Kosakowski 5/13/81 N.

US EPA RECORDS CENTER REGION 5
513917
931274

FINAL REPORT

MS DATA FILE FRN: 5158

NAME: CDO 1285 81-CC16S01 FV .1
MISC DATA: 5-7-81 BTL#19 Q5158 D5158

IDFILE FRN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	.93
	*1	OCTAFLUORONAPHTHALENE	4.37
	*2	DECAFLUOROBIPHENYL	1.70
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .03
	5	ACENAPHTHYLENE	LESS THAN .02
	6	ACENAPHTHENE	.17
	7	FLUORENE	.13
	8	PHENANTHRENE	LESS THAN .04
	9	ANTHRACENE	LESS THAN .04
	10	FLUORANTHENE	LESS THAN .04
	*11	BROMOPHENANTHRENE	4.73
	12	PYRENE	LESS THAN .05
	13	CHRYSENE/BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* internal standards

DATA SET: CDO 1285 (ST. LOUIS PARK)
WATER SAMPLE

CRL SAMPLE NUMBER 81-CC16S01

(UNITS ARE UG/L)

COMPOUND	ESTIMATED CONCENTRATION
1-ETHENYL-2-METHYLBENZENE	.1
DIBENZOFURAN	.1

COMPOUND FOUND	STANDARD USED TO QUANTIFY
1-ETHENYL-2-METHYLBENZENE	D-10 PHENANTHRENE
DIBENZOFURAN	D-10 PHENANTHRENE

FINAL REPORT

MS DATA FILE FRN: 5142

NAME: CDO 1285 81-CC16502 FV .1
MISC DATA: 5-7-81 BTL#3 05142 D5142

IDFILE FRN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

	NAME	CONCENTRATION (PPB)
STANDARD	D-10 PHENANTHRENE	.93
*1	OCTAFLUORONAPHTHALENE	4.97
*2	DECAFLUOROBIPHENYL	1.98
3	NAPHTHALENE.	LESS THAN .03
4	2-CHLORONAPHTHALENE	LESS THAN .04
5	ACENAPHTHYLENE	LESS THAN .03
6	ACENAPHTHENE	.2
7	FLUORENE	LESS THAN .04
8	PHENANTHRENE	LESS THAN .05
9	ANTHRACENE	LESS THAN .05
10	FLUORANTHENE	LESS THAN .05
*11	BROMOPHENANTHRENE	5.0
12	PYRENE	LESS THAN .05
13	CHRYSENE, BENZ(A)ANTHRACENE	LESS THAN .05
14	BENZO(A)PYRENE	LESS THAN .20
15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — internal standards

FINAL REPORT

MS DATA FILE FPN: 5143

NAME: CDO 1285 81-CC16503 FV .1
MISC DATA: 5-7-81 BTL#4 05143 D5143

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

	NAME	CONCENTRATION (PPB)
STANDARD	D-10 PHENANTHRENE	.94
*1	OCTAFLUORONAPHTHALENE	9.1
*2	DECAFLUOROBIPHENYL	3.4
3	NAPHTHALENE	LESS THAN .02
4	2-CHLORONAPHTHALENE	LESS THAN .03
5	ACENAPHTHYLENE	LESS THAN .02
6	ACENAPHTHENE	.32
7	FLUORENE	LESS THAN .03
8	PHENANTHRENE	LESS THAN .04
9	ANTHRACENE	LESS THAN .04
10	FLUORANTHENE	LESS THAN .04
*11	BROMOPHENANTHRENE	7.4
12	PYRENE	LESS THAN .06
13	CHRYSENE (BENZ(A)ANTHRACENE	LESS THAN .09
14	BENZO(A)PYRENE	LESS THAN .20
15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — internal standards

FINAL REPORT

MS DATA FILE FPN: 5144

NAME: CDO 1285 81-CC16504 FV .1
MISC DATA: 5-7-81 BTL#5 05144 D5144

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	.77
	* 1	OCTAFLUORONAPHTHALENE	3.45
	* 2	DECAFLUOROBIPHENYL	1.36
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .02
	5	ACENAPHTHYLENE	.10
	6	ACENAPHTHENE	.15
	7	FLUORENE	.11
	8	PHENANTHRENE	.13
	9	ANTHRACENE	.28
	10	FLUORANTHENE	LESS THAN .04
	* 11	BROMOPHENANTHRENE	2.9
	12	PYRENE	LESS THAN .05
	13	CHRYSENE (BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — internal standards

DATA SET: CDO 1285 (ST. LOUIS PAPI)
WATER SAMPLE

CPL SAMPLE NUMBER 81-CC16504

(UNITS ARE UG L)

COMPOUND	ESTIMATED CONCENTRATION
1-ETHENYL-3-METHYLBENZENE	.1
DIBENZOFURAN	.1
UNKNOWN 1678	.3

COMPOUND FOUND	STANDARD USED TO QUANTIFY
1-ETHENYL-3-METHYLBENZENE	D-10 PHENANTHRENE
DIBENZOFURAN	D-10 PHENANTHRENE
UNKNOWN 1678	D-10 PHENANTHRENE

FINAL REPORT

MS DATA FILE FRN: 5147

NAME: CDO 1285 81-CC16505 FV .1
MISC DATA: 5-7-81 BTL#8 05147 D5147

IDFILE FRN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

	NAME	CONCENTRATION (PPB)
STANDARD	D-10 PHENANTHRENE	.77
* 1	OCTAFLUORONAPHTHALENE	3.91
* 2	DECAFLUOROBIPHENYL	2.34
3	NAPHTHALENE	LESS THAN .02
4	2-CHLORONAPHTHALENE	LESS THAN .03
5	ACENAPHTHYLENE	LESS THAN .02
6	ACENAPHTHENE	LESS THAN .02
7	FLUORENE	LESS THAN .02
8	PHENANTHRENE	LESS THAN .03
9	ANTHRACENE	LESS THAN .04
10	FLUORANTHENE	LESS THAN .04
* 11	BROMOPHENANTHRENE	4.92
12	PYRENE	LESS THAN .05
13	CHRYSENE/BENZ(A)ANTHRACENE	LESS THAN .05
14	BENZO(A)PYRENE	LESS THAN .20
15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

FINAL REPORT

MS DATA FILE FPN: 5160

NAME: CDO 1285 81-CC16S06 FV 1.0
MISC DATA: 5-7-81 BTL#21 Q5160 D5160

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	7.7
	*1	OCTAFLUORONAPHTHALENE	3.0
	*2	DECAFLUOROBIPHENYL	1.1
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .03
	5	ACENAPHTHYLENE	LESS THAN .02
	6	ACENAPHTHENE	LESS THAN .03
	7	FLUORENE	LESS THAN .03
	8	PHENANTHRENE	LESS THAN .03
	9	ANTHRACENE	LESS THAN .03
	10	FLUORANTHENE	LESS THAN .04
	*11	BROMOPHENANTHRENE	4.2
	12	PYRENE	LESS THAN .05
	13	CHRYSENE BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

FINAL REPORT

MS DATA FILE FPN: 5159

NAME: CDO 1285 81-CC16507
MISC DATA: 5-7-81 FV.1 BTL#20 05159 D5159

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

	NAME	CONCENTRATION (PPB)
STANDARD	D-10 PHENANTHRENE	.77
*1	OCTAFLUORONAPHTHALENE	1.44
*2	DECAFLUOROBIPHENYL	1.62
3	NAPHTHALENE	LESS THAN .02
4	2-CHLORONAPHTHALENE	LESS THAN .02
5	ACENAPHTHYLENE	.73
6	ACENAPHTHENE	1.56
7	FLUORENE	1.30
8	PHENANTHRENE	.06
9	ANTHRACENE	.13
10	FLUORANTHENE	.28
*11	BROMOPHENANTHRENE	3.52
12	PYRENE	.21
13	CHRYSENE (BENZ(A)ANTHRACENE	LESS THAN .05
14	BENZO(A)PYRENE	LESS THAN .20
15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal Standards

DATA SET: CDO 1285 (ST. LOUIS PAPI)
WATER SAMPLE

CPL SAMPLE NUMBER 81-CC16507

(UNITS ARE UG/L)

COMPOUND	ESTIMATED CONCENTRATION
1-ETHENYL-2-METHYLBENZENE	2.3
METHYLINDENE & 2,3-DIHYDRO-2-METHYLINDENE	.5
1,1A,6,6A-TETRAHYDROCYCLOPROP[A]INDENE	.5
6-METHYL-1H-PURINE	.6
BIPHENYL	.9
DIMETHYLNAPHTHALENE (TWO ISOMERS)	.7
DIBENZOFURAN	2.1
2-METHYL-1,1'-BIPHENYL	.2
1-(2-PROPENYL)NAPHTHALENE	.4
CYCLOPENTA[D,E,F]PHENANTHRENE	.4
METHYLPHENANTHRENE	0.1

COMPOUND FOUND	STANDARD USED TO QUANTIFY
1-ETHENYL-2-METHYLBENZENE	D-10 PHENANTHRENE
METHYLINDENE & 2,3-DIHYDRO-2-METHYLINDENE	D-10 PHENANTHRENE
1,1A,6,6A-TETRAHYDROCYCLOPROP[A]INDENE	D-10 PHENANTHRENE
6-METHYL-1H-PURINE	D-10 PHENANTHRENE
BIPHENYL	D-10 PHENANTHRENE
DIMETHYLNAPHTHALENE (TWO ISOMERS)	D-10 PHENANTHRENE
DIBENZOFURAN	D-10 PHENANTHRENE
2-METHYL-1,1'-BIPHENYL	D-10 PHENANTHRENE
1-(2-PROPENYL)NAPHTHALENE	D-10 PHENANTHRENE
CYCLOPENTA[D,E,F]PHENANTHRENE	D-10 PHENANTHRENE
METHYLPHENANTHRENE	D-10 PHENANTHRENE

FINAL REPORT

MS DATA FILE FPN: 5149

NAME: CDO 1285 81-CC16S08 FV .1
MISC DATA: 5-7-81 BTL#10 05149 D5149

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	.77
	* 1	OCTAFLUORONAPHTHALENE	4.0
	* 2	DECAFLUOROBIPHENYL	1.5
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .03
	5	ACENAPHTHYLENE	.60
	6	ACENAPHTHENE	1.5
	7	FLUORENE	1.4
	8	PHENANTHRENE	.06
	9	ANTHRACENE	.13
	10	FLUORANTHENE	.12
	* 11	BROMOPHENANTHRENE	5.2
	12	PYRENE	.10
	13	CHRYSENE BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

DATA SET: CDO 1205 (ST. LOUIS PARK)
WATER SAMPLE

CRL SAMPLE NUMBER 81-CC16508

(UNITS ARE UG/L)

COMPOUND	ESTIMATED CONCENTRATION
1-ETHENYL-2-METHYLBENZENE	2.5
METHYLINDENE & 2,3-DIHYDRO-2-METHYLINDENE	.6
1,1A,6,6A-TETRAHYDROCYCLOPROP[A]INDENE	.5
6-METHYL-1H-PURINE	.6
BIPHENYL	.9
DIMETHYLNAPHTHALENE (TWO ISOMERS)	.5
DIBENZOFURAN	1.8
2-METHYL-1,1'-BIPHENYL	.3
1-(2-PROPENYL)NAPHTHALENE	.3
CYCLOPENTA(D,E,F)PHENANTHRENE	.5
METHYLPHENANTHRENE	.1

COMPOUND FOUND	STANDARD USED TO QUANTIFY
1-ETHENYL-2-METHYLBENZENE	D-10 PHENANTHRENE
METHYLINDENE & 2,3-DIHYDRO-2-METHYLINDENE	D-10 PHENANTHRENE
1,1A,6,6A-TETRAHYDROCYCLOPROP[A]INDENE	D-10 PHENANTHRENE
6-METHYL-1H-PURINE	D-10 PHENANTHRENE
BIPHENYL	D-10 PHENANTHRENE
DIMETHYLNAPHTHALENE (TWO ISOMERS)	D-10 PHENANTHRENE
DIBENZOFURAN	D-10 PHENANTHRENE
2-METHYL-1,1'-BIPHENYL	D-10 PHENANTHRENE
1-(2-PROPENYL)NAPHTHALENE	D-10 PHENANTHRENE
CYCLOPENTA(D,E,F)PHENANTHRENE	D-10 PHENANTHRENE
METHYLPHENANTHRENE	D-10 PHENANTHRENE

FINAL REPORT

MS DATA FILE FPN: 5150

NAME: CDO 1285 81-CC16509 FW .1
MISC DATA: 5-7-81 BTL#11 05150 D5150

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

	NAME	CONCENTRATION (PPB)
STANDARD	D-10 PHENANTHRENE	.77
*1	OCTAFLUORONAPHTHALENE	519
*2	DECAFLUOROBIPHENYL	382
3	NAPHTHALENE	LESS THAN .02
4	2-CHLORONAPHTHALENE	LESS THAN .03
5	ACENAPHTHYLENE	LESS THAN .02
6	ACENAPHTHENE	LESS THAN .03
7	FLUORENE	LESS THAN .03
8	PHENANTHRENE	LESS THAN .04
9	ANTHRACENE	LESS THAN .04
10	FLUORANTHENE	LESS THAN .04
*11	BROMOPHENANTHRENE	430
12	PYRENE	LESS THAN .05
13	CHRYSENE BENZ(A)ANTHRACENE	LESS THAN .05
14	BENZO(A)PYRENE	LESS THAN .20
15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

FINAL REPORT

MS DATA FILE FRN: 5151

NAME: CDO 1285 81-CC16S10 FV .1
MISC DATA: 5-7-81 BTL#12 05151 D5151

IDFILE FRN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	.77
	*1	OCTAFLUORONAPHTHALENE	4.44
	*2	DECAFLUOROBIPHENYL	3.54
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .04
	5	ACENAPHTHYLENE	LESS THAN .02
	6	ACENAPHTHENE	LESS THAN .03
	7	FLUORENE	LESS THAN .03
	8	PHENANTHRENE	LESS THAN .04
	9	ANTHRACENE	LESS THAN .04
	10	FLUORANTHENE	LESS THAN .04
	*11	BROMOPHENANTHRENE	3.72
	12	PYRENE	LESS THAN .05
	13	CHRYSENE BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

DATA SET: CDO 1285 (ST. LOUIS PARK)
WATER SAMPLE

CPL SAMPLE NUMBER 81-CC16S10

(UNITS ARE UG L)

COMPOUND	ESTIMATED CONCENTRATION
DI-ISOOCTYL PHTHALATE	3.4

COMPOUND FOUND	STANDARD USED TO QUANTIFY
DI-ISOOCTYL PHTHALATE	D-10 PHENANTHRENE

FINAL REPORT

MS DATA FILE FRN: 5153

NAME: CDO 1285 81-CC16D11 FV .4
MISC DATA: 5-7-81 BTL#14 05153 D5153

IDFILE FRN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	3.0
*	1	OCTAFLUORONAPHTHALENE	4.4
*	2	DECAFLUOROBIPHENYL	3.7
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .03
	5	ACENAPHTHYLENE	LESS THAN .02
	6	ACENAPHTHENE	LESS THAN .03
	7	FLUORENE	LESS THAN .03
	8	PHENANTHRENE	LESS THAN .04
	9	ANTHRACENE	LESS THAN .04
	10	FLUORANTHENE	LESS THAN .04
*	11	BROMOPHENANTHRENE	5.4
	12	PYRENE	LESS THAN .05
	13	CHRYSENE (BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

FINAL REPORT

MS DATA FILE FRN: 5154

NAME: CDO 1285 81-CC16512 FV .1
MISC DATA: 5-7-81 BTL#15 05154 D5154

IDFILE FRN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	154
	*1	OCTAFLUORONAPHTHALENE	315
	*2	DECAFLUOROBIPHENYL	242
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .03
	5	ACENAPHTHYLENE	LESS THAN .02
	6	ACENAPHTHENE	.04
	7	FLUORENE	LESS THAN .03
	8	PHENANTHRENE	LESS THAN .04
	9	ANTHRACENE	LESS THAN .04
	10	FLUORANTHENE	LESS THAN .04
	*11	BROMOPHENANTHRENE	352
	12	PYRENE	LESS THAN .05
	13	CHRYSENE (BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

FINAL REPORT

MS DATA FILE FPN: 5155

NAME: CDO 1285 81-CC16513 FV .1
MISC DATA: 5-7-81 BTL#16 05155 D5155

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

	NAME	CONCENTRATION (PPB)
STANDARD	D-10 PHENANTHRENE	.77
* 1	OCTAFLUORONAPHTHALENE	4.31
* 2	DECAFLUOROBIPHENYL	3.35
3	NAPHTHALENE	LESS THAN .02
4	2-CHLORONAPHTHALENE	LESS THAN .03
5	ACENAPHTHYLENE	LESS THAN .02
6	ACENAPHTHENE	LESS THAN .03
7	FLUORENE	LESS THAN .03
8	PHENANTHRENE	LESS THAN .04
9	ANTHRACENE	LESS THAN .04
10	FLUORANTHENE	LESS THAN .04
* 11	BROMOPHENANTHRENE	4.83
12	PYRENE	LESS THAN .05
13	CHRYSENE BENZ(A)ANTHRACENE	LESS THAN .05
14	BENZO(A)PYRENE	LESS THAN .20
15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

FINAL REPORT

MS DATA FILE FPN: 5141

NAME: CDO 1285 81-CC16514 (BLK)
MISC DATA: 5-7-81 BTL#2 Q5141 D5141

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	3.0
	*1	OCTAFLUORONAPHTHALENE	32.7
	*2	DECAFLUOROBIPHENYL	25.6
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .03
	5	ACENAPHTHYLENE	LESS THAN .02
	6	ACENAPHTHENE	LESS THAN .03
	7	FLUORENE	LESS THAN .03
	8	PHENANTHRENE	LESS THAN .04
	9	ANTHRACENE	LESS THAN .04
	10	FLUORANTHENE	LESS THAN .04
	*11	BROMOPHENANTHRENE	24.7
	12	PYRENE	LESS THAN .05
	13	CHRYSENE BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

DATA SET: CDO 1285 (ST. LOUIS PARK)
WATER SAMPLE (BLANK)

CRL SAMPLE NUMBER 81-CC16514

(UNITS ARE UG L)

COMPOUND	ESTIMATED CONCENTRATION
CYCLOLHEPTATRIENE	.7
HYDROCARBON	.5
2-METHYL-4-HEPTANONE	1.3

COMPOUND FOUND	STANDARD USED TO QUANTIFY
CYCLOLHEPTATRIENE	D-10 PHENANTHRENE
HYDROCARBON	D-10 PHENANTHRENE
2-METHYL-4-HEPTANONE	D-10 PHENANTHRENE

FINAL REPORT

MS DATA FILE FPN: 5156

NAME: CDO 1285 81-CC16515 FV .1
MISC DATA: 5-7-81 BTL#17 05156 D5156

IDFILE FPN: 4602

IDFILE NAME: PNA STD B
MISC DATA: 5-13-81

		NAME	CONCENTRATION (PPB)
STANDARD		D-10 PHENANTHRENE	3.0
	* 1	OCTAFLUORONAPHTHALENE	17.0
	* 2	DECAFLUOROBIPHENYL	8.1
	3	NAPHTHALENE	LESS THAN .02
	4	2-CHLORONAPHTHALENE	LESS THAN .03
	5	ACENAPHTHYLENE	LESS THAN .02
	6	ACENAPHTHENE	LESS THAN .03
	7	FLUORENE	LESS THAN .03
	8	PHENANTHRENE	LESS THAN .04
	9	ANTHRACENE	LESS THAN .04
	10	FLUORANTHENE	LESS THAN .04
	* 11	BROMOPHENANTHRENE	16.1
	12	PYRENE	LESS THAN .05
	13	CHRYSENE (BENZ(A)ANTHRACENE	LESS THAN .05
	14	BENZO(A)PYRENE	LESS THAN .20
	15	DIBENZ(A,H)ANTHRACENE	LESS THAN .20

* — Internal standards

DATA SET: CDO 1285 (ST. LOUIS PARK)
WATER SAMPLE (BLANK)

CPL SAMPLE NUMBER 81-CC16S15

(UNITS ARE UG L)

COMPOUND	ESTIMATED CONCENTRATION
UNIDENTIFIED PHTHALATES (TWO)	.7
UNKNOWN 821	0.1

COMPOUND FOUND	STANDARD USED TO QUANTIFY
UNIDENTIFIED PHTHALATES (TWO)	D-10 PHENANTHRENE
UNKNOWN 821	D-10 PHENANTHRENE

1977?
N.

Hopkins

No. 1	McCarthy	9th Ave S + Co. Rd. 3	204573
No. 2	McCarthy	8th + Excelsior	207995
No. 3	McCarthy	Mon K + St. Louis Rd 1121 2nd St. N.E.	203198
No. 4	Bergerson-Caswell	Back of Elmo Park Apts 1401 Elmo Pk. Service B	204068
No. 5	Bergerson-Caswell	1205 Hwy 7 by H.S. Tennis Courts	204570
No. 6	Bergerson-Caswell	Hwy. 7 + Co. Rd. 18	112228

41-97
(Rev. 2-59)

ADD Now abandoned

Hopkins gas-

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

File No. [redacted]

Well No. 117/22-25 baa

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well 204573 Hopkins #1 #1

Hennepin — County

Hopkins — City or Town

9th Ave S. & Co. Rd 3. — Describe Further by Lot, Block, Nearest Highway, Street and Number

Locate Well on Plat of Section

Sec. 25

Twp. 117N

Range 22W

Drilled for: _____

Driller McCarthy — ck. for data on W.L

Address _____

Address _____

Date of Completion 1920

Site _____ Upland, Valley, Hillside, Etc.

Type of Well _____ Dug, Driven, Bored, Drilled

Drill Rig Used _____ Solid Tool, Jet, Rotary

Diameter: Top 16 Bottom 12"

Depth of Well 780

Ground Elevation 920 — Sea Level Datum or Give Distance Above or Below R. R., Highway, Lake, Etc.

Height of Casing Above Ground _____

Quality of Water _____ (Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water _____

Was Laboratory Analysis Made? _____

For What Purpose Will Water Be Used? _____

~~Is~~ Was Well Pumped? ✓ Pump Capacity 750 GPM

Was Well Sealed on Completion? _____

Does Well Overflow Without Pumping? _____ Yes or No

Natural Flow _____ GPM

What Pressure, or Head, at Ground Level? _____

Principal Aquifer Penetrated _____

REPORT OF FINAL PUMPING TEST

Date of Test _____

Duration of Test _____ Hrs. _____ Min.

Rate of Pumping _____ GPM

Static Water Level ? Ft.

Water Level While Pumping _____ Ft.

Drawdown _____ Ft.

Time Required for Recovery _____

Expected Average Yield _____ Gal. per day

If Other Tests were Made, Give Details on Another Sheet.

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

CHECKED

(Fill Out Both Sides of Form)

From Schwartz

Gr. El. 92

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Thickness of Formation	Depth in Feet From	Depth in Feet To	Casing Diam.	Water Conditions Found
Drift	95	0	95	16"	
Platteville L.S.	25	95	120	12" to 286'	
St. Peter S.S.	90	120	210		
Shale	25	210	235		
S.S.	35	235	270		
Shakopee Oneota Dol.	120	270	390		
Jordan S.S.	80	390	470		
St. Lawrence Shale	190	470	660		
Franconia S.S.(?)	45	660	705		
Dresbach Shale & S.S.	75	705	780		
				Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development	

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at _____ this _____ day of _____, 19__.

(Firm Name) _____

By _____

Title _____

M-459

W 41-97
(Rev. 2-69)
ADP
1968

Not used presently

ck with McCarthy for log

Hopkins #2

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

File No. 104-B

Well No. 117/22-24dbc

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well Hopkins #2

County Hennepin City or Town Hopkins

Describe Further by Lot, Block, Nearest Highway, Street and Number SW & Excelsior

Locate Well on Plat of Section

207995

Sec. 24

Twp. 117N

Range 22W

ck for more info log

Drilled for:

Address

Driller McCarthy

Address

Date of Completion 1936?

Site
Upland, Valley, Hillside, Etc.

Type of Well
Dug, Driven, Bored, Drilled

Drill Rig Used
Solid Tool, Jet, Rotary

Diameter: Top 16" Bottom 12"

Depth of Well 728

Ground Elevation 930 ±
Sea Level Datum or Give Distance Above or Below R. R., Highway, Lake, Etc.

Height of Casing Above Ground

Quality of Water
(Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water

Was Laboratory Analysis Made?

For What Purpose Will Water Be Used?

Is Well Pumped? yes Pump Capacity 580 GPM

Was Well Sealed on Completion?

Does Well Overflow Without Pumping?
Yes or No

Natural Flow GPM

What Pressure, or Head, at Ground Level?

Principal Aquifer Penetrated

#2

REPORT OF FINAL PUMPING TEST

Date of Test

Duration of Test Hrs. Min.

Rate of Pumping GPM

Static Water Level 72 Ft. (1948)

Water Level While Pumping Ft.

Drawdown Ft.

Time Required for Recovery

Expected Average Yield Gal. per day

If Other Tests were Made, Give Details on Another Sheet.

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

M.475

W 4 R-97 (Rev. 2-59)

ALL 1955

well Locator on City of St. Louis Park map. SEE Metro. Area map.

Hopkins

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

File No. 104-B

Well No. 117/21-19 ddd

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well: Hopkins Well #3

County: Hopkins — City or Town

Describe Further by Lot, Block, Nearest Highway, Street and Number: Moak & St. Louis Rd. 1121 2nd Street N.E.

Locate Well on Plat of Section

Sec. 19

Twp. 117N

Range 21W

Drilled for:

Address

Driller: McCarthy

Address

Date of Completion: 1948

Site: Upland, Valley, Hillside, Etc.

Type of Well: Drilled — Dug, Driven, Bored, Drilled

Drill Rig Used: Solid Tool, Jet, Rotary

Diameter: Top 24" Bottom 20"

Depth of Well: 475'

Ground Elevation: 940± — Sea Level Datum or Give Distance Above or Below R. R., Highway, Lake, Etc.

Height of Casing Above Ground

Quality of Water: (Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water

Was Laboratory Analysis Made?

For What Purpose Will Water Be Used?

Is Well Pumped? Pump Capacity 1250 GPM

Was Well Sealed on Completion?

Does Well Overflow Without Pumping? Yes or No

Natural Flow GPM

What Pressure, or Head, at Ground Level?

Principal Aquifer Penetrated: Jordan S.S.

REPORT OF FINAL PUMPING TEST #3

Date of Test

Duration of Test Hrs. Min.

Rate of Pumping GPM 1,950 (849)

Static Water Level 61' Ft. Present Well 109'

Water Level While Pumping Ft.

Drawdown Ft. 801

Time Required for Recovery

Expected Average Yield Gal. per day

If Other Tests were Made, Give Details on Another Sheet.

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

CHECKED

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Thickness of Formation	Depth in Feet From	Depth in Feet To	Casing Diam.	Water Conditions Found
Drift: Clay		1	5		CLAY
Drift: S. & gravel		5	45	PIT	S SAND, GRVL
Drift: Clay S & G.		45	80		SAND, GRVL
Platteville L.S.		80	110		OPVL LMSN
Blue shale		110	116		OGWD SHLE
Shale & L.S.		116	145		SNDS SILT
St. Peter S.S.		145	225	12"	OSTP SNDS
Red shale		225	240		SHLE
Shak. Group: Grey shale & L.S.		240	276		SHLE, DLMT
Shak. Group: Hard L.S.		276	396		OPDC DLMT
Shak. Group: L.S.		396	460		DLMT
Sandy shale		460	475		CJTN SNDS SHLE
					Aquifer unknown
					no casing record
					Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at _____ this _____ day of _____, 19___.

(Firm Name) _____

By _____

Title _____

41-97
(Rev. 2-59)

GWQ211

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Hopkins Fuel

File No. 104-B

Well No. 117.22.13.ccc

Location of Well: Hopkins #4
Hopkins GWQ 211

County: Back of Elm Park Apts
City or Town:
Describe Further by Lot, Block, Nearest Highway, Street and Number: 15th Ave & Hiway 7

Locate Well on Plat of Section

Sec. 13
Twp. 117
Range 22

Drilled for: 117-22-13 CCDC
Address: elev. 980 ± 5

Driller: Bergeson Const CC
Address:

20" casing to 410

#4

Date of Completion: 5/14/1954

Site: Upland, Valley, Hillside, Etc.

Type of Well: Drilled (Dug, Driven, Bored, Drilled)

Drill Rig Used: Solid Tool, Jet, Rotary

Diameter: Top 24" Bottom 20"

Depth of Well: 548

Ground Elevation: 970 ± (Sea Level Datum, or Give Distance Above or Below R. R., Highway, Lake, Etc.)

Height of Casing Above Ground:

Quality of Water: (Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water:

Was Laboratory Analysis Made?

For What Purpose Will Water Be Used?

Is Well Pumped? Yes Pump Capacity 2000 GPM (300 HP Dayton)

Was Well Sealed on Completion?

Does Well Overflow Without Pumping? No (Yes or No)

Natural Flow: GPM

What Pressure, or Head, at Ground Level?

Principal Aquifer Penetrated:

REPORT OF FINAL PUMPING TEST

Date of Test: 2350 gpm - 34' dd.

Duration of Test: 15 Hrs. 00 Min. - 22' drawdown

Rate of Pumping: 0 static level GPM → 126 7/26/1954

Static Water Level: 148 Ft. → July 24-56 (822 ft)

Water Level While Pumping: Ft.

Drawdown: Ft.

Ap. capacity 830 gpm/ft of drawdown

Time Required for Recovery:

Expected Average Yield: Gal. per day

If Other Tests were Made, Give Details on Another Sheet.

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

Month of June 1959 water table was 151'

970
148
822

(Fill Out Both Sides of Form)

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Thickness of Formation	Depth in Feet From	Depth in Feet To	Casing Diam.	Water Conditions Found
Drift & Bowlders		0	144	24"	to 125
Platteville LS		144	171	20"	826
Green Shale		171	175	open Hole	
St. Peter Shelley S.S.		175	339		795
Shakopee LS		339	450		631
Jordan S.S.		450	530		520
St. Lawrence Green Shale		530	548		440
				Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development	

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at _____ this _____ day of _____, 19__.

Signature
John A. Brecka
Water Supt
86,555,400 gals. pumped

(Firm Name) Hopkins Municipal

By John A. Brecka

Title Water Supt.

W 97-41
(Rev. 1-61)

27-018c

ADP
1968

4140

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

Director	
Publ.	
Ground W.	

PA 67-128

Well No. 5

Mail Report Promptly To Director, Division Of Waters, Centennial Office Bldg., St. Paul 1, Minn.

Location of Well (address) 204570

Hennepin County — Hopkins, Minnesota City or Town

Describe Further by Lot, Block, Nearest Highway. #5

PA# 67-128

Locate Well on Plat of Section

Sec. 24

Twp. 117

Range 22

Drilled for: City of Hopkins

Driller Bergerson-Caswell Inc.

Address Hopkins, Minn.

Address 13120 Wayzata Blvd.
Minnetonka, Minnesota #5

Date of Completion May 1967

REPORT OF FINAL PUMPING TEST

Type of well drilled (Dug, Driven, Bored, Drilled) Depth 500' Duration of Test 4 Hrs. ____ Min. Date 4/26/67

Casing diameter 30"OD inch, from 0 to 240' Rate of Pumping 2050 GPM

24"OD inch, from 217' to 320½' Static Water Level 117' Ft. Above/Below land surface

16"OD inch, from 0 to 382½' Water Level While Pumping 121' Ft.

Screen: None Length ____ Diameter ____ Slot size ____ Use: Domestic [X] Industrial [ ] Irrigation [ ]

Pump: Type turbine Horsepower 100 Public supply [X] Commercial [ ] Stock [ ]

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Depth in Feet From	To	Geologic Formations Kind, Color, Hard or Soft	Depth in Feet From	To
Platform	5	5			
Clay & boulders	47	52			
Coarse gravel	4	56			
sandy clay & stones	47	103			
sand & gravel	8	111			
sandy clay	21	132			
sand & gravel	5	137			
fine hard sand	9	146			
clay, stones & sand	33	179			
hard shale & sandrock	35	214			
brown shale hard	8	222			
shale & sandrock	18	240			
sandrock	20	260			
shale	16	276			
sandrock-shaley	41	317			
Sahkopee/Oneota	110	427			
Jordan sandrock	62	489			
St. Lawrence shale	11	500			

CHECKED

STATE OF MINNESOTA
DEPARTMENT OF HEALTH

WATER WELL RECORD

Minnesota Statutes 156A.01-.08

MINNESOTA UNIQUE WELL NO. for Water Sample: 112228

1. LOCATION OF WELL

County Name	Fraction	Section Number	Township Number	Range Number
Hennepin	NE ¼ ¼ ¼	224	117N	22W

Distance and Direction from Road Intersection or Street Address and City of Well Location: Hwy. 7 and Co. Rd. 18 = Hopkins

Show exact location of well in section grid with "X." Sketch map of well location.

117-22-13 CCD ?

3. PROPERTY OWNER'S NAME / Address: City of Hopkins ※ 6 ?
Hopkins, Minnesota

4. WELL DEPTH (completed): 545 ft. Date of Completion: 9/30/77

5. [X] 1 Cable tool [ ] 2 Hollow rod [ ] 3 Rotary [ ] 4 Reverse [ ] 5 Air [ ] 6 Jetted [ ] 7 Driven [ ] 8 Bored [ ] 9 Power Auger [ ] 10 Dug [ ] 11 ______

6. USE: [ ] 1 Domestic [ ] 2 Irrigation [ ] 3 Test Well [X] 4 Public Supply [ ] 5 Air Conditioning [ ] 6 ______ [ ] 7 Industry [ ] 8 Commercial

2. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Clay, sand & gravel			0	66
Sand	grey		66	71
clay, sand & gravel			71	134
Platville limerock	CPVL		134	165
Shaley sandrock & grav.	OSTP		166	281
Shale	OSTP red		281	292
Hard shaley sandrock	OSTP		292	333
Lime rock, SR & shale	OPDC		333	345
Hard lime rock	OPDC		345	356
Sand rock CPDC	CJDN		356	545
117-22-24	abbbba			
elev. 963 ±	5			
104 A				
	→ in [illegible]			

Use a second sheet, if needed.

7. CASING DIAM. Threaded [ ] 1 Welded [X] 3 Black [ ] 2 Galv. [ ] 4
30 in. to 132 ft. depth
24 in. to 354 ft. depth
______ in. to ______ ft. depth
HEIGHT: Above/Below Surface 2 ft.
Weight .375 lbs./ft.
Drive Shoe? Yes [X] No ___

8. SCREEN Make NONE Type ______ Dia. ______ Slot/Gauze ______ Length ______
Set between ______ ft. and ______ ft.
Or open hole from 354 ft. to 545 ft.
FITTINGS:

9. STATIC WATER LEVEL 147 ft. [X] below [ ] above land surface. Date Measured 9/29/77

10. PUMPING LEVEL (below land surface) 150 ft. after 7.5 hrs. pumping 3000 g.p.m.
______ ft. after ______ hrs. pumping ______ g.p.m.

11. WELL HEAD COMPLETION [ ] 1 Pitless adapter [ ] 2 Basement offset [X] 3 At least 12" above grade

12. Well grouted? [X] Yes [ ] No Cu. Yds. 50
[X] 1 Neat cement [ ] 2 Bentonite [ ] 3 ______
Depth: from 0 ft. to 751 ft.
from ______ ft. to ______ ft.

13. Nearest source of possible contamination ______ feet ______ direction ______ type
Well disinfected upon completion? Yes [X] No [ ]

14. PUMP Date installed ______ [X] Not installed
Manufacturer's Name ______
Model Number ______ HP ______ Volts ______
Length of drop pipe ______ ft. capacity ______ g.p.m.
Material of drop pipe ______
Type: [ ] 1 Submersible [ ] 2 Jet [ ] 3 L.S. Turbine [ ] 4 Centrifugal [ ] 5 Reciprocating [ ] 6 ______

15. REMARKS, ELEVATION, SOURCE OF DATA, etc.

16. WATER WELL CONTRACTOR'S CERTIFICATION
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Bergerson-Caswell Inc. 27058
Licensee Business Name / License No.
Address 5115 Industrial St., Maple Plain, MN
Signed [signature] Date 10/4/77
Authorized Representative
E. P. Hennich

City of Edina 73-1119

73-1119

19. Well Data#

a) Well Number	1	2	3	4	5	6	7	8	9	10	11	12	13
b) Year Installed		1935	1947	1950	1954	1954	1955	1953	1957	1963	1963	1964	1964
c) Casing Diameter		12"	12"	16"	16"	16"	16"	16"	16"	16"	16"	16"	16"
d) Casing Depth		250		265	252	316	380	232	563	381	321	995	427
e) Well Depth		460	475	495	443	505	547	472	1130	1001	402	1081	496
f) Screen Length		--		90	--								
g) Static Level		67	70	82	77	103	138	61	313	170	27	319	116
h) Drawdown		15	8	50	7	32	16	16	52	74	15	61	29
i) Pump (type & cap.) All V.T.		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

19. Well Data#

a) Well Number	14	15	16	17	18								
b) Year Installed	1964	1967	1967	1970	1973								
c) Casing Diameter	16	20	20	24	16								
d) Casing Depth	325	225' 20"	265	373	335								
e) Well Depth	420	405	380	461	445								
f) Screen Length													
g) Static Level	40	84	75	62	50								
h) Drawdown		22	9	22									
i) Pump (type & cap.)	1000	1000	1000	1000	1000								

205591 Edina #1 #1
4521 50th Street
(Abandoned)

104-A

MINNESOTA DEPARTMENT OF HEALTH
Division of Sanitation

Report on Water Supply of Edina, Minnesota

April 28, 1936

The water supply for the village is now obtained from a drilled well which is 460 feet in depth and which is located adjacent to the elevated steel tank on 50th Street. The water is drawn from the well by means of a vertical turbine pump, rated at 200 gallons per minute. The pump is situated on the top of the 10-inch well casing about 15" above the ground level. The discharge tee is above ground level but the valves and pipes leading to the elevated tank are enclosed in a concrete tunnel below ground level. This tunnel extends from the well casing to the riser pipe for the tank. A small pipe, originally intended to drain the discharge pipe back into the well casing after the pump stops, is tapped into the well casing immediately above the floor of the tunnel.

ABANDONED

The log of the well shows that the earth formations encountered in drilling the well were as follows:

0 to 61	Sand, clay and gravel	61 feet
61 to 90	Blue rock	29
90 to 95	Shale	5
95 to 150	St. Peter sand rock	155
150 to 158	Shale	8
158 to 285	Shakopee dolomite	127
285 to 350	Jordan sand rock	65
350 to 460	Sandy Shale	10
	Total	460 feet

SAND, CLAY, GRVL
GRVL, LMSN
SHLE
SNDS
POST SHLE
OPDC, DLMT
CSDN, SNDS
CSTL, SHLE, SNDS
Aquifer OPDC-CSDN

Casing: 61' to 61'
61' to 258'-12" (Telescoping)

The 10-inch trunk sewer which carries untreated sewage from the entire village passes the well on the south side of 50th Street at a distance of about 90 feet. The sewage from the district, east of Wooddale Avenue

208399 #2 104-A

Elev.

