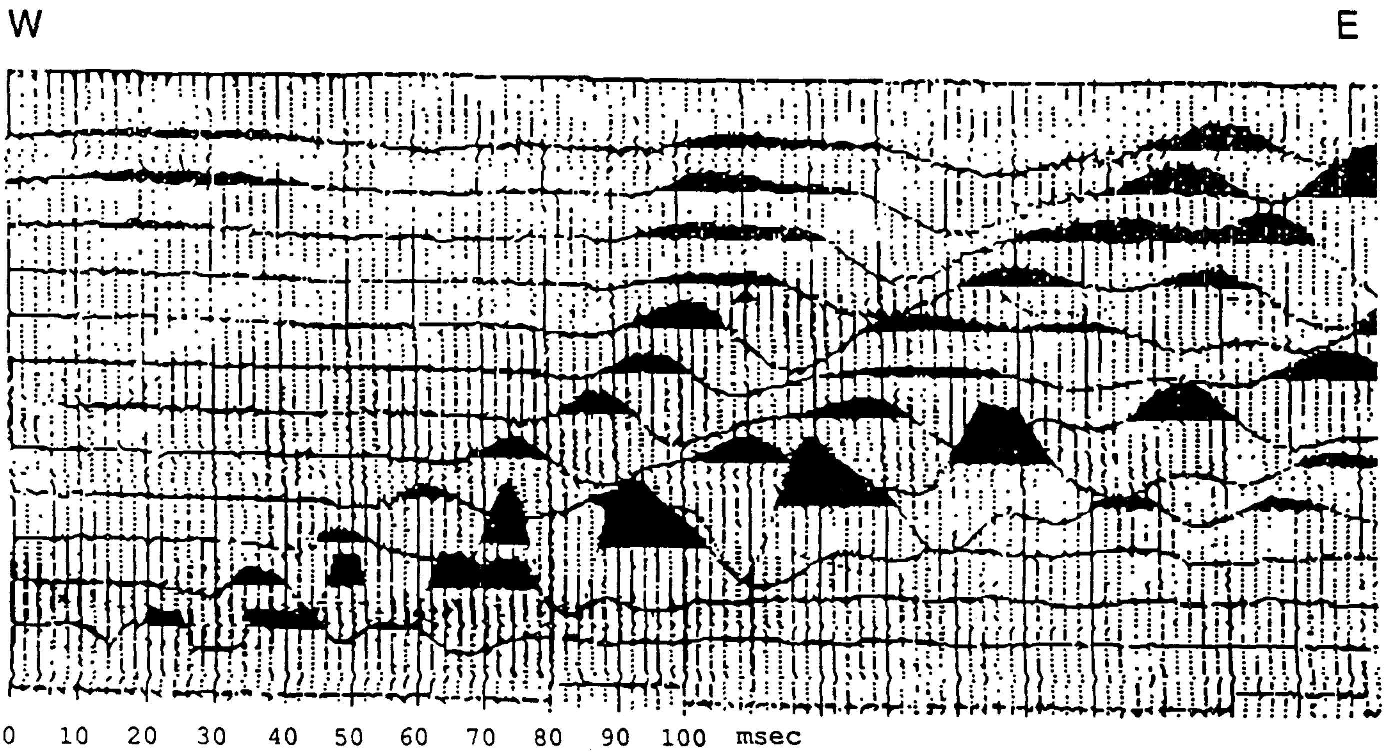
Representative Seismogram and Analysis

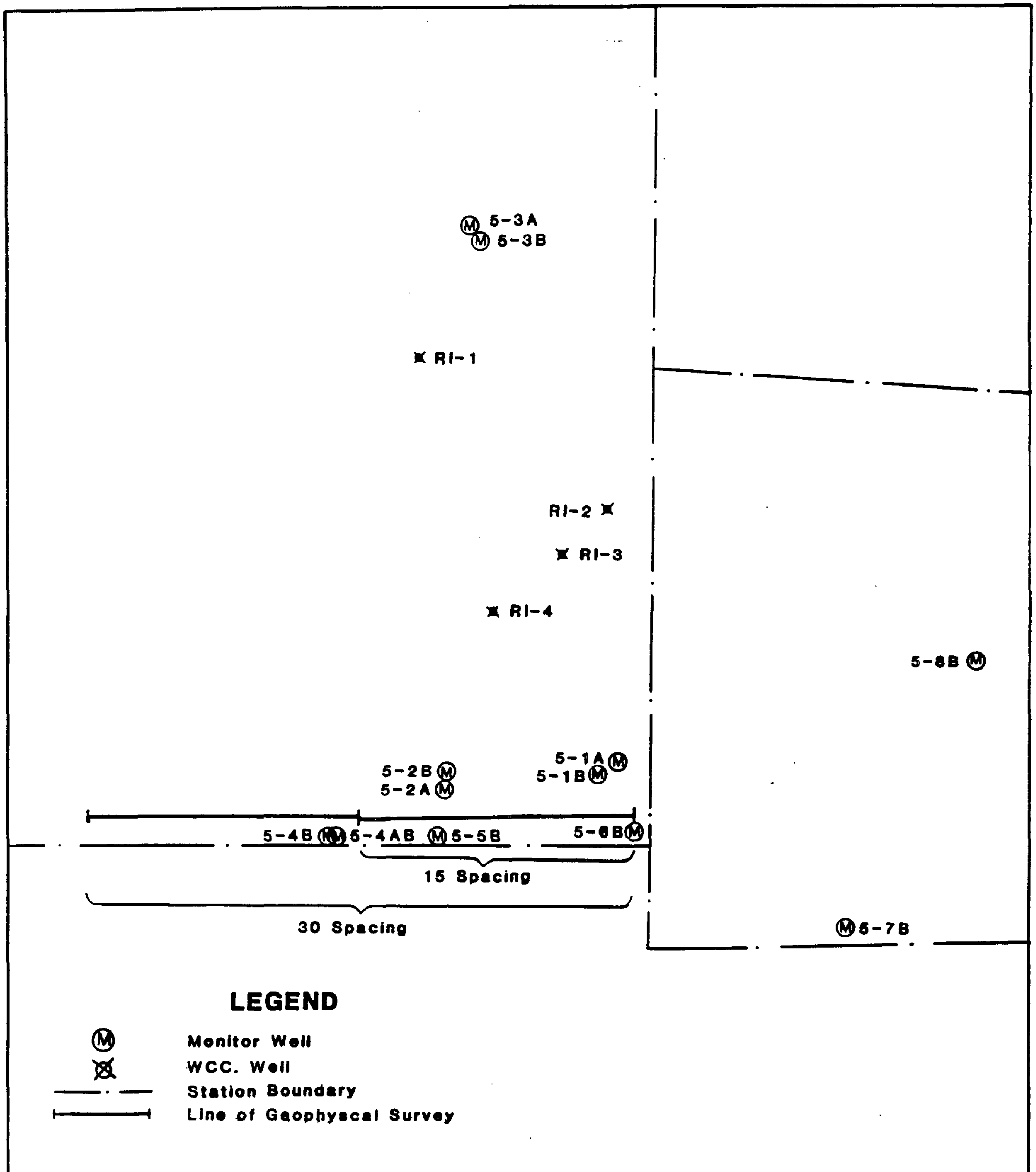


Ft.	0	15	30	45	60	75	90	105	120	135	150	165	180
ms.	0	11	22	38	47	60	70	77	83	86	88	90	92

X_C ranges from 110 to 125

$$\text{Depth} = \frac{X_C}{2}\left(\frac{6670 - 1458}{6670 + 1458}\right)^{1/2} = 44' \text{ to } 50'$$





Location of Geophysical Surveys

Appendix H: Slug Test Data

5-1B(SHALLOW)

DATE	TIME (H:M:S)	CUM T (MIN)	BOREHOLE HEAD(FT)	D to W (FT)	H/Ho
31-Aug-89	13:53:00	0.00	0.00	45.10	NA
31-Aug-89	13:53:10	0.17	-0.34	45.44	NA
31-Aug-89	13:53:20	0.33	1.03	44.07	1.00
31-Aug-89	13:53:30	0.50	0.85	44.25	0.83
31-Aug-89	13:53:40	0.67	0.84	44.26	0.82
31-Aug-89	13:53:50	0.83	0.83	44.27	0.81
31-Aug-89	13:54:00	1.00	0.82	44.28	0.80
31-Aug-89	13:54:10	1.17	0.82	44.28	0.80
31-Aug-89	13:54:20	1.33	0.81	44.29	0.79
31-Aug-89	13:54:30	1.50	0.81	44.29	0.79
31-Aug-89	13:54:40	1.67	0.80	44.30	0.78
31-Aug-89	13:54:50	1.83	0.79	44.31	0.77
31-Aug-89	13:55:00	2.00	0.78	44.32	0.76
31-Aug-89	13:55:10	2.17	0.78	44.32	0.76
31-Aug-89	13:55:20	2.33	0.77	44.33	0.75
31-Aug-89	13:55:30	2.50	0.77	44.33	0.75
31-Aug-89	13:55:40	2.67	0.76	44.34	0.74
31-Aug-89	13:55:50	2.83	0.76	44.34	0.74
31-Aug-89	13:56:00	3.00	0.75	44.35	0.73
31-Aug-89	13:56:20	3.33	0.74	44.36	0.72
31-Aug-89	13:56:40	3.67	0.74	44.36	0.72
31-Aug-89	13:57:00	4.00	0.74	44.36	0.72
31-Aug-89	13:57:30	4.50	0.72	44.38	0.70
31-Aug-89	13:58:00	5.00	0.71	44.39	0.69
31-Aug-89	13:58:30	5.50	0.70	44.40	0.68
31-Aug-89	13:59:00	6.00	0.70	44.40	0.68
31-Aug-89	13:59:30	6.50	0.70	44.40	0.68
31-Aug-89	14:00:00	7.00	0.69	44.41	0.67
31-Aug-89	14:01:00	8.00	0.68	44.42	0.66
31-Aug-89	14:02:00	9.00	0.65	44.45	0.63
31-Aug-89	14:04:00	11.00	0.64	44.46	0.62
31-Aug-89	14:06:00	13.00	0.61	44.49	0.59
31-Aug-89	14:08:00	15.00	0.59	44.51	0.57
31-Aug-89	14:10:00	17.00	0.56	44.54	0.54
31-Aug-89	14:15:00	22.00	0.50	44.60	0.49
31-Aug-89	14:20:00	27.00	0.46	44.64	0.45
31-Aug-89	14:25:00	32.00	0.40	44.70	0.39
31-Aug-89	14:30:00	37.00	0.36	44.74	0.35
31-Aug-89	14:40:00	47.00	0.28	44.82	0.27
31-Aug-89	14:50:00	57.00	0.20	44.90	0.19
31-Aug-89	15:00:00	67.00	0.20	44.90	0.19
31-Aug-89	15:20:00	87.00	0.14	44.96	0.14
31-Aug-89	16:00:00	127.00	0.10	45.00	0.10
31-Aug-89	16:30:00	157.00	0.10	45.00	0.10
31-Aug-89	17:30:00	217.00	0.10	45.00	0.10
31-Aug-89	19:00:00	307.00	0.09	45.01	0.09
31-Aug-89	22:00:00	487.00	0.07	45.03	0.07
01-Sep-89	07:10:00	917.00	0.00	45.10	0.00

5-2B(SHALLOW)

DATE	TIME (H:M:S)	CUM T (MIN)	BOREHOLE HEAD(FT)	D to W (FT)	H/Ho
31-Aug-89	17:35:00	0.00	0.00	47.91	NA
31-Aug-89	17:35:05	0.08	-0.02	47.93	NA
31-Aug-89	17:35:10	0.17	0.38	47.53	1.00
31-Aug-89	17:35:15	0.25	0.29	47.62	0.76
31-Aug-89	17:35:20	0.33	0.26	47.65	0.68
31-Aug-89	17:35:25	0.42	0.23	47.68	0.61
31-Aug-89	17:35:30	0.50	0.22	47.69	0.58
31-Aug-89	17:35:35	0.58	0.20	47.71	0.53
31-Aug-89	17:35:40	0.67	0.20	47.71	0.53
31-Aug-89	17:35:45	0.75	0.19	47.72	0.50
31-Aug-89	17:35:50	0.83	0.15	47.76	0.39
31-Aug-89	17:35:56	0.93	0.15	47.76	0.39
31-Aug-89	17:36:05	1.08	0.17	47.74	0.45
31-Aug-89	17:36:10	1.17	0.17	47.74	0.45
31-Aug-89	17:36:25	1.42	0.16	47.75	0.42
31-Aug-89	17:36:35	1.58	0.15	47.76	0.39
31-Aug-89	17:36:45	1.75	0.14	47.77	0.37
31-Aug-89	17:36:55	1.92	0.14	47.77	0.37
31-Aug-89	17:37:05	2.08	0.13	47.78	0.34
31-Aug-89	17:37:15	2.25	0.12	47.79	0.32
31-Aug-89	17:37:25	2.42	0.12	47.79	0.32
31-Aug-89	17:37:35	2.58	0.11	47.80	0.29
31-Aug-89	17:37:45	2.75	0.11	47.80	0.29
31-Aug-89	17:38:00	3.00	0.10	47.81	0.26
31-Aug-89	17:38:15	3.25	0.10	47.81	0.26
31-Aug-89	17:38:30	3.50	0.09	47.82	0.24
31-Aug-89	17:38:45	3.75	0.09	47.82	0.24
31-Aug-89	17:39:00	4.00	0.08	47.83	0.21
31-Aug-89	17:39:15	4.25	0.08	47.83	0.21
31-Aug-89	17:39:30	4.50	0.07	47.84	0.18
31-Aug-89	17:39:45	4.75	0.07	47.84	0.18
31-Aug-89	17:40:00	5.00	0.06	47.85	0.16
31-Aug-89	17:40:30	5.50	0.06	47.85	0.16
31-Aug-89	17:41:00	6.00	0.05	47.86	0.13
31-Aug-89	17:40:30	5.50	0.05	47.86	0.13
31-Aug-89	17:42:00	7.00	0.04	47.87	0.11
31-Aug-89	17:42:30	7.50	0.03	47.88	0.08
31-Aug-89	17:43:00	8.00	0.03	47.88	0.08
31-Aug-89	17:44:00	9.00	0.02	47.89	0.05
31-Aug-89	17:45:00	10.00	0.02	47.89	0.05
31-Aug-89	17:46:00	11.00	0.02	47.89	0.05
31-Aug-89	17:47:00	12.00	0.01	47.90	0.03
31-Aug-89	17:48:00	13.00	0.01	47.90	0.03
31-Aug-89	17:50:00	15.00	0.00	47.91	0.00
31-Aug-89	17:52:00	17.00	0.00	47.91	0.00
31-Aug-89	17:57:00	22.00	0.00	47.91	0.00
31-Aug-89	18:02:00	27.00	0.00	47.91	0.00
31-Aug-89	18:12:00	37.00	0.00	47.91	0.00
31-Aug-89	18:22:00	47.00	0.00	47.91	0.00

5-3B(SHALLOW)

DATE	TIME (H:M:S)	CUM T (MIN)	BOREHOLE HEAD(FT)	D to W (FT)	H/Ho
31-Aug-89	16:08:00	0.00	0.00	44.06	NA
31-Aug-89	16:08:05	0.08	0.00	44.06	NA
31-Aug-89	16:08:10	0.17	-0.18	44.24	NA
31-Aug-89	16:08:15	0.25	0.46	43.60	NA
31-Aug-89	16:08:20	0.33	0.69	43.37	NA
31-Aug-89	16:08:25	0.42	0.90	43.16	1.00
31-Aug-89	16:08:30	0.50	0.79	43.27	0.88
31-Aug-89	16:08:37	0.62	0.83	43.23	0.92
31-Aug-89	16:08:42	0.70	0.71	43.35	0.79
31-Aug-89	16:08:50	0.83	0.64	43.42	0.71
31-Aug-89	16:08:55	0.92	0.61	43.45	0.68
31-Aug-89	16:09:00	1.00	0.57	43.49	0.63
31-Aug-89	16:09:10	1.17	0.47	43.59	0.52
31-Aug-89	16:09:20	1.33	0.47	43.59	0.52
31-Aug-89	16:09:30	1.50	0.43	43.63	0.48
31-Aug-89	16:09:40	1.67	0.39	43.67	0.43
31-Aug-89	16:09:50	1.83	0.35	43.71	0.39
31-Aug-89	16:10:00	2.00	0.32	43.74	0.36
31-Aug-89	16:10:10	2.17	0.28	43.78	0.31
31-Aug-89	16:10:20	2.33	0.26	43.80	0.29
31-Aug-89	16:10:30	2.50	0.23	43.83	0.26
31-Aug-89	16:10:40	2.67	0.21	43.85	0.23
31-Aug-89	16:10:50	2.83	0.20	43.86	0.22
31-Aug-89	16:11:00	3.00	0.18	43.88	0.20
31-Aug-89	16:11:10	3.17	0.16	43.90	0.18
31-Aug-89	16:11:20	3.33	0.15	43.91	0.17
31-Aug-89	16:11:30	3.50	0.14	43.92	0.16
31-Aug-89	16:11:40	3.67	0.13	43.93	0.14
31-Aug-89	16:11:50	3.83	0.12	43.94	0.13
31-Aug-89	16:12:00	4.00	0.11	43.95	0.12
31-Aug-89	16:12:10	4.17	0.10	43.96	0.11
31-Aug-89	16:12:20	4.33	0.09	43.97	0.10
31-Aug-89	16:12:30	4.50	0.08	43.98	0.09
31-Aug-89	16:12:40	4.67	0.07	43.99	0.08
31-Aug-89	16:12:50	4.83	0.07	43.99	0.08
31-Aug-89	16:13:00	5.00	0.06	44.00	0.07
31-Aug-89	16:13:20	5.33	0.05	44.01	0.06
31-Aug-89	16:13:40	5.67	0.04	44.02	0.04
31-Aug-89	16:14:00	6.00	0.04	44.02	0.04
31-Aug-89	16:14:20	6.33	0.03	44.03	0.03
31-Aug-89	16:14:40	6.67	0.03	44.03	0.03
31-Aug-89	16:15:00	7.00	0.02	44.04	0.02
31-Aug-89	16:15:30	7.50	0.02	44.04	0.02
31-Aug-89	16:16:00	8.00	0.01	44.05	0.01
31-Aug-89	16:16:30	8.50	0.01	44.05	0.01
31-Aug-89	16:17:00	9.00	0.00	44.06	0.00

Appendix I: Chemical Sampling Protocol and Documentation

Sampling Protocol Prepared by GWRC.
Used Prior to September 27, 1989.

SAMPLE COLLECTION PROCEDURES

			Lab Bottle Number
I. Containers			
A.	PCBs:	Four 1-liter glass bottles with no preservative per sample	13 or Amber Glass
	NOTE:	ENRON has requested 100% splits on PCB samples, thus 2 bottles/sample for GWRC, 2 bottles per sample for ENRON.	
B.	VOCs:	Three 40-ml VOA vials **with preservative** per sample	VOA vial
C.	B/NAs:	Two 1-liter glass bottles with no preservative per sample	Amber Glass
D.	Common Ions:	One 500 ml plastic bottle with no preservative per sample	1D
E.	Nitrate:	One 16 oz glass bottle **with preservative** per sample	2T
F.	Trace Metals (Dissolved):	One 500 ml plastic bottle with no preservative per sample	4D

II. Sample Collection - Individual Parameter Groups

A. PCBs

1. Use 1 liter unpreserved glass containers with Teflon caps
2. a. Fill two containers for each GWRC sample (including blanks and dups). NOTE: Second container requested by lab as backup.
   b. Fill two containers for each ENRON split sample
3. Do NOT prerinse containers
4. Fill containers at least to neck of bottle
5. Collect one field blank (one set of four containers) and two field duplicates (two sets of four containers). See Section III, QC sampling procedures. NOTE: Prepare PCB QC sample splits for ENRON.
6. ENRON splits go in separate cooler
7. NOTE: Holding time for PCB samples is 72 hours prior to extraction, 40 days thereafter. Sample pH must be within 5-9 range if samples not extracted within 72 hours of collection. Please call the office for further instructions if groundwater pH exceeds this range.

B. VOCs
1. Use three 40 ml **preserved** VOA vials per sample (amount requested by lab)
2. Vials contain acid preservative (HCL), therefore do NOT prerinse vials and avoid contact with acid.
3. Fill vials with no headspace
4. Collect one trip blank, (prepared by lab), one field blank (one set of three containers), and two duplicates (two sets of two containers). See QC sample procedures.

C. B/NAs
1. Use two 1-liter unpreserved glass bottles per sample
2. Do NOT prerinse bottles
3. Collect one field blank (one set of two containers) and two field duplicates (two sets of two containers)

D. Common Ions
1. Use one 500 ml unpreserved plastic bottle per sample
2. Prerinse bottle with sample water
3. Do NOT collect trip blank for common ions. Even if one has been prepared by lab, do not submit it for analyses.

E. Nitrate
1. Use one 16 oz glass container **preserved with Sulfuric Acid** (2 mls) for each sample
2. Do NOT prerinse bottle. Avoid contact with acid.
3. Do NOT collect trip blank for nitrate

F. Trace Metals
1. Use one 500-ml **unpreserved** plastic bottle per sample
2. Prerinse sample bottle
3. Indicate on sample label that analyses is for **DISSOLVED** metals
4. Indicate on chain-of-custody and analytical request schedule that Dissolved Trace Metal samples be **filtered and acidified upon receipt at the laboratory**

III. Sample Collection - Quality Control Samples

A. Sample Splits
1. Collect 100% splits (two containers per sample) of PCB samples for ENRON. This includes Field blank and duplicates collected for PCB analyses.
2. Store ENRON samples in separate cooler

B. Trip Blanks
1. Trip blanks for VOC analyses have been prepared by the laboratory
2. Trip blanks must be kept in coolers with VOC samples at all times
3. Trip blanks must be labelled as "Trip Blank" and type of analyses (i.e., VOCs by 624). NOTE: Lab has prepared trip blanks for each type of analyses. Even so, do NOT

submit trip blank for PCBs, B/NAs, common ions, nitrate or trace metals.

C. Field Blanks
1. Collect same number of containers for field blanks as for sample (i.e., three vials for VOC analysis)
2. Fill one field blank with distilled water at any well site (Note well site in field notes.) Field blank will be comprised of two 1-liter glass containers for PCB analyses, three 40-ml vials for VOC analyses and two 1-liter glass containers for PCB analyses.
3. Label "Field Blank," parameter and method
4. Return to cooler with other like samples

D. Duplicates
1. Collect two sets of duplicates for organics
2. Collect duplicates in same number of containers as for samples, with sample water from two different wells. Duplicates will be comprised of containers for PCBs, VOCs and B/NAs.
3. Fill containers after collecting primary samples at well
4. Label duplicate samples with "A" after well number

E. If NOT using dedicated pump or bailer, take one equipment blank for each group of organic parameters. (Distilled water rinseate collected after equipment has been cleaned between well sites.) Label "equipment blank," note time and location on field notes.

IV. Miscellaneous

A. Sample labels have been provided by lab, please use them if adequate.

B. Indicate lab bottle number on chain-of-custody and analytical request schedule forms

C. For organics, indicate parameters and methods on sample labels and sample forms

VOCs method 624
B/NAs method 625
PCBs method 608

D. Inorganics
1. For Trace Metals, indicate DISSOLVED on all labels and forms
2. On analytical request schedule indicate individual metals and request for lab filtration and acidification

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium (Tot), Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Zinc

3. For Common Ions, list individual ions on analytical request schedule

   Calcium, Magnesium, Sodium, Potassium, Carbonate, Bicarbonate, Chloride, Sulfate, Fluoride, Boron, Silica, TDS

Groundwater Resources Consultants,
1020 S. Euclid Ave.
Tucson, Arizona 85719
(602) 629-0909

ENRON - NEW MEXIC

CHAIN OF CUSTODY RECORD

Client name		Job number
Project name		
Project manager	Sampler(s)	

Sample number	Date sampled	Time sampled	Type Composite or Grab	Sample description	Number of containers	PCBs (608)	PRIORITY VOCs (624)	PRIORITY B/NAs (625)	COMMON IONS	NITRATE	DISS. TRACE METALS	Hazardous sample	Special handling required	Remarks * SEE BOTTOM OF PAGE

	Signature	Company	Date	Time
Relinquished by				
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by				

☐ DISSOLVED TRACE METALS: PLEASE FILTER AND ACIDIFY UPON RECEIPT AT LABORATORY
☐

PROJECT NO. 89310

LABORATORY REQUEST SCHEDULE

ORGANIC ANALYSES

ENRON - NEW MEXICO

*******EPA ORGANIC PRIORITY POLLUTANTS*******

SAMPLE IDENTIFIER	DATE SAMPLED	PCBs (Method 608)	VOLATILE ORGANICS (Method 624)	BASE/NEUTRAL AND ACID ORGANICS (Method 625)	OTHER (Method ______)	OTHER (Method ______)	REMARKS and/or additional analysis to be performed

PROJECT NO. 89310

LABORATORY REQUEST SCHEDULE

INORGANIC ANALYSES

ENRON - NEW MEXICO

SAMPLE IDENTIFIER	DATE SAMPLED	COMMON IONS[1]	DISSOLVED[2/] TRACE METALS	NITRATE	REMARKS and/or additional analysis to be performed

1 COMMON IONS:

Bicarbonate	Calcium	Chloride	Magnesium	pH	Silica	TDS
Boron	Carbonate	Fluoride	Potassium	Sodium	Sulfate	

2 TRACE METALS (DISSOLVED):

Antimony	Beryllium	Copper	Manganese	Nickel	Strontium
Arsenic	Cadmium	Iron	Mercury	Selenium	Thallium
Barium	Chromium(total)	Lead	Molybdenum	Silver	Zinc

* NOTE: Please filter and acidify trace metal samples upon receipt at laboratory.

Standard Operating Procedures and
Health and Safety Plan Prepared by and
Used by DBS&A for all Sampling
from September 27, 1989 Forward.

DANIEL B. STEPHENS & ASSOCIATES, INC.
CONSULTANTS IN GROUND-WATER HYDROLOGY

• GROUND-WATER CONTAMINATION • UNSATURATED ZONE INVESTIGATIONS • WATER SUPPLY DEVELOPMENT •

Standard Operating Procedure

For

Soil Sampling

prepared for

Transwestern Pipeline Company

Prepared By	[signature]	Date	9/27/89
Reviewed By		Date	
Approved By	[signature]	Date	9/27/89

4115 Hawkins NE Albuquerque, New Mexico 87109 (505) 345-4567 FAX 345-4560

Standard Operating Procedure
for
Soil Sampling
Prepared for
Transwestern Pipeline Company

1. PURPOSE

The intent of this Standard Operating Procedure (SOP) is to provide technical guidance to Daniel B. Stephens & Associates, Inc. (DBS&A) field personnel for the collection and handling of soil samples. This document contains specific guidelines for

1) sampling equipment decontamination, preparation, and handling;

2) sample collection;

3) sample preservation, handling, and shipping;

4) chain of custody procedures.

2. Equipment Preparation

Care will be taken to ensure that all field equipment is clean and in proper operating condition prior to departure for the field. This requires that each piece of equipment be inspected, cleaned, calibrated (if necessary) at the DBS&A offices prior to the start of field activities. Any deficiencies will be reported immediately to the project manager.

2.1 Sampling Equipment Cleaning

2.1.1 <u>Soil Sampling Equipment</u>

The soil sampling equipment shall be thoroughly decontaminated before each use. The cleaning method shall include the following, at minimum:

i) All sampling equipment (split spoons, drive shoes, sample rings, spatulae, etc.) will be scrubbed in a clean wash tub containing a non-phosphate detergent in distilled/deionized water solution. All scrub brushes and washing equipment will be clean and appropriate for such use; no wood handled washing brushes are to be used. Fresh vinyl or latex gloves will be worn during the entire washing and rinsing operation.

ii) The equipment will be rinsed in distilled/deionized water.

iii) The equipment will be thoroughly steam cleaned and placed in a clean protected area until use.

2.1.2 <u>Sampling Equipment Handling and Decontamination</u>

All down-hole sampling equipment will be cleaned between sampling events. The sampling equipment will be thoroughly washed in a LIQUINOX solution, followed by a tap water rinse, followed by a thorough steam cleaning. If considerable hydrocarbon contamination is encountered, it may be necessary to wipe the sampling equipment with an acetone-wetted cloth prior to the tap water rinse, or to steam-clean the equipment prior to the LIQUINOX wash.

3. SAMPLE COLLECTION

3.1 Soil Sample Collection and Logging Procedures

Two types of samples will be collected during the drilling operations:

i) Soil-water chemistry samples

ii) Geologic samples, for detailed geologic logging

All samples will be collected at 5 foot intervals to 35 feet below land surface using a modified California, ring-type sampler. The sampler will be driven into the borehole using a top mounted hammer. Blow counts will be recorded for all sampler driving events. The total depth of penetration of the sampling equipment will be noted in order to verify that the samples are representative of the indicated horizon.

Upon retrieval, the core barrel will be opened on a clean surface using clean vinyl or latex gloves and a decontaminated spatula. The individual samples will be collected according to the following scheme: i) The samples to be collected for chemical analysis will be collected first. These samples will be selected from an interior stainless steel ring, away from any possible sloughed or disturbed material at the ends of the core barrel. Geologic samples will be collected last, and have the lowest priority. If necessary, geologic samples may be collected from loose (obviously non-sloughed) material and from partially filled rings. All remaining loose, non-slough, material will be placed in a zip-lock baggie for geologic logging and possible headspace analysis.

3.2 Soil-Water Chemistry Sample Collection

Soil samples for later analysis of pore-fluid chemistry will be collected using a split-spoon sampler, a modified California ring-type sampler, or, in the event that either of these methods is inapplicable, an appropriate alternate method. Once the core barrel is opened, the soil-water chemistry sample ring will be removed from the sample collection device using a clean spatula. One end of the sample reing will be immediately covered with a teflon membrane and a plastic end cap. The other end will be covered in a like manner as quickly as possible. Once both ends are capped, the caps should be secured by wrapping with vinyl tape. If absolutely necessary, due to sample disturbance, insufficient sample within the rings, etc., the soil samples may be removed from the ring or sampling device, and quickly packed into pre-cooled, 250 ml wide-mouth glass bottles with teflon liners. The soil will be packed tightly into the sample bottles, and headspace will be minimized. All scoops, spatulas, and sampling equipment will be cleaned according to the cleaning guidelines outlined previously. The immediate work area within the sample collection area will be cleaned between sampling events. Full sample rings and bottles will be shielded from direct sunlight and placed into a cooler as soon as possible after collection. Fresh latex gloves shall be worn during the sampling operations.

3.3 Geologic Samples

Upon retrieval, the geologic samples will be removed from the core barrel, and visually examined, logged, labeled, and placed in appropriate containers for storage. The following parameters should be noted on a log form:

i) Approximate moisture content.

ii) Sample description based on particle size.

iii) Particle size gradation, or any trends in particle size distribution.

iv) Particle lithology, if evident in the hand sample.

v) Degree of sorting.

vi) Sample color.

vii) Organic vapor levels of the headspace over the samples within the sampling equipment, and within the sample bags once the samples have been placed in their appropriate containers, if measured.

Loose split-spoon geologic samples will be placed in Zip-Loc type bags, which have been labeled to indicate the project number, borehole name, depth increment, date and time of sample collection, sampling personnel present, and approximate sample description. Ring-type geologic samples will be wrapped in aluminum foil prior to being placed in labeled Zip-Loc bag. In addition, an orientation arrow will be marked on the rings, and on the aluminum wrap of the ring-type samples. After collection and geologic logging, all geologic samples will be stored in a fiberboard or other suitable box.

4. QA/QC AND CHAIN OF CUSTODY

The chain of custody program shall include the following elements:

1) Standardized sample labels, as provided by the analytical laboratory. Information to include: sample name/ID number, project ID number, parameters to be analyzed for, date and time of sample collection, and collectors name. The labels are to be permanently affixed to each bottle and vial, and shall be filled out prior to sample collection.

2) Cooler Seal. A chain of custody seal shall be placed across the gap between the cooler body and the lid in order to ensure that the samples have not been tampered with during transit. Each cooler seal shall be dated and initialed by the collector.

3) Chain of custody record. An appropriate chain of custody form shall be used.

4) Field logbook.

A field logbook shall be maintained which includes entries on:

* date and time of each activity
* well ID
* well depth
* depth to samples interval and measurement method
* presence of contamination
* total blow count
* approximate sample recovery
* sample collection and drilling method
* sequence of sample collection
* sample ID numbers
* analyses requested
* preservatives and sample containers used
* field personnel involved in sample collection
* shipper and shipping date/time
* calibration and testing of equipment
* field observations
* weather conditions

Standard Operating Procedure
for
Soil and Ground-Water Sampling

1. PURPOSE

The intent of this Standard Operating Procedure (SOP) is to provide technical guidance to Daniel B. Stephens & Associates, Inc. (DBS&A) field personnel for the collection and handling of ground-water quality samples. This document contains specific guidelines for

1) sampling equipment cleaning, preparation, and handling;

2) well and well-head preparation;

3) sample collection;

4) sample preservation, handling, and shipping;

5) quality control/quality assurance; and

6) chain of custody procedures.

2. DUTIES AND RESPONSIBILITIES

It is the direct responsibility of the DBS&A project manager to ensure that all requirements and procedures contained in this SOP are followed during the field program. In addition, the DBS&A project manager shall provide all DBS&A field personnel with copies of this SOP, which they are required to read and keep available at all times during the field work.

The following personnel will be involved in the sampling program:

Jeffrey A. Havlena	Project Manager/Health and Safety Officer
Greg Lewis	Staff Hydrologist
Kevin Myers	Staff Hydrologist
Andrew Orrell	Staff Geologist

2.1 Project Manager

The project manager is responsible for the completion of all field activities as specified in this SOP and in the Work Plan for Ground-Water Quality Sampling (WP). The project manager shall monitor daily manpower requirements and expenditures, and shall be responsible for compliance to preliminary budget estimates. The project manager shall approve and be responsible for the development and implementation of subcontractor contracts, work agreements, work plans, SOP's, and health and safety plans. The project manager shall be responsible for operational decisions necessary to implement the work plan, SOP's, and health and safety plan.

2.2 Project Hydrogeologist

The project hydrogeologist shall be responsible for implementation of the field program as specified in the WP and this SOP. These duties are to include, but shall not be limited to 1) equipment and supply purchase, rental, maintenance, calibration, and preparation; 2) scheduling and logistics; 3) supervision of field personnel to ensure proper use of equipment and correct implementation of quality assurance/quality control measures; 4) preparation of contracts, work agreements, work plans, SOP's, and Health and Safety plans, and 5) interpretation of data. The project hydrogeologist shall also provide assistance to the DBS&A field personnel when necessary.

2.3 Health and Safety Officer

The health and safety officer shall be responsible for strict adherence to the site and project specific health and safety plan (H&S). The health and safety officer or the appointed health and safety facilitator will monitor on site health and safety issues, advise field personnel and sub- contractors of site specific health and safety concerns, conduct daily tailgate health and safety meetings, conduct the initial team health and safety briefing, and shall report directly to the project manager.

2.4 Staff Hydrologist/Engineer /Geologist

The staff hydrologist/engineer shall be responsible for executing the assigned tasks according to the procedures and techniques outlined in the work plan, the health and safety plan, and this SOP. The staff hydrologist shall read each of the above plans, and shall be familiar with the material contained therein; the staff hydrologist is responsible for the safe and timely completion of all assigned tasks.

3. Equipment Preparation

Care will be taken to ensure that all field equipment is clean and in proper operating condition prior to departure for the field. This requires that each piece of equipment be inspected, cleaned, calibrated, and bench-tested in the DBS&A soil-water laboratory at least three days prior to the start of field activities. Any deficiencies will be reported immediately to the project manager.

Table 1 lists the equipment that shall be taken to the site.

3.1 Sampling Equipment Cleaning

3.1.1 Soil Sampling Equipment

The soil sampling equipment shall be thoroughly decontaminated before each use. The cleaning method shall include the following, at minimum:

i) All sampling equipment (split spoons, drive shoes, sample rings, spatulae, etc.) will be scrubbed in a clean wash tub containing a non-phosphate detergent in distilled water solution. All scrub brushes and washing equipment will be clean and appropriate for such use; no wood handled washing brushes are to be used. Fresh latex gloves will be worn during the entire washing and rinsing operation.

ii) The equipment will be rinsed in distilled deionized water.

iii) The equipment will be thoroughly steam cleaned and placed in a clean protected area until use.

3.1.2 Ground-Water Sampling Equipment

All sampling equipment that may come in direct contact with ground water shall be cleaned prior to each use in order to reduce the possibility of introducing contaminants into the ground water or sample. The cleaning method used shall be 1) appropriate for the type of analysis to be performed on the sample, or, 2) according to the location of the well with respect to areas of known contamination, or, 3) according to the type of sampling equipment used, or, 4) according to the presence or absence of free product within the well.

For wells to be sampled for inorganics and/or metals, or wells outside of the area of known ground-water contamination, the following procedures shall be used:

i) Wash the equipment in non-phosphate detergent (LIQUINOX) and tap water. All surfaces that may come in direct contact with ground water are to be washed. A clean NALGENE tub will be used to contain the wash solution. Latex gloves will be worn during the entire washing and rinsing process.

ii) The first rinse shall be dilute (0.1 N) hydrochloric acid.

iii) The final rinse shall be distilled/deionized water.

iv) The equipment will be dried before use, to the extent practical.

For sampling equipment to be used for collection of ground-water samples for organics analysis, the following cleaning procedures shall be followed:

i) The equipment is to be washed according to the procedures for inorganics and/or metals.

ii) The first rinse shall be clear tap water.

iii) The second rinse shall be distilled/deionized water.

iv) The third rinse shall be distilled/deionized water.

v) The final rinse shall be organic free water.

vi) The equipment shall be thoroughly dried before use, to the extent practical.

Care shall be taken to ensure that clean sampling equipment does not contact the ground or any other potentially contaminated surface. All wash and rinse water from potentially contaminated equipment shall be contained on site in approved sealed and labeled 55 gallon drums, pending the results of analytical testing. The wash and rinse water will be changed frequently; wash and rinse water will be changed after each use when cleaning obviously contaminated equipment. Latex gloves will be worn by all personnel directly involved in equipment cleaning. Fresh latex gloves shall be worn for each cleaning event, or more frequently, as conditions require.

All cleaned equipment shall be stored in clean, labeled boxes. In addition any equipment that may come in direct contact with ground water or water quality samples shall be wrapped in clean, aluminum foil or inert plastic.

3.2 Equipment Calibration and Testing

All equipment shall be calibrated and bench-tested prior to departure for the field. The following equipment shall be calibrated, adjusted, and tested according to manufacturers instructions (enclosed in the individual equipment cases):

* pH/MV meter
* Temperature Meter
* conductivity meter
* pump controller/driver

All Calibration and Bench-testing shall be documented, in addition to the initial calibration and bench-testing, all meters shall be inspected daily for operation and calibration. All equipment shall be cleaned after each day of use, or more often, as necessary.

3.3 Soil Sample Collection and Logging Procedures

Four types of samples will be collected during the drilling operations:

i) Soil-water chemistry samples

ii) Geologic samples, for detailed geologic logging

iii) Soil hydraulic properties samples, for determination of hydraulic conductivity and other properties by the DBS&A Hydrology Laboratory.

iv) Initial moisture content, porosity, bulk density

All samples will be collected at 10 foot intervals using a modified California, ring-type sampler. The sampler will be driven into the borehole using a top mounted hammer. Blow counts will be recorded for all sampler driving events. The total depth of penetration of the sampling equipment will be noted in order to verify that the samples are representative of the indicated horizon.

Upon retrieval, the core barrel will be opened on a clean surface using clean latex gloves and a decontaminated spatula. The individual samples will be collected according to the following scheme: i) The samples to be collected for chemical analysis will be collected first. These samples will be selected from an interior stainless steel ring, away from any possible sloughed or disturbed material at the ends of the core barrel. The samples for initial moisture content determination are to be determined next. The samples for hydraulic properties analysis will be collected next. These samples will be selected from a suitable ring, according to the same criteria as the chemistry samples. Geologic samples will be collected last, and have the lowest priority. If necessary, geologic samples may be collected from loose (obviously non-sloughed) material and from partially filled rings. All remaining loose, non-slough, material will be placed in a zip-lock baggie for geologic logging and headspace analysis.

3.3.1 <u>Soil-Water Chemistry Sample Collection</u>

Collection of soil samples for later analysis of pore-fluid chemistry will be conducted during the drilling portion of the program. Soil samples will be collected using a split-spoon sampler, a modified California sampler, or, in the event that either of these methods is inapplicable, an appropriate alternate method. The soil sample ring will be removed from the sample collection device, and the ends of the sampling ring will immediately be covered with teflon membrane, end caps placed over the teflon membrane, and wrapped thoroughly with vinyl tape. If absolutely necessary, due to sample disturbance, insufficient sample within the rings, etc., the soil samples may be removed from the ring or sampling device, and quickly packed into pre-cooled, pre-labeled 250 ml wide-mouth glass bottles with teflon liners. The soil will be packed tightly into the sample bottles, and headspace will be minimized. All scoops, spatulas, and sampling equipment will be cleaned according to the cleaning guidelines outlined previously. The immediate work area within the sample collection area will be cleaned between sampling events. Full sample rings and bottles will be shielded from direct sunlight and placed into a cooler as soon as possible after collection. Fresh latex gloves shall be worn during the sampling operations.

3.3.2 <u>Geologic Samples</u>

Upon retrieval, the geologic samples will be removed from the core barrel, and visually examined, logged, labeled, and placed in appropriate containers for storage. The following parameters should be noted on the DBS&A Boring Log form:

i) Approximate moisture content.

ii) Sample description based on particle size.

iii) Particle size gradation, or any trends in particle size distribution.

iv) Particle lithology, if evident in the hand sample.

v) Degree of sorting.

vi) Sample color.

vii) Organic vapor levels of the headspace over the samples within the sampling equipment, and within the sample bags once the samples have been placed in their appropriate containers.

Loose split-spoon geologic samples will be placed in Zip-Loc type bags, which have been labeled to indicate the project number, borehole name, depth increment, date and time of sample collection, sampling personnel present, and approximate sample description. Ring-type geologic samples will be wrapped in aluminum foil prior to being placed in labeled Zip-Loc bag. In addition, an orientation arrow will be marked on the rings, and on the aluminum wrap of the ring-type samples. After collection and geologic logging, all geologic samples will be stored in a fiberboard or other suitable box.

3.3.3 Soil Hydraulic Properties

In conjunction with geologic and chemistry sample collection, undisturbed samples will be collected at 10 foot intervals for laboratory analysis of hydraulic properties. These samples will be collected from adjacent to the chemistry sample within the same ring sampler device as the other samples. The ends of the sample will be visually checked for integrity; the sample should appear undisturbed, and shall occupy the entire ring volume, leaving no void space. If there is any question as to the integrity and suitability of the samples, an additional suite of samples will be collected from immediately below the sampled interval.

Immediately upon collection and verification of integrity, the sample ring will be marked and sealed. Sample ring marking shall include an up-down orientation arrow on the body of the ring, and borehole number depth interval, time and date, collector, and type of sample shall be indicated on the upper plastic end caps will be sealed tightly with at least three windings of vinyl tape. Samples will be stored in a cool, shaded area, within a cushioned container, and transported to the DBS&A Hydrology Lab for analysis.

3.3.4 Sampling Equipment Handling and Decontamination

All down-hole sampling equipment will be cleaned between sampling events. The sampling equipment will be thoroughly washed in ALCONOX solution, followed by a tap water rinse, followed by a thorough steam cleaning. If considerable contamination is encountered, it may be necessary to wipe the sampling equipment with an acetone-wetted cloth prior to the tap water rinse, or to steam-clean the equipment prior to the ALCONOX wash.

4. GROUND-WATER SAMPLING

4.1 Well and Wellhead Preparation

Prior to ground-water sample collection, the following shall be conducted:

i) The area around the wellhead shall be inspected for integrity, cleanliness, and signs of possible contamination.

ii) A clean plastic sheet shall be spread over the ground around the wellhead.

iii) The cap on the wellhead shall be removed. Any obvious odors within the wellbore should be noted.

iv) The static water level shall be measured to the nearest 0.01 foot using a chalked steel tape, or an appropriate water level sounder. The presence of any contamination on the tape after use shall be noted. The tape shall be cleaned after each use in order to prevent cross contamination.

v) In order to check for floating product, a bailer shall be used to extract a sample from the surface of the water within the well. After an initial visual inspection, the fluid from the bailer shall be slowly poured into a small tub or container in order to check for a sheen or any other sign of free product. Any obvious odors shall be also noted. If free product is detected, the bailer shall be used to remove as much free product as is possible from the wellbore. Whenever a bailer is used within the wellbore, it shall be lowered into the water slowly in order to prevent degassing. All recovered product shall be contained for proper disposal. After any free product has been removed from the wellbore, a fresh plastic sheet shall be emplaced around the wellhead, and all contaminated equipment shall be cleaned, or segregated from the other equipment.

vi) The well shall be purged at a flow rate equal to, or greater than the sampling rate. The following field parameters: temperature, pH, MV, conductivity,
shall be measured at the pump outlet and within a clean container every 0.5 casing volume pumped, or more frequently. Purging shall be considered complete when the above parameters are approximately stable over at least one casing volume. However, a minimum of three (3) casing volumes shall be purged from each well. All fluid from obviously contaminated wells shall be contained for later disposal; anomalous values for the above field parameters, odor, visible sheen, or the presence of free product may be taken as signs of contamination.

Careful notes shall be taken during all of the above activities in order to document all pertinent conditions during the sampling event. In addition, a well sampling form shall be used during well purging and sampling.

4.2 Ground-Water Sample Collection

Once the well has been sufficiently purged, the water quality samples shall be collected. The samples should be collected using a dedicated teflon bailer with a bottom emptying device or a teflon bladder pump as soon as is possible after purging is complete in order to reduce the possibility of volatilization within the wellbore. Under no circumstance should the well be allowed to stand for more than three hours between purging and sample withdrawal.

Samples shall be collected in decreasing order of volatility; volatile organics samples shall be collected first. The pumping rate during sample collection should never equal or exceed the rate at which the well was purged, or, as specified for each suite of analyses. Samples shall be collected only in approved containers, according to the analysis to be performed.

Samples for volatile organics analysis EPA 624 shall be collected in pre-cooled, pre-acidified, certified-clean, 40 ml, borosilicate vials with teflon septae supplied by the analytical laboratory. The pumping rate during collection shall be maintained at less than 100 ml per minute. The water stream shall be directed against the inside surface of the vial, and should be allowed to overflow at least 20 ml. A convex meniscus should be allowed to form across the mouth of the filled vial. The outlet of the sampling pump discharge tubing should never be allowed to come into direct contact with the sample vial or the water within the vial. The vial should then be carefully capped and checked for bubbles before being wrapped and placed into the cooler. If air bubbles are present, the vial shall be emptied, and the filling procedure repeated.

Samples to be analyzed for PCB (via EPA Method 608) and EPA 625 shall be collected in pre-cooled, certified-clean, 1 liter, narrow-mouth, amber, glass bottles with teflon lined cap. The flow rate shall not exceed that used during well purging. The outlet of the sampling pump discharge tubing shall not contact the sample bottle or the water within the sample bottle. The sample bottle shall be filled to approximately full by directing the sample stream down the inside surface of the bottle. The bottle shall be capped immediately after sample collection.

Samples to be analyzed for major ions/inorganics shall be collected in pre-cooled, clean, 1 liter, plastic bottles or cubitainers. The procedures to be followed during sampling shall be as listed above for polynuclear aromatic hydrocarbons. Samples to be analyzed for metals shall also be collected according to the above procedures, however, the water sample shall be pressure filtered through a clean 0.45 micron filter, and the sample shall be acidified to a pH of <2 with nitric acid immediately upon collection.

After all water quality samples have been collected, the field parameters shall be measured for a final time to ensure that the samples are representative of the aquifer water. If the field parameters are significantly different from the pre-sampling measurement, then the well shall be repurged until the field parameters stabilize, and new samples shall be collected.

All full sample bottles and vials shall be wrapped (glass vials and bottles in bubble wrap) and placed immediately in a cooler. The cooler shall be kept at 4° C by placing at least 8 pounds of cube ice within leak-proof plastic baggies in the cooler. The bags of ice shall be placed in close contact the sample bottles and vials; both on the side of, and on top of, the bottles and vials. Sample bottles and vials shall be protected from direct sunlight during and after sample collection. Full coolers shall be sealed with strapping tape, and mailed VIA Federal Express to the analytical laboratory. Coolers shall be mailed within 24 hours of collection; sooner, if possible to:

Rocky Mountain Analytical Laboratory
Enesco Incorporated
4955 Yarrow Street
Arvada, CO 80002
(303)421-6611

Attn: Cindy Ingram

5. QUALITY ASSURANCE/QUALITY CONTROL

5. QUALITY ASSURANCE/QUALITY CONTROL

The key elements in the quality assurance/quality control (QA/QC) program are sample splits, replicates, blanks, spikes, and fictitious samples. Table 2 lists the types and frequency of QA/QC samples.

6. CHAIN OF CUSTODY

The chain of custody program shall include the following elements:

i) Standardized sample labels, as provided by the analytical laboratory. Information to include: sample name/ID number, project ID number, parameters to be analyzed for, date and time of sample collection, and collectors name. The labels are to be permanently affixed to each bottle and vial, and shall be filled out prior to sample collection.

2) Cooler Seal. A chain of custody seal shall be placed across the gap between the cooler body and the lid in order to ensure that the samples have not been tampered with during transit. Each cooler seal shall be dated and initialed by the collector.

3) Field Logbook

A field logbook shall be maintained which includes entries on:

* date and time of each activity
* well ID
* well depth
* depth to water and measurement method
* presence of free product
* total purged volume
* well purging method
* purge pumping rate
* approximate well yield
* duration of purge pumping
* sample collection and pumping method
* sequence of sample collection
* sample ID numbers
* analyses requested
* preservatives and sample containers used
* field personnel involved in sample collection
* field parameters
* shipper and shipping date/time
* calibration and testing of equipment
* field observations
* weather conditions

4) Chain of custody record. A chain of custody form shall be used.

7. REVISIONS TO THIS SOP

The methods and procedures contained within this SOP are to be followed rigorously by DBS&A field personnel during the field program. Any deviation from the guidelines contained herein shall not be allowed, unless authorized in writing by the project manager. All such deviations shall be thoroughly documented by the project manager, who has ultimate responsibility for any variance from this SOP. Such documentation shall include reference to the procedure to be revised, a description of the revised procedure, reason for the revision, anticipated effect of the revision (especially with respect to the QA/QC program), personnel involved in the procedure, and the date and time of implementation of the revised procedure.

8. FIELD TEAM BRIEFINGS

Prior to departure to the field, the DBS&A field team shall meet to discuss the objectives and methods of the field program. The work plan, this SOP, and the health and safety plan shall be discussed in detail by the project manager during the briefing. All of the above plans and SOP's shall have been reviewed by the team members prior to the meeting; all aspects of the field program shall be familiar to all members of the team. In addition to the initial briefing, daily team meetings shall be conducted by the project hydrologist in conjunction with the tailgate health and safety meetings, in order to allow discussion on the anticipated activities of the day.

9. ACKNOWLEDGEMENT

The undersigned have read this SOP, and shall adhere to the methods and procedures described therein:

Name	Title	Date

TABLE 1. FIELD EQUIPMENT

	Sample Bottles - 24 Aqueous PNA, 24 Aqueous VOA, 12 Aqueous Inorganics, 12 Dissolved Metals, 5 VOA Trip Blanks, 48 250ml VOA Soil Jars
3	Coolers
1	3 foot Teflon Bailer with bottom emptying, VOA sampling device
1	Bailer Tripod
1	Bailer Reel
150ft	Teflon Coated Bailer Cord or natural twine
1	QED Pump Controller/Driver with Fittings
18	Sample Pro Filters
10	Hand Filters with Hand Pump
1	Conductivity Meter
1	pH/MV Meter
1	D.O./Temp Meter
24	Tyvek Suits
36 pr	Tyvek Boot Covers
2	North Medium Respirators
10	Organic Vapor Cartridges
10	Dusts/Mists Pre-Filters
200 pr	Latex Gloves
2 pr	Neoprene Gloves
2 pr	Leather Gloves
2 pr	Safety Goggles

TABLE 1. FIELD EQUIPMENT (continued)

1 doz	Disposable Ear Plugs
3	Hard Hats
2 pr	Steel Toed Boots
2 pr	Steel Toed Swamp Boots
2	Plastic Cleaning Trays
1	32 gal Plastic Pail
2	2 gal Plastic Buckets
2	6 gal Plastic Water Jugs
1	Nalgene Dish Pan
1	Plastic Dish Pan
1	Roll Plastic Sheeting
1	Tarp
1	Roll 24" Aluminum Foil
1	gal Liquinox
10 packets	Alconox
5 rolls	Paper Towels
5 rolls	Bubble Wrap
1 roll	Duct Tape
1 rolls	Strapping Tape
2 rolls	Package Tape
≥1 gal	Acetone
4 gal	Hexane
50 gal	Distilled/Deionized Water
1	Truck Tool Kit

TABLE 1. FIELD EQUIPMENT (continued)

1	M-Scope
1	Powers Electric Well Rounder
1	Steel Tape for Clean Wells
4	Carpenter Chalk
1	Field Log Book
10	Chain of Custody Forms (Organics)
10	Chain of Custody Forms (Inorganics)
10	Chain of Custody Seals
1	Miscellaneous Equipment Kit

TABLE 2.

SAMPLE TYPE	DESCRIPTION	FREQUENCY OF COLLECTION
Aqueous Primary	Primary Water Quality Sample	Each Well/Sampling Point
Soil Primary	Primary Soil Sample	Each Sampling Interval (10 feet)
Replicate	Replicate to be collected at the same time as the Primary Sample. To be labeled "Replicate"	Every 10th Primary
Trip Blank	Distilled/Deionized water. prepared by contract lab	One per cooler (VOA only)
Aqueous Equipment Blank	Distilled/Deionized water. to be run through field-cleaned sampling pumps	One per day
Fictitious Sample	Replicate sample labeled with fictitious sample name	Every 20th primary
Split	Replicate sample sent to different lab	Every 20th primary
Spike	Blank prepared with known concentration of desired analyate	Every 20th primary

DANIEL B. STEPHENS & ASSOCIATES, INC.
CONSULTANTS IN GROUND-WATER HYDROLOGY

• GROUND-WATER CONTAMINATION • UNSATURATED ZONE INVESTIGATIONS • WATER SUPPLY DEVELOPMENT •

TRANSWESTERN PIPELINE COMPANY

SOIL AND GROUND-WATER INVESTIGATION

HEALTH AND SAFETY PLAN

FOR

SOIL BORING AND SOIL SAMPLING

Prepared By: [signature] Date: 9/27/89

Reviewed By: ______ Date: ______

Approved By: [signature] Date: 9/28/89

TRANSWESTERN PIPELINE COMPANY

SOIL AND GROUND-WATER INVESTIGATION

HEALTH AND SAFETY PLAN

FOR

SOIL BORING AND SOIL SAMPLING

1. INTRODUCTION

The health and safety plan contains guidelines for worker safety during the drilling program. The purpose of this plan is to familiarize the field personnel with safe operating procedures, and to serve as a guideline for the implementation of these procedures. The proposed drill site for the soil boring is near the pig receiver, at a location to be selected in coordination with Enron personnel.

1.1 Potential Contamination

Low to moderate levels of polychlorinated biphenol have been documented within the soil 20 feet north of the proposed drill site. Benzene and toluene have been detected in water samples from a well tapping the perched water zone. This well is within 50 feet of the proposed drill site. There is a potential for these compounds to be encountered in low to moderate levels in the soil boring.

Based on currently available information, Level C decontamination, and Health and Safety procedures are to be followed.

2. DUTIES AND RESPONSIBILITIES

It is the direct responsibility of the DBS&A project manager to ensure that all requirements and procedures contained in this Health & Safety Plan are followed during the field program. In addition, the DBS&A project manager shall provide all DBS&A field personnel with copies of this SOP, which they are required to read and keep available at all times during the field work.

The following personnel will be involved in the sampling program:

Jeffrey A. Havlena	Project Manager/Hydrogeologist/ Health and Safety Officer
Earl Mattson	Staff Hydrologist
Stewart S. Smith	Staff Hydrologist
Lori Simpson	Staff Engineer

2.1 Project Manager

The project manager is responsible for the completion of all field activities as specified in this H&S plan and in the Work Plan for Ground-Water and Soil Quality Sampling (WP). The project manager shall monitor daily manpower requirements and expenditures, and shall be responsible for compliance to preliminary budget estimates. The project manager shall approve and be responsible for the development and implementation of subcontractor contracts, work agreements, work plans, SOP's, and health and safety plans. The project manager shall be responsible for operational decisions necessary to implement the work plan, SOP's, and health and safety plan.

2.2 Project Hydrogeologist

The project hydrogeologist shall be responsible for implementation of the field program as specified in the WP and this H&S plan. These duties are to include, but shall not be limited to 1) equipment and supply purchase, rental, maintenance, calibration, and preparation; 2) scheduling and logistics; 3) supervision of field personnel to ensure proper use of equipment and correct implementation of quality assurance/quality control measures; 4) preparation of contracts, work agreements, work plans, SOP's, and Health and Safety plans, and 5) interpretation of data. The project hydrogeologist shall also provide assistance to the DBS&A field personnel when necessary.

2.3 Health and Safety Officer

The health and safety officer shall be responsible for strict adherence to the site and project specific health and safety plan (H&S). The health and safety officer or the appointed health and safety facilitator will monitor on site health and safety issues, advise field personnel and sub- contractors of site specific health and safety concerns, conduct daily tailgate health and safety meetings, conduct the initial team health and safety briefing, and shall report directly to the project manager.

2.4 Staff Hydrologist/Engineer

The staff hydrologist/engineer shall be responsible for executing the assigned tasks according to the procedures and techniques outlined in the work plan, the health and safety plan, and appropriate SOP. The staff hydrologist shall read each of the above plans, and shall be familiar with the material contained therein; the staff hydrologist is responsible for the safe and timely completion of all assigned tasks.

3. SAFETY GUIDELINES FOR DRILLING AND SAMPLE COLLECTION

The following guidelines are meant to cover operations by the Daniel B. Stephens and Associates, Inc. (DBS&A) field personnel during drilling. Safety guidelines for other activities are not included in this plan, nor are safety guidelines for the drill crew and support personnel under the employ of the drilling contractor. Health and safety issues for the drill crew and support personnel are the responsibility of the drilling contractor, not DBS&A.

Because of the limited scope of this plan, the only issues to be specifically addressed are personal safety issues and vapor monitoring.

3.1 Personal Health and Safety

All DBS&A field personnel are to maintain a safe distance from the area of most activity at the drill rig and all operating air compressors, generators, and similar heavy equipment. A 25 foot radius work area shall be designated around all heavy equipment. DBS&A personnel shall enter this work zone only when absolutely necessary for the performance of the task at hand. Under no circumstance shall DBS&A personnel become directly involved in drilling operations, other than that immediately required for sample collection and the performance of vapor monitoring and geologic logging.

DBS&A personnel shall refrain from direct contact with any recovered soil material. All samples shall be handled according to the guidelines set forth in the standard operating procedures (SOP) document.

3.1.1 Heat Stress

Heat-stress monitoring will be part of the daily regimen, and should include, at minimum, heart-rate monitoring, and/or body-temperature monitoring. These heat-stress indicators should be observed at least once every hour. If the pulse rate exceeds 110 beats per minute (or the body termperature exceeds 99° F), then the length of the next work period shall be reduced by 10 minutes and the heat-stress parameters observed again at that time. If the pulse rate at the beginning of the next rest period exceeds 100, and the last reading was over 110 (or the body temperature exceeds 99.7° F and the last reading was over 99° F), the work cycle should be reduced by one-third. Whenever pluse-rate and/or body temperature are elevated, work should not be resumed until the pulse rate is below 100 beats per minute, and/or the body temperature is below 99° F. In order to ensure against heat-stress related problems, loose-fitting clothing shall be worn, and at least 8 oz of fluid should be taken each hour.

3.1.2 Eating and Drinking

No eating, drinking, smoking, or gum or tobacco chewing is allowed within the 25 foot work zone.

3.1.3 Eye Protection

Approved protective eyewear will be worn at all times when within the 25 foot radius work zone. The minimum eyewear protection required will be shatter-proof glasses or goggles.

3.1.4 Dust Protection

When blowing dust makes it necessary to protect personnel, disposable-type dust masks and goggles will be worn. If a respirator is in use, dust/mists pre-filters will be worn.

3.1.5 Noise Protection

Ear plugs will be worn whenever the noise level approaches 80 db, or whenever conditions require.

3.1.6 Disposal of Contaminated Clothing and Equipment

All potentially contaminated clothing, Tyvek coveralls, gloves, paper towels, and other expendable items should be placed and sealed in a plastic bag. Enron station personnel should be consulted as to where to store this bag until later transport off-site. Fresh Tyvek coveralls and work gloves should be donned at the start of each work day, whenever required.

3.2 Vapor Monitoring

The DBS&A field hydrologist will be present near the drilling rig at all times to monitor the work area for organic vapors using a Foxboro-Century OVA-128 organic vapor meter (OVA), or equivalent. OVA readings in the survey will be taken every 5 foot of drillstring advancement, or every 15 minutes of drilling time, whichever occurs first. The headspace within the borehole, and the breathing zone within the work area will be monitored. The drilling supervisor will be notified of all OVA readings, and is responsible for decisions regarding their safety and the continuance of drilling operations.

3.3 Personal Protective Equipment

The following personal protective equipment should be worn at all times while working within the Exclusion Zone (see Section 3.4).

i) One-piece, hooded, Saranex-coated Tyvek suits.

ii) NIOSH approved, quarter-face respirator, with organic vapor cartridges.

iii) Inner latex or vinyl gloves with outer chemical resistant gloves.

iv) Chemical resistant, steel toed safety boots, with boot covers.

v) Taped joints between gloves, boots, and suit.

vi) Hard Hat

vii) Protective eyewear and ear plugs where necessary.

Because of the relatively low concentrations of contaminants expected within the soil, it is likely that the Saranex Suits, outer gloves, hard hats, eyewear, ear protection, and safety boots can be sufficiently decontaminated in the field to allow reuse during the project. These items are to be field decontaminated and reused wherever possible.

3.4 Site Access and Decontamination Zones

Access into the work area will be restricted according to the task to be performed and the level of PPE. Three zones will be set up around the work area:

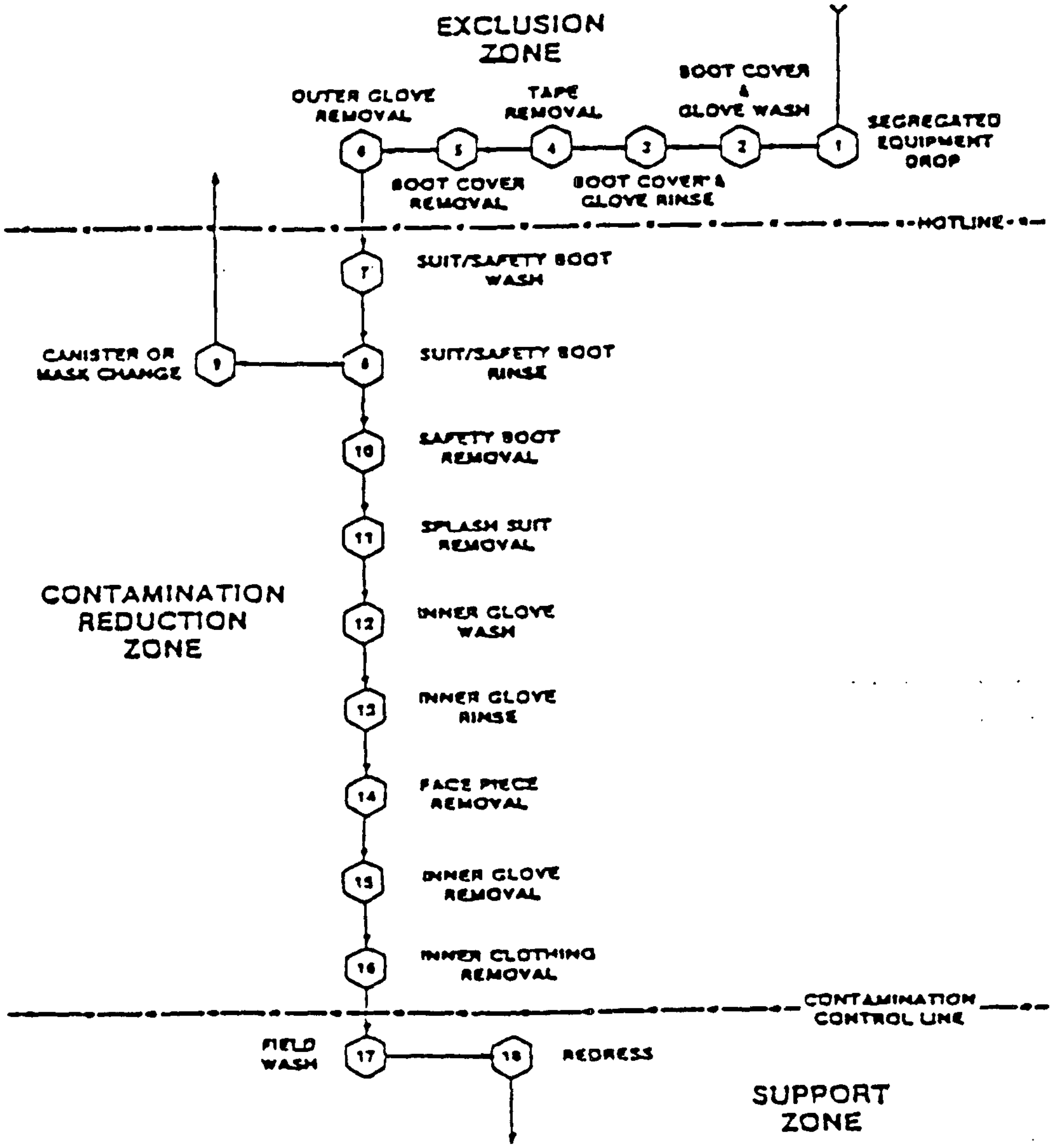
1) The Exclusion Zone, defined by the extent of obvious contamination, or a radius 25 feet from the borehole. Level C PPE will be required of all personnel within the Exclusion Zone.

2) The Contamination Reduction Zone, just outside of the Exclusion Zone, which contains the bulk of the decontamination stations.

3) The Support Zone, which contains equipment and material storage.

A Hotline will be established between the Exclusion Zone and the Contamination Reduction Zone. All personnel and equipment within the Exclusion Zone must not cross the Hotline, unless the proper decontamination procedures are followed. A Contamination Control Line will be established between the Contamination Control Zone and the Support Zone. No potentially contaminated materials are to cross the Contamination Control Line unless properly packaged and labeled for disposal.

A total of 18 decontamination stations will be established: six within the Exclusion Zone; ten within the Contamination Control Zone; and two within the Support Zone. Figure 1 shows the different zones and associated stations.



EXCLUSION ZONE
OUTER GLOVE REMOVAL
TAPE REMOVAL
BOOT COVER & GLOVE WASH
SEGREGATED EQUIPMENT DROP
BOOT COVER REMOVAL
BOOT COVER & GLOVE RINSE
HOTLINE
SUIT/SAFETY BOOT WASH
CANISTER OR MASK CHANGE
SUIT/SAFETY BOOT RINSE
SAFETY BOOT REMOVAL
SPLASH SUIT REMOVAL
CONTAMINATION REDUCTION ZONE
INNER GLOVE WASH
INNER GLOVE RINSE
FACE PIECE REMOVAL
INNER GLOVE REMOVAL
INNER CLOTHING REMOVAL
CONTAMINATION CONTROL LINE
FIELD WASH
REDRESS
SUPPORT ZONE

Figure 1

3.5 Procedure for Decontamination

Station 1: Segregated Equipment Drop

All tools, equipment, and materials used within the Exclusion Zone are to be deposited on a plastic drop cloth or within different containers with plastic liners. All materials deposited at the segregated equipment drop must be thoroughly washed in a Liquinox solution followed by a clean tap water rinse before it can be removed through the Contamination Control Zone. Materials and equipment which cannot be washed, such as notebooks and delicate instruments, should be thoroughly wiped to remove as much potentially contaminated soil as is possible.

Station 2: Boot Cover and Glove Wash

Scrub outer boot covers and gloves with liquinox solution.

Station 3: Boot Cover and Glove Rinse

Rinse liquinox solution using clean tap water.

Station 4: Tape Removal

Remove tape from around gloves and boots and deposit into plastic lined container.

Station 5: Boot Cover Removal

Remove boot covers and deposit in the same plastic lined container as used at Station 4.

Station 6: Outer Glove Removal

Remove outer gloves and deposit in separate plastic lined container.

Station 7: Suit, Hard Hat, and Safety Boot Wash

Scrub Saranex suit, hard hat, and safety boots with liquinox solution.

Station 8: Suit, Hard Hat, and Safety Boot Rinse

Rinse off Liquinox solution.

Station 9: Cartridge or Mask Change

If worker only needs to change respirator cartridge or respirator, then this is the last station in the decon procedure. Worker to return to duty following this station. Cleaned outer gloves are donned, new tape and boot covers to be worn.

Station 10 Safety Boot Removal

Remove steel toed safety boots and deposit in plastic lined container for reuse.

Station 11: Saranex Suit and Hard Hat Removal

Remove Saranex Suit and hard hat, and deposit in plastic lined container. Suit and hard hat to be reused unless grossly contaminated.

Station 12: Inner Glove Wash

Wash inner gloves in Liquinox solution.

Station 13: Inner Glove Rinse

Rinse inner gloves in clean tap water.

Station 14: Respirator Removal

Remove respirator and deposit in plastic lined container for reuse.

Station 15: Inner Glove Removal

Remove inner gloves and deposit in plastic lined container.

Station 16: Inner Clothing Removal

Remove soiled and perspiration soaked inner clothing, where necessary.

Station 17: Field Wash

Wash hands and face with soap solution and rinse with clean tap water.

Station 18: Redress

Don clean street clothes as necessary.

4. DAILY SAFETY MEETINGS

Prior to commencing each day's drilling activities, a "tailgate" safety meeting will be conducted by the designated DBS&A on-site safety facilitator. All personnel directly involved in the drilling operations will be required to attend. The meeting will address specific issues regarding on-site health and safety, including:

* Recommended personal safety equipment, as outlined in section 3.3 of this document.

* Discuss general contingency plan in case of an emergency, specifically where to go to get help and whom to call. All personnel should know locations of first aid kits and fire extinguishers.

* Appropriate site specific issues, such as, soil contamination levels, ambient air temperature, dust conditions, and weather conditions.

All attendees will be required to sign an attendance sheet.

5. EMERGENCY PROCEDURES

The Enron site manager (Mr. John Hendrick) is to be notified of all emergencies. Established Enron site emergency procedures are to be followed.

6. INITIAL HEALTH & SAFETY BRIEFING

A health & safety briefing will be conducted before arriving on the site. The initial health and safety briefing will be conducted by the designated DBS&A task health & safety officer, and will be attended by all DBS&A personnel involved in the particular task. The health and safety plan and all pertinent health and safety issues will be discussed during the briefing. All attendees will initial the health & safety briefing form (Attachment A).

7. ACKNOWLEDGEMENT

The undersigned have read the Health & Safety Plan and pledge to adhere to the provisions contained therein:

NAME	TITLE	SIGNATURE	DATE

PROJECT: ____________________

TASK: ____________________

DANIEL B. STEPHENS & ASSOCIATES, INC.

FIELD INSTRUCTIONS AND PROCEDURES

HEALTH & SAFETY BRIEFING

Project Number: 89-030 Date: 9/29/89

Field Location: THOREAU

Purpose of Work: 1 SOIL BORING

Tasks to be Accomplished: SOIL BORING & SAMPLING

SOP's Required: SOIL SAMPLING & THE H&S SOP

Health & Safety Issues Discussed: ALL ISSUES IN THIS SOP

DBS&A Health & Safety Officer:

Attendees :

Name	Job Title	Date
Ray Pearson	Driller	9-29-89
[signature]	ENGR.	9/29/89
Linda M. Maher	Geologist ENTRIX	9-29-89
Ray Gutierrez	Helper	9/29-89

Well Sampling Documentation

WELL SAMPLING FORM

Project No 89032 Date 12/12/89

Project Name Enron - Thoreau

Sample Location THHS Thoreau High School

Weather Conditions Clear cold windy

Observations/Comments sampled at well head before water softener added

Sampling method purge

Method to measure water level —

Pump lines or bailer ropes new or cleaned? —

Method of cleaning Bailer/Pump —

Water Level (below MP) at start — end

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance µmhos/cm Field	Sp Conductance µmhos/cm @25°C	REMARKS
1050	20	6.37	14.3	159		≈ 1.2 gpm at well head discharge pt.

Total discharge 20 gal at well head Casing volumes removed

Method of disposal of discharged water to ground surface

Number and size of sample containers filled TIMS [illegible] 2-1l glass 2-1l plastic containers

Collected by R.M.

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-032 Date 12/12/89

Project Name Enron Thoreau

Sample Location Windmill SE of SITE

Well 16B-39 Contact Ben Tso Supervisor Water Maintenance 786-5313

Weather Conditions clear cold 15-20mph winds

Observations/Comments

Sampling method purge & sample

Method to measure water level

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start ______ end ______

T.D. = 730'
pump = at 630'

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance umhos/cm Field	Sp Conductance umhos/cm @25°C	REMARKS
1143	54	8.72	13.5	0.558		2 gpm flow rate

Total discharge 54 @ pipe Casing volumes removed > 3 [illegible] based on Wind

Method of disposal of discharged water Open to surface around well

Number and size of sample containers filled 3-40ml Vials 2-1l glass
2 cubitainer

Collected by KM

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 12/7/89

Project Name ENRON / TRANSWESTERN

Sample Location THOREAU THOREAU #2

Weather Conditions

Observations/Comments: PUMP OFF

USED ~2 HRS / DAY

Sampling method SPIGOT

Method to measure water level:

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start end

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance μmhos/cm Field	Sp. Conductance μmhos/cm @25°C	REMARKS
~1230	~90 gpm					START PUMP
1236	900 gal			860*		SAMPLE COLLECTED

* MEASURED 12/8/89

Total discharge ~900 g Casing volumes removed < 1

Method of disposal of discharged water INTO SYSTEM

Number and size of sample containers filled 2x1l (608) 3x40ml (624) 1l inorgs 1l metals (NOT FILTERED)

Collected by G LEWIS

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No. 89-030 Date 12/7/89

Project Name ENRON / TRANSWESTERN

Sample Location THOREAU NTUA #2

ON 8-10 hours/day

Weather Conditions

Observations/Comments: WELL NOT PURGED. HAD BEEN ON @ ~30 gpm WELL ON 8 to 10 Hours/day. ARRIVED 0930

Sampling method SPIGOT

Method to measure water level.

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start ~29? end

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance μmhos/cm Field	Sp. Conductance μmhos/cm	REMARKS
0945	30 gpm Since 0930 = ≥450	6.7	21.5	232		WELL HAD BEEN PUMPING

Total discharge ≥ 450 Casing volumes removed ~< 1

Method of disposal of discharged water into system

Number and size of sample containers filled 2x1 l (648) 3x40ml (624) 1 l inorganics 1 l metals (NOT FILTERED)

Collected by G. LEWIS

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 12/7/89

Project Name CHEVRON / TRANSWESTERN

Sample Location THOREAU NTUA #1

Weather Conditions

Observations/Comments: WELL NOT PURGED - HAD BEEN ON AT 18 gpm

Sampling method SPIGOT

Method to measure water level

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start ___ end ___

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance μmhos/cm Field	Sp. Conductance μmhos/cm @25°C	REMARKS
1010	18GPM	7.3	21.9	245		WELL HAD BEEN PUMPING

Total discharge — Casing volumes removed —

Method of disposal of discharged water INTO SYSTEM

Number and size of sample containers filled 2x1l (608) 3x40ml (624) ~~2x~~1l inorgs 1l metals (not filtered)

Collected by G. LEWIS

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89 - 030 Date. 12-6-89

Project Name ENRON THOREAU

Sample Location 5-1A

Weather Conditions COLD, overcast

Observations/Comments: ≈ 10gpm pump on 1015
pump off 1250

Sampling method Submersible pump, faucet in discharge land

Method to measure water level. powers sounder

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

12-6-89
1000

Water Level (below MP) at start 385.41' end

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance umhos/cm Field	@25°C	REMARKS
1035		961	17.4	0.760		
1144		9.43	18.0	0.741		
1229		9.37	18.0	0.728		
1253		9.26	17.8	0.707		

Total discharge 1550 gallons Casing volumes removed > 3 vol.

Method of disposal of discharged water: Off site by garden hose to BLM land

Number and size of sample containers filled 3-40ml Vorts, 4-1l glass, 1-500ml plastic
1-500 ml plastic

Collected by Keen/AO

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No ~~89~~ 89-030 Date 12-6+7-89

Project Name Enron Thoreau

Sample Location 5-2A

Weather Conditions windy, cold

Observations/Comments: Bailed water ~~[illegible]~~ dark (black) foams briefly, slight odor (weakly suggestive of septic tank)

Sampling method Rig Bailed dry, ~~Recovery~~ enough to sample 2" Hand bailer

Method to measure water level. powers sounder

Pump lines or bailer ropes new or cleaned? decon. between wells + when new

Method of cleaning Bailer/Pump decon with Steam cleaner + triple rinse

Water Level (below MP) at start 311.70 (12:00) ~~[illegible]~~ (12-6-89) end 393.88' (12-7-89) (1321)

Measuring Point (MP) TOC

	Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance μmhos/cm Field	@25°C	REMARKS
12-7-89	1350	256	8.08	14.3	240	(100 ATC scale)	2400 ~~m~~ /cm

Total discharge 257 gallons Casing volumes removed Rig Bailed Dry, Sampled after some recovery

Method of disposal of discharged water: STORED IN STOCK TANK

Number and size of sample containers filled 3-40ml VOA's, 4-1l glass, 1-1l cubitainer 1-500ml plastic

Collected by KCM/AO

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No. 89-030 Date 12-6+7-89

Project Name Enron - Thoreau

Sample Location 5-3A

Weather Conditions Cold, windy

Observations/Comments:

Sampling method Rig Bailed dry, then Recovery enough to sample

Method to measure water level. Powers Sounder

Pump lines or bailer ropes new or cleaned? Decon btwn wells & new.

Method of cleaning Bailer/Pump Steam clean, liquinox, Triple rinse D.I. water

Water Level (below MP) at start 0920 254.20 ~~441.45'~~ end 435.56' 0830 12-7-89

Measuring Point (MP)

	Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	@25°C	REMARKS
12-7-89	850	620	7.15	14.2	3780 (ATC)		12/6 wtr level 13:58 = 441.76' 1507 = 439.75'
							16:33 = 438.46' 12/7 0830 = 435.56'
							~~27~~.80 (100ATC)

Total discharge 621 gallons Casing volumes removed Rig Bailed dry, Recovered Same for Sampling

Method of disposal of discharged water: STORED IN STOCK TANK

Number and size of sample containers filled 3-40ml VOA's, 4-1l glass, 1-1l cubitainer, 1-500ml plastic

Collected by AO/KCM

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 12-6-89

Project Name ENRON Thoreau

Sample Location SUPPLY WELL EAST (SUPE)

[Supply Well #2]

Weather Conditions Overcast, cold

Observations/Comments: FLOWMETER START 43682900 at 04-30 ENRON Personnel

END 4369351.0

≈ 40 gpm

Sampling method 15 min thru sampling faucet after 3 casing vol. Removed

Method to measure water level. N/A

Pump lines or bailer ropes new or cleaned? —

Method of cleaning Bailer/Pump

Water Level (below MP) at start — end

Measuring Point (MP) —

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance μmhos/cm Field	Sp Conductance μmhos/cm @25°C	REMARKS
08~~44~~	9200	7.85	22.4	0.567		LEAK AT flow meter (12/1/...
0853	9560	7.87	22.2	0.567		on nearby 1" pipe (2" standi... water

Total discharge 10,610 gallons Casing volumes removed > 3

Method of disposal of discharged water: Stored on site TANK

Number and size of sample containers filled 3-40ml VOAs (624) 2-1l glass (608)

Collected by KM/AO

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date. 12-1-89

Project Name Enron-Thoreau

Sample Location 5-1A

Weather Conditions clear + cold

Observations/Comments: 6" casing ~~with~~ 206 ft. wtr → one casing vol. equals 449.3 gallons ; pump was off briefly, Pumping rate doubled after generator was warm

Sampling method purge + trap

Method to measure water level. Powers Sounder

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump Dedicated pump

Water Level (below MP) at start. 384.31' end

Measuring Point (MP) TOC ~~Pitless~~ cap

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance μmhos/cm Field	Sp. Conductance μmhos/cm @25°C	REMARKS
0746	32	10.00	12.3	0.501		3.8gpm/wtr level 405.30'
0758	100	9.78	14.2	0.87		4.1gpm/wtr level 409.43'
1003	802	9.82	16.4	0.783		5.24gpm
1059	1140	Generator out of Gas				≈ 4.0 gpm
1104	1140					Pump on, generator refilled with gas, ≈ 10gpm
1116		8.80	17.8	0.752		
1126	1363	9.04	16.9	0.748		
11:38	1465	9.05	17.4	0.748		
1147	1486	8.75	18.4	0.740		Some AIR BUBBLE @ the flow rate

Total discharge 1486 Casing volumes removed > 3 vol.