Edina Municipal Well #2
4521 50th Street (20' S of #1)

Drift	0-62	PLTS	DRFT
Platteville Limestone	62-97	OPVL	LMSN
St. Peter Sandstone	97-262	OSTP	SNDS
Shakopee Dolomite	262-385	OPDC	DLMT
Jordan Sandstone	385-390	CJDN	SNDS
St. Lawrence Shale	390-391		SNDS

Drilled 1938 Aquifer OSTP-CJDN
Casing - 24" to 65'
10" to 100'

CODED

Data from State Health Dept. records.

M 414

W 41-97
(Rev. 2-59)

200561

28-24-19BCDAA

Mp is. 20. Grand

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT GWQ202

File No. elev. 890

Well No. 28/24-19 bdb

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well Concord Ave. & Southview Ln. #4

Hennepin — County

Edina — City or Town

Describe Further by Lot, Block, Nearest Highway, Street and Number

Locate Well on Plat of Section

104-A

Sec. 19

Twp. 28

Range 24

Drilled for: Village of Edina

Address #4

Driller Bergeson & Caswell

Address

Date of Completion 1950

Site Level Area
Upland, Valley, Hillside, Etc.

Type of Well Drilled
Dug, Driven, Bored, Drilled

Drill Rig Used Solid Blade
Solid Tool, Jet, Rotary

Diameter: Top 16" Bottom 19"

Depth of Well 500'

Ground Elevation 900±
Sea Level Datum or Give Distance Above or Below R. R., Highway, Lake, Etc.

Height of Casing Above Ground 24"

Quality of Water Hard
(Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water

Was Laboratory Analysis Made? Yes

For What Purpose Will Water Be Used? Domestic Supply

Is Well Pumped? Yes Pump Capacity 900 GPM

Was Well Sealed on Completion? Yes

Does Well Overflow Without Pumping? No
Yes or No

Natural Flow GPM

What Pressure, or Head, at Ground Level?

Principal Aquifer Penetrated Jordan

REPORT OF FINAL PUMPING TEST

Date of Test

Duration of Test Hrs. Min.

Rate of Pumping 750 GPM

Static Water Level 80' Ft. 820

Water Level While Pumping 138 Ft.

Drawdown 58' Ft.

Time Required for Recovery

Expected Average Yield Gal. per day

If Other Tests were Made, Give Details on Another Sheet.

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

RECEIVED
SEP 1 1959
DIVISION OF WATERS

Director		Hydro Stud	
Deputy			
Secretary			
Records		Surveys W.	
Chemists			
Engineers			
Drainage			

COPY

THE DATA CONTAINED HEREIN IS CONFIDENTIAL AND IS TO BE USED FOR SCIENTIFIC STUDY ONLY BY DIV. OF WATERS IN ACCORDANCE WITH MSA 103.51.

ACKNOWLEDGED 9/1/59

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Thickness of Formation	Depth in Feet From	Depth in Feet To	Casing Diam.	Water Conditions Found
Drift	80'	0	80'	24"	outside, grouted
Platteville Limestone	30'	80	110'		
St. Peter Sandstone	160	110	270	16'	
Shakopee & [illegible]	140	270	410	19'	Open Rock
Jordan	90	410	500	19'	

Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at Elgin this 26 day of Aug, 1959

(Firm Name) Village of Elgin

By [illegible signature]

Title Supt.

#5

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

Mpls. S. 5B p.41

GWQ 203

206377

Owner [redacted] Date Completed 1954

Location ? 66th & France [redacted] Ave. South Driller Layne-Minnesota

Well No. [redacted] #5 Size _____ Total Depth [redacted] Type _____

elev. 873±5 28-24-29 CCBCCD

DRILLERS LOG

[redacted] ' to [redacted] ' [redacted]

[redacted] ' to [redacted] ' [redacted]

[redacted] ' to [redacted] ' [redacted]

[redacted] ' to [redacted] ' [redacted]

_____ ' to _____ ' _____

_____ ' to _____ ' _____

_____ ' to _____ ' _____

_____ ' to _____ ' _____

_____ ' to _____ ' _____

_____ ' to _____ ' _____

_____ ' to _____ ' _____

_____ ' to _____ ' _____

_____ ' to _____ ' _____

PERMANENT PUMP DATA

Mfg. _____ Type _____ Serial No. _____

Capacity _____ GPM _____ TDH

Motor Make _____ Type _____

_____ H. P. _____ Volts _____ Ph. _____ RPM

_____ ft. _____ in Col. pipe _____ in. Shaft

_____ ft. _____ in Bowls _____ Stages _____ Type

_____ ft. _____ in suction pipe & _____

_____ ft. Total Length of Pump

_____ ft. _____ in. drop pipe & _____ No. Cable

_____ ft. _____ in. air line

_____ in. Pitless _____ ft. bury _____ in outlet _____

WELL MATERIALS

_____ ' of _____ " diameter of Outer Casing

_____ ' of _____ " diameter of Open Hole

_____ ' of _____ " diameter of Inner Casing

_____ ' of _____ " diameter of Open Hole

_____ ' to _____ Mix grout _____ (yds.) (Sacks)

_____ ' _____ " diameter _____ Screen

RECORD OF TEST PUMPING

Static Water Level [redacted] ft. from _____

[redacted] GPM [redacted] D.D. _____ Hours

_____ GPM _____ D.D. _____ Hours

_____ GPM _____ D.D. _____ Hours

_____ GPM _____ D.D. _____ Hours

_____ GPM _____ D.D. _____ Hours

Remarks:

[redacted] ' of [redacted] " pipe O.D.

[redacted] ' of [redacted] " pipe O.D.

[redacted] ' of [redacted] " pipe O.D.

200561

WELL RECORD

MPS-5
4D P.33

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

ST. PAUL, MINNESOTA

CBB DAC
28-24-19

ELEV 900 ±5

Town: Village of Edina — Hwy 100 & H.S.

Date Completed: June, 1954

Location: At water tower — Inside

Driller:

Well No.: #6 — Sec. 24 - 15

Total Depth: ~~Elev~~ 503 — Type: #6

Elevation: 911'

DRILLERS LOG

0' to 2'	Pipe above ground		
2' to 96'	Yellow clay (sandy)	PLTS	CLAY
96' to 112'	Limerock	OPVL	LMSN
112' to 120'	Sandstone	OGWD	SHLE
120' to 290'	Sand	OSTP	SNDS
290' to 410'	Shakopee	OPDC	DLMT
410' to 495'	Jordan	CJDN	SNDS
495' to 503'	Shale	CSTL	SHLE
' to '			
' to '			
' to '			
' to '			
' to '			

900
410
490

WELL MATERIALS

96'6" ' of 24 " diameter of Outer Casing

' of " diameter of Open Hole

316 ' of 16 " diameter of Inner Casing

' of " diameter of Open Hole

' to Mix grout (yds.) (Sacks)

290 ' " diameter Screen

RECORD OF TEST PUMPING

Static Water Level 90 ft. from

1956	GPM	75'	D.D.	Hours
1823	GPM	70'	D.D.	Hours
1599	GPM	60'	D.D.	Hours
1284	GPM	48'	D.D.	Hours
	GPM		D.D.	Hours

Remarks:

200564

PERMANENT PUMP DATA

Type Turb Serial No.

Capacity 1000 GPM 360' TDH:

Motor Make Smith Type

H.P. 220 Volts 3 Ph. 1750 RPM

in. Col. pipe in. Shaft

in. Bowls Stages Type

in. Suction pipe

Total Length of Pump

in. Drop pipe No. Cable

in. Air line

in. Packer ft. long in. outer

CODED

206474

206474
Mp13.5.
p.33 3D

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

117-21-28 CCDCA
ELEV 950

EDINA #7

County Hennepin Minnesota — Date Completed March, 1955

Location ? — Driller H. Johnson, W. Larson

Well No. #7 Size 24 x 16 Total Depth 547 Type

SHERWOOD & Hwy 169

DRILLERS LOG

0 to 30	Clay	
30 to 35	Sand & gravel	
35 to 90	Clay	
90 to 132	Sand	
132 to 154	Limerock	T/Mt. Op
154 to 187	Sandstone	GLENWOOD
187 to 290	Sandrock	Osp
290 to 324	Sandrock & shale	
324 to 453	Shakopee	Opc
453 to 545	Jordan T/497	Єj
545 to 547	Shale	Єm
to		
to	950	950 950
to	453	162 132
	497	788 818

WELL MATERIALS

148 16"	of 24	" diameter of Outer Casing
200	of 23	" diameter of Open Hole
350	of 16	" diameter of Inner Casing
200	of 18 & 19	" diameter of Open Hole
1	to 1	Mix grout 463 (yds) (Sacks)
		" diameter Screen

RECORD OF TEST PUMPING

Static Water Level 112 ft. from

1040 GPM	25'	D.D.	Hours
1471 GPM	38'	D.D.	Hours
1809 GPM	47'	D.D.	Hours
GPM		D.D.	Hours
GPM		D.D.	Hours

Remarks: Drilling, casing, grouting & cleaning and testing deep well for 1800 GPM sand free well.

PERMANENT PUMP DATA

Mfg. Type Serial No.

Capacity GPM TDH

Motor Make Type

H.P. Volts Ph. RPM

ft. to Col. pipe in. Shaft

ft. to Bowls Stages Type

ft. to suction pipe ft.

ft. Total Length of Pump

ft. to Discharge Size No. Cable

ft. to air line

ft. Meas. ft. bury in outlet

RECEIVED

Edina Well #8

BERGERSON-CASWELL INC.

204884

(8)

Mpls. S. 204884

P41 3B #8

REPORT ON WELL ON STOW PROPERTY 66th & RIDGEVIEW

116-21-4 CBB BA

ELEV 870 ±5

Log of Formations	Thickness	Depth	
Clay	13'	13'	0-13
Clay, sand and boulders	22	40	13-40
Hard sand and stones	20	60	40-60
Sandy clay and boulders	40	100	60-100
Muddy sand, gravel and stones	57	157	100-157
Sand and gravel	16	173	157-173
Hard grey clay	14	191	173-191
Clay, gravel and limerock mixed	35	218	191-218
Hard blue and grey shale	2	220	218-220
Shakopee limerock	141	361	220-361
Shale and limerock mixed	3	364	361-364
Jordan sandrock	81	445	364-445
Blue shale (St. Lawrence)	27	472	

OPC

Total depth of well 472'.
24" pipe driven to depth of 219' - Top 2' above grade.
16" pipe set to depth of 232' - Top 2½" above grade.
Annular space surrounding 16" pipe filled with cement grout to top.
Water level stands 49' below surface.
Water level while pumping 1500 GPM 82' below surface.
Specific capacity of well 14.6 gallons per minute per foot of drawdown below static level.

COPIED

870 870
270 364
600 506

206588

VILLAGE OF EDINA, MINNESOTA GWQ062

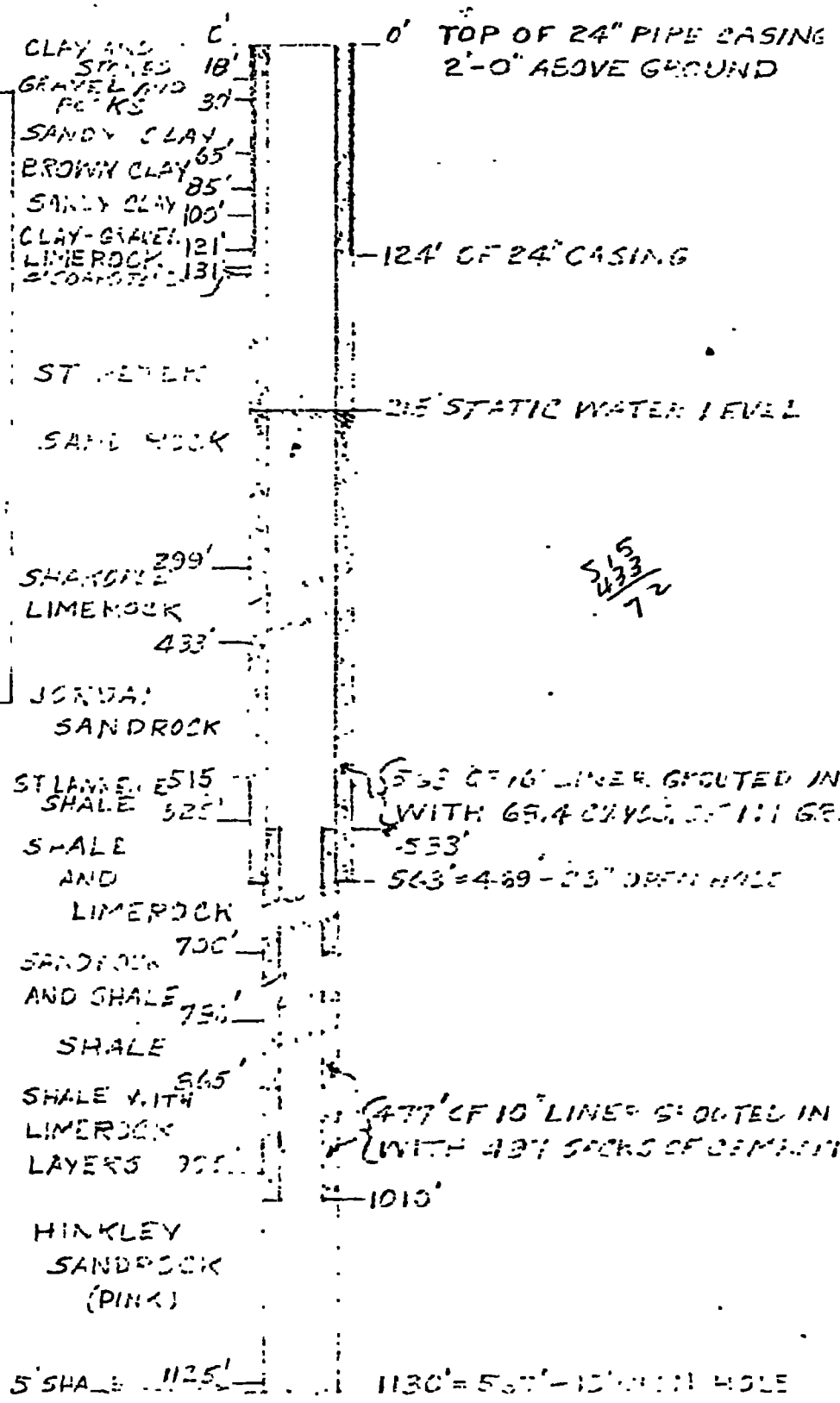
LOG OF WELL NO. 9

DRILLED BY KEYS WELL DRILLING CO. – OCTOBER 1957
24" X 16" X 10" WELL 1130' DEEP

PUMP TESTS

FIRST TEST:
WITHOUT 10" LINER
STATIC WATER LEVEL 136'
678 GPM – 122' DD
796 GPM – 130' DD

SECOND TEST:
AFTER 10" LINER INSTALLED THE WELL WAS BLASTED AND BAILED FROM 1116' TO 1050'.
STATIC WATER LEVEL 215'
754 GPM – 73' DD
881 GPM – 95' DD



EMMOTT ENGINEERING CO
310 No. Snelling
ST PAUL 4, MINN.

117-21-3 ZDADADA
ELEV 880 #5

WELL RECORD

KEYS WELL DRILLING COMPANY #9

WATER PRODUCERS

SAINT PAUL, MINNESOTA

206588

Mpls.S.
p.41.3A
GWQ062

Town: Village of Sutton, Minnesota — Date Completed October, 1957

Location: Water Supply Well — Driller: Royce Johnson

Well No. #9 Size 24x16x15 — Total Depth 1138 — Type 59th St & Hauser Rd

DRILLERS LOG

0' to 3'	Plow shave ground	
3' to 12'	Clay - stone	
12' to 23'	Gravel & rocks	
23' to 32'	Sandy clay	
32' to 85'	Brown clay	
85' to 100'	Gray sandy clay	
100' to 121'	Clay, gravel & rocks	
121' to 131'	Blackjack op	
131' to 135'	Sagatuna GLENWOOD	
135' to 239'	St. Peter sandrock op	299 135 164
239' to 433'	Shakopee limerock	
433' to 515'	Jordan sandrock 7/447	
515' to 525'	Shale (St. Lawrence)	
525' to 708'	Shale & sandrock	
708' to 780'	Sandrock & shale	
780' to 865'	Shale	
865' to 999'	Shale - sandrock layers	
999' to 1125'	Mincklay sandrock, pink	
1125' to 1138'	Shale	

WELL MATERIALS

124	' of 24	" diameter of Outer Casing	
439	' of 23	" diameter of Open Hole	
563	' of 16	" diameter of Inner Casing	
567	' of 15	" diameter of Open Hole	
1	' to 1	Mix grout 58 lb (Sacks)	
		" diameter	Screen

RECORD OF TEST PUMPING

Static Water Level 215 ft. from

1st Test:	678	GPM	122'	D.D.	Hours
	786	GPM	138'	D.D.	Hours
2nd Test:	754	GPM	73'	D.D.	Hours
	891	GPM	98'	D.D.	Hours
		GPM		D.D.	Hours

SWL: 21

Remarks:

880	880	880
121	121	135
759	759	745

PERMANENT PUMP DATA

Mfg. ____ Type ____ Serial No. ____

Capacity ____ GPM ____ TDH ____

Motor Make ____ Type ____

H.P. ____ Volts ____ Ph. ____ RPM ____

ft. ____ in Col. pipe ____ in. Shaft ____

ft. ____ in Bowls ____ Stages ____ Type ____

ft. ____ in suction pipe ____

ft. Total Length of Pump ____

ft. ____ in drop pipe ____ No. Cable ____

ft. ____ in. pitless ____

Pump Power ____ by ____ Installed ____

SCANNED

206184 Mpls.S. P.41 4C

Bergerson-Caswell Inc.

GROUND WATER CONSULTANTS AND METER CORRECTORS

13120 Wayzata Boulevard
Minneapolis 26, Minnesota
Liberty 5-8834

#10

28-24-31 CDA ADB

October 8, 1963

RECEIVED
OCT 10 1963
BANISTER ENGINEERING CO.

M.G.S. #274

ELEV. 833 ±5

Banister Engineering Company
310 North Snelling Avenue
St. Paul, Minnesota

Attention: Norm Hendrickson

Re: Village of Edina
Well ~~#11~~ 10

76th & KELLOGG

Gentlemen:

The following information and data is submitted for your records.

Well Log

Formation		Thickness	Depth
Drift	0-183	183'	183'
Shokapee/Oneota	183-305	122'	305'
Jordan sandrock		98'	403'
St. Lawrence shale		43'	446'
Franconia-shale and sandrock		146'	592'
Dresbach		284'	876'
Gailesville-sandrock	592' to 664'		
Eau Claire-shale	664' to 729'		
Mt. Simon sandrock-	729' to 876'		
Hinckly sandrock		123'6"	999'6"
Red shale		1'6"	1001'

CODED

24" O.D. casing to	183'6"	
20" O.D. casing to	651'	
16" O.D. casing-top at minus	623'3"	
bottom at	881'	

The well was shot at 985' with 32# of boosters equivalent of 50# dynamite. Very little material brought down, estimate one yard.

After above shot an obstruction was found in the 16" O.D. casing at 649'. A dummy, 11 7/8" O.D. will pass freely to bottom of well, but a dummy, 12 3/4" O.D. stops at 657'.

It is conservatively estimated that 400 cubic yards of sandrock was removed by pumping.

TEST PUMPING RESULTS - STATIC W.L.

10:00 A.M.	5/27/63	143'6"
7:30 A.M.	5/9/63	185'
4:00 A.M.	3/25/63	149'

5/21/63-1200 GPM-Pumping level-	224'10"
5/20/63- 900 GPM- " "	198'11"
4/23/63-2000 GPM- " "	279'8"
4/26/63-2000 GPM- " "	271'

(206183
~~Mpls. S. pill 4c~~

Bergerson-Caswell Inc.

GROUND WATER CONSULTANTS AND MEMBER OF GROUND WATER INSTITUTE

13120 Wayzata Boulevard
Minneapolis 26, Minnesota
Liberty 5-8834

28-24-31 CDAADA

M.G.S.

April 16, 1963 X

285 ELEV. 833±5

#11

Banister Engineering Co.
310 North Snelling Avenue
St. Paul, Minnesota

RE: Village of Edina 206183
Well # 1

Attn: Mr. Norm Hendrickson

76 ; 1 KELLOGG

Gentlemen:

The following information and data is submitted for your records.

WELL LOG

FORMATION		THICHNESS	DEPTH
Sand and gravel	0-36	36'	36'
Blue clay and rocks	36-45	9'	45'
Sandy blue clay	45-75	30'	75'
Brown clay, sand, gravel and rocks	75-173	98'	173'
Coarse gravel and rocks-dirty	173-179	6'	179'
Shakopee/Oneota limerock	179-304	125'	304'
Jordan sandrock	-	98'	402' T/529
Coarse, med. hard 304' to 327'			
Med. hard 327' to 350'			
Very hard 350' to 362'			
Med. hard, med. grain 362' to 384'			
Hard, med. shaley 384' to 402'			
St. Laurence shale		0'6"	402'6"

833 / 179 / 654

833 / 304 / 529

833 / 304 / 529

24" O.D. casing to 182'
16" O.D. casing to 321'

To keep the 23" hole thru the Shakopee/Oneota limerock within limits of straightness it was necessary to shoot the limerock as follows: 725 1# primers from a depth of 220' to 286.5'.

The Jordan sandrock was also shot as follows: 120 1# primers from a depth of 350' to 390'. We conservatively estimate that 300 to 400 cu. yds. of sandrock was removed from this well.

COPIED

203614

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

ADP
NE968 3 1985

#12

Hennepin
well log

Owner City of Edina Date Completed May 1964

Location Bellwood Park Driller Hopkins

Well No. 12 Size 24 x 16 Total Depth 1081' Type

PA63-627G
elev-

117.21.30 pab

DRILLERS LOG

0	to 111	Drift	
111	to 128	Platteville	869 (17)
128	to 297	St Peter	852 (169)
297	to 411	Shakopee	683 (114)
411	to 499	Jordan	569 (88)
499	to 547	St Lawrence	481 (48)
547	to 682	Franconia	433 (135)
682	to 745	Dresbach	298 (63)
745	833	Eau Claire	235 (88)
833	to 986	Mt Simon	147 (153)
986	to 1081	Hinckley	-6 (95)
1081	to	Red Clastics	-101

WELL MATERIALS

116 ' of 24 " diameter of Outer Casing

965 ' of 23 " diameter of Open Hole

955 ' of 16 " diameter of Inner Casing

' of " diameter of Open Hole

' to Mix grout 117 yds.

' " diameter Screen

RECORD OF TEST PUMPING

Static Water Level 25 ft. from

1200	GPM 106	D.D.	Hours
1400	GPM 48'4"	D.D.	Hours
1740	GPM 209"	D.D.	Hours

PERMANENT PUMP DATA

Mfg. Model Remarks:

Type Serial No.

Capacity GPM TDH

H. P. Volts Ph. RPM

ft. in Col. pipe in. Shaft

ft. in Bowls Stages

ft. in suction pipe &

ft. Total Length of Pump

ft. in. drop pipe & No. Cable

ft. in. air line

in. Pitless ft. bury in outlet

3575

203613

ADP 1968

MAY 13 1965

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

#13

Hennig Co well logs

Owner City of Edina Date Completed May 1964

Location Belmore Park Driller Lyttino R

Well No. 13 Size 24 x 16 Total Depth 496 Type

PA63-627G

117.21.3cbab

DRILLERS LOG

0 ' to 106 ' Drift

106 ' to 125 ' Platteville 874(19)

125 ' to 294 ' St. Peter 955(169)

294 ' to 414 ' Shakopee 686(120)

414 ' to 496 ' Jordan 566(82)

496 ' to – ' St Lawrence

' to '

' to '

' to '

' to '

WELL MATERIALS

109 ' of 24 " diameter of Outer Casing

387 ' of 23 " diameter of Open Hole

429 ' of 16 " diameter of Inner Casing

' of " diameter of Open Hole

' to ' Mix grout 44 yds.

' " diameter Screen

RECORD OF TEST PUMPING

Static Water level 97' ft. from

1000 GPM 37 D.D. Hours

1500 GPM 51'1" D.D. Hours

1700 GPM 60'3" D.D. Hours

PERMANENT PUMP DATA

Mfg. Model

Type Serial No.

Capacity GPM TDH

H. P. Volts Ph. RPM

ft. in Col. pipe in. Shaft

ft. in Bowls Stages

ft. in suction pipe &

ft. Total Length of Pump

ft. in. drop pipe & No. Cable

ft. in. air line

in. Pitless ft. bury in outlet

Remarks:

3576

CODED

LLER BROS. Contractors
Municipal and Industrial Water Conditioning Equipment and Service
Phone: 237-27
237-29
GAYLORD, MINNESOT.

Edan P. 2C P.41

WELL LOG AND CONSTRUCTION RECORD

#14

200913

Date February 19 64

TO Village of Edina

ADDRESS Well #14 - Golf Course

CITY Edina STATE Minn.

No location except on Braemar Golf Course

LOG OF FORMATIONS

				SWL
0	to	182	Drift	
182	to	315	Shakopee T/668	
315	to	414	Jordan Sandstone T/535	
414	to	420	St. Lawrence	37'6"

116-21-7DADCB
ELEV. 850 ±5

850
182
315
414

CASED

WELL DESIGN

Depth measured from Top of Casing

SCREEN WELL DATA

Make of Screen

Size: Diam. in. Length ft. Slot Size

Location in Well to Screen Metal

Fittings: Top

Bottom

Other Screen Data

ROCK WELL DATA

Open borehole 23½" diam. to 420 ft.

WELL TEST DATA

2000 gpm. Static Water Level 37'6" Pumping Water Level 129'

72½ hours of pumping (Drawdown 91'6" ft.)

PUMP DATA

Make Type

Model Serial Number Size

HP Drop Pipe Size " & Length Shaft Size & Length

GPM Head ' RPM

otor: Volts Phase Cycles

Well Seal

Water Analysis: Hardness ppm. Iron ppm.

CASING STRINGS

0 to 182
23½ ID 24 OD
Wt. 94.62 lbs. per ft.
Thrd. & Cpld.
Welded yes
Drive Shoe yes
Cemented yes

2.

0 to 325
15½ ID 16 OD
Wt. 62.58 lbs. per ft.
Thrd. & Cpld.
Welded yes
Drive Shoe ~~yes~~ yes
Cemented yes

3.

to
ID OD
Wt. lbs. per ft.
Thrd. & Cpld.
Welded
Drive Shoe
Cemented

MB. Form No. 206
Gaylord Hub Print

Signed Devaine P. Mosgrove

LAYNE-MINNESOTA CO. # 434

117-21-29 dbb

FIELD REPORT OF COMPLETED WELL

P. 33 3C

#15

Name of Job Edina Well No. 15 207674 Date started

Address Interlachen Rd. & Mirror Lake Date completed 11/6/67

Edina, Minnesota No. of days

LOG OF WELL

feet From	To	Material	feet From	To	Material
0	91	Sand & Clay PLTS SAND, CLAY	260	265	Hard shale, Blues. CSTP SHLE
91	111	Platteville rock OPVL LMSN	265	400	Hit rock. OPDC DLMT
111	205	St. Peter sand SNDS	400		Jordon Sandstone CJDV SNDS
205	210	Shale & sand mix, hard. CSTP SNDS SHLE			
210	260	Shale & sand mix. SHLE SNDS			

Total: 92'4"

Method of drilling Cable Tool Rig used 28L Diam. of drill hole 30 in.

Was outer casing cemented yes Method pump Amount cement 27 yds.

Depth of well - from ground level 405 ft. from top of casing 275'10" ft. Static 69 ft.

MATERIAL LEFT IN WELL

Aquifer CPK-CDV

	Opening	Length - feet	Diameter - inches	Material
Screen		275'10"	20" casing	3/8
Inner casing		92'4"	30" casing	3/8
Outer casing		225'5"	24" casing	3/8

Under reamed from ft. to ft. Diameter in. Method

Size-sizes-of gravel Amount

Well shot at ft. to ft. depth Number Size lb. Material removed yd

WELL TEST

Hours Pumped From	To	Yield gal. per min.	Water Level - ft. below surface	Drawdown feet	Remarks
3PM	10PM	1200	110'	41'	Pump lot of sand & dirty water
10PM	10AM (next day)	2000	138'	69'	Pumping clear now & less sand
10AM	Noon	1800	126'	57'	Least sand at this rate
1PM	6PM	1500	117'	48'	No sand & clear.

Time to clear 2 days Specific Capacity 1800 g.p.m./ft. d.d. 70'

Date 11/6/67 Driller s/Gordon Hollen

6 bags cement for bottom plug.

LAYNE-MINNESOTA CO.

M(-) #435 Hops 41 2A p.41 #16

203101 (104.1)

FIELD REPORT OF COMPLETED WELL

Name of Job: Edina, Village of — Date started: 9/6/67

Address: Gleason Road & Crosstown — Date completed: 11/10/67

Well #16 — No. of days:

LOG OF WELL

Aquifer OPDC-CJDN

FEET From	FEET To	Material	FEET From	FEET To	Material
45	115	Rocks, gravel PLUS CAVE-IN 1/65P T/780'	255	380	Rock - Shakopee Limestone OPDC DLMIT T/640'
115	175	St. Peter SNDS	380		Jordan Sandstone - CJDN T/515'
175	184	Shale, blue STIP CHIPS			116-21-6 ACA bbb-S.S
184	215	Shale, sand, gray CM FEED SHALE			Elev' 895±5'
215	255	Shale, gray SHALE SEAM			

Method of drilling: cable tool — Rig used: #36 — Diam. of drill hole: 30 in.

Was outer casing cemented: yes — Method: — Amount cement:

Depth of well - from ground level: 380 ft. - from top of casing: 382 ft. Static: 66 ft.

MATERIAL LEFT IN WELL

	Opening	Length - feet	Diameter - inches	Material
Screen				
Inner casing		265	20	3/8
Outer casing		215	30	3/8

Under reamed from ____ ft. to ____ ft. Diameter ____ in. Method ____

Size-sizes-of gravel ____ Amount ____

Well shot at ____ ft. to ____ ft. depth Number ____ Size ____ lb. Material removed ____ yd

WELL TEST

Hours Pumped From	Hours Pumped To	Yield gal. per min.	Water Level - ft. below surface	Drawdown feet	Remarks

Time to clear: ____ Specific Capacity: 1500 g.p.m./ft. d.d.

Date: 10/31/67 — Driller: s/Bill Drechsel

CERTIFIED

2 CEN
MPLS SO. QUAD
P 41 4A

28-24-196

WELL RECORD

~~Hopkins~~
~~P-41-4A~~

KEYS WELL DRILLING COMPANY #17

WATER PRODUCERS

SAINT PAUL, MINNESOTA

104-A

200914

M.G.S. #633

Owner Village of Edina, Minnesota — Date Completed November 17, 1970

Location Pamela Park - 59th and View Streets ? — Driller Richard A. Sittig

Well No. 17 — Size 30" x 24" — Total Depth 461' — Type Jordan

DRILLERS LOG

0'	to	76'	Clay	CLAY
76'	to	131'	Sandy Clay	PLIS CLAY
131'	to	133'	Gravel	GRVL
133'	to	196'	Sandrock (soft)	OUTP SAND
196'	to	201'	Shale	OUTP SHLE
201'	to	363'	Shakopee	OPP DOLM
363'	to	461'	Jordan	CODAR SNDS
'	to	'		
'	to	'		
'	to	'	Aquit. CODAR-CODAR	
'	to	'		
'	to	'		
'	to	'		
'	to	'		

WELL MATERIALS

196' of 30" diameter of Outer Casing

265' of 29" diameter of Open Hole

373' of 24" diameter of Inner Casing

' of " diameter of Open Hole

0' to 373 Mix grout 30 (yds.) (Sacks)

' " diameter Screen

RECORD OF TEST PUMPING

Static Water Level 59'2" ft. from top of pipe

2500	GPM	64'2"	D.D.	Hours
1940	GPM	59'2"	D.D.	Hours
1500	GPM	21'10"	D.D.	Hours
1230	GPM	78'4"	D.D.	Hours
	GPM		D.D.	Hours

Remarks: The well was blasted with 137 lbs. (9 shots) of dynamite and bailed out, then air developed for 44-1/2 hours.

PERMANENT PUMP DATA

Mfg. ____ Type ____ Serial No. ____

Capacity ____ GPM ____ TDH

Motor Make ____ Type ____

____ H. P. ____ Volts ____ Ph. ____ RPM

____ ft. ____ in Col. pipe ____ in. Shaft

____ ft. ____ in Bowls ____ Stages ____ Type

____ ft. ____ in suction pipe & ____

____ ft. Total Length of Pump

____ ft. ____ in. drop pipe & ____ No. Cable

____ ft. ____ in. air line

____ in. Pitless ____ ft. bury ____ in outlet ____

CODED

M.G.S. #945 WELL RECORD 200918

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

Owner Village of Edina, Minnesota Date Completed October 16, 1973

Location East side of York Avenue at W. 73rd Street Driller Floyd C. O'Brien

Well No. 18 Size 30" x 24" x 16" Total Depth 446' Type Jordan

DRILLERS LOG

0'	to 14'	Clay
14'	to 61'	Sand and Clay
61'	to 223'	Sand and Gravel
223'	to 232'	Clay and Gravel
232'	to 347'	Limerock
347'	to 446'	Sandrock
'	to '	
'	to '	
'	to '	
'	to '	
'	to '	
'	to '	
'	to '	

PERMANENT PUMP DATA

Mfg. _____ Type _____ Serial No. _____

Capacity _____ GPM _____ TDH

Motor Make _____ Type _____

_____ H. P. _____ Volts _____ Ph. _____ RPM

_____ ft. _____ in Col. pipe _____ in. Shaft

_____ ft. _____ in Bowls _____ Stages _____ Type

_____ ft. _____ in suction pipe &

_____ ft. Total Length of Pump

_____ ft. _____ in. drop pipe & _____ No. Cable

_____ ft. _____ in. air line

_____ in. Pitless _____ ft. bury _____ in outlet

WELL MATERIALS

150 ' of 30" " diameter of Outer Casing

232 ' of 24" " diameter of ~~Open Hole~~ Inner Casing

365 ' of 16" " diameter of Inner Casing

214 ' of 23" " diameter of Open Hole

0 ' to 365' Mix grout 36 (yds.) (~~Sacks~~)

' " diameter Screen

RECORD OF TEST PUMPING

Static Water Level 61' 4" ft. from top of pipe.

1016	GPM	42' 5"	D.D.	Hours
1404	GPM	70' 8"	D.D.	Hours
1914	GPM	89' 5"	D.D.	Hours
2013	GPM	100' 4"	D.D.	Hours
2218	GPM	108' 2"	D.D.	Hours

Pumping Total -59-1/2 Hours

Remarks: Well was blasted with 23 shots (230#) of dynamite - loose sandrock bailed out for 201-1/2 hours and air developed for 73-1/4 ho

Sand Content @ 1016-GPM - 1 PPM

Sand Content @ 1711-GPM - 37 PPM

28-24-32

200979

117-21-17CAADC

INVOICES: elev. 895.5

(Well) No.

(Pump) No.

E. H. RENNER & SONS WELL COMPANY

3465 Co. Rd. 18 North — Minneapolis 28

WELL LOG W-105

104-A

Date Started June 18 1908 — Date Completed Sept 19 1908

Owner or Contractor Republic Concreting — Address St. Louis Park

Job Location ? New Ave. & 2nd St., St. Louis Park — M-7

Sec. 17 & 18T R 22, elev. 900

Lot ____ Block ____ Twp or city St. Louis Park County Henn State of Minnesota

Well: Cased with 22 x 10x 8 Ft. Total Depth of Well 950

Feet of Open Hole 690 (Type and Size) Finished in Hinshley Water Level 60

Tested at no record gallons per min. Drawn down of no record feet.

Screen: Size ____ Make ____ Slot or Guage ____ Number ____

Pump: Make ____ H.P. ____ Type ____ Tank Size ____

Motor Serial No. ____ Pump Serial No. ____ Drop Pipe ____ feet

Size ____ Capacity of pump ____ G.P.M. Date Installed ____

ABANDONED

KIND OF FORMATION	COLOR OF FORMATION	STARTED DEPTH	ENDED DEPTH	TOTAL THICKNESS OF FORMATION	REMARKS
Gravel	tan	0	73	73	PLTS GRVL
Plattville	gray	73	93	20	OPVL LMSN
St. Peter	white	93	260	167	OSTP SNDS
Dolomite	[illegible]	260	385	125	OPDC DLMT
Jordan -	gray	385	504	119	CJDN SNDS
St. Lawrence	green	504	813	309	shale probably front of SHLE Fran Conian CUDF SNDS
Fran Conian	white	813	903	90	SNDS
Dresbosh		903	940	37	CMTS SNDS
Hinshley		940	950	10	SNDS, SHLE
					Aquifer unknown

No._____ W-22 Walnut 1170

E. H. RENNER & SONS

5800 GOODRICH AVENUE - ST. LOUIS PARK - MINNEAPOLIS 16, MINN. 200493

WELL LOG 117-21-17 CAADA

Date Started Dec. 19 47 Date Completed Dec. 19 47

OWNER Republic Creasoting Co. elev 895 ± 5

ADDRESS St. Louis Park & Walker St. 164-A

Description Of Property On Which Drilling Was Done

The _____ of Sec. _____ Twp. _____ Elv. _____

Lot _____ Block _____ in the City of St. Louis Park

County of Henn. State of Minn.

Cased with 1¼" Black SCALLESS (TYPE AND SIZE), 71 feet of Casing used.

Total Depth of Well 91 Feet of Open Hole 20

Finished in Limestone (PLATVILLE) Water Level 6 FT FROM GRADE

Tested at 60 Gal. per Min.

Draw Down of 0 Feet

Screen Used NO ME (SIZE, MAKE, SLOT, NUMBER)

Pump; Make Myers HP 3/4 Type Jet

Drop Pipe 1¼ X 1'21" feet Size

Capacity of Pump 15 Gal. per Min. ABANDONED

KIND OF FORMATION	COLOR OF FORMATION	STARTED DEPTH	ENDED DEPTH	TOTAL THICKNESS OF FORMATION	REMARKS
Sand Fill	Red	0	7	7	QUAT FILL
Peat	Dark	7	15	8	PLTS PEAT
Clay	Gray	15	35	20	CLAY
Sand	Redish	35	65	30	SAND
BROKEN ~~Boston~~ Lime		65	71	6	OPVL LMSN
Limestone		71	91	20	PLATVILLE LMSN
St.Peter Sand STONE	White	91	-	-	Soft OSTP SNDS
					Aquifer OPVL-OSTP

COPY

5/31/77
N.