Method of disposal of discharged water: Seeped into ground offsite South of well

Number and size of sample containers filled

Collected by

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 12-1-89

Project Name ENRON - Thoreau

Sample Location 5-1B

Weather Conditions Clear & Cold

Observations/Comments: Low producing well

Sampling method purged & sampled

Method to measure water level. M-Scope

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump dedicated pump pH/S.C./Temp meters Rinsed

Water Level (below MP) at start. 44.98' end:

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	Sp. Conductance µmhos/cm @25°C	REMARKS
11:12						Pump ON wtr Clear 1114
1117	0.75	6.69	11.8	1,285		
1128	1.5	6.92	10.8	1.230		
1132	1.7	3.95 Gal. pumped				pumped dry
1352	—	—	PUMP ON			wtr. level 45.30
1412	0.25	7.29	12.1	1.320		
1418	0.60	6.95	12.3	1.308		Pump off
	0.85 gal pumped					

Total discharge 4.80 gal. Casing volumes removed ≈2, Pumped dry, 80% recovery

Method of disposal of discharged water: Inside Tank on site

Number and size of sample containers filled 3 40ml VOA's EPA 624
3 - 1l glass - EPA 608

Collected by AO/KM

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 12-1-89

Project Name Enron - Thoreau

Sample Location SUPPLY WELL WEST (SUPW)

Weather Conditions Clear + cold

Observations/Comments: ~~Pump was~~ on between ~~7:00~~-8:10 AM
3 casing volumes ≈ 1500 gal

Sampling method purge + sample

Method to measure water level. Tried powers sounders - no reading

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump Dedicated pump

Water Level (below MP) at start N/A end

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance umhos/cm Field	Sp. Conductance umhos/cm @25°C	REMARKS
7:00 8:10	2177	-	-	-	-	≈ 31 gpm Auto timer Inc 10 min.
0959						pump ON
1009						pump press 82 psi
1010	open faucet	at well head				press 60 psi
1015	[illegible]	9.50	18.0	0.789		≈ 10 gpm at faucet
1033		9.57	18.3	0.784		
1045	1652	pump		off		
						≈ 31.1 gpm

Total discharge 2177 + 1652 Casing volumes removed 4 + 3

Method of disposal of discharged water: TANK + Discharged at wellhead

Number and size of sample containers filled 3 VOA's (40ml) - EPA 624; 2-1l glass (cm) - 608

Collected by KM/AD

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 12-1-89

Project Name ENRON - Thoreau

Sample Location S-4B

Weather Conditions Clear + cold

Observations/Comments: OVA 200ppm with cover bolt removed
OVA - 700 ppm initial at well cap then dissapated

Sampling method purged + sampled w/bladder pump

Method to measure water level. M-scope

Pump lines or bailer ropes new or cleaned? ~~ded~~ wtr. level decon.

Method of cleaning Bailer/Pump dedicated pump

Water Level (below MP) at start. 48.42' end ~~[illegible]~~

Measuring Point (MP) Top of pump cap

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	Sp. Conductance µmhos/cm @25°C	REMARKS
1223						Pump on, wtr. ~~[illegible]~~ clear
1227	1 gal	6.78	12.9	1.369		
1229	2	6.78	12.4	1.385		
1234	3					pumping Air
1240	—	pump off	—			
1442						wtr level 50.69
1444	—	Pump ON	—			
1452	0.25	6.85	12.7	1.323		
1456	0.5	6.81	12.9	1.304		
1458	0.75	—				PUMPED DRY

Total discharge 7.5 Casing volumes removed ≈2.5 pump dry, 80% Recovery

Method of disposal of discharged water: STORED IN ON-SITE TANK

Number and size of sample containers filled 3 40ml VOA's EPA 624
2-1l glass EPA 608

Collected by AO / KM

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 12-1-89

Project Name Enron - Thoreau

Sample Location 5-6B

Weather Conditions clear + cold

Observations/Comments: OVA = 0ppm
Replicate Samples taken 5-6BA ....

Sampling method

Method to measure water level. M-Scope

Pump lines or bailer ropes new or cleaned? decon. wtr level

Method of cleaning Bailer/Pump dedicated pump

Water Level (below MP) at start. 43.53' end 50.15'

Measuring Point (MP)

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	Sp. Conductance µmhos/cm @25°C	REMARKS
1249	1	7.54	11.8	1.447		
1257	3	7.36	12.1	1.292		
1302	5	7.38	12.2	1.293		
1305	7	7.45	12.3	1.356		
1307	8					WL. 49.3'
1315	10	7.40	11.9	1.410		
1319	11	7.41	12.2	1.390		
1323	12	7.43	12.2	1.357		
1326	13	7.45	12.3	1.339		
1335	15 gallons	7.37	12.3	1.302		

Total discharge 15 gal. Casing volumes removed > 3 vol.

Method of disposal of discharged water: stored in onsite Tank

Number and size of sample containers filled 3-40ml VOA's EPA 624
2-1l glass EPA 608

Collected by KM/AO

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No ____________ Date. 11/30/89

Project Name Enron Moreau

Sample Location Well 5-5B

Weather Conditions Cold, snowy.

Observations/Comments:

Sampling method Well Wizard

Method to measure water level. M-Scope

Pump lines or bailer ropes new or cleaned? N/A

Method of cleaning Bailer/Pump

Water Level (below MP) at start. 47.15 end 47.20

Measuring Point (MP) Well Pump Cap

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	@25°C	REMARKS
0904	1	6.71	12.4		1.6	YSI s.c. on 2 ATC
0910	5	6.71	12.6		1,670	
0914	7.5	6.73	12.4		1,678	
0920	10	6.74	12.6		1,683	
0930	15	6.75	12.6		1,686	
0941	20	6.75	12.5		1,678	Just before sampling
0948	21	6.74	12.4		1,679	Just after sampling

Total discharge 21 gal Casing volumes removed > 3

Method of disposal of discharged water: Tank Trailer

Number and size of sample containers filled 3 - 40ml vials EPA-624
3-1l bottle EPA 608

Collected by AO KM

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No ______________ Date. 11/30/89

Project Name Enron Moreau

Sample Location SUPC-1

Supply Well Center

Weather Conditions Windy, cold, snow

Observations/Comments:

Average Pump rate = 17.94 gpm

Sampling method ______________

Method to measure water level. Powers Sounder

Pump lines or bailer ropes new or cleaned? ______________

Method of cleaning Bailer/Pump ______________

Water Level (below MP) at start. NR and NR

Measuring Point (MP) pump cap

14736412

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	@25°C	REMARKS
0814	0					Pump ON
0825	268					
0916	1363					
1034	2738					19.55 gpm
1203	4148					18.11 gpm
1208		8.54	18.9		.584	42 pts bled out of tap
1212	4288	8.90	18.7		.589	50 pts " " " "
1214		8.95	18.4		.580	Sampling started
1216		9.00	18.4		.590	Sampling complete
1223	4468					Pump off

Total discharge 4468 gal Casing volumes removed 3 (?)

Method of disposal of discharged water: Water pumped into tower tank.

Number and size of sample containers filled 3-40 ml vial EPA-624

2-1 l bottles EPA-608

Collected by SC KM

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No ______ Date 11/30/89

Project Name Enron Moreau

Sample Location Well 5-2B

Weather Conditions Windy, cold, snowing

Observations/Comments:
Strong odor of Mercaptan

Sampling method ______

Method to measure water level. M-Scope

Pump lines or bailer ropes new or cleaned? ______

Method of cleaning Bailer/Pump ______

Water Level (below MP) at start. 47.82 end ______

Measuring Point (MP) Pump cap

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	Sp. Conductance µmhos/cm @25°C	REMARKS
1303	.75	6.75	12.8		~~1.308~~	
1316	5	6.69	12.8		1.347	
1324	8	6.71	12.8		1.346	No OVA = 0ppm
1327	10	6.70	12.8		1.347	Drawdown WL 49.0
1339	15	6.72	12.8		1.351	" " 49.11
1343	18	6.74	12.8		1.352	~~Sampling Began~~
1348	20	6.74	12.8		1.357	Sampling ~~End~~ Begin
1355	21	6.73	12.8		1.355	Sampling Done
						Drawdown WL = 49.0

Total discharge 21 Casing volumes removed > 3

Method of disposal of discharged water: Tank Trailer

Number and size of sample containers filled 3-40ml Vials EPA 624
2-1l bottles EPA 608

Collected by AD RM

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No ______ Date 11/29/89

Project Name Enron (Moran)

Sample Location Well 5-3B

Weather Conditions Windy, cold, snow flurries, overcast

Observations/Comments: Supply well East (Just 30' N of 5-3B) is leaking ≥ 1gpm into the ground about 4' below ground level.

Sampling method Well Wizard installed @ 51.5'

Method to measure water level. M-scope

Pump lines or bailer ropes new or cleaned? N/A

Method of cleaning Bailer/Pump

Water Level (below MP) at start 43.82 end

Measuring Point (MP) Pump cap

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance μmhos/cm Field	Sp. Conductance μmhos/cm @25°C	REMARKS
1409	2	7.51	12.5		1,055	YSI SC m 2 ATC
1415	3	7.60	12.6		1065	
1423	6	7.64	12.4		1,071	
1436	8	7.56	12.6		1,076	
1443	11	7.55	12.6		1,072	
1448	13	7.55	12.6		1,076	
1504	19	7.51	12.7		1,081	- Just before sampling
1507	23	X	12.6		1,071	- Just after sampling

Total discharge 23 gal Casing volumes removed > 3

Method of disposal of discharged water Tank trailer

Number and size of sample containers filled 3-40ml vials (EPA 624) 2-1l bottles (EPA-608)

Collected by J.C. & K.M.

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 10/6/89

Project Name ENRON / TRANSWESTERN

Sample Location THOREAU 5-4B

Weather Conditions

Observations/Comments: WELL IS POOR PRODUCER. PUMPED DRY @ 0945.

Sampling method QED WELL WIZARD

Method to measure water level.

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start 48.71 end

Measuring Point (MP) TOC / MARK

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance μmhos/cm Field	Sp Conductance μmhos/cm @25°C	REMARKS
1200	>4					

Total discharge >4 Casing volumes removed ~2.4

Method of disposal of discharged water

Number and size of sample containers filled 3 x 40 ml (624)

Collected by S. STOLLER

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89 - 030 Date 10/6/89

Project Name ENRON / TRANSWESTERN

Sample Location THOREAU 5 - 4BA (REPLICATE)

Weather Conditions

Observations/Comments: REPLICATE. POOR PRODUCER > 2hr RECOVERY

Sampling method QED WELL WIZARD

Method to measure water level.

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start 48.71 end

Measuring Point (MP) TOC / MARK

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance μmhos/cm Field	Sp Conductance μmhos/cm @25°C	REMARKS
~12⁰⁵	5					

Total discharge ~5 Casing volumes removed ~3

Method of disposal of discharged water TANK

Number and size of sample containers filled 3 x 40 ml (624)

Collected by S. STOLLER

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89 - 030 Date 10/3/89

Project Name ENRON / TRANSWESTERN

Sample Location THOREAU 5-6B

Weather Conditions

Observations/Comments: WTR - CLOUDY

Sampling method QED WELL WIZARD

Method to measure water level:

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start 50.85 end

Measuring Point (MP) TOC / MARK

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	@25°C	REMARKS
17 06	~58.5					METER BROKE

Total discharge 57 + 1.5 Casing volumes removed ~22

Method of disposal of discharged water TANK

Number and size of sample containers filled 3 x 40 ml (624)

Collected by S. STOLLER

DANIEL B. STEPHENS
& ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 10/3/89

Project Name ENRON TRANSWESTERN

Sample Location THOREAU 5-SB

Weather Conditions

Observations/Comments: WATER CLEAR

Sampling method (2ED WELL WIZARD

Method to measure water level.

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start 47.21 end 47.40

Measuring Point (MP) TOC MARK

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance µmhos/cm Field	Sp Conductance µmhos/cm @25°C	REMARKS
1440	8	—	—	—	—	WATER CLEAR. METERS BROKEN

Total discharge 8 Casing volumes removed 4.8

Method of disposal of discharged water TANK

Number and size of sample containers filled 3 x 40 ml (624)

Collected by S. STOLLER

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 10/3/89

Project Name ENRON | TRANSWESTERN

Sample Location THOREAU S-5BA (REPLICATE)

Weather Conditions

Observations/Comments: WATER CLEAR

Sampling method QED WELL WIZARD

Method to measure water level:

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start 47.21 end 47.40

Measuring Point (MP) TOC MARK

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance µmhos/cm Field	Sp Conductance µmhos/cm @25°C	REMARKS
1440	8					WATER CLEAR - METER BACK

Total discharge 8 Casing volumes removed 4.8

Method of disposal of discharged water TANK

Number and size of sample containers filled 3 x 40 mL (624)

Collected by S-STULLER

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 8/8/89

Project Name ENRON / TRANSWESTERN

Sample Location THOREAU 5-1B

Weather Conditions

Observations/Comments: WELL NOT EQUIPPED, WELL NOT PURGED. SAMPLE COLLECTED AT REQUEST OF J. CRABTREE

Sampling method BAIL

Method to measure water level.

Pump lines or bailer ropes new or cleaned? SEE SOP

Method of cleaning Bailer/Pump SEE SOP

Water Level (below MP) at start 45.08 end

Measuring Point (MP) TOC (MARK

Time	Discharge (gallons)	pH	Temp (°C)	Conductance µmhos/cm Field	Conductance µmhos/cm @25°C	REMARKS
1345	<1					WELL NOT PURGED, SAMPLE COLLECTED.

Total discharge <1 Casing volumes removed <1

Method of disposal of discharged water: TANK

Number and size of sample containers filled 4x1 l (608)

Collected by S. STOLLER

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 8/2/89

Project Name ENRON/ TRANSWESTERN

Sample Location THOREAU 5-2 BA (REPLICATE)

Weather Conditions

Observations/Comments 'MERCAPTAN' ODOR

Sampling method QED WELL WIZARD

Method to measure water level.

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start 47.9 end

Measuring Point (MP) TOC / MARK

Time	Discharge (gallons)	pH	Temp (°C)	Sp Conductance umhos/cm Field	Sp Conductance umhos/cm @25°C	REMARKS
1035	6	6.51		749		
1042	7	6.64		692		
1056	10	6.75		748		
1115	13	6.77		845		
1135	17	6.77		750		
1145	19					5-2B SAMPLE COLLECTED
1200	22					5-2BA (REPLICATE COLLECTED)

Total discharge 22 g Casing volumes removed 30

Method of disposal of discharged water TANK

Number and size of sample containers filled 2x1l (608); 3x40ml (622); 2x1l (625)

Collected by S. STOLLER

DANIEL B. STEPHENS & ASSOCIATES, INC

WELL SAMPLING FORM

Project No 89-030 Date 8/8/89

Project Name ENRON / TRANSWESTERN

Sample Location THOREAU WELL 5-2B

Weather Conditions

Observations/Comments: "MERCAPTAN" ODOR

Sampling method QED WELL WIZARD

Method to measure water level:

Pump lines or bailer ropes new or cleaned?

Method of cleaning Bailer/Pump

Water Level (below MP) at start 47.90 end

Measuring Point (MP) TOC/MARK

Time	Discharge (gallons)	pH	Temp (°C)	Sp. Conductance µmhos/cm Field	Sp. Conductance µmhos/cm @25°C	REMARKS
1035	6	6.51		749		
1042	7	6.64		692		
1056	10	6.75		748		
1115	13	6.77		845		
1135	17	6.77		750		
1145	19					SAMPLE COLLECTED

Total discharge 19 GAL Casing volumes removed 2.5

Method of disposal of discharged water TANK

Number and size of sample containers filled 2×1l (608); 3×40ml (624); 2×1l (625)

1l INORGANICS 1l NO$_3$ 1l METALS

(FIELD FILTERED)

Collected by S. STOLLER

DANIEL B. STEPHENS & ASSOCIATES, INC

Appendix J: Analytical Chemistry Reports

Rocky Mountain
Analytical Laboratory

RECEIVED JUN 2 2 1989

Enseco

June 15, 1989

Mr. Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for four aqueous samples we received at Enseco-Rocky Mountain Analytical Laboratory on May 10, 1989.

Included with the report is a quality control summary. Referenced at the end of the report are the analytical methodologies used for the various analyses performed.

Please call if you have any questions.

Sincerely,

Cindy Ingram

Cindy Ingram
Program Administrator

Reviewed by:

Charles D. Mamrak
Technical Manager

CI/CDM/lw
Enclosures

RMAL #004839

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Rocky Mountain
Analytical Laboratory

Enseco

ANALYTICAL RESULTS

FOR

ENRON

ENSECO-RMAL NO. 004839

JUNE 15, 1989

Reviewed by: Cindy Ingram

Cindy Ingram

Charles D. Mamrak

Charles D. Mamrak

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- o Sample Description Information
- o Analytical Test Requests
- o Analytical Results
- o Quality Control Report
- o Description of Analytical Methodology

The reporting limit for bis(2-ethylhexyl)phthalate was raised to 15 ug/L from 10 ug/L for the semivolatile analysis due to the concentration of this analyte in the method blank.

Samples 004839-0001 and 0002 had poor recovery for the dibutylchlorendate surrogate for the 608 analysis. The Enseco Single Control Sample (SCS) as well as the client field blank had acceptable surrogate recoveries.

These two samples (004839-0001 and 0002) were reprepared and reanalyzed. The same sample results and surrogate recoveries were obtained. The laboratory logbook noted the formation of emulsions during sample preparation, possibly due to the samples matrices. The low surrogate recoveries may be attributed to this observation.

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
004839-0001-SA	5-1	AQUEOUS	08 MAY 89	14:20	10 MAY 89
004839-0002-SA	5-1A	AQUEOUS	08 MAY 89	14:20	10 MAY 89
004839-0003-SA	Field Blank	AQUEOUS	08 MAY 89	14:00	10 MAY 89
004839-0004-SA	Trip Blank	AQUEOUS	08 MAY 89	14:00	10 MAY 89

Enseco

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 004839	Group Code	Analysis Description	Custom Test?
0001	A	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Nitrate, Ion Chromatography	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Fluoride, Electrode	N
		Total Dissolved Solids (TDS)	N
		pH	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		Lead, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		Thallium, Furnace AA (Dissolved)	N
		Mercury, Cold Vapor AA (Dissolved)	N
		Prep - Mercury, Cold Vapor AA, (Dissolved)	N
0002 - 0003	B	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
0004	C	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content. All data is "blank corrected", i.e. the level of contamination, if any, found in the laboratory blank is subtracted from the analytical result before it is reported.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-1
Lab ID: 004839-0001-SA   Enseco ID: 1037453
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 12 MAY 89   Analyzed: 18 ~~MAY 89~~

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene (BFB)	101	%	--
1,2-Dichloroethane-d4	103	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Monica Brinkman   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-1A
Lab ID: 004839-0002-SA   Enseco ID: 1037454
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 12 MAY 89   Analyzed: 18 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene (BFB)	99.0	%	--
1,2-Dichloroethane-d4	102	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Monica Brinkman   Approved By: Jeff Lowry

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Field Blank
Lab ID: 004839-0003-SA   Enseco ID: 1037455
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 11 MAY 89   Analyzed: 18 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	100	%	--
4-Bromofluorobenzene (BFB)	100	%	--
1,2-Dichloroethane-d4	104	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Monica Brinkman   Approved By: Jeff Lowry

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Trip Blank
Lab ID: 004839-0004-SA   Enseco ID: 1037456
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 11 MAY 89   Analyzed: 18 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene (BFB)	99.8	%	--
1,2-Dichloroethane-d4	104	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Monica Brinkman   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-1
Lab ID: 004839-0001-SA   Enseco ID: 1037453
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 15 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin   Approved By: Jeff Lowry

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-1
Lab ID: 004839-0001-SA   Enseco ID: 1037453
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 15 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	15
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	79.0	%	--
2-Fluorobiphenyl	76.4	%	--
Terphenyl-d14	83.5	%	--
Phenol-d5	74.0	%	--
2-Fluorophenol	72.5	%	--
2,4,6-Tribromophenol	77.0	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-1A
Lab ID: 004839-0002-SA   Enseco ID: 1037454
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 15 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-1A
Lab ID: 004839-0002-SA Enseco ID: 1037454
Matrix: AQUEOUS Sampled: 08 MAY 89 Received: 10 MAY 89
Authorized: 10 MAY 89 Prepared: 15 MAY 89 Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	15
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	83.3	%	--
2-Fluorobiphenyl	82.6	%	--
Terphenyl-d14	92.4	%	--
Phenol-d5	82.5	%	--
2-Fluorophenol	78.5	%	--
2,4,6-Tribromophenol	82.0	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: Field Blank
Lab ID: 004839-0003-SA   Enseco ID: 1037455
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 15 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin   Approved By: Jeff Lowry

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: Field Blank
Lab ID: 004839-0003-SA
Enseco ID: 1037455
Matrix: AQUEOUS
Sampled: 08 MAY 89
Received: 10 MAY 89
Authorized: 10 MAY 89
Prepared: 15 MAY 89
Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	15
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	73.1	%	--
2-Fluorobiphenyl	71.9	%	--
Terphenyl-d14	74.0	%	--
Phenol-d5	72.5	%	--
2-Fluorophenol	69.0	%	--
2,4,6-Tribromophenol	69.5	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin

Approved By: Jeff Lowry

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-1
Lab ID: 004839-0001-SA
Matrix: AQUEOUS
Authorized: 10 MAY 89

Enseco ID: 1037453
Sampled: 08 MAY 89
Prepared: 12 MAY 89

Received: 10 MAY 89
Analyzed: 27 MAY 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	19.4	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Huison Chang

Approved By: Kim Zilis

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-1A
Lab ID: 004839-0002-SA
Matrix: AQUEOUS
Authorized: 10 MAY 89

Enseco ID: 1037454
Sampled: 08 MAY 89
Prepared: 12 MAY 89

Received: 10 MAY 89
Analyzed: 27 MAY 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	2.00	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Huison Chang

Approved By: Kim Zilis

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: Field Blank
Lab ID: 004839-0003-SA   Enseco ID: 1037455
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: 12 MAY 89   Analyzed: 27 MAY 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	88.5	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Huison Chang   Approved By: Kim Zilis

Enseco

General Inorganics

Client Name: Enron
Client ID: 5-1
Lab ID: 004839-0001-SA   Enseco ID: 1037453
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	201	mg/L	5	310.1	NA	10 MAY 89
Alkalinity, Carb. as CaCO3 at pH 8.3	28	mg/L	5	310.1	NA	10 MAY 89
Chloride	19	mg/L	3	300.0	NA	11 MAY 89
Fluoride	0.4	mg/L	0.1	340.2	NA	23 MAY 89
Nitrate as N	0.9	mg/L	0.1	300.0	NA	11 MAY 89
pH	8.7	units	0.01	150.1	NA	10 MAY 89
Sulfate	48	mg/L	5	300.0	NA	11 MAY 89
Total Dissolved Solids	392	mg/L	10	160.1	NA	11 MAY 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Janice Collins   Approved By: Toni Stovall

Ensco

Metals

Dissolved Metals

Client Name: Enron
Client ID: 5-1
Lab ID: 004839-0001-SA   Ensco ID: 1037453
Matrix: AQUEOUS   Sampled: 08 MAY 89   Received: 10 MAY 89
Authorized: 10 MAY 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.05	200.7	NA	20 MAY 89
Arsenic	ND	mg/L	0.003	206.2	NA	02 JUN 89
Barium	0.006	mg/L	0.005	200.7	NA	20 MAY 89
Beryllium	ND	mg/L	0.001	200.7	NA	20 MAY 89
Boron	0.19	mg/L	0.01	200.7	NA	20 MAY 89
Cadmium	ND	mg/L	0.005	200.7	NA	20 MAY 89
Calcium	0.8	mg/L	0.1	200.7	NA	20 MAY 89
Chromium	ND	mg/L	0.01	200.7	NA	20 MAY 89
Copper	ND	mg/L	0.006	200.7	NA	20 MAY 89
Iron	ND	mg/L	0.05	200.7	NA	20 MAY 89
Lead	0.004	mg/L	0.002	239.2	NA	18 MAY 89
Magnesium	ND	mg/L	0.1	200.7	NA	20 MAY 89
Manganese	0.005	mg/L	0.005	200.7	NA	20 MAY 89
Mercury	ND	mg/L	0.0001	245.1	11 MAY 89	15 MAY 89
Molybdenum	ND	mg/L	0.02	200.7	NA	20 MAY 89
Nickel	ND	mg/L	0.04	200.7	NA	20 MAY 89
Potassium	ND	mg/L	5	200.7	NA	20 MAY 89
Selenium	0.008	mg/L	0.002	270.2	NA	07 JUN 89
Silica as SiO2	9.1	mg/L	0.1	200.7	NA	20 MAY 89
Silver	ND	mg/L	0.005	200.7	NA	20 MAY 89
Sodium	152	mg/L	0.05	200.7	NA	20 MAY 89
Strontium	0.02	mg/L	0.02	200.7	NA	20 MAY 89
Thallium	ND	mg/L	0.004	279.2	NA	18 MAY 89
Zinc	0.03	mg/L	0.01	200.7	NA	20 MAY 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bryan Anderson   Approved By: Tammy Bailey

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of duplicate Laboratory Control Samples (LCS) at frequent, well-defined intervals. An LCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the LCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate LCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For Organic analyses an additional control measure is taken in the form of a Surrogate Control Sample (SCS). The SCS is a control sample spiked with surrogate standards which is analyzed with every analytical lot. The recovery of the SCS is charted in exactly the same manner as described for the LCS, and provides a daily check on the performance of the method.

Accuracy for LCS and SCS is measured by Percent Recovery.

$$\%\ \text{Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for LCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{\text{Measured Concentration LCS1} - \text{Measured Concentration LCS2}}{(\text{Measured Concentration LCS1} + \text{Measured Concentration LCS2})/2}$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, LCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report. The test codes assigned are defined in Section VI., Analytical Methodology.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
004839-0001-SA	AQUEOUS	624-A	17 MAY 89-Z	18 MAY 89-Z
004839-0002-SA	AQUEOUS	624-A	17 MAY 89-Z	18 MAY 89-Z
004839-0003-SA	AQUEOUS	624-A	17 MAY 89-Z	18 MAY 89-Z
004839-0004-SA	AQUEOUS	624-A	17 MAY 89-Z	18 MAY 89-Z

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: 624-A
Matrix: AQUEOUS
QC Lot: 17 MAY 89-Z
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
1,1-Dichloroethene	50	41.9	41.6	41.8	84	61-145	0.7	14
Trichloroethene	50	56.1	60.1	58.1	116	71-120	6.9	14
Benzene	50	54.9	59.0	57.0	114	76-127	7.2	11
Toluene	50	52.9	52.1	52.5	105	76-125	1.5	13
Chlorobenzene	50	53.9	53.2	53.6	107	75-130	1.3	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 17 MAY 89-Z QC Run: 18 MAY 89-Z				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	48.3	97	76-114
4-Bromofluorobenzene (BFB)	50.0	51.5	103	86-115
Toluene-d8	50.0	49.9	100	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 17 MAY 89-Z QC Run: 18 MAY 89-Z			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 17 MAY 89-Z QC Run: 18 MAY 89-Z			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 17 MAY 89-Z QC Run: 18 MAY 89-Z			
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 17 MAY 89-Z QC Run: 18 MAY 89-Z			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 17 MAY 89-Z QC Run: 18 MAY 89-Z

Analyte	Result	Units	Reporting Limit
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

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QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
004839-0001-SA	AQUEOUS	625-A	15 MAY 89-A	15 MAY 89-A
004839-0002-SA	AQUEOUS	625-A	15 MAY 89-A	15 MAY 89-A
004839-0003-SA	AQUEOUS	625-A	15 MAY 89-A	15 MAY 89-A

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 15 MAY 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Phenol	100	71.7	63.6	67.6	68	12- 89	12	42
2-Chlorophenol	100	75.8	69.5	72.6	73	27-123	8.7	40
1,4-Dichlorobenzene	50	33.0	30.6	31.8	64	36- 97	7.5	28
N-Nitroso-di-n-propylamine	50	35.1	31.1	33.1	66	41-116	12	38
1,2,4-Trichlorobenzene	50	35.2	34.1	34.6	69	39- 98	3.2	28
4-Chloro-3-methylphenol	100	77.4	72.6	75.0	75	23- 97	6.4	42
Acenaphthene	50	37.2	34.8	36.0	72	46-118	6.7	31
4-Nitrophenol	100	30.6	24.4	27.5	28	10- 80	23	50
2,4-Dinitrotoluene	50	33.3	31.9	32.6	66	24- 96	4.3	38
Pentachlorophenol	100	38.7	42.3	40.5	41	9-103	8.9	50
Pyrene	50	41.2	38.4	39.8	80	26-127	7.0	31

alculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 15 MAY 89-A QC Run: 15 MAY 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Nitrobenzene-d5	100	60.5	60	35-114
2-Fluorobiphenyl	100	54.8	55	43-116
Terphenyl-d14	100	58.6	59	33-141
2-Fluorophenol	200	117	58	21-100
Phenol-d5	200	123	62	10- 94
2,4,6-Tribromophenol	200	112	56	10-123

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 15 MAY 89-A QC Run: 15 MAY 89-A

Analyte	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 15 MAY 89-A QC Run: 15 MAY 89-A			
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	13	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 15 MAY 89-A QC Run: 15 MAY 89-A			
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 15 MAY 89-A QC Run: 15 MAY 89-A

Analyte	Result	Units	Reporting Limit
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	13	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 15 MAY 89-A QC Run: 15 MAY 89-A			
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
004839-0001-SA	AQUEOUS	608-A	04 MAY 89-A	12 MAY 89-A
004839-0002-SA	AQUEOUS	608-A	04 MAY 89-A	12 MAY 89-A
004839-0003-SA	AQUEOUS	608-A	04 MAY 89-A	12 MAY 89-A

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DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 608-A Matrix: AQUEOUS QC Lot: 04 MAY 89-A Concentration Units: ug/L								
gamma-BHC (Lindane)	0.2	0.131	0.129	0.130	65	56-123	1.5	15
Heptachlor	0.2	0.152	0.155	0.154	77	40-131	2.0	20
Aldrin	0.2	0.111	0.116	0.114	57	40-120	4.4	22
Dieldrin	0.5	0.355	0.351	0.353	71	52-126	1.1	18
Endrin	0.5	0.409	0.391	0.400	80	56-121	4.5	21
4,4′-DDT	0.5	0.341	0.333	0.337	68	38-127	2.4	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 608-A				
Matrix: AQUEOUS				
QC Lot: 04 MAY 89-A QC Run: 12 MAY 89-A				
Concentration Units: ug/L				
Dibutylchlorendate	1.00	0.885	88	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 MAY 89-A QC Run: 12 MAY 89-A			
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 MAY 89-A QC Run: 12 MAY 89-A			
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10

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METHOD BLANK REPORT
Semivolatile Organics by GC (cont.)

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 MAY 89-A QC Run: 12 MAY 89-A			
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0

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QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
004839-0001-SA	AQUEOUS	ICP-AD	20 MAY 89-C
004839-0001-SA	AQUEOUS	AS-FAA-AD	02 JUN 89-A
004839-0001-SA	AQUEOUS	PB-FAA-AD	18 MAY 89-C
004839-0001-SA	AQUEOUS	SE-FAA-AD	07 JUN 89-A
004839-0001-SA	AQUEOUS	TL-FAA-AD	18 MAY 89-D
004839-0001-SA	AQUEOUS	HG-CVAA-AT	15 MAY 89-A

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average (%) DCS	Accuracy Average (%) Limits	Precision (RPD) DCS	Precision (RPD) Limit

Category: ICP-AD
Matrix: AQUEOUS
QC Lot: 20 MAY 89-C
Concentration Units: mg/L

Analyte	Spiked	DCS1	DCS2	AVG	DCS	Limits	DCS	Limit
Aluminum	2.0	1.97	1.97	1.97	98	75-125	0.0	20
Antimony	0.5	0.50	0.49	0.50	99	75-125	2.0	20
Arsenic	2.0	1.89	1.91	1.90	95	75-125	1.1	20
Barium	2.0	2.02	2.02	2.02	101	75-125	0.0	20
Beryllium	0.05	0.050	0.050	0.050	100	75-125	0.0	20
Cadmium	0.05	0.059	0.060	0.060	119	75-125	1.7	20
Calcium	100	99.0	99.2	99.1	99	75-125	0.2	20
Chromium	0.2	0.20	0.20	0.20	100	75-125	0.0	20
Cobalt	0.5	0.47	0.48	0.48	95	75-125	2.1	20
Copper	0.25	0.25	0.25	0.25	100	75-125	0.0	20
Iron	1.0	1.00	1.00	1.00	100	75-125	0.0	20
Lead	0.5	0.49	0.50	0.50	99	75-125	2.0	20
Magnesium	50	48.7	48.9	48.8	98	75-125	0.4	20
Manganese	0.5	0.49	0.50	0.50	99	75-125	2.0	20
Nickel	0.5	0.49	0.49	0.49	98	75-125	0.0	20
Potassium	100	96.1	96.2	96.2	96	75-125	0.1	20
Selenium	0	NA	NA	NC	NC	75-125	NC	20
Silver	0.05	0.046	0.048	0.047	94	75-125	4.3	20
Sodium	100	97.9	98.3	98.1	98	75-125	0.4	20
Thallium	0	NA	NA	NC	NC	75-125	NC	20
Tin	0.4	0.38	0.40	0.39	98	75-125	5.1	20
Vanadium	0.5	0.50	0.51	0.50	101	75-125	2.0	20
Zinc	0.5	0.48	0.48	0.48	96	75-125	0.0	20

Category: AS-FAA-AD
Matrix: AQUEOUS
QC Lot: 02 JUN 89-A
Concentration Units: mg/L

Analyte	Spiked	DCS1	DCS2	AVG	DCS	Limits	DCS	Limit
Arsenic	0.04	0.047	0.047	0.047	118	75-125	0.0	20

Category: PB-FAA-AD
Matrix: AQUEOUS
QC Lot: 18 MAY 89-C
Concentration Units: mg/L

Analyte	Spiked	DCS1	DCS2	AVG	DCS	Limits	DCS	Limit
Lead	0.02	0.020	0.021	0.021	103	75-125	3.9	20

ND = Not detected.
NC = Not calculated; see discussion.
NA = Not applicable.

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: SE-FAA-AD Matrix: AQUEOUS QC Lot: 07 JUN 89-A Concentration Units: mg/L								
Selenium	0.01	0.012	0.011	0.012	115	75-125	8.7	20
Category: TL-FAA-AD Matrix: AQUEOUS QC Lot: 18 MAY 89-D Concentration Units: mg/L								
Thallium	0.05	0.047	0.047	0.047	94	75-125	0.0	20
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 15 MAY 89-A Concentration Units: mg/L								
Mercury	0.0010	0.00112	0.00115	0.00114	114	75-125	2.6	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Ensco

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
004839-0001-SA	AQUEOUS	ALK-A	10 MAY 89-A
004839-0001-SA	AQUEOUS	NO3-A	11 MAY 89-B
004839-0001-SA	AQUEOUS	CL-A	11 MAY 89-A
004839-0001-SA	AQUEOUS	SO4-A	11 MAY 89-A
004839-0001-SA	AQUEOUS	F-A	23 MAY 89-A
004839-0001-SA	AQUEOUS	TDS-S	11 MAY 89-A
004839-0001-SA	AQUEOUS	PH-A	10 MAY 89-A

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ALK-A Matrix: AQUEOUS QC Lot: 10 MAY 89-A Concentration Units: mg/L								
Alkalinity, Total as CaCO3 at pH 4.5	151	145	145	145	96	90-110	0.0	10
Category: NO3-A Matrix: AQUEOUS QC Lot: 11 MAY 89-B Concentration Units: mg/L								
Nitrate as N	20	19.3	19.2	19.2	96	91-109	0.5	10
Category: CL-A Matrix: AQUEOUS QC Lot: 11 MAY 89-A Concentration Units: mg/L								
Chloride	100	102	103	102	103	92-108	1.0	10
Category: SO4-A Matrix: AQUEOUS QC Lot: 11 MAY 89-A Concentration Units: mg/L								
Sulfate	200	208	206	207	104	93-107	1.0	15
Category: F-A Matrix: AQUEOUS QC Lot: 23 MAY 89-A Concentration Units: mg/L								
Fluoride	11.9	12.0	12.0	12.0	101	88-112	0.0	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: TDS-S Matrix: AQUEOUS QC Lot: 11 MAY 89-A Concentration Units: mg/L								
Total Dissolved Solids	1070	1000	1030	1020	95	90-110	2.8	10
Category: PH-A Matrix: AQUEOUS QC Lot: 10 MAY 89-A Concentration Units: units								
pH	9.1	9.01	9.02	9.02	99	98-102	0.1	5

Calculations are performed before rounding to avoid round-off errors in calculated results.

Analytical Methodology

Enseco - Rocky Mountain Analytical Laboratory performs analytical services according to methods approved by EPA and other regulatory agencies, whenever possible.

Methods for metals and organic compounds are primarily derived from three sources of EPA methods, 1) the methods promulgated in 40 CFR 136 for priority pollutants, 2) the methods published in SW-846 and 3) methods developed by the EPA-EMSL/LV for Superfund investigations, as well as several documents published by the EPA and Enseco - Rocky Mountain Analytical Laboratory in 1984 and 1985. These methods all use the same generic technology as summarized below:

- Metals: acid digestion followed by analyses by ICP supported by graphite furnace AA
- Volatile Organics: purge and trap GC/MS or purge and trap GC with a selective detector.
- Semivolatile (base/neutral and acid) organics: solvent extraction followed by capillary column GC/MS, and
- Pesticides/Herbicides: solvent extraction, followed by gas chromatography.

Exact method references are provided in the Analytical Methodology Tables.

ANALYTICAL METHODOLOGY - ORGANIC TESTS

Test	Description	Methodology	Reference
VOA	Volatile Organics	Purge & Trap, GC/MS	624(1)/8240(2)
BNA	Semivolatile Organics	Extraction, GC/MS	625(1)/8270(2)
DXN	Dioxin	Extraction, GC/MS	613(1)/8280(2)
601	Halogenated Volatile Organics	Purge & Trap GC/Hall	601(1)/8010(2)
THM	Trihalomethanes	Purge & Trap GC/Hall	601(1)/8010(2)
602	Aromatic Volatile Organics	Purge & Trap GC/PID	602(1)/8020(2)
OCP	Organochlorine Pesticides	Extraction, GC/ECD	608(1)/8080(2)
OPP	Organophosphate Pesticides	Extraction, GC/FPD	614(1)/8140(2)
619	Triazine Pesticides	Extraction, GC/NPD	619(1)
LC CARB	Carbamate and Urea Pesticides	Extraction, HPLC	632(1)
PCB	PCB's	Extraction, GC/ECD	608(1)/8080(2)
HRB	Phenoxyacid Herbicides	Extraction, GC/ECD	615(1)/8150(2)
603	Acrolein & Acrylonitrile	Purge & Trap GC/FID	603(1)/8030(2)
604	Phenols	Extraction, GC/FID	604(1)/8040(2)
605	Benzidines	Extraction, HPLC	605(1)/8050(2)
606	Phthalate Esters	Extraction, GC/FID	606(1)/8060(2)
607	Nitrosamines	Extraction, GC/NPD	607(1)
609	Nitroaromatics & Cyclic Ketones	Extraction, GC/NPD	609(1)/8090(2)
PNA	Polynuclear Aromatic Hydrocarbons	Extraction, HPLC	610(1)/8310(2)
611	Haloethers	Extraction, GC/ECD	611(1)
612	Chlorinated Hydrocarbons	Extraction, GC/ECD	612(1)/8120(2)
GD FID	Hydrocarbon Scan	Extraction, GC/FID	D3328-78(3)
GC BPD	Boiling Point Determination	Extraction, GC/FID	D2887-84(4)

References

(1) Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).
(2) SW-846, 2nd Edition, 1984.
(3) "Annual Book of ASTM Standards", Volume 11.01, 1985.
(4) "Annual Book of ASTM Standards", Volume 05.02, 1984.

ANALYTICAL METHODOLOGY - INORGANIC TESTS

Test	Description	Methodology	Reference
ICP	Trace Metals	ICP Emission Spectroscopy	200.7(1)/6010(2)
FSB	Antimony	Furnace Atomic Absorption	204.2(1)/7041(2)
FAS	Arsenic	Furnace Atomic Absorption	206.2(1)/7060(2)
FCD	Cadmium	Furnace Atomic Absorption	213.2(1)/7131(2)
FPB	Lead	Furnace Atomic Absorption	239.2(1)/7421(2)
FSE	Selenium	Furnace Atomic Absorption	270.2(1)/7740(2)
FAG	Silver	Furnace Atomic Absorption	272.2(1)/7761(2)
FTL	Thallium	Furnace Atomic Absorption	279.2(1)/7841(2)
CVHG	Mercury	Cold Vapor Atomic	245.1(1)/7471(2)
CR + 6	Chromium (VI)	Colorimetric	312B(3)
IC CL	Chloride	Ion Chromatography	300.0(1)
BURCL	Chloride	Manual Titrimetric	325.3(1)
METF	Fluoride	Electrode	340.2(1)
IC SO4	Sulfate	IC	300.0(1)
SPESO4	Sulfate	Manual Turbidimetric	375.4(1)
METALK	Alkalinity, Total	Titrimetric	310.1(1)
METACK	Alkalinity, Forms	Titrimetric	403(3)
TECNOXT	Nitrate+Nitrite as N	Cd Reduction Colorimetric	353.2(1)
METPH	pH	Meter	150.1(1)/9045(2)
CELSP	Specific Conductance @ 25°C	Bridge	120.1(1)
BALTDS	Total Dissolved Solids	Gravimetric, 180°C	160.1(1)
BALTSS	Total Suspended Solids	Gravimetric, 105°C	160.2(1)
BALTS	Total Solids	Gravimetric, 105°C	160.3(1)
BALTVS	Total Volatile Solids	Gravimetric, 550°C	160.4(1)
TECO P	Ortho-Phosphate as P	Two Reagent Colorimetric	365.3(1)
TECT P	Total Phosphorus as P	Digestion-Colorimetric	365.3(1)
ICP	Total Phosphorus as P	Digestion-ICP/AES	200.7(1)
ICP	Silica as SiO_2	ICP/AES	200.7(1)
SPESIO2	Silica as SiO_2	Colorimetric	370.1(1)
METBOD	Biochemical Oxygen Demand	Dilution Bottle-D.O. probe	405.1(1)
METCOD	Chemical Oxygen Demand	Micro Colorimetric	410.4(1)
TOCTOC	Total Organic Carbon	UV Oxidation-IR	415.2(1)
METNH3	Ammonia as N	Electrode	350.3(1)
TECNH3	Ammonia as N	Automated Colorimetric	350.1(1)
METTKN	Total Kjeldahl Nitrogen as N	Digestion-Electrode	351.4(1)
TECTKN	Total Kjeldahl Nitrogen as N	Digestion-Colorimetric	351.2(1)
TOXTOX	Total Organic Halogen	Combustion-Titrimetric	9020(2)
TONO1	Total Organic Nitrogen	Calculation (TKN-NH_3)	-
BAL O&G	Oil and Grease	Freon Extraction-Gravimetric	413.1(1)
IR AO&G	Oil and Grease	Freon Extraction-IR	413.2(1)
TECCN F	Cyanide Amendable to Chlorination	Chlorination-Distillation-Colorimetric	335.1(1)
TECCN W	Weak & Dissolved Cyanide	Distillation-Colorimetric	412H(3)
TECCN T	Total Cyanide	Distillation-Colorimetric	335.2(1)/9010(2)
STEPHEN	Phenolics	Distillation-Colorimetric	420.1(1)
COLIF F	Fecal Coliform	Membrane Filter	909C(3)
COLIF T	Total Coliform	Membrane Filter	909A(3)

ANALYTICAL METHODOLOGY - INORGANIC TESTS (CONT.)