Analytical Results: Samples From
St. Louis Park, Minnesota
(Samples Received May 31, 1977)

Emilio Sturino, Ph.D.
Chief, Organic Laboratory Section
U.S. Environmental Protection Agency
Region V, Central Regional Laboratory
1819 West Pershing Road
Chicago, IL 60609
312-353-8370

Objective

To provide a comprehensive organic analysis of six groundwater samples. The results of the analysis are to be used to monitor the movement of organics from one well throughout the groundwater shed at St. Louis Park, Minnesota.

Results

The quantitative results of the analysis are summarized in Table I.

Table I

Quantitative Summary of Data

		Concentration mg/l	
CRL Sample #	Well #	Polynuclear Aromatics	Total Extractables
77-18465	W-9	<0.1	2.5
77-18466	W-13	3,400	3,400
77-18467	W-14	<0.03	0.05
77-18468	W-17	1.7	1.7
77-18469	CW-3	<0.03	0.05
77-18470	Flame	<0.03	0.05

Qualitative results indicate that sample #77-18466 contains the following polynuclear aromatic hydrocarbons:

naphthalene	phenanthrene or anthracene
methylnaphthalene	fluoranthene
acenaphthene	pyrene
dibenzofuran	

Naphthalene and acenaphthene were also detected in sample #77-18468. No detectable amounts of polynuclear aromatic hydrocarbons were detected in samples 77-18469 and 77-18470. Sample 77-18465 contains a mixture of hydrocarbons but no polynuclear aromatic hydrocarbons could be detected.

Analytical Procedure

Each sample was extracted three times, once each with 60 ml of 15% (V/V) methylene chloride in hexane. The combined extracts were then concentrated to approximately one ml on a steam bath using a Kuderna-Danish apparatus. The concentrated extracts were then analyzed by flame-ionization gas chromatography and by computerized gas chromatography mass spectroscopy.

The analytical column used consisted of a 6' x 1/8" glass column packed with 5% Dexil 300 on ABS Anakron. The column oven temperature was programmed from 100° to 300°C at 10° per minute.

After glass chromatographic analysis, the samples were concentrated to constant weight at room temperature by means of a gentle stream of nitrogen. The results are reported as total extractables.

Participants

All sample preparation and analytical work was performed by Dr. Emilio Sturino and Mr. Robert Glowacky.

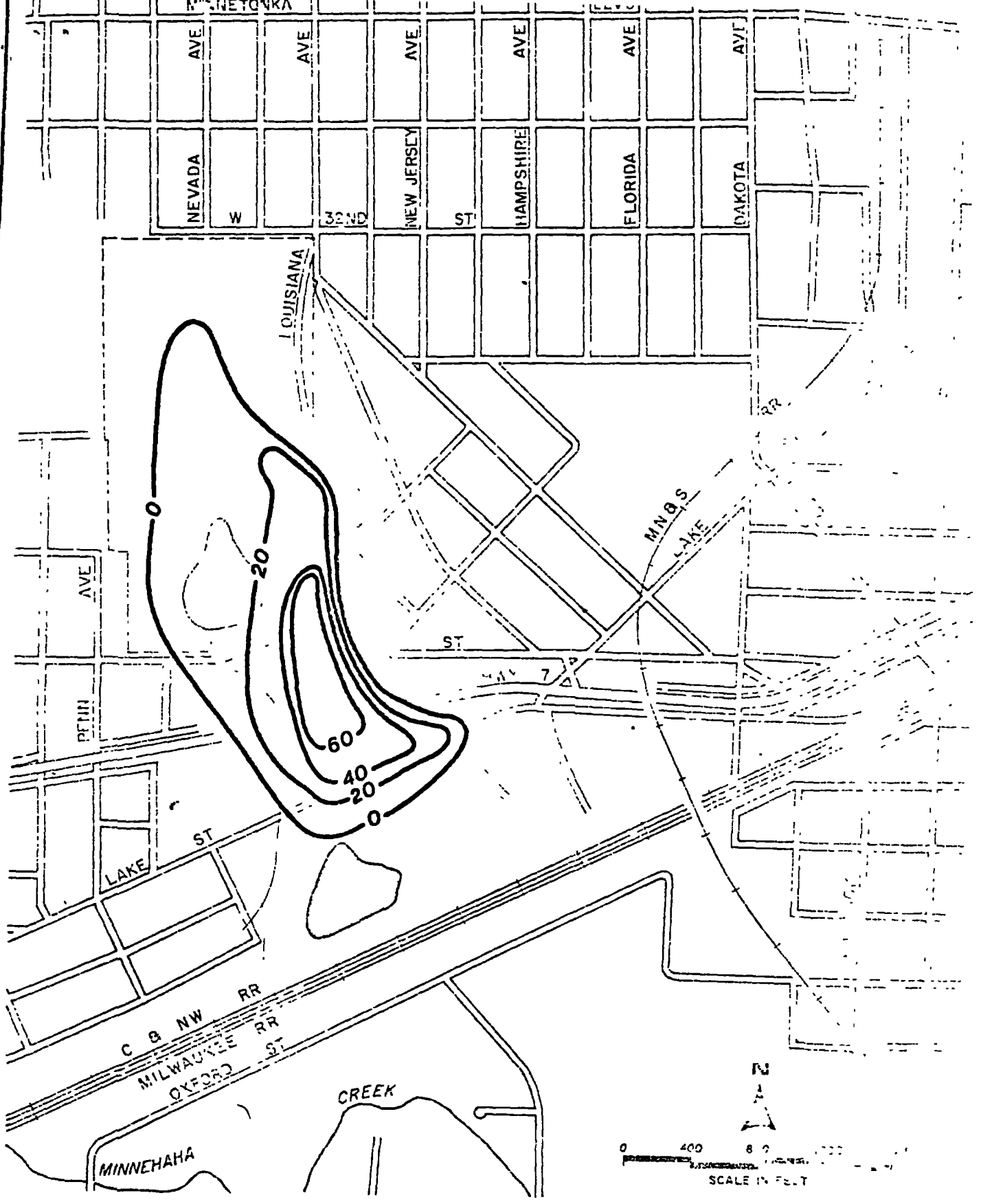


FIGURE 28

REMOVAL DEPTH CONTOURS
Soil With Phenolic Concentrations
Greater Than 1 mg/kg

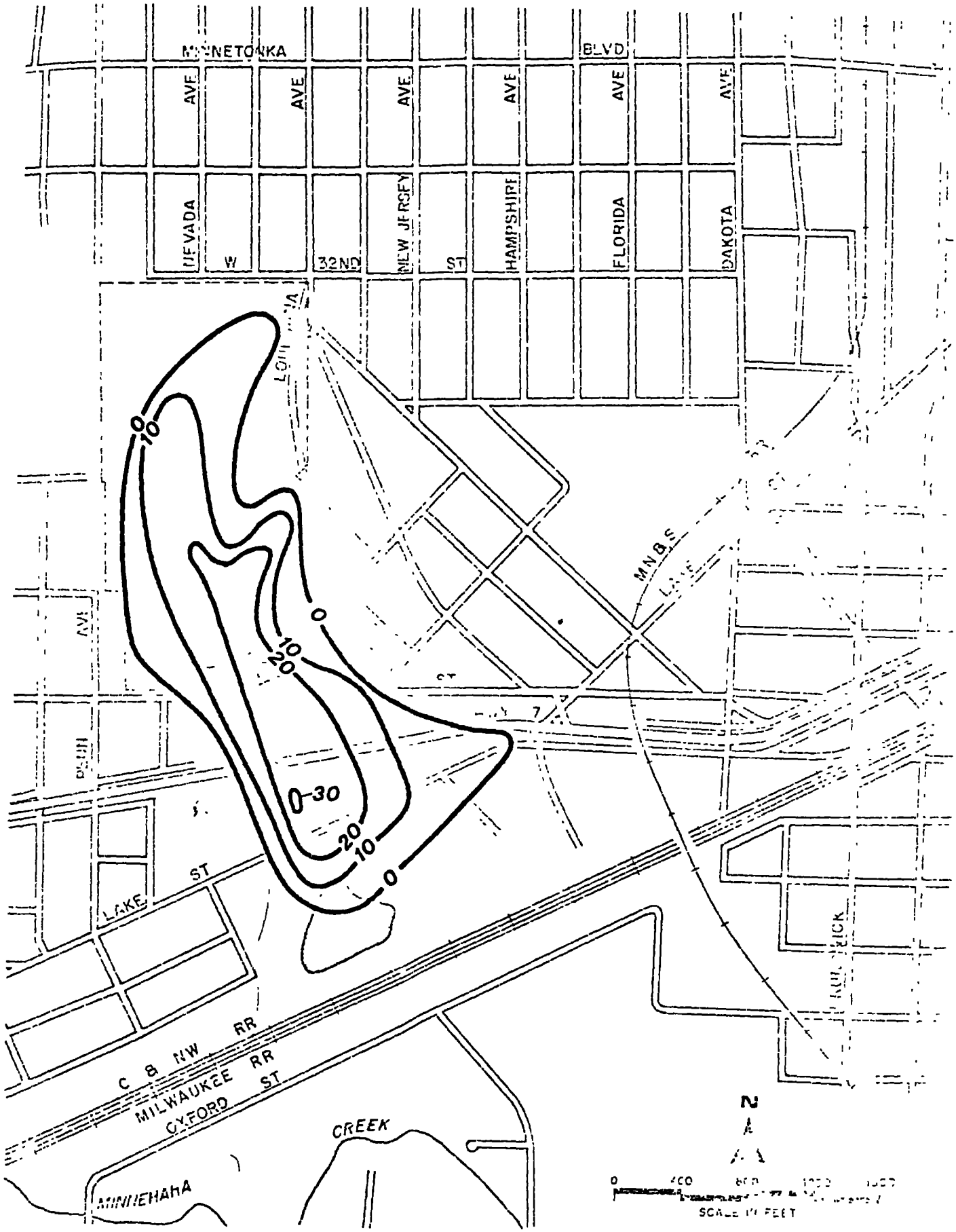


FIGURE 31

REMOVAL DEPTH CONTOURS
Soil With Benzene Extractable Concentrations
Greater Than 1,000 mg/kg

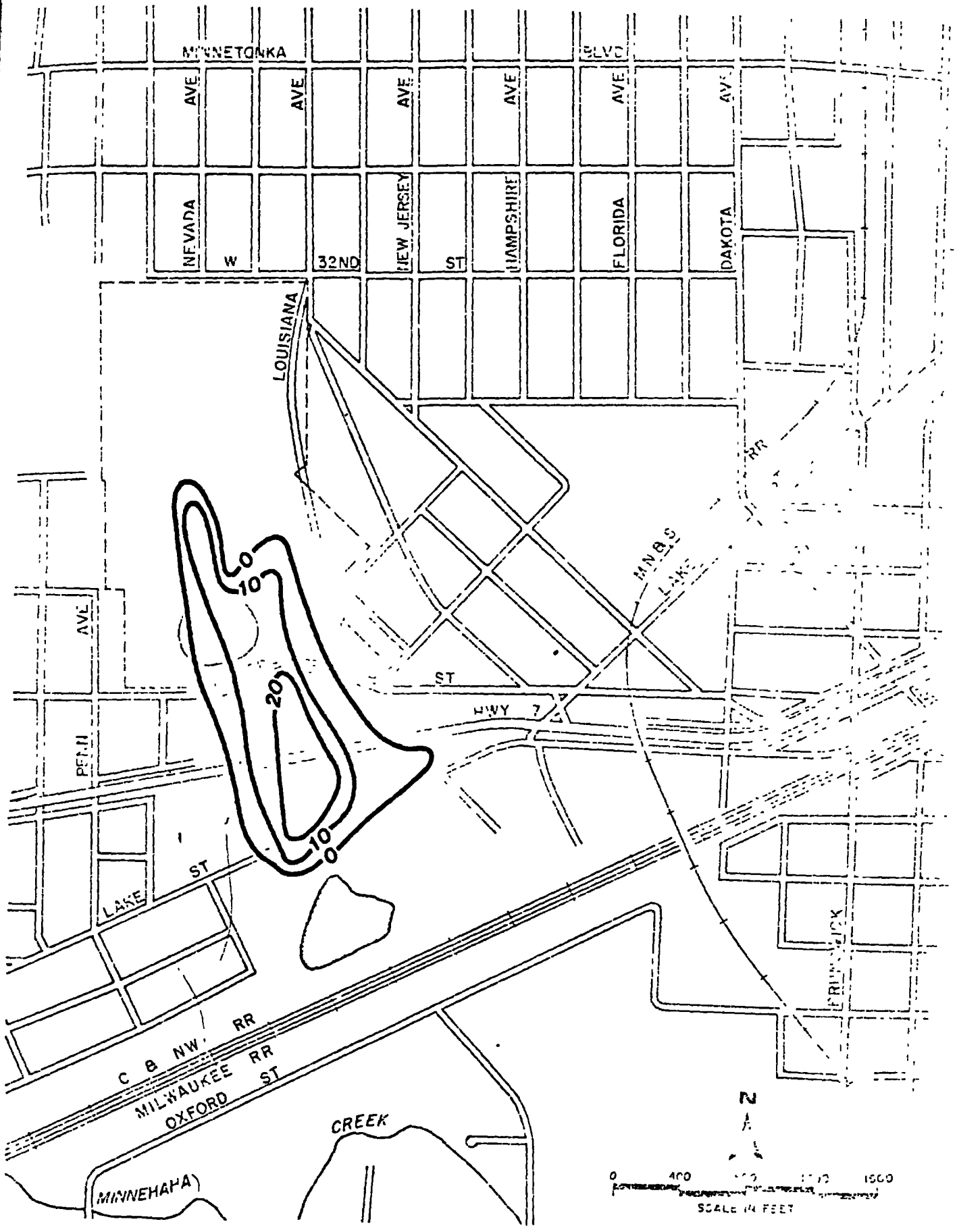


FIGURE 32

REMOVAL DEPTH CONTOURS
Soil With Benzene Extractable Concentrations
Greater Than 10,000 mg/kg

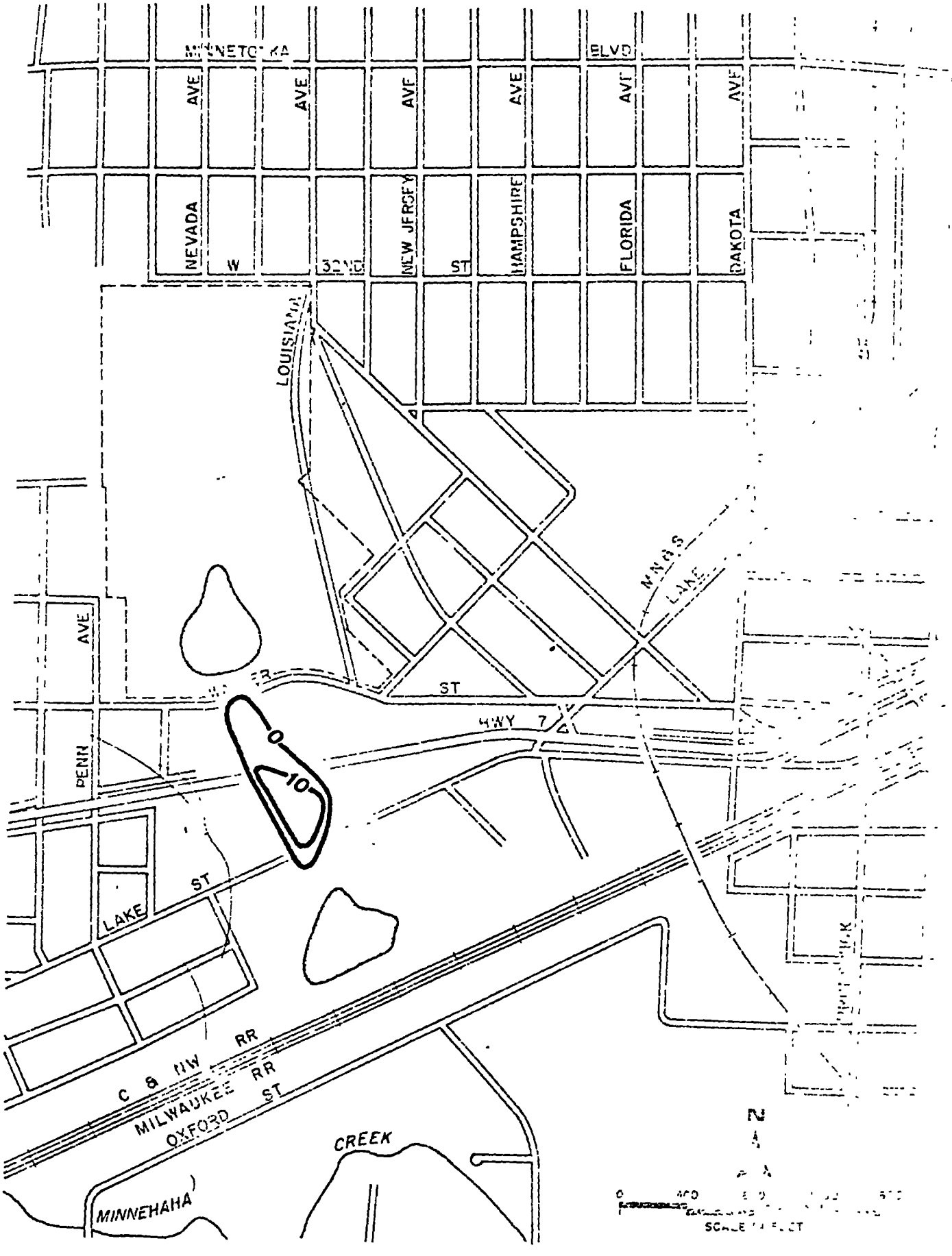


FIGURE 33

REMOVAL DEPTH CONTOURS
Soil With Benzene Extractable Concentrations
Greater Than 100,000 mg/kg

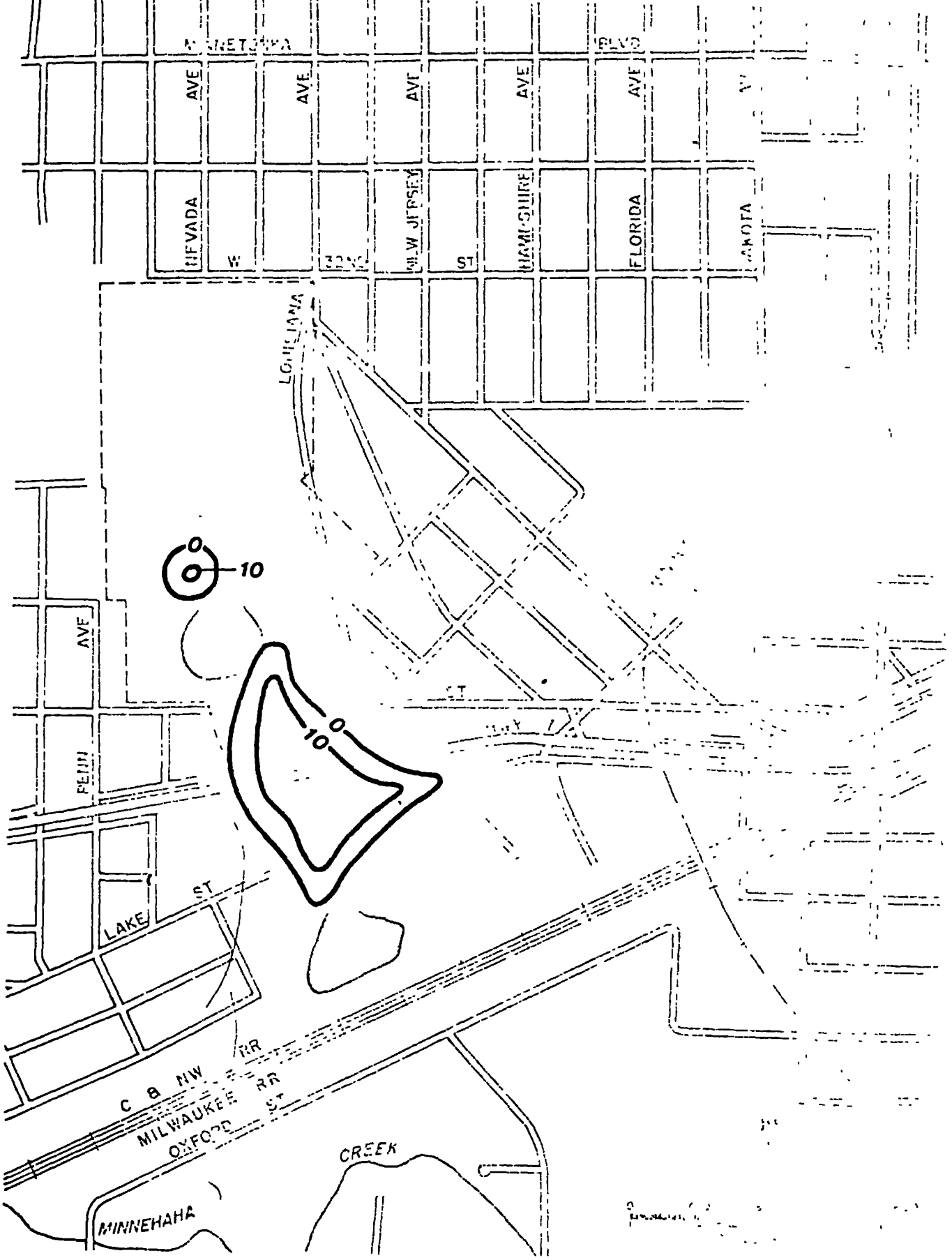


FIGURE 29

REMOVAL DEPTH CONTOURS
Soil With Phenolic Concentrations
Greater Than 10 mg/kg

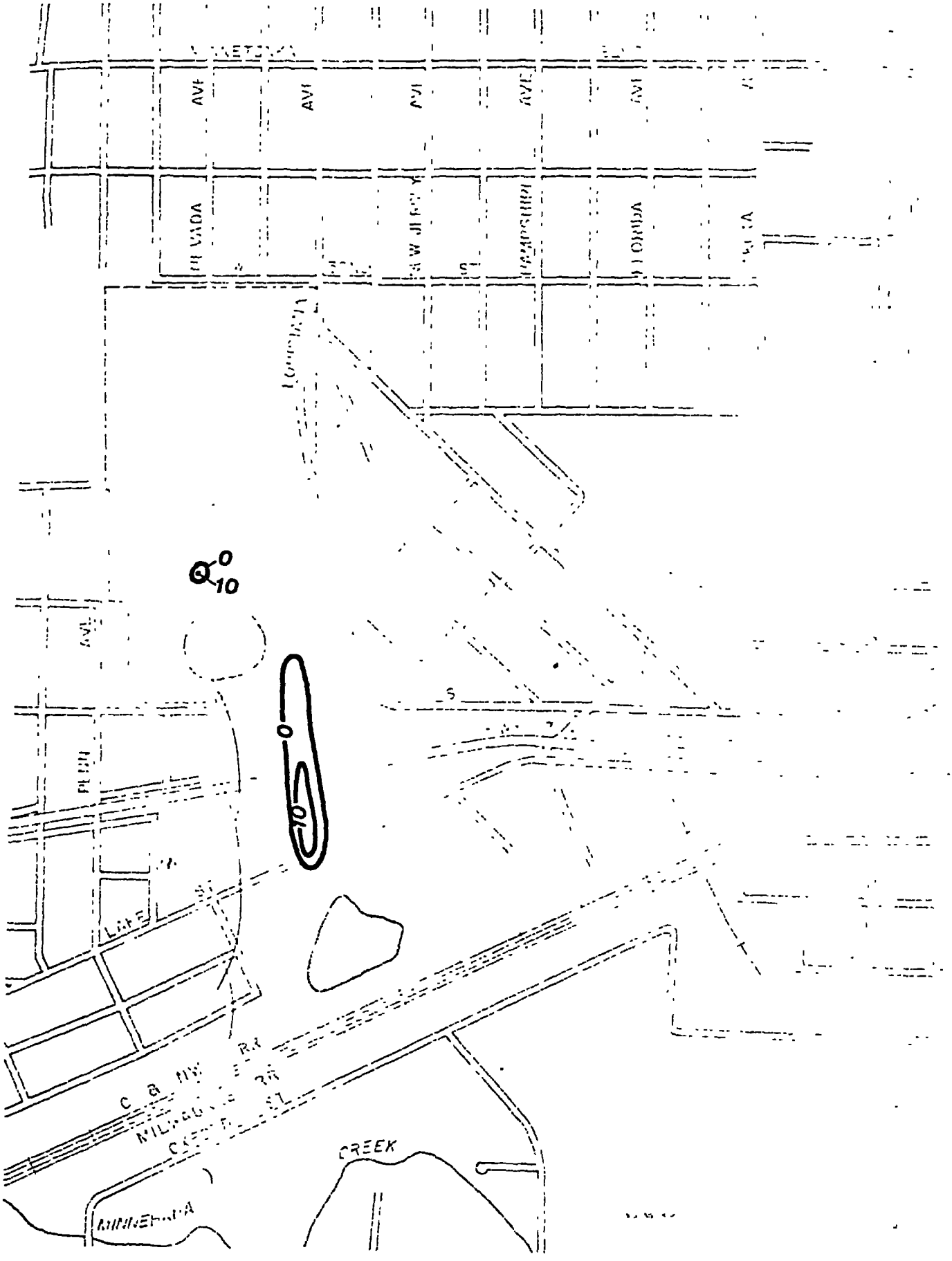


FIGURE 30

REMOVAL DEPTH CONTOURS
Soil With Phenolic Concentrations
Greater Than 100 mg/kg

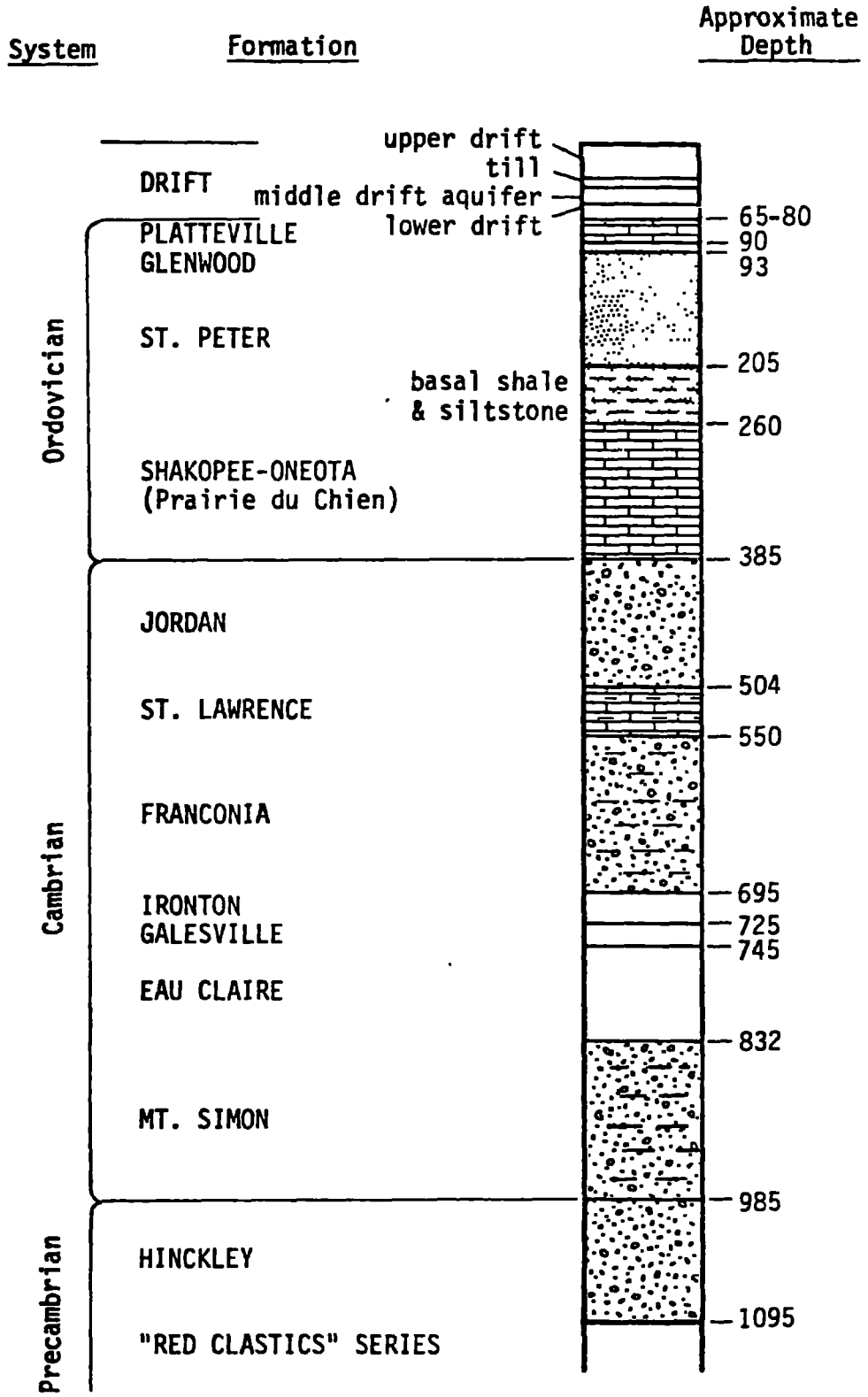


FIGURE 5

GENERALIZED GEOLOGIC COLUMN

Adopted from Sunde, Hydrogeologic Study of the Republic Creosote Site (1974).

NON-RESPONSIVE

TABLE 2

CONSTRUCTION DATA FOR MONITORING WELLS

Well No.	Elevation Top of Pipe (MSL)	Elevation Bottom of Well (MSL)	Depth (feet)	Comments
1	922.8	815.8	107	No screen, cased to top of Platteville, 5' of open hole in Platteville.
2	897.1	861.1	36	Screened in sand and gravel in middle drift aquifer.
3	896.7	844.7	52	Screened in gravel below approximately 45' of peat and muck in middle drift aquifer.
5	891.8	865.8	25	Screened in sand and gravel in middle drift aquifer.
6	892.6	866.6	26	Screened in sand and gravel in middle drift aquifer.
7	930.0	860.0	70	Screened in fine sand in middle drift aquifer.
8	893.0	862.0	31	Screened in sand and gravel in middle drift aquifer.
9	891.3	866.3	25	Screened in sand and gravel in middle drift aquifer.
10	892.1	863.1	29	Screened in gravel in middle drift aquifer.
11	897.3	874.3	23	Screened in gravel in middle drift aquifer.
12	917.4	870.4	47	Screened in sand and gravel in middle drift aquifer.
13	891.0	841.0	50	Screened in sand and gravel in middle drift aquifer.
14	891.5	796.5	95	Screened in St. Peter sandstone.
15	892.5	816.5	76	Screened in sand and gravel in lower drift.
16	892.2	828.2	64	Screened in sand in lower drift.
17	897.4	828.4	69	Screened in silty gravel in lower drift.
P-1	929.9	821.4	108.5	Screened in silty sand in lower drift.
P-2	918.0	822.0	96	Screened in silty sand in lower drift.
P-3	892.6	822.1	70.5	Screened in silty sand in lower drift.

TABLE 4

CHARACTERISTICS OF MUNICIPAL, INDUSTRIAL AND PRIVATE WELLS SAMPLED DURING STUDY

NON-RESPONSIVE

Lowest Formation	Casing Depth	Summary of Log
Shakopee	257'	73' Drift; 17' Platteville; 4' Glenwood; 157' St. Peter; 84' Shakopee
St. Peter	?	80' Drift; 20' Platteville; 2' Glenwood; 80' St. Peter
Shakopee	292'	93' Drift; 14' Platteville; 6' Glenwood; 167' St. Peter; 62' Shakopee
Jordan	288'	111' Drift; 165' St. Peter; 121' Prairie du Chien; 78' Jordan
Jordan	No Log Found	--
Shakopee	244'	92' Drift; 2' Platteville; 171' St. Peter; 47' Shakopee
Jordan	270'	94' Drift; 163' St. Peter; 120' Prairie du Chien; 89' Jordan; 19' St. Lawrence
St. Peter (160' deep)	?	No log available
St. Peter	104'	104' Drift; 32' Platteville; 154' St. Peter
St. Peter	103'+	103' Drift; 15' Platteville; 168' St. Peter
Jordan	315'	105' Drift; 20' Platteville; 165' St. Peter; 119' Prairie du Chien; 91' Jordan

KOSAKOWSKI 12/4/73 N.

Abbreviations used for PAHs in the Reilly Tar groundwater data summation:

Ace	Acenaphthene
A	Anthracene
1,2 BA	1,2-Benzanthracene
B(a)A	Benzo (a) anthracene
B(a)P	Benzo (a) pyrene
BbFl	Benzo (b) fluoranthene
B(e)P	Benzo (e) pyrene
B(ghi)P or BPR	Benzo (ghi) perylene
B(j)F	Benzo (j) fluoranthene
B(k)F or B(k)Fl	Benzo (k) fluoranthene
9,10 BPA	9,10-Benzphenanthrene
BP	Biphenyl
Ch or CH	Chrysene
1,2,3,4-D	1,2,3,4-Dibenzanthracene
DiB(ah)A	Dibenzo(a,h) anthracene
Fl	Fluoranthene
F	Fluorene
IP or ipp	Indeno (1,2,3-cd) pyrene
2MN	2-methylnaphthalene
O-p	O-phenylenepyrene
Per or Pr	Perylene
PA	Phenanthrene
P or Pyr	Pyrene
1,2,6,7 tHP	1,2,6,7-tetrahydropyrene

Name	Date	Contaminant	Concentration	Notes
SLP #1	12-4-73	phenol	.013 mg/l	
	9-69		.014	
	12-27-73		.008	
	1-08- 74		.003	
	1-30-74		<.002	
	1-16-74		<.002	
	2-05-74		.007	
	1-22-74		.009	
	1-03-74		<.002	
	9-25-73		<.002	
	9-18-73		.035	
SLP #3	12-04-73	phenol	.002	
	12-11-73		<.002	
	4-69		.012	
	3-07-68		.002	
	12-27-73		.002	
	1-08-74		.006	
	1-16-74		<.002	
	1-30-74		<.002	
	7-17-74		<.002	
	2-05-74		<.002	
	1-22-74		.004	
	1-03-74		.005	
	12-18-73		<.002	
	9-18-73		<.002	

Name	Date	Contaminant	Concentration	Notes
SLP #4	12-04-73	phenol	<.002 mg/l	
	12-11-73		.007	
	9-69		.014	
	1-14-46		.100	
	9-30-46		.115	
	6-23-48		.005	
	6-23-48		.010	
	6-30-48		.005	
	8-05-48		.070	
	8-05-48		.015	
	8-13-48		.070	
	3-07-68		.008	
	4-16-70		.005	
	12-27-73		<.002	
	1-08-74		<.002	
	1-16-74		<.002	
	1-30-74		<.002	
	7-17-74		<.002	
	2-05-74		<.002	
	1-22-74		<.002	
	1-03-74		.002	
	12-18-73		<.002	
	9-18-73		<.002	
			ng/l	
	10-19-79	Ace	230	

Name	Date	Contaminant	Concentration	Notes
SLP #4 cont.		BP	47 ng/l	5 PAHs below detection
		PA	66	
		P	87	
		FL	5.8	
		CH	3.6	
	11-08-79	BP	34	
		PA	36	8 PAHs below detection
		FL	3.3	
	11-16-74	Ace	290	6 PAHs below detection
		BP	17	
		PA	42	
		FL	2.3	
		BaP	<6.4 - 12.0	
	1-07-80	BP	100	
		PA	110	15 PAHs below detection
		F	100	
		FL	7.0	
		9,10 BPA	2.4	
	1-09-80	2 MN	200	
		Ace	530	13 PAHs below detection
		BP	99	
		PA	120	
		F	120	
		FL	6.8	
		CH	4.0	

Name	Date	Contaminant	Concentration	Notes
SLP #4 cont.	1-11-80	Ace	390 ng/l	
		BP	60	15 PAHs below detection
		PA	100	
		F	86	
		FL	20	
	1-14-80	Ace	290	
		BP	56	15 PAHs below detection
		PA	100	
		F	81	
		FL	38	
	1-16-80	Ace	230	
		BP	42	15 PAHs below detection
		PA	110	
		FL	14	
		CH	4.3	
	1-18-80	2 MNA	96	
		Ace	58	14 below detection
		BP	22	
		PA	62	
		FL	21	
		CH	4.5	
	1-21-80	2 MNA	110	
		Ace	76	14 below detection
		BP	26	
		PA	91	
		FL	25	
		CH	8.2	

Name	Date	Contaminant	Concentration	Notes
SLP #4 cont.	1-23-80	Ace	500 ng/l	
		BP	68	14 below detection
		PA	90	
		1267 thP	140	
		FL	12	
		1234 D	3.7	
	1-25-80	2 MNA	14	
		Ace	220	13 PAHs below detection
		BP	27	
		PA	61	
		1267 thP	86	
		FL	13	
		BeP	5.7	
	1-28-80	Ace	440	
		PA	70	16 PAHs below detection
		F	43	
		FL	13	
	1-30-80	2 MNA	34	
		Ace	240	15 PAHs below detection
		PA	56	
		F	50	
		FL	15	
	2-01-80	Ace	410	
		PA	64	15 PAHs below detection
		F	54	
		FL	13	
		BeP	5.3	

Name	Date	Contaminant	Concentration	Notes
SLP # 5	12-04-73	phenol	<.002 mg/l	
	12-11-73		.005	
	9-69		.014	
	9-30-46		.020	
	10-24-47		.020	
	4-16-70		<.005	
	12-27-73		<.002	
	1-08-74		<.002	
	1-16-74		<.002	
	1-30-74		<.002	
	7-17-74		.017	
	2-05-74		<.002	
	1-2-74		<.002	
	1-03-74		.003	
	12-18-73		<.002	
	9-25-73		<.002	
	9-18-73		.070	
SLP #6	12-04-73	phenol	.002	
	12-11-73		<.002	
	6-69		.023	
	10-16-47		.007	
	4-19-48		.015	
	4-23-48		.015	
	3-07-68		.0025	
	12-27-73		<.002	
	1-08-74		.007	
	1-16-74		<.002	

Name	Date	Contaminant	Concentration	Notes
SLP #6 cont.	1-30-74		<.002 mg/l	
	7-17-74		.008	
	2-05-74		.002	
	1-22-74		<.002	
	1-03-74		<.002	
	12-13-73		<.002	
	9-18-73		.004	
	10-19-79			11 PAHs below detection
	1-07-80	BP	15 ng/l	1 PAH detected 19 PAHs below detection
	1-09-80	BP	9.4	2 PAHs detected
		PA	12	18 PAHs below detection
	1-11-80	BP	7.7	2 PAHs detected
		PA	12	18 PAHs below detection
	1-14-80	PA	717	1 PAH detected 19 PAHs below detection
	1-16-80	BP	11	2 PAHs detected
		PA	8.4	18 PAHs below detection
	1-18-80	BP	22	2 PAHs detected
		A	16	18 PAHs below detection
	1-21-80	BP	15	2 PAHs detected
		A	11	18 PAHs below detection
	1-23-80	Ace	47	3 PAHs detected

Name	Date	Contaminant	Concentration	Notes
SLP #6 cont.		1234 D	4.6 ng/l	
		PA	11	17 PAHs below detection
	1-25-80	Ace	27	3 PAHs detected
		BP	9.1	17 PAHs below detection
		PA	6.1	
	1-28-80	1234 D	11	1 PAH detected
				19 PAHs below detection
	1-30-80	2 MNA	34	4 PAHs detected
		BP	74	16 PAHs below detection
		PA	13	
		1234 D	8.9	
	2-01-80			20 PAHs below detection
SLP #7	9-19-73	phenol	<.002 mg/l	
	6-69		.013	
	4-16-70		<.005	
	7-17-74		<.002	
	9-18-73		<.002	
	11-05-79			10 PAHs below detection
	1-08-80	BP	53	
		A	12	16 PAHs below detection
		P	87	
		F	61	

Name	Date	Contaminant	Concentration	Notes
SLP #7 cont.	1-22-80	Ace	31 ng/l	
		BP	30	14 PAHs below detection
		P	30	
		1267 tHP	48	
		FL	5.2	
		1,234 D	11	
SLP #8	12-04-73	phenol	.014 mg/l	
	12-11-73		<.002	
	6-69		.018	
	4-16-70		<.005	
	12-27-73		.003	
	1-08-74		<.002	
	1-30-74		<.002	
	4-17-74		<.002	
	1-03-74		.002	
	12-18-73		<.002	
	9-25-73		.004	
	9-18-73		.044	
	10-19-79	PA	5.8 ng/l	9 PAHs below detection
SLP #9	9-18-73	phenol	.003 mg/l	
	6-69		.013	
	4-16-70		<0.005	
	7-17-74		<.002	
	11-05-79			10 PAHs below detection

Name	Date	Contaminant	Concentration	Notes
SLP #10	9-18-73	phenol	.006 mg/l	
	12-04-73		.003	
	12-11-73		<.002	
	12-27-73		.013	
	6-69		.014	
	1-08-74		<.002	
	1-16-74		<.002	
	1-30-74		<.002	
	7-17-74		.011	
	11-05-79	BP	930 ng/l	
		PA + P	690	5 PAHS below detection
		Fl	810	
		1,2 BA	65	
		BaP	44	
SLP #11	9-18-73	phenol	.007 mg/l	
	12-04-73		<.002	
	12-11-73		.007	
	12-18-73		<.002	
	12-27-73		.002	
	6-69		Trace	
	3-07-68		<0.002	
	1-08-74		<.002	
	1-16-74		<.002	
	1-30-74		<.002	
	7-17-74		<.002	
	2-05-74		.025	
	1-22-74		<.002	
	1-03-74		<.002	
	10-19-79			11 PAHs below detection

Name	Date	Contaminant	Concentration	Notes
SLP #12	9-18-73	phenol	.022 mg/l	
	12-04-73		<.002	
	12-11-73		<.002	
	12-18-73		<.002	
	12-27-73		.004	
	6-69		.018	
	3-07-68		<0.00	
	1-08-74		<.002	
	1-16-74		<.002	
	1-30-74		<.002	
	7-17-74		<.002	
	2-05-74		.007	
	1-03-74		<.002	
	1-22-74		<.002	
	9-25-73		<.002	
	10-19-79			11 PAHs below detection
SLP #13	9-18-73	phenol	.018	
	12-04-73		.004	
	12-11-73		<.002	
	12-18-73		<.002	
	12-27-73		<.002	
	6-69		.018	
	3-07-68		<0.00	
	4-16-70		<0.005	
	1-08-74		<.002	
	1-16-74		<.002	
	1-30-74		<.002	
	7-17-74		.021	

Name	Date	Contaminant	Concentration	Notes
SLP #13 cont.	2-05-74		<.002 mg/l	
	1-22-74		.006	
	1-03-74		<.002	
	9-25-74		<.002	
	10-19-79			11 PAHs below detection
	1-08-80	A	5.1 ng/l	19 PAHs below detection
	1-22-80	BP	5.7	
		PA	8.7	17 PAHs below detection
		1,2,3,4-D	3.6	
SLP #14	9-18-73	phenol	<.002 mg/l	
	12-04-73		<.002	
	12-11-73		<.002	
	12-18-73		<.002	
	12-27-73		<.002	
	6-69		.009	
	3-07-68		<0.00	
	4-16-70		<0.005	
	1-08-74		<.002	
	1-16-74		.003	
	1-30-74		<.002	
	7-17-74		.006	
	1-22-74		.002	
	1-03-74		<.002	
	10-19-79	Ace	39 ng/l	
		BP	11	7 PAHs below detection
		PA	12	

Name	Date	Contaminant	Concentration	Notes
SLP #15	9-18-73	phenol	<.002 mg/l	
	12-04-73		.007	
	12-11-73		<.002	
	12-18-73		<.002	
	12-27-73		<.002	
	1-08-74		.003	
	1-16-74		<.002	
	7-17-74		<.002	
	1-03-74		<.002	
	1-22-74		<.002	
	1-30-74		<.002	
	2-05-74		<.002	
	11-08-79	BP	1300 ng/l	
		PA	1000	6 PAHs below detection
		Fl	450	
		12 BA	40	
		BaP	30	
	11-05-79	BP	1140	
		PA + P	1000	5 PAHs below detection
		Fl	550	
		12 BA	33	
		BaP	38	
	10-19-79	PA	1300	
		Fl	830	8 PAHs below detection
		12 BA	39	

Name	Date	Contaminant	Concentration	Notes
SLP #15 cont.	7-16-79	Ace + BP	3200 ng/l	
		PA + P	1700	8 PAHs below detection
		Fl	510	
	7-18-79	Ace + BP	2400	
		PA + P	1800	8 PAHs below detection
		Fl	440	
	7-19-79	Ace + BP	2800	
		PA + P	1900	8 PAHs below detection
		Fl	380	
	7-20-79	BP	450	
		A	60	6 PAHs below detection
		PA + P	1400	
		Fl	190	
SLP - Theater	6-07-79			9 PAHs below detection
		Ace	2600	
		BP	3500	
		P	3000	
		Fl	370	
		CH	24	
		phenols	<2.0	
		TOC	3.5	

Name	Date	Contaminant	Concentration	Notes
City Hall SLP	12-27-73	phenol	.002	
Hedberg Friedheim Well - 6"D (W 106)				
	8-15-79			4 PAHs below detection
		biphenyl	220 ng/l	
		A	210	
		Fl	340	
		1,2 BA	68	
		Bb Fl	62	
		ipp	25	
Q&S Machine Tool 3636 Quebec Avenue So.				
	1-03-74	phenol	<.002 mg/l	
	2-05-74		.002	
	1-16-74		<.002	
	1-08-74		.004	
Crib Diaper (W 34)	4-24-79			12 PAHs below detection
		BP	34 ng/l	
		P	35	
		Fl	19	
		1,2-BA	2.4	
		phenols	<2.0 ug/l	
		TOC	2.3 mg/l	

Name	Date	Contaminant	Concentration	Notes
Terry Excavating Company (W 27)				
	7-17-79	phenols	52 ug/l	
		TOC	3.0 mg/l	
		DOC	3.0 mg/l	
				9-11 PAHs below detection
		P	7900 ng/l	
		Fl	95	
Buidick Grain (W 47?)	1-22-74	phenol	<.002	
	1-30-74		<.002	
	2-05-74		.017	
	1-16-74		.005	
	4-05-79	phenol	<.002	21 PAHs below deteciton
Northland Aluminum Well (Carpenter Shop)				
	1-15-80			13 PAHs below detection
		2 MN	620 ng/l	
		PA	500	
		Fl	23	
		1,2-BA	38	
		CH	880	
		BPR	440	
		ipp	13	
		phenol	<2.0 ug/l	
		TOC	4.6 mg/l	
		DOC	2.4	

Name	Date	Contaminant	Concentration	Notes
North Aluminum Well (183 ft. deep (believed to be old Interior Elevator well)				
	1-11-80			15 PAHs below detection
		PA	100 ug/l	
		1,2,6,7 thP	900	
		Fl	7.6	
		1,2-BA	22	
		CH	650	
		DOC	3.2	
		phenol	11.6 ug/l	
		TOC	3.7 mg/l	
Milwaukee R.R. Well (W 38)				
	1-09-80			10 PAHs below detection
		2 MN	16,000	
		Ace	6,300	
		PA	3,100	
		1,2,6,7 thP	6,800	
		Fl	650	
		1,2-BA	2,000	
		CH	8,200	
		BeP	310	
		ipp	450	
		phenols	11.6 ug/l	
		TOC	4.7 mg/l	
		DOC	7.9	
	1-22-80	DOC	4.00 mg/l	

Name	Date	Contaminant	Concentration	Notes
NON-RESPONSIVE				
	1-14-80			14 PAHs below detection
		biphenyl	180 ng/l	
		PA	140	
		1,2,6,7 tHP	1200	
		Fl	6.7	
		1,2-BA	7.5	
		CH	180	
		phenols	<2.0 ug/l	
		TOC	4.9 mg/l	
		DOC	4.3	
NON-RESPONSIVE				
	4-26-79	Ace	35 ng/l	
		PA	7.3	11 PAHs below detection
		P	26	
		Fl	1.7	phenol 5.8 ppb
		BbFl	1.3	
	5-14-79	Ace	69	
		BP	79	7 PAHs below detection
		PA	9.8	
		P	28	
		Fl	3.6	
		1,2-BA	3.0	
		BaP	2.9	
		ipp	1.7	

Name	Date	Contaminant	Concentration	Notes
NON-RESPONSIVE				
				7 PAHs below detection
		Ace	67 ng/l	
		BP	77	
		PA	9.8	
		P	28	
		Fl	3.6	
		1,2-BA	3.0	
		BaP	2.9	
		BbFl	2.7	
		ipp	1.7	
NON-RESPONSIVE				
	6-13-79	TOC	35 mg/l	
		phenols	4.8 ug/l	10 PAHs below detection
		Fl	8.5	
		1,2-BA	9.6	
		BaP	9.3	
		BeP	12.0	
		BbFl	5.2	
		ipp	4.6	

Name	Date	Contaminant	Concentration	Notes
NON-RESPONSIVE				
	[illegible]	[illegible]	23 ng/l	
		BP	4.8	13 PAHs below detection
		1,2,6,7 tHP	16	
		Fl	19	
		CH	3.5	
		BeP	11	
		BPR	20	
	2-05-80			20 PAHs below detection
SLP Union 76 Texatonka Service Station				
	12-18-73	phenol	<.002 mg/l	
Texatonka Well (W 322)				
	8-15-79			6 PAHs below detection
		A	1,700	
		PA	17,000	
		Fl	1,500	
		1,2-BA	35	
		CH	390	
Flame Well (W 29)	10-17-79			8 PAHs below detection
		PA	24,000 ng/l	
		Fl	600	
		1,2-BA	550	
		BbFl	6.4	
	5-29-79			4 PAHs below detection

Name	Date	Contaminant	Concentration	Notes
	5-29-79 cont.			
		Ace	15,000 ng/l	
		BP	41,000	
		A	360	
		PA	5,000	
		P	19,000	
		1,2,6,7 tHP	750	
		Fl	2,800	
		1,2-BA	240	
		CH	250	
		BeP	7.9	
		BbFl	5.4	
		1,2,5,6 DBA	2.4	
		TOC	5.9 mg/l	
		phenols	70 ug/l	
SLP Flame Industries				
	4-16-70	phenol	<0.005 mg/l	
	12-18-73		.004	
	12-27-73		.003	
	1-03-74		.004	
	1-16-74		.003	
	1-30-74		.004	
	2-05-74		.004	
	1-22-74		.004	
	1-08-74		.004	
	12-11-73		.002	

Name	Date	Contaminant	Concentration	Notes
Strand Manufacturing (W 33)				
	6-05-79			12 PAHs below detection
		Fl	4.1 ng/l	
		1,2-BA	2.6	
		BbFl	2.5	
		ipp	4.0	
		phenols	220 ug/l	
		TOC	14 mg/l	
Park Pet Hospital	5-22-79			12 PAHs below detection
		Ace	15 ng/l	
		BP	63	
		Fl	2.8	
		ipp	2.4	
		phenols	<2.0 ug/l	
		TOC	5.2 mg/l	
Precision Instruments	4-26-79			12 PAHs below detection
		Fl	2.4 ng/l	
		PR	1.2	
		BbFl	1.9	
		ipp	2.4	

Name	Date	Contaminant	Concentration	Notes
S-K Products	4-16-70	phenol	<0.005 mg/l	
	12-18-73		<.002	
	12-27-73		.003	
	1-03-74		.007	
	1-16-74		<.002	
	1-30-74		<.002	
	2-05-74		<.002	
	1-22-74		<.002	
	1-08-74		<.002	
	12-11-73		<.002	
	4-17-74		<.002	
McCourtney's Plastics	4-16-70	phenol	<0.005	
	12-18-73		.002	
	12-27-73		<.002	(cooling H_2O outfall)
	12-27-73		.023	
	1-03-74		.003	
	1-16-74		.003	
	1-30-74		<002	
	2-05-74		.003	
	1-22-74		.003	
	1-08-74		.004	
	12-11-74		<.002	

Name	Date	Contaminant	Concentration	Notes
Robinson Rubber Products .				
	12-18-73	phenol	1.0 ug/l	
	12-27-73		1.2	
	1-03-74		1.2	
	1-08-74		1.0	
	1-16-74		1.1	
	1-30-74		1.1	
	2-05-74		1.1	
	5-22-74		0.62	
	1-22-74		1.2	
	1-03-74		1.2	
	12-11-74		1.1	
Minnesota Rubber	12-18-73	phenol	.008 mg/l	
	12-27-73		.009	
	1-03-74		<.002	
	1-30-74		<.002	
	2-05-74		<.002	
	1-16-74		<.002	
	1-22-74		<.002	
	1-08-74		.003	
	12-11-73		<.002	
Food Products Inc. (Food Producers)				
	12-18-73	phenol	.002	
	12-27-73		<.002	
	1-03-74		<.002	
	1-16-74		.006	
	1-30-74		.013	

Name	Date	Contaminant	Concentration	Notes
Food Products, Inc. (Food Producers) cont.				
	2-05-74		<.002 mg/l	
	1-22-74		<.002	
	1-08-74		<.002	
	12-11-73		<.002	
Prestolite Well (W 50)	8-16-79			5 PAHs below detection
		biphenyl	12 ng/l	
		PA	99	
		Fl	94	
		1,2-BA	36	
		BaP	40	
		BbFl	48	
		ipp	30	
		TOC	5.0 mg/l	
		DOC	5.8 mg/l	
		phenols	22 ug/l	
Hedberg-Freidheim, Lake Augmentation Well 7				
	8-01-79	DOC	3.1 mg/l	
		TOC	2.7 mg/l	
		phenol	12 ug/l	9 PAHs below detection
		biphenyl	65 ng/l	
		Fl	22 ng/l	
		phenols	12.0 ug/l	
		TOC	2.7 mg/l	
		DOC	3.1 mg/l	

Name	Date	Contaminant	Concentration	Notes
	1-09-79			2 PAHs below detection
		P	240 ng/l	
		Fl	29 ng/l	
		BPR	1.0 ng/l	
		ipp	0.31 ng/l	
Bloomington Well #1	1-17-80			16 PAHs below detection
		BP	10 ng/l	
		A	8.7 ng/l	
		PA	26 ng/l	
		1,2,6,7 tHP	34 ng/l	
Bloomington Well #2	6-20-80			16 PAHs below detection
		A	2.8 ng/l	
		P	82 ng/l	
		Fl	0.79 ng/l	
(2 samples-same day) high conc. chosen	3-4-80			17 PAHs below detection
		2 MN	24 ng/l	
		Fl	1.4 ng/l	
		Pr	0.67 ng/l	
	1-17-80			19 PAHs below detection
		A	8.1 ng/l	
Bloomington Well #3	6-20-80			16 PAHs below detection
		A	1.5 ng/l	
		P	88 ng/l	
		Fl	0.73 ng/l	

Name	Date	Contaminant	Concentration	Notes
Bloomington Well #3 cont.				
	3-4-80			13 PAHs below detection
		BP	9.6 ng/l	
		A	1.9 ng/l	
		1,2,6,7 tHP	106 ng/l	
		Fl	8.2 ng/l	
		1,2-BA	4.5 ng/l	
		BaP	5.7 ng/l	
		BPR	7.1 ng/l	
	1-17-80			19 PAHs below detection
		A	8.4 ng/l	
Bloomington Well #4	6-20-80			16 PAHs below detection
		A	5.8 ng/l	
		P	36 ng/l	
		Fl	1.4 ng/l	
(2 samples-same day) high conc. chosen	3-04-80			15 PAHs below detection
		BP	6.2 ng/l	
		PA	14 ng/l	
		1,2,6,7 tHP	43 ng/l	
		Fl	1.9 ng/l	
		BPR	9.3 ng/l	
	1-17-80			19 PAHs below detection
		1,2,6,7 tHP	25 ng/l	

Name	Date	Contaminant	Concentration	Notes
Minnetonka Well #6	6-12-80			17 PAHs below detection
		A	23 ng/l	
		Fl	2.2 ng/l	
	1-10-80			19 PAHs below detection
		PA	4.8 ng/l	
(2 samples-same day high conc. chosen)	5-24-79			16 PAHs below detection
		BP	2.9 ng/l	
		PA	3.0 ng/l	
		F	5.2 ng/l	
		Fl	0.92 ng/l	
Minnetonka Well #7	6-12-80			17 PAHs below detection
		FL	0.56 ng/l	
		PR	0.63 ng/l	
	1-10-80		2.2 ng/l	19 PAHs below detection
Minnetonka Well #11	6-12-80			17 PAHs below detection
		P	23 ng/l	
		Fl	1.5 ng/l	
	1-10-80			18 PAHs below detection
		PA	6 ng/l	
		BPR	18 ng/l	
	10-19-79			9 PAHs below detection
		BP	11 ng/l	
		PA	10 ng/l	
	5-24-79			13 PAHs below detection
		2 MN	24 ng/l	
		PA	1.8 ng/l	
		F	2.7 ng/l	
		Fl	1.8 ng/l	
Minnetonka Well #12	6-12-80			17 PAHs below detection
		Fl	0.84 ng/l	
		BPR	4.7 ng/l	

Name	Date	Contaminant	Concentration	Notes
Minnetonka Well #12 continued				
	1-10-80			18 PAHs below detection
		BP	8.3 ng/l	
		PA	18 ng/l	
	5-24-79			12 PAHs below detection
		BP	4.1 ng/l	
		PA	5.6 ng/l	
		F	12 ng/l	
		Fl	3.1 ng/l	
		CH	11 ng/l	
Minnetonka Well #13	6-12-80			17 PAHs below detection
		2MN	28 ng/l	
		Fl	0.87 ng/l	
	1-10-80			19 PAHs below detection
		A	2.4 ng/l	
	5-24-79			14 PAHs below detection
		2MN	17 ng/l	
		PA	2.8 ng/l	
		Fl	6.8 ng/l	
Minnetonka Well #13a	6-12-80			18 PAHs below detection
		Fl	0.48 ng/l	
	1-10-80			18 PAHs below detection
		PA	9.9 ng/l	
		CH	4.6 ng/l	
Minnetonka Well #14	6-12-80			17 PAHs below detection
		Fl	0.46 ng/l	
		BbFl	0.52 ng/l	
	1-10-80			19 PAHs below detection
		PA	13 ng/l	

Name	Date	Contaminant	Concentration	Notes
Minnetonka Well #14 continued				
	5-24-79			9 PAHs below detection
		2MN	51 ng/l	
		BP	2.9 ng/l	
		PA	13 ng/l	
		F	1.6 ng/l	
		Fl	12 ng/l	
		9,10 B PA	1.3 ng/l	
		BPR	12 ng/l	
		ipp	0.91 ng/l	
Minnetonka Well #14a	1-10-80			19 PAHs below detection
		PA	3.9 ng/l	
Minnetonka Well #15	6-12-80			18 PAHs below detection
		BPR	4.8 ng/l	
	1-10-80			19 PAHs below detection
		A	1.5 ng/l	
	10-19-79			9 PAHs below detection
		BP	7.5 ng/l	
		PA	4.7 ng/l	
Minnetonka Well #15a	6-12-80			17 PAHs below detection
		1,2,6,7 tHP	14 ng/l	
		Fl	0.58 ng/l	
	1-10-80			19 PAHs below detection
		ipp	4.7 ng/l	
North Jr. High (2 samples-same day)	5-24-79			13 PAHs below detection
		BP	2.5 ng/l	
		PA	2.8 ng/l	
		F	5.8 ng/l	
		Fl	1.3 ng/l	
Robbinsdale Well #2	6-4-80			17 PAHs below detection
		PA	1.9 ng/l	
		Fl	3.3 ng/l	
	1-24-80			18 PAHs below detection
		PA	10 ng/l	
		9,10 B PA	9.5 ng/l	

Name	Date	Contaminant	Concentration	Notes
Robbinsdale Well #2 continued				
	5-31-79			10 PAHs below detection
		A	3.1 ng/l	
		PA	11 ng/l	
		Fl	4.6 ng/l	
		PR	0.6 ng/l	
		1,2,3,4-D	2.2 ng/l	
Robbinsdale Well #3	6-04-80			19 PAHs below detection
	1-24-80	2MN	15 ng/l	
		PA	18 ng/l	
		Fl	4.8 ng/l	
		1,2,3,4-D	5.5 ng/l	
	5-31-79			12 PAHs below detection
		BP	3.6 ng/l	
		PA	5.2 ng/l	
		Fl	5.6 ng/l	
Robbinsdale Well #4	6-04-80			18 PAHs below detection
		Fl	2.8 ng/l	
	5-31-79			12 PAHs below detection
		BP	3.6 ng/l	
		PA	5.2 ng/l	
		Fl	5.6 ng/l	
Robbinsdale Well #5	6-04-80			18 PAHs below detection
		Fl	0.68 ng/l	
	1-24-80			18 PAHs below detection
		BP	5 ng/l	
	10-19-79			18 PAHs below detection
		BP	8.3 ng/l	
Robbinsdale Well #1	1-24-80			19 PAHs below detection
		PA	7.3 ng/l	
Richfield Well #1	6-04-80			18 PAHs below detection
		2MN	32 ng/l	
	1-24-80			19 PAHs below detection
		PA	6.9 ng/l	

Name	Date	Contaminant	Concentration	Notes
Richfield Well #3	6-04-80			17 PAHs below detection
		P	2.2 ng/l	
		Fl	4.9 ng/l	
	1-24-80			18 PAHs below detection
		Ace	27 ng/l	
		BP	5 ng/l	
Richfield Well #2	1-24-80			20 PAHs below detection
Richfield Well #4	6-04-80			19 PAHs below detection
	1-24-80			20 PAHs below detection
Richfield Well #5	1-24-80			19 PAHs below detection
		Fl	7.5 ng/l	
Richfield Well #6	6-04-80			16 PAHs below detection
		PA	2.1 ng/l	
		Fl	4.8 ng/l	
		PR	2.0 ng/l	
	1-24-80			19 PAHs below detection
		1,2,3,4-D	3.9 ng/l	
Richfield Well #7	6-04-80			18 PAHs below detection
		Fl	3.8 ng/l	
	1-24-80			19 PAHs below detection
		P	17 ng/l	
Hopkins Well #1	6-18-80			15 PAHs below detection
		PA	14 ng/l	
		Fl	2.1 ng/l	
		PR	4.1 ng/l	
		B(k)Fl	9.0 ng/l	
	1-17-80			15 PAHs below detection
		BP	8.6 ng/l	
		A	8.8 ng/l	
		1,2,6,7 tHP	24 ng/l	
		9,10 BA	3.1 ng/l	
		BPR	45 ng/l	

Name	Date	Contaminant	Concentration	Notes
Hopkins Well #1 continued				
	5-31-79			11 PAHs below detection
		PA	5.4 ng/l	
		P	10 ng/l	
		Fl	.58 ng/l	
Hopkins Well #3 (2 samples-same day highest conc. reported)	5-31-80			11 PAHs below detection
		A	6.2 ng/l	
		P	3.6 ng/l	
		Fl	32 ng/l	
		1,2 BA	.91 ng/l	
Hopkins Well #4	6-18-80			16 PAHs below detection
		Fl	1.5 ng/l	
		BbFl	0.53 ng/l	
	3-04-80			15 PAHs below detection
		BP	8.6 ng/l	
		P	12 ng/l	
		1,2,6,7 tHP	43 ng/l	
		Fl	5.3 ng/l	
		PR	.50 ng/l	
	1-17-80			16 PAHs below detection
		BP	9.8 ng/l	
		A	9.5 ng/l	
		1,2,6,7 tHP	20 ng/l	
		Fl	6.7 ng/l	
	5-31-79			13 PAHs below detection
		PA	4.8 ng/l	
		Fl	290 ng/l	
Hopkins Well #5	6-18-80			18 PAHs below detection
		Fl	9.4 ng/l	
	3-04-80			16 PAHs below detection
		BP	6.6 ng/l	
		A	2.8 ng/l	
		1,2,6,7 tHP	22 ng/l	
		Fl	1.0 ng/l	

Name	Date	Contaminant	Concentration	Notes
Hopkins Well #5 continued				
	1-17-80			18 PAHs below detection
		BP	6.4 ng/l	
		A	7.6 ng/l	
	5-31-79			12 PAHs below detection
		PA	14 ng/l	
		Fl	3.9 ng/l	
		1,2 BA	2.6 ng/l	
Hopkins Well #6	6-18-80			18 PAHs below
		Fl	0.72 ng/l	
(2 samples same day highest conc. reported)	3-04-80			14 PAHs below detection
		BP	9.6 ng/l	6 PAHs below detection
		A	25 ng/l	
		1,2,6,7 tHP	19 ng/l	
		Fl	2.8 ng/l	
		9,10 BPA	9.1 ng/l	
		BPR	2.7 ng/l	
	5-31-79			12 PAHs below detection
		BP	6.9 ng/l	
		PA	4.7 ng/l	
		Fl	.82 ng/l	
City Hall Distribution	5-31-79			11 PAHs below detection
		PA	18 ng/l	
		Fl	7.9 ng/l	
		1,2 BA	6.2 ng/l	
		PR	18 ng/l	

NON-RESPONSIVE

	6-06-80			18 PAHs below detection
		FL	4.4 ng/l	
	2-07-80			18 PAHs below detection
		2MN	25 ng/l	

Name	Date	Contaminant	Concentration	Notes
Methodist Hospital, SLP				
	6-06-80			13 PAHs below detection
		BP	1200 ng/l	
		A	6.5 ng/l	
		PA	240 ng/l	
		P	960 ng/l	
		Fl	110 ng/l	
		BbFl	0.34 ng/l	
NON-RESPONSIVE				
	1-14-80			14 PAHs below detection
		BP	180 ng/l	
		PA	140 ng/l	
		1,2,6,7 tHP	1200 ng/l	
		Fl	6.7 ng/l	
		1,2 BA	7.5 ng/l	
		CH	1.80 ng/l	
NON-RESPONSIVE				
	5-14-79			8 PAHs below detection
		Ace	69 ng/l	
		BP	79	
		PA	9.8	
		P	28	
		Fl	3.6	
		1,2 BA	3.0	
		BaP	2.9	
	4-26-79			11 PAHs below detection
		Ace	35 ng/l	
		PA	7.3	
		P	26	
		Fl	1.7	
NON-RESPONSIVE				
	6-13-79			11 PAHs below detection
		Fl	8.5 ng/l	
		1,2 BA	9.6 ng/l	
		BaP	9.3 ng/l	
		BeP	12 ng/l	

(16) NaOH (sodium hydroxide) discharged formerly in wastewater, and groundwater ratio Na:Cl locally approx. 2:1 (cf. road salt <1:1).
(17) DOC (dissolved organic carbon) "natural" groundwater levels apparently 1-3 mg/l.
(18) Nitrogen in groundwater enters area from W as nitrate, appears in contaminated area mostly as ammonia (total N approx. 5 mg/l).
(19) Preferential movement of more soluble compounds:

Well	Aquifer	Location	Ratio BaP:Phenol
W6	Drift	On Site	Approx. 1:1
W101	Platteville	E of Site 4,000 ft	Approx. 1:1,000

(Note: Phenol solubility approx. 10^7 times BaP's.)

(20) Drift groundwater at S and to S of Site most severely contaminated.
(21) Hydrocarbon fluid phase in drift moves downward relative to aqueous phase.
(22) Buried valleys to S and E of Site expose St. Peter sandstone.
(23) Contaminants moved at least 4,000 ft to buried valley to E of Site.
(24) TOC (total organic carbon) in "source fluid" 6,000 mg/l; at buried valley to E, groundwater DOC = 2 mg/l.
(25) Contaminant pattern in bedrock aquifers is complex.
(26) Multi-aquifer wells in area number at least 25.
(27) Downward flow of 20-150 gpm observed in 5 of these wells (4 wells with observed contamination).
(28) Prairie du Chien contaminant transport rapid due to high transmissivity, low effective porosity (solution channels).
(29) Prairie du Chien-Jordan gradient locally controlled by pumpage and multi-aquifer well injection.
(30) PdC-J wells up to 2 miles N of Site found contaminated in 1978.
(31) PdC-J water levels August 1977 also indicated movement to N.
(32) Shutdown of municipal PdC-J wells since 1978 possibly altered contaminant transport.

Name	Date	Contaminant	Concentration	Notes
NON-RESPONSIVE				
(5 samples same day highest conc. reported)	10-24-79			8 PAHs below detection
		Ace	89 ng/l	
		Fl	13 ng/l	
		1,2 BA	13 ng/l	
NON-RESPONSIVE				
	2-05-80			20 PAHs below detection
	1-22			14 PAHs below detection
		2MN	23	
		1,2,6,7 tHP	16	
		Fl	19	
		CH	3.5	
		BPR	20	
		BeP	11	
NON-RESPONSIVE	6-13-80			14 PAHs below detection
		BP	6.7 ng/l	
		PA	4.7 ng/l	
		Fl	1.1 ng/l	
		1,2 BA	5.8 ng/l	
		BaP	1.8 ng/l	
NON-RESPONSIVE	6-13-80			17 PAHs below detection
		Fl	4.1 ng/l	
		9,10 BPA	12 ng/l	
	2-05-80			20 PAHs below detection
		2MN		11 ng/l
NON-RESPONSIVE				16 PAHs below detection
	6-13-80			
		2MN	21 ng/l	
		Fl	8.0 ng/l	
		1,2,5,6 DBA	4.9 ng/l	
	2-05-80			20 PAHs below detection

Name	Date	Contaminant	Concentration	Notes
NON-RESPONSIVE				
	1-22-80			16 PAHs detected
		BP	6.0 ng/l	
		PA	9.5 ng/l	
		CH	3.9 ng/l	
		1,2,3,4 DBA	11 ng/l	
Schlampps, 29th and Hennepin Ave., Minneapolis				
	6-25-80			16 PAHs detected
		2MN	45 ng/l	
		PA	220 ng/l	
		Fl	0.88 ng/l	
	2-07-80			18 PAHs detected
		Ace	25 ng/l	
Norris Creamery, Minneapolis				
	6-25-80			16 PAHs detected
		P	30 ng/l	
		Fl	0.96 ng/l	
		CH	13 ng/l	
				16 PAHs detected
		Ace	24 ng/l	
		Fl	6.8 ng/l	
		9,10 BPA	9.8 ng/l	
Lake Harriet, N.W. corner of Lake Minneapolis				
	6-25-80			16 PAHs detected
		P	27 ng/l	
		Fl	0.98 ng/l	
		PR	1.0 ng/l	
	2-06-80			18 PAHs detected
		Ace	21 ng/l	
Muningswear Building, Minneapolis				
	6-25-80			17 PAHs detected
		2 MN	56 ng/l	
		Fl	0.71 ng/l	
	2-07-80			18 PAHs detected
	2-07-80	B(j)Fl	29 ng/l	

N.P.
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TABLE 6
ULTIMATE ANALYSIS OF PEAT SOLIDS Wt %

	GOP-1	GOP-2	GOP-3	GOP-4B	GOP-6
	43.97	42.76	44.53	45.89	45.41
d Dev.	0.304	0.050	0.354	1.018	0.290
n	4.09	3.90	4.15	4.33	4.16
d Dev.	0.042	0.057	0.050	0.071	0.099
	0.85	0.91	0.93	0.91	1.05
d Dev.	0.113	0.106	0.014	0.028	0.014
	0.1409	0.1733	0.1369	0.1460	0.1715
d Dev.	0.0001	0.005	0.003	0.002	0.016
	47.69	48.53	45.83	44.10	44.21
d Dev.	0.327	0.130	0.357	1.021	0.307
	56.42	64.00	*54.73	39.43	51.04
d Dev.	0.622	0.905	*0.021	4.957	12.473
n	1.47	1.15	*3.93	1.10	0.65
d Dev.	0.050	0.007	*0.050	0.134	0.262
n	0.88	0.70	*1.35	0.71	0.46
d Dev.	0.085	0.021	*0.028	0.000	0.000
	0.0944	0.0844	*0.3742	0.2464	0.3524
d Dev.	0.006	0.008	*0.010	0.012	0.027
	15.40	0.60	*32.59	19.79	18.53
d Dev.	0.630	0.905	*0.062	4.959	12.476
	70.74	73.51	67.30	69.38	72.72
d Dev.	0.891	0.354	0.092	5.501	3.04

N.D.
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Bases

carbazole * c
acridine *
indene
quinoline
dibenz-c,g-carbazole *
benz-c-acridine *
aniline
1-naphthylamine -
amino-biphenyl -

Volatiles

toluene
xylene
ethyl benzene *
trimethyl benzene
triethyl benzene
methyl ethyl benzene
naphthalene *
thiophene
benzofuran
pyridine
trichloro ethylene *
indene - c

Acids

phenol *
cresol *
trimethylphenol *
hydroxy-naphthalene
hydroxy-biphenyl
2,4,5-trichlorophenol
3 tetrachlorophenols
pentachlorophenol *

Neutrals

Rings	
2	naphthalene *
3	phenanthrene *
	acenaphthene *
	acenaphthylene
	fluorene
4	benz(a) anthracene *
	pyrene *
	chrysene *
	7,12-dimethyl-benz(a) anthracene
	fluoranthene *
	3-methyl cholanthrene
5	BaP *
	BeP *
	dibenz-a,h-anthracene *
	benz-b-fluoranthene
	benz-j-fluorathene
	BaP-3,6-quinone
6	indeno-1,2,3-c,d-pyrene
	dibenz- ae -pyrene, ah, ai — one *
	benzo-ghi-pyrene

biphenyl *
pinene
dibenzofuran
thiophene
benzothiophene
dibenzothiophene

Project 1-452-124 D

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TABLE 1. REVISED RESULTS OF ANALYSIS FOR BENZENE EXTRACTABLE ORGANICS

GCA Control No.	Sample I.D.	Sample Tag Number	Percent Moisture	Sample Weight (dry,g.)	Benzene Extractables (mg/kg)[a]
27675	10/18-3-4'-6'-ST-1	b	76.4	3.5	5400
27676	10/18-4-6'-8'-ST-1	b	18.8	12.2	< 250
27677	10/18-5'-8'-10'-ST-1	b	36.7	9.6	1600
27684	10/29-3-4'-6'-PB138	b	18.1	12.4	6200[c]
27838	11/8-2-2'-4'-PB140	b	6.5	14.0	17000[d]
27839	11/8-3-4'-6'-PB140	b	5.4	14.2	< 210
27840	11/8-4-6'-8'-PB140	b	22.5	11.6	< 260
27841	11/8-6-13'-15'-PB140	b	8.9	13.7	< 220
27915	11/17-2-8'-10'-PB144	b	21.1	11.8	400
27916	11/7-3-13'-15'-PB144	b	77.4	2.3	6700[d]
27919	11/17-7-28'-30'-PB144	b	11.3	13.4	< 220
35371	PB-143-#1	000103	81.9	2.7	33000
35372	PB-143-#2	000104	64.3	5.3	4800
35373	PB-143-#3A	000105	49.8	7.5	< 400
35374	PB-143#3B	000106	46.6	8.0	< 370[c]
35375	PB-143#5	000109	12.0	13.2	< 230
35376	PB-143-#10	000110	18.8	12.2	< 250
35377	B-145-#1	000201	32.1	10.2	42000
35378	B-145-#2	000202	78.6	3.2	120000
35379	B-145-#3	000203	45.6	8.2	390
35380	B-145-#4	000204	10.8	13.4	1100
35381	B-145-#6	000206	15.6	12.7	< 240
35382	B-145-#7	000207	17.8	12.3	< 240
35393	B-146-2 (2.5 - 4.5')	000121	8.4	14.0	600
35394	B-146-3 (8.0' - 10')	000123	10.5	13.4	2700
35395	B-146-4 (13' - 15')	000122	35.2	9.7	270

(continued)

TABLE 1. REVISED RESULTS OF ANALYSIS FOR BENZENE EXTRACTABLE ORGANICS (continued)

GCA Control No.	Sample I.D.	Sample Tag Number	Percent Moisture	Sample Weight (dry,g.)	Benzene Extractables (mg/kg)[a]
35396	B-146-7 (28' - 30')	000124	65.3	5.2	1500
35397	B-146-8 (33' - 35')	000125	2.0	14.7	100
35398	B-146-10 (43' - 45')	000126	0.1	15.0	< 200[c]
35399	B-146-12 (48' - 50')	000127	13.2	13.0	< 230
35400	B-146-15 (58' - 60')	000129	6.1	14.1	< 210
35401	B-147-3 (13' - 15')	000211	72.4	4.1	3000
35402	B-147-4 (18' - 20')	000212	37.8	9.3	2000
35403	B-147-5 (23' - 25')	000213	10.9	13.4	1900[c]
35404	B-147-7 (33' - 35')	000214	15.4	12.7	120
35405	B-147-8 (38' - 40')	000216	12.1	13.2	< 230
35406	B-148 (13' - 15')	000132	63.0	5.5	< 550
35407	B-148 (18' - 20')	000133	53.5	7.0	< 430
35408	B-148 (23' - 25')	000134	22.2	11.7	210
35409	B-148 (33' - 35')	000135	13.4	13.0	1000
35410	B-148 (45' - 47')	000137	11.2	13.3	26000
35411	B-148-13 (53' - 55')	000138	8.6	13.7	< 220
35412	B-148-14 (53' - 60')	000139	14.5	12.8	< 230
35413	B-149-3 (13' - 15')	000219	13.8	12.9	< 230

[a]Results based on sample dry weight; values have been method blank corrected.

[b]No tag number available.

[c]Results based on mean of replicate extraction and analysis.

[d]Results based on mean of replicate gravimetric measurements.