Test	Description	Methodology	Reference
IC BR	Bromide	Ion Chromatography	300.0(1)
POTCL2R	Residual Chlorine	Amperometric	330.2(1)
NESCOLR	Color	Pt-Co Colorimetric	110.2(1)
ICPHAR	Hardness as $CaCo_3$	Calculation	200.7(1)/314A(3)
TECNO2	Nitrite as N	Colorimetric	354.1(1)
SPES	Sulfide	Colorimetric	376.2(1)/9030(2)
BURSO3	Sulfite	Titrimetric	377.1(1)
SPEMBAS	MBAS (Surfactants)	Colorimetric	425.1(1)
SPETURB	Turbidity	Turbidimeter	180.1(1)
Gross Alpha		Proportional Counter	703(3)
Gross Beta		Proportional Counter	703(3)
Radium 226		Separation - Counter	705(3)
Radium 228		Separation - Counter	707(3)
Uranium		Fluorimetric	D2907.75(4)

References

(1) Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).
(2) SW-846, 2nd Edition, 1984.
(3) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, 1980.
(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Enseco

July 19, 1989

Mr. Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for six samples we received at Enseco-Rocky Mountain Analytical Laboratory on May 25, 1989.

Included with the report is a quality control summary. Referenced at the end of the report are the analytical methodologies used for the various analyses performed.

Please call if you have any questions.

Sincerely,

Cindy Ingram
Cindy Ingram
Program Administrator

Reviewed by:

Charles D. Mamrak
Technical Manager

CI/CDM/lw
Enclosures

RMAL #005102

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Enseco

ANALYTICAL RESULTS

FOR

ENRON

ENSECO-RMAL NO. 005102

JULY 19, 1989

Reviewed by: Cindy Ingram

Cindy Ingram

Charles D. Mamrak

Charles D. Mamrak

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Description of Analytical Methodology

Consistent with directives in the CLP protocol in SW-846 and other EPA methods, all GC/MS analyses were performed so that the maximum concentration of sample was analyzed. Some samples required dilutions to avoid saturation of the detector, to achieve linearity for a specific target compound or to reduce matrix interferences. As stated in Section 7.5.4 of Method 8270, 7.4.1.16 of Method 8240 and Exhibit E of the CLP protocol these dilutions must be performed. The reporting limits for these samples are therefore proportionate to the dilution required. Surrogate compounds may not be measurable in samples which have been diluted.

Sample 005102-0003-SA required a dilution for the volatile analysis due to non-target compounds. This sample also required a dilution for the semivolatile analysis due to non-target compounds.

The reporting limit for bis(2-ethylhexyl)phthalate for samples 005102-0001, 0003, and 0004 were raised due to the concentration of this analyte found in the method blank.

Due to matrix interference, the reporting limit for Aroclor 1221 was raised for sample 005102-0003 for the pesticide/PCB analysis.

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
005102-0001-SA	5-3B	AQUEOUS	23 MAY 89	11:00	25 MAY 89
005102-0002-SA	5-3BA	AQUEOUS	23 MAY 89	11:00	25 MAY 89
005102-0003-SA	5-2BB	AQUEOUS	23 MAY 89	15:00	25 MAY 89
005102-0004-SA	Field Blank	AQUEOUS	23 MAY 89	12:45	25 MAY 89
005102-0005-SA	Trip Blank	AQUEOUS	24 MAY 89	07:00	25 MAY 89
005102-0006-SA	Trip Blank	AQUEOUS	24 MAY 89	07:00	25 MAY 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 005102	Group Code	Analysis Description	Custom Test?
0001 , 0003	A	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Nitrate, Ion Chromatography	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Fluoride, Electrode	N
		Total Dissolved Solids (TDS)	N
		pH	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		Lead, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		Thallium, Furnace AA (Dissolved)	N
		Mercury, Cold Vapor AA (Dissolved)	N
		Prep - Mercury, Cold Vapor AA, (Dissolved)	N
0002 , 0004	B	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
0005 - 0006	C	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-3B
Lab ID: 005102-0001-SA   Enseco ID: 1039878
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 29 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene (BFB)	98.1	%	--
1,2-Dichloroethane-d4	103	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Tim Miller   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-3BA
Lab ID: 005102-0002-SA Enseco ID: 1039883
Matrix: AQUEOUS Sampled: 23 MAY 89 Received: 25 MAY 89
Authorized: 25 MAY 89 Prepared: 26 MAY 89 Analyzed: 29 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	103	%	--
4-Bromofluorobenzene (BFB)	98.1	%	--
1,2-Dichloroethane-d4	105	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Tim Miller Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-2BB
Lab ID: 005102-0003-SA   Enseco ID: 1039884
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 29 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	400
Bromomethane	ND	ug/L	400
Vinyl chloride	ND	ug/L	400
Chloroethane	ND	ug/L	400
Methylene chloride	ND	ug/L	1000
1,1-Dichloroethene	ND	ug/L	200
1,1-Dichloroethane	ND	ug/L	200
1,2-Dichloroethene (cis/trans)	ND	ug/L	200
Chloroform	ND	ug/L	200
1,2-Dichloroethane	ND	ug/L	200
1,1,1-Trichloroethane	ND	ug/L	200
Carbon tetrachloride	ND	ug/L	200
Bromodichloromethane	ND	ug/L	200
1,2-Dichloropropane	ND	ug/L	200
trans-1,3-Dichloropropene	ND	ug/L	200
Trichloroethene	ND	ug/L	200
Chlorodibromomethane	ND	ug/L	200
1,1,2-Trichloroethane	ND	ug/L	200
Benzene	1800	ug/L	200
cis-1,3-Dichloropropene	ND	ug/L	200
2-Chloroethyl vinyl ether	ND	ug/L	400
Bromoform	ND	ug/L	200
1,1,2,2-Tetrachloroethane	ND	ug/L	200
Tetrachloroethene	ND	ug/L	200
Toluene	2000	ug/L	200
Chlorobenzene	ND	ug/L	200
Ethyl benzene	ND	ug/L	200
Toluene-d8	107	%	--
4-Bromofluorobenzene (BFB)	102	%	--
1,2-Dichloroethane-d4	105	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Tim Miller   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Field Blank
Lab ID: 005102-0004-SA
Matrix: AQUEOUS
Authorized: 25 MAY 89

Enseco ID: 1039886
Sampled: 23 MAY 89
Prepared: 26 MAY 89

Received: 25 MAY 89
Analyzed: 29 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	105	%	--
4-Bromofluorobenzene (BFB)	99.4	%	--
1,2-Dichloroethane-d4	105	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Tim Miller

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Trip Blank
Lab ID: 005102-0005-SA   Enseco ID: 1039889
Matrix: AQUEOUS   Sampled: 24 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 29 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	106	%	--
4-Bromofluorobenzene (BFB)	97.6	%	--
1,2-Dichloroethane-d4	104	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Tim Miller   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Trip Blank
Lab ID: 005102-0006-SA
Matrix: AQUEOUS
Authorized: 25 MAY 89

Enseco ID: 1039890
Sampled: 24 MAY 89
Prepared: 26 MAY 89

Received: 25 MAY 89
Analyzed: 29 MAY 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene (BFB)	97.0	%	--
1,2-Dichloroethane-d4	102	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Tim Miller

Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-3B
Lab ID: 005102-0001-SA
Matrix: AQUEOUS
Authorized: 25 MAY 89

Enseco ID: 1039878
Sampled: 23 MAY 89
Prepared: 26 MAY 89

Received: 25 MAY 89
Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Angie Poturalski

Approved By: Jeff Lowry

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-3B
Lab ID: 005102-0001-SA   Enseco ID: 1039878
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	40
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	94.6	%	--
2-Fluorobiphenyl	79.8	%	--
Terphenyl-d14	85.9	%	--
Phenol-d5	81.0	%	--
2-Fluorophenol	81.0	%	--
2,4,6-Tribromophenol	74.5	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Angie Poturalski   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-3BA
Lab ID: 005102-0002-SA
Matrix: AQUEOUS
Authorized: 25 MAY 89

Enseco ID: 1039883
Sampled: 23 MAY 89
Prepared: 30 MAY 89

Received: 25 MAY 89
Analyzed: 08 JUN 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin

Approved By: Jeff Lowry

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-3BA
Lab ID: 005102-0002-SA   Enseco ID: 1039883
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 30 MAY 89   Analyzed: 08 JUN 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	13	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	75.9	%	--
2-Fluorobiphenyl	77.4	%	--
Terphenyl-d14	97.2	%	--
Phenol-d5	17.2	%	--
2-Fluorophenol	58.0	%	--
2,4,6-Tribromophenol	75.0	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bob Martin   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-2BB
Lab ID: 005102-0003-SA   Enseco ID: 1039884
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
Phenol	120	ug/L	100
bis(2-Chloroethyl)ether	ND	ug/L	100
2-Chlorophenol	ND	ug/L	100
1,3-Dichlorobenzene	ND	ug/L	100
1,4-Dichlorobenzene	ND	ug/L	100
1,2-Dichlorobenzene	ND	ug/L	100
bis(2-Chloroisopropyl) ether	ND	ug/L	100
N-Nitroso-di-n-propylamine	ND	ug/L	100
Hexachloroethane	ND	ug/L	100
Nitrobenzene	ND	ug/L	100
Isophorone	ND	ug/L	100
2-Nitrophenol	ND	ug/L	100
2,4-Dimethylphenol	ND	ug/L	100
bis(2-Chloroethoxy) methane	ND	ug/L	100
2,4-Dichlorophenol	ND	ug/L	100
1,2,4-Trichlorobenzene	ND	ug/L	100
Naphthalene	ND	ug/L	100
Hexachlorobutadiene	ND	ug/L	100
4-Chloro-3-methylphenol	ND	ug/L	100
Hexachlorocyclopentadiene	ND	ug/L	100
2,4,6-Trichlorophenol	ND	ug/L	100
2-Chloronaphthalene	ND	ug/L	100
Dimethyl phthalate	ND	ug/L	100
Acenaphthylene	ND	ug/L	100
Acenaphthene	ND	ug/L	100
2,4-Dinitrophenol	ND	ug/L	500
4-Nitrophenol	ND	ug/L	500
2,4-Dinitrotoluene	ND	ug/L	100
2,6-Dinitrotoluene	ND	ug/L	100
Diethyl phthalate	ND	ug/L	100
4-Chlorophenyl phenyl ether	ND	ug/L	100
Fluorene	ND	ug/L	100
4,6-Dinitro-2-methylphenol	ND	ug/L	500
1,2-Diphenylhydrazine	ND	ug/L	100
N-Nitrosodiphenylamine	ND	ug/L	100

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Angie Poturalski   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-2BB
Lab ID: 005102-0003-SA   Enseco ID: 1039884
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	100
Hexachlorobenzene	ND	ug/L	100
Pentachlorophenol	ND	ug/L	500
Phenanthrene	ND	ug/L	100
Anthracene	ND	ug/L	100
Di-n-butyl phthalate	ND	ug/L	100
Fluoranthene	ND	ug/L	100
Pyrene	ND	ug/L	100
Butyl benzyl phthalate	ND	ug/L	100
3,3'-Dichlorobenzidine	ND	ug/L	200
Benzo(a)anthracene	ND	ug/L	100
bis(2-Ethylhexyl) phthalate	ND	ug/L	400
Chrysene	ND	ug/L	100
Di-n-octyl phthalate	ND	ug/L	100
Benzo(b)fluoranthene	ND	ug/L	100
Benzo(k)fluoranthene	ND	ug/L	100
Benzo(a)pyrene	ND	ug/L	100
Indeno(1,2,3-c,d)pyrene	ND	ug/L	100
Dibenz(a,h)anthracene	ND	ug/L	100
Benzo(g,h,i)perylene	ND	ug/L	100
Nitrobenzene-d5	81.4	%	--
2-Fluorobiphenyl	83.0	%	--
Terphenyl-d14	64.2	%	--
Phenol-d5	60.5	%	--
2-Fluorophenol	63.0	%	--
2,4,6-Tribromophenol	74.5	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Angie Poturalski   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: Field Blank
Lab ID: 005102-0004-SA   Enseco ID: 1039886
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Angie Poturalski   Approved By: Jeff Lowry

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: Field Blank
Lab ID: 005102-0004-SA   Enseco ID: 1039886
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 05 JUN 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	40
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	80.9	%	--
2-Fluorobiphenyl	79.1	%	--
Terphenyl-d14	90.2	%	--
Phenol-d5	83.0	%	--
2-Fluorophenol	85.0	%	--
2,4,6-Tribromophenol	81.5	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Angie Poturalski   Approved By: Jeff Lowry

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-3B
Lab ID: 005102-0001-SA   Enseco ID: 1039878
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 23 JUN 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	81.2	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Huison Chang   Approved By: Kim Zilis

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-3BA
Lab ID: 005102-0002-SA
Matrix: AQUEOUS
Authorized: 25 MAY 89

Enseco ID: 1039883
Sampled: 23 MAY 89
Prepared: 26 MAY 89

Received: 25 MAY 89
Analyzed: 23 JUN 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	85.9	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Huison Chang

Approved By: Kim Zilis

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-2BB
Lab ID: 005102-0003-SA Enseco ID: 1039884
Matrix: AQUEOUS Sampled: 23 MAY 89 Received: 25 MAY 89
Authorized: 25 MAY 89 Prepared: 26 MAY 89 Analyzed: 23 JUN 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	1.0
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	75.1	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Huison Chang Approved By: Kim Zilis

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: Field Blank
Lab ID: 005102-0004-SA   Enseco ID: 1039886
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: 26 MAY 89   Analyzed: 23 JUN 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	77.8	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Huison Chang   Approved By: Kim Zilis

Metals

Dissolved Metals

Client Name: Enron
Client ID: 5-3B
Lab ID: 005102-0001-SA   Enseco ID: 1039878
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.05	200.7	NA	21 JUN 89
Arsenic	ND	mg/L	0.003	206.2	NA	21 JUN 89
Barium	0.15	mg/L	0.005	200.7	NA	21 JUN 89
Beryllium	ND	mg/L	0.001	200.7	NA	21 JUN 89
Boron	0.25	mg/L	0.01	200.7	NA	21 JUN 89
Cadmium	ND	mg/L	0.005	200.7	NA	21 JUN 89
Calcium	50	mg/L	0.1	200.7	NA	21 JUN 89
Chromium	ND	mg/L	0.01	200.7	NA	21 JUN 89
Copper	ND	mg/L	0.006	200.7	NA	21 JUN 89
Iron	ND	mg/L	0.05	200.7	NA	21 JUN 89
Lead	ND	mg/L	0.002	239.2	NA	21 JUN 89
Magnesium	13	mg/L	0.1	200.7	NA	21 JUN 89
Manganese	0.27	mg/L	0.005	200.7	NA	21 JUN 89
Mercury	ND	mg/L	0.0001	245.1	13 JUN 89	15 JUN 89
Molybdenum	ND	mg/L	0.02	200.7	NA	21 JUN 89
Nickel	ND	mg/L	0.04	200.7	NA	21 JUN 89
Potassium	ND	mg/L	5	200.7	NA	21 JUN 89
Selenium	0.010	mg/L	0.002	270.2	NA	21 JUN 89
Silica as SiO2	20	mg/L	0.1	200.7	NA	21 JUN 89
Silver	ND	mg/L	0.005	200.7	NA	21 JUN 89
Sodium	285	mg/L	0.05	200.7	NA	21 JUN 89
Strontium	0.98	mg/L	0.02	200.7	NA	21 JUN 89
Thallium	ND	mg/L	0.04	279.2	NA	19 JUN 89
Zinc	ND	mg/L	0.01	200.7	NA	21 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bryan Anderson   Approved By: Tammy Bailey

Enseco

Metals

Dissolved Metals

Client Name: Enron
Client ID: 5-2BB
Lab ID: 005102-0003-SA   Enseco ID: 1039884
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.05	200.7	NA	21 JUN 89
Arsenic	0.029	mg/L	0.003	206.2	NA	21 JUN 89
Barium	0.44	mg/L	0.005	200.7	NA	21 JUN 89
Beryllium	ND	mg/L	0.001	200.7	NA	21 JUN 89
Boron	0.87	mg/L	0.01	200.7	NA	21 JUN 89
Cadmium	ND	mg/L	0.005	200.7	NA	21 JUN 89
Calcium	118	mg/L	0.1	200.7	NA	21 JUN 89
Chromium	ND	mg/L	0.01	200.7	NA	21 JUN 89
Copper	ND	mg/L	0.006	200.7	NA	21 JUN 89
Iron	ND	mg/L	0.05	200.7	NA	21 JUN 89
Lead	ND	mg/L	0.002	239.2	NA	21 JUN 89
Magnesium	22	mg/L	0.1	200.7	NA	21 JUN 89
Manganese	1.4	mg/L	0.005	200.7	NA	21 JUN 89
Mercury	ND	mg/L	0.0001	245.1	13 JUN 89	15 JUN 89
Molybdenum	ND	mg/L	0.02	200.7	NA	21 JUN 89
Nickel	ND	mg/L	0.04	200.7	NA	21 JUN 89
Potassium	ND	mg/L	5	200.7	NA	21 JUN 89
Selenium	ND	mg/L	0.002	270.2	NA	21 JUN 89
Silica as SiO2	24	mg/L	0.1	200.7	NA	21 JUN 89
Silver	ND	mg/L	0.005	200.7	NA	21 JUN 89
Sodium	190	mg/L	0.05	200.7	NA	21 JUN 89
Strontium	1.1	mg/L	0.02	200.7	NA	21 JUN 89
Thallium	ND	mg/L	0.008	279.2	NA	19 JUN 89
Zinc	ND	mg/L	0.01	200.7	NA	21 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bryan Anderson   Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: 5-3B
Lab ID: 005102-0001-SA   Enseco ID: 1039878
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	588	mg/L	5	310.1	NA	25 MAY 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	25 MAY 89
Chloride	224	mg/L	3	300.0	NA	25 MAY 89
Fluoride	0.2	mg/L	0.1	340.2	NA	15 JUN 89
Nitrate as N	8.6	mg/L	0.1	300.0	NA	25 MAY 89
pH	7.8	units	0.01	150.1	NA	25 MAY 89
Sulfate	102	mg/L	5	300.0	NA	25 MAY 89
Total Dissolved Solids	1010	mg/L	10	160.1	NA	30 MAY 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell   Approved By: Toni Stovall

Enseco

General Inorganics

Client Name: Enron
Client ID: 5-2BB
Lab ID: 005102-0003-SA   Enseco ID: 1039884
Matrix: AQUEOUS   Sampled: 23 MAY 89   Received: 25 MAY 89
Authorized: 25 MAY 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	1510	mg/L	5	310.1	NA	25 MAY 89
Alkalinity, Carb. as CaCO3 at pH 8.3	1510	mg/L	5	310.1	NA	25 MAY 89
Chloride	17	mg/L	3	300.0	NA	25 MAY 89
Fluoride	0.2	mg/L	0.1	340.2	NA	15 JUN 89
Nitrate as N	0.6	mg/L	0.1	300.0	NA	25 MAY 89
pH	7.4	units	0.01	150.1	NA	25 MAY 89
Sulfate	7	mg/L	5	300.0	NA	25 MAY 89
Total Dissolved Solids	910	mg/L	10	160.1	NA	30 MAY 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell   Approved By: Toni Stovall

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report. The test codes assigned are defined in Section V, Analytical Methodology.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
005102-0001-SA	AQUEOUS	624-A	24 MAY 89-B	28 MAY 89-B
005102-0002-SA	AQUEOUS	624-A	24 MAY 89-B	28 MAY 89-B
005102-0003-SA	AQUEOUS	624-A	24 MAY 89-B	28 MAY 89-B
005102-0004-SA	AQUEOUS	624-A	24 MAY 89-B	28 MAY 89-B
005102-0005-SA	AQUEOUS	624-A	24 MAY 89-B	28 MAY 89-B
005102-0006-SA	AQUEOUS	624-A	24 MAY 89-B	28 MAY 89-B

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: 624-A
Matrix: AQUEOUS
QC Lot: 24 MAY 89-B
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
1,1-Dichloroethene	50	45.3	48.2	46.8	94	61-145	6.2	14
Trichloroethene	50	51.1	51.0	51.0	102	71-120	0.2	14
Benzene	50	52.7	51.2	52.0	104	76-127	2.9	11
Toluene	50	49.5	50.3	49.9	100	76-125	1.6	13
Chlorobenzene	50	51.0	50.9	51.0	102	75-130	0.2	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits

Category: 624-A
Matrix: AQUEOUS
QC Lot: 24 MAY 89-B QC Run: 28 MAY 89-B
Concentration Units: ug/L

Analyte	Spiked	Measured	SCS	Limits
1,2-Dichloroethane-d4	50.0	50.4	101	76-114
4-Bromofluorobenzene (BFB)	50.0	49.3	99	86-115
Toluene-d8	50.0	52.0	104	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 24 MAY 89-B QC Run: 28 MAY 89-B

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

Test: 624-PP-A
Matrix: AQUEOUS
QC Lot: 24 MAY 89-B QC Run: 28 MAY 89-B

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/l	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-A			
Matrix: AQUEOUS			
QC Lot: 24 MAY 89-B QC Run: 28 MAY 89-B			
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Test: 624-PP-A			
Matrix: AQUEOUS			
QC Lot: 24 MAY 89-B QC Run: 28 MAY 89-B			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-A			
Matrix: AQUEOUS			
QC Lot: 24 MAY 89-B QC Run: 28 MAY 89-B			
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
005102-0001-SA	AQUEOUS	625-A	26 MAY 89-A	26 MAY 89-A
005102-0002-SA	AQUEOUS	625-A	26 MAY 89-A	30 MAY 89-A
005102-0003-SA	AQUEOUS	625-A	26 MAY 89-A	26 MAY 89-A
005102-0004-SA	AQUEOUS	625-A	26 MAY 89-A	26 MAY 89-A

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 26 MAY 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Phenol	100	106	83.9	95.0	95	12- 89	23	42
2-Chlorophenol	100	85.6	77.1	81.4	81	27-123	10	40
1,4-Dichlorobenzene	50	35.7	17.3	26.5	53	36- 97	69	28
N-Nitroso-di-n-propylamine	50	45.6	21.6	33.6	67	41-116	71	38
1,2,4-Trichlorobenzene	50	39.6	19.5	29.6	59	39- 98	68	28
4-Chloro-3-methylphenol	100	107	85.7	96.4	96	23- 97	22	42
Acenaphthene	50	50.0	23.1	36.6	73	46-118	74	31
4-Nitrophenol	100	93.0	49.0	71.0	71	10- 80	62	50
2,4-Dinitrotoluene	50	43.7	19.4	31.6	63	24- 96	77	38
Pentachlorophenol	100	91.2	70.7	81.0	81	9-103	25	50
Pyrene	50	65.0	23.2	44.1	88	26-127	95	31

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 625-A				
Matrix: AQUEOUS				
QC Lot: 26 MAY 89-A QC Run: 26 MAY 89-A				
Concentration Units: ug/L				
Nitrobenzene-d5	100	112	112	35-114
2-Fluorobiphenyl	100	97.8	98	43-116
Terphenyl-d14	100	111	111	33-141
2-Fluorophenol	200	175	88	21-100
Phenol-d5	200	181	90	10- 94
2,4,6-Tribromophenol	200	200	100	10-123
Category: 625-A				
Matrix: AQUEOUS				
QC Lot: 26 MAY 89-A QC Run: 30 MAY 89-A				
Concentration Units: ug/L				
Nitrobenzene-d5	100	84.4	84	35-114
2-Fluorobiphenyl	100	82.1	82	43-116
Terphenyl-d14	100	93.2	93	33-141
2-Fluorophenol	200	160	80	21-100
Phenol-d5	200	173	86	10- 94
2,4,6-Tribromophenol	200	167	84	10-123

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 26 MAY 89-A QC Run: 26 MAY 89-A

Analyte	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 26 MAY 89-A QC Run: 26 MAY 89-A			
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	32	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 26 MAY 89-A QC Run: 30 MAY 89-A			
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 26 MAY 89-A QC Run: 30 MAY 89-A

Analyte	Result	Units	Reporting Limit
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 26 MAY 89-A QC Run: 30 MAY 89-A

Analyte	Result	Units	Reporting Limit
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 26 MAY 89-A QC Run: 26 MAY 89-A

Analyte	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 26 MAY 89-A QC Run: 26 MAY 89-A

Analyte	Result	Units	Reporting Limit
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	32	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
005102-0001-SA	AQUEOUS	608-A	21 MAY 89-A	26 MAY 89-A
005102-0002-SA	AQUEOUS	608-A	21 MAY 89-A	26 MAY 89-A
005102-0003-SA	AQUEOUS	608-A	21 MAY 89-A	26 MAY 89-A
005102-0004-SA	AQUEOUS	608-A	21 MAY 89-A	26 MAY 89-A

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 21 MAY 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
gamma-BHC (Lindane)	0.2	0.136	0.136	0.136	68	56-123	0.0	15
Heptachlor	0.2	0.162	0.163	0.162	81	40-131	0.6	20
Aldrin	0.2	0.116	0.116	0.116	58	40-120	0.0	22
Dieldrin	0.5	0.342	0.341	0.342	68	52-126	0.3	18
Endrin	0.5	0.286	0.280	0.283	57	56-121	2.1	21
4,4'-DDT	0.5	0.339	0.340	0.340	68	38-127	0.3	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 608-A Matrix: AQUEOUS QC Lot: 21 MAY 89-A QC Run: 26 MAY 89-A Concentration Units: ug/L				
Dibutylchlorendate	1.00	0.781	78	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 21 MAY 89-A QC Run: 26 MAY 89-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 21 MAY 89-A QC Run: 26 MAY 89-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10

METHOD BLANK REPORT
Semivolatile Organics by GC (cont.)

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 21 MAY 89-A QC Run: 26 MAY 89-A

Analyte	Result	Units	Reporting Limit
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
005102-0001-SA	AQUEOUS	ICP-AD	21 JUN 89-D
005102-0001-SA	AQUEOUS	AS-FAA-AD	21 JUN 89-A
005102-0001-SA	AQUEOUS	PB-FAA-AD	21 JUN 89-A
005102-0001-SA	AQUEOUS	SE-FAA-AD	21 JUN 89-A
005102-0001-SA	AQUEOUS	TL-FAA-AD	19 JUN 89-A
005102-0001-SA	AQUEOUS	HG-CVAA-AT	12 JUN 89-D
005102-0003-SA	AQUEOUS	ICP-AD	21 JUN 89-D
005102-0003-SA	AQUEOUS	AS-FAA-AD	21 JUN 89-A
005102-0003-SA	AQUEOUS	PB-FAA-AD	21 JUN 89-A
005102-0003-SA	AQUEOUS	SE-FAA-AD	21 JUN 89-A
005102-0003-SA	AQUEOUS	TL-FAA-AD	19 JUN 89-A
005102-0003-SA	AQUEOUS	HG-CVAA-AT	12 JUN 89-D

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Category: ICP-AD
Matrix: AQUEOUS
QC Lot: 21 JUN 89-D
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Aluminum	2.0	1.94	1.94	1.94	97	75-125	0.0	20
Antimony	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Arsenic	2.0	1.97	1.94	1.96	98	75-125	1.5	20
Barium	2.0	1.91	1.90	1.90	95	75-125	0.5	20
Beryllium	0.05	0.047	0.047	0.047	94	75-125	0.0	20
Cadmium	0.05	0.049	0.053	0.051	102	75-125	7.8	20
Calcium	100	99.6	99.3	99.4	99	75-125	0.3	20
Chromium	0.2	0.19	0.20	0.20	98	75-125	5.1	20
Cobalt	0.5	0.48	0.47	0.48	95	75-125	2.1	20
Copper	0.25	0.25	0.25	0.25	100	75-125	0.0	20
Iron	1.0	0.96	1.00	0.98	98	75-125	4.1	20
Lead	0.5	0.48	0.49	0.48	97	75-125	2.1	20
Magnesium	50	50.0	49.8	49.9	100	75-125	0.4	20
Manganese	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Nickel	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Potassium	100	96.8	96.6	96.7	97	75-125	0.2	20
Selenium	0	NA	NA	NC	NC	75-125	NC	20
Silver	0.05	0.046	0.046	0.046	92	75-125	0.0	20
Sodium	100	100	100	100	100	75-125	0.0	20
Thallium	0	NA	NA	NC	NC	75-125	NC	20
Tin	0.4	0.41	0.42	0.42	104	75-125	2.4	20
Vanadium	0.5	0.48	0.47	0.48	95	75-125	2.1	20
Zinc	0.5	0.48	0.48	0.48	96	75-125	0.0	20

Category: AS-FAA-AD
Matrix: AQUEOUS
QC Lot: 21 JUN 89-A
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Arsenic	0.04	0.044	0.046	0.045	113	75-125	4.4	20

Category: PB-FAA-AD
Matrix: AQUEOUS
QC Lot: 21 JUN 89-A
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Lead	0.02	0.018	0.018	0.018	90	75-125	0.0	20

ND = Not detected
NC = Not calculated, calculation not applicable
NA = Not applicable

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: SE-FAA-AD Matrix: AQUEOUS QC Lot: 21 JUN 89-A Concentration Units: mg/L								
Selenium	0.01	0.011	0.011	0.011	110	75-125	0.0	20
Category: TL-FAA-AD Matrix: AQUEOUS QC Lot: 19 JUN 89-A Concentration Units: mg/L								
Thallium	0.05	0.049	0.049	0.049	98	75-125	0.0	20
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 12 JUN 89-D Concentration Units: mg/L								
Mercury	0.0010	0.000950	0.000950	0.000950	95	75-125	0.0	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
005102-0001-SA	AQUEOUS	ALK-A	25 MAY 89-A
005102-0001-SA	AQUEOUS	NO3-A	25 MAY 89-C
005102-0001-SA	AQUEOUS	CL-A	25 MAY 89-C
005102-0001-SA	AQUEOUS	SO4-A	25 MAY 89-C
005102-0001-SA	AQUEOUS	F-A	15 JUN 89-A
005102-0001-SA	AQUEOUS	TDS-S	30 MAY 89-A
005102-0001-SA	AQUEOUS	PH-A	25 MAY 89-A
005102-0003-SA	AQUEOUS	ALK-A	25 MAY 89-A
005102-0003-SA	AQUEOUS	NO3-A	25 MAY 89-C
005102-0003-SA	AQUEOUS	CL-A	25 MAY 89-C
005102-0003-SA	AQUEOUS	SO4-A	25 MAY 89-C
005102-0003-SA	AQUEOUS	F-A	15 JUN 89-A
005102-0003-SA	AQUEOUS	TDS-S	30 MAY 89-A
005102-0003-SA	AQUEOUS	PH-A	25 MAY 89-A

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ALK-A Matrix: AQUEOUS QC Lot: 25 MAY 89-A Concentration Units: mg/L								
Alkalinity, Total as CaCO3 at pH 4.5	27.3	27.9	26.4	27.2	99	90-110	5.5	10
Category: NO3-A Matrix: AQUEOUS QC Lot: 25 MAY 89-C Concentration Units: mg/L								
Nitrate as N	20	19.1	18.7	18.9	95	91-109	2.1	10
Category: CL-A Matrix: AQUEOUS QC Lot: 25 MAY 89-C Concentration Units: mg/L								
Chloride	100	97.9	98.0	98.0	98	92-108	0.1	10
Category: SO4-A Matrix: AQUEOUS QC Lot: 25 MAY 89-C Concentration Units: mg/L								
Sulfate	200	200	196	198	99	93-107	2.0	15
Category: F-A Matrix: AQUEOUS QC Lot: 15 JUN 89-A Concentration Units: mg/L								
Fluoride	14.1	13.6	13.8	13.7	97	88-112	1.5	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: TDS-S Matrix: AQUEOUS QC Lot: 30 MAY 89-A Concentration Units: mg/L								
Total Dissolved Solids	1450	1390	1330	1360	94	90-110	4.4	10
Category: PH-A Matrix: AQUEOUS QC Lot: 25 MAY 89-A Concentration Units: units								
pH	9.1	8.99	9.01	9.00	99	98-102	0.2	5

Calculations are performed before rounding to avoid round-off errors in calculated results.

Analytical Methodology

Enseco - Rocky Mountain Analytical Laboratory performs analytical services according to methods approved by EPA and other regulatory agencies, whenever possible.

Methods for metals and organic compounds are primarily derived from three sources of EPA methods, 1) the methods promulgated in 40 CFR 136 for priority pollutants, 2) the methods published in SW-846 and 3) methods developed by the EPA-EMSL/LV for Superfund investigations, as well as several documents published by the EPA and Enseco - Rocky Mountain Analytical Laboratory in 1984 and 1985. These methods all use the same generic technology as summarized below:

- Metals: acid digestion followed by analyses by ICP supported by graphite furnace AA

- Volatile Organics: purge and trap GC/MS or purge and trap GC with a selective detector.

- Semivolatile (base/neutral and acid) organics: solvent extraction followed by capillary column GC/MS, and

- Pesticides/Herbicides: solvent extraction, followed by gas chromatography.

Exact method references are provided in the Analytical Methodology Tables.

ANALYTICAL METHODOLOGY - ORGANIC TESTS

Test	Description	Methodology	Reference
VOA	Volatile Organics	Purge & Trap, GC/MS	624(1)/8240(2)
BNA	Semivolatile Organics	Extraction, GC/MS	625(1)/8270(2)
DXN	Dioxin	Extraction, GC/MS	613(1)/8280(2)
601	Halogenated Volatile Organics	Purge & Trap GC/Hall	601(1)/8010(2)
THM	Trihalomethanes	Purge & Trap GC/Hall	601(1)/8010(2)
602	Aromatic Volatile Organics	Purge & Trap GC/PID	602(1)/8020(2)
OCP	Organochlorine Pesticides	Extraction, GC/ECD	608(1)/8080(2)
OPP	Organophosphate Pesticides	Extraction, GC/FPD	614(1)/8140(2)
619	Triazine Pesticides	Extraction, GC/NPD	619(1)
LC CARB	Carbamate and Urea Pesticides	Extraction, HPLC	632(1)
PCB	PCB's	Extraction, GC/ECD	608(1)/8080(2)
HRB	Phenoxyacid Herbicides	Extraction, GC/ECD	615(1)/8150(2)
603	Acrolein & Acrylonitrile	Purge & Trap GC/FID	603(1)/8030(2)
604	Phenols	Extraction, GC/FID	604(1)/8040(2)
605	Benzidines	Extraction, HPLC	605(1)/8050(2)
606	Phthalate Esters	Extraction, GC/FID	606(1)/8060(2)
607	Nitrosamines	Extraction, GC/NPD	607(1)
609	Nitroaromatics & Cyclic Ketones	Extraction, GC/NPD	609(1)/8090(2)
PNA	Polynuclear Aromatic Hydrocarbons	Extraction, HPLC	610(1)/8310(2)
611	Haloethers	Extraction, GC/ECD	611(1)
612	Chlorinated Hydrocarbons	Extraction, GC/ECD	612(1)/8120(2)
GD FID	Hydrocarbon Scan	Extraction, GC/FID	D3328-78(3)
GC BPD	Boiling Point Determination	Extraction, GC/FID	D2887-84(4)

References

(1) Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).
(2) SW-846, 3rd Edition, 1986.
(3) "Annual Book of ASTM Standards", Volume 11.01, 1985.
(4) "Annual Book of ASTM Standards", Volume 05.02, 1984.

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ANALYTICAL METHODOLOGY - INORGANIC TESTS

Test	Description	Methodology	Reference
ICP	Trace Metals	ICP Emission Spectroscopy	200.7(1)/6010(2)
FSB	Antimony	Furnace Atomic Absorption	204.2(1)/7041(2)
FAS	Arsenic	Furnace Atomic Absorption	206.2(1)/7060(2)
FCD	Cadmium	Furnace Atomic Absorption	213.2(1)/7131(2)
FPB	Lead	Furnace Atomic Absorption	239.2(1)/7421(2)
FSE	Selenium	Furnace Atomic Absorption	270.2(1)/7740(2)
FAG	Silver	Furnace Atomic Absorption	272.2(1)/7761(2)
FTL	Thallium	Furnace Atomic Absorption	279.2(1)/7841(2)
CVHG	Mercury	Cold Vapor Atomic	245.1(1)/7471(2)
CR + 6	Chromium (VI)	Colorimetric	312B(3)
IC CL	Chloride	Ion Chromatography	300.0(1)
BURCL	Chloride	Manual Titrimetric	325.3(1)
METF	Fluoride	Electrode	340.2(1)
IC SO4	Sulfate	IC	300.0(1)
SPESO4	Sulfate	Manual Turbidimetric	375.4(1)
METALK	Alkalinity, Total	Titrimetric	310.1(1)
METACK	Alkalinity, Forms	Titrimetric	403(3)
TECNOXT	Nitrate+Nitrite as N	Cd Reduction Colorimetric	353.2(1)
METPH	pH	Meter	150.1(1)/9045(2)
CELSP	Specific Conductance at 25°C	Bridge	120.1(1)
BALTDS	Total Dissolved Solids	Gravimetric, 180°C	160.1(1)
BALTSS	Total Suspended Solids	Gravimetric, 105°C	160.2(1)
BALTS	Total Solids	Gravimetric, 105°C	160.3(1)
BALTVS	Total Volatile Solids	Gravimetric, 550°C	160.4(1)
TECO P	Ortho-Phosphate as P	Two Reagent Colorimetric	365.3(1)
TECT P	Total Phosphorus as P	Digestion-Colorimetric	365.3(1)
ICP	Total Phosphorus as P	Digestion-ICP/AES	200.7(1)
ICP	Silica as SiO_2	ICP/AES	200.7(1)
SPESIO2	Silica as SiO_2	Colorimetric	370.1(1)
METBOD	Biochemical Oxygen Demand	Dilution Bottle-D.O. probe	405.1(1)
METCOD	Chemical Oxygen Demand	Micro Colorimetric	410.4(1)
TOCTOC	Total Organic Carbon	UV Oxidation-IR	415.2(1)
METNH3	Ammonia as N	Electrode	350.3(1)
TECNH3	Ammonia as N	Automated Colorimetric	350.1(1)
METTKN	Total Kjeldahl Nitrogen as N	Digestion-Electrode	351.4(1)
TECTKN	Total Kjeldahl Nitrogen as N	Digestion-Colorimetric	351.2(1)
TOXTOX	Total Organic Halogen	Combustion-Titrimetric	9020(2)
TONO1	Total Organic Nitrogen	Calculation (TKN-NH_3)	-
BAL O&G	Oil and Grease	Freon Extraction-Gravimetric	413.1(1)
IR AO&G	Oil and Grease	Freon Extraction-IR	413.2(1)
TECCN F	Cyanide Amendable to Chlorination	Chlorination-Distillation-Colorimetric	335.1(1)
TECCN W	Weak & Dissolved Cyanide	Distillation-Colorimetric	412H(3)
TECCN T	Total Cyanide	Distillation-Colorimetric	335.2(1)/9010(2)
STEPHEN	Phenolics	Distillation-Colorimetric	420.1(1)
COLIF F	Fecal Coliform	Membrane Filter	909C(3)
COLIF T	Total Coliform	Membrane Filter	909A(3)

ANALYTICAL METHODOLOGY - INORGANIC TESTS (CONT.)

Test	Description	Methodology	Reference
IC BR	Bromide	Ion Chromatography	300.0(1)
POTCL2R	Residual Chlorine	Amperometric	330.2(1)
NESCOLR	Color	Pt-Co Colorimetric	110.2(1)
ICPHAR	Hardness as $CaCo_3$	Calculation	200.7(1)/314A(3)
TECNO2	Nitrite as N	Colorimetric	354.1(1)
SPES	Sulfide	Colorimetric	376.2(1)/9030(2)
BURSO3	Sulfite	Titrimetric	377.1(1)
SPEMBAS	MBAS (Surfactants)	Colorimetric	425.1(1)
SPETURB	Turbidity	Turbidimeter	180.1(1)
Gross Alpha		Proportional Counter	703(3)
Gross Beta		Proportional Counter	703(3)
Radium 226		Separation - Counter	705(3)
Radium 228		Separation - Counter	707(3)
Uranium		Fluorimetric	D2907.75(4)

References

(1) Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).
(2) SW-846, 3rd Edition, 1986.
(3) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

Rocky Mountain
Analytical Laboratory

Enseco Incorporated

FILE COPY

Enseco

RECEIVED AUG 7 1989

August 3, 1989

Mr. Jeff Havlena
Dan Stephens and Associates
4415 Hawkins
Albuquerque, NM 87109

Dear Mr. Havlena:

Enclosed are the Tentatively Identified Compounds for RMAL project 005102 sample 0003 for Enron. TICs were not present for 005102-0001 and 0002.