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TABLE 2. QUALITY CONTROL DATA: RESULTS OF ANALYSIS OF METHOD BLANKS FOR BENZENE EXTRACTABLE ORGANICS

QC Number	Gravimetric Residue (mg)
865	3.0
879	0.2
890	2.0
905	2.2
906	0.6
	$\bar{X}$ = 1.6

TABLE 3. QUALITY CONTROL DATA: PRECISION OF REPLICATE GRAVIMETRIC DETERMINATIONS

GCA Control No.	Gravimetric Residue (mg)		
	A	B	Percent Difference[a]
27684-A	84	83	1.2
27684-B	73	68	7.1
27684-C	76	76	0.0
			$\bar{X}$ = 2.8

[a]Percent difference = $\frac{A - B}{(A+B)/2}$ x 100

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TABLE 4. QUALITY CONTROL DATA: PRECISION OF REPLICATE ANALYSIS FOR BENZENE EXTRACTABLE ORGANICS

GCA Control No.	Gravimetric Residue (mg/kg)				
	A	B	C	$\bar{X}$	RSD (%)
27684	5800	6800	6100	6200	8.3
35398	< 200	< 200	< 200	< 200	NA
35374	< 370	< 370	< 370	< 370	NA
35403	2000	1900	430[a]	1900	5.3[b]

RSD = Relative standard deviation.

[a]Data rejected as outlier based on Dixon's test for extreme observations (Code of Federal Regulations, U.S. Environmental Protection Agency. 40 Part 60. Standards of Performance for New Stationary Sources. Appendix A. Reference Methods, U.S. Government Printing Office, Washington, D.C. Revised as of 1 July 1981).

[b]Reported value based on percent difference calculation, where percent difference = $\frac{A - B}{(A+B)/2}$.

NA = Not applicable.

Table 6

SLP #4

Scan #	Tentative Identification	Purity	Fit	Est. Conc. (µg/L)
Volatiles:				
58	methylene chloride	890	995	12
153	pentane	911	949	—
219	benzene	742	987	1
220	trichloroethene	---	---	<1
304	tetrachloroethene	265	818	<1
325	trimethylbenzene	837	965	—
395	trimethylbenzene	883	993	—
397	trimethylbenzene	820	994	—

Acid/Base-neutral (sample received broken).

PARMETER
(ALL VALUES IN ug/l)

Table 5-1
ANALYSIS OF SURROUNDING WATER SUPPLIES
(Samples taken 11/16/82)
Note: All compounds found at less than detection limit have been deleted

	St. Paul Influent	St. Paul Effluent	St. Paul Tap	Plymouth Influent	Plymouth Effluent	Plymouth Effluent	Plymouth Tap 1	MPLS Influent	MPLS Effluent	MPLS Tap
ANALYSIS BY:	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL
ANALYTICAL EQUIPMENT:	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS
PAH (*INDICATES CARCINOGENIC PAH)										
NAPHTHALENE	16	13	29	7.8	5.9	5.3	9.4	Note 1	9.1	Note 1
1-METHYLNAPHTHALENE		5.1	12	1.2	1.2	1.2	6.0		3.8	
2-METHYLNAPHTHALENE		7.4	17	5.3	5.0	4.3	11		5.4	
ACENAPHTHYLENE			9.0							
ACENAPHTHENE			5.3							
FLUORENE			19				9.9			
ANTHRACENE			12							
PHENANTHRENE	5	1.0	220				37		2.7	
PYRENE			64							
FLUORANTHENE			140							
PHENYLNAPHTHALENE										
1,2,6,7-TETRAHYDROPYRENE										
BENZO(a)ANTHRACENE*			6.0							
9,10-BENZPHENANTHRENE										
CHRYSENE*										
BENZO(b&k)FLUORANTHENE*			9.4							
BENZO(a)PYRENE*										
BENZO(e)PYRENE										
BENZO(j)FLUORANTHENE*										
PERYLENE										
BENZO(g,h,i)PERYLENE										
INDENO(1,2,3-cd)PYRENE*										
O-PHENYLENEPYRENE										
DIBENZO(a,h)ANTHRACENE*										
TOTAL CARCINOGENIC PAH'S	--	--	15.4	--						
TOTAL "OTHER" PAH'S	21	26.5	527	14.3						
NITROGEN HETEROCYCLES										
ACRIDINE										
CARBAZOLE			28							
INDOLE										
PHENANTHRIDINE										
QUINOLINE		4.7	5.1							
SULFUR HETEROCYCLES										
BENZO(b)THIOPHENE			1.0							
DIBENZOTHIOPHENE										
OXYGEN HETEROCYCLES										
DIBENZOFURAN			23				7.3			
MISCELLANEOUS										
BIPHENYL			4.0				10			
2,3-DIHYDROINDENE				3.2						
INDENE										
2,3-DIHYDRO-1-INDENE		1.4	1.4		1.4	1.4	1.4		1.4	
1H-INDENE			1.0	2.2	1.0	1.0	1.0		2.4	
TOTAL OTHER BASE NEUTRAL COMPOUNDS										
AROMATIC AMINES										
ANILINE										
1-AMINONAPHTHALENE										
2-AMINOBIPHENYL										

NOTE 1: Coextraction of a yellow substance caused inordinately high detection limits in these samples.

5 of Loose Papers I

? What do these come from

NP

N.A.

Table XVI

Concentration (ng/l) of PAH's in Finished and Distributed Waters[a]

Compound	Standish, ME[b] Fin	Standish, ME[b] Dist[d]	Ludlow, MA[b] Fin	Ludlow, MA[b] Dist[d]	Columbus, OH[c] Fin	Columbus, OH[c] Dist[d,f]	Portland, OR[b,c] Raw	Portland, OR[b,c] Dist[e,g]	Seattle, WA[b] Fin	Seattle, WA[b] Dist[e]	Colorado Springs, CO[b] Fin	Colorado Springs, CO[b] Dist[e]
Ph	5	57	2	3	3	17	8	3300	2	32	3	29
Fl	2	10	1	1	1	13	4	640	3	8	2	6
Pyr	1	5	1	1	<1	8	6	340	2	2	<1	<1
1-MP	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
An	<1	<1	<1	<1	--	--	--	--	<1	<1	<1	<1
Ch	<1	<1	<1	<1	<1	4	<1	6	<1	<1	<1	<1
B(a)A	<1	<1	<1	<1	<1	3	<1	2	<1	<1	<1	<1
Per	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
B(e)P	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
B(a)P	<1	<1	<1	<1	<1	--	<1	<1	<1	<1	<1	<1
B(ghi)P	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1
B(b)F	<1	<1	<1	<1	<1	4	<1	3	<1	<1	<1	<1
B(k)F	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	<1	<1
DiB(ah)A	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
IP	<1	<1	1	1	<1	<4	<1	<1	<1	<1	<1	<1
Total	8	72	5	6	4	54	18	4300	7	42	5	35

a < Indicates that the compound may or may not have been present at less than this concentration
b Zoldak, 1978
c Sorrell, et al., 1979
d Asphalt lining
e Coal tar lining
f Sediment present in water sample
g Taken at the end of a low demand 24" transmission line

Table VII

PAHs in Raw and Finished Waters in the United States[a] (ng/l)

Compound	Cincinnati OH Raw	Cincinnati OH Fin	New Orleans LA Distributed	Miami FL Raw	Miami FL Fin	Seattle WA Raw	Seattle WA Fin	Portland OR Raw	Columbus OH Fin	Cape Girardeau MO Raw	Cape Girardeau MO Fin	Wheeling WV Raw	Wheeling WV Fin	Jefferson Parish LA Raw	Jefferson Parish LA Fin	Tucson AZ Raw
Ph	14	10	14	6	14	10	12	8	3	14	5	9	4	20	14	10
Fl	<7	<3	<5	<4	<4	<4	<8	4	1	11	1	15	4	25	7	<2
Pyr	<14	<4	<3	<4	<6	<4	<6	6	<1	9	<1	15	2	18	3	<2
1-MP	<6	<4	b	<2	<1	<1	<1	<1	<1	<1	<1	5	<1	5	<2	<2
An	b	b	b	b	b	b	b	b	b	1	<1	b	<1	2	<2	<2
Ch	4	<1	<1	<1	2	<1	2	<1	<1	5	<1	8	<1	8	<2	<2
B(a)A	4	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	9	<1	9	<2	<2
Per	b	<1	<1	<1	<1	<1	<1	<1	<1	b	<1	<4	<1	7	b	b
B(e)P	b	<1	<1	<1	<1	<1	<1	<1	<1	b	<1	b	<1	<14	<2	<2
B(a)P	9	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	13	<1	12	<2	<2
B(ghi)P	<1	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	9	<1	7	b	b
B(b)F	5	<1	<1	<1	<1	<1	<1	<1	<1	4	<1	16	<1	9	<2	<2
B(k)F	3	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	7	<1	3	<2	<2
DiB(ah)A	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<2	<2	<2
IP	<4	<1	<1	<1	<1	<1	<1	<1	<1	<3	<1	<12	<1	<9	<2	<2
Total	39	10	14	6	16	10	14	18	4	58	6	107	10	125	24	10

a Sorrell, et.al., 1979.
b Not analyzed.

PARAMETER
(ALL VALUES IN ug/l)

Table 5-2
ANALYSIS OF SURROUNDING WATER SUPPLIES
(Samples taken 1/20/83)

	ST. PAUL Effluent	ST. PAUL Tap 1	ST. PAUL Tap 2	SLP-8	SLP-8	SLP Tap 1	MPLS Effluent	MPLS Tap 1
ANALYSIS BY:	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL	CH2M HILL
ANALYTICAL EQUIPMENT	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS
PAH (*INDICATES CARCINOGENIC PAH)								
NAPHTHALENE	13	45	21	7.0	7.0	5.6	8.8	20
1-METHYLNAPHTHALENE	4.9	26	6.7	2.9	2.9	2.5	2.9	4.6
2-METHYLNAPHTHALENE	8	58	12	5.9	5.9	5.2	4.7	9.3
ACENAPHTHYLENE								
ACENAPHTHENE		1.0	1.3			2.6		1.3
FLUORENE		1.4	6.3			4.4		
ANTHRACENE								
PHENANTHRENE	2.3	25	95	1.0	1.0	9.3	1.0	1.0
PYRENE	1.0	3.0	12			1.0		
FLUORANTHENE	1.0	9.3	43			2.5		1.0
PHENYLNAPHTHALENE								
1,2,6,7-TETRAHYDROPYRENE								
BENZO(a)ANTHRACENE*	1.0							
9,10-BENZPHENANTHRENE								
CHRYSENE*	2.3	1.0	3.0					
BENZO(bkk)FLUORANTHENE*								
BENZO(a)PYRENE*								
BENZO(e)PYRENE								
BENZO(j)FLUORANTHENE*								
PERYLENE								
BENZO(g,h,i)PERYLENE								
INDENO(1,2,3-cd)PYRENE*								
O-PHENYLENEPYRENE								
DIBENZO(a,h)ANTHRACENE*								
TOTAL CARCINOGENIC PAH'S	3.3	1.0	3.0	--	--	--	--	--
TOTAL "OTHER" PAH'S	30.2	168.7	197.3	16.8	16.8	33.1	17.4	37.2
NITROGEN HETEROCYCLES								
ACRIDINE								
CARBAZOLE		1.1	5.0					
INDOLE								
PHENANTHRIDINE								
QUINOLINE	8.2	6.6	9.0		1.0	1.0	2.4	3.2
SULFUR HETEROCYCLES								
BENZO(b)THIOPHENE		2.0	1.0			1.0		1.0
DIBENZOTHIOPHENE								
OXYGEN HETEROCYCLES								
DIBENZOFURAN		2.0	6.9			2.0		
MISCELLANEOUS								
BIPHENYL		2.2	1.0			2.6		1.0
2,3-DIHYDROINDENE	3.5	19	4.2	1.4	1.4	4.9	4.1	4.1
INDENE	1.0	2.3	1.0	1.0	1.0	2.3	1.0	1.0
TOTAL OTHER BASE NEUTRAL COMPOUNDS								
AROMATIC AMINES								
ANILINE								
1-AMINONAPHTHALENE								
1-AMINOBIPHENYL								

NOTE: All compounds found at less than detection limit have been deleted.

GT 10/10 [illegible]

N.D.
N.

PRELIMINARY

BORING LOG

GCA

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
Twin Tow	1-619-078	1 OF 2	PB136

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
Background: 36th & Minnehaha	Lat & Long	90°	—

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
10/18	10/25	Braun Engr.	CME-75	4"			93.5'

CORE RECOVERY (ft, %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140# / 30"	4" / 7'	P. HUDOBIRO

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH	CORE RUN / SAMPLE RECOVERY	CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS25	2'	6"		13	25	2	3	3	5			1	Top soil; organic, roots & grass	Mud & cuttings discharged to rock per instruction of Mike Hansel, stand pipe with 2.65' stick up. Water table @ 5'. The hole was not drilled to spoon since they advance the casing, then roller bit and then sample 2' ahead of casing. Operation start @ 11:00. SS sampler is 2.5" ID and the tip is flush inside
	2'	12"		16	50	3	3	4	6			2	Top soil, roots, grass, clayey	
SS	2'	14"		12	58	2	2	4	4	5		3	Brown fibrous peat	
SS	2'	20"		12	83	2	1	4	5			4	Top 6" is black non fibrous peat with some roots. Rest is lake beds. Med-coarse sand, mostly qtz with organic silt/clay rich zones ≈ 1cm thick interlayered	
SS	2'	24"		15	100	4	4	4	3	10		5		
SS	2'	23.6"		44	98	9	11	11	13			6	Top 6" is organic s/c non fibrous peat. Bottom 12" is a peat layer followed by well sorted outwash sand mostly qtz. Med-coarse	
										15			gray till. Very fine silty clay with pebbles and ox. zones at the bottom 0.6'	
SS	2'	23.2"		42	97	4	10	12	16			7	gray till. Pebbles of LS, SS, and mafic rocks.	
										20				
SS	2'	18"		39	75	6	9	12	12			8	gray till. Same as #7	
										25				
SS	2'	0		62	0	12	16	17	17			9	Same material consists of fine gravel imbedded in grey clay. No sand; out sumach coarse material; pebbles ≈ 2cm LS, red SS, basalt & rock fragments	
										30				
SS	2'	0.7'		57	35	10	14	23	10			10	coarse outwash material 0.5-2cm. with a trasition to reddish brown sandy clay at bottom 7".	
										35				
SS	2'	2'		72	100	15	21	16	20			11	Fine gravelly outwash no diff. in composition blends in to gray till with oxidation zones.	
										40				
												12	gray till	

SS = SPLIT SPOON; ST = SHELBY TUBE
D = DENNISON; P = PITCHER; O = OTHER

SITE: Background: 36th & Minnehaha

HOLE NO. PB136

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
Reilly TAR	1-619-078	2 OF 2	PB 136

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	4th 6"	ELEVATION	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	4"	115	17	21	19	32	43				12	grey till	
										45				
SS	2'	3"	97	13	20	26	21	30				13	grey till	Reduced sampler tip to spec.
										50				
SS	2'	9.5"	155	40	35	38	38	44				14	moderately sorted med. sand, lts + feldspars with rock frags. of LS, red SS (arkose) + mafic rocks, basalt and granitic with dark inclusions. Bottom 4" fine gravel of same composition	
										55				
SS	2'	9"	71	38	16	18	16	21				15	grey till	
										60				
SS	2'	0	192	0	21	41	55	75				16		
										65				
SS	2'	0	345	0	44	80	126	95				17	pebble of LS, basalt, gabbro, arkosic SS, olivine basalt, rock frags. with olivine xtls; 0.5-2 cm. Outwash	
										70				
SS	2'	0.85'	189	43	36	44	46	63				18	grey till	
										75				
SS	2'	1.85'	208	93	35	45	64	64				19	Mod sorted med. sand with fine gravel overlying gray till	
										80				
SS	2'	0.8'	244	40	19	60	86	79				20	sandy matrix with fine gravel of LS, red SS, basalt + gabbro rock frags. Reddish brown,	
										85				
SS	2"	1'	201	50	21	180						21	reddish brown medium sand matrix with pebbles. Overlying chunky (2-3 cm) of soft weathered LS gray-white in color	Loss of all washing + mud. at 87.5'
										90				

SS = SPLIT SPOON; ST = SHELBY TUBE
D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003B

PRELIMINARY

OBSERVATION WELL CONSTRUCTION SUMMARY

PROJECT Reilly TAR 1-619-078

SITE Background clean #1 36d Minnehaha

COORDINATES

DATE COMPLETED 10/25/82

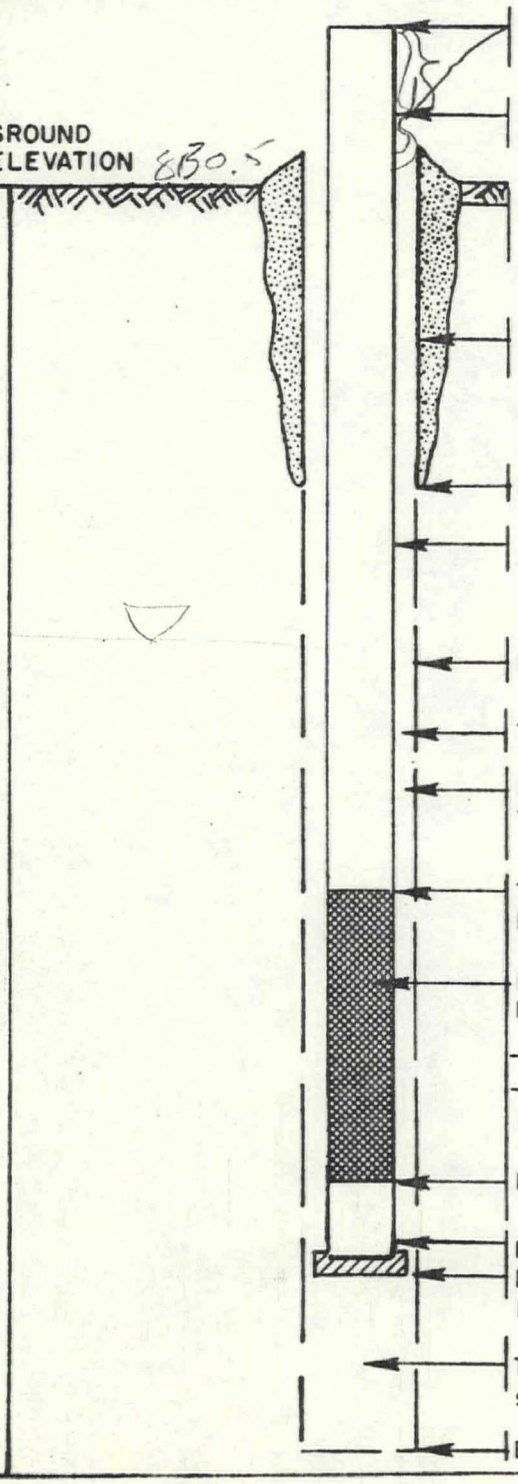
SUPERVISED BY P. Heidbolm

WELL NO. PB13C

AQUIFER Platteville limestone (Screen location)

GROUND ELEVATION 880.5

GENERALIZED STRATIGRAPHY



Elevation of reference point	882.5
Height of reference point above ground surface	2
Depth of surface seal	2'
Type of surface seal: concrete	
I.D. of surface casing	4"
Type of surface casing: steel with welded locking cap	
Depth of surface casing	~~2~~ 5'
I.D. of riser pipe	2"
Type of riser pipe: galvanized 10.5 section	
Diameter of borehole	4"
Type of filler: cement/bentonite 1:1	
Elevation / depth of top of seal	86'
Type of seal: 6:1 Cement/Bentonite	
Type of gravel pack No. 20 Silica Sand	
Elev./depth of top of gravel pack	87.5'
Elevation / depth of top of screen	89.3'
Description of screen 3' x 2" welded slot No 10	
I.D. of screen section	
Elevation / depth of bottom of screen	92.3'
Elev./depth of bottom of ~~gravel pack~~ bentonite	92.3'
Elev./depth of bottom of plugged blank section	93.5'
Type of filler below plugged section / bentonite	
Elevation of bottom of borehole	93.5'

GCA CORPORATION
Technology Division

FORM 1002

PRELIMINARY

WATER LEVEL MEASUREMENTS (Field)

Measured by P. Huidobro

Location of project Reilly TAR - 36th & Minnehaha

Date	Hour	Well	Tape Reading at Meas. Point	Tape Reading at Water Lv.	Depth to Water	Remarks
10/29	8:00	PB136			8.60	All readings are
10/29	8:13	PB136			16.72	from ground surface
10/29	8:15	PB136			17.20	and measured in
10/29	8:17	PB136			13.61	feet.
10/29	8:18	PB136			12.90	
10/29	8:20	PB136			11.42	
10/29	8:22	PB136			10.50	
10/29	8:24	PB136			9.81	
10/29	8:26	PB136			9.54	
10/29	8:28	PB136			9.40	
10/29	8:30	PB136			9.31	
10/29	8:32	PB136			9:31	
10/29	8:33	PB136			9:31	

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GCA CORPORATION
Technology Division

FORM 1000

PRELIMINARY

GCA	BORING LOG	PROJECT: Reilly TAR	JOB NO.: 1-619-078	SHEET NO.: 1 OF 2	HOLE NO.: PB137

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
Background; 36th & Kimmelsby		90°	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
10/26	10/28	Brown Engr.	CME 75	4"			86.5'

CORE RECOVERY (ft, %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140# 30"	4" x 7'	P. Huidobro

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4th 6"	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	0.7'	17	35	2	4	5	5			1	Top soil with grass and roots and pebbles. Probably fill	
SS	2'	0.8'	18	40	4	5	4	5			2	Top soil overlying Brownish peat with fibers	
ST	1'	1'		100					5		3	Fibrous peat	ST: 3" x 30"
ST	2.5'	0		0							4	bounced off rock. Covered on the outside by black non fibrous peat	
ST	2.5'	2.5'		100					10		5	Top and bottom of sampler show Lacustrine gray clays	
ST	2.5'	2.5'		100							6	Top is clay; bottom shows typical gray till w/ fine gravel.	
									15				Washings are uniform through out the rest of the hole, showing fine gravels and some gray s/c. very little sand.
									20				
									25				
ST	0	0									7	No penetration, Retrieved some pebbles 1x1 cm and coarse sand. No s/c. Typical outwash, pebbles of LS, SS (red), and basaltic composition, sands are mostly qtz.	
									30				
									35				
									40				

SS = SPLIT SPOON; ST = SHELBY TUBE
D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
Reilly TAR	1-619-078	2 OF 2	PB127

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N" / PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
								45				
								50				
								55				
								60				
								65				
								70				
								75				
								80				
ST	1'	1'	100					85		8	Top inch of gray till and ≈ 1' of large (3-4 cm) chunks of weathered LS light gray with white streaks. Very soft. Broken with finger nails. No sand, no outwash	Loss of H_2O & Mud. Roller bit to 86.5' is difficult and jumpy. No readings are recorded.
								90				

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003B

PRELIMINARY

OBSERVATION WELL CONSTRUCTION SUMMARY

PROJECT Reilly TAR

SITE 36 [illegible]

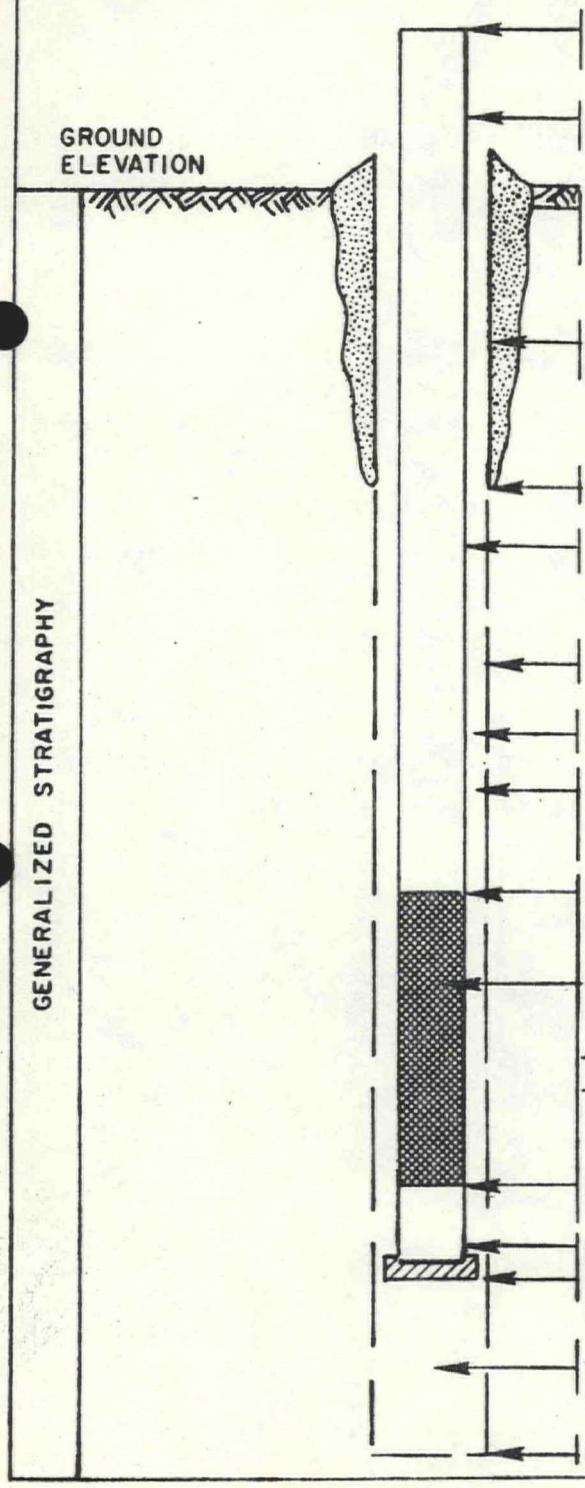
COORDINATES

DATE COMPLETED 10/27/82

SUPERVISED BY P. Hudobro

WELL NO. PB137

AQUIFER Glacial Drift



Elevation of reference point _____

Height of reference point above ground surface _____

Depth of surface seal _____

Type of surface seal: _____

I.D. of surface casing _____

Type of surface casing: steel with vented locking cap

Depth of surface casing 5'

I.D. of riser pipe 2"

Type of riser pipe: galvanized

Diameter of borehole 4"

Type of filler: 1/1 cement/bentonite

Elevation / depth of top of seal 74.6'

Type of seal: 1/1 cement/bentonite

Type of gravel pack Silica Sand No. 20

Elev./depth of top of gravel pack 75.6'

Elevation / depth of top of screen 82.3'

Description of screen No. 10 slot welded galvanized

I.D. of screen section _____

Elevation / depth of bottom of screen 85.3'

Elev./depth of bottom of ~~gravel pack~~ bentonite 86.5'

Elev./depth of bottom of plugged blank section 86.5'

Type of filler below plugged section bentonite

Elevation of bottom of borehole 86.5'

GCA CORPORATION
Technology Division

FORM 1002

WATER LEVEL MEASUREMENTS (Field)

PRELIMINARY

Measured by P. HUIDOBRO

Location of project REILLY TAR - 36th & Minnehaha

Date	Hour	Well	Tape Reading at Meas. Point	Tape Reading at Water Lv.	Depth to Water	Remarks
10/29	8:34	PB137			8.70'	All Readings are
10/29	8:45	PB137			18.65	from ground surface
10/29	8:47	PB137			14.05	and measured in
10/29	8:48	PB137			8.95	feet
10/29	8:48'30"	PB137			8.70	

GCA CORPORATION
Technology Division

FORM 1000

PRELIMINARY

GCA BORING LOG	PROJECT: Reilly TAR	JOB NO.: F619-078	SHEET NO.: 1 OF 2	HOLE NO.: PB138

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
34th & Xylon - Wyoming		90°	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
10/29/82	11/2/82	BRAUN ENGR.	CME 75				78.5'

CORE RECOVERY (ft, %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
		19				77'

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140#/30"	4"/7'	P. HUIDOBRO

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE	LENGTH CORE RUN	SAMPLE RECOVERY	CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	4th 6"	ELEVATION	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
2.5" SS	2'	1.2'			30	60	4	7	8	11				1	Brown top soil and fill, sandy clay silt with pebbles (≈1cm). Roots & grass.	Drilling uninterrupted using method of Sampling ahead of the casing; RB 3' and driving casing 5' Supply of mud in continuous now, due to pressure in the field of a longyear mud mixer. Operation goes faster and without problem.
SS	2'	0.8'			42	40	12	9	9	12				2	Organic black topsoil; sandy silt. Bottom 2.5cm is a 0.5cm layer of brownish fibrous peat overlying 2cm of gray clay	
SS	2'	0.6'			27	30	6	7	8	6		5		3	Brown mod. sorted brown sand, 90% qtz, rest is mafic rock frags. Layer of bitumen @ 2cm large (3cm) chunks of tar	
SS	2'	1.5'			24	75	4	5	8	7				4	4" top layer of oxidized red-brown clay; followed by 4" of brown medium sand, mostly qtz & rock frags. ≈ 7" of black/brown fibrous peat and a layer of black non-fibrous peat at the bottom.	
3.0" ST	2.5'	1.8'				90						10		5		
															Top is black peat, bottom gray till: poorly sorted sand and fine gravel (LS)	
SS	2'	1'			60	50	16	12	14	18		15		6	Poorly sorted sand and fine gravel; angular qtz, feldspars and mafic rock frags. LS gravel and red SS and red qtz. Fine Gravel < 5% and up to 0.5cm.	
															gray till. 30% fine sand (qtz) and s/c with oxidized zones intermittent. Sporadic layers of very fine sand predominant and fine gravel consisting mostly of LS chips very angular, and well rounded fragments of mafic rocks. Pebbles of all sizes up to ≈ 1cm, some red amorphous qtz (agate), red SS and feldspar rich RX are also present. No structures except for the yellow/brown oxidation zones at the top of this layer. At this depth there appears to be a preferred orientation of some shale pebbles. Gravel content increases.	
SS	2'	1.8'			27	90	4	6	7	10		20		7		
SS	2'	1.7'			42	85	7	8	11	16		25		8		
SS	2'	1.8'			72	90	23	11	17	21		30		9		
															Coarse gravel of up to 4x2cm pebbles of weathered LS, olivine basalt, red SS, feldspar granite/olivine, garnets, mica); agate granite and feldspar phenocrysts.	
SS	2'	1'			370	50	80	66	90	134		35		10	Outwash fine sand. Moderately to well sorted, with no gravel due < 5% s/c. Brown in color due to presence of mafic minerals and red agate grains, and iron stained qtz grains. Sand is in general feldspar depleted, being mostly orthoclase. The sand in this unit increases in size with depth, although the sorting coefficient remains constant	
SS	2'	2'			197	100	50	49	45	53		40		11		

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 34th & XYLON

HOLE NO.: PB138

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT: Reilly TAR | JOB NO. 1-619-078 | SHEET NO. 2 OF 2 | HOLE NO. PB138

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4th 6"	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	1.5'	233	75	55	59	56	63	45		12		
ST	30"	24"		80					50		13		
	2'	16"	399	67	84	127	100	88	55		14	Finer grain size with a s/c rich one inch layer. Same outwash as above the thin s/c layer	
SS	2'	1.5'	500	75	83	104	100	213	60		15	Thin layer of highly compacted s/c. Outwash similar to above layer	
SS	2'	1.5'	222	75	55	47	54	66	65		16	Med. to coarse poorly sorted sands, mostly qtz interlayered with highly compacted s/c. Fine gravel of basalt, shale, red ss. with red and blue/green zones of reducing & oxidizing seasonal environments.	
SS	2'	1.5'	114	75	28	29	30	27	70		17	Lacustrine s/c gray, uniform layer 70% silt, 25% clay, <5% very fine sand with lenses of gray very fine sand. Large rafted pebbles of basaltic composition	
SS	2'	14"	87	58	23	23	19	22	75		18		
												Washings consist of qtz, feldspar, ls and mafic minerals sand coarse to medium size, chips of weathered ls are observed.	
SS	3"	0	300	0	300				80		19	weathered bedrock.	No loss of H2O at bedrock contact perhaps it is not weathered or fractured. Washings from 80' come out with fine sand and large LS chips.
									85				
									90				

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 34th & Xylon / Wyoming

HOLE NO. PB138

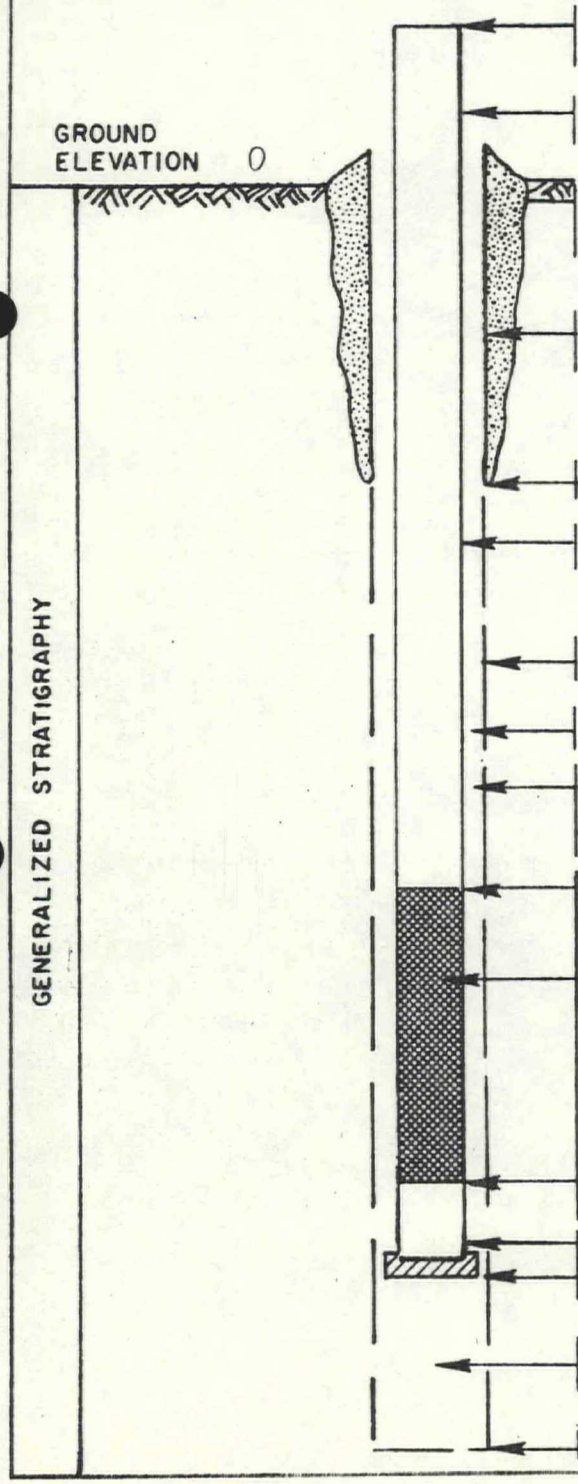
FORM 1003B

PRELIMINARY

OBSERVATION WELL CONSTRUCTION SUMMARY

PROJECT Reilly TAR
SITE 34th & Xylon / Wyoming
COORDINATES
DATE COMPLETED 11/2/82
SUPERVISED BY P. Hridobro

WELL NO. PB 138
AQUIFIER Glacial Drift



Elevation of reference point	
Height of reference point above ground surface	
Depth of surface seal	
Type of surface seal: concrete	
I.D. of surface casing	4"
Type of surface casing: steel	
Depth of surface casing	5'
I.D. of riser pipe	2"
Type of riser pipe: galvanized steel, coupled	
Diameter of borehole	4"
Type of filler: cement / bentonite 1:1	
Elevation / depth of top of seal	57.5'
Type of seal: 6:1 cement / bentonite	
Type of gravel pack Silica sand #20	
Elev./depth of top of gravel pack	59.3'
Elevation / depth of top of screen	63.5'
Description of screen No. 10 slot welded steel	
I.D. of screen section	2"
Elevation / depth of bottom of screen	66.5'
Elev./depth of bottom of gravel pack	72'
Elev./depth of bottom of plugged blank section	78.5'
Type of filler below plugged section bentonite	
Elevation of bottom of borehole	78.5'

GCA CORPORATION
Technology Division

FORM 1002

PRELIMINARY

BORING LOG

GCA

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
RSILLY TAR	1-619-078	1 OF 2	PB139

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
31st & Quebec		90°	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
11/3/82	11/4/82	BRAUNSINGER	CME 75	4"			67.5'

CORE RECOVERY (ft, %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
		17				66'

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140# / 30"	4" / 5'	P. Hnidobro

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	4th 6"	ELEVATION	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	14"	32	58	3	7	11	11				1	Top Soil, organic rich with grass roots and oxidized zones. Coarse sand and rock fragments with pebbles of up to 2C cm. Mostly qtz and feldspar, LS, and mafic rx. Some compacted clay zones. Evidence of bioturbation. Clean sand at bottom	Continuous sampling for top 10', after which samples are taken ahead of the H casing, after RB and introduction of casing. Safety considerations are applied as per contract requirements because site is suspected to be contaminated. No contamination by oil or creosote is observed in the RB washings and cuttings
SS	2'	1.2'	57	60	8	15	15	19				2		
SS	2'	2'	72	100	12	16	20	24		5		3		
SS	2'	1.5'	14	75	3	3	3	5				4	3" of brown peat. very fibrous compacted uniform black non-fibrous peat. No accessories, strong decomp. odor organic rich. Very fine sand layer at bottom.	
SS	2'	1.5'	7	75	0	2	2	3				5		
										10				
SS	2'	0	18	0	5	4	4	5				6	Possibly transition from peat to loc. clays as evidenced by blow count.	
										15				
SS	2'	14"	8	58	1	2	2	3				7	Lacustrine clayey silts with interlayered lenses of very fine sand (varves?) Very uniform layer.	
ST 30"	30"	30"		100						20		8	~~Outwash sand well sorted~~	
SS	2'	14"	60	58	13	15	20	12		25		9	S/C layer in contact with out-wash sands < 1% gravel. Mostly qtz feldspar, mafic rock frags and LS. gray uniform S/C	
SS	2'	1.5'	65	75	13	11	17	24		30		10	Gray till. Fine to medium sand with up to 30% S/C, Mostly qtz, orthoclase and rock frags of quartz, red SS, mafic rx and LS. Red-brown oxidized zones are 1-2" thick of med. sand and no S/C. Gravel increase of granitic & mafic rx and LS. up to 4x3 cm.	
SS	2'	1'	88	50	22	21	20	25		35		11	Outwash material. Sand fraction is brown, fine to coarse sand, poorly sorted, qtz and rock frags of SS, LS and mafic rocks (x 5%) are very angular with the exception of the black rocks. Fine to medium gravel is pervasive throughout this thick layer. Up to a	
SS	2'	0	71	0	23	18	15	15		40		12		Character of washings at the intervals

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 31st & Quebec

HOLE NO. PB139

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
REILLY TAR	1-619-078	2 OF 2	PB 139

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE	LENGTH CORE RUN	SAMPLE RECOVERY	CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4-4 1/2"	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	0	100	0	28		27	20	25		45		13	few centimeters in size, it has the sample general composition: the coarse sand, namely, fragments of both granitic and mafic rocks, with LS chunks and red SS as well as red agate qtz rocks. A layer 4" thick of well sorted fine sand is observed at ≈ 53', mostly qtz with ≈ 40% of rock fragments of red SS and agate qtz. No s/c and no gravel, underlyed by coarser outwash very poorly sorted and with fine to coarse gravel of the same character as material above the sand. This thick unit of outwash material is in contact with approximately 1" of red till which overlies bedrock. Red till is 30% silt 50% very fine sand and clay; 20% large pebbles (2-4cm) of LS, mafic rocks and red SS.	where no samples are recovered are consistent with those above and below those intervals core catcher is replace after sample # 13. Samples 15 & 16 are impossible to extrude from liners, possibly due to highly cohesive fine sands. @ 64', RB is jumpy and hydraulic pressure ≈ 800 lbs. Washings contain chunks of weathered limestone.
SS	2'	1'	92	50	19		26	22	25		50		14		
SS	2'	4"	150	17	33		38	38	41		55		15		
SS	2'	1'	193	50	40		46	52	55		60		16		
SS	0.5'	0	200	0	200						65		17	Bedrock	
											70				

SS = SPLIT SPOON; ST = SHELBY TUBE
D = DENNISON; P = PITCHER; O = OTHER

SITE: 31St & QUEBEC

HOLE NO. PB 139

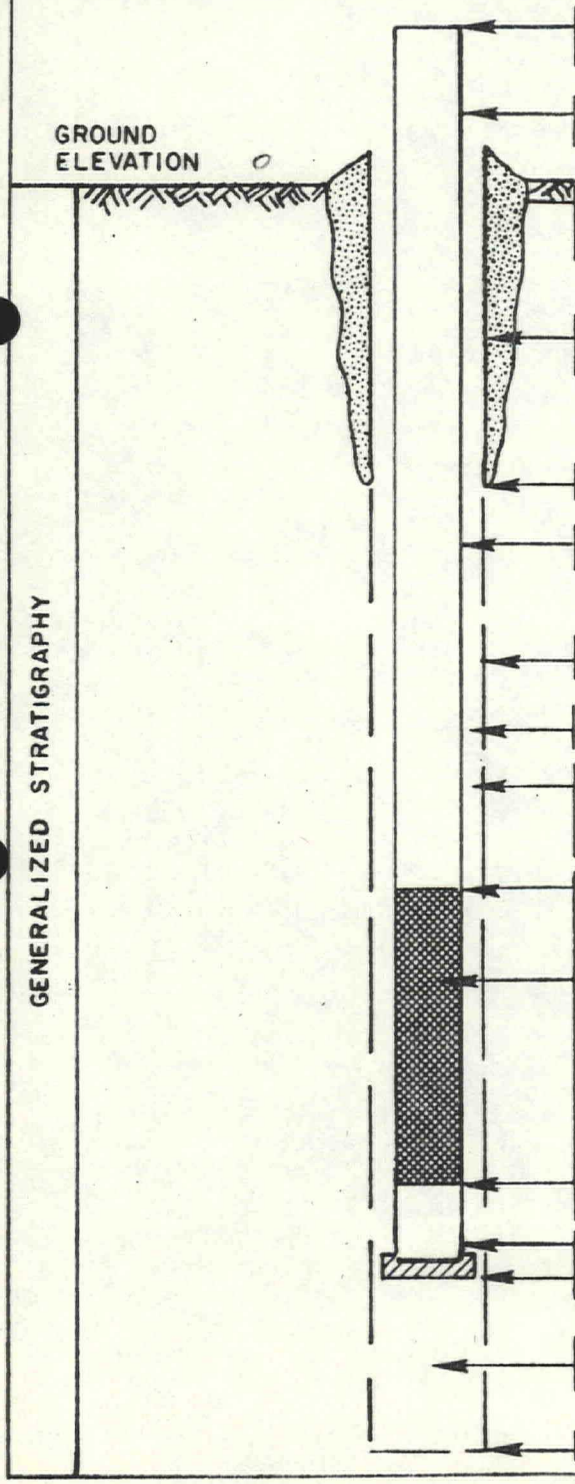
FORM 1003B

PRELIMINARY

OBSERVATION WELL CONSTRUCTION SUMMARY

PROJECT: REILLY TAR
SITE: 31st & QUEBEC
COORDINATES:
DATE COMPLETED: 11/5/82
SUPERVISED BY: P. Huidobro

WELL NO. PB139
AQUIFER: Glacial Drift



Elevation of reference point	
Height of reference point above ground surface	
Depth of surface seal	
Type of surface seal: concrete	
I.D. of surface casing	4"
Type of surface casing: steel 7' x 4"	
Depth of surface casing	
I.D. of riser pipe	2"
Type of riser pipe: coupled galvanized steel	
Diameter of borehole	4"
Type of filler: 1:1 cement / bentonite	
Elevation / depth of top of seal	55'
Type of seal: 6:1 cement / bentonite	
Type of gravel pack: silica Sand	
Elev./depth of top of gravel pack	56.5'
Elevation / depth of top of screen	59.0'
Description of screen: No. 10 slot welded steel	
I.D. of screen section	2"
Elevation / depth of bottom of screen	62.0'
Elev./depth of bottom of gravel pack	66.0'
Elev./depth of bottom of plugged blank section	67.5'
Type of filler below plugged section: bentonite	
Elevation of bottom of borehole	67.5'

GCA CORPORATION
Technology Division

FORM 1002

PRELIMINARY

GCA	BORING LOG	PROJECT: REILLY TAR	JOB NO.: 1-619-078	SHEET NO.: 1 OF 2	HOLE NO.: PB140

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
Louisiana Av. Near W23		90°	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
11/8/82	11/10/82	Brown Sugr	CME 75	4"			71'

CORE RECOVERY (ft. %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140#/30'		P. Heidobro

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE	LENGTH CORE RUN	SAMPLE RECOVERY	CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4th 6"	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	1.6'	1.5'	274		94	2	10	31	231				1	Top soil, brown sandy clay with roots and grass.	Using existing pit to dispose of cuttings and mud.
SS	2'	1.5'	231		75	105	53	38	35				2	Well compacted black bituminous material gravelly sand all coated with black material. Tar smell. Material is very brittle.	Samples recovered from tarry layer are impossible to extrude from liners; they have to be scraped off
SS	2'	1'	43		50	12	14	9	8		5		3	Coarse, moderately sorted brown sand mostly qtz and rock fragments in color	
SS	2'	1.8'	27		90	6	5	7	9				4	1" layer of black sand (coated)	
ST	30"	18"			60						10		5	Very uniform layer of fibrous peat. gray-black silty clay with gravel (4 cm). Strong tarry smell.	
														gray medium-fine sand, mostly qtz with some gravel, weathered LS and xtline rocks	Washing from smelly zones come out with an iridescent, oily film floating on top.
SS	2'	16"	48		67	14	11	11	12		15		6	Very smelly silty clay gray on top and brown at bottom interlayered with coarse gravel.	
SS	2'	1''	79		50	20	21	17	21		20		7	Outwash, mod. sorted sand and fine gravel. It is not possible to determine its color because the grains appear to be saturated with very smelly "oily" fluid that coat all particles with an iridescent sheen. Mineralogy & petrology are tentative at best, mostly qtz and rock fragments. Gravel components are LS, red SS and xtalline rocks of basaltic nature as well as porphyritic igneous rocks. Subporphyritic mafic rocks are also present. Phaneritic rocks of granitic composition with subhedral fabric. Gravel component decreases with depth and the sediment becomes better sorted in the medium to coarse sand range, which is about 90% qtz with little feldspars and rock fragments. Silt and clay content of this outwash is less than 10%.	Smell from washings is unbearable, HNU reading is 75 ppm, though.
SS	2'	0	90		0	20	19	22	29		25		8		Casing does not advance beyond 27'; Rolla bit goes through. When pulled out, drill pipe is all chewed up, bit brings up a large chunk of jasper.
SS	2'	6"	61		25	16	15	16	14		30		9		Cuttings & washings from RB from 30'-55' consist of sand and broken gravel. Sand is fine and gravel is about 1 cm
SS	2'	0	74		0	19	20	18	17		35		10		
SS	2'	0	118		0	18	22	32	46		40		11	48'-50' into the out wash consists of poorly sorted very fine to coarse sand with 25% gravel	

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT: REILLY TAR | JOB NO. 1619-078 | SHEET NO. 2 OF 2 | HOLE NO. PB 140

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N" / PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	4th 6"	ELEVATION	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	0	160 0	49	32	34	45		45		12	and traces of silt and clay. Sand is reddish brown in color, and consist mostly of qtz with a large component of red and black rock fragments and some Red SS chips. Rock fragments are very angular and in general with a high sphericity value.	It is possible that this material is no held properly by the core catcher, or interfering with the ball valve on top, thus the samples are flushed out. Left the site @ 16:30 after hitting bedrock and under heavy snow and hail/sleet.
SS	2'	4"	59 17	9	14	20	16				13		
SS	2'	0.5'	83 25	18	29	18	18		50		14	58'-60' Outwash zone with mineralogy and petrology similar to overlying zone. Well sorted medium sand 90% qtz 10% feldspars and fragments of mafic rx and red SS. Traces of S/C. No gravel.	
SS	2'	0	156 0	34	43	41	38		55		15		
SS	2'	10"	75 42	21	22	17	15		60		16	63'-65' Outwash is poorly sorted very fine to coarse brown sand with about 5% gravel.	
SS	2'	10"	146 42	24	31	59	32		65		17	Red/Brown till in contact with bedrock. This unit is composed of ≈70% very fine sand, 25% silt and clay and ≈5% medium gravel. Fine portion is mostly qtz while pebbles are of mafic rock, and LS, angular to well rounded. Unstratified.	
SS	1.5'	0.5'	242 33	50	40	152			70		18		
												Bedrock	
									75				

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003B

PRELIMINARY

OBSERVATION WELL CONSTRUCTION SUMMARY

PROJECT Reilly Tar

SITE Louisiana Abe Netto to W23

COORDINATES

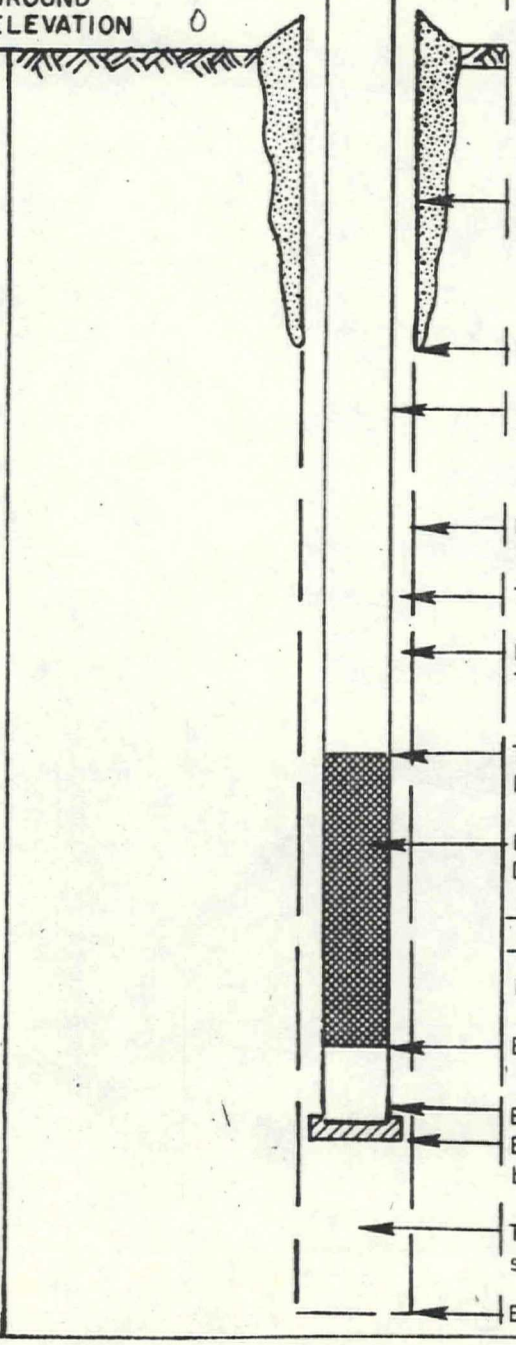
DATE COMPLETED 11/10/82

SUPERVISED BY P. Hrudobro

WELL NO. PB 140

AQUIFER Glacial Drift

GROUND ELEVATION 0



GENERALIZED STRATIGRAPHY

Elevation of reference point	2'
Height of reference point above ground surface	
Depth of surface seal	
Type of surface seal: Concrete	
I.D. of surface casing	4"
Type of surface casing: steel 7' long	
Depth of surface casing	5'
I.D. of riser pipe	2"
Type of riser pipe: galvanized steel	
Diameter of borehole	4"
Type of filler: 1:1 cement/bentonite	
Elevation / depth of top of seal	62.0
Type of seal: 6/1 Cement/bentonite	
Type of gravel pack No. 20 Silica Sand	
Elev./depth of top of gravel pack	63.0'
Elevation / depth of top of screen	65.7'
Description of screen No. 10 slot welded galvanized	
I.D. of screen section	2"
Elevation / depth of bottom of screen	68.7'
Elev./depth of bottom of gravel pack	70.0'
Elev./depth of bottom of plugged blank section	71.0'
Type of filler below plugged section	
Elevation of bottom of borehole	71.0'

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23
187

GCA CORPORATION
Technology Division

FORM 1002

PRELIMINARY

GCA **BORING LOG**

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
REILLY TAR	1619-078	1 OF 2	B141

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
Hwy 7, west of Louisiana Ave. Ext.		90°	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
11/15/82	11/15/82	BRAUN ENGR	CME 75	4"			65'

CORE RECOVERY (ft. %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140# / 30'		P. Hoidolno

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE	LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	4th 6"	ELEVATION	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	1.1'	37	55	12	9	8	8			5		1	0-08' Black sand and gravel, organic rich fill. 1'-30' is fill material that comprises the embankment for the Hwy 7 overpass. No particular odor or visible contaminants are detected in this interval. Fill is poorly sorted material ranging from fine sand to fine gravel. Sand fraction consists mostly of qtz and rock fragments of LS and mafic vx. Gravel is composed mostly of well rounded pebbles of gabbro and red SS. Between 18' and 30' there are small blotches of yellow-brown oxidized zones.	Drilling on a 2-lane Hwy. One lane closed imposes time limitations for drilling time thus no casing is used. Hollow stem is used instead, with RB as appropriate. Sampling ahead of auger.
SS	2'	1.3'	41	65	13	11	8	9			10		2		
SS	2'	1.5'	57	75	14	12	11	20			15		3		
SS	2'	1.5'	102	75	26	23	18	35			20		4		
SS	2'	1.8'	82	90	37	14	10	21			25		5		
SS	2'	0.4'	60	20	12	12	19	17			30		6	30'-35' odorless black, organic silt and clay layer; uniform with some very fine sand	
SS	2'	2'	65	100	4	11	18	32			35		7	33'-35' Uniform layer of brown peat, rich in light-brown fibers. Odorless	
SS	2'	2'	27	100	3	6	8	10			40		8	38'-43.5' Organic rich, well compacted dark grey decomposed peat with abundance of fresh H_2O shell fragments, layer is odorless and structureless. Mostly silt with some clay.	

SS = SPLIT SPOON; ST = SHELBY TUBE
D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT: REILLY TAR | JOB NO. 1-619-078 | SHEET NO. 2 OF 2 | HOLE NO. B141

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4th 6"	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	1.8'	41	90	3	8	14	16	45		9	Grey till made up of about 90% very fine sand and silt with clay and fine gravel. Strong creosote smell	
SS	2'	0	61	0	22	15	12	12	50		10	48'-65' Outwash. Moderately to poorly sorted sands mixed with some gravel. Sand portion consists of qtz, red ss and mafic rock fragments. Feldspar content is <5%, mostly orthoclase. Gravel grains measure up to about 3 cm consist of well rounded pebbles of mafic rock and quartzite.	
SS	2'	1.2'	61	60	16	13	14	18	55		11		Forced to abandon site @ 15:30. Boring grout to the top and cuttings discarded on site.
SS	2'	0.4'	60	20	21	13	12	14	60		12		
SS	2'	0	63	0	27	14	12	10	65		13		
									70				

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003B

PRELIMINARY

BORING LOG

GCA

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
REILLY TAR	1-618-078	1 OF 2	B142

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
WALKER AV. & Louisiana Ext.		90°	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
11/11/82	11/12/82	BRAUN ENGR	CME 75	4"			64'

CORE RECOVERY (ft. %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 # / 30"		P. HUDOBRO

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE	LENGTH CORE RUN	SAMPLE RECOVERY	CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4½ 6"	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'		1'		30	50	3	6	11	10			1	0-0.5' Top soil - organic, grass, roots. 0.5-1.8' Brown fill. Sandy clay, fibrous, fine gravel (1cm). No odor or contaminants present. Sand amount increases.	Original site under 2' of H2O due to heavy rain. Moved location across the street. Drill using hollow stem auger with RB as appropriate. AW rod. Auger is 3¼" I.D. Sample #6 lost due to character of sediments, which are washed out due to grain size.
SS	2'		8"		36	33	6	6	9	15			2	Brown peat, fibrous @ 3-4' non fibrous @ 4'-5.5'	
ST	2.5'		1.9'			76					5		3	outwash sand. med-coarse	
SS	2'		0.7'		38	35	9	8	11	10	10		4	Uniform layer of black organic top soil, mostly clay with fine gravel up to 1cm. No odor moist on top.	
SS	2'		1.5'		48	75	11	12	13	12	15		5	10'-48' Outwash: 13'-20' Moderately sorted coarse sand with strong creosote smell. Contamination is not visible. 80% qtz, 5% LS, 15% mafic minerals and rock fragments.	
SS	2'		0		33	0	9	9	8	7	20		6		Character of washings remains the same through about the 45' marker: "dominantly fine sands."
SS	2'		1'		62	50	20	18	12	12	25		7	23-45' Unstratified outwash with very poorly sorted sand and fine gravel (2-10 mm). Sand composition similar to 13'-20' layer. Gravel is about 50% quartzite fragments, 30% basalt chips and feldspar phenocrysts with porphyritic fabric; mixed with fragments of red sandstone, limestone and mafic rocks. Fragments are very angular of all shapes.	
SS	2'		0		42	0	8	13	11	10	30		8		
SS	2'		1'		79	50	33	15	15	16	35		9		
SS	2'		8"		34	33	6	8	13	7	40		10	Creosote smell is still very evident in this layer through to the 45' marker.	

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT: REILLY TAR | JOB NO. 1-619-078 | SHEET NO. 2 OF 2 | HOLE NO. B142

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION (4'6")	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	1'	30	50	4	6	9	11	45		11		
												48'-≈55' Unstratified red glacial till. The entire unit has a characteristic creosote smell, though the contaminants are not visible. This thick layer is highly compacted and generally composed of silty clay, with little sand and fine to coarse gravel, mostly basalt & other xtalline rock fragments; angular. More sand and less compacted at bottom.	
SS	2'	2'	279	100	26	71	82	100	50		12		
SS	2'	1.2'	94	60	7	13	26	48	55		13		
SS	2'	1.5'	224	75	44	40	50	90	60		14	55'-63. Outwash. Brown sand (qtz, mafic xx & LS & red SS) well sorted, coarse. Gravel at bottom up to 2cm pebbles of LS, red SS, angular to subangular. Creosote smell is evident	
SS	0	-	300	0	300				65		15	Weathered limestone bedrock	Auger jumps & jerks @ 63'. Truck lifted @ 63.7'
									70				

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003B

PRELIMINARY

GCA BORING LOG	PROJECT: REILLY TAR	JOB NO.: 1-619-078	SHEET NO.: 1 OF 2	HOLE NO.: PB 144

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
Filled swamp S of Hy 7; 164' W of W13		90	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (ft.)	ROCK (ft.)	TOTAL DEPTH
11/17/82	11/19/82	BRAUN ENGR	CME 75	4"			58'

CORE RECOVERY (ft, %)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140#/30"		P. Hoidobro

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4+76.11	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	0	35	0	10	11	8	6	5		1	0-~10' Top soil and fill material: Generally black sandy muck with oxidized zones yellowish brown. Pebbles of LS and red SS are 2-5 cm strong smell of rubber. Few isolated black fibrous clay, possibly peat chunks	
SS	2'	1.2'	4	60	1	1	1	1	10		2	@ 13' a thin layer of grey silty clay with large pebbles in contact with brown fibrous peat. Very strong smell difficult to describe: H_2S, tar, creosote. down to 15'	
SS	2'	1'	26	50	5	5	8	8	15		3		
ST	30"	2.5'		100							4	15-24' Peat layer, very mature black silt and clay peat with numerous shell fragment of fresh water molluscs Peat is slightly fibrous and has the characteristic odor described in 13'-15' portion; however, contaminants are no distinguishible with the naked eye.	@ 18' No washings come out during introduction of H casing, this is probably due to dissolution of organic material which will absorb the fluids.
SS	2'	1.5'	10	75	0	3	3	4	20		5		
SS	2'	1.5'	21	75	2	7	5	7	25		6		
												24'-25' Brown SK with black blotches, strong smell	
SS	2'	1'	59	50	9	15	18	17	30		7	28'-51' Outwash: Generally an unstratified, structureless layer of poorly sorted medium to coarse sand and fine to medium gravel. Sand portion is mostly quartz and rock fragments. Pebbles are chiefly limestone and mafic rocks, and rocks of granitic composition with abundant	
SS	2'	0	73	0	20	20	17	16	35		8		
SS	2'	0	50	0	24	12	7	7	40		9		

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003A

PRELIMINARY

GCA **BORING LOG**

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
REILLY TAR	1-619-078	2 OF 2	PB144

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N" / PERCENT CORE RECOVERY	PENETRATION BLOWS 1st 6"	2nd 6"	3rd 6"	ELEVATION 4th 6"	DEPTH, ft	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2'	0.5'	127 / 25	28	41	30	28	45		10	agate silica. Isolated small (1cm) chunks of hard intmixed bitominous material found at ≈ 45', mixed with some grey colored silt and clay. This entire outwash unit has the typical smell described (?) for the 13'-15' interval.	samples that here are probably being washed out or the # of blows is the result of compaction of weathered material by the sampler
SS	2'	0	178 / 0	48	43	41	34	50		11		
SS	2'	0	144 / 0	55	36	28	25	55		12	55'-60' weathered L-S bedrock	
SS	1'	0	415 / 0	177	238			60		13		
								65				

SS = SPLIT SPOON; ST = SHELBY TUBE
D = DENNISON; P = PITCHER; O = OTHER

SITE

HOLE NO.

FORM 1003B

PRELIMINARY

OBSERVATION WELL CONSTRUCTION SUMMARY

PROJECT REILLY TAR

SITE Filled Swamp; S of Hy 7, 164' W of W13

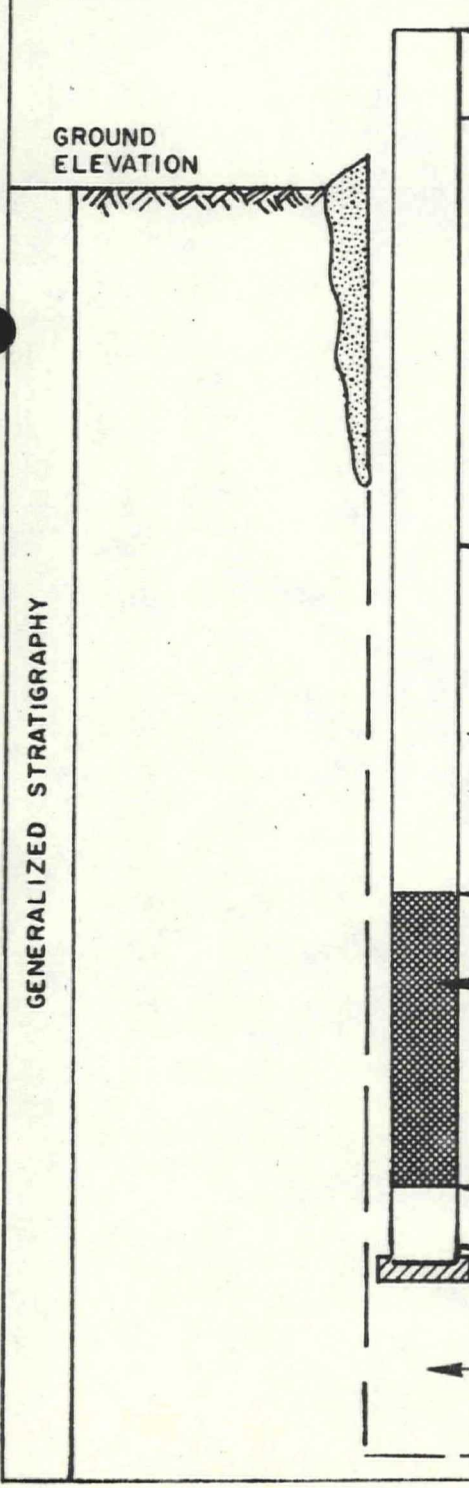
COORDINATES

DATE COMPLETED 11/19/82

SUPERVISED BY P. HUIDOBRO

WELL NO. PB144

AQUIFER Glacial Drift



Elevation of reference point	
Height of reference point above ground surface	
Depth of surface seal	
Type of surface seal: concrete	
I.D. of surface casing	4"
Type of surface casing: black steel	
Depth of surface casing	5'
I.D. of riser pipe	2"
Type of riser pipe: galvanized, coupled 10.5' section	
Diameter of borehole	4"
Type of filler: 1:1 cement/bentonite	
Elevation / depth of top of seal	41.3'
Type of seal: 6:1 cement/bentonite	
Type of gravel pack No.20 Silica Sand	
Elev./depth of top of gravel pack	42.3'
Elevation / depth of top of screen	44.3'
Description of screen No 10 slot galvanized, welded	
I.D. of screen section	2"
Elevation / depth of bottom of screen	47.3'
Elev./depth of bottom of gravel pack	52'
Elev./depth of bottom of plugged blank section	54'
Type of filler below plugged section bentonite	
Elevation of bottom of borehole	58'

GCA CORPORATION
Technology Division

FORM 1002

8/10-13/81 Sampling

Wells

Compounds	Sample Number* #3 343	#4 310	#5 311	#6 312	#7 317	#8 313	#9 314	Hinckley #11 317	Hinckley #12 309	Hinckley #13 318	#14 320	#15 319	#16 315	Field Blank
Naphthalene	99	<10	182	<10	<10	145	<10	<10	132	11	145	1180	[illegible]	26
Acenaphthylene	<60	<60	2280	<60	<60	<60	<60	<60	<60	<60	<60	1475	60	<60
Acenaphthene	185	107	6560	<60	<60	<60	<60	<60	<60	91	<60	780	<60	<60
Fluorene	18	27	2210	<10	<10	<10	<10	<10	<10	<10	<10	249	12	<10
Phenanthrene	<10	<10	2210	<10	<10	<10	<10	<10	<10	<10	17	118	45	59
Anthracene	<31	<31	1300	<31	<31	<31	<31	<31	<31	<31	<31	862	<31	<31
Fluoranthene	<1	6	716	<1	<1	<1	4	<1	<1	<1	2	532	<1	1
Pyrene	2	10	603	<2	<2	<2	<2	<2	<2	<2	6	360	4	<2
Benzo(a) anthracene	<1	<1	4	<1	<1	<1	<1	<1	1	<1	<1	9	<1	<1
Chrysene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5	<2	<2	17
Benzo(k) fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(a) pyrene	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1
Dibenzo(a,h) anthracene	<1	<1	<4	<1	<1	<1	<1	<1	<1	<1	<1	<3	<1	<1
Benzo(g,h,i)perylene, 7-12-dimethyl benzo(a)anthracene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

*All concentrations are expressed in parts per trillion

WATER ANALYSIS
WELL NO. 5 - ST. LOUIS PARK
SAMPLE OF AUGUST 17, 1981

* All concentrations are expressed in parts per trillion

PNA Compound	Serco	Iowa	Iowa
Acenaphthene	<55	4010	3905
Acenaphthylene	940	1169	713***
Anthracene	1000	402	462
Benza(a)anthracene	28	24	10
* Benzo(a)pyrene	130	<1	<1
Benzo(ghi)perylene	<12	<1	<1
Benzo(k)fluoranthene	<3.7	<1	<1
* Chrysene	16	21	18
Dibenzo(ah)anthracene	<32	<1	<1
Fluoranthene	600	591	558
Fluorene	**	1432	530
Naphthalene	<27	<40	<40
Phenanthrane	2600	1497	2053
Pyrene	770	351	304

** Coelutes with acenaphthene

*** Peak shoulder interference

Done as a result of routine sampling done week of 8/10/81.

Identical procedures except for N_2

Table 5 (36): PAH in St. Louis Park Drinking Water, 1978.
(ng/l, ppt)

Well	Depth (feet)	A	P	FI	BaP	BghiPE	OPP	N
SLP #3	236	< 1.9	< 47	< 0.9	<1.1	< 4.4	<1.1	< 10
SLP #4	500	<1.9	< 47	4.5	<1.1	< 4.4	<1.1	< 10
SLP #5	465	<1.9	< 47	< 7.4	<1.0	< 4.1	<1.2	< 10
SLP #6	480	<1.9	< 47	< 1.0	<1.0	< 4.8	<1.5	< 10
SLP #7	446	11.4	104	7.4	<1.1	< 4.4	<1.1	< 10
SLP #8	507	<1.9	< 47	< 0.8	<1.1	< 4.4	<1.1	< 10
SLP #9	473	12.2	199	21.1	<1.1	< 4.4	<1.1	< 10
SLP #10	500	100	800	450	<1.1	< 9.8	<2.1	-
SLP #10	500	54	486	152	1.3	4.4	<1.2	80
SLP #11	1000	<1.9	< 47	< 0.9	<1.1	< 4.5	<1.1	< 10
SLP #12	1095	<1.9	< 47	< 0.9	<1.1	< 4.5	<1.1	< 10
SLP #13	1040	<1.9	< 47	1.0	<1.1	< 4.5	<1.2	< 10
SLP #13	1040	<1.9	< 47	< 0.9	<1.2	< 4.9	<1.1	< 10
SLP #14	485	6.3	< 47	4.2	1.8	5.5	2.2	< 10
SLP #14	485	6.3	< 47	2.4	<1.2	5.4	<1.1	< 10
SLP #15	503	190	750	390	<1.2	< 10.7	<2.4	-
SLP #15	503	241	1221	292	1.5	6.8	2.0	160
SLP #16	500	<1.9	< 47	< 0.8	<1.1	< 4.4	<1.1	< 10

Key: < = less than detection limit. A = anthrancene, P = pyrene, FI = fluoranthene, BaP = benzo(a)pyrene, BghiPE = benzo(a,hji)perylene, OPP = O-phenylenepyrene, N = naphthacene.

of Minnesota
Form 203

St. Louis Park #4 ✓

TABULATION SHEET

DATE OF TABULATION____

TABULATED BY__Minnesot

9403936

date of sample	lab number	total volume pumped in previous 24 hours	2-methylnaphthalene	acenaphthalene	biphenyl	anthracene	phenanthrene	pyrene	1,2,6,7-tetrahydropyrene	fluorene	fluoranthene	1,2-benzanthracene	chrysene	benzo (a) pyrene	9,10-benzphenanthrene	benzo (e) pyrene	perylene	benzo (g,h,i) perylene	benzo (k) fluoranthene	benzo (j) fluoranthene	o-phenylenepyrene	1,2,3,4-dibenzanthracene	
		x 1000 gal.	nanograms/liter = parts per trillion																				
1-7-80	55767	0.	<47.	<100.	95.	<1.5	110.	<14.	<15.	100.	7.0	<6.6	<3.7	<8.5	2.4	<7.3	<2.0	<14.	<2.5	<8.7	<3.6	<7.5	
1-9-80	55774	0.1	200.	530.	99.	<1.5	120.	<14.	<15.	120.	6.8	<6.6	4.0	<8.5	<2.0	<7.3	<2.0	<14.	<2.5	<8.7	<3.6	<7.5	
1-11-80	55800	0.	<47.	390.	60.	<1.4	100.	<14.	<14.	86.	20.	<6.2	<3.6	<8.0	<3.1	<7.0	<2.5	<14.	<2.2	<8.3	<3.3	<7.2	
1-14-80	55813	0.	<54.	290.	56.	<1.6	100.	<16.	<16.	81.	38.	<7.1	<4.1	<9.2	<2.1	<8.0	<2.9	<16.	<2.5	<9.5	<3.8	<8.2	
1-16-80	55837	0.	<28.	230.	42.	<1.6	110.	<15.	<14.	<7.9	14.	<3.8	4.3	<9.0	<2.0	<5.5	<3.0	<11.	<2.0	<8.8	<3.4	<3.9	well dept
1-18-80	55878	0.1	96.	58.	20.	<1.6	62.	<15.	<14.	<7.9	21.	<3.8	4.5	<9.0	<2.0	<5.5	<3.0	<11.	<2.0	<8.8	<3.4	<3.9	casing de
1-21-80	55884	0.1	110.	76.	26.	<1.6	91.	<15.	<14.	<7.9	25.	<3.8	8.2	<9.0	<2.0	<5.5	<3.0	<11.	<2.0	<8.8	<3.4	<3.9	
1-23-80	55906	0.	<8.8	500.	68.	<12.	90.	<16.	140.	<4.3	12.	<3.0	<3.1	<8.9	<4.6	<3.4	<3.0	<9.1	<2.0	<10.	<3.0	3.7	
1-25-80	55930	0.7	14.	220.	27.	<12.	61	<16.	86.	<4.3	13.	<3.0	<3.1	<8.9	<4.6	5.7	<3.0	<9.1	<2.0	<10.	<3.0	<3.0	casing to
1-28-80	55947	0.	<24.	440.	<48.	<17.	70.	<23.	<37.	43.	13.	<3.2	<10.	<10.	<10.	<4.8	<4.6	<11.	<2.5	<11.	<3.5	<3.5	open hole
1-30-80	55979	0.	34.	260.	<48.	<17.	56.	<23.	<37.	50.	15.	<3.2	<10.	<10.	<10.	<4.8	<4.6	<11.	<2.5	<11.	<3.5	<3.5	
2-1-80	55007	0.	<24.	410.	<48.	<17.	64	<23	<37.	54	13.	<3.2	<10.	<10.	<10.	5.3	<4.6	<11.	<2.5	<11	<3.5	<3.5	pumping
																							drawdown

N.D.
N.

Table 21

A. PAHs IN WATER SAMPLES FROM W13

Analysis by WRD

Compound	WRD of USGS (ng/l)	
naphthalene	220,000	
acenaphthylene	<5,250	
acenaphthene	<5,250	(Not reported in HPLC analysis 8,000,000 by GC/MS)
phenanthrene	6,300	630,000
anthracene	6,600	66,000
fluoranthene	420,000	
pyrene	500,000	
chrysene	360	< 360
benz(a)anthracene	300,000	
benzo(a)pyrene	160,000	
dibenz(a,h)anthracene	160,000	16,000
indeno(1,2,3-C,d)pyrene	27,000	
benzo(ghi)perylene	92,000	

10/80 ?

B. Amines & Heterocyclics in Water Samples from W13

2-methylpyridine	41
benzeneamine	705
4-methylbenzeneamine	647
3-methylbenzeneamine	297
2-methylquinolene	21
benzo(h)quinolene	7
acridine	106
benzo(f)quinolene	2
4-azafluorene	13

10/81

N.D.
IV.

enought to detect and quantify compounds present in the water.

Given these differences, it is inappropriate to compare "total PAH concentrations" reported by CH2M HILL with those reported by other laboratories. Where specific compounds are reported by several laboratories, the results can be roughly compared, subject to differences in test procedures (e.g., potential coelution of some compounds in HPLC makes exact comparison of HPLC and GC/MS data difficult).

Available data indicates that the analytical technique used by CH2M HILL yields similar results to those reported by other laboratories. The data suggest that HPLC techniques are more sensitive for high molecular weight compounds and less sensitive to the low molecular weight compounds. Data from other laboratories using GC/MS procedures are similar to those reported by CH2M HILL.

DATA SUMMARY - ACID FRACTION, VOLATILES, TOC, INORGANICS

All well water samples collected in the first round of well sampling were analyzed for acid fraction compounds. Other than W-13, the only acid fraction compound detected was phenol, at concentrations ranging from 0.12 to 0.26 ug/l. W-13 contained several acid fraction compounds, totalling about 35 mg/l.

Samples from Wells SLP-15 and W-13 were analyzed for volatile compounds during the first round of sampling. No volatile compounds were reported at SLP-15. The following volatile compounds were measured in the water fraction of the sample from W-13:

Compound	Concentration (ppb)
Benzene	1,040
Toulene	1,010
Ethyl Benzene	220
Xylene (total isomers)	715

During the second round of well sampling, TOC was measured in selected water samples:

Well Number	TOC mg/l
W2	4.01
W70	4.44
W100	4.75
W112	6.49/3.78
SLP-9	3.93
SLP-15	9.47

During the first round of well testing, selected inorganics were measured in a water sample from SLP-15:

Compound	Concentration (mg/l)
NH_3	0.3
CO_3	0
SO_4	16.8
Fe	0.62
Mn	0.07
Mg	30.0

SPECIAL NONTARGET ANALYSIS

At two times during the project, CH2M HILL's chemist performed special searches of GC/MS data files to identify compounds other than those targeted in the QA/QC Project Plan. Several compounds were tentatively identified from a computer search of the major peaks in the chromatograms. The compounds listed exhibited high computer calculated fit and purity correlations when compared to the National Bureau of Standards Mass Spectral Library. The compounds were quantitatively estimated (see Chemists Report for Sampling Round 1).

Compounds tentatively identified in the two special searches are summarized as follows:

SLP-5 First Round of Well Sampling and Analysis

Compound	Estimated Concentration ng/l
Methyl Substituted - 2,3-Dihydro-1H-Indene	
Isomer #1	210
Isomer #2	360
Methyl Substituted 1H-Indene	
Isomer #1	180
Isomer #2	340
Methyl Substituted - Benzo (b) Thiophene	
Isomer #1	160
Isomer #2	130
C_3-Alkyl Substituted Naphthalene	
Isomer #1	180
Isomer #2	780
Isomer #3	490
Isomer #4	320

Dibenzofuran	3,600
Methyl Substituted Biphenyl	
Isomer #1	150
Isomer #2	400
Isomer #3	300

SLP-15 - Last Day of Pilot Test*

Compounds Identified[1]	Estimated Concentration ng/l
C_1-2,3-Dihydro-H-Indene	
Isomer #1	130
Isomer #2	130
Isomer #3	290
C_1-benzofuran	
Isomer #1	110
Isomer #2	120
Isomer #3	90
C_1-H-Indene	
Isomer #1	160
Isomer #2	300
C_2-Benzofuran	
Isomer #1	40
Isomer #2	30
Isomer #3	50
C_1-Benzothiophene	
Isomer #1	90
Isomer #2	70
C_2-Naphthalene	
Isomer #1	100
Isomer #2	170
Isomer #3	90
Isomer #4	100
Isomer #4	110
C_1-Dibenzofuran	
Isomer #1	130
Isomer #2	160
C_1 Phenanthrene/Anthracene	

Isomer #1	110
Isomer #2	20
Isomer #3	100

* This sample from SLP-15 was the feed-water sample to the GAC pilot system on day 42 of operation (Calgon System), as described in technical memorandum K. A similar computer search for effluent from the first Calgon column found only 5 of these compounds totalling less than 9 ng/l.