These data sheets present results for the "identification" of unknown compounds that were detected in the GC/MS analysis for sample 005102-0003. The results from this work are presented as "tentatively identified compounds" (TIC). The approach used for reporting TICs was based on the protocol established for this purpose in the EPA Superfund methods and on guidelines established by the American Chemical Society (ACS).

In summary, the mass spectrum of chromatographic peaks in concentrations in excess of 10% of the internal standard were obtained. For this project, the number of unknown compounds identified was limited to 10 compounds in the volatile fraction and 20 compounds in the semivolatile fraction. Each mass spectrum was then compared to a library of over 30,000 reference spectra in a computerized "library search." The three "best" matches obtained by the computer were hardcopied along with the mass spectrum of the unknown peak. This information was then reviewed by an analyst who "identified" the compound based on the available information.

All identifications were based on the "Guidelines for GC/MS Identification" developed by the American Chemical Society (Environmental Science and Technology, 1982, 16 143A). As recommended in these guidelines, identifications of unknown substances were reported with a level of confidence. The three levels of confidence cited in the ACS guidelines and used in this report are as follows:

Level 3: Confirmed Identification

The identification and quantitation are based on the analysis of an authentic standard.

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

Level 2: Confident Identification

Good agreement was observed between the unknown compound and either a specific library spectrum or the ions characteristic of a class of compounds. Quantitation is based on the total ionization peak area relative to an internal standard, assuming a response factor of one.

Level 1: Tentative Identification

The unknown compound is only indicative of a specific library spectrum or the ions characteristic of a class of compounds. Quantitation is based on total ionization peak as in Level 2. If there were no library spectra similar to the unknown, and it could not be assigned to a particular class of compounds, the compound is reported as "unknown."

In addition, the following qualifiers may be used to clarify Level 1 and Level 2 identifications. If no qualifier is present, the identification refers to the specific compound listed. The two qualifiers used in this report are:

I - Isomer

The unknown may be this specific isomer or an isomer with the same molecular formula.

C - Class

The unknown compound contains ions characteristic of a particular class of compounds.

If you have any questions, please do not hesitate to call.

Sincerely,

Cindy Ingram

Cindy Ingram
Program Administrator

CI/lw
Enclosures

cc: Gordon Wassell, Enron

RMAL #005102

TENTATIVELY IDENTIFIED COMPOUNDS
FOR
ENRON

SAMPLE NUMBER 005102-03

Compound Name	Fraction	Confidence Level	Estimated Concentration ug/L
Oxirane,2-Methyl-2-(1-Methylethyl)-	BNA	1	14
2-Hexanol,2-Methyl-	BNA	2I	10
Oxygenated Hydrocarbon	BNA	2C	39
Oxygenated Hydrocarbon	BNA	2C	74
2-Hexanol,2,5-Dimethyl-,(S)-	BNA	2I	25
Oxygenated Hydrocarbon	BNA	2C	25
Oxygenated Hydrocarbon	BNA	2C	11
Oxygenated Hydrocarbon	BNA	2C	22
Benzene,1,3,5-Trimethyl-	BNA	2I	13
Oxygenated Hydrocarbon	BNA	2C	12
Benzene,1,2,4-Trimethyl-	BNA	2I	15
Alcohol	BNA	2C	10
Oxygenated Hydrocarbon	BNA	2C	10
Ethanone,1-Phenyl-	BNA	2I	31
Oxygenated Hydrocarbon	BNA	2C	14
Ethanone,1-(Methylphenyl)-	BNA	2I	22
Oxygenated Hydrocarbon	BNA	2C	24
Oxygenated Hydrocarbon	BNA	2C	16
Oxygenated Hydrocarbon	BNA	2C	14
Oxygenated Hydrocarbon	BNA	2C	22
Oxygenated Hydrocarbon	BNA	2C	15
Oxygenated Hydrocarbon	BNA	2C	12

NOTES:

Confidence Levels

Level 3 - Confirmed Identification
Level 2 - Confident Identification
Level 1 - Tentative Identification

Qualifiers

B - Blank Contaminant
I - Isomer
C - Class

Please refer to the discussion for further details.

TENTATIVELY IDENTIFIED COMPOUNDS

FOR

ENRON

SAMPLE NUMBER 005102-03

Compound Name	Fraction	Confidence Level	Estimated Concentration ug/L
1-Pentene, 2-Methyl-	VOA	2I	200
1-Pentene, 2-Methyl-	VOA	2I	760
Cyclohexane, Methyl-	VOA	2	370

NOTES:

Confidence Levels

Level 3 - Confirmed Identification
Level 2 - Confident Identification
Level 1 - Tentative Identification

Qualifiers

B - Blank Contaminant
I - Isomer
C - Class

Please refer to the discussion for further details.

RECEIVED AUG 2 5 1989

Enseco

August 22, 1989

Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the three aqueous samples received at Rocky Mountain Analytical Laboratory on August 10, 1989.

If you have any questions, the Technical Manager assigned to this project is Jeanne Howbert.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Jeanne Howbert, TM

RMAL #006099

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

Quality Control Reports

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006099-0001-SA	5-2B	AQUEOUS	08 AUG 89	12:00	10 AUG 89
006099-0002-SA	5-1B	AQUEOUS	08 AUG 89	13:45	10 AUG 89
006099-0003-SA	5-2BA	AQUEOUS	08 AUG 89	12:30	10 AUG 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 006099	Group Code	Analysis Description	Custom Test?
0001	A	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
		Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Alkalinity,	N
		Total/Carbonate/Bicarbonate/Hydroxide	N
		Nitrate, as Nitrogen	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Fluoride, Electrode	N
		Total Dissolved Solids (TDS)	N
		pH	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		Lead, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		Thallium, Furnace AA (Dissolved)	N
		Mercury, Cold Vapor AA (Dissolved)	N
		Prep - Mercury, Cold Vapor AA, (Dissolved)	N
0002	B	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
0003	C	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
		Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-2B
Lab ID: 006099-0001-SA   Enseco ID: 1048354
Matrix: AQUEOUS   Sampled: 08 AUG 89   Received: 10 AUG 89
Authorized: 10 AUG 89   Prepared: 11 AUG 89   Analyzed: 15 AUG 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	1000
Bromomethane	ND	ug/L	1000
Vinyl chloride	ND	ug/L	1000
Chloroethane	ND	ug/L	1000
Methylene chloride	ND	ug/L	500
1,1-Dichloroethene	ND	ug/L	500
1,1-Dichloroethane	ND	ug/L	500
1,2-Dichloroethene (cis/trans)	ND	ug/L	500
Chloroform	ND	ug/L	500
1,2-Dichloroethane	ND	ug/L	500
1,1,1-Trichloroethane	ND	ug/L	500
Carbon tetrachloride	ND	ug/L	500
Bromodichloromethane	ND	ug/L	500
1,2-Dichloropropane	ND	ug/L	500
trans-1,3-Dichloropropene	ND	ug/L	500
Trichloroethene	ND	ug/L	500
Chlorodibromomethane	ND	ug/L	500
1,1,2-Trichloroethane	ND	ug/L	500
Benzene	2500	ug/L	500
cis-1,3-Dichloropropene	ND	ug/L	500
2-Chloroethyl vinyl ether	ND	ug/L	1000
Bromoform	ND	ug/L	500
1,1,2,2-Tetrachloroethane	ND	ug/L	500
Tetrachloroethene	ND	ug/L	500
Toluene	4700	ug/L	500
Chlorobenzene	ND	ug/L	500
Ethyl benzene	ND	ug/L	500
Toluene-d8	108	%	--
4-Bromofluorobenzene (BFB)	98.4	%	--
1,2-Dichloroethane-d4	94.8	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Steve Siegel   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-2BA
Lab ID: 006099-0003-SA   Enseco ID: 1048356
Matrix: AQUEOUS   Sampled: 08 AUG 89   Received: 10 AUG 89
Authorized: 10 AUG 89   Prepared: 11 AUG 89   Analyzed: 15 AUG 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	1000
Bromomethane	ND	ug/L	1000
Vinyl chloride	ND	ug/L	1000
Chloroethane	ND	ug/L	1000
Methylene chloride	ND	ug/L	500
1,1-Dichloroethene	ND	ug/L	500
1,1-Dichloroethane	ND	ug/L	500
1,2-Dichloroethene (cis/trans)	ND	ug/L	500
Chloroform	ND	ug/L	500
1,2-Dichloroethane	ND	ug/L	500
1,1,1-Trichloroethane	ND	ug/L	500
Carbon tetrachloride	ND	ug/L	500
Bromodichloromethane	ND	ug/L	500
1,2-Dichloropropane	ND	ug/L	500
trans-1,3-Dichloropropene	ND	ug/L	500
Trichloroethene	ND	ug/L	500
Chlorodibromomethane	ND	ug/L	500
1,1,2-Trichloroethane	ND	ug/L	500
Benzene	2700	ug/L	500
cis-1,3-Dichloropropene	ND	ug/L	500
2-Chloroethyl vinyl ether	ND	ug/L	1000
Bromoform	ND	ug/L	500
1,1,2,2-Tetrachloroethane	ND	ug/L	500
Tetrachloroethene	ND	ug/L	500
Toluene	5000	ug/L	500
Chlorobenzene	ND	ug/L	500
Ethyl benzene	ND	ug/L	500
Toluene-d8	103	%	--
4-Bromofluorobenzene (BFB)	98.0	%	--
1,2-Dichloroethane-d4	95.6	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Steve Siegel   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-2B
Lab ID: 006099-0001-SA Enseco ID: 1048354
Matrix: AQUEOUS Sampled: 08 AUG 89 Received: 10 AUG 89
Authorized: 10 AUG 89 Prepared: 14 AUG 89 Analyzed: 18 AUG 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	100
bis(2-Chloroethyl)ether	ND	ug/L	100
2-Chlorophenol	ND	ug/L	100
1,3-Dichlorobenzene	ND	ug/L	100
1,4-Dichlorobenzene	ND	ug/L	100
1,2-Dichlorobenzene	ND	ug/L	100
bis(2-Chloroisopropyl) ether	ND	ug/L	100
N-Nitroso-di-n-propylamine	ND	ug/L	100
Hexachloroethane	ND	ug/L	100
Nitrobenzene	ND	ug/L	100
Isophorone	ND	ug/L	100
2-Nitrophenol	ND	ug/L	100
2,4-Dimethylphenol	ND	ug/L	100
bis(2-Chloroethoxy) methane	ND	ug/L	100
2,4-Dichlorophenol	ND	ug/L	100
1,2,4-Trichlorobenzene	ND	ug/L	100
Naphthalene	ND	ug/L	100
Hexachlorobutadiene	ND	ug/L	100
4-Chloro-3-methylphenol	ND	ug/L	100
Hexachlorocyclopentadiene	ND	ug/L	100
2,4,6-Trichlorophenol	ND	ug/L	100
2-Chloronaphthalene	ND	ug/L	100
Dimethyl phthalate	ND	ug/L	100
Acenaphthylene	ND	ug/L	100
Acenaphthene	ND	ug/L	100
2,4-Dinitrophenol	ND	ug/L	500
4-Nitrophenol	ND	ug/L	500
2,4-Dinitrotoluene	ND	ug/L	100
2,6-Dinitrotoluene	ND	ug/L	100
Diethyl phthalate	ND	ug/L	100
4-Chlorophenyl phenyl ether	ND	ug/L	100
Fluorene	ND	ug/L	100
4,6-Dinitro-2-methylphenol	ND	ug/L	500
1,2-Diphenylhydrazine	ND	ug/L	100
N-Nitrosodiphenylamine	ND	ug/L	100

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Michael Gallik Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-2B
Lab ID: 006099-0001-SA   Enseco ID: 1048354
Matrix: AQUEOUS   Sampled: 08 AUG 89   Received: 10 AUG 89
Authorized: 10 AUG 89   Prepared: 14 AUG 89   Analyzed: 18 AUG 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	100
Hexachlorobenzene	ND	ug/L	100
Pentachlorophenol	ND	ug/L	500
Phenanthrene	ND	ug/L	100
Anthracene	ND	ug/L	100
Di-n-butyl phthalate	ND	ug/L	100
Fluoranthene	ND	ug/L	100
Pyrene	ND	ug/L	100
Butyl benzyl phthalate	ND	ug/L	100
3,3'-Dichlorobenzidine	ND	ug/L	200
Benzo(a)anthracene	ND	ug/L	100
bis(2-Ethylhexyl) phthalate	ND	ug/L	100
Chrysene	ND	ug/L	100
Di-n-octyl phthalate	ND	ug/L	100
Benzo(b)fluoranthene	ND	ug/L	100
Benzo(k)fluoranthene	ND	ug/L	100
Benzo(a)pyrene	ND	ug/L	100
Indeno(1,2,3-c,d)pyrene	ND	ug/L	100
Dibenz(a,h)anthracene	ND	ug/L	100
Benzo(g,h,i)perylene	ND	ug/L	100
Nitrobenzene-d5	62.9	%	--
2-Fluorobiphenyl	63.5	%	--
Terphenyl-d14	47.7	%	--
Phenol-d5	35.0	%	--
2-Fluorophenol	29.2	%	--
2,4,6-Tribromophenol	34.4	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Michael Gallik   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-2BA
Lab ID: 006099-0003-SA
Matrix: AQUEOUS
Authorized: 10 AUG 89

Enseco ID: 1048356
Sampled: 08 AUG 89
Prepared: 14 AUG 89

Received: 10 AUG 89
Analyzed: 18 AUG 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	100
bis(2-Chloroethyl)ether	ND	ug/L	100
2-Chlorophenol	ND	ug/L	100
1,3-Dichlorobenzene	ND	ug/L	100
1,4-Dichlorobenzene	ND	ug/L	100
1,2-Dichlorobenzene	ND	ug/L	100
bis(2-Chloroisopropyl) ether	ND	ug/L	100
N-Nitroso-di-n-propylamine	ND	ug/L	100
Hexachloroethane	ND	ug/L	100
Nitrobenzene	ND	ug/L	100
Isophorone	ND	ug/L	100
2-Nitrophenol	ND	ug/L	100
2,4-Dimethylphenol	ND	ug/L	100
bis(2-Chloroethoxy) methane	ND	ug/L	100
2,4-Dichlorophenol	ND	ug/L	100
1,2,4-Trichlorobenzene	ND	ug/L	100
Naphthalene	ND	ug/L	100
Hexachlorobutadiene	ND	ug/L	100
4-Chloro-3-methylphenol	ND	ug/L	100
Hexachlorocyclopentadiene	ND	ug/L	100
2,4,6-Trichlorophenol	ND	ug/L	100
2-Chloronaphthalene	ND	ug/L	100
Dimethyl phthalate	ND	ug/L	100
Acenaphthylene	ND	ug/L	100
Acenaphthene	ND	ug/L	100
2,4-Dinitrophenol	ND	ug/L	500
4-Nitrophenol	ND	ug/L	500
2,4-Dinitrotoluene	ND	ug/L	100
2,6-Dinitrotoluene	ND	ug/L	100
Diethyl phthalate	ND	ug/L	100
4-Chlorophenyl phenyl ether	ND	ug/L	100
Fluorene	ND	ug/L	100
4,6-Dinitro-2-methylphenol	ND	ug/L	500
1,2-Diphenylhydrazine	ND	ug/L	100
N-Nitrosodiphenylamine	ND	ug/L	100

(continued on following page)

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Michael Gallik

Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-2BA
Lab ID: 006099-0003-SA
Matrix: AQUEOUS
Authorized: 10 AUG 89

Enseco ID: 1048356
Sampled: 08 AUG 89
Prepared: 14 AUG 89

Received: 10 AUG 89
Analyzed: 18 AUG 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	100
Hexachlorobenzene	ND	ug/L	100
Pentachlorophenol	ND	ug/L	500
Phenanthrene	ND	ug/L	100
Anthracene	ND	ug/L	100
Di-n-butyl phthalate	ND	ug/L	100
Fluoranthene	ND	ug/L	100
Pyrene	ND	ug/L	100
Butyl benzyl phthalate	ND	ug/L	100
3,3'-Dichlorobenzidine	ND	ug/L	200
Benzo(a)anthracene	ND	ug/L	100
bis(2-Ethylhexyl) phthalate	ND	ug/L	100
Chrysene	ND	ug/L	100
Di-n-octyl phthalate	ND	ug/L	100
Benzo(b)fluoranthene	ND	ug/L	100
Benzo(k)fluoranthene	ND	ug/L	100
Benzo(a)pyrene	ND	ug/L	100
Indeno(1,2,3-c,d)pyrene	ND	ug/L	100
Dibenz(a,h)anthracene	ND	ug/L	100
Benzo(g,h,i)perylene	ND	ug/L	100
Nitrobenzene-d5	57.6	%	--
2-Fluorobiphenyl	63.3	%	--
Terphenyl-d14	61.8	%	--
Phenol-d5	ND	%	--
2-Fluorophenol	ND	%	--
2,4,6-Tribromophenol	ND	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Michael Gallik

Approved By: Jeff Lowry

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-2B
Lab ID: 006099-0001-SA   Enseco ID: 1048354
Matrix: AQUEOUS   Sampled: 08 AUG 89   Received: 10 AUG 89
Authorized: 10 AUG 89   Prepared: 11 AUG 89   Analyzed: 17 AUG 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4'-DDT	ND	ug/L	0.10
drin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	74.0	%	--

N.D. = Not Detected
A. = Not Applicable

Reported By: Stephanie Boehnke   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-1B
Lab ID: 006099-0002-SA   Enseco ID: 1048355
Matrix: AQUEOUS   Sampled: 08 AUG 89   Received: 10 AUG 89
Authorized: 10 AUG 89   Prepared: 11 AUG 89   Analyzed: 17 AUG 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	2.1	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	79.5	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Stephanie Boehnke   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-2BA
Lab ID: 006099-0003-SA
Matrix: AQUEOUS
Authorized: 10 AUG 89

Enseco ID: 1048356
Sampled: 08 AUG 89
Prepared: 11 AUG 89

Received: 10 AUG 89
Analyzed: 17 AUG 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0
Dibutylchlorendate	57.3	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Stephanie Boehnke

Approved By: Barbara Sullivan

Enseco

Metals

Dissolved Metals

Client Name: Enron
Client ID: 5-2B
Lab ID: 006099-0001-SA Enseco ID: 1048354
Matrix: AQUEOUS Sampled: 08 AUG 89 Received: 10 AUG 89
Authorized: 10 AUG 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.05	200.7	NA	16 AUG 89
Arsenic	0.025	mg/L	0.005	206.2	NA	14 AUG 89
Barium	0.53	mg/L	0.01	200.7	NA	16 AUG 89
Beryllium	ND	mg/L	0.002	200.7	NA	16 AUG 89
Boron	0.84	mg/L	0.02	200.7	NA	16 AUG 89
Cadmium	ND	mg/L	0.005	200.7	NA	16 AUG 89
Calcium	134	mg/L	0.2	200.7	NA	16 AUG 89
Chromium	ND	mg/L	0.01	200.7	NA	16 AUG 89
Copper	ND	mg/L	0.01	200.7	NA	16 AUG 89
Iron	2.8	mg/L	0.1	200.7	NA	16 AUG 89
Lead	ND	mg/L	0.005	239.2	NA	14 AUG 89
Magnesium	23	mg/L	0.2	200.7	NA	16 AUG 89
Manganese	2.0	mg/L	0.01	200.7	NA	16 AUG 89
Mercury	ND	mg/L	0.0002	245.1	15 AUG 89	16 AUG 89
Molybdenum	ND	mg/L	0.02	200.7	NA	16 AUG 89
Nickel	ND	mg/L	0.04	200.7	NA	16 AUG 89
Potassium	ND	mg/L	5	200.7	NA	16 AUG 89
Selenium	ND	mg/L	0.005	270.2	NA	14 AUG 89
Silica as SiO2	23	mg/L	0.2	200.7	NA	16 AUG 89
Silver	ND	mg/L	0.01	200.7	NA	16 AUG 89
Sodium	184	mg/L	5	200.7	NA	16 AUG 89
Strontium	1.2	mg/L	0.05	200.7	NA	16 AUG 89
Thallium	ND	mg/L	0.05	279.2	NA	16 AUG 89
Zinc	ND	mg/L	0.01	200.7	NA	16 AUG 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Harold Borquez Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: 5-2B
Lab ID: 006099-0001-SA
Matrix: AQUEOUS
Authorized: 10 AUG 89

Enseco ID: 1048354
Sampled: 08 AUG 89
Prepared: See Below

Received: 10 AUG 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	774	mg/L	5	310.1	NA	11 AUG 89
Alkalinity, Bicarb. as CaCO3 at pH 4.5	774	mg/L	5	310.1	NA	11 AUG 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	11 AUG 89
Alkalinity, Hydrox. as CaCO3	ND	mg/L	5	310.1	NA	11 AUG 89
Chloride	11	mg/L	3	300.0	NA	16 AUG 89
Fluoride	0.2	mg/L	0.1	340.2	NA	16 AUG 89
Nitrate as N	ND	mg/L	0.5	353.2	NA	18 AUG 89
pH	7.1	units	--	150.1	NA	11 AUG 89
Sulfate	ND	mg/L	5	300.0	NA	16 AUG 89
Total Dissolved Solids	827	mg/L	10	160.1	NA	15 AUG 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Jennifer Franzen

Approved By: Tammy Bailey

LOT ASSIGNMENT REPORT
atile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006099-0001-SA	AQUEOUS	624-A	07 AUG 89-D	15 AUG 89-D
006099-0003-SA	AQUEOUS	624-A	07 AUG 89-D	15 AUG 89-D

ICATE CONTROL SAMPLE REPORT
atile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 07 AUG 89-D								
Concentration Units: ug/L								
1,1-Dichloroethene	50	43.5	44.2	43.8	88	61-145	1.6	14
Trichloroethene	50	50.0	51.4	50.7	101	71-120	2.8	14
Benzene	50	56.4	59.0	57.7	115	76-127	4.5	11
Toluene	50	45.4	49.1	47.2	95	76-125	7.8	13
Chlorobenzene	50	51.1	54.5	52.8	106	75-130	6.4	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

LE CONTROL SAMPLE REPORT
atile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A Matrix: AQUEOUS QC Lot: 07 AUG 89-D QC Run: 15 AUG 89-D Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	46.6	93	76-114
4-Bromofluorobenzene (BFB)	50.0	49.3	99	86-115
Toluene-d8	50.0	49.8	100	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

[illegible]OD BLANK REPORT
[illegible]atile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 07 AUG 89-D QC Run: 15 AUG 89-D			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
[illegible]orodibromomethane	ND	ug/L	5.0
[illegible],2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 07 AUG 89-D QC Run: 15 AUG 89-D			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

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METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 07 AUG 89-D QC Run: 15 AUG 89-D

Analyte	Result	Units	Reporting Limit
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

Enseco

LOT ASSIGNMENT REPORT
ıivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006099-0001-SA	AQUEOUS	625-A	14 AUG 89-A	14 AUG 89-B
006099-0003-SA	AQUEOUS	625-A	14 AUG 89-A	14 AUG 89-B

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 14 AUG 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Phenol	100	50.3	53.8	52.0	52	12- 89	6.7	42
2-Chlorophenol	100	50.9	53.3	52.1	52	27-123	4.6	40
1,4-Dichlorobenzene	50	17.8	16.7	17.2	35	36- 97	6.4	28
N-Nitroso-di-n-propylamine	50	23.9	27.3	25.6	51	41-116	13	38
1,2,4-Trichlorobenzene	50	18.2	17.1	17.6	35	39- 98	6.2	28
4-Chloro-3-methylphenol	100	64.1	65.3	64.7	65	23- 97	1.9	42
Acenaphthene	50	23.5	24.7	24.1	48	46-118	5.0	31
4-Nitrophenol	100	41.0	44.8	42.9	43	10- 80	8.9	50
2,4-Dinitrotoluene	50	30.0	30.4	30.2	60	24- 96	1.3	38
Pentachlorophenol	100	39.9	45.6	42.8	43	9-103	13	50
Pyrene	50	30.3	29.4	29.8	60	26-127	3.0	31

Calculations are performed before rounding to avoid round-off errors in calculated results.

GLE CONTROL SAMPLE REPORT
ivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 14 AUG 89-A QC Run: 14 AUG 89-B
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Nitrobenzene-d5	100	43.6	44	35-114
2-Fluorobiphenyl	100	42.7	43	43-116
Terphenyl-d14	100	52.9	53	33-141
2-Fluorophenol	200	83.9	42	21-100
Phenol-d5	200	73.9	37	10- 94
2,4,6-Tribromophenol	200	129	64	10-123

Calculations are performed before rounding to avoid round-off errors in calculated results.

OD BLANK REPORT
volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 14 AUG 89-A QC Run: 14 AUG 89-B			
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
Dichlorophenol	ND	ug/L	10
,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10

HOD BLANK REPORT
ivolatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 14 AUG 89-A QC Run: 14 AUG 89-B			
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
deno(1,2,3-c,d)pyrene	ND	ug/L	10
enz(a,h)anthracene	ND	ug/L	10
enzo(g,h,i)perylene	ND	ug/L	10
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 14 AUG 89-A QC Run: 14 AUG 89-B			
Phenol	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10

OD BLANK REPORT
olatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 14 AUG 89-A QC Run: 14 AUG 89-B

Analyte	Result	Units	Reporting Limit
bis(2-Chloroethoxy) methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
ethyl phthalate	ND	ug/L	10
lorophenyl enyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 14 AUG 89-A QC Run: 14 AUG 89-B

Analyte	Result	Units	Reporting Limit
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006099-0001-SA	AQUEOUS	608-A	11 AUG 89-A	11 AUG 89-A
006099-0002-SA	AQUEOUS	608-A	11 AUG 89-A	11 AUG 89-A
006099-0003-SA	AQUEOUS	608-A	11 AUG 89-A	11 AUG 89-A

ICATE CONTROL SAMPLE REPORT
ivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 11 AUG 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
gamma-BHC (Lindane)	0.2	0.153	0.173	0.163	82	56-123	12	15
Heptachlor	0.2	0.172	0.189	0.180	90	40-131	9.4	20
Aldrin	0.2	0.149	0.164	0.156	78	40-120	9.6	22
Dieldrin	0.5	0.440	0.492	0.466	93	52-126	11	18
Endrin	0.5	0.420	0.468	0.444	89	56-121	11	21
4,4'-DDT	0.5	0.413	0.469	0.441	88	38-127	13	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

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LE CONTROL SAMPLE REPORT
volatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 608-A				
Matrix: AQUEOUS				
QC Lot: 11 AUG 89-A QC Run: 11 AUG 89-A				
Concentration Units: ug/L				
Dibutylchlorendate	1.00	0.789	79	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 11 AUG 89-A QC Run: 11 AUG 89-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 11 AUG 89-A QC Run: 11 AUG 89-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10

METHOD BLANK REPORT
Semivolatile Organics by GC (cont.)

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 11 AUG 89-A QC Run: 11 AUG 89-A

Analyte	Result	Units	Reporting Limit
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 11 AUG 89-A QC Run: 11 AUG 89-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50

ETHOD BLANK REPORT
volatile Organics by GC (cont.)

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 11 AUG 89-A QC Run: 11 AUG 89-A			
Toxaphene	ND	ug/L	1.0
Aroclor-1016	ND	ug/L	0.50
Aroclor-1221	ND	ug/L	0.50
Aroclor-1232	ND	ug/L	0.50
Aroclor-1242	ND	ug/L	0.50
Aroclor-1248	ND	ug/L	0.50
Aroclor-1254	ND	ug/L	1.0
Aroclor-1260	ND	ug/L	1.0

[illegible]OT ASSIGNMENT REPORT
[illegible]ls Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
006099-0001-SA	AQUEOUS	ICP-AD	16 AUG 89-A
006099-0001-SA	AQUEOUS	AS-FAA-AD	14 AUG 89-A
006099-0001-SA	AQUEOUS	PB-FAA-AD	14 AUG 89-D
006099-0001-SA	AQUEOUS	SE-FAA-AD	14 AUG 89-A
006099-0001-SA	AQUEOUS	TL-FAA-AD	16 AUG 89-A
006099-0001-SA	AQUEOUS	HG-CVAA-AT	15 AUG 89-A

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ICATE CONTROL SAMPLE REPORT
ls Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-AD								
Matrix: AQUEOUS								
QC Lot: 16 AUG 89-A								
Concentration Units: mg/L								
Aluminum	2.0	2.04	1.98	2.01	101	75-125	3.0	20
Antimony	0.5	0.52	0.52	0.52	104	75-125	0.0	20
Arsenic	2.0	2.00	2.00	2.00	100	75-125	0.0	20
Barium	2.0	1.98	2.00	1.99	100	75-125	1.0	20
Beryllium	0.05	0.050	0.050	0.050	100	75-125	0.0	20
Cadmium	0.05	0.054	0.050	0.052	104	75-125	7.7	20
Calcium	100	103	104	104	104	75-125	1.0	20
Chromium	0.2	0.21	0.21	0.21	105	75-125	0.0	20
Cobalt	0.5	0.48	0.49	0.48	97	75-125	2.1	20
Copper	0.25	0.26	0.26	0.26	104	75-125	0.0	20
Iron	1.0	1.04	1.04	1.04	104	75-125	0.0	20
Lead	0.5	0.50	0.52	0.51	102	75-125	3.9	20
Magnesium	50	51.6	51.9	51.8	104	75-125	0.6	20
Manganese	0.5	0.50	0.50	0.50	100	75-125	0.0	20
Nickel	0.5	0.50	0.50	0.50	100	75-125	0.0	20
assium	100	101	101	101	101	75-125	0.0	20
enium	0	NA	NA	NC	NC	75-125	NC	20
Silver	0.05	0.055	0.058	0.056	113	75-125	5.3	20
Sodium	100	102	102	102	102	75-125	0.0	20
Thallium	0	NA	NA	NC	NC	75-125	NC	20
Tin	0.4	0.44	0.44	0.44	110	75-125	0.0	20
Vanadium	0.5	0.50	0.50	0.50	100	75-125	0.0	20
Zinc	0.5	0.53	0.53	0.53	106	75-125	0.0	20
Category: AS-FAA-AD								
Matrix: AQUEOUS								
QC Lot: 14 AUG 89-A								
Concentration Units: mg/L								
Arsenic	0.04	0.036	0.039	0.038	94	75-125	8.0	20
Category: PB-FAA-AD								
Matrix: AQUEOUS								
QC Lot: 14 AUG 89-D								
Concentration Units: mg/L								
Lead	0.02	0.021	0.023	0.022	110	75-125	9.1	20

ND = Not detected
NC = Not calculated, calculation not applicable
NA = Not applicable

culations are performed before rounding to avoid round-off errors in calculated results.

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ICATE CONTROL SAMPLE REPORT
als Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: SE-FAA-AD Matrix: AQUEOUS QC Lot: 14 AUG 89-A Concentration Units: mg/L								
Selenium	0.01	0.010	0.010	0.010	100	75-125	0.0	20
Category: TL-FAA-AD Matrix: AQUEOUS QC Lot: 16 AUG 89-A Concentration Units: mg/L								
Thallium	0.05	0.055	0.054	0.054	109	75-125	1.8	20
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 15 AUG 89-A ncentration Units: mg/L								
cury	0.0010	0.000980	0.00101	0.000995	100	75-125	3.0	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

LOT ASSIGNMENT REPORT
Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006099-0001-SA	AQUEOUS	ALK-A	11 AUG 89-A	
006099-0001-SA	AQUEOUS	NO3-A	18 AUG 89-A	
006099-0001-SA	AQUEOUS	CL-IC-A	16 AUG 89-B	
006099-0001-SA	AQUEOUS	SO4-IC-A	16 AUG 89-A	
006099-0001-SA	AQUEOUS	F-A	16 AUG 89-A	
006099-0001-SA	AQUEOUS	TDS-A	15 AUG 89-A	15 AUG 89-A
006099-0001-SA	AQUEOUS	PH-A	11 AUG 89-A	

LICATE CONTROL SAMPLE REPORT
t. Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: ALK-A Matrix: AQUEOUS QC Lot: 11 AUG 89-A Concentration Units: mg/L								
Alkalinity, Total as CaCO3 at pH 4.5	125	118	119	118	95	90-110	0.8	10
Category: NO3-A Matrix: AQUEOUS QC Lot: 18 AUG 89-A Concentration Units: mg/L								
Nitrate as N	5.4	5.44	5.65	5.54	103	91-109	3.8	10
Category: CL-IC-A Matrix: AQUEOUS QC Lot: 16 AUG 89-B centration Units: mg/L								
Chloride	100	103	104	104	104	75-125	1.0	20
Category: SO4-IC-A Matrix: AQUEOUS QC Lot: 16 AUG 89-A Concentration Units: mg/L								
Sulfate	200	209	210	210	105	75-125	0.5	20
Category: F-A Matrix: AQUEOUS QC Lot: 16 AUG 89-A Concentration Units: mg/L								
Fluoride	12	12.9	13.1	13.0	108	88-112	1.5	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

HOD BLANK REPORT
Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit

Test: TDS-BAL-A
Matrix: AQUEOUS
QC Lot: 15 AUG 89-A QC Run: 15 AUG 89-A

Total Dissolved Solids	ND	mg/L	10

Enseco - Rocky Mountain Analytical
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No.

Attn: CINDY INGRAM OR JULIE HIATT

Enseco Client ENRON

Project

Sampling Co. DANIEL B. STEPHENS & ASSOC.

Sampling Site THOREAU

Team Leader SHARON STOLLER

SAMPLE SAFE™ CONDITIONS

1. Packed by: ______ Seal # ______
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: ______
4. Sealed for Shipping by: ______
5. Initial Contents Temp.: ______ °C Seal # ______
6. Sampling Status: Done Continuing Until ______
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: ______ °C
9. Condition of Contents: ______

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
8/8/89	12³⁰	5-2BA	WATER	3	VOA EPA 624	
8/8/89	12³⁰	5-2BA	WATER	2	PCB EPA 608	
8/8/89	12³⁰	5-2BA	WATER	2	B/NA EPA 625	
8/8/89	10⁰⁰	EQUIPMENT BLANK	WATER	3	VOA EPA 624	
8/8/89	10⁰⁰	EQUIPMENT BLANK	WATER	2	PCB EPA 608	
8/8/89	10⁰⁰	EQUIPMENT BLANK	WATER	2	B/NA EPA 625	
		TRIP BLANK	WATER	1	VOA EPA 624	PREPARED BY RMA
		TRIP BLANK	WATER	1	PCB EPA 608	"
		TRIP BLANK	WATER	1	B/NA EPA 625	"

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Sharon L. Stoller			
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: ______

Method of Shipment: ______ Airbill # ______

Received for Lab: RMAL Signed: B Mayo Date/Time 8-10-89 10:00

Enseco Project No. 6099

White and Pink Copies to Lab Yellow to Sampler

SS-001

RECEIVED SEP 25 1989

Enseco

September 8, 1989

Gordon Wassell
Enron
2223 Dodge St.
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the two aqueous samples received at Rocky Mountain Analytical Laboratory on September 2, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #006385

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

Quality Control Reports

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\%\ \text{Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\ \text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}\ |}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006385-0001-SA	5-2A	AQUEOUS	31 AUG 89	15:15	02 SEP 89
006385-0002-SA	Trip blank	AQUEOUS	01 SEP 89	11:00	02 SEP 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 006385	Group Code	Analysis Description	Custom Test?
0001 - 0002	A	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-2A
Lab ID: 006385-0001-SA   Enseco ID: 1050929
Matrix: AQUEOUS   Sampled: 31 AUG 89   Received: 02 SEP 89
Authorized: 02 SEP 89   Prepared: 06 SEP 89   Analyzed: 06 SEP 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene (BFB)	98.8	%	--
1,2-Dichloroethane-d4	99.7	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Steve Siegel   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Trip blank
Lab ID: 006385-0002-SA
Matrix: AQUEOUS
Authorized: 02 SEP 89

Enseco ID: 1050930
Sampled: 01 SEP 89
Prepared: 06 SEP 89

Received: 02 SEP 89
Analyzed: 06 SEP 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene (BFB)	99.0	%	--
1,2-Dichloroethane-d4	94.4	%	--

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

. LOT ASSIGNMENT REPORT
ɔlatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006385-0001-SA	AQUEOUS	624-A	25 AUG 89-H	06 SEP 89-H
006385-0002-SA	AQUEOUS	624-A	25 AUG 89-H	06 SEP 89-H

Enseco

LOT ASSIGNMENT REPORT
olatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006385-0001-SA	AQUEOUS	624-A	25 AUG 89-H	06 SEP 89-H
006385-0002-SA	AQUEOUS	624-A	25 AUG 89-H	06 SEP 89-H

Enseco

PLICATE CONTROL SAMPLE REPORT
latile Organics by GC/MS

Category: 624-A
Matrix: AQUEOUS
QC Lot: 25 AUG 89-H
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
1,1-Dichloroethene	50	40.2	39.0	39.6	79	61-145	3.0	14
Trichloroethene	50	42.1	42.3	42.2	84	71-120	0.5	14
Benzene	50	48.5	49.2	48.8	98	76-127	1.4	11
Toluene	50	42.7	43.7	43.2	86	76-125	2.3	13
Chlorobenzene	50	43.8	44.9	44.4	89	75-130	2.5	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

NGLE CONTROL SAMPLE REPORT
latile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 25 AUG 89-H QC Run: 06 SEP 89-H				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	48.3	97	76-114
4-Bromofluorobenzene (BFB)	50.0	49.7	99	86-115
Toluene-d8	50.0	50.4	101	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

METHOD BLANK REPORT
Volatile Organics by GC/MS

Test: 624-PP-A
Matrix: AQUEOUS
QC Lot: 25 AUG 89-H QC Run: 06 SEP 89-H

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

Rocky Mountain
Analytical Laboratory

Enseco

October 17, 1989

Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the one aqueous and four soil samples received at Rocky Mountain Analytical Laboratory on September 22, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #006689

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

Quality Control Reports

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006689-0001-SA	5-4b @ 30.5'	SOIL	18 SEP 89	11:55	22 SEP 89
006689-0002-SA	5-4b @ 52'	SOIL	18 SEP 89	16:40	22 SEP 89
006689-0003-SA	5-5b @ 30.5'	SOIL	19 SEP 89	14:10	22 SEP 89
006689-0004-SA	5-5b @ 52'	SOIL	20 SEP 89	11:25	22 SEP 89
006689-0005-SA	Trip blank	AQUEOUS	21 SEP 89	12:00	22 SEP 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 006689	Group Code	Analysis Description	Custom Test?
0001 - 0004	A	Aromatic Volatile Organics	N
0005	B	Aromatic Volatile Organics	N

Aromatic Volatile Organics

Method 8020

Client Name: Enron
Client ID: 5-4b @ 30.5'
Lab ID: 006689-0001-SA   Enseco ID: 1053602
Matrix: SOIL   Sampled: 18 SEP 89   Received: 22 SEP 89
Authorized: 22 SEP 89   Prepared: NA   Analyzed: 29 SEP 89

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang   Approved By: Barbara Sullivan

Enseco

Aromatic Volatile Organics

Method 8020

Client Name: Enron
Client ID: 5-4b @ 52'
Lab ID: 006689-0002-SA Enseco ID: 1053603
Matrix: SOIL Sampled: 18 SEP 89 Received: 22 SEP 89
Authorized: 22 SEP 89 Prepared: NA Analyzed: 29 SEP 89

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	100
Toluene	ND	ug/kg	100
Chlorobenzene	ND	ug/kg	100
Ethyl benzene	ND	ug/kg	100
Total xylenes	410	ug/kg	200
1,3-Dichlorobenzene	ND	ug/kg	100
1,4-Dichlorobenzene	ND	ug/kg	100
1,2-Dichlorobenzene	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang Approved By: Barbara Sullivan

Aromatic Volatile Organics

Method 8020

Client Name: Enron			
Client ID: 5-5b @ 30.5'			
Lab ID: 006689-0003-SA	Enseco ID: 1053604		
Matrix: SOIL	Sampled: 19 SEP 89	Received: 22 SEP 89	
Authorized: 22 SEP 89	Prepared: NA	Analyzed: 29 SEP 89	

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang   Approved By: Barbara Sullivan

Enseco

Aromatic Volatile Organics

Method 8020

Client Name: Enron
Client ID: 5-5b @ 52'
Lab ID: 006689-0004-SA   Enseco ID: 1053605
Matrix: SOIL   Sampled: 20 SEP 89   Received: 22 SEP 89
Authorized: 22 SEP 89   Prepared: NA   Analyzed: 29 SEP 89

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang   Approved By: Barbara Sullivan

Aromatic Volatile Organics

Method 602

Client Name: Enron
Client ID: Trip blank
Lab ID: 006689-0005-SA   Enseco ID: 1053606
Matrix: AQUEOUS   Sampled: 21 SEP 89   Received: 22 SEP 89
Authorized: 22 SEP 89   Prepared: NA   Analyzed: 28 SEP 89

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	0.77	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang   Approved By: Barbara Sullivan

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006689-0001-SA	SOIL	8020-S	28 SEP 89-H	28 SEP 89-H
006689-0002-SA	SOIL	8020-S	29 SEP 89-F	29 SEP 89-F
006689-0003-SA	SOIL	8020-S	28 SEP 89-H	28 SEP 89-H
006689-0004-SA	SOIL	8020-S	28 SEP 89-H	28 SEP 89-H
006689-0005-SA	AQUEOUS	602-A	28 SEP 89-H	28 SEP 89-H

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Category: 8020-S
Matrix: SOIL
QC Lot: 28 SEP 89-H
Concentration Units: ug/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Benzene	500	503	495	499	100	77-123	1.6	20
Toluene	500	508	499	504	101	77-123	1.8	20
Chlorobenzene	500	547	533	540	108	77-123	2.6	20
Ethyl benzene	500	516	507	512	102	77-123	1.8	20
Total xylenes	500	530	520	525	105	77-123	1.9	20
1,3-Dichlorobenzene	500	519	512	516	103	77-123	1.4	20