DATA INTERPRETATION - PAH ANALYSIS

Attachment D-4 contains a number of data summary tables. The tables summarizes available analyses for PAH's and other coal tar derivatives on water samples from the same wells sampled and analyzed by CH2M HILL.

As discussed earlier, it is difficult to directly compare CH2M HILL's results with those of other laboratories. Table D-1 summarizes CH2M HILL's interpretation of well water quality data generated during the well sampling and analysis program.

GLT207/21

N.P.
N.

SPECIFICATION LIST

PIPING

C2	CARBON STEEL PIPE - HIGH PRESSURE
C5	CARBON STEEL PIPE - LOW PRESSURE
C13	GALVANIZED STEEL
C20	HEAVY STEEL PIPE
C21	EPOXY LINED CAST IRON
C21	CEMENT LINED DUCTILE IRON PIPE
C22	REINFORCED CONCRETE PIPE
C24	CEMENT LINED CAST IRON PIPE
P1	PVC
P10	PVC FOR LOW PRESSURE UNDERGROUND GAS SERVICE

VALVES

1.14	IRON BODY DOUBLE DISC GATE VALVE
3.12	WAFER BUTTERFLY VALVE
4.03	BALL VALVE
6.08	PLUG VALVE
8.05	WAFER CHECK VALVE
8.06	REDUCED PRESSURE BACKFLOW PREVENTER
21.95	AIR RELEASE VALVE
23.29	SIGHT FLOW INDICATOR
25.22	2" SPRAY NOZZLE
31.07	RUBBER WATER HOSE
31.22	RUBBER WATER HOSE W/ BLACK SYNTHETIC RUBBER COVER
32.03	QUICK DISCONNECT ADAPTER - MALE
32.04	QUICK DISCONNECT ADAPTER - FEMALE
32.09	QUICK DISCONNECT ADAPTER

MISCELLANEOUS ITEMS

TI-13	0 TO 200 F TEMPERATURE INDICATOR
PI-215	0 - 60 PRESSURE INDICATOR
PI-216	0 - 100 PRESSURE INDICATOR
PI-218	0 - 200 PRESSURE INDICATOR
FI-600	FLOW METER AND INDICATOR
PCV-601	PRESSURE REGULATOR
PSE-602	RUPTURE DISC
FCV-603	BUTTERFLY FLOW CONTROL VALVE

SUBJECT LAB RESULTS CHECK BY LMR DATE 9/29/86 N.

SHEET ___ OF ___

PROJECT NO. W63720.FR

$Q \times C \times 8.34 = L$ (Q: MGD, C: mg/l, L: lb/day)

Feed Water : 9/8/86

PAH Σ = 325.42 ng/l

$0.0011\ MGD \times 325.42 \frac{ng}{l} \times \frac{1\ mg}{1000\ ng} \times 8.34 = 0.0030\ lb/day$ PAH

Feed Water : 8/26/86

PAH Σ = 345.40 ng/l

$0.0011 \times 345.40 \times \frac{1}{1000} \times 8.34 = 0.0032\ lb/day$ PAH

Feed Water : 5/23/86

PAH Σ = 366.54 ng/l

$0.0011 \times 366.54 \times \frac{1}{1000} \times 8.34 = 0.0034\ lb/day$ PAH

Carcingenic v. OTHER PAH, treated water samples #2 & #3 on 9/8/86

#2 : CARCINOGENIC PAH : 8.1 ng/l

OTHER PAH : 46.0 ng/l

benzo(a)pyrene, dibenz(a,h)anthracene } : 2.4 ng/l

#3 : CARCINOGENIC PAH : 8.1 ng/l

OTHER PAH : 42.1 ng/l

benzo(a)pyrene, dibenz(a,h)anthracene } : 2.4 ng/l

	ADVISORY LEVEL	DRINKING WATER CRITERION
CARCINOGENIC PAH	15 ng/l	28 ng/l
OTHER PAH	175 ng/l	280 ng/l
Sum OF benzo(a) pyrene and dibenz(a,h)anthracene	3.0 ng/l	5.6 ng/l

FORM 188

Parameter	Advisory Level	Drinking Water Criterion
The sum of benzo (a) pyrene and dibenz(a,h)anthracene	3.0 ng/l*	5.6 ng/l
Carcinogenic PAH	15 ng/l**	28 ng/l**
Other PAH	175 ng/l	280 ng/l

* Or lowest concentration that can be quantified, whichever is greater.

** Different concentrations for Additional Carcinogenic PAH may be established in accordance with the procedures specified in Part D.1 of the Consent Decree.

The Commissioner may require that the use of any drinking water supply well whose water exceeds any of these Drinking Water Criteria, as determined in accordance with Section 12.1., be discontinued until such time as the Drinking Water Criteria are met by treatment or other means. Compliance with these Drinking Water Criteria shall be determined at the point at which the water in question is introduced to the water supply distribution system but before dilution with water from any other source. The Advisory Levels for Carcinogenic PAH and the sum of benzo(a)pyrene and dibenz(a,h)anthracene are used in Section 4 as operational and cessation criteria for drinking water treatment systems. The Advisory Levels are also used in this RAP to trigger increased Monitoring requirements.

2.3. Quinoline

In the event quinoline is detected in any sample, and no other Carcinogenic PAH compound listed in Parts A.1.1. and

APPENDIX A

PAH COMPOUNDS TO BE MONITORED

A.1. List of Compounds To Be Monitored on a Routine Basis

A.1.1. Carcinogenic PAH

Whenever this RAP specifies Monitoring for Carcinogenic PAH, the analysis shall include the following PAH compounds and those Additional Carcinogenic PAH compounds added pursuant to Part D.1. of the Consent Decree:

benz(a)anthracene	(56-55-3)*
benzo(b)fluoranthene	(205-99-2)
benzo(j)fluoranthene	(205-82-3)
benzo(ghi)perylene	(191-24-2)
benzo(a)pyrene	(50-32-8)
chrysene	(218-01-9)
dibenz(a,h)anthracene	(53-70-3)
indeno(1,2,3-cd)pyrene	(193-39-5)
quinoline	(91-22-5)

A.1.2. Other PAH

Whenever this RAP specifies Monitoring for Other PAH, the analysis shall include the following PAH compounds:

---

* Chemical Abstracts Service registry number.

acenaphthene	(83-32-9)
acenaphthylene	(208-96-8)
acridine	(260-94-6)
anthracene	(120-12-7)
benzo(k)fluoranthene	(207-08-9)
2,3-benzofuran	(271-89-6)
benzo(e)pyrene	(192-97-2)
benzo(b)thiophene	(95-15-8)
biphenyl	(92-15-8)
carbazole	(86-74-8)
dibenzofuran	(132-64-9)
dibenzothiophene	(132-65-0)
2,3-dihydroindene	(496-11-7)
fluoranthene	(206-44-0)
fluorene	(86-73-7)
indene	(95-13-6)
indole	(120-72-9)
1-methylnaphthalene	(90-12-0)
2-methylnaphthalene	(91-57-6)
naphthalene	(91-20-3)
perylene	(198-55-0)
phenanthrene	(85-01-08)
pyrene	(129-00-0)

A.2. Extended List of Carcinogenic PAH

The following PAH are suspected human carcinogens, but have not

1. Inconsistency. — duplicate Samples — Feedwater & Well head.

Change statement in Table 2-1. page 7/37

Section 2.2 to match up with Table 2-1. Section 2.1. page 6/37

2. Figure 2-1 (page 8/37)

X

3. Section 2.3 (page 10/37)

✓ add physical observation and condition)

4. page 18/37.

X use "fall outside" (or exceeds) substituted for "below" add confidence between 95% Int.

5. for data pages — Std deviation not report

6. Data package. — review of difficulty in data review

include initial calibration & continuous

7. page 37/37. correct accordingly

matrix spike Sample

8. page 34/37

8/6/86
N.

GAC WELLHEAD SAMPLES

SAMPLE NO.	W-01	W-02	W-03	W-04A	W-04B
SAMPLE DATE	07/15/86	07/22/86	07/30/86	08/06/86	08/06/86
CARCINOGENS					
Quinoline	ND	ND	ND	ND	ND
Benzo (A) Anthracene	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND
Benzofluoranthenes	ND	ND	ND	ND	ND
Benzo (A) Pyrene	ND	ND	ND	ND	ND
Indeno (1,2,3-CD) Pyrene	ND	ND	ND	ND	ND
Dibenz (A,H) Anthracene	ND	ND	ND	ND	ND
Benzo (G,H,I) Peryene	ND	ND	ND	ND	ND
CARCINOGENS TOTAL	0.00	0.00	0.00	0.00	0.00
OTHER PAH					
2,3-Benzofuran	ND	ND	ND	ND	ND
2,3-Dihydroindene	<3.4	7.70	15.00	7.20	7.80
Indene	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND
Benzo (B) Thiopene	ND	ND	ND	ND	ND
Indole	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND	ND
Biphenyl	ND	ND	ND	ND	ND
Acenaphthylene	<1.7	7.50	12.00	8.10	3.80
Acenaphthene	4.70	11.00	17.00	11.00	11.00
Dibenzofuran	ND	<1.2	2.00	1.70	1.60
Fluorene	1.80	4.50	6.30	4.70	4.70
Dibenzothiophene	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	3.90	3.20
Anthracene	ND	<3.4	ND	<3.1	<3.4
Acridine	ND	ND	ND	ND	ND
Carbazole	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND
Pyrene	4.50	4.50	5.40	6.20	6.40
Benzo (E) Pyrene	3.50	ND	ND	ND	ND
Perylene	ND	ND	ND	ND	ND
OTHER PAH TOTAL	14.5	35.2	57.7	42.8	38.5
TOTAL PAH'S	14.5	35.2	57.7	42.8	38.5

Wilson-ERT 5/7/86
N.

ERT SURROGATE RECOVERIES
1986

ERT NUMBER	% RECOVERY CHRYSENE-D12	FLUORENE-D10 - non filtered
33606	48	74
33608	27	60
33609	52	62
33613	26	76
33618	30	85
33622	29	100
33624	28	93
33626	34	104
33629	39	107
33631	20	68
33632	21	115
MB860089	47	76
LF860117	46	97
33726	41	89
33628	44	98
33708	47	101
33710	27	102
33733	31	88
33738	10	102
33739	28	96
33741	14	98
33743	18	87
33744	19	92
MB860099	41	89
LF860127	40	74
MEAN	32	89
STD.DEV.	12	14
95% CONF.	8-56	61-117
n=25		

MEAN	30	94
STD.DEV.	12	17
95%	7-54	60-128
n=36		

gAc test of SLP

33616	40	100
33714	27	120
33716	19	92
33766	38	124
33808	33	126
33605	18	107
33675	24	73
33805	4*	28*
33602	14	70
33674	23	110
33768	27	111
33806	22	113
MEAN	26	104
STD.DEV.	8	19
N=11		

* These values not used.

SUBJECT St. Louis Park GAC
Headloss Calcs

BY T&M DATE 4-29-86
SHEET NO. 1 OF 3
PROJECT NO. W63220.FR

H_L from Vessel effluent to Storm sewer drain:

610gpm, 4"Ø pipe, velocity = 15.3 FPS, $\frac{v^2}{2g} = 3.6$

	K	H_L (Ft.)
2 90° bends	.75	5.4
BF Valve	0.3	1.1
19' of Pipe	33.8 FT/100'	6.4
outlet loss	1	3.6
Total		16.5 FT.

5' from vessel effluent to floor

Head difference = 16.5 - 5 = 11.5' ~~x2~~ = ~~23'~~

Total h_L

FORM 3B

SUBJECT St. Louis Park GAC
Headloss Calcs

BY TGM DATE 4-29-86
SHEET NO. 2 OF 3
PROJECT NO. W63720.FR

Headloss from Vessel effluent to Reservoir (Full):

12" Ø pipe, 1200 gpm, velocity = 3.41 FPS, $v^2/2g = 0.18$

From Vessel to edge of Carbon Bldg:

	K	H_L (Ft.)
BF Valve	0.3	.05
(4) 90° Bends	0.75	.54
(1) 45° Bend	0.3	.05
65' of pipe	0.581'/100'	.38
From Carbon Bldg. to WTP		
(6) 90° bends	.75	.81
(1) tee	1.8	.32
(1) control valve	10	1.8
84' of 12" pipe	.581'/100'	.49
From WTP to Reservoir		
(3) 90° bends	.75	.02
(1) BF valve	.3	—
outlet	1	.01
56' of 24" pipe	.02'/100'	.01
Total		4.5'

25' from vessel effluent to top of reservoir

total = 25 + 4.5 = 29.5'

Difference between storm sewer discharge + reservoir fill = 18.0

29.5 − ~~23~~ 11.5 = ~~6.5'~~

FORM 3B

SUBJECT

BY DATE

SHEET NO. 3 OF 3

PROJECT NO.

Well pump #15 rated @ 1200gpm @ 220' TDH

increase head to 227', flow = 1190 gpm

insignificant difference

flow @ TDH = 238 = 1170 gpm

FORM 3B

5/16/86
N.

WORK PLAN REVISION REQUEST

CONTRACTOR CH2M HILL Southeast, Inc.
REM/FIT Contract No. 68-01-6692

REVISION NO.: 1 DATE: May 16, 1986

INSTRUCTIONS FOR PROCESSING "WORK PLAN REVISION REQUEST"

1) SM generates request form plus OF 60 and forwards both to APM-ADMIN.
2) APM-ADMIN executes OF 60 and forwards to RPM.
3) RPM and REM-RPO give approval and forward original to CO and copies to PO APM-ADMIN.
4) CO gives final approval and forwards to APM-ADMIN.
5) APM-ADMIN authorizes SM to begin work.

FROM: Dan Bicknell
Regional Project Manager

TO: Vincent Gonzales
Contracting Officer

WA NO.: 16-5L06.0

SITE NAME: Reilly Tar, St. Louis Park, MN

ACTIVITY: Enforcement Support

SM NAME: Don Gallo

EXPLANATION OF NEED FOR REVISION: See letter

SM

BUDGET:

Prior Authorized Amount	$ 42,000
Current Increase Requested	$ 12,249
Increase(s) Pending Approval	$ 0
Total Budget	$ 54,249

LOE:

Prior Authorized Amount	300 Hrs.
Current Increase Requested	417 * Hrs.
Increase(s) Pending Approval	0 Hrs.
Total Budget	717 Hrs.

* The 59 hours of the 417 hour addition is from the hours held in reserve above the current zone wide goal of 560,000 hours.

EFFECT OF CHANGE ON SCHEDULE:

RPM/RPO

DB. Daniel J. Bicknell
RPM Signature/Date

J. A. Nelson, acting
RPO Signature/Date 6-10-86

cc: PO,
APM-ADMIN

EPA HQ

additional hrs approved by Carol Fowler on 9/3/86

— Approved as submitted
— Approved with changes
— Approved pending funding
— Partial approval
— Not approved

CO Authorization Signature/Date 9/3/86

RECEIVED

SEP 08 1986

PLANNING AND CONTRACTS
MANAGEMENT UNIT

Lt'l steel

.202
200 ⟌ 43.0

- why (benzo (ghi) perylene 9% MSR when 20 ppt spike & 4-3 recover = 2 20%)

- ~~they~~ July 22
  1. how analysis w/ only 2 bottles? BLANK
  2. Naphthalene SR% < Min max of 42 = 35.8
  3. benzo (ghi) perylene MSR% < 40% = 9%
  4. D.L. not reported

  July 16 1. - Treat as 3 bottles
  2. Napthalene SR% < Min max 42 = 31%
  3. D.L not reported
  4. why D bot wellhead if red water

W-01 - SLP9

12:00a 8/28 Tsai - QADP

1. No corrective action taken when they should
2. did not re-run sample - not mentioned in report
3. " " the raw data result as they should have
4. D.L.
5. need computer of GC/MS graphs - compute quantitation results
6. we will step-up S/a

July 29 - F03 - N F C Prob F, B, ...

12:00 8/28 J. Gruber

1. TD then TD; ERT said they found something mass 242 benzo(b) " (k) pyrene
2. <3.4 d.l. on benzo(ghi) pyrene

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID MS-01 ERT NO . 36755

PARAMETERS	SPIKE LEVEL (NG/L)	% RECOVERY
NAPHTHALENE	110	45
FLUORENE	21	39
CHRYSENE	24	57
BENZO (G,H,I) PERYLENE	22	20
INDENE	25	28
QUINOLINE	24	46
BENZO (E) PYRENE	20	31
2-METHYLNAPHTHALENE	21	39
AVERAGE % RECOVERY		38

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID T-01 ERT NO 36750

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	13	51	42-102
FLUORENE - D10	13	133	60-128
CHRYSENE - D12	14	66	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID F-01 ERT NO 36751

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9 9	48	42-102
FLUORENE - D10	9 5	58	60-128
CHRYSENE - D12	10 5	51	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID W-01 ERT NO 36752

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9 9	21	42-102
FLUORENE - D10	9 5	93	60-128
CHRYSENE - D12	10 5	43	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-01 ERT NO 36753

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	65	42-102
FLUORENE - D10	9.5	65	60-128
CHRYSENE - D12	10.5	102	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID TD-01

ERT NO 36754

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9 9	25	42-102
FLUORENE - D10	9 5	108	60-128
CHRYSENE - D12	10 5	53	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID MS-01 ERT NO 36755

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9 9	31	42-102
FLUORENE - D10	9 5	86	60-128
CHRYSENE - D12	10 5	62	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID MB8605:7 ERT NO 37054

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9 9	73	42-102
FLUORENE - D10	9 5	79	60-128
CHRYSENE - D12	10 5	113	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-02 ERT NO.: 37018

PARAMETERS	SPIKE LEVEL (NG/L)	% RECOVERY
NAPHTHALENE	110	49
FLUORENE	21.1	43
CHRYSENE	24.2	40
BENZO (G,H,I) PERYLENE	22.4	9
INDENE	24.6	28
QUINOLINE	23 5	52
BENZO (E) PYRENE	20.4	12
2-METHYLNAPHTHALENE	21.2	50
AVERAGE % RECOVERY		38

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: T-02 ERT NO.: 37014

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	60	42-102
FLUORENE - D10	9.5	140	60-128
CHRYSENE - D12	9.8	19	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: W-02

ERT NO.: 37015

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	35	42-102
FLUORENE - D10	9.5	103	60-128
CHRYSENE - D12	9.8	80	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-02 ERT NO.: 37016

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	24	42-102
FLUORENE - D10	9.5	789	60-128
CHRYSENE - D12	9.8	76	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-02

ERT NO.: 37017

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	27	42-102
FLUORENE - D10	9.5	150	60-128
CHRYSENE - D12	9.8	26	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-02 ERT NO.: 37018

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	34	42-102
FLUORENE - D10	9.5	96	60-128
CHRYSENE - D12	9.8	38	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB860527 ERT NO.: 37134

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	35	42-102
FLUORENE - D10	9.5	84	60-128
CHRYSENE - D12	9.8	61	10-54

2/20/85
N.

CH2M HILL

ORGANIC ANALYSIS

RECEIVED
MAR 1 1985
CH2M HILL-GLO

SAMPLE INFORMATION

Client: U. S. EPA Region 5 Attn: Paul Bitter

Address: 5HR-13 230 South Dearbon Chicago, IL 60604

Date Received: February 20, 1985 Date Reported: February 25, 1985

Types and Quantity of Samples: One Water Sample

Analysis Requested:

1. Priority Pollutants
   Volatiles _____
   Base/Neutrals _____
   Acids _____
   Pesticides _____
2. SDWA Pesticides & Herbicides _____
3. Trihalomethanes _____
4. PCB's _____
5. Other Trace PAH

ANALYTICAL INSTRUMENTATION

X Finnigan Model 4021 Gas Chromatograph/Mass Spectrometer/Data System equipped with a Tekmar LSC-1 Liquid Sample concentrator.

_____ Varian Model 3700 Gas Chromatograph equipped with flame ionization, electron capture, and thermionic specific detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants—The samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982)
2. Phenoxyacid Herbicides—Samples are analyzed in accordance with procedures outlined in Methods 7, *Federal Register*, Vol. 38, No. 75, Part II, November 28, 1973.
3. Pesticides and PCB's (soil, sediment, etc.)—Samples are analyzed in accordance with procedures outlined in EPA Method 8.08, *Test Methods for Evaluating Solid Waste*, 1980.

cc: Mike Harris/GLO

Respectfully submitted,

Harold E. Cole

Harold E. Cole, Mass Spectroscopist/Manager Organics

Craig O. Vinson, Laboratory Director

CH2M HILL

ANALYTICAL REPORT

PAH, N and S Heterocyclic Compounds

Sample Identification Sta. #1 Waterside Mall Lab # 5780

Date Received 2/20/85 Date Extracted 2/22/85

Date Analyzed 2/22/85

Compounds	MDL[1] ng/l	Conc[2] ng/l	Compounds	MDL[1] ng/l	Conc[2] ng/l
2,3-Benzofuran	*	4.4	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	3.3	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	8.3	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	2.3
Quinoline	1.0	BMDL	Pyrene	1.0	1.2
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.2	Benzo(b & k)Fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.7	7,12-Dimethyl benzo(a)		
Biphenyl	1.0	2.6	anthracene	*	BMDL
Acenaphthylene	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Benzo(a)pyrene	1.0	BMDL
Dibenzofuran	2.0	2.5	Perylene	1.0	BMDL
Fluorene	1.4	1.9	3-Methyl cholanthrene	*	BMDL
Dibenzothiophene	*	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Phenanthrene	1.0	1.8	Dibenzo(a,h)anthracene	1.4	BMDL
			Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 91%

[1]MDL = Method Detection Limit

[2]BMDL = Below Method Detection Limit

ND = Not Detected
*Detection limit not determined

3/17/86
N.

CH2M HILL

ORGANIC ANALYSIS

SAMPLE INFORMATION

Client: U.S. Environmental Protection Agency ATTN: Alan Scribner

Address: CH2M HILL, P.O. Box 2090, Milwaukee, WI 53201

Date Received: February 6, 1986 Date Reported: March 17, 1986

Types and Quantity of Samples: Six Water Samples

Analysis Requested:

1. Priority Pollutants
   - Volatiles _____
   - Base/Neutrals _____
   - Acids _____
   - Pesticides _____
2. SDWA Pesticides & Herbicides _____
3. Trihalomethanes _____
4. PCB's _____
5. Other PAH

ANALYTICAL INSTRUMENTATION

X Finnigan Model 4021 Gas Chromatograph/Mass Spectrometer/Data System equipped with a Tekmar LSC-1 Liquid Sample concentrator.

_____ Varian Model 3700 Gas Chromatograph equipped with flame ionization, electron capture, and thermionic specific detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants—The samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982)
2. Phenoxyacid Herbicides—Samples are analyzed in accordance with procedures outlined in Methods 7, *Federal Register*, Vol. 38, No. 75, Part II, November 28, 1973.
3. Pesticides and PCB's (soil, sediment, etc.)—Samples are analyzed in accordance with procedures outlined in EPA Method 8.08, *Test Methods for Evaluating Solid Waste*, 1980.

Respectfully submitted,

Harold E. Cole

Harold E. Cole, Mass Spectroscopist/Manager Organics

Craig O. Vinson

Craig O. Vinson, Laboratory Director

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - REILLY BLANK

Lab No. : 7107-1

Date Sampled : 2/5/86

Date Extracted : 2/20/86

Date Received 2/6/86

Date Analyzed : 2/21/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	2.6	Acridine	1.8	BMDL
1H-Indene	1.0	1.4	Phenanthridine	1.4	BMDL
Naphthalene	1.9	12	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.7	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.6	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 74

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - FEED WATER

Lab No. : 7107-2

Date Sampled : 2/5/86

Date Extracted : 2/20/86

Date Received 2/6/86

Date Analyzed : 2/21/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	5.0
2,3-Dihydro-1H-Indene	1.4	350	Acridine	1.8	BMDL
1H-Indene	1.0	18	Phenanthridine	1.4	BMDL
Naphthalene	1.9	6.3	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	37	Fluoranthene	1.0	67
Quinoline	1.0	BMDL	Pyrene	1.0	180
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	6.6
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	4.7
2-Methylnaphthalene	2.0	2.1	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	3.6	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	5.2	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	200	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	620	Perylene	1.0	BMDL
Dibenzofuran	2.0	61	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	270	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	22	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	4.2	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 79

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens

REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - CARBON TREATMENT V-1

Lab No. : 7107-3

Date Sampled : 2/5/86

Date Extracted : 2/20/86

Date Received 2/6/86

Date Analyzed : 2/21/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	1.6	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.3	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 78

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - CARBON TREATMENT V-2

Lab No. : 7107-4

Date Sampled : 2/5/86

Date Extracted : 2/20/86

Date Received 2/6/86

Date Analyzed : 2/21/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	1.5	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.7	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.3	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 74

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

REVIEW

Comments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - TRAVEL BLANK

Lab No. : 7107-5

Date Sampled : 2/5/86

Date Extracted : 2/20/86

Date Received 2/6/86

Date Analyzed : 2/21/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	1.6	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.4	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 75

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - BOTTLE #6

Lab No. : 7107-6

Date Sampled : 2/5/86

Date Extracted : 2/20/86

Date Received 2/6/86

Date Analyzed : 2/21/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	2.2	Acridine	1.8	BMDL
1H-Indene	1.0	7.7	Phenanthridine	1.4	BMDL
Naphthalene	1.9	15	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = ND (Surrogate is not added to field blanks)

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

3/17/86
N.

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MAR 24 1986

CH2M HILL-OLO

CH2M HILL

ORGANIC ANALYSIS

SAMPLE INFORMATION

Client: U.S. Environmental Protection Agency ATTN: Alan Scribner

Address: CH2M HILL, P.O. Box 2090, Milwaukee, WI 53201

Date Received: February 6, 1986 Date Reported: March 17, 1986

Types and Quantity of Samples: Five Water Samples

Analysis Requested:

1. Priority Pollutants
   - Volatiles ____
   - Base/Neutrals ____
   - Acids ____
   - Pesticides ____
2. SDWA Pesticides & Herbicides ____
3. Trihalomethanes ____
4. PCB's ____
5. Other PAH

ANALYTICAL INSTRUMENTATION

X Finnigan Model 4021 Gas Chromatograph/Mass Spectrometer/Data System equipped with a Tekmar LSC-1 Liquid Sample concentrator.

____ Varian Model 3700 Gas Chromatograph equipped with flame ionization, electron capture, and thermionic specific detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants—The samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982)
2. Phenoxyacid Herbicides—Samples are analyzed in accordance with procedures outlined in Methods 7, *Federal Register*, Vol. 38, No. 75, Part II, November 28, 1973.
3. Pesticides and PCB's (soil, sediment, etc.)—Samples are analyzed in accordance with procedures outlined in EPA Method 8.08, *Test Methods for Evaluating Solid Waste*, 1980.

Respectfully submitted,

Harold E. Cole

Harold E. Cole, Mass Spectroscopist/Manager Organics

Craig O. Vinson

Craig O. Vinson, Laboratory Director

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - F-FILTER FEED

Lab No. : 7152-1

Date Sampled : 2/14/86

Date Received 2/17/86

Date Extracted : 2/20/86

Date Analyzed : 2/24/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	2.0	50
2,3-Dihydro-1H-Indene	2.8	1100	Acridine	3.6	BMDL
1H-Indene	2.0	35	Phenanthridine	2.8	BMDL
Naphthalene	3.8	12	Carbazole	2.2	7.4
Benzo(b)thiophene	2.0	220	Fluoranthene	2.0	310
Quinoline	2.0	BMDL	Pyrene	2.0	240
Isoquinoline	*	BMDL	Benzo(a)anthracene	2.0	7.1
Indole	5.8	BMDL	Chrysene/Triphenylene	2.0	7.1
2-Methylnaphthalene	4.0	4.0	Benzo(b & k)fluoranthene	2.0	BMDL
1-Methylnaphthalene	2.4	36	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	2.0	360	Benzo(e)pyrene	2.0	BMDL
Acenaphthylene	2.0	540	Benzo(a)pyrene	2.0	BMDL
Acenaphthene	2.6	1400	Perylene	2.0	BMDL
Dibenzofuran	4.0	650	3-Methyl cholanthrene	*	BMDL
Fluorene	2.8	1200	Indeno(1,2,3-cd)Pyrene	3.4	BMDL
Dibenzothiophene	*	140	Dibenzo(a,h)anthracene	2.8	BMDL
Phenanthrene	2.0	51	Benzo(g,h,i)perylene	2.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 57

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - TREATED VESSEL #1

Lab No. : 7152-2

Date Sampled : 2/14/86

Date Extracted : 2/20/86

Date Received 2/17/86

Date Analyzed : 2/24/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	1.8	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	5.3	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.5	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.4	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 72

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - TREATED VESSEL #2

Lab No. : 7152-3

Date Sampled : 2/14/86

Date Extracted : 2/20/86

Date Received 2/17/86

Date Analyzed : 2/24/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	1.7	Acridine	1.8	BMDL
1H-Indene	1.0	1.0	Phenanthridine	1.4	BMDL
Naphthalene	1.9	5.3	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.3	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.3	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 71

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - REILLY BLANK

Lab No. : 7152-4

Date Sampled : 2/14/86

Date Extracted : 2/20/86

Date Received 2/17/86

Date Analyzed : 2/24/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	2.0	Acridine	1.8	BMDL
1H-Indene	1.0	1.0	Phenanthridine	1.4	BMDL
Naphthalene	1.9	13	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	3.6	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.8	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 73

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification GLO / US EPA WATER - TRAVEL BLANK

Lab No. : 7152-5

Date Sampled : N/A

Date Extracted : 2/20/86

Date Received 2/17/86

Date Analyzed : 2/24/86

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	BMDL	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.7	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene = 76

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

SAMPLING PROTOCOL FOR POLLUTANT SOURCE

IDENTIFICATION STUDY SAS 1141-E

Sample Shipment

Samples will be shipped daily using overnight delivery. Samples will be shipped in locked containers.

TABLE Q. Critical values of Student's t-distribution.

ν \ α	0.9	0.5	0.4	0.2	0.1	0.05	0.02	0.01	0.001	α / ν
1	.158	1.000	1.376	3.078	6.314	12.706	31.821	63.657	636.619	1
2	.142	.816	1.061	1.886	2.920	4.303	6.965	9.925	31.598	2
3	.137	.765	.978	1.638	2.353	3.182	4.541	5.841	12.924	3
4	.134	.741	.941	1.533	2.132	2.776	3.747	4.604	8.610	4
5	.132	.727	.920	1.476	2.015	2.571	3.365	4.032	6.869	5
6	.131	.718	.906	1.440	1.943	2.447	3.143	3.707	5.959	6
7	.130	.711	.896	1.415	1.895	2.365	2.998	3.499	5.408	7
8	.130	.706	.889	1.397	1.860	2.306	2.896	3.355	5.041	8
9	.129	.703	.883	1.383	1.833	2.262	2.821	3.250	4.781	9
10	.129	.700	.879	1.372	1.812	2.228	2.764	3.169	4.587	10
11	.129	.697	.876	1.363	1.796	2.201	2.718	3.106	4.437	11
12	.128	.695	.873	1.356	1.782	2.179	2.681	3.055	4.318	12
13	.128	.694	.870	1.350	1.771	2.160	2.650	3.012	4.221	13
14	.128	.692	.868	1.345	1.761	2.145	2.624	2.977	4.140	14
15	.128	.691	.866	1.341	1.753	2.131	2.602	2.947	4.073	15
16	.128	.690	.865	1.337	1.746	2.120	2.583	2.921	4.015	16
17	.128	.689	.863	1.333	1.740	2.110	2.567	2.898	3.965	17
18	.127	.688	.862	1.330	1.734	2.101	2.552	2.878	3.922	18
19	.127	.688	.861	1.328	1.729	2.093	2.539	2.861	3.883	19
20	.127	.687	.860	1.325	1.725	2.086	2.528	2.845	3.850	20
21	.127	.686	.859	1.323	1.721	2.080	2.518	2.831	3.819	21
22	.127	.686	.858	1.321	1.717	2.074	2.508	2.819	3.792	22
23	.127	.685	.858	1.319	1.714	2.069	2.500	2.807	3.767	23
24	.127	.685	.857	1.318	1.711	2.064	2.492	2.797	3.745	24
25	.127	.684	.856	1.316	1.708	2.060	2.485	2.787	3.725	25
26	.127	.684	.856	1.315	1.706	2.056	2.479	2.779	3.707	26
27	.127	.684	.855	1.314	1.703	2.052	2.473	2.771	3.690	27
28	.127	.683	.855	1.313	1.701	2.048	2.467	2.763	3.674	28
29	.127	.683	.854	1.311	1.699	2.045	2.462	2.756	3.659	29
30	.127	.683	.854	1.310	1.697	2.042	2.457	2.750	3.646	30
40	.126	.681	.851	1.303	1.684	2.021	2.423	2.704	3.551	40
60	.126	.679	.848	1.296	1.671	2.000	2.390	2.660	3.460	60
120	.126	.677	.845	1.289	1.658	1.980	2.358	2.617	3.373	120
∞	.126	.674	.842	1.282	1.645	1.960	2.326	2.576	3.291	∞

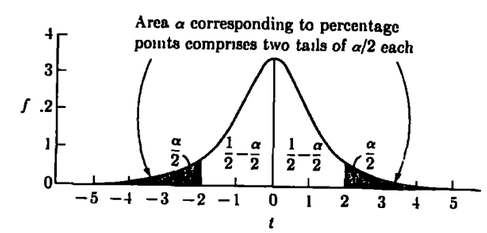

Table 1.--Data on selected wells in the St. Louis Park area, Minnesota

Driller's log: Qd, ~~Glacial~~ undifferentiated drift; Opl, Platteville Limestone; Ogl, Glenwood Shale; Osp, St. Peter Sandstone, undifferentiated; Ospl, St. Peter Sandstone, lower silty beds; Opc, Prairie du Chien Group; Cj, Jordan Sandstone; Csl, St. Lawrence Formation; Cf, Franconia Sandstone; Cig, Ironton and Galesville Sandstones; Ce, Eau Claire Sandstone; Cm, Mount Simon Sandstone; pCh Hinckley Sandstone.

Altitude: When MP is given, altitude is measuring point, not land surface.

Field measurement status: A, well field located and permanenetly sealed; AM, well field located and permanently sealed by MDH; AR, well reported permanently sealed; BR, well reported filled; D, well field located and contains debris; F, well field located; G, well field located and geophysically logged; M, mass measurement well (measured 2 to 3 times per year); O, observation well (measured every 2 to 3 weeks); P, well field located and has pump; X, well destroyed.