Category: 8020-S
Matrix: SOIL
QC Lot: 29 SEP 89-F
Concentration Units: ug/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Benzene	500	433	443	438	88	77-123	2.3	20
Toluene	500	427	442	434	87	77-123	3.5	20
Chlorobenzene	500	532	478	505	101	77-123	11	20
Ethyl benzene	500	446	451	448	90	77-123	1.1	20
Total xylenes	500	429	428	428	86	77-123	0.2	20
1,3-Dichlorobenzene	500	434	348	391	78	77-123	22	20

Category: 602-A
Matrix: AQUEOUS
QC Lot: 28 SEP 89-H
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Benzene	5.0	5.04	4.93	4.98	100	75-115	2.2	20
Toluene	5.0	5.06	4.95	5.00	100	75-115	2.2	20
Chlorobenzene	5.0	5.36	5.29	5.32	107	75-115	1.3	20
Ethyl benzene	5.0	5.14	4.99	5.06	101	75-115	3.0	20
Total xylenes	5.0	5.19	5.09	5.14	103	75-115	1.9	20
1,3-Dichlorobenzene	5.0	4.93	4.84	4.88	98	75-115	1.8	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Category: 8020-S
Matrix: SOIL
QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H
Concentration Units: ug/kg

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
a,a,a-Trifluorotoluene	500	608	122	20-160

Category: 8020-S
Matrix: SOIL
QC Lot: 29 SEP 89-F QC Run: 29 SEP 89-F
Concentration Units: ug/kg

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
a,a,a-Trifluorotoluene	3000	3110	104	20-160

Category: 602-A
Matrix: AQUEOUS
QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
a,a,a-Trifluorotoluene	5.00	6.08	122	20-160

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8020-S			
Matrix: SOIL			
QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50
Test: 8020-S			
Matrix: SOIL			
QC Lot: 29 SEP 89-F QC Run: 29 SEP 89-F			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50
Test: 602-AP			
Matrix: AQUEOUS			
QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H			
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

Rocky Mountain
Analytical Laboratory

Enseco

October 17, 1989

Gordon Wassell
Enron
2223 Dodge St.
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the two soil and one aqueous samples received at Rocky Mountain Analytical Laboratory on September 25, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #006720

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

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Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

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SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006720-0001-SA	5-6B @ 32.5-32.75'	SOIL	21 SEP 89	19:00	25 SEP 89
006720-0002-SA	5-6B @ 54.25-54.5'	SOIL	22 SEP 89	11:30	25 SEP 89
006720-0003-SA	Trip Blank	AQUEOUS	23 SEP 89	13:30	25 SEP 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 006720	Group Code	Analysis Description	Custom Test?
0001 - 0002	A	Aromatic Volatile Organics	N
0003	B	Aromatic Volatile Organics	N

Enseco

Aromatic Volatile Organics

Method 8020

Client Name: Enron
Client ID: 5-6B @ 32.5-32.75'
Lab ID: 006720-0001-SA   Enseco ID: 1053811
Matrix: SOIL   Sampled: 21 SEP 89   Received: 25 SEP 89
Authorized: 25 SEP 89   Prepared: NA   Analyzed: 28 SEP 89

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang   Approved By: Barbara Sullivan

Enseco

Aromatic Volatile Organics

Method 8020

Client Name: Enron
Client ID: 5-6B @ 54.25-54.5'
Lab ID: 006720-0002-SA   Enseco ID: 1053812
Matrix: SOIL   Sampled: 22 SEP 89   Received: 25 SEP 89
Authorized: 25 SEP 89   Prepared: NA   Analyzed: 28 SEP 89

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang   Approved By: Barbara Sullivan

Aromatic Volatile Organics

Method 602

Client Name: Enron
Client ID: Trip Blank
Lab ID: 006720-0003-SA   Enseco ID: 1053813
Matrix: AQUEOUS   Sampled: 23 SEP 89   Received: 25 SEP 89
Authorized: 25 SEP 89   Prepared: NA   Analyzed: 28 SEP 89

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	0.50	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

ND = Not detected
NA = Not applicable

Reported By: Leewaphath Xaiyasang   Approved By: Barbara Sullivan

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006720-0001-SA	SOIL	8020-S	28 SEP 89-H	28 SEP 89-H
006720-0002-SA	SOIL	8020-S	28 SEP 89-H	28 SEP 89-H
006720-0003-SA	AQUEOUS	602-A	28 SEP 89-H	28 SEP 89-H

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Category: 8020-S
Matrix: SOIL
QC Lot: 28 SEP 89-H
Concentration Units: ug/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Benzene	500	503	495	499	100	77-123	1.6	20
Toluene	500	508	499	504	101	77-123	1.8	20
Chlorobenzene	500	547	533	540	108	77-123	2.6	20
Ethyl benzene	500	516	507	512	102	77-123	1.8	20
Total xylenes	500	530	520	525	105	77-123	1.9	20
1,3-Dichlorobenzene	500	519	512	516	103	77-123	1.4	20

Category: 602-A
Matrix: AQUEOUS
QC Lot: 28 SEP 89-H
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Benzene	5.0	5.04	4.93	4.98	100	75-115	2.2	20
Toluene	5.0	5.06	4.95	5.00	100	75-115	2.2	20
Chlorobenzene	5.0	5.36	5.29	5.32	107	75-115	1.3	20
Ethyl benzene	5.0	5.14	4.99	5.06	101	75-115	3.0	20
Total xylenes	5.0	5.19	5.09	5.14	103	75-115	1.9	20
1,3-Dichlorobenzene	5.0	4.93	4.84	4.88	98	75-115	1.8	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 8020-S Matrix: SOIL QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	608	122	20-160
Category: 602-A Matrix: AQUEOUS QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H Concentration Units: ug/L				
a,a,a-Trifluorotoluene	5.00	6.08	122	20-160

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC

Test: 8020-S
Matrix: SOIL
QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

Test: 602-AP
Matrix: AQUEOUS
QC Lot: 28 SEP 89-H QC Run: 28 SEP 89-H

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

RECEIVED OCT 2 5 1989

Rocky Mountain
Analytical Laboratory

Enseco

October 18, 1989

Gordon Wassell
Enron
2223 Dodge St.
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the two soil samples received at Rocky Mountain Analytical Laboratory on September 29, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #006801

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

Quality Control Reports

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006801-0001-SA	5-8b @ 30.5'	SOIL	25 SEP 89	14:25	29 SEP 89
006801-0002-SA	5-7b @ 30.5'	SOIL	27 SEP 89	15:35	29 SEP 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 006801	Group Code	Analysis Description	Custom Test?
0001 - 0002	A	Aromatic Volatile Organics	N

Enseco

Aromatic Volatile Organics

Method 8020

Client Name: Enron
Client ID: 5-8b @ 30.5'
Lab ID: 006801-0001-SA   Enseco ID: 1054436
Matrix: SOIL   Sampled: 25 SEP 89   Received: 29 SEP 89
Authorized: 29 SEP 89   Prepared: NA   Analyzed: 04 OCT 89

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

ND = Not detected
NA = Not applicable

Reported By: William Sullivan   Approved By: Kim Zilis

Aromatic Volatile Organics

Method 8020

Client Name: Enron
Client ID: 5-7b @ 30.5'
Lab ID: 006801-0002-SA   Enseco ID: 1054437
Matrix: SOIL   Sampled: 27 SEP 89   Received: 29 SEP 89
Authorized: 29 SEP 89   Prepared: NA   Analyzed: 04 OCT 89

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

ND = Not detected
NA = Not applicable

Reported By: William Sullivan   Approved By: Kim Zilis

Enseco

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006801-0001-SA	SOIL	8020-S	04 OCT 89-F	04 OCT 89-F
006801-0002-SA	SOIL	8020-S	04 OCT 89-F	04 OCT 89-F

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured DCS1	Concentration Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 8020-S								
Matrix: SOIL								
QC Lot: 04 OCT 89-F								
Concentration Units: ug/kg								
Benzene	500	439	432	436	87	77-123	1.6	20
Toluene	500	454	450	452	90	77-123	0.9	20
Chlorobenzene	500	515	516	516	103	77-123	0.2	20
Ethyl benzene	500	481	480	480	96	77-123	0.2	20
Total xylenes	500	456	457	456	91	77-123	0.2	20
1,3-Dichlorobenzene	500	455	483	469	94	77-123	6.0	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 8020-S				
Matrix: SOIL				
QC Lot: 04 OCT 89-F QC Run: 04 OCT 89-F				
Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	3000	3360	112	20-160

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC

Test: 8020-S
Matrix: SOIL
QC Lot: 04 OCT 89-F QC Run: 04 OCT 89-F

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Chlorobenzene	ND	ug/kg	50
Ethyl benzene	ND	ug/kg	50
Total xylenes	ND	ug/kg	100
1,3-Dichlorobenzene	ND	ug/kg	50
1,4-Dichlorobenzene	ND	ug/kg	50
1,2-Dichlorobenzene	ND	ug/kg	50

Rocky Mountain
Analytical Laboratory

Enseco

October 24, 1989

Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the five aqueous samples received at Rocky Mountain Analytical Laboratory on October 5, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #006865

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

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Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

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Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\%\ \text{Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\ \text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}\ |}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006865-0001-SA	5-5BA	AQUEOUS	03 OCT 89	14:40	05 OCT 89
006865-0002-SA	Field blank	AQUEOUS	03 OCT 89	12:30	05 OCT 89
006865-0003-SA	5-5B	AQUEOUS	03 OCT 89	14:30	05 OCT 89
006865-0004-SA	5-6B	AQUEOUS	03 OCT 89	17:00	05 OCT 89
006865-0005-SA	Trip blank	AQUEOUS	04 OCT 89	09:30	05 OCT 89

Enseco

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 006865	Group Code	Analysis Description	Custom Test?
0001 - 0005	A	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-5BA
Lab ID: 006865-0001-SA
Matrix: AQUEOUS
Authorized: 05 OCT 89

Enseco ID: 1054965
Sampled: 03 OCT 89
Prepared: 06 OCT 89

Received: 05 OCT 89
Analyzed: 13 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	103	%	--
4-Bromofluorobenzene (BFB)	99.2	%	--
1,2-Dichloroethane-d4	105	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Field blank
Lab ID: 006865-0002-SA
Matrix: AQUEOUS
Authorized: 05 OCT 89

Enseco ID: 1054966
Sampled: 03 OCT 89
Prepared: 06 OCT 89

Received: 05 OCT 89
Analyzed: 12 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	97.9	%	--
4-Bromofluorobenzene (BFB)	95.3	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-5B
Lab ID: 006865-0003-SA   Enseco ID: 1054967
Matrix: AQUEOUS   Sampled: 03 OCT 89   Received: 05 OCT 89
Authorized: 05 OCT 89   Prepared: 06 OCT 89   Analyzed: 17 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	8.7	ug/L	5.0
Toluene-d8	96.4	%	--
4-Bromofluorobenzene (BFB)	98.0	%	--
1,2-Dichloroethane-d4	83.3	%	--

ND = Not detected
NA = Not applicable

Reported By: Lisa Traut   Approved By: Jeff Lowry

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-6B
Lab ID: 006865-0004-SA
Matrix: AQUEOUS
Authorized: 05 OCT 89

Enseco ID: 1054968
Sampled: 03 OCT 89
Prepared: 06 OCT 89

Received: 05 OCT 89
Analyzed: 15 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	15	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	108	%	--
4-Bromofluorobenzene (BFB)	101	%	--
1,2-Dichloroethane-d4	96.3	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Trip blank
Lab ID: 006865-0005-SA   Enseco ID: 1054969
Matrix: AQUEOUS   Sampled: 04 OCT 89   Received: 05 OCT 89
Authorized: 05 OCT 89   Prepared: 10 OCT 89   Analyzed: 12 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	100	%	--
4-Bromofluorobenzene (BFB)	86.3	%	--
1,2-Dichloroethane-d4	98.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais   Approved By: Jeff Lowry

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006865-0001-SA	AQUEOUS	624-A	13 OCT 89-H1	13 OCT 89-H1
006865-0002-SA	AQUEOUS	624-A	13 OCT 89-B	12 OCT 89-B
006865-0003-SA	AQUEOUS	624-A	05 OCT 89-L	17 OCT 89-L
006865-0004-SA	AQUEOUS	624-A	13 OCT 89-B	15 OCT 89-B
006865-0005-SA	AQUEOUS	624-A	13 OCT 89-B	12 OCT 89-B

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 624-A Matrix: AQUEOUS QC Lot: 13 OCT 89-H1 Concentration Units: ug/L								
1,1-Dichloroethene	50	55.3	52.1	53.7	107	61-145	6.0	14
Trichloroethene	50	47.0	46.6	46.8	94	71-120	0.9	14
Benzene	50	54.3	53.6	54.0	108	76-127	1.3	11
Toluene	50	48.9	49.5	49.2	98	76-125	1.2	13
Chlorobenzene	50	51.0	51.7	51.4	103	75-130	1.4	13
Category: 624-A Matrix: AQUEOUS QC Lot: 13 OCT 89-B Concentration Units: ug/L								
1,1-Dichloroethene	50	51.8	50.8	51.3	103	61-145	1.9	14
Trichloroethene	50	45.4	44.0	44.7	89	71-120	3.1	14
Benzene	50	55.4	54.7	55.0	110	76-127	1.3	11
Toluene	50	48.3	48.2	48.2	97	76-125	0.2	13
Chlorobenzene	50	47.0	47.8	47.4	95	75-130	1.7	13
Category: 624-A Matrix: AQUEOUS QC Lot: 05 OCT 89-L Concentration Units: ug/L								
1,1-Dichloroethene	50	50.5	52.1	51.3	103	61-145	3.1	14
Trichloroethene	50	42.3	42.3	42.3	85	71-120	0.0	14
Benzene	50	54.0	51.7	52.8	106	76-127	4.4	11
Toluene	50	47.4	50.3	48.8	98	76-125	5.9	13
Chlorobenzene	50	50.6	53.9	52.2	105	75-130	6.3	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 13 OCT 89-H1 QC Run: 13 OCT 89-H1				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	47.1	94	76-114
4-Bromofluorobenzene (BFB)	50.0	49.8	100	86-115
Toluene-d8	50.0	50.7	101	88-110
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 13 OCT 89-B QC Run: 12 OCT 89-B				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	47.2	94	76-114
4-Bromofluorobenzene (BFB)	50.0	46.4	93	86-115
Toluene-d8	50.0	48.5	97	88-110
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 05 OCT 89-L QC Run: 17 OCT 89-L				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	49.0	98	76-114
4-Bromofluorobenzene (BFB)	50.0	49.7	99	86-115
Toluene-d8	50.0	51.0	102	88-110
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 13 OCT 89-B QC Run: 15 OCT 89-B				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	49.9	100	76-114
4-Bromofluorobenzene (BFB)	50.0	51.0	102	86-115
Toluene-d8	50.0	51.8	104	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 13 OCT 89-H1 QC Run: 13 OCT 89-H1			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 13 OCT 89-B QC Run: 12 OCT 89-B			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 13 OCT 89-B QC Run: 12 OCT 89-B

Analyte	Result	Units	Reporting Limit
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 05 OCT 89-L QC Run: 17 OCT 89-L

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 05 OCT 89-L QC Run: 17 OCT 89-L			
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 13 OCT 89-B QC Run: 15 OCT 89-B			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 13 OCT 89-B QC Run: 15 OCT 89-B			
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

Rocky Mountain
Analytical Laboratory

RECEIVED OCT 3 1 1989

Enseco

October 24, 1989

Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the five aqueous samples received at Rocky Mountain Analytical Laboratory on October 7, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #006889

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interferences or analytes present at concentrations above the linear calibration curve, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006889-0001-SA	Trip blank	AQUEOUS	05 OCT 89	11:45	07 OCT 89
006889-0002-SA	RI-1	AQUEOUS	06 OCT 89	11:00	07 OCT 89
006889-0003-SA	5-4BB	AQUEOUS	06 OCT 89	12:00	07 OCT 89
006889-0004-SA	5-4BBA	AQUEOUS	06 OCT 89	12:10	07 OCT 89
006889-0005-SA	Field Blank	AQUEOUS	06 OCT 89	12:15	07 OCT 89

Enseco

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 006889	Group Code	Analysis Description	Custom Test?
0001 - 0005	A	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Trip blank
Lab ID: 006889-0001-SA   Enseco ID: 1055375
Matrix: AQUEOUS   Sampled: 05 OCT 89   Received: 07 OCT 89
Authorized: 09 OCT 89   Prepared: 10 OCT 89   Analyzed: 15 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene (BFB)	103	%	--
1,2-Dichloroethane-d4	102	%	--

ND = Not detected
NA = Not applicable

Reported By: Monica Brinkman   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: RI-1
Lab ID: 006889-0002-SA   Enseco ID: 1055376
Matrix: AQUEOUS   Sampled: 06 OCT 89   Received: 07 OCT 89
Authorized: 09 OCT 89   Prepared: 10 OCT 89   Analyzed: 16 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	250
Bromomethane	ND	ug/L	250
Vinyl chloride	ND	ug/L	250
Chloroethane	ND	ug/L	250
Methylene chloride	ND	ug/L	120
1,1-Dichloroethene	ND	ug/L	120
1,1-Dichloroethane	ND	ug/L	120
1,2-Dichloroethene (cis/trans)	ND	ug/L	120
Chloroform	ND	ug/L	120
1,2-Dichloroethane	ND	ug/L	120
1,1,1-Trichloroethane	ND	ug/L	120
Carbon tetrachloride	ND	ug/L	120
Bromodichloromethane	ND	ug/L	120
1,2-Dichloropropane	ND	ug/L	120
trans-1,3-Dichloropropene	ND	ug/L	120
Trichloroethene	ND	ug/L	120
Chlorodibromomethane	ND	ug/L	120
1,1,2-Trichloroethane	ND	ug/L	120
Benzene	ND	ug/L	120
cis-1,3-Dichloropropene	ND	ug/L	120
2-Chloroethyl vinyl ether	ND	ug/L	250
Bromoform	ND	ug/L	120
1,1,2,2-Tetrachloroethane	ND	ug/L	120
Tetrachloroethene	ND	ug/L	120
Toluene	ND	ug/L	120
Chlorobenzene	ND	ug/L	120
Ethyl benzene	ND	ug/L	120
Toluene-d8	101	%	--
4-Bromofluorobenzene (BFB)	100	%	--
1,2-Dichloroethane-d4	102	%	--

ND = Not detected
NA = Not applicable

Reported By: Monica Brinkman   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-4BB
Lab ID: 006889-0003-SA   Enseco ID: 1055377
Matrix: AQUEOUS   Sampled: 06 OCT 89   Received: 07 OCT 89
Authorized: 09 OCT 89   Prepared: 10 OCT 89   Analyzed: 16 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	50
Bromomethane	ND	ug/L	50
Vinyl chloride	ND	ug/L	50
Chloroethane	ND	ug/L	50
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	25
1,1-Dichloroethane	ND	ug/L	25
1,2-Dichloroethene (cis/trans)	ND	ug/L	25
Chloroform	ND	ug/L	25
1,2-Dichloroethane	ND	ug/L	25
1,1,1-Trichloroethane	ND	ug/L	25
Carbon tetrachloride	ND	ug/L	25
Bromodichloromethane	ND	ug/L	25
1,2-Dichloropropane	ND	ug/L	25
trans-1,3-Dichloropropene	ND	ug/L	25
Trichloroethene	ND	ug/L	25
Chlorodibromomethane	ND	ug/L	25
1,1,2-Trichloroethane	ND	ug/L	25
Benzene	ND	ug/L	25
cis-1,3-Dichloropropene	ND	ug/L	25
2-Chloroethyl vinyl ether	ND	ug/L	50
Bromoform	ND	ug/L	25
1,1,2,2-Tetrachloroethane	ND	ug/L	25
Tetrachloroethene	ND	ug/L	25
Toluene	ND	ug/L	25
Chlorobenzene	ND	ug/L	25
Ethyl benzene	ND	ug/L	25
Toluene-d8	102	%	--
4-Bromofluorobenzene (BFB)	99.3	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-4BBA
Lab ID: 006889-0004-SA   Enseco ID: 1055378
Matrix: AQUEOUS   Sampled: 06 OCT 89   Received: 07 OCT 89
Authorized: 09 OCT 89   Prepared: 10 OCT 89   Analyzed: 16 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	50
Bromomethane	ND	ug/L	50
Vinyl chloride	ND	ug/L	50
Chloroethane	ND	ug/L	50
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	25
1,1-Dichloroethane	ND	ug/L	25
1,2-Dichloroethene (cis/trans)	ND	ug/L	25
Chloroform	ND	ug/L	25
1,2-Dichloroethane	ND	ug/L	25
1,1,1-Trichloroethane	ND	ug/L	25
Carbon tetrachloride	ND	ug/L	25
Bromodichloromethane	ND	ug/L	25
1,2-Dichloropropane	ND	ug/L	25
trans-1,3-Dichloropropene	ND	ug/L	25
Trichloroethene	ND	ug/L	25
Chlorodibromomethane	ND	ug/L	25
1,1,2-Trichloroethane	ND	ug/L	25
Benzene	ND	ug/L	25
cis-1,3-Dichloropropene	ND	ug/L	25
2-Chloroethyl vinyl ether	ND	ug/L	50
Bromoform	ND	ug/L	25
1,1,2,2-Tetrachloroethane	ND	ug/L	25
Tetrachloroethene	ND	ug/L	25
Toluene	ND	ug/L	25
Chlorobenzene	ND	ug/L	25
Ethyl benzene	ND	ug/L	25
Toluene-d8	103	%	--
4-Bromofluorobenzene (BFB)	101	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Field Blank
Lab ID: 006889-0005-SA Enseco ID: 1055379
Matrix: AQUEOUS Sampled: 06 OCT 89 Received: 07 OCT 89
Authorized: 09 OCT 89 Prepared: 10 OCT 89 Analyzed: 16 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Toluene-d8	99.2	%	--
4-Bromofluorobenzene (BFB)	99.9	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Monica Brinkman Approved By: Jeff Lowry

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
006889-0001-SA	AQUEOUS	624-A	13 OCT 89-H1	15 OCT 89-H
006889-0002-SA	AQUEOUS	624-A	13 OCT 89-H1	15 OCT 89-H
006889-0003-SA	AQUEOUS	624-A	16 OCT 89-H	16 OCT 89-H
006889-0004-SA	AQUEOUS	624-A	16 OCT 89-H	16 OCT 89-H
006889-0005-SA	AQUEOUS	624-A	13 OCT 89-H1	15 OCT 89-H

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 13 OCT 89-H1								
Concentration Units: ug/L								
1,1-Dichloroethene	50	55.3	52.1	53.7	107	61-145	6.0	14
Trichloroethene	50	47.0	46.6	46.8	94	71-120	0.9	14
Benzene	50	54.3	53.6	54.0	108	76-127	1.3	11
Toluene	50	48.9	49.5	49.2	98	76-125	1.2	13
Chlorobenzene	50	51.0	51.7	51.4	103	75-130	1.4	13
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 16 OCT 89-H								
Concentration Units: ug/L								
1,1-Dichloroethene	50	53.3	52.4	52.8	106	61-145	1.7	14
Trichloroethene	50	51.8	50.2	51.0	102	71-120	3.1	14
Benzene	50	54.4	53.9	54.2	108	76-127	0.9	11
Toluene	50	50.5	50.0	50.2	101	76-125	1.0	13
Chlorobenzene	50	54.5	52.9	53.7	107	75-130	3.0	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 13 OCT 89-H1 QC Run: 15 OCT 89-H				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	49.9	100	76-114
4-Bromofluorobenzene (BFB)	50.0	50.1	100	86-115
Toluene-d8	50.0	49.7	99	88-110
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 16 OCT 89-H QC Run: 16 OCT 89-H				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	48.7	97	76-114
4-Bromofluorobenzene (BFB)	50.0	49.1	98	86-115
Toluene-d8	50.0	49.7	99	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 13 OCT 89-H1 QC Run: 15 OCT 89-H			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 16 OCT 89-H QC Run: 16 OCT 89-H			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

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METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 16 OCT 89-H QC Run: 16 OCT 89-H			
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethyl benzene	ND	ug/L	5.0

Rocky Mountain
Analytical Laboratory

Enseco

RECEIVED JAN 16 1990

December 20, 1989

Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the nine aqueous samples received at Rocky Mountain Analytical Laboratory on December 1, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #007674

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

Quality Control Reports

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\%\ \text{Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\ \text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}\ |}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
007674-0001-SA	5-3B-1,5-3B-2,5-3B-3	AQUEOUS	29 NOV 89	15:13	01 DEC 89
007674-0002-SA	5-5B-1,5-5B-2,5-5B-3	AQUEOUS	30 NOV 89	09:43	01 DEC 89
007674-0003-SA	SUPC-1,SUPC-2,SUPC-3	AQUEOUS	30 NOV 89	12:17	01 DEC 89
007674-0004-SA	5-2B-1,5-2B-2,5-2B-3	AQUEOUS	30 NOV 89	13:50	01 DEC 89
007674-0005-SA	Trip Blank	AQUEOUS	27 NOV 89		01 DEC 89
007674-0006-SA	5-3B-4,5-3B-5	AQUEOUS	29 NOV 89	15:16	01 DEC 89
007674-0007-SA	5-5B-4,5-5B-5	AQUEOUS	30 NOV 89	09:47	01 DEC 89
007674-0008-SA	SUPC-4,SUPC-5	AQUEOUS	30 NOV 89	12:20	01 DEC 89
007674-0009-SA	5-2B-4,5-2B-5	AQUEOUS	30 NOV 89	13:55	01 DEC 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 007674	Group Code	Analysis Description	Custom Test?
0001 - 0005	A	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
0006 - 0009	B	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-3B-1,5-3B-2,5-3B-3
Lab ID: 007674-0001-SA Enseco ID: 1061354
Matrix: AQUEOUS Sampled: 29 NOV 89 Received: 01 DEC 89
Authorized: 01 DEC 89 Prepared: 04 DEC 89 Analyzed: 05 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	94.4	%	--
4-Bromofluorobenzene	93.1	%	--
1,2-Dichloroethane-d4	108	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-5B-1,5-5B-2,5-5B-3
Lab ID: 007674-0002-SA   Enseco ID: 1061355
Matrix: AQUEOUS   Sampled: 30 NOV 89   Received: 01 DEC 89
Authorized: 01 DEC 89   Prepared: 04 DEC 89   Analyzed: 05 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	93.0	%	--
4-Bromofluorobenzene	93.8	%	--
1,2-Dichloroethane-d4	102	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: SUPC-1,SUPC-2,SUPC-3
Lab ID: 007674-0003-SA Enseco ID: 1061356
Matrix: AQUEOUS Sampled: 30 NOV 89 Received: 01 DEC 89
Authorized: 01 DEC 89 Prepared: 04 DEC 89 Analyzed: 06 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	92.5	%	--
4-Bromofluorobenzene	90.7	%	--
1,2-Dichloroethane-d4	106	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-2B-1,5-2B-2,5-2B-3
Lab ID: 007674-0004-SA Enseco ID: 1061357
Matrix: AQUEOUS Sampled: 30 NOV 89 Received: 01 DEC 89
Authorized: 01 DEC 89 Prepared: 04 DEC 89 Analyzed: 06 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	500
Bromomethane	ND	ug/L	500
Vinyl chloride	ND	ug/L	500
Chloroethane	ND	ug/L	500
Methylene chloride	ND	ug/L	250
1,1-Dichloroethene	ND	ug/L	250
1,1-Dichloroethane	ND	ug/L	250
1,2-Dichloroethene (cis/trans)	ND	ug/L	250
Chloroform	ND	ug/L	250
1,2-Dichloroethane	ND	ug/L	250
1,1,1-Trichloroethane	ND	ug/L	250
Carbon tetrachloride	ND	ug/L	250
Bromodichloromethane	ND	ug/L	250
1,2-Dichloropropane	ND	ug/L	250
trans-1,3-Dichloropropene	ND	ug/L	250
Trichloroethene	ND	ug/L	250
Chlorodibromomethane	ND	ug/L	250
1,1,2-Trichloroethane	ND	ug/L	250
Benzene	1800	ug/L	250
cis-1,3-Dichloropropene	ND	ug/L	250
2-Chloroethyl vinyl ether	ND	ug/L	500
Bromoform	ND	ug/L	250
1,1,2,2-Tetrachloroethane	ND	ug/L	250
Tetrachloroethene	ND	ug/L	250
Toluene	3100	ug/L	250
Chlorobenzene	ND	ug/L	250
Ethylbenzene	250	ug/L	250
Toluene-d8	95.0	%	--
4-Bromofluorobenzene	92.5	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais Approved By: Jeff Lowry

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Trip Blank
Lab ID: 007674-0005-SA   Enseco ID: 1061358
Matrix: AQUEOUS   Sampled: 27 NOV 89   Received: 01 DEC 89
Authorized: 01 DEC 89   Prepared: 04 DEC 89   Analyzed: 06 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1;2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	97.9	%	--
4-Bromofluorobenzene	91.8	%	--
1,2-Dichloroethane-d4	100	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais   Approved By: Jeff Lowry

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-3B-4,5-3B-5
Lab ID: 007674-0006-SA   Enseco ID: 1061359
Matrix: AQUEOUS   Sampled: 29 NOV 89   Received: 01 DEC 89
Authorized: 01 DEC 89   Prepared: 02 DEC 89   Analyzed: 10 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	82.4	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-5B-4,5-5B-5
Lab ID: 007674-0007-SA
Matrix: AQUEOUS
Authorized: 01 DEC 89

Enseco ID: 1061360
Sampled: 30 NOV 89
Prepared: 02 DEC 89

Received: 01 DEC 89
Analyzed: 10 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	82.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser

Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: SUPC-4,SUPC-5
Lab ID: 007674-0008-SA   Enseco ID: 1061361
Matrix: AQUEOUS   Sampled: 30 NOV 89   Received: 01 DEC 89
Authorized: 01 DEC 89   Prepared: 02 DEC 89   Analyzed: 10 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	84.6	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-2B-4,5-2B-5
Lab ID: 007674-0009-SA   Enseco ID: 1061362
Matrix: AQUEOUS   Sampled: 30 NOV 89   Received: 01 DEC 89
Authorized: 01 DEC 89   Prepared: 02 DEC 89   Analyzed: 11 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	52.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007674-0001-SA	AQUEOUS	624-A	04 DEC 89-L	05 DEC 89-L
007674-0002-SA	AQUEOUS	624-A	04 DEC 89-L	05 DEC 89-L
007674-0003-SA	AQUEOUS	624-A	04 DEC 89-L	05 DEC 89-L
007674-0004-SA	AQUEOUS	624-A	04 DEC 89-L	05 DEC 89-L
007674-0005-SA	AQUEOUS	624-A	04 DEC 89-L	05 DEC 89-L

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 04 DEC 89-L								
Concentration Units: ug/L								
1,1-Dichloroethene	50	51.5	49.4	50.4	101	61-145	4.2	14
Trichloroethene	50	52.7	52.0	52.4	105	71-120	1.3	14
Benzene	50	58.4	60.7	59.6	119	76-127	3.9	11
Toluene	50	56.7	57.4	57.0	114	76-125	1.2	13
Chlorobenzene	50	55.2	54.9	55.0	110	75-130	0.5	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A Matrix: AQUEOUS QC Lot: 04 DEC 89-L QC Run: 05 DEC 89-L Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	49.5	99	76-114
4-Bromofluorobenzene	50.0	44.5	89	86-115
Toluene-d8	50.0	46.2	92	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

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METHOD BLANK REPORT
Volatile Organics by GC/MS

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 04 DEC 89-L QC Run: 05 DEC 89-L

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

Enseco

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007674-0006-SA	AQUEOUS	608-A	19 NOV 89-A	02 DEC 89-A
007674-0007-SA	AQUEOUS	608-A	19 NOV 89-A	02 DEC 89-A
007674-0008-SA	AQUEOUS	608-A	19 NOV 89-A	02 DEC 89-A
007674-0009-SA	AQUEOUS	608-A	19 NOV 89-A	02 DEC 89-A

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 19 NOV 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
gamma-BHC (Lindane)	0.2	0.186	0.192	0.189	95	56-123	3.2	15
Heptachlor	0.2	0.198	0.214	0.206	103	40-131	7.8	20
Aldrin	0.2	0.189	0.204	0.196	98	40-120	7.6	22
Dieldrin	0.5	0.494	0.516	0.505	101	52-126	4.4	18
Endrin	0.5	0.435	0.463	0.449	90	56-121	6.2	21
4,4'-DDT	0.5	0.434	0.460	0.447	89	38-127	5.8	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 608-A Matrix: AQUEOUS QC Lot: 19 NOV 89-A QC Run: 02 DEC 89-A Concentration Units: ug/L				
Dibutyl chlorendate	1.00	0.758	76	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

METHOD BLANK REPORT
Semivolatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 19 NOV 89-A QC Run: 02 DEC 89-A			
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Rocky Mountain
Analytical Laboratory

Enseco

RECEIVED JAN 16 1990

January 11, 1990

Gordon Wassell
Enron
2223 Dodge Street
Omaha, NE 68102

Dear Mr. Wassell:

Enclosed is the report for the seven aqueous samples received at Rocky Mountain Analytical Laboratory on December 2, 1989.

If you have any questions, the Program Administrator assigned to this project is Cindy Ingram.

Sincerely,

Ramona Power

Ramona Power
Data Control

Enclosures

cc: Cindy Ingram, PA

RMAL #007681

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Discussion

This report contains results and supporting quality contrrl and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

Quality Control Reports

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\text{\% Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
007681-0001-SA	SUPW-1 thru -5	AQUEOUS	01 DEC 89	10:36	02 DEC 89
007681-0002-SA	5-1A-1 thru -5	AQUEOUS	01 DEC 89	11:43	02 DEC 89
007681-0003-SA	5-6B-1 thru -5	AQUEOUS	01 DEC 89	13:30	02 DEC 89
007681-0004-SA	5-6BA-1 thru -5	AQUEOUS	01 DEC 89	13:30	02 DEC 89
007681-0005-SA	5-1B-1 thru -5	AQUEOUS	01 DEC 89	14:14	02 DEC 89
007681-0006-SA	5-4B-1 thru -5	AQUEOUS	01 DEC 89	14:52	02 DEC 89
007681-0007-SA	TRIP BLANK	AQUEOUS	01 DEC 89	15:19	02 DEC 89

Enseco

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 007681	Group Code	Analysis Description	Custom Test?
0001 - 0006	A	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
0007	B	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: SUPW-1 thru -5
Lab ID: 007681-0001-SA   Enseco ID: 1061543
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 06 DEC 89   Analyzed: 09 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	94.2	%	--
1,2-Dichloroethane-d4	104	%	--

ND = Not detected
NA = Not applicable

Reported By: Lisa Traut   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-1A-1 thru -5
Lab ID: 007681-0002-SA
Matrix: AQUEOUS
Authorized: 02 DEC 89

Enseco ID: 1061544
Sampled: 01 DEC 89
Prepared: 06 DEC 89

Received: 02 DEC 89
Analyzed: 09 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	98.7	%	--
4-Bromofluorobenzene	91.2	%	--
1,2-Dichloroethane-d4	101	%	--

ND = Not detected
NA = Not applicable

Reported By: Lisa Traut

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-6B-1 thru -5
Lab ID: 007681-0003-SA   Enseco ID: 1061546
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 06 DEC 89   Analyzed: 13 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	7.4	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	35	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	21	ug/L	5.0
Toluene-d8	105	%	--
4-Bromofluorobenzene	92.7	%	--
1,2-Dichloroethane-d4	95.2	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-6BA-1 thru -5
Lab ID: 007681-0004-SA Enseco ID: 1061549
Matrix: AQUEOUS Sampled: 01 DEC 89 Received: 02 DEC 89
Authorized: 02 DEC 89 Prepared: 06 DEC 89 Analyzed: 13 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	5.2	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	25	ug/L	5.0
Toluene-d8	99.9	%	--
4-Bromofluorobenzene	97.1	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-1B-1 thru -5
Lab ID: 007681-0005-SA   Enseco ID: 1061551
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 06 DEC 89   Analyzed: 13 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	6.3	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	97.2	%	--
4-Bromofluorobenzene	97.5	%	--
1,2-Dichloroethane-d4	101	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-4B-1 thru -5
Lab ID: 007681-0006-SA
Matrix: AQUEOUS
Authorized: 02 DEC 89

Enseco ID: 1061552
Sampled: 01 DEC 89
Prepared: 06 DEC 89

Received: 02 DEC 89
Analyzed: 13 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	18	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	104	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: TRIP BLANK
Lab ID: 007681-0007-SA
Matrix: AQUEOUS
Authorized: 02 DEC 89

Enseco ID: 1061553
Sampled: 01 DEC 89
Prepared: 06 DEC 89

Received: 02 DEC 89
Analyzed: 13 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	103	%	--
4-Bromofluorobenzene	101	%	--
1,2-Dichloroethane-d4	97.9	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller

Approved By: Jeff Lowry

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: SUPW-1 thru -5
Lab ID: 007681-0001-SA   Enseco ID: 1061543
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 04 DEC 89   Analyzed: 14 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	89.2	%	--

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-1A-1 thru -5
Lab ID: 007681-0002-SA   Enseco ID: 1061544
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 04 DEC 89   Analyzed: 15 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	33.2	%	--

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-6B-1 thru -5
Lab ID: 007681-0003-SA   Enseco ID: 1061546
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 04 DEC 89   Analyzed: 05 JAN 90

Parameter	Result	Units	Reporting Limit	
alpha-BHC	ND	ug/L	5.0	
beta-BHC	ND	ug/L	5.0	
delta-BHC	ND	ug/L	5.0	
gamma-BHC (Lindane)	ND	ug/L	5.0	
Heptachlor	ND	ug/L	5.0	
Aldrin	ND	ug/L	5.0	
Heptachlor epoxide	ND	ug/L	5.0	
Endosulfan I	ND	ug/L	5.0	
Dieldrin	ND	ug/L	10	
4,4'-DDE	ND	ug/L	10	
Endrin	ND	ug/L	10	
Endosulfan II	ND	ug/L	10	
4,4'-DDD	ND	ug/L	10	
Endosulfan sulfate	ND	ug/L	10	
4,4'-DDT	ND	ug/L	10	
Endrin aldehyde	ND	ug/L	10	
alpha-Chlordane	ND	ug/L	50	
gamma-Chlordane	ND	ug/L	50	
Toxaphene	ND	ug/L	100	
Aroclor 1016	ND	ug/L	50	
Aroclor 1221	180	ug/L	50	
Aroclor 1232	ND	ug/L	50	
Aroclor 1242	ND	ug/L	50	
Aroclor 1248	ND	ug/L	50	
Aroclor 1254	ND	ug/L	100	
Aroclor 1260	ND	ug/L	100	
Dibutyl chlorendate	ND	%	--	H

Note H : Surrogate not detected because of required sample dilution.

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-6BA-1 thru -5
Lab ID: 007681-0004-SA   Enseco ID: 1061549
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 04 DEC 89   Analyzed: 05 JAN 90

Parameter	Result	Units	Reporting Limit	
alpha-BHC	ND	ug/L	5.0	
beta-BHC	ND	ug/L	5.0	
delta-BHC	ND	ug/L	5.0	
gamma-BHC (Lindane)	ND	ug/L	5.0	
Heptachlor	ND	ug/L	5.0	
Aldrin	ND	ug/L	5.0	
Heptachlor epoxide	ND	ug/L	5.0	
Endosulfan I	ND	ug/L	5.0	
Dieldrin	ND	ug/L	10	
4,4'-DDE	ND	ug/L	10	
Endrin	ND	ug/L	10	
Endosulfan II	ND	ug/L	10	
4,4'-DDD	ND	ug/L	10	
Endosulfan sulfate	ND	ug/L	10	
4,4'-DDT	ND	ug/L	10	
Endrin aldehyde	ND	ug/L	10	
alpha-Chlordane	ND	ug/L	50	
gamma-Chlordane	ND	ug/L	50	
Toxaphene	ND	ug/L	100	
Aroclor 1016	ND	ug/L	50	
Aroclor 1221	160	ug/L	50	
Aroclor 1232	ND	ug/L	50	
Aroclor 1242	ND	ug/L	50	
Aroclor 1248	ND	ug/L	50	
Aroclor 1254	ND	ug/L	100	
Aroclor 1260	ND	ug/L	100	
Dibutyl chlorendate	ND	%	--	H

Note H : Surrogate not detected because of required sample dilution.

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-1B-1 thru -5
Lab ID: 007681-0005-SA   Enseco ID: 1061551
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 04 DEC 89   Analyzed: 15 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	2.0	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	70.3	%	--

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-4B-1 thru -5
Lab ID: 007681-0006-SA   Enseco ID: 1061552
Matrix: AQUEOUS   Sampled: 01 DEC 89   Received: 02 DEC 89
Authorized: 02 DEC 89   Prepared: 04 DEC 89   Analyzed: 15 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	70.6	%	--

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007681-0001-SA	AQUEOUS	624-A	03 DEC 89-B	09 DEC 89-B
007681-0002-SA	AQUEOUS	624-A	03 DEC 89-B	09 DEC 89-B
007681-0003-SA	AQUEOUS	624-A	14 DEC 89-L	13 DEC 89-L
007681-0004-SA	AQUEOUS	624-A	14 DEC 89-L	13 DEC 89-L
007681-0005-SA	AQUEOUS	624-A	14 DEC 89-L	13 DEC 89-L
007681-0006-SA	AQUEOUS	624-A	14 DEC 89-L	13 DEC 89-L
007681-0007-SA	AQUEOUS	624-A	14 DEC 89-L	13 DEC 89-L

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: 624-A
Matrix: AQUEOUS
QC Lot: 03 DEC 89-B
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
1,1-Dichloroethene	50	52.7	52.0	52.4	105	61-145	1.3	14
Trichloroethene	50	49.0	48.7	48.8	98	71-120	0.6	14
Benzene	50	56.1	56.4	56.2	113	76-127	0.5	11
Toluene	50	52.9	52.1	52.5	105	76-125	1.5	13
Chlorobenzene	50	50.5	50.4	50.4	101	75-130	0.2	13

Category: 624-A
Matrix: AQUEOUS
QC Lot: 14 DEC 89-L
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
1,1-Dichloroethene	50	44.6	47.4	46.0	92	61-145	6.1	14
Trichloroethene	50	47.2	47.7	47.4	95	71-120	1.1	14
Benzene	50	52.2	52.3	52.2	105	76-127	0.2	11
Toluene	50	50.9	51.3	51.1	102	76-125	0.8	13
Chlorobenzene	50	53.5	53.5	53.5	107	75-130	0.0	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

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SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A Matrix: AQUEOUS QC Lot: 03 DEC 89-B QC Run: 09 DEC 89-B Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	48.4	97	76-114
4-Bromofluorobenzene	50.0	47.0	94	86-115
Toluene-d8	50.0	47.5	95	88-110
Category: 624-A Matrix: AQUEOUS QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	50.1	100	76-114
4-Bromofluorobenzene	50.0	50.3	101	86-115
Toluene-d8	50.0	48.5	97	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 03 DEC 89-B QC Run: 09 DEC 89-B			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L			
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L			
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007681-0001-SA	AQUEOUS	608-A	04 DEC 89-A	04 DEC 89-A
007681-0002-SA	AQUEOUS	608-A	04 DEC 89-A	04 DEC 89-A
007681-0003-SA	AQUEOUS	608-A	04 DEC 89-A	04 DEC 89-A
007681-0004-SA	AQUEOUS	608-A	04 DEC 89-A	04 DEC 89-A
007681-0005-SA	AQUEOUS	608-A	04 DEC 89-A	04 DEC 89-A
007681-0006-SA	AQUEOUS	608-A	04 DEC 89-A	04 DEC 89-A

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 04 DEC 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
gamma-BHC (Lindane)	0.2	0.161	0.173	0.167	84	56-123	7.2	15
Heptachlor	0.2	0.172	0.187	0.180	90	40-131	8.4	20
Aldrin	0.2	0.146	0.158	0.152	76	40-120	7.9	22
Dieldrin	0.5	0.392	0.428	0.410	82	52-126	8.8	18
Endrin	0.5	0.383	0.417	0.400	80	56-121	8.5	21
4,4'-DDT	0.5	0.416	0.461	0.438	88	38-127	10	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 608-A Matrix: AQUEOUS QC Lot: 04 DEC 89-A QC Run: 04 DEC 89-A Concentration Units: ug/L				
Dibutyl chlorendate	1.00	0.767	77	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

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METHOD BLANK REPORT
Semivolatile Organics by GC

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 04 DEC 89-A QC Run: 04 DEC 89-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Rocky Mountain
Analytical Laboratory

RECEIVED

ANALYTICAL RESULTS

FOR

ENRON

ENSECO-RMAL NO. 007776

JANUARY 11, 1990

Enseco

Reviewed by: Cindy Ingram
Cindy Ingram

Jeanne B. Howbert
Jeanne B. Howbert

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Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interferences or analytes present at concentrations above the linear calibration curve, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Bis(2-ethylhexyl)phthalate is a common laboratory contaminant. Results should be considered suspect at levels close to the reporting limit.

Samples 007776-0007 and 0008 contained bis(2-ethylhexyl)phthalate at 31 and 580 ug/L respectively. Sample 007776-0008 was diluted due to this compound. Due to low acid surrogate recoveries, both samples were reprepared and reanalyzed outside of holding times. The surrogate recoveries were comparable with the initial results, indicating a matrix effect for both samples. The concentration of bis(2-ethylhexyl)phthalate in the reanalysis was 7.2 ug/L for sample 007776-0007 and 22 ug/L for sample 007776-0008 indicating probable laboratory contamination. The original data for sample 007776-0007 is reported. Due to laboratory contamination of bis(2-ethylhexyl) phthalate resulting in a required dilution, the original extract for sample 007776-0008 was reanalyzed within analysis holding times to achieve lower reporting limits.

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
007776-0001-SA	SUPE	AQUEOUS	06 DEC 89	08:45	08 DEC 89
007776-0002-SA	5-1A	AQUEOUS	06 DEC 89	12:46	08 DEC 89
007776-0003-SA	5-Tank	AQUEOUS	06 DEC 89	17:07	08 DEC 89
007776-0004-SA	NTUA #2	AQUEOUS	07 DEC 89	09:45	08 DEC 89
007776-0005-SA	NTUA #1	AQUEOUS	07 DEC 89	10:10	08 DEC 89
007776-0006-SA	Thoreau #2	AQUEOUS	07 DEC 89	12:30	08 DEC 89
007776-0007-SA	5-3A	AQUEOUS	07 DEC 89	09:14	08 DEC 89
007776-0008-SA	5-2A	AQUEOUS	07 DEC 89	14:05	08 DEC 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 007776	Group Code	Analysis Description	Custom Test?
0001 , 0003	A	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
0002	B	Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Nitrate, Ion Chromatography	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Fluoride, Electrode	N
		Total Dissolved Solids (TDS)	N
		pH	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		Lead, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		Thallium, Furnace AA (Dissolved)	N
		Mercury, Cold Vapor AA (Dissolved)	N
		Prep - Mercury, Cold Vapor AA, (Dissolved)	N
0004 - 0006	C	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Sulfate, Ion Chromatography	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Chloride, Ion Chromatography	N
		Total Dissolved Solids (TDS)	N
		pH	N
		Nitrate, Ion Chromatography	N
		Arsenic, Furnace AA (Dissolved)	N
		ICP Metals (Dissolved)	Y
		Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
0007 - 0008	D	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N

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ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 007776	Group Code	Analysis Description	Custom Test?
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Nitrate, Ion Chromatography	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Fluoride, Electrode	N
		Total Dissolved Solids (TDS)	N
		pH	N
		Arsenic, Furnace AA (Dissolved)	N
		Lead, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		Thallium, Furnace AA (Dissolved)	N
		Mercury, Cold Vapor AA (Dissolved)	N
		Prep - Mercury, Cold Vapor AA, (Dissolved)	N
		ICP Metals (Dissolved)	Y

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

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Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: SUPE
Lab ID: 007776-0001-SA
Enseco ID: 1062213
Matrix: AQUEOUS
Sampled: 06 DEC 89
Received: 08 DEC 89
Authorized: 08 DEC 89
Prepared: 11 DEC 89
Analyzed: 20 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	104	%	--
1,2-Dichloroethane-d4	99.1	%	--

ND = Not detected
NA = Not applicable

Reported By: Tim Miller

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-Tank
Lab ID: 007776-0003-SA Enseco ID: 1062215
Matrix: AQUEOUS Sampled: 06 DEC 89 Received: 08 DEC 89
Authorized: 08 DEC 89 Prepared: 11 DEC 89 Analyzed: 20 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	5.2	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	2.00	%	--
4-Bromofluorobenzene	98.8	%	--
1,2-Dichloroethane-d4	92.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Phillip Tallarico Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: NTUA #2
Lab ID: 007776-0004-SA   Enseco ID: 1062222
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 20 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene	99.2	%	--
1,2-Dichloroethane-d4	111	%	--

ND = Not detected
NA = Not applicable

Reported By: Shawn Kassner   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: NTUA #1
Lab ID: 007776-0005-SA   Enseco ID: 1062223
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 20 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	100	%	--
4-Bromofluorobenzene	94.6	%	--
1,2-Dichloroethane-d4	103	%	--

ND = Not detected
NA = Not applicable

Reported By: Shawn Kassner   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: Thoreau #2
Lab ID: 007776-0006-SA — Enseco ID: 1062224
Matrix: AQUEOUS — Sampled: 07 DEC 89 — Received: 08 DEC 89
Authorized: 08 DEC 89 — Prepared: 11 DEC 89 — Analyzed: 20 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	94.8	%	--
1,2-Dichloroethane-d4	105	%	--

ND = Not detected
NA = Not applicable

Reported By: Shawn Kassner — Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-3A
Lab ID: 007776-0007-SA   Enseco ID: 1062225
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 13 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	103	%	--
1,2-Dichloroethane-d4	106	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-2A
Lab ID: 007776-0008-SA   Enseco ID: 1062226
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 14 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	50
Bromomethane	ND	ug/L	50
Vinyl chloride	ND	ug/L	50
Chloroethane	ND	ug/L	50
Methylene chloride	ND	ug/L	25
1,1-Dichloroethene	ND	ug/L	25
1,1-Dichloroethane	ND	ug/L	25
1,2-Dichloroethene (cis/trans)	ND	ug/L	25
Chloroform	ND	ug/L	25
1,2-Dichloroethane	ND	ug/L	25
1,1,1-Trichloroethane	ND	ug/L	25
Carbon tetrachloride	ND	ug/L	25
Bromodichloromethane	ND	ug/L	25
1,2-Dichloropropane	ND	ug/L	25
trans-1,3-Dichloropropene	ND	ug/L	25
Trichloroethene	ND	ug/L	25
Chlorodibromomethane	ND	ug/L	25
1,1,2-Trichloroethane	ND	ug/L	25
Benzene	ND	ug/L	25
cis-1,3-Dichloropropene	ND	ug/L	25
2-Chloroethyl vinyl ether	ND	ug/L	50
Bromoform	ND	ug/L	25
1,1,2,2-Tetrachloroethane	ND	ug/L	25
Tetrachloroethene	ND	ug/L	25
Toluene	490	ug/L	25
Chlorobenzene	ND	ug/L	25
Ethylbenzene	56	ug/L	25
Toluene-d8	99.4	%	--
4-Bromofluorobenzene	98.8	%	--
1,2-Dichloroethane-d4	105	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-1A
Lab ID: 007776-0002-SA   Enseco ID: 1062214
Matrix: AQUEOUS   Sampled: 06 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 19 DEC 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl)-ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	1(

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Marshall Tilbury   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-1A
Lab ID: 007776-0002-SA   Enseco ID: 1062214
Matrix: AQUEOUS   Sampled: 06 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 19 DEC 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	12	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	94.9	%	--
2-Fluorobiphenyl	70.7	%	--
Terphenyl-d14	97.1	%	--
Phenol-d5	78.0	%	--
2-Fluorophenol	75.0	%	--
2,4,6-Tribromophenol	89.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Marshall Tilbury   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-3A
Lab ID: 007776-0007-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062225
Sampled: 07 DEC 89
Prepared: 11 DEC 89

Received: 08 DEC 89
Analyzed: 19 DEC 89

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl)-ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

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ND = Not detected
NA = Not applicable

Reported By: Marshall Tilbury   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-3A
Lab ID: 007776-0007-SA   Enseco ID: 1062225
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 19 DEC 89

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	31	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	92.0	%	--
2-Fluorobiphenyl	73.8	%	--
Terphenyl-d14	81.5	%	--
Phenol-d5	ND	%	--
2-Fluorophenol	ND	%	--
2,4,6-Tribromophenol	ND	%	--

ND = Not detected
NA = Not applicable

Reported By: Marshall Tilbury   Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-2A
Lab ID: 007776-0008-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062226
Sampled: 07 DEC 89
Prepared: 11 DEC 89

Received: 08 DEC 89
Analyzed: 09 JAN 90

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl)-ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Bob Martin

Approved By: Jeff Lowry

Enseco

Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-2A
Lab ID: 007776-0008-SA   Enseco ID: 1062226
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 09 JAN 90

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	580	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Nitrobenzene-d5	71.1	%	--
2-Fluorobiphenyl	65.8	%	--
Terphenyl-d14	69.2	%	--
Phenol-d5	ND	%	--
2-Fluorophenol	ND	%	--
2,4,6-Tribromophenol	ND	%	--

ND = Not detected
NA = Not applicable

Reported By: Bob Martin   Approved By: Jeff Lowry

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: SUPE
Lab ID: 007776-0001-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062213
Sampled: 06 DEC 89
Prepared: 11 DEC 89

Received: 08 DEC 89
Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	91.8	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser

Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-Tank
Lab ID: 007776-0003-SA   Enseco ID: 1062215
Matrix: AQUEOUS   Sampled: 06 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	73.4	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: NTUA #2
Lab ID: 007776-0004-SA   Enseco ID: 1062222
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	94.6	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: NTUA #1
Lab ID: 007776-0005-SA   Enseco ID: 1062223
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	88.6	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: Thoreau #2
Lab ID: 007776-0006-SA   Enseco ID: 1062224
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	76.2	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-3A
Lab ID: 007776-0007-SA   Enseco ID: 1062225
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: 11 DEC 89   Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	85.8	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser   Approved By: Stephanie Boehnke

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-2A
Lab ID: 007776-0008-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062226
Sampled: 07 DEC 89
Prepared: 11 DEC 89

Received: 08 DEC 89
Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	80.7	%	--

ND = Not detected
NA = Not applicable

Reported By: Todd Burgesser

Approved By: Stephanie Boehnke

Enseco

Metals

Dissolved Metals

Client Name: Enron
Client ID: 5-1A
Lab ID: 007776-0002-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062214
Sampled: 06 DEC 89
Prepared: See Below

Received: 08 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.05	200.7	NA	04 JAN 90
Arsenic	ND	mg/L	0.005	206.2	NA	04 JAN 90
Barium	0.02	mg/L	0.01	200.7	NA	04 JAN 90
Beryllium	ND	mg/L	0.002	200.7	NA	04 JAN 90
Boron	0.15	mg/L	0.02	200.7	NA	04 JAN 90
Cadmium	ND	mg/L	0.005	200.7	NA	04 JAN 90
Calcium	1.1	mg/L	0.2	200.7	NA	04 JAN 90
Chromium	ND	mg/L	0.01	200.7	NA	04 JAN 90
Copper	ND	mg/L	0.01	200.7	NA	04 JAN 90
Iron	0.6	mg/L	0.1	200.7	NA	04 JAN 90
Lead	0.006	mg/L	0.005	239.2	NA	04 JAN 90
Magnesium	ND	mg/L	0.2	200.7	NA	04 JAN 90
Manganese	0.02	mg/L	0.01	200.7	NA	04 JAN 90
Mercury	ND	mg/L	0.0002	245.1	21 DEC 89	22 DEC 89
Molybdenum	ND	mg/L	0.02	200.7	NA	04 JAN 90
Nickel	ND	mg/L	0.04	200.7	NA	04 JAN 90
Potassium	ND	mg/L	5	200.7	NA	04 JAN 90
Selenium	0.009	mg/L	0.005	270.2	NA	04 JAN 90
Silica as SiO2	11	mg/L	0.2	200.7	NA	04 JAN 90
Silver	ND	mg/L	0.01	200.7	NA	04 JAN 90
Sodium	172	mg/L	5	200.7	NA	04 JAN 90
Strontium	ND	mg/L	0.05	200.7	NA	04 JAN 90
Thallium	ND	mg/L	0.01	279.2	NA	29 DEC 89
Zinc	1.5	mg/L	0.01	200.7	NA	04 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez

Approved By: Tammy Bailey

Enseco

Metals

Dissolved Metals

Client Name: Enron
Client ID: NTUA #2
Lab ID: 007776-0004-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062222
Sampled: 07 DEC 89
Prepared: See Below

Received: 08 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.005	206.2	NA	04 JAN 90
Boron	0.03	mg/L	0.02	200.7	NA	04 JAN 90
Calcium	41	mg/L	0.2	200.7	NA	04 JAN 90
Iron	0.5	mg/L	0.1	200.7	NA	04 JAN 90
Magnesium	19	mg/L	0.2	200.7	NA	04 JAN 90
Manganese	0.01	mg/L	0.01	200.7	NA	04 JAN 90
Potassium	ND	mg/L	5	200.7	NA	04 JAN 90
Sodium	23	mg/L	5	200.7	NA	04 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez

Approved By: Tammy Bailey

Metals

Dissolved Metals

Client Name: Enron
Client ID: NTUA #1
Lab ID: 007776-0005-SA Enseco ID: 1062223
Matrix: AQUEOUS Sampled: 07 DEC 89 Received: 08 DEC 89
Authorized: 08 DEC 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.005	206.2	NA	04 JAN 90
Boron	0.03	mg/L	0.02	200.7	NA	04 JAN 90
Calcium	42	mg/L	0.2	200.7	NA	04 JAN 90
Iron	2.3	mg/L	0.1	200.7	NA	04 JAN 90
Magnesium	19	mg/L	0.2	200.7	NA	04 JAN 90
Manganese	0.02	mg/L	0.01	200.7	NA	04 JAN 90
Potassium	ND	mg/L	5	200.7	NA	04 JAN 90
Sodium	25	mg/L	5	200.7	NA	04 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez Approved By: Tammy Bailey

Enseco

Metals

Dissolved Metals

Client Name: Enron
Client ID: Thoreau #2
Lab ID: 007776-0006-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062224
Sampled: 07 DEC 89
Prepared: See Below

Received: 08 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.005	206.2	NA	04 JAN 90
Boron	0.05	mg/L	0.02	200.7	NA	04 JAN 90
Calcium	141	mg/L	0.2	200.7	NA	04 JAN 90
Iron	2.0	mg/L	0.1	200.7	NA	04 JAN 90
Magnesium	26	mg/L	0.2	200.7	NA	04 JAN 90
Manganese	0.01	mg/L	0.01	200.7	NA	04 JAN 90
Potassium	ND	mg/L	5	200.7	NA	04 JAN 90
Sodium	10	mg/L	5	200.7	NA	04 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez

Approved By: Tammy Bailey

Enseco

Metals

Dissolved Metals

Client Name: Enron
Client ID: 5-3A
Lab ID: 007776-0007-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062225
Sampled: 07 DEC 89
Prepared: See Below

Received: 08 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	1	200.7	NA	04 JAN 90
Arsenic	ND	mg/L	0.03	206.2	NA	04 JAN 90
Barium	ND	mg/L	0.2	200.7	NA	04 JAN 90
Beryllium	ND	mg/L	0.04	200.7	NA	04 JAN 90
Boron	1.4	mg/L	0.4	200.7	NA	04 JAN 90
Cadmium	ND	mg/L	0.1	200.7	NA	04 JAN 90
Calcium	750	mg/L	4	200.7	NA	04 JAN 90
Chromium	ND	mg/L	0.2	200.7	NA	04 JAN 90
Copper	ND	mg/L	0.2	200.7	NA	04 JAN 90
Iron	ND	mg/L	2	200.7	NA	04 JAN 90
Lead	ND	mg/L	0.1	239.2	NA	04 JAN 90
Magnesium	83	mg/L	4	200.7	NA	04 JAN 90
Manganese	3.3	mg/L	0.2	200.7	NA	04 JAN 90
Mercury	ND	mg/L	0.0002	245.1	21 DEC 89	22 DEC 89
Molybdenum	ND	mg/L	0.4	200.7	NA	04 JAN 90
Nickel	ND	mg/L	0.8	200.7	NA	04 JAN 90
Potassium	ND	mg/L	100	200.7	NA	04 JAN 90
Selenium	ND	mg/L	0.05	270.2	NA	04 JAN 90
Silica as SiO2	ND	mg/L	4	200.7	NA	04 JAN 90
Silver	ND	mg/L	0.2	200.7	NA	04 JAN 90
Sodium	6660	mg/L	100	200.7	NA	04 JAN 90
Strontium	29	mg/L	1	200.7	NA	04 JAN 90
Thallium	ND	mg/L	0.5	279.2	NA	29 DEC 89
Zinc	ND	mg/L	0.2	200.7	NA	04 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez

Approved By: Tammy Bailey

Metals

Dissolved Metals

Client Name: Enron
Client ID: 5-2A
Lab ID: 007776-0008-SA   Enseco ID: 1062226
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	1	200.7	NA	04 JAN 90
Arsenic	ND	mg/L	0.03	206.2	NA	04 JAN 90
Barium	ND	mg/L	0.2	200.7	NA	04 JAN 90
Beryllium	ND	mg/L	0.04	200.7	NA	04 JAN 90
Boron	1.7	mg/L	0.4	200.7	NA	04 JAN 90
Cadmium	ND	mg/L	0.1	200.7	NA	04 JAN 90
Calcium	1300	mg/L	4	200.7	NA	04 JAN 90
Chromium	ND	mg/L	0.2	200.7	NA	04 JAN 90
Copper	ND	mg/L	0.2	200.7	NA	04 JAN 90
Iron	12	mg/L	2	200.7	NA	04 JAN 90
Lead	ND	mg/L	0.1	239.2	NA	04 JAN 90
Magnesium	140	mg/L	4	200.7	NA	04 JAN 90
Manganese	5.9	mg/L	0.2	200.7	NA	04 JAN 90
Mercury	ND	mg/L	0.0002	245.1	21 DEC 89	22 DEC 89
Molybdenum	ND	mg/L	0.4	200.7	NA	04 JAN 90
Nickel	ND	mg/L	0.8	200.7	NA	04 JAN 90
Potassium	ND	mg/L	100	200.7	NA	04 JAN 90
Selenium	ND	mg/L	0.05	270.2	NA	04 JAN 90
Silica as SiO2	ND	mg/L	4	200.7	NA	04 JAN 90
Silver	ND	mg/L	0.2	200.7	NA	04 JAN 90
Sodium	8820	mg/L	100	200.7	NA	04 JAN 90
Strontium	50	mg/L	1	200.7	NA	04 JAN 90
Thallium	ND	mg/L	0.5	279.2	NA	29 DEC 89
Zinc	0.2	mg/L	0.2	200.7	NA	04 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez   Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: 5-1A
Lab ID: 007776-0002-SA
Enseco ID: 1062214
Matrix: AQUEOUS
Sampled: 06 DEC 89
Received: 08 DEC 89
Authorized: 08 DEC 89
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	208	mg/L	5	310.1	NA	08 DEC 89
Alkalinity, Carb. as CaCO3 at pH 8.3	42	mg/L	5	310.1	NA	08 DEC 89
Chloride	37	mg/L	3	300.0	NA	09 DEC 89
Fluoride	0.4	mg/L	0.1	340.2	NA	13 DEC 89
Nitrate as N	0.8	mg/L	0.1	300.0	NA	09 DEC 89
pH	8.9	units	--	150.1	NA	08 DEC 89
Sulfate	48	mg/L	5	300.0	NA	09 DEC 89
Total Dissolved Solids	400	mg/L	10	160.1	NA	11 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Blake Besser

Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: NTUA #2
Lab ID: 007776-0004-SA   Enseco ID: 1062222
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	199	mg/L	5	310.1	NA	08 DEC 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	08 DEC 89
Chloride	4	mg/L	3	300.0	NA	09 DEC 89
Nitrate as N	ND	mg/L	0.1	300.0	NA	09 DEC 89
pH	7.7	units	--	150.1	NA	08 DEC 89
Sulfate	15	mg/L	5	300.0	NA	09 DEC 89
Total Dissolved Solids	220	mg/L	10	160.1	NA	11 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Blake Besser   Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: NTUA #1
Lab ID: 007776-0005-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062223
Sampled: 07 DEC 89
Prepared: See Below

Received: 08 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	186	mg/L	5	310.1	NA	08 DEC 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	08 DEC 89
Chloride	16	mg/L	3	300.0	NA	09 DEC 89
Nitrate as N	ND	mg/L	0.1	300.0	NA	09 DEC 89
pH	7.8	units	--	150.1	NA	08 DEC 89
Sulfate	21	mg/L	5	300.0	NA	09 DEC 89
Total Dissolved Solids	240	mg/L	10	160.1	NA	11 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Blake Besser

Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: Thoreau #2
Lab ID: 007776-0006-SA   Enseco ID: 1062224
Matrix: AQUEOUS   Sampled: 07 DEC 89   Received: 08 DEC 89
Authorized: 08 DEC 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	211	mg/L	5	310.1	NA	08 DEC 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	08 DEC 89
Chloride	5	mg/L	3	300.0	NA	09 DEC 89
Nitrate as N	ND	mg/L	0.1	300.0	NA	09 DEC 89
pH	7.4	units	--	150.1	NA	08 DEC 89
Sulfate	241	mg/L	5	300.0	NA	09 DEC 89
Total Dissolved Solids	550	mg/L	10	160.1	NA	11 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Blake Besser   Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: 5-3A
Lab ID: 007776-0007-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062225
Sampled: 07 DEC 89
Prepared: See Below

Received: 08 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	31	mg/L	5	310.1	NA	08 DEC 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	08 DEC 89
Chloride	16000	mg/L	3	300.0	NA	09 DEC 89
Fluoride	0.2	mg/L	0.1	340.2	NA	13 DEC 89
Nitrate as N	3.8	mg/L	0.1	300.0	NA	09 DEC 89
pH	6.5	units	--	150.1	NA	08 DEC 89
Sulfate	796	mg/L	5	300.0	NA	09 DEC 89
Total Dissolved Solids	26300	mg/L	10	160.1	NA	11 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Blake Besser

Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: 5-2A
Lab ID: 007776-0008-SA
Matrix: AQUEOUS
Authorized: 08 DEC 89

Enseco ID: 1062226
Sampled: 07 DEC 89
Prepared: See Below

Received: 08 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	28	mg/L	5	310.1	NA	08 DEC 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	08 DEC 89
Chloride	10700	mg/L	3	300.0	NA	09 DEC 89
Fluoride	0.4	mg/L	0.1	340.2	NA	13 DEC 89
Nitrate as N	3.7	mg/L	0.1	300.0	NA	09 DEC 89
pH	6.9	units	--	150.1	NA	08 DEC 89
Sulfate	1290	mg/L	5	300.0	NA	09 DEC 89
Total Dissolved Solids	20700	mg/L	10	160.1	NA	11 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Blake Besser

Approved By: Tammy Bailey

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\text{\% Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007776-0001-SA	AQUEOUS	624-A	03 DEC 89-H	19 DEC 89-H
007776-0003-SA	AQUEOUS	624-A	22 NOV 89-D	20 DEC 89-D
007776-0004-SA	AQUEOUS	624-A	21 DEC 89-S	20 DEC 89-S
007776-0005-SA	AQUEOUS	624-A	21 DEC 89-S	20 DEC 89-S
007776-0006-SA	AQUEOUS	624-A	21 DEC 89-S	20 DEC 89-S
007776-0007-SA	AQUEOUS	624-A	14 DEC 89-L	13 DEC 89-L
007776-0008-SA	AQUEOUS	624-A	14 DEC 89-L	14 DEC 89-L

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: 624-A
Matrix: AQUEOUS
QC Lot: 03 DEC 89-H
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
1,1-Dichloroethene	50	52.5	52.3	52.4	105	61-145	0.4	14
Trichloroethene	50	50.9	50.5	50.7	101	71-120	0.8	14
Benzene	50	61.2	59.8	60.5	121	76-127	2.3	11
Toluene	50	54.9	55.7	55.3	111	76-125	1.4	13
Chlorobenzene	50	54.0	55.2	54.6	109	75-130	2.2	13

Category: 624-A
Matrix: AQUEOUS
QC Lot: 22 NOV 89-D
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
1,1-Dichloroethene	50	59.5	52.5	56.0	112	61-145	12	14
Trichloroethene	50	53.6	53.5	53.6	107	71-120	0.2	14
Benzene	50	59.3	56.8	58.0	116	76-127	4.3	11
Toluene	50	57.1	54.7	55.9	112	76-125	4.3	13
Chlorobenzene	50	56.0	57.7	56.8	114	75-130	3.0	13

Category: 624-A
Matrix: AQUEOUS
QC Lot: 21 DEC 89-S
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
1,1-Dichloroethene	50	58.4	51.7	55.0	110	61-145	12	14
Trichloroethene	50	48.6	49.1	48.8	98	71-120	1.0	14
Benzene	50	52.5	52.2	52.4	105	76-127	0.6	11
Toluene	50	46.5	46.9	46.7	93	76-125	0.9	13
Chlorobenzene	50	53.7	57.5	55.6	111	75-130	6.8	13

Category: 624-A
Matrix: AQUEOUS
QC Lot: 14 DEC 89-L
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
1,1-Dichloroethene	50	44.6	47.4	46.0	92	61-145	6.1	14
Trichloroethene	50	47.2	47.7	47.4	95	71-120	1.1	14
Benzene	50	52.2	52.3	52.2	105	76-127	0.2	11
Toluene	50	50.9	51.3	51.1	102	76-125	0.8	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Concentration Spiked	Concentration Measured DCS1	Concentration Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 624-A Matrix: AQUEOUS QC Lot: 14 DEC 89-L Concentration Units: ug/L								
Chlorobenzene	50	53.5	53.5	53.5	107	75-130	0.0	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: 624-A
Matrix: AQUEOUS
QC Lot: 03 DEC 89-H QC Run: 19 DEC 89-H
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	50.0	49.2	98	76-114
4-Bromofluorobenzene	50.0	51.0	102	86-115
Toluene-d8	50.0	51.2	102	88-110

Category: 624-A
Matrix: AQUEOUS
QC Lot: 22 NOV 89-D QC Run: 20 DEC 89-D
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	50.0	46.1	92	76-114
4-Bromofluorobenzene	50.0	49.7	99	86-115
Toluene-d8	50.0	50.6	101	88-110

Category: 624-A
Matrix: AQUEOUS
QC Lot: 21 DEC 89-S QC Run: 20 DEC 89-S
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	50.0	53.2	106	76-114
4-Bromofluorobenzene	50.0	47.1	94	86-115
Toluene-d8	50.0	52.3	105	88-110

Category: 624-A
Matrix: AQUEOUS
QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	50.0	50.1	100	76-114
4-Bromofluorobenzene	50.0	50.3	101	86-115
Toluene-d8	50.0	48.5	97	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 14 DEC 89-L QC Run: 14 DEC 89-L				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	55.7	111	76-114
4-Bromofluorobenzene	50.0	50.0	100	86-115
Toluene-d8	50.0	50.1	100	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 03 DEC 89-H QC Run: 19 DEC 89-H

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 22 NOV 89-D QC Run: 20 DEC 89-D

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

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METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 22 NOV 89-D QC Run: 20 DEC 89-D

Analyte	Result	Units	Reporting Limit
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

Test: 624-PP-AP
Matrix: AQUEOUS
QC Lot: 21 DEC 89-S QC Run: 20 DEC 89-S

Analyte	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 21 DEC 89-S QC Run: 20 DEC 89-S			
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Test: 624-PP-A			
Matrix: AQUEOUS			
QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-A			
Matrix: AQUEOUS			
QC Lot: 14 DEC 89-L QC Run: 13 DEC 89-L			
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Test: 624-PP-A			
Matrix: AQUEOUS			
QC Lot: 14 DEC 89-L QC Run: 14 DEC 89-L			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007776-0002-SA	AQUEOUS	625-A	11 DEC 89-B	11 DEC 89-B
007776-0007-SA	AQUEOUS	625-A	11 DEC 89-B	11 DEC 89-B
007776-0008-SA	AQUEOUS	625-A	11 DEC 89-B	11 DEC 89-B

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DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 11 DEC 89-B
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Phenol	100	67.1	50.7	58.9	59	12- 89	28	42
2-Chlorophenol	100	77.9	55.5	66.7	67	27-123	34	40
1,4-Dichlorobenzene	50	20.4	11.6	16.0	32	36- 97	55	28
N-Nitroso-di-n-propylamine	50	32.8	29.2	31.0	62	41-116	12	38
1,2,4-Trichlorobenzene	50	21.7	12.8	17.2	35	39- 98	52	28
4-Chloro-3-methylphenol	100	77.9	70.3	74.1	74	23- 97	10	42
Acenaphthene	50	29.4	22.5	26.0	52	46-118	27	31
4-Nitrophenol	100	73.6	82.2	77.9	78	10- 80	11	50
2,4-Dinitrotoluene	50	35.3	36.5	35.9	72	24- 96	3.3	38
Pentachlorophenol	100	77.8	78.5	78.2	78	9-103	0.9	50
Pyrene	50	38.7	42.3	40.5	81	26-127	8.9	31

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 11 DEC 89-B QC Run: 11 DEC 89-B
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Nitrobenzene-d5	100	56.7	57	35-114
2-Fluorobiphenyl	100	48.3	48	43-116
Terphenyl-d14	100	74.7	75	33-141
2-Fluorophenol	200	97.5	49	21-100
Phenol-d5	200	105	52	10- 94
2,4,6-Tribromophenol	200	126	63	10-123

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 11 DEC 89-B QC Run: 11 DEC 89-B			
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl)-ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 11 DEC 89-B QC Run: 11 DEC 89-B			
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 11 DEC 89-B QC Run: 11 DEC 89-B			
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl)-ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 11 DEC 89-B QC Run: 11 DEC 89-B

Analyte	Result	Units	Reporting Limit
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 625-PP-A			
Matrix: AQUEOUS			
QC Lot: 11 DEC 89-B QC Run: 11 DEC 89-B			
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007776-0001-SA	AQUEOUS	608-A	04 DEC 89-A	11 DEC 89-A
007776-0003-SA	AQUEOUS	608-A	04 DEC 89-A	11 DEC 89-A
007776-0004-SA	AQUEOUS	608-A	04 DEC 89-A	11 DEC 89-A
007776-0005-SA	AQUEOUS	608-A	04 DEC 89-A	11 DEC 89-A
007776-0006-SA	AQUEOUS	608-A	04 DEC 89-A	11 DEC 89-A
007776-0007-SA	AQUEOUS	608-A	04 DEC 89-A	11 DEC 89-A
007776-0008-SA	AQUEOUS	608-A	04 DEC 89-A	11 DEC 89-A

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 04 DEC 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
gamma-BHC (Lindane)	0.2	0.161	0.173	0.167	84	56-123	7.2	15
Heptachlor	0.2	0.172	0.187	0.180	90	40-131	8.4	20
Aldrin	0.2	0.146	0.158	0.152	76	40-120	7.9	22
Dieldrin	0.5	0.392	0.428	0.410	82	52-126	8.8	18
Endrin	0.5	0.383	0.417	0.400	80	56-121	8.5	21
4,4'-DDT	0.5	0.416	0.461	0.438	88	38-127	10	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 04 DEC 89-A QC Run: 11 DEC 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Dibutyl chlorendate	1.00	0.921	92	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

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METHOD BLANK REPORT
Semivolatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 DEC 89-A QC Run: 11 DEC 89-A			
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 DEC 89-A QC Run: 11 DEC 89-A			
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10

METHOD BLANK REPORT
Semivolatile Organics by GC (cont.)

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 DEC 89-A QC Run: 11 DEC 89-A			
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 DEC 89-A QC Run: 11 DEC 89-A			
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50

METHOD BLANK REPORT
Semivolatile Organics by GC (cont.)

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 04 DEC 89-A QC Run: 11 DEC 89-A			
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007776-0002-SA	AQUEOUS	ICP-AD	04 JAN 90-A	-
007776-0002-SA	AQUEOUS	AS-FAA-AD	04 JAN 90-D	-
007776-0002-SA	AQUEOUS	PB-FAA-AD	04 JAN 90-A	-
007776-0002-SA	AQUEOUS	SE-FAA-AD	04 JAN 90-D	-
007776-0002-SA	AQUEOUS	TL-FAA-AD	29 DEC 89-A	-
007776-0002-SA	AQUEOUS	HG-CVAA-AT	21 DEC 89-A	-
007776-0004-SA	AQUEOUS	AS-FAA-AD	04 JAN 90-D	-
007776-0004-SA	AQUEOUS	ICP-AD	04 JAN 90-A	-
007776-0005-SA	AQUEOUS	AS-FAA-AD	04 JAN 90-A	-
007776-0005-SA	AQUEOUS	ICP-AD	04 JAN 90-A	-
007776-0006-SA	AQUEOUS	AS-FAA-AD	04 JAN 90-A	-
007776-0006-SA	AQUEOUS	ICP-AD	04 JAN 90-A	-
007776-0007-SA	AQUEOUS	AS-FAA-AD	04 JAN 90-D	-
007776-0007-SA	AQUEOUS	PB-FAA-AD	04 JAN 90-A	-
007776-0007-SA	AQUEOUS	SE-FAA-AD	04 JAN 90-D	-
007776-0007-SA	AQUEOUS	TL-FAA-AD	29 DEC 89-A	-
007776-0007-SA	AQUEOUS	HG-CVAA-AT	21 DEC 89-A	-
007776-0007-SA	AQUEOUS	ICP-AD	04 JAN 90-A	-
007776-0008-SA	AQUEOUS	AS-FAA-AD	04 JAN 90-D	-
007776-0008-SA	AQUEOUS	PB-FAA-AD	04 JAN 90-A	-
007776-0008-SA	AQUEOUS	SE-FAA-AD	04 JAN 90-D	-
007776-0008-SA	AQUEOUS	TL-FAA-AD	29 DEC 89-A	-
007776-0008-SA	AQUEOUS	HG-CVAA-AT	21 DEC 89-A	-
007776-0008-SA	AQUEOUS	ICP-AD	04 JAN 90-A	-

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DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: ICP-AD								
Matrix: AQUEOUS								
QC Lot: 04 JAN 90-A								
Concentration Units: mg/L								
Aluminum	2.0	1.95	1.98	1.96	98	75-125	1.5	20
Antimony	0.5	0.44	0.45	0.44	89	75-125	2.2	20
Arsenic	0.5	0.49	0.50	0.50	99	75-125	2.0	20
Barium	2.0	1.76	1.78	1.77	89	75-125	1.1	20
Beryllium	0.05	0.048	0.048	0.048	96	75-125	0.0	20
Cadmium	0.05	0.052	0.051	0.052	103	75-125	1.9	20
Calcium	100	98.3	99.2	98.8	99	75-125	0.9	20
Chromium	0.2	0.20	0.20	0.20	100	75-125	0.0	20
Cobalt	0.5	0.49	0.49	0.49	98	75-125	0.0	20
Copper	0.25	0.26	0.26	0.26	104	75-125	0.0	20
Iron	1.0	0.99	1.00	1.00	100	75-125	1.0	20
Lead	0.5	0.47	0.48	0.48	95	75-125	2.1	20
Magnesium	50	50.1	50.6	50.4	101	75-125	1.0	20
Manganese	0.5	0.51	0.51	0.51	102	75-125	0.0	20
Nickel	0.5	0.50	0.50	0.50	100	75-125	0.0	20
Potassium	100	98.7	100	99.4	99	75-125	1.3	20
Silver	0.05	0.047	0.047	0.047	94	75-125	0.0	20
Sodium	100	92.3	93.4	92.8	93	75-125	1.2	20
Vanadium	0.5	0.47	0.47	0.47	94	75-125	0.0	20
Zinc	0.5	0.51	0.51	0.51	102	75-125	0.0	20
Category: AS-FAA-AD								
Matrix: AQUEOUS								
QC Lot: 04 JAN 90-D								
Concentration Units: mg/L								
Arsenic	0.04	0.036	0.038	0.037	93	75-125	2.7	20
Category: PB-FAA-AD								
Matrix: AQUEOUS								
QC Lot: 04 JAN 90-A								
Concentration Units: mg/L								
Lead	0.02	0.017	0.018	0.018	88	75-125	5.7	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

PLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: SE-FAA-AD Matrix: AQUEOUS QC Lot: 04 JAN 90-D *Concentration Units:* mg/L								
Selenium	0.010	0.011	0.012	0.012	116	75-125	6.9	20
Category: TL-FAA-AD Matrix: AQUEOUS QC Lot: 29 DEC 89-A Concentration Units: mg/L								
Thallium	0.05	0.051	0.050	0.050	101	75-125	2.0	20
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 21 DEC 89-A Concentration Units: mg/L								
Mercury	0.0010	0.00102	0.00104	0.00103	103	75-125	1.9	20
Category: AS-FAA-AD Matrix: AQUEOUS QC Lot: 04 JAN 90-A Concentration Units: mg/L								
Arsenic	0.04	0.039	0.040	0.040	99	75-125	2.5	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007776-0002-SA	AQUEOUS	ALK-A	08 DEC 89-Q	-
007776-0002-SA	AQUEOUS	NO3-IC-A	09 DEC 89-M	-
007776-0002-SA	AQUEOUS	CL-IC-A	09 DEC 89-M	-
007776-0002-SA	AQUEOUS	SO4-IC-A	09 DEC 89-M	-
007776-0002-SA	AQUEOUS	F-A	13 DEC 89-A	-
007776-0002-SA	AQUEOUS	TDS-A	11 DEC 89-A	11 DEC 89-A
007776-0002-SA	AQUEOUS	PH-A	08 DEC 89-Q	-
007776-0004-SA	AQUEOUS	SO4-IC-A	09 DEC 89-M	-
007776-0004-SA	AQUEOUS	ALK-A	08 DEC 89-Q	-
007776-0004-SA	AQUEOUS	CL-IC-A	09 DEC 89-M	-
007776-0004-SA	AQUEOUS	TDS-A	11 DEC 89-A	11 DEC 89-A
007776-0004-SA	AQUEOUS	PH-A	08 DEC 89-Q	-
007776-0004-SA	AQUEOUS	NO3-IC-A	09 DEC 89-M	-
007776-0005-SA	AQUEOUS	SO4-IC-A	09 DEC 89-M	-
007776-0005-SA	AQUEOUS	ALK-A	08 DEC 89-Q	-
007776-0005-SA	AQUEOUS	CL-IC-A	09 DEC 89-M	-
007776-0005-SA	AQUEOUS	TDS-A	11 DEC 89-A	11 DEC 89-A
007776-0005-SA	AQUEOUS	PH-A	08 DEC 89-Q	-
007776-0005-SA	AQUEOUS	NO3-IC-A	09 DEC 89-M	-
007776-0006-SA	AQUEOUS	SO4-IC-A	09 DEC 89-M	-
007776-0006-SA	AQUEOUS	ALK-A	08 DEC 89-Q	-
007776-0006-SA	AQUEOUS	CL-IC-A	09 DEC 89-M	-
007776-0006-SA	AQUEOUS	TDS-A	11 DEC 89-A	11 DEC 89-A
007776-0006-SA	AQUEOUS	PH-A	08 DEC 89-Q	-
007776-0006-SA	AQUEOUS	NO3-IC-A	09 DEC 89-M	-
007776-0007-SA	AQUEOUS	ALK-A	08 DEC 89-Q	-
007776-0007-SA	AQUEOUS	NO3-IC-A	09 DEC 89-M	-
007776-0007-SA	AQUEOUS	CL-IC-A	09 DEC 89-M	-
007776-0007-SA	AQUEOUS	SO4-IC-A	09 DEC 89-M	-
007776-0007-SA	AQUEOUS	F-A	13 DEC 89-A	-
007776-0007-SA	AQUEOUS	TDS-A	11 DEC 89-A	11 DEC 89-A
007776-0007-SA	AQUEOUS	PH-A	08 DEC 89-Q	-
007776-0008-SA	AQUEOUS	ALK-A	08 DEC 89-Q	-
007776-0008-SA	AQUEOUS	NO3-IC-A	09 DEC 89-M	-
007776-0008-SA	AQUEOUS	CL-IC-A	09 DEC 89-M	-
007776-0008-SA	AQUEOUS	SO4-IC-A	09 DEC 89-M	-
007776-0008-SA	AQUEOUS	F-A	13 DEC 89-A	-
007776-0008-SA	AQUEOUS	TDS-A	11 DEC 89-A	11 DEC 89-A
007776-0008-SA	AQUEOUS	PH-A	08 DEC 89-Q	-