Township and range	Site identification (latitude and longitude)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Driller's log	Land surface altitude, in feet	~~Originally~~ reported depth of well, in feet	Casing schedule	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 AAB1	445654 093215501	216030	W 1	Monitoring Well	E. M. Renner	03-09-76	0-102 Qd 102-107 Opl	922.76 MP	107	4 in. 0-102	Opl	43.67	11-28-78	O
117.21.17 BAC1	445651 093222901	216031	W 2	do	do	03-01-76	0-36 Qd	897.14 MP	36	4 in. 0-32	Qd	10.40	11-28-78	O
117.21.17 BDB1	445637 093222401	216032	W 3	do	do	05-10-76	0-52 Qd	897	52	4 in. 0-49	Qd	7	05-10-76	D,X
117.21.17 CAD2	445622 093221901	216033	W 5	do	do	02-17-76	0-26 Qd	891.72 MP	26	4 in. 0-21	Qd	6.59	11-28-78	O
117.21.17 CAC1	445620 093222601	216034	W 6	do	do	02-18-76	0-26 Qd	892.74 MP	26	4 in. 0-22	Qd	7.39	11-28-78	O
117.21.17 CBD1	445625 093223601	216035	W 7	do	do	03-02-76	0-71 Qd	930	71	4 in. 0-66	Qd	35	03-02-76	D,X
117.21.17 CDD1	445607 093222101	216036	W 8	do	do	02-26-76	0-31 Qd	892.87 MP	31	4 in.	Qd	7.96	11-28-78	O
117.21.17 DCA1	445614 093220301	216037	W 9	do	do	02-24-76	0-25 Qd	891.21 MP	25	4 in. 0-20	Qd	7.13	11-27-78	O
117.21.20 ABD1	445559 093220201	216038	W 10	do	do	02-19-76	0-29 Qd	891.82 MP	29	4 in. 0-25	Qd	7.63	11-27-78	O
117.21.17 DDB2	445614 093215301	216039	W 11	do	do	11-23-76	0-23 Qd	897.20 MP	23	4 in. 0-19	Qd	13.63	11-27-78	O
117.21.17 DDA1	445613 093214001	216040	W 12	do	do	12-04-76	0-47 Qd	919.26 MP	47	4 in. 0-42	Qd	37.02	11-27-78	O
117.21.17 DCB1	445615 093220901	216041	W 13	do	do	11-28-76	0-50 Qd	890.40 MP	50	4 in. 0-45	Qd	6.19	11-28-78	O
117.21.17 DCA2	445613 093220302	216042	W 14	do	do	02-11-77	0-68 Qd 68-82 Opl 82-85 Ogl 85-95 Osp	891.41 MP	95	8 in. 0-69 4 in. 0-86	Osp	23.75	11-27-78	O,O
117.21.17 CAC2	445621 093222601	216043	W 15	do	do	04-07-77	0-76 Qd	892.47 MP	76	4 in.	Qd	8.30	11-28-78	O
117.21.20 ABD2	445559 093220202	216044	W 16	do	do	04-13-77	0-73.5 Qd	892.07 MP	84	4 in. 0-61	Qd	8.56	11-27-78	O
117.21.17 DDB3	445614 093215302	216045	W 17	do	do	04-19-77	0-69 Qd	897.07 MP	69	4 in. 0-66	Qd	14.05	11-27-78	O
117.21.17 DCA3	445614 093220303	216046	W 18	do	do	1978	0-88 Qd 88-78 Opl	893.23 MP	78	4 in. 0-68	Opl	9.86	11-27-78	O
117.21.17 CDD2	445607 093222102	216047	W 19	do	do	1978	0-72 Qd 72-81 Opl	894.43 MP	81	4 in. 0-81	Opl	11.22	11-28-78	O
117.21.20 AAB1	445605 093215101	216048	W 20	do	do	1978	0-69 Qd 69-80 Opl	895.55 MP	80	4 in. 0-70	Opl	14.01	11-27-78	O
117.21.20 ABD3	445559 093220203	216049	W 21	do	do	1978	0-87 Qd 87-92 Osp	892.60 MP	92	4 in. 0-92	Osp	24.27	11-27-78	O
117.21.17 CAA1	445630 093222101	200993	W 22	Republic Creosote Washroom Well	do	1917	0-65 Qd 65-91 Opl 91-91 Osp	896.16 MP	91	4 in. 0-71	Originally Opl-Osp Now Opl	11.44	11-28-78	O,O
117.21.17 CAD1	445625 093221601	216050	W 23	Republic Creosote Site "Hinckley" Well, Cooling Well	McCarthy	12-10-17 to May 1918	0-60 Qd 60-95 Opl 95-195 Osp 195-258 Ospl 258-372 Opc 372-457 Cj 457-507 Csl 507-835 Cf-Ce 835-909 Cm	894.49 MP	909	12 in. 0-65 10 in. 0-257 7 in. (230-373 4 in. 0-	Originally Cj,Csl,Cf, Cig,Ce,Cm Now Osp,Opc, Cj,Csl,Cf	33.18	11-28-78	O,O
117.21.20 ABB1	445604 093220501	160018	W 24	Monitoring Well	E. M. Renner	1978	0-81 Qd 81-83 Opl 83-86 Ogl 86-90 Osp	892.92 MP	---	8 in. 0-81.5 4 in. 0-86.7	Osp	22.84	11-27-78	O
117.21.17 CDC2	445610 093222602	206448	W 25	Lakeland Door	do	11-01-50	0-79 Qd 79-85 Opl	888.79 MP	85	3 in. 0-79	Opl	4.39 9	10-15-78 11-01-50	O,O
117.21.17 CDA1	445619 093221801	209344	W 26	Mill City Plywood	do	08-11-52	0-59 Qd 59-90 Opl	891.45 MP	90	4 in. 0-76	Opl	6.90 3.5	10-13-78 08-05-52	O,O
117.21.17 DBC1	445624 093220801	216052	W 27	Terry Excavating	do	1953	0-80 Qd 80-100 Opl 100-112 Osp	905+5	112	4 in.	Opl-Osp	30	1953	O,O
117.21.17 CDB1	445619 093222501	216053	W 28	7401 Walker St.	---	before 1939	---	895+5	---	---	---	---	---	X
117.21.20 BAA2	445604 093223801	206454	W 29	Flame Industries	E. M. Renner	04-12-63	0-73 Qd 73-90 Opl 90-94 Ogl 94-202 Osp 202-251 Ospl 251-335 Opc	897+5	335	10 in. 0-77 8 in. 0-257	Opc	68	04-12-63	P
117.21.17 CCA2	445614 093223601	216054	W 30	3636 Quebec Ave.	do	about 1940	---	935+5	200	6 in. 0-100	Opl-Osp	---	---	AM
117.21.20 BBB1	445600 093224901	216055	W 31	3831 Texas Ave.	---	about 1949	---	905+5	---	---	---	---	---	---
117.21.07 DDD1	445702 093225401	203190	W 32	Texatonka Shopping Center	E. M. Renner	08-00-51	0-98 Qd 98-112 Opl 112-117 Ogl 117-228 Osp 228-283 Ospl 283-405 Opc 405-466 Cj	925+5	466	8 in. 0-283.5	Opc-Cj	80	08-00-51	F
117.21.17 DDB1	445614 093214901	206449	W 33	Strand Mfg., Wayne Register, Midco Register, Robinson Rubber	Max Renner	06-30-53	0-80 Qd 80-100 Opl 100-102 Ogl 102-182 Osp	906.37 MP	182	8 in.	Opl-Osp Osp (from 6-79)	23.62 45.97	11-27-78 07-10-79	P,G
117.21.16 CAA1	445627 093213601	216056	W 34	Crib Diaper Service, Sterilized Diaper Service	Bergerson-Caswell	05-26-67	0-93 Qd 93-107 Opl 107-113 Ogl 113-212 Osp 212-280 Ospl 280-342 Opc	915+5	342	6 in. 0-292	Opc	99.1	11-08-78	AM,G
117.21.16 DAA1	445625 093210301	216057	W 35	Burdick Grain Co.	---	about 1910	---	912+5	Assume 200? ---	4 in.	Opl(?)-Osp(?)	51.6	10-20-78	P,M
117.21.16 DBD1	445620 093211901	216058	W 36	Dayton Rogers Well #1	---	before 1947	---	908+5	---	3 in.	Qd	31.77	10-25-78	F,O [G]
117.21.16 DBD2	445619 093211801	216059	W 37	Dayton Rogers Well #2	Laurel Hansmann	03-14-73	---	910+5	120	6 in.	Opl	36.03	10-25-78	O,G
117.21.16 DCA1	445618 093211601	216060	W 38	Milwaukee Railroad Well	---	1913	0-107 Qd 107-111 Opl 111-260 Osp 260-405 Opc 405-485 Cj 485-515 Csl 515-1002 Cf- pCh	914+5	1002	---	Opl-Osp pCh	---	---	

PRELIMINARY Subject to Revision

0.65 cu yds #94

6.76 cu yds #981

Table 1.--Data on selected wells in the St. Louis Park area, Minnesota--Continued

Driller's log: Qd, Glacial drift; Opl, Platteville Limestone; Ogl, Glenwood Shale; Osp, St. Peter Sandstone, undifferentiated; Ospl, St. Peter Sandstone, lower silty beds; Opc, Prairie du Chien Group; Cj, Jordan Sandstone; Csl, St. Lawrence Formation; Cf, Franconia Sandstone; Cig, Ironton and Galesville Sandstones; Ce, Eau Claire Sandstone; Cm, Mount Simon Sandstone; pCh Hinckley Sandstone.

Altitude: When MP is given, altitude is measuring point, not land surface.

Field measurement status: A, well field located and permanenetly sealed; AM, well field located and permanently sealed by MDH; AR, well reported permanently sealed; BR, well reported filled; D, well field located and contains debris; F, well field located; G, well field located and geophysically logged; M, mass measurement well (measured 2 to 3 times per year); O, observation well (measured every 2 to 3 weeks); P, well field located and has pump; X, well destroyed.

Township and range	Site identification (latitude and longitude)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Driller's log	Land surface altitude, in feet	~~Originally~~ reported depth of well, in feet	Casing schedule	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.16 DCA3	445613 093212201	216061	W 39	3612 Alabama Ave.	---	---	---	910+5	---	---	Osp	---	---	X
*Est. 117.21.16 CDB1	445615 093212301	206444	W 40	Minnesota Rubber	Max Renner	08-20-50	0-111 Qd 111-276 Osp 276-397 Opc 397-475 Cj	910+5	475	8 in. 0-211 6 in. 184-268	Opc- Cj	84	08-20-50	P
* 117.21.16 DCC3	445611 093213403	216062	W 41	Hartmann #1 3700 Colorado	E. H. Renner	---	---	912+5	160	2 in.	Osp(?)	---	---	D
117.21.16 DCC1	445611 093213401	216063	W 42	Hartmann #2 3700 Colorado	---	---	---	912+5	60	-"-	-"-	---	---	---
* Est. 28.24.7 BBC1	445559 093210301	200541	W 44	King's Inn, Lilac Lane Bowling Alley	Max Renner	12-20-51	0-111 Qd 111-131 Opl 131-259 Osp	910+5	259	8 in. 0-111	Opl-Osp	47	1951	P
3.35 cu yds #485														
*Est 117.21.16 CDA1	445618 093210001	206445	W 45	S-K Products, Inc.	Don Stodala's Well Drilling	07-25-63	0-90 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	900+5	312	8 in. 0-7 6 in. 0-244	Ospl-Opc	84	07-25-78	P
*Est 117.21.16 CDA2	445617 093210201	216065	W 46	S-K Products, Inc.	do	1973	0-92 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	905+5	305	6 in. 0-234	Ospl-Opc	95	02-16-73	P
* 28.24.6 AAC1	445647 093195301	216066	W 47	Belco; Burdick Grain Co.	---	before 1942	---	891+	---	8 in.	Opl-Cj	16.39	12-06-78	G,A
* 117.21.20 ADA2	445646 093214601	216067	W 48	Methodist Hospital	McCarthy	---	0-85 Qd 85-94 Opl 94-257 Osp 257-377 Opc 377-466 Cj 466-485 Csl	869.6	485 462.5	20 in. 0-255	Ospl(?) Opc- Csl	68.82	12-06-78	G,P
117.21.17 DDD1	445607 093214101	206540	W 49	Strom Block - Deep Well	E. H. Renner	1958	0-72 Qd 72-92 Opl 92-96 Ogl 96-260 Osp 260-381 Opc 381-384 Cj	900+5	384	8 in. 0-77 6 in. 0-241	Ospl- Cj	65	09-00-58	---
117.21.17 DCD1	445609 093215801	216068	W 50	Prestolite	---	before 1937	---	890+4	---	---	---	---	---	~~D~~ G,AM
Well Plugged 117.21.20 BAA1	445605 093221601	216069	W 51	Androc Chemical Co.	---	---		892+2	---	4 in.	Opl	---	---	G,AM
Well Plugged * 117.21.20 BCA1	445548 093223701	216070	W 52	Merit Gage Co.; Suburban Sanitary Drainage	E. H. Renner	09-29-61	0-81 Qd 81-95 Opl 95-97 Ogl 97-110 Osp	920+5	---	4 in. 0-82	Opl-Osp	30	09-29-61	G,AM
28.24.6 BDB2	445638 093204001	216071	W 53	Northland Aluminum	---		---	884+2	---	---	---	84.10	06-22-79	F
117.21.19 AAD1	445553 093225401	216072	W 54	Old Galachirche Residence	---		---	920+5	---	6 in.	---	---	---	---
117.21.20 BBA1	445605 093223501	216073	W 55	7612 Division St.	E. H. Renner	01-00-59	0-99 Qd 99-118 Opl	915+5	118	4 in. 0-102	Opl	36	1959	---
117.21.17 CCB1	445619 093224201	216074	W 56	Earlinson Residence	---	---	---	938+5	---	4 in.	---	---	---	---
[illegible] CCA1	[illegible] 093223601	216075	W 57	Oak Hill School	---	before 1940	---	935+5	---	---	---	---	---	---
117.21.17 DBB1	445628 093221101	216077	W 59	On site east of Louisiana Extension	---	~~before 1950~~	---	---	24	6 in. 0-15	~~Qd~~	~~24~~	~~06-00-56~~	AM
well Plugged 117.21.17 CCA3	445614 093224001	216078	W 60	3645 Rhode Island Ave.	E. H. Renner	---	---	935+5	250	6 in.	Opl-Osp	---	---	AM
117.21.17 DDD3	445607 093214001	216079	W 61	William V. Terry	~~do~~	~~07-03-55~~	~~0-80 Qd 80-100 Opl 100-410 Osp~~	905+4	~~410~~	~~4 in. 0-81~~	~~Opl-Osp~~	~~30~~	~~07-06-03~~	---
Est 117.21.8 CAA1	445721 093221801	206438 11.46	W 62 #1661	McCourtney Plastics	do	09-05-66	0-86 Qd 86-103 Opl 103-105 Ogl 105-274 Osp 274-394 Opc	910+5	394	12 in. 0-90 10 in. 0-246	Ospl-Opc	85	09-05-69	P
117.21.20 CBB1	445538 093224501	216080	W 63	National Foods	McCarthy	09-00-45	---	910+5	285	10 in. inside 12 in.	---	75	09-00-45	P
* 117.21.17 DDD4	445607 093214202	206451	W 65	Ace Manufacturing Strom Block-	E. H. Renner	09-23-58	0-77 Qd 77-93 Opl 93-95 Ogl 95-109 Osp	904+3	109	4 in. 0-77	Opl-Osp	24.68 MP is 1.77 ft above floor	12-01-78	F
117.21.19 ABA2	445559 093220502	216081	W 66	Black Top Service Deep well	do	01-00-56	0-65 Qd 65-86 Opl 86-87 Ogl 87-251 Osp 251-280 Opc	899+1	280	6 in.	---	---	---	BR
* 117.21.19 ABA1	445559 093220501	216082	W 67	Black Top Service Shallow well	do	12-29-55	0-78 Qd 78-84 Opl 84-85 Ogl 85-105 Osp	812+3	---	3 in. 0-84	Opl(?)-Osp	25	12-29-55	---
117.21.20 BAC1	445604 093223001	206447	W 68	Bergeson Residence	Aamot	12-00-61	0-95 Qd	900	110	2 in. 0-90	Qd	40	12-00-61	P
* 28.24.6 ~~CAA1~~ CCA 01	445614 ~~093204101~~ 093203601	216083	W 69	Hedberg-Friedheim Block Co.; Wolfe Lake Augmention Well	Max Renner	07-16-47	0-71 Qd 71-78 Opl 78-81 Ogl 81-246 Osp 246-327 Opc	890	327	---	---	65	1947	G
* 28.24.6 BAA1	445653 093202601	200539	W 70	Park Theatre	do	09-00-39	0-74 Qd 74-104 Opl 104-229 Osp 229-358 Opc 358-398 Cj	905+5	398	10 in. 0-74 8 in. 0-229	Opc- Cj	46	1939	P
28.24.07 CAB1	445535 093203401	200543	W 71	Cairns Residence	Max Renner	03-00-56	0-70 Qd 70-86 Opl	880	86	4 in. 0-70	Opl	16	03-00-56	---
28.24.07 DBA1	445533 093200701	216085	W 72	Harder Residence	Pederson	12-00-56	0-138 Qd 138-153 Osp	925+5	153	---	Osp	---	---	---
117.21.19 ACA	---	216086	W 73	Jasperson Dairy	E. H. Renner	05-22-52	0-87 Qd 87-114 Opl 114-120 Ogl 120-144 Osp	915+5	144	6 in. 0-90.3	Opl-Osp	22	05-22-52	---
* 117.21.08 CAA1	445721 093221601	216087	W 74	Landers Gravel	McCarthy	09-00-21	0-82 Qd 82-100 Opl 100-265 Osp 265-280 Opc	890	280	---	Opl (?) Osp(?)-Opc	31	09-00-21	AR

PRELIMINARY Subject to Revision

Table 1.--Data on selected wells in the St. Louis Park area, Minnesota--Continued

log: Qd, Glacial drift; Opl, Platteville Limestone; Ogl, Glenwood Shale; Osp, St. Peter Sand- undifferentiated; Ospl, St. Peter Sandstone, lower silty beds; Opc, Prairie du Chien Group; Cj, nes; Ce, Eau Claire Sandstone; Cm, Mount Simon Sandstone; pCh Hinckley Sandstone.

When MP is given, altitude is measuring point, not land surface.

Field measurement status: A, well field located and permanenetly sealed; AM, well field located and per- manently sealed by MDH; AR, well reported permanently sealed; BR, well reported filled; D, well field located and contains debris; F, well field located; G, well field located and geophysically logged; M; mass measurement well (measured 2 to 3 times per year); O, observation well (measured every 2 to 3 weeks); P, well field located and has pump; X, well destroyed.

Site identification (latitude and longitude)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Driller's log	Land surface altitude, in feet	~~Originally~~ reported depth of well, in feet	Casing schedule	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
445639 093203201	216089	W 75	Park Pet Hosp.	Max Renner	1951	0-67 Qd 67-130 Opl-Osp	884+2	130	6 in. 0-67	Opl-Osp	33.51	12-11-78	P
445644 093202101	216090 1.34 cu yds $194	W 76	Professional Instruments	do	1946	---	882+2	184	6 in.	Opl(?)-Osp	---	---	P
445608 093240301	216093	W 80	Red Owl	Keys	10-03-46	0-99 Qd 99-117 Opl 117-279 Osp 279-397 Opc 397-502 Cj	920+5	502	16 in. 0-279 12 in. 0-304 grouted 279-304	Opc	70	10-03-46	---
445916 093205101	201039	W 82	Weldwood Nursing	Bergeson-Caswell	10-31-57	0-56 Qd 56-67 Opl 67-235 Osp 235-348 Opc 348-444 Cj	(890) USGS File 878+2	444	12 in. 0-56 6 in. 0-348 grouted 0-348	(?)- Cj	50	11-07-57	---
445808 093103901	201014	W 86	Prudential Insurance Co. No. 1	Layne	07-00-54	0-243 Qd 243-257 Osp 257-383 Opc 383-467 Cj 467-470 Cal	925	470	16 in. 0-259	Opc-Cal	78	07-00-54	---
445651 093222902	149710	W 100	Monitoring Well	E. H. Renner	12- -78	0-73 Qd 73-88 Opl	910	88	4 in 0-73	Opl	13.03	12-26-78	O
445617 093211501	149711	W 101	Monitoring Well	do	12-26-78	0-82 Qd 82-106 Opl	910	106	4 in. 0-103	Opl	53.41	12-26-78	G,O
---	216102	W 104	Rice Gravel & Sand	---	1935	---	---	250	12 in.	Opc(?)	---	---	---
---	200979 ?	W 105	Minnesota sugar Beet Co.	Swenson	1899	0-73 Qd 73-93 Opl 93-260 Osp 260-285 Opc 385-504 Cj 504-950 Cal-Cm	892+2	940	---	Opl- Cm(?)	---	---	---
445614 093204102	216103	W 106	Hedberg, Friedheim & Co.	---	before 1936	0-90 Qd 90-100 Opl 100-230 Osp	900	230	---	Opl(?)-Osp	---	---	---
445634 093204101	216104	W 107	Interior Elevator Co., Salem Ave. and Chicago & Milwaukee Rail Road tracks	---	about 1893	0-75 Qd 75-100 Opl 100-250 Osp 250-390 Opc 390-495 Cj 495-710 Cal- Cf 710-755 Cig	875	755	---	Opl(?)- Cig	---	---	---
445605 093211201	216029	W 108	5800 Goodrich	E. H. Renner	before 1938	---	---	---	---	---	---	---	---
445658 093211201	216105	W 109	Max Renner's Shop	Max Renner	before 1938	0-93 Qd 93-113 Opl 113-118 Osp[illegible]	925	118	---	Opl(?)-Osp[illegible]	---	---	---
445609 093212501	216107	W 111	6030 Oxford St.	Max Renner	before 1938	0-190 Qd 190-240 Osp	919	240	---	Osp	---	---	G
445615 093212301	206443	W 112	Old St. Louis Park Well #1	McCarthy	08-08-32	0-109 Qd 109-274 Osp 274-398 Opc 398-486 Cj 486-540 Cal	917.52	540	16 in. 0-212 12 in. 194-274	in 1932 Opc- Cal in 1978 Opc	77	12-21-78	G,M
445701 093215803	206440	W 113	St. Louis Park No. 3	do	08-00-39	0-103 Qd 103-118 Opl 118-286 Osp	922	286	24 in. 0-103	Opl-Osp	60	08-00-39	P
445614 093204103	216108	W 114	Hedberg, Friedheim & Co.	E. H. Renner	before 1936	0-60 Qd 60-80 Opl 80-249 Osp	887	249	---	Opl(?)-Osp	---	---	F?
445554 093220201 3	216109	W 115	Monitoring Well	Bergerson-Caswell	02-08-79	0-65 Qd 65-78 Opl 78-78 Ogl	892.16 MP	78	4 in. 0-66	Opl	10.85	02-12-79	O
445634 093205903	160030	W 116	do	E. H. Renner	04-13-79	0-67 Qd	909.59	67	0-4 in. 0-63 screened 63-67	Qd	35.01	06-05-79	O
445617 093211502	160031	W 117	do	do	04-17-79	0-72 Qd	917.73 MP	72	4 in. 0-68 screened 68-72	Qd	39.68	06-05-79	O
445516 093222501	216088	W 118	Minneapolis Park Board-Meadowbrook Golf Course	---	---	0-80 Qd 80-89 Opl 89-245 Osp 245-370 Opc 370-485 Cj 485-487 Cal	905	487	---	Opc-Cal	---	-/-	AR
445527 093215201	216009	W 119	do	---	06-27-35	0-74 Qd 74-82 Opl 82-90 Ogl 90-252 Osp 252-375 Opc 375-465 Cj 465-502 Cal	890+5	502	16 in. 0-77 12 in. 77-257	Opc-Cal	54.5	06-28-35	---
445014 093212802	165516	W 120	Monitoring Well	E. H. Renner	07-12-79	0-95.5 Qd 95.5-98 Opl, (weathered) 98-107 Opl 107-108.6 Ogl	919.8 MP	105.7	4 in. 0-98	Opl	38.84	07-12-79	G,O
445558 093212001	165577	W 121	do	do	07-18-79	0-110 Qd 110-115 Opl, (weathered) 115-117 Ogl	918+2	113.25	4 in. 0-109 screened 109-115	Opl	53.58	07-18-79	G,O
445557 093210901	165578	W 122	do	do	08-01-79	0-237 Qd 237-239 Ospl	920+2	239	4 in. 0-217	---	---	---	O
445559 093213201	216129	W 140	Cambridge Brick	---	---	---	---	---	4 in.	Opl?	---	---	D
445607 093214203	216061	W 143	6425 Oxford St.	---	---	0-70 Qd 70-90 Opl	---	---	4 in. 0-70	Opl	---	---	G
445634 093204102	216128	W 144	Interior Elevator Co.	---	---	---	---	---	---	---	---	---	F

PRELIMINARY Subject to Revision

	Initials	Date
Prepared By		
Approved By		

PPT PAH Compounds

	Benzo(e) Pyrene	perylene	benzo(g,h,i) perylene	benzo(k) fluoranthene	benzo(j) Fluoranthene	o-phenylenepyrene	2,3,4, dibenzanthracene
SLP #3 1-29-80	<4.8	<4.6	<11 <4.4	<2.5	<11	<3.5 <1.1	18
5-21-80	<5.8	<.44	<3.3	<.40	<28		
5-21-80, 6-5-80 #4	<5.8	<.44	<3.3	<.44	<28		
1-28-80 to	5.7	<4.6 <2.2	<11 <4.4	<2.5	<13	<3.6 <2.6 <1.1	3.7 <4.1
3-24-80 5-16-80	<5.8	<.44	<3.3	1.7	<28		<4.0
6-20-80, 6-13-80	<5.5	<.51	<4.4	<.34	<1.4		
#5 1-29-80	<4.8	<4.6	<11 <4.1	<2.5	<11	<3.5 <1.2	4
					<28		
5-21-80	<5.8	<.44	<3.3	<.40	<13	<3.6 <1.5	11
#6 1-7-80 to	3.5	<4.6	<14 <4.8	<2.5			
3-24-80		<2.2					
6-5-80	<5.8		<3.3	<.40	<28		
#7 1-8-80 to	<7.3	<4.5	<15 <4.4	<2.5	<20	<3.6 <1.1	11 <16
2-8-80		<16				<12	
6-20-80, 6-13-80	<5.5	<.51	<4.4	<.34	<1.4		
#8 1-29-80	<4.8	<4.6	<11 <4.4	<2.5	<11	<3.5 <1.1	<3.5 <4.1
5-21-80	<5.8	<.44	<3.3	<.40	<28	<2.6	
#9 6-13-80, 6-20-80	<5.5	<.51	<4.4	<.34	<1.4		
6-5-80	<5.8	2.2	<3.3 <4.4	<.40	<28	<12 <1.1	<16
7-3-80	<5.5	<.45	<2.9	<.36	<1.4		
#10 1-29-80	<24	<23	<55 <9.8	<2.9	<55	<18	<23
			4.4			<2.1	
						<1.2	
#11 1-29-80	<5.0	<4.6	<11 <4.5	<2.5	<11	<3.5 <2.6 <1.1	8.5
5-21-80	<5.8	<.44	<3.3	<.40	<28		
#12 1-29-80	<4.8	<4.6	<11 <4.5	<2.5	<11	<3.5 <2.6 <1.1	<3.5
5-21-80	<6.6	<.50	<3.8	<.46	<32		
#13 1-29-80	<4.5	<4.5	<15 <4.5	<2.5	<20	<5.0 <1.1	3.6
		<2.2				<2.6	<4.1
#14 1-29-80 to	5.9	<4.6 <2.2	9.4 5.5	<2.5	13	1.3 <2.6 2.2	<3.5
3-24-80		<4.4	<3.3 5.4	<.40	<28	<1.1	
5-21-80	<5.8						
#15 1-29-80	<24 <.33	<23	<55 <10.7	<2.5	<55	<18 <2.4	13
6-20-80, 6-13-80	<5.5	<.51 <.16	<4.4	<.34	2.1	<.30 2.0	<.69
6-5-80	<5.8	<.44	<3.3 6.8	<.40	<28		
#16 1-29-80	<4.8	<4.6 <2.2	<11 <4.4	<2.5	<11	<3.5 <1.1	<3.7
5-21-80	<5.8	<4.4	<3.3	<.40	<28	<2.6	

	Initials	Date
Prepared By		
Approved By		

1978 72

Parts per trillion PAH Compounds

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
		2-methylnaphthalene	Acenaphthalene	biphenyl	anthracene	phenanthrene	pyrene	1,2,6,7-tetrahydropyrene	flourene	flouranthene	1-2 benzanthracene	chrysene	benzo(a)pyrene	9-10-benzophenanthrene
1	SLP #3 5-20-80	—	<23	<4.6	<1.2 <1.9	<1.8	<11 <47	—	<9.4	<.49 <.9	<2.0	<3.4	<1.7 <1.1	<1.9
	1-29-80	<24	<23	<48	<17	<11	36	<37	<15	<4.9	<3.2	12	<10	<10
2	5-21-80	<16	500	—	<1.2	<1.8	<11	—	<9.4	4.7	<2.0	<3.4	<1.7 <1.1	<1.9 <1.9
	6-5-80	<16	<23	—	<1.2	73	<11 10-19-79	—	<9.4	3.8	<2.0	<5.4	<1.7	<2.0
	6-13-80	<18	—	<6.5	<1.0	69	87	—	<11	—	<3.0	<4.3	<1.87	
3	closed 1979 #4 1-9-80	200	* 530	* 99	<12 <1.9	* 120	<16 5-2-80	140 5-2-80	120	* 38 4.5	<5.2	8.2	* 5.1 11-16-79	2.4
	to 3-24-80		290	<6.5	<1.0	62	30	<14	<11	1.7	<3.0	<4.3	<1.87	<2.0
4	6-20-80	<18	290	—	—	64	<47	—	<8.6	5.5	<2.1	<3.5	<1.5	<2.0
	7-3-80	<16					<10							
5	#5 1-29-80	<24	<23	<48	<17 <1.9	<11	<23 <47	<37	<15	5.1 7.4	4.4	<10	<10 <1.0	<10
6														
7	5-21-80	<16	—	<4.6	<1.2	<1.8	<11	—	<9.4	1.1	<2.0	<3.4	<1.7	<1.9
	#6 1-7-80 to 3-24-80	34	47	74	16 <1.9	13	<15 <47	<16	<7.9	<4.8 <1.0	<3.8	<3.8	<8.0 <1.0	<4.6
8	1978 closed 6-13-80	<19 7-3-80	<19 7-3-80	<6.5 7-3-80	— 7-3-80	<1.9 7-3-80	— 7-3-80	— 7-3-80	<11 7-3-80	— 7-3-80	<3.0 7-3-80	<4.3 7-3-80	<1.87 7-3-80	<2.0 7-3-80
	7-8-80	<19 <16	<19 <22	45		<11 2.4	39 50	<47 7-3-80	<13 48.6	4.2 6.2	<2.7 <21	<8.4 <3.5	<12 <1.5	<7.6 <2.0
9	#7 1-22-80	<8.8	81	30	* <1.2 11.4	<1.7	30	48	<4.3	* 5.2 7.4	<3.0	<5.1	* <6.9	<4.6
	1-8-80	<47	<100	53	12	<2.7	87 104	<15	61	<5.0	<6.6	<3.7	<8.5 4.1	<2.0
10	6-5-80	<16	<23 <19	<4.6 <6.5	—	<1.8 <1.3	44 42	—	<9.4	11	<3.0	<4.4	<1.7	<1.9
	6-20-80			<4.6	<1.2	<1.6	<11	—	<11	—	<3.0	<4.3	<1.87	<3.0
11	#8 5-20-80	<16	<23						<9.4	<.49	<2.0	<3.4		<1.9
	1-29-80	<24	<23	<48	<17 <1.9	<11 5.8 10-19-79	<23 <47	<37	<15	<4.9 <.8	<3.2	<10	<10 <1.1	<10
12	1978 closed													
13	#9 6-5-80	<16	<23	<4.6	<1.2	—	17	—	<9.4	8.3	<2.0	<3.4	<1.7	<1.9
	6-13-80	<18	* <19 <100	<6.5	* 12 12.2	<1.9	* 32 199	—	<11	* 7.0 21.1	<3.0	<4.3	* <1.87 <1.1	<2.0
14	6-20-80	<18	<19 11-5-79	18	—	<1.9 13	<10	—	<11	5.8	<3.0	<4.3	<1.87	<2.0
	7-3-80	<16	<22						<8.6	3.8	<2.1	<3.5	<1.5	<2.0
15	1978 closed #10 11-5-79	<100	930			690				810	65	<15	44	
	1-29-80	<120	* <120	<240	* 490 100	72	* <120 800 1978	<180	2100	* 750 450	140	<50	* <50 <1.1	37
16					54		486			152	1.3			
17	2-24-80	<22	<19	<8.0	<1.5	<2.9	<12	<13	<2.4	4.6	<3.2	<2.9	<3.5	<1.7
	#11 1-29-80	<24	<23	450	<17 <1.9	<11	<23 <47	<37	40	14 <1.9	<3.3	<10	<10 <1.1	<10
18	5-21-80	<16	<24	<4.6	<1.2	<1.8	<11	—	<9.4	—	<2.0	<3.4		<1.9
19	5-21-80	—	<26	<52	<1.4	10	<13	—	<11	—	<2.2	<3.9	<1.9	<2.2
	#12 1-29-80	<24	32	53	<17 <1.9	<11	<25 <47	<37	<15	<4.9 <1.9	<3.2	<10	<10 <1.1	<10
20	2-5-80	<19	<19	<50	—	<11	<15	<47	<13	<3.5 1.0	<2.7	<8.4	<12	<7.6
21	#13 1-22-80	<8.8	<20	5.7	<12 <1.9	8.7	<16 <47	<16	<4.3	<4.4 <1.9	<3.0	<5.1	<8.9 <1.1	<4.6
	1-8-80	<47	<100	<4.9	5.1	<1.7	<14	<15	<7.9	<5.0	<6.6	<3.7	<8.5	<2.0
22	5-20-80	<16	—	<46	—	<2.9	<11	<13	<9.4	3.8	<3.0	<3.4	<1.7	<1.9
	3-24-80	<22	27	33	10	<2.3	17	<11	<2.4	21	<3.3	<2.9	<3.5 1.8	<1.7
23	3-10-80	<16	16 <14	2,50	3.7, 3.3 6.3	<2.3 12 10-19-79	29.3 <47	<57	<5.4	7.2 5.5 4.2	<2.0	<2.3	<3.0	<1.3
	#14 1-29-80	<24	130	<48	<17	<11	<23		15	<4.9 2.4	<5.2	<10	<10 4.2	<10
24	6-20-80	<18	<29	2500	210	<1.9	270	—	<9.4	260	<3.0	48	<1.87 <1.2	<2.0
	6-5-80	<16	<23	1900	260	<1.8 7-19-79	1600	—	<11	330 590	<2.0		<1.87	<2.0
25	1978 closed #15 6-13-80	<18	2100 3200	<6.5	120 190	<1.9	2300 750	—	2200	790	<3.0	39	38 1.5	<2.0
	1-29-80	<120	* <120 7-16-79	<240	* 570 291	<55 1900	* <120 1221	<180		* 780 292	52	<50	* <50 11-5-79	50
26	5-20-80	<16	<23	<4.6	<1.2	<1.8	<11	—	<9.4	<.59	<2.0	<3.4	<1.7 <1.1	<1.9
27	#16 1-29-80	<24	<23	<48	<17 <1.9	<11	<23 <47	<37	<15	<4.9 <.8	<3.2	<10	<10	<10

8514 GREEN

	Initials	Date
Prepared By		
Approved By		

1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Coliforms MPN. per 100ml	*Total Solids	Turbidity	Color	*Total Hardness as $CaCO_3$	Alkalinity as $CaCO_3$	*pH	*Iron mg/l	Mn mg/l	Cl_2	SO_4	F_2	Tot P	Ca as $CaCO_3$
SLP # 3 7/17/74		440	—	—	370	300	7.5	.68	.075	34	81	.17	.07	230
# 4 7/17/74		340	—	—	340	300	7.5	.80	.043	12	17	.18	.09	210
# 5 7/17/74		300	—	—	290	290	7.5	.70	.051	4.1	8	.21	.10	180
#6 7/17/74		340	—	—	320	300	7.6	.65	.035	6.7	19	.19	.09	190
#7 7/17/74 9/18/73	<2.2	380 450 mg/l	10	25	340 400 mg/l	300 310 mg/l	7.4 7.3	1.3 —	.088	19	64 62	.28 .40	1.5 .14	240 220
#8 7/17/74		320 mg/l	—	—	320 mg/l	310 mg/l	7.5	.67	.096	3.8	7.0	.19	.08	200
#9 7/17/74 9/18/73	<2.2	400 410 mg/l	9.8	25	360 300 mg/l	300 300 mg/l	7.4 7.5	1.1 1.8	.067 .08	21 13	50 40	.17 .30	.10 .05	220 200
#10 7/17/74 9/18/73	<2.2	360 350 mg/l	5.9	20	310 220 mg/l	290 240 mg/l	7.5 7.5	.80 .79	.072 .06	15 21	6 19	.17 .19	.06 .06	190 140
#11 7/17/74 9/18/73	<2.2	350 360 mg/l	5.3	20	220 210 mg/l	220 230 mg/l	7.5 7.7	.63 .84	.011 .008	31 44	54 47	.30 .44	.04 <.01	150 96
#12 7/17/74 9/18/73	<2.2	240 240 mg/l	3.8	15	160 140 mg/l	170 180 mg/l	7.6 7.7	.51 .59	.011 .008	30 31	12 12	.41 .62	.02 <.01	100 76
#13 7/17/74 9/18/73	<2.2	310 370 mg/l	2.3	20	210 190 mg/l	200 260 mg/l	7.5 7.5	.69 1.4	— .03	29 25	49 39	.39 1.1	.03 .03	130 80
#14 7/17/74 9/18/73	<2.2	390 380 mg/l	7.8	20	340 280 mg/l	300 270 mg/l	7.4 7.4	.50 .91	.056 .08	11 7.4	50 36	.22 .23	.06 .11	200 100
#15 7/17/74 9/18/73	<2.2 <2.2	340 mg/l 360 mg/l	4.2	20	320 mg/l 300 mg/l	310 mg/l 330 mg/l	7.5 7.4	.64 .79	.072 .08	8.6 6.9	15 9.5	.20 <.1	.15 .10	190 200

	Initials	Date
Prepared By		
Approved By		

	Sodium	Potassium	Phenols mg/l	Cu ug/l	Cd ug/l	Ni ug/l	Zn ug/l	Pb ug/l	Oil & Grease mg/l	TOC mg/l	Flow gpm
SLP #3	10 7-17-74	2.9 7-17-74	.006 1-8-74; 12/11/73 <.002 7-17-74; 12/4/73 .002 12-27-73	<10 7-17-74	<10 7-17-74	<10 7-17-74	16 7-17-74	<10 7-17-74	<.5 7-17-74	17 7-17-74	1200
#4	6.2 7-17-74	3.5 7-17-74	12/11/73 .007; 12/4/73 <.002 12-27-73, 1-8-74, 7-17-74	<10 7-17-74	<10 7-17-74	<10 7-17-74	14 7-17-74	<10 7-17-74	<.5 7-17-74	7.6 7-17-74	
#5	4.6 7-17-74	2.7 7-17-74	12/11/73 .005 .007 7-17-74; 12/4/73 <.002 12-27-73, 1-8-74	<10 7-17-74	<10 7-17-74	<10 7-17-74	<10 7-17-74	<10 7-17-74	.9 7-17-74; 9.3 12-27-73	12 7-17-74	1200
#6	4.6 7-17-74	2.9 7-17-74	12/11/73 <.002 12-27-73; 12/4/73 <.002; 1-8-74 .007 .008 7-17-74	<10 7-17-74	<10 7-17-74	<10 7-17-74	14 7-17-74	<10 7-17-74	<.5 7-17-74	13 7-17-74	1200
#7 9-18-73	11 7-17-74; 47	3.2 7-17-74; 5	<.002 7-17-74	<10 7-17-74	<10 7-17-74	<10 7-17-74	18 7-17-74	<10 7-17-74	<.5 7-17-74	9.5 7-17-74	
#8	3.8 7-17-74	2.9	12/11/73 <.002 - 1-8-74, 7-17-74; 12/4/73 .013; 12/27/73 .008	<10 7-17-74	20 7-17-74	<10 7-17-74	<10 7-17-74	<10 7-17-74	<.5 7-17-74	13 7-17-74	1200
#9 9/18/73	9.5 7-17-74; 9	3 7-17-74; 2	<.002 7-17-74; .003	<10 7-17-74	56 7-17-74; <10	<10 7-17-74	<10 7-17-74	<10 7-17-74	<.5 7-17-74		
#10 9-18-73	6.5 7-17-74; 8	2.9 7-17-74; 2	12-11-73 <.002 - 1-8-74; 12-4-73 .003 .013 12-27-73; .006 .018 7-17-74	<10 7-17-74	10 7-17-74; <10	<10 7-17-74	<10 7-17-74; 15	<10 7-17-74	<.5 7-17-74; 2.8 12-27-73; 12-18-73 <.5		
#11 9-18-73	26 7-17-74; 25	7.9 7-17-74; 7 1-16-74	12-11-73 .007 .002 1-8-74 12-27-73; 12-4-73 <.002 - 12-18-73 - 7-17-74; .007	<10 7-17-74	32 7-17-74; <10	<10 7-17-74	11 7-17-74; <10	17 7-17-74; <10	<.5 7-17-74		1200
#12 9-18-73	52	5	12-11-73 <.002 - 1-8-74; 12-4-73 <.002 .022 .004 12-27-73 - 12-18-73 - 7-17-74	<10 7-17-74	22 7-17-74; <10	<10 7-17-74	16 7-17-74; 10	<10 7-17-74	45 7-17-74		1400
#13 9-18-73	48	4	12-11-73 <.002 - 1-8-74; 12-4-73 .004 .021 7-17-74 .018 1-16-74; 12-27-73 - 12-18-73	<10 7-17-74	<10 7-17-74	<10 7-17-74	<10 7-17-74; 14	<10 7-17-74			1400
#14 9-18-73	5	3	12-11-73 <.002 - 12-18-73; 12-4-73 <.002 .003 1-16-74 .006 7-17-74 <.000	<10 7-17-74; 15	10 7-17-74; <10	<10 7-17-74	23 7-17-74; 12	<10 7-17-74; 20			1200
#15 9-18-73	5.8 7-17-74; 2	2.4 7-17-74; 2	12-11-73 <.002 - 12-18-73; 12-4-73 .007 1-8-74 1-16-74; <.000 7-17-74 <.002	<10 7-17-74	15 7-17-74; <10	<10 7-17-74	7-17-74 <10	7-17-74 <10		9.8 7-17-74	

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