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: ALK-A Matrix: AQUEOUS QC Lot: 08 DEC 89-Q Concentration Units: mg/L								
Alkalinity, Total as CaCO3 at pH 4.5	184	184	185	184	100	90-110	0.5	10
Category: NO3-IC-A Matrix: AQUEOUS QC Lot: 09 DEC 89-M Concentration Units: mg/L								
Nitrate as N	20	19.6	18.7	19.2	96	91-109	4.7	20
Category: CL-IC-A Matrix: AQUEOUS QC Lot: 09 DEC 89-M Concentration Units: mg/L								
Chloride	100	102	97.3	99.6	100	92-108	4.7	20
Category: SO4-IC-A Matrix: AQUEOUS QC Lot: 09 DEC 89-M Concentration Units: mg/L								
Sulfate	200	202	195	198	99	93-107	3.5	20
Category: F-A Matrix: AQUEOUS QC Lot: 13 DEC 89-A Concentration Units: mg/L								
Fluoride	6.7	6.71	6.80	6.76	101	88-112	1.3	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: TDS-A Matrix: AQUEOUS QC Lot: 11 DEC 89-A Concentration Units: mg/L								
Total Dissolved Solids	1140	1080	1120	1100	96	90-110	3.6	10
Category: PH-A Matrix: AQUEOUS QC Lot: 08 DEC 89-Q Concentration Units: units								
pH	9.1	9.07	9.08	9.08	100	98-102	0.1	5

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 11 DEC 89-A QC Run: 11 DEC 89-A			
Total Dissolved Solids	ND	mg/L	10
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 11 DEC 89-A QC Run: 11 DEC 89-A			
Total Dissolved Solids	ND	mg/L	10
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 11 DEC 89-A QC Run: 11 DEC 89-A			
Total Dissolved Solids	ND	mg/L	10

Rocky Mountain
Analytical Laboratory

T RECEIVED JAN 1 6 1990

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ANALYTICAL RESULTS

FOR

ENRON

ENSECO-RMAL NO. 007827

JANUARY 11, 1990

Reviewed by: Cindy Ingram

Cindy Ingram

Jeanne B. Howbert

Jeanne B. Howbert

Enseco Incorporated
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Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- o Sample Description Information
- o Analytical Test Requests
- o Analytical Results
- o Quality Control Report

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

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SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
007827-0001-SA	TRIP BLANK	AQUEOUS	01 DEC 89		13 DEC 89
007827-0002-SA	THHS-1 THRU -7	AQUEOUS	12 DEC 89	10:33	13 DEC 89
007827-0003-SA	WND-1 THRU -7	AQUEOUS	12 DEC 89	11:17	13 DEC 89

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 007827	Group Code	Analysis Description	Custom Test?
0001	A	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
0002 - 0003	B	Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Arsenic, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Chloride, Ion Chromatography	N
		Total Dissolved Solids (TDS)	N
		pH	N
		Nitrate, Ion Chromatography	N
		Lead, Furnace AA (Total)	N
		Selenium, Furnace AA (Total)	N
		Thallium, Furnace AA (Total)	N
		Mercury, Cold Vapor AA (Total)	N
		Prep - Mercury, Cold Vapor AA (Total)	N

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: TRIP BLANK
Lab ID: 007827-0001-SA
Matrix: AQUEOUS
Authorized: 13 DEC 89

Enseco ID: 1062658
Sampled: Unknown
Prepared: 14 DEC 89

Received: 13 DEC 89
Analyzed: 20 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	103	%	--
4-Bromofluorobenzene	99.8	%	--
1,2-Dichloroethane-d4	95.8	%	--

ND = Not detected
NA = Not applicable

Reported By: Shawn Kassner

Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: THHS-1 THRU -7
Lab ID: 007827-0002-SA   Enseco ID: 1062660
Matrix: AQUEOUS   Sampled: 12 DEC 89   Received: 13 DEC 89
Authorized: 13 DEC 89   Prepared: 14 DEC 89   Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	103	%	--
1,2-Dichloroethane-d4	97.8	%	--

ND = Not detected
NA = Not applicable

Reported By: Michael Blades   Approved By: Jeff Lowry

Enseco

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: WND-1 THRU -7
Lab ID: 007827-0003-SA   Enseco ID: 1062661
Matrix: AQUEOUS   Sampled: 12 DEC 89   Received: 13 DEC 89
Authorized: 13 DEC 89   Prepared: 14 DEC 89   Analyzed: 21 DEC 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	103	%	--
4-Bromofluorobenzene	101	%	--
1,2-Dichloroethane-d4	101	%	--

ND = Not detected
NA = Not applicable

Reported By: Michael Blades   Approved By: Jeff Lowry

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: THHS-1 THRU -7
Lab ID: 007827-0002-SA   Enseco ID: 1062660
Matrix: AQUEOUS   Sampled: 12 DEC 89   Received: 13 DEC 89
Authorized: 13 DEC 89   Prepared: 15 DEC 89   Analyzed: 04 JAN 90

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	97.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

Enseco

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: WND-1 THRU -7
Lab ID: 007827-0003-SA   Enseco ID: 1062661
Matrix: AQUEOUS   Sampled: 12 DEC 89   Received: 13 DEC 89
Authorized: 13 DEC 89   Prepared: 15 DEC 89   Analyzed: 04 JAN 90

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	99.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Jim Rasmussen   Approved By: Barbara Sullivan

Enseco

Metals

Total Metals

Client Name: Enron
Client ID: THHS-1 THRU -7
Lab ID: 007827-0002-SA   Enseco ID: 1062660
Matrix: AQUEOUS   Sampled: 12 DEC 89   Received: 13 DEC 89
Authorized: 13 DEC 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.005	206.2	22 DEC 89	27 DEC 89
Boron	0.05	mg/L	0.02	200.7	29 DEC 89	05 JAN 90
Calcium	72	mg/L	0.2	200.7	29 DEC 89	05 JAN 90
Iron	0.8	mg/L	0.1	200.7	29 DEC 89	05 JAN 90
Lead	ND	mg/L	0.005	239.2	22 DEC 89	27 DEC 89
Magnesium	19	mg/L	0.2	200.7	29 DEC 89	05 JAN 90
Manganese	0.02	mg/L	0.01	200.7	29 DEC 89	05 JAN 90
Mercury	ND	mg/L	0.0002	245.1	21 DEC 89	22 DEC 89
Potassium	ND	mg/L	5	200.7	29 DEC 89	05 JAN 90
Selenium	ND	mg/L	0.005	270.2	22 DEC 89	02 JAN 90
Sodium	16	mg/L	5	200.7	29 DEC 89	05 JAN 90
Thallium	ND	mg/L	0.005	279.2	22 DEC 89	29 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Dave Roberts   Approved By: Tammy Bailey

Metals

Total Metals

Client Name: Enron
Client ID: WND-1 THRU -7
Lab ID: 007827-0003-SA   Enseco ID: 1062661
Matrix: AQUEOUS   Sampled: 12 DEC 89   Received: 13 DEC 89
Authorized: 13 DEC 89   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.005	206.2	22 DEC 89	27 DEC 89
Boron	0.16	mg/L	0.02	200.7	29 DEC 89	05 JAN 90
Calcium	0.7	mg/L	0.2	200.7	29 DEC 89	05 JAN 90
Iron	0.3	mg/L	0.1	200.7	29 DEC 89	05 JAN 90
Lead	ND	mg/L	0.005	239.2	22 DEC 89	27 DEC 89
Magnesium	ND	mg/L	0.2	200.7	29 DEC 89	05 JAN 90
Manganese	ND	mg/L	0.01	200.7	29 DEC 89	05 JAN 90
Mercury	ND	mg/L	0.0002	245.1	21 DEC 89	22 DEC 89
Potassium	ND	mg/L	5	200.7	29 DEC 89	05 JAN 90
Selenium	ND	mg/L	0.005	270.2	22 DEC 89	02 JAN 90
Sodium	124	mg/L	5	200.7	29 DEC 89	05 JAN 90
Thallium	ND	mg/L	0.005	279.2	22 DEC 89	29 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Dave Roberts   Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: THHS-1 THRU -7
Lab ID: 007827-0002-SA
Matrix: AQUEOUS
Authorized: 13 DEC 89

Enseco ID: 1062660
Sampled: 12 DEC 89
Prepared: See Below

Received: 13 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	206	mg/L	5	310.1	NA	18 DEC 89
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	18 DEC 89
Chloride	14	mg/L	3	300.0	NA	14 DEC 89
Nitrate as N	0.7	mg/L	0.1	300.0	NA	14 DEC 89
pH	7.8	units	--	150.1	NA	18 DEC 89
Total Dissolved Solids	320	mg/L	10	160.1	NA	18 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Pam Rosas

Approved By: Tammy Bailey

Enseco

General Inorganics

Client Name: Enron
Client ID: WND-1 THRU -7
Lab ID: 007827-0003-SA
Matrix: AQUEOUS
Authorized: 13 DEC 89

Enseco ID: 1062661
Sampled: 12 DEC 89
Prepared: See Below

Received: 13 DEC 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as $CaCO_3$ at pH 4.5	190	mg/L	5	310.1	NA	18 DEC 89
Alkalinity, Carb. as $CaCO_3$ at pH 8.3	20	mg/L	5	310.1	NA	18 DEC 89
Chloride	4	mg/L	3	300.0	NA	14 DEC 89
Nitrate as N	ND	mg/L	0.1	300.0	NA	14 DEC 89
pH	8.6	units	--	150.1	NA	18 DEC 89
Total Dissolved Solids	330	mg/L	10	160.1	NA	18 DEC 89

ND = Not detected
NA = Not applicable

Reported By: Pam Rosas

Approved By: Tammy Bailey

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\text{\% Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007827-0001-SA	AQUEOUS	624-A	21 DEC 89-S	20 DEC 89-S
007827-0002-SA	AQUEOUS	624-A	20 DEC 89-H	20 DEC 89-H
007827-0003-SA	AQUEOUS	624-A	20 DEC 89-H	20 DEC 89-H

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 21 DEC 89-S								
Concentration Units: ug/L								
1,1-Dichloroethene	50	58.4	51.7	55.0	110	61-145	12	14
Trichloroethene	50	48.6	49.1	48.8	98	71-120	1.0	14
Benzene	50	52.5	52.2	52.4	105	76-127	0.6	11
Toluene	50	46.5	46.9	46.7	93	76-125	0.9	13
Chlorobenzene	50	53.7	57.5	55.6	111	75-130	6.8	13
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 20 DEC 89-H								
Concentration Units: ug/L								
1,1-Dichloroethene	50	56.8	54.2	55.5	111	61-145	4.7	14
Trichloroethene	50	51.3	48.1	49.7	99	71-120	6.4	14
Benzene	50	50.7	48.2	49.4	99	76-127	5.1	11
Toluene	50	46.8	42.6	44.7	89	76-125	9.4	13
Chlorobenzene	50	54.3	49.8	52.0	104	75-130	8.6	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A Matrix: AQUEOUS QC Lot: 21 DEC 89-S QC Run: 20 DEC 89-S Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	53.2	106	76-114
4-Bromofluorobenzene	50.0	47.1	94	86-115
Toluene-d8	50.0	52.3	105	88-110
Category: 624-A Matrix: AQUEOUS QC Lot: 20 DEC 89-H QC Run: 20 DEC 89-H Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	49.8	100	76-114
4-Bromofluorobenzene	50.0	49.3	99	86-115
Toluene-d8	50.0	51.3	103	88-110

alculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 21 DEC 89-S QC Run: 20 DEC 89-S			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 20 DEC 89-H QC Run: 20 DEC 89-H			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

Enseco

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 20 DEC 89-H QC Run: 20 DEC 89-H			
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007827-0002-SA	AQUEOUS	608-A	04 DEC 89-A	15 DEC 89-A
007827-0003-SA	AQUEOUS	608-A	04 DEC 89-A	15 DEC 89-A

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 04 DEC 89-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
gamma-BHC (Lindane)	0.2	0.161	0.173	0.167	84	56-123	7.2	15
Heptachlor	0.2	0.172	0.187	0.180	90	40-131	8.4	20
Aldrin	0.2	0.146	0.158	0.152	76	40-120	7.9	22
Dieldrin	0.5	0.392	0.428	0.410	82	52-126	8.8	18
Endrin	0.5	0.383	0.417	0.400	80	56-121	8.5	21
4,4'-DDT	0.5	0.416	0.461	0.438	88	38-127	10	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 608-A Matrix: AQUEOUS QC Lot: 04 DEC 89-A QC Run: 15 DEC 89-A Concentration Units: ug/L				
Dibutyl chlorendate	1.00	0.945	94	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 04 DEC 89-A QC Run: 15 DEC 89-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007827-0002-SA	AQUEOUS	ICP-AT	29 DEC 89-A	29 DEC 89-A
007827-0002-SA	AQUEOUS	AS-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0002-SA	AQUEOUS	PB-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0002-SA	AQUEOUS	SE-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0002-SA	AQUEOUS	TL-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0002-SA	AQUEOUS	HG-CVAA-AT	21 DEC 89-B	21 DEC 89-B
007827-0003-SA	AQUEOUS	ICP-AT	29 DEC 89-A	29 DEC 89-A
007827-0003-SA	AQUEOUS	AS-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0003-SA	AQUEOUS	PB-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0003-SA	AQUEOUS	SE-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0003-SA	AQUEOUS	TL-FAA-AT	21 DEC 89-E	21 DEC 89-E
007827-0003-SA	AQUEOUS	HG-CVAA-AT	21 DEC 89-B	21 DEC 89-B

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-AT								
Matrix: AQUEOUS								
QC Lot: 29 DEC 89-A								
Concentration Units: mg/L								
Aluminum	2.0	1.98	1.96	1.97	99	75-125	1.0	20
Antimony	0.5	0.47	0.47	0.47	94	75-125	0.0	20
Arsenic	0.5	0.48	0.49	0.48	97	75-125	2.1	20
Barium	2.0	1.79	1.76	1.78	89	75-125	1.7	20
Beryllium	0.05	0.049	0.048	0.048	97	75-125	2.1	20
Cadmium	0.05	0.048	0.051	0.050	99	75-125	6.1	20
Calcium	100	96.4	95.2	95.8	96	75-125	1.3	20
Chromium	0.2	0.19	0.19	0.19	95	75-125	0.0	20
Cobalt	0.5	0.48	0.47	0.48	95	75-125	2.1	20
Copper	0.25	0.25	0.24	0.24	98	75-125	4.1	20
Iron	1.0	0.97	0.99	0.98	98	75-125	2.0	20
Lead	0.5	0.47	0.47	0.47	94	75-125	0.0	20
Magnesium	50	49.7	48.9	49.3	99	75-125	1.6	20
Manganese	0.5	0.49	0.49	0.49	98	75-125	0.0	20
Nickel	0.5	0.49	0.49	0.49	98	75-125	0.0	20
Potassium	100	98.8	95.4	97.1	97	75-125	3.5	20
Silver	0.05	0.049	0.046	0.048	95	75-125	6.3	20
Sodium	100	92.8	88.0	90.4	90	75-125	5.3	20
Vanadium	0.5	0.47	0.46	0.46	93	75-125	2.2	20
Zinc	0.5	0.52	0.51	0.52	103	75-125	1.9	20
Category: AS-FAA-AT								
Matrix: AQUEOUS								
QC Lot: 21 DEC 89-E								
Concentration Units: mg/L								
Arsenic	0.04	0.030	0.033	0.032	79	75-125	9.5	20
Category: PB-FAA-AT								
Matrix: AQUEOUS								
QC Lot: 21 DEC 89-E								
Concentration Units: mg/L								
Lead	0.02	0.019	0.019	0.019	95	75-125	0.0	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: SE-FAA-AT Matrix: AQUEOUS QC Lot: 21 DEC 89-E Concentration Units: mg/L								
Selenium	0.01	0.0096	0.0098	0.0097	97	75-125	2.1	20
Category: TL-FAA-AT Matrix: AQUEOUS QC Lot: 21 DEC 89-E Concentration Units: mg/L								
Thallium	0.05	0.046	0.046	0.046	92	75-125	0.0	20
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 21 DEC 89-B Concentration Units: mg/L								
Mercury	0.0010	0.00104	0.00106	0.00105	105	75-125	1.9	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-AT			
Matrix: AQUEOUS			
QC Lot: 29 DEC 89-A QC Run: 29 DEC 89-A			
Boron	ND	mg/L	0.02
Calcium	ND	mg/L	0.2
Iron	ND	mg/L	0.1
Magnesium	ND	mg/L	0.2
Manganese	ND	mg/L	0.01
Potassium	ND	mg/L	5
Sodium	ND	mg/L	5
Test: AS-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 21 DEC 89-E QC Run: 21 DEC 89-E			
Arsenic	ND	mg/L	0.005
Test: PB-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 21 DEC 89-E QC Run: 21 DEC 89-E			
Lead	ND	mg/L	0.005
Test: SE-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 21 DEC 89-E QC Run: 21 DEC 89-E			
Selenium	ND	mg/L	0.005
Test: TL-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 21 DEC 89-E QC Run: 21 DEC 89-E			
Thallium	ND	mg/L	0.005

METHOD BLANK REPORT
Metals Analysis and Preparation (cont.)

Test: HG-CVAA-AT
Matrix: AQUEOUS
QC Lot: 21 DEC 89-B QC Run: 21 DEC 89-B

Analyte	Result	Units	Reporting Limit
Mercury	ND	mg/L	0.0002

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
007827-0002-SA	AQUEOUS	ALK-A	18 DEC 89-A	-
007827-0002-SA	AQUEOUS	CL-IC-A	14 DEC 89-M	-
007827-0002-SA	AQUEOUS	TDS-A	18 DEC 89-A	18 DEC 89-A
007827-0002-SA	AQUEOUS	PH-A	18 DEC 89-A	-
007827-0002-SA	AQUEOUS	NO3-IC-A	14 DEC 89-M	-
007827-0003-SA	AQUEOUS	ALK-A	18 DEC 89-A	-
007827-0003-SA	AQUEOUS	CL-IC-A	14 DEC 89-M	-
007827-0003-SA	AQUEOUS	TDS-A	18 DEC 89-A	18 DEC 89-A
007827-0003-SA	AQUEOUS	PH-A	18 DEC 89-A	-
007827-0003-SA	AQUEOUS	NO3-IC-A	14 DEC 89-M	-

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: ALK-A Matrix: AQUEOUS QC Lot: 18 DEC 89-A Concentration Units: mg/L								
Alkalinity, Total as CaCO3 at pH 4.5	180	187	186	186	104	90-110	0.5	10
Category: CL-IC-A Matrix: AQUEOUS QC Lot: 14 DEC 89-M Concentration Units: mg/L								
Chloride	100	99.8	102	101	101	92-108	2.2	20
Category: TDS-A Matrix: AQUEOUS QC Lot: 18 DEC 89-A Concentration Units: mg/L								
Total Dissolved Solids	1210	1170	1150	1160	96	90-110	1.7	10
Category: PH-A Matrix: AQUEOUS QC Lot: 18 DEC 89-A Concentration Units: units								
pH	9.1	9.05	9.08	9.06	100	98-102	0.3	5
Category: NO3-IC-A Matrix: AQUEOUS QC Lot: 14 DEC 89-M Concentration Units: mg/L								
Nitrate as N	20	19.2	19.6	19.4	97	91-109	2.1	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A			
Matrix: AQUEOUS			
QC Lot: 18 DEC 89-A QC Run: 18 DEC 89-A			
Total Dissolved Solids	ND	mg/L	10

Rocky Mountain
Analytical Laboratory

Enseco Incorporated

RECEIVED FEB 2 1 1990

ANALYTICAL RESULTS

FOR

ENRON

ENSECO-RMAL NO. 008151

FEBRUARY 13, 1990

Enseco

Reviewed by: Cindy Ingram
Cindy Ingram

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611

Facsimile: 303/431-7171

Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- o Sample Description Information
- o Analytical Test Requests
- o Analytical Results
- o Quality Control Report

Consistent with directives in the CLP protocol in SW-846 and other EPA methods, all GC/MS analyses were performed so that the maximum concentration of sample was analyzed. Some samples required dilutions to avoid saturation of the detector, to achieve linearity for a specific target compound or to reduce matrix interferences. As stated in Section 7.5.4 of Method 8270, 7.4.1.16 of Method 8240 and Exhibit E of the CLP protocol these dilutions must be performed. The reporting limits for these samples are therefore proportionate to the dilution required. Surrogate compounds may not be measurable in samples which have been diluted.

The Methods 8240 and 8270 analyses for sample 008151-0001 were analyzed at dilutions due to target compounds for the volatiles and non-target compounds for the semivolatiles.

The pesticide analysis for sample 008151-0003 was performed at a dilution due to the Aroclor 1221 concentration.

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a *unique six digit number. Samples within the project are numbered* sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

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SAMPLE DESCRIPTION INFORMATION
for
Enron

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
008151-0001-SA	5-2A-1,2,3,4,5	AQUEOUS	26 JAN 90	14:45	27 JAN 90
008151-0002-SA	5-4B-1,2	AQUEOUS	26 JAN 90	15:35	27 JAN 90
008151-0003-SA	5-6B-1,2	AQUEOUS	26 JAN 90	13:10	27 JAN 90

ANALYTICAL TEST REQUESTS
for
Enron

Lab ID: 008151	Group Code	Analysis Description	Custom Test?
0001	A	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N
		Priority Pollutant Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Nitrate, Ion Chromatography	N
		pH	N
0002 - 0003	B	Priority Pollutant Organochlorine Pesticides/PCBs	N
		Prep - Organochlorine Pesticides/PCBs by GC	N
		Priority Pollutant Volatile Organics	N
		Prep-Volatile Organics by GC/MS	N

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

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Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-2A-1,2,3,4,5
Lab ID: 008151-0001-SA   Enseco ID: 1065318
Matrix: AQUEOUS   Sampled: 26 JAN 90   Received: 27 JAN 90
Authorized: 27 JAN 90   Prepared: 31 JAN 90   Analyzed: 01 FEB 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	30
Bromomethane	ND	ug/L	30
Vinyl chloride	ND	ug/L	30
Chloroethane	ND	ug/L	30
Methylene chloride	ND	ug/L	15
1,1-Dichloroethene	ND	ug/L	15
1,1-Dichloroethane	ND	ug/L	15
1,2-Dichloroethene (cis/trans)	ND	ug/L	15
Chloroform	ND	ug/L	15
1,2-Dichloroethane	ND	ug/L	15
1,1,1-Trichloroethane	ND	ug/L	15
Carbon tetrachloride	ND	ug/L	15
Bromodichloromethane	ND	ug/L	15
1,2-Dichloropropane	ND	ug/L	15
trans-1,3-Dichloropropene	ND	ug/L	15
Trichloroethene	ND	ug/L	15
Chlorodibromomethane	ND	ug/L	15
1,1,2-Trichloroethane	ND	ug/L	15
Benzene	42	ug/L	15
cis-1,3-Dichloropropene	ND	ug/L	15
2-Chloroethyl vinyl ether	ND	ug/L	30
Bromoform	ND	ug/L	15
1,1,2,2-Tetrachloroethane	ND	ug/L	15
Tetrachloroethene	ND	ug/L	15
Toluene	210	ug/L	15
Chlorobenzene	ND	ug/L	15
Ethylbenzene	24	ug/L	15
Toluene-d8	97.4	%	--
4-Bromofluorobenzene	97.0	%	--
1,2-Dichloroethane-d4	96.4	%	--

ND = Not detected
NA = Not applicable

Reported By: Shawn Kassner   Approved By: Jeff Lowry

Enseco
A CORNING Company

Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-4B-1,2
Lab ID: 008151-0002-SA   Enseco ID: 1065319
Matrix: AQUEOUS   Sampled: 26 JAN 90   Received: 27 JAN 90
Authorized: 27 JAN 90   Prepared: 31 JAN 90   Analyzed: 02 FEB 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	9.5	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	21	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	104	%	--
1,2-Dichloroethane-d4	99.2	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller   Approved By: Jeff Lowry

Enseco
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Priority Pollutant Volatile Organics

Method 624

Client Name: Enron
Client ID: 5-6B-1,2
Lab ID: 008151-0003-SA
Enseco ID: 1065320
Matrix: AQUEOUS
Sampled: 26 JAN 90
Received: 27 JAN 90
Authorized: 27 JAN 90
Prepared: 31 JAN 90
Analyzed: 02 FEB 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	8.3	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	103	%	--
1,2-Dichloroethane-d4	105	%	--

ND = Not detected
NA = Not applicable

Reported By: Deneen Miller

Approved By: Jeff Lowry

Enseco
A CORNING Company

Priority Pollutant Semivolatile Organics

Method 625

Client Name: Enron
Client ID: 5-2A-1,2,3,4,5
Lab ID: 008151-0001-SA
Matrix: AQUEOUS
Authorized: 27 JAN 90

Enseco ID: 1065318
Sampled: 26 JAN 90
Prepared: 01 FEB 90

Received: 27 JAN 90
Analyzed: 08 FEB 90

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	26
bis(2-Chloroethyl) ether	ND	ug/L	26
2-Chlorophenol	ND	ug/L	26
1,3-Dichlorobenzene	ND	ug/L	26
1,4-Dichlorobenzene	ND	ug/L	26
1,2-Dichlorobenzene	ND	ug/L	26
bis(2-Chloroisopropyl)-ether	ND	ug/L	26
N-Nitroso-di-n-propylamine	ND	ug/L	26
Hexachloroethane	ND	ug/L	26
Nitrobenzene	ND	ug/L	26
Isophorone	ND	ug/L	26
2-Nitrophenol	ND	ug/L	26
2,4-Dimethylphenol	ND	ug/L	26
bis(2-Chloroethoxy)-methane	ND	ug/L	26
2,4-Dichlorophenol	ND	ug/L	26
1,2,4-Trichlorobenzene	ND	ug/L	26
Naphthalene	ND	ug/L	26
Hexachlorobutadiene	ND	ug/L	26
4-Chloro-3-methylphenol	ND	ug/L	26
Hexachlorocyclopentadiene	ND	ug/L	26
2,4,6-Trichlorophenol	ND	ug/L	26
2-Chloronaphthalene	ND	ug/L	26
Dimethyl phthalate	ND	ug/L	26
Acenaphthylene	ND	ug/L	26
Acenaphthene	ND	ug/L	26
2,4-Dinitrophenol	ND	ug/L	130
4-Nitrophenol	ND	ug/L	130
2,4-Dinitrotoluene	ND	ug/L	26
2,6-Dinitrotoluene	ND	ug/L	26
Diethyl phthalate	ND	ug/L	26
4-Chlorophenyl phenyl ether	ND	ug/L	26
Fluorene	ND	ug/L	26
4,6-Dinitro-2-methylphenol	ND	ug/L	130
1,2-Diphenylhydrazine	ND	ug/L	26
N-Nitrosodiphenylamine	ND	ug/L	26

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Cheryl Jones

Approved By: Jeff Lowry

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Priority Pollutant Semivolatile Organics (CONT.)

Method 625

Client Name: Enron
Client ID: 5-2A-1,2,3,4,5
Lab ID: 008151-0001-SA Enseco ID: 1065318
Matrix: AQUEOUS Sampled: 26 JAN 90 Received: 27 JAN 90
Authorized: 27 JAN 90 Prepared: 01 FEB 90 Analyzed: 08 FEB 90

Parameter	Result	Units	Reporting Limit
4-Bromophenyl phenyl ether	ND	ug/L	26
Hexachlorobenzene	ND	ug/L	26
Pentachlorophenol	ND	ug/L	130
Phenanthrene	ND	ug/L	26
Anthracene	ND	ug/L	26
Di-n-butyl phthalate	ND	ug/L	26
Fluoranthene	ND	ug/L	26
Pyrene	ND	ug/L	26
Butyl benzyl phthalate	ND	ug/L	26
3,3'-Dichlorobenzidine	ND	ug/L	52
Benzo(a)anthracene	ND	ug/L	26
bis(2-Ethylhexyl) phthalate	ND	ug/L	26
Chrysene	ND	ug/L	26
Di-n-octyl phthalate	ND	ug/L	26
Benzo(b)fluoranthene	ND	ug/L	26
Benzo(k)fluoranthene	ND	ug/L	26
Benzo(a)pyrene	ND	ug/L	26
Indeno(1,2,3-cd)pyrene	ND	ug/L	26
Dibenz(a,h)anthracene	ND	ug/L	26
Benzo(g,h,i)perylene	ND	ug/L	26
Nitrobenzene-d5	77.0	%	--
2-Fluorobiphenyl	82.0	%	--
Terphenyl-d14	78.2	%	--
Phenol-d5	21.5	%	--
2-Fluorophenol	20.8	%	--
2,4,6-Tribromophenol	33.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Cheryl Jones Approved By: Jeff Lowry

Enseco
A CORNING Company

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-2A-1,2,3,4,5
Lab ID: 008151-0001-SA
Matrix: AQUEOUS
Authorized: 27 JAN 90

Enseco ID: 1065318
Sampled: 26 JAN 90
Prepared: 29 JAN 90

Received: 27 JAN 90
Analyzed: 05 FEB 90

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	87.0	%	--

ND = Not detected
NA = Not applicable

Reported By: Ann Steyert

Approved By: Stephanie Boehnke

Enseco
A CORNING Company

Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-4B-1,2
Lab ID: 008151-0002-SA Enseco ID: 1065319
Matrix: AQUEOUS Sampled: 26 JAN 90 Received: 27 JAN 90
Authorized: 27 JAN 90 Prepared: 29 JAN 90 Analyzed: 05 FEB 90

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0
Dibutyl chlorendate	94.1	%	--

ND = Not detected
NA = Not applicable

Reported By: Ann Steyert Approved By: Stephanie Boehnke

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Priority Pollutant Organochlorine Pesticides/PCBs

Method 608

Client Name: Enron
Client ID: 5-6B-1,2
Lab ID: 008151-0003-SA   Enseco ID: 1065320
Matrix: AQUEOUS   Sampled: 26 JAN 90   Received: 27 JAN 90
Authorized: 27 JAN 90   Prepared: 29 JAN 90   Analyzed: 05 FEB 90

Parameter	Result	Units	Reporting Limit	
alpha-BHC	ND	ug/L	2.0	
beta-BHC	ND	ug/L	2.0	
delta-BHC	ND	ug/L	2.0	
gamma-BHC (Lindane)	ND	ug/L	2.0	
Heptachlor	ND	ug/L	2.0	
Aldrin	ND	ug/L	2.0	
Heptachlor epoxide	ND	ug/L	2.0	
Endosulfan I	ND	ug/L	2.0	
Dieldrin	ND	ug/L	4.0	
4,4'-DDE	ND	ug/L	4.0	
Endrin	ND	ug/L	4.0	
Endosulfan II	ND	ug/L	4.0	
4,4'-DDD	ND	ug/L	4.0	
Endosulfan sulfate	ND	ug/L	4.0	
4,4'-DDT	ND	ug/L	4.0	
Endrin aldehyde	ND	ug/L	4.0	
alpha-Chlordane	ND	ug/L	20	
gamma-Chlordane	ND	ug/L	20	
Toxaphene	ND	ug/L	40	
Aroclor 1016	ND	ug/L	20	
Aroclor 1221	100	ug/L	20	
Aroclor 1232	ND	ug/L	20	
Aroclor 1242	ND	ug/L	20	
Aroclor 1248	ND	ug/L	20	
Aroclor 1254	ND	ug/L	40	
Aroclor 1260	ND	ug/L	40	
Dibutyl chlorendate	ND	%	--	H

Note H : Surrogate not detected because of required sample dilution.

ND = Not detected
NA = Not applicable

Reported By: Ann Steyert   Approved By: Stephanie Boehnke

Enseco
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General Inorganics

Client Name: Enron
Client ID: 5-2A-1,2,3,4,5
Lab ID: 008151-0001-SA
Matrix: AQUEOUS
Authorized: 27 JAN 90

Enseco ID: 1065318
Sampled: 26 JAN 90
Prepared: See Below

Received: 27 JAN 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	39	mg/L	5	310.1	NA	27 JAN 90
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5	310.1	NA	27 JAN 90
Nitrate as N	3.2	mg/L	0.1	300.0	NA	07 FEB 90
pH	7.2	units	--	9040	NA	27 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Mike Settell

Approved By: Kimberly Conroy

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

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QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008151-0001-SA	AQUEOUS	624-A	02 JAN 90-F	01 FEB 90-F
008151-0002-SA	AQUEOUS	624-A	01 FEB 90-B	02 FEB 90-B
008151-0003-SA	AQUEOUS	624-A	01 FEB 90-B	02 FEB 90-B

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{ Measured Concentration DCS1} - \text{Measured Concentration DCS2 }|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008151-0001-SA	AQUEOUS	624-A	02 JAN 90-F	01 FEB 90-F
008151-0002-SA	AQUEOUS	624-A	01 FEB 90-B	02 FEB 90-B
008151-0003-SA	AQUEOUS	624-A	01 FEB 90-B	02 FEB 90-B

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DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 624-A Matrix: AQUEOUS QC Lot: 02 JAN 90-F Concentration Units: ug/L								
1,1-Dichloroethene	50	50.0	49.2	49.6	99	61-145	1.6	14
Trichloroethene	50	50.5	52.8	51.6	103	71-120	4.5	14
Benzene	50	56.8	57.9	57.4	115	76-127	1.9	11
Toluene	50	49.1	50.2	49.6	99	76-125	2.2	13
Chlorobenzene	50	52.2	51.8	52.0	104	75-130	0.8	13
Category: 624-A Matrix: AQUEOUS QC Lot: 01 FEB 90-B Concentration Units: ug/L								
1,1-Dichloroethene	50	42.0	41.9	42.0	84	61-145	0.2	14
Trichloroethene	50	40.9	42.5	41.7	83	71-120	3.8	14
Benzene	50	47.8	52.2	50.0	100	76-127	8.8	11
Toluene	50	45.6	46.0	45.8	92	76-125	0.9	13
Chlorobenzene	50	48.3	49.5	48.9	98	75-130	2.5	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

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[S]INGLE CONTROL SAMPLE REPORT
[V]olatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A Matrix: AQUEOUS QC Lot: 02 JAN 90-F QC Run: 01 FEB 90-F Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	46.3	93	76-114
4-Bromofluorobenzene	50.0	48.1	96	86-115
Toluene-d8	50.0	48.9	98	88-110
Category: 624-A Matrix: AQUEOUS QC Lot: 01 FEB 90-B QC Run: 02 FEB 90-B Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	50.8	102	76-114
4-Bromofluorobenzene	50.0	49.8	100	86-115
Toluene-d8	50.0	50.4	101	88-110

[C]alculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-PP-A			
Matrix: AQUEOUS			
QC Lot: 02 JAN 90-F QC Run: 01 FEB 90-F			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 01 FEB 90-B QC Run: 02 FEB 90-B			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0

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METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-PP-AP			
Matrix: AQUEOUS			
QC Lot: 01 FEB 90-B QC Run: 02 FEB 90-B			
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008151-0001-SA	AQUEOUS	625-A	31 JAN 90-B	01 FEB 90-A

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DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 31 JAN 90-B
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Phenol	100	67.9	59.6	63.8	64	12- 89	13	42
2-Chlorophenol	100	69.5	62.1	65.8	66	27-123	11	40
1,4-Dichlorobenzene	50	25.5	26.2	25.8	52	36- 97	2.7	28
N-Nitroso-di-n-propylamine	50	44.8	40.6	42.7	85	41-116	9.8	38
1,2,4-Trichlorobenzene	50	24.7	27.0	25.8	52	39- 98	8.9	28
4-Chloro-3-methylphenol	100	72.1	66.6	69.4	69	23- 97	7.9	42
Acenaphthene	50	29.4	30.3	29.8	60	46-118	3.0	31
4-Nitrophenol	100	55.7	50.3	53.0	53	10- 80	10	50
2,4-Dinitrotoluene	50	32.1	30.8	31.4	63	24- 96	4.1	38
Pentachlorophenol	100	72.6	67.8	70.2	70	9-103	6.8	50
Pyrene	50	38.3	36.2	37.2	75	26-127	5.6	31

Calculations are performed before rounding to avoid round-off errors in calculated results.

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SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 625-A				
Matrix: AQUEOUS				
QC Lot: 31 JAN 90-B QC Run: 01 FEB 90-A				
Concentration Units: ug/L				
Nitrobenzene-d5	100	69.5	70	35-114
2-Fluorobiphenyl	100	67.8	68	43-116
Terphenyl-d14	100	80.0	80	33-141
2-Fluorophenol	200	114	57	21-100
Phenol-d5	200	121	60	10- 94
2,4,6-Tribromophenol	200	124	62	10-123

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 31 JAN 90-B QC Run: 01 FEB 90-A

Analyte	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
bis(2-Chloroisopropyl)-ether	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
1,2-Diphenylhydrazine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 625-PP-A
Matrix: AQUEOUS
QC Lot: 31 JAN 90-B QC Run: 01 FEB 90-A

Analyte	Result	Units	Reporting Limit
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	14	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008151-0001-SA	AQUEOUS	608-A	15 JAN 90-A	29 JAN 90-A
008151-0002-SA	AQUEOUS	608-A	15 JAN 90-A	29 JAN 90-A
008151-0003-SA	AQUEOUS	608-A	15 JAN 90-A	29 JAN 90-A

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DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Category: 608-A
Matrix: AQUEOUS
QC Lot: 15 JAN 90-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
gamma-BHC (Lindane)	0.2	0.160	0.159	0.160	80	56-123	0.6	15
Heptachlor	0.2	0.180	0.174	0.177	89	40-131	3.4	20
Aldrin	0.2	0.160	0.154	0.157	79	40-120	3.8	22
Dieldrin	0.5	0.455	0.452	0.454	91	52-126	0.7	18
Endrin	0.5	0.456	0.453	0.454	91	56-121	0.7	21
4,4'-DDT	0.5	0.478	0.455	0.466	93	38-127	4.9	27

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 608-A Matrix: AQUEOUS QC Lot: 15 JAN 90-A QC Run: 29 JAN 90-A Concentration Units: ug/L				
Dibutyl chlorendate	1.00	0.844	84	48-136

Calculations are performed before rounding to avoid round-off errors in calculated results.

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METHOD BLANK REPORT
Semivolatile Organics by GC

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 15 JAN 90-A QC Run: 29 JAN 90-A

Analyte	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Test: 608-PP-A
Matrix: AQUEOUS
QC Lot: 15 JAN 90-A QC Run: 29 JAN 90-A

alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10

METHOD BLANK REPORT
Semivolatile Organics by GC (cont.)

Analyte	Result	Units	Reporting Limit
Test: 608-PP-A			
Matrix: AQUEOUS			
QC Lot: 15 JAN 90-A QC Run: 29 JAN 90-A			
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin aldehyde	ND	ug/L	0.10
alpha-Chlordane	ND	ug/L	0.50
gamma-Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

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QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008151-0001-SA	AQUEOUS	ALK-A	27 JAN 90-A	-
008151-0001-SA	AQUEOUS	NO3-IC-A	07 FEB 90-M	-
008151-0001-SA	AQUEOUS	PH-A	27 JAN 90-A	-

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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ALK-A Matrix: AQUEOUS QC Lot: 27 JAN 90-A Concentration Units: mg/L								
Alkalinity, Total as $CaCO_3$ at pH 4.5	157	157	159	158	101	90-110	1.3	10
Category: NO3-IC-A Matrix: AQUEOUS QC Lot: 07 FEB 90-M Concentration Units: mg/L								
Nitrate as N	20	18.5	19.0	18.8	94	91-109	2.7	20
Category: PH-A Matrix: AQUEOUS QC Lot: 27 JAN 90-A Concentration Units: units								
pH	9.1	9.09	9.11	9.10	100	98-102	0.2	5

Calculations are performed before rounding to avoid round-off errors in calculated results.