TABLE 2.1

BEDROCK HYDRAULIC MONITORING /SAMPLING SUMMARY
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

A) Hydraulic Monitoring Locations

(i) ***Bedrock Well Locations - (Round 1, Round 2)***

OW400 B, C, D; OW401 B, C, D; OW402 B, C, D; OW403 B, C, D; OW404 B, C, D; OW405 B, C, D; OW406 B, C, D; OW407 B, C, D; OW408 B, C, D; OW409 B, C, D; OW410 B, C, D; OW411 B, C, D; OW412 B, C, D; OW413 B, D; OW414 B, C, D; OW415 B, C, D; OW416 B, C, D; and OW417 B, C, D.

OW649 C, D; OW650 D; OW651 C, D; OW652 B, C, D; OW653 B, C, D; OW654 B, C, D;
OW655; OW656; OW657 B, C, D; OW658 B, C, D; OW659 B, C, D; BH11D-92, PASNY139, MW-88-6B, MW-88-6A, MW23 C and MW23 B.

(ii) ***Overburden Well Locations - (Round 1, Round 2)***

OW306, OW307, OW308, OW309, OW310, BH1A and BH1B.
OW553, OW554, OW555, OW556 and OW557.
MW1, MW2 and MW3.

B) SSI Sampling Locations

(i) *Bedrock Well Locations*	*Round 1*	*Round 2*
PASNY 139	yes	no
BH11D-92	yes	no
OW65OD, OW652D, OW653D	yes	no
OW652B, OW652C	yes	yes
OW653B, OW653C	yes	yes
OW657B, OW657C, OW657D	yes	yes
OW658B, OW658C, OW658D	yes	yes
OW659B, OW659C, OW659D	yes	yes

(ii) *Overburden Well Locations*		
MW-1	no	yes
MW-2, MW-3	yes	no

TABLE 2.2

BEDROCK WELL SOUNDED DEPTH RESULTS
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Well No.	*Drilled Depth (ft BGS)*	*Measured Depth* (ft BGS)*	*Difference (ft.)*
OW649C	109.6	107.90	1.7
OW649D	58.0	56.38	1.6
OW650D	58.5	50.07	8.4
OW651C	91.3	90.36	0.8
OW651D	61.0	58.20	2.8
OW652B	127.0	126.10	0.9
OW652C	93.0	90.40	2.6
OW652D	60.5	59.72	0.8
OW653B	122.0	119.22	2.8
OW653C	96.0	88.50	7.5
OW653D	70.2	69.00	1.2
OW654B	125.5	128.50	-3.0
OW654C	88.5	87.50	1.0
OW654D	59.6	55.30	4.3
OW655D	64.0	62.72	1.3
OW656D	60.2	59.77	0.4
OW657B	130.5	128.60	1.9
OW657C	95.1	94.60	0.5
OW657D	64.5	58.11	6.4
OW658B	131.0	129.55	1.4
OW658C	95.1	95.02	0.1
OW658D	65.0	64.70	0.3
OW659B	130.0	129.90	0.1
OW659C	94.5	93.45	1.0
OW659D	64.4	60.70	3.7
BH11D-92	26.9	25.64	1.3
PASNY139	unknown	133.50	NA
MW-88-6A	22.4	24.60	-2.2
MW-88-6B	32.0	34.12	-2.1

Notes:

* Measured May 3, 1993.
NA - Not Aplicable.

TABLE 2.3

SITE SPECIFIC INDICATORS (SSI)
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Analytes	*Unit*	*Method Detection Level*
pH	S.U.	
Specific Conductance	µmhos/cm	1
Phosphorus, Total Soluble (As P)	µg-P/L	10
Arsenic	µg/L	19/23*
Mercury	µg/L	0.2/0.4*
Lead	µg/L	16/18*
Toluene	µg/L	1
2-Chlorotoluene	µg/L	1
4-Chlorotoluene	µg/L	1
2,2/2,5-Dichlorotoluene	µg/L	1
2,6-Dichlorotoluene	µg/L	1
2,3/3,4-Dichlorotoluene	µg/L	1
2,3,6-Trichlorotoluene	µg/L	1
2,4,5-Trichlorotoluene	µg/L	1
Benzene	µg/L	1
Chlorobenzene	µg/L	1
1,2-Dichlorobenzene	µg/L	1
1,3-Dichlorobenzene	µg/L	1
1,4-Dichlorobenzene	µg/L	1
1,2,3-Trichlorobenzene	µg/L	1
1,2,4-Trichlorobenzene	µg/L	1
1,2,3,4-Tetrachlorobenzene	µg/L	1
1,2,4,5-Tetrachlorobenzene	µg/L	1
Hexachlorobenzene	µg/L	1
Trichloroethylene	µg/L	1
Tetrachloroethylene	µg/L	1
2-Chlorobenzotrifluoride	µg/L	1
4-Chlorobenzotrifluoride	µg/L	1
2,4-Dichlorobenzotrifluoride	µg/L	1
3,4-Dichlorobenzotrifluoride	µg/L	1
Hexachlorobutadiene	µg/L	1
Hexachlorocyclopentadiene	µg/L	1
Octachlorocyclopentene	µg/L	1
Perchloropentacyclodecane (Mirex)	µg/L	1
2,4,5-Trichlorophenol	µg/L	10
a-Hexachlorocyclohexane	µg/L	1
b-Hexachlorocyclohexane	µg/L	1
g-Hexachlorocyclohexane	µg/L	1
d-Hexachlorocyclohexane	µg/L	1
Benzoic Acid	µg/L	100
2-Chlorobenzoic Acid	µg/L	30
3-Chlorobenzoic Acid	µg/L	30
4-Chlorobenzoic Acid	µg/L	30
Chlorobenzoic Acids, Total	µg/L	90
Chlorendic Acid	µg/L	250
Total Organic Carbon (TOC)	mg/L	1
Total Organic Halides (TOX)	µg/L	50

Note:

* MDL Round 1/MDL Round 2

TABLE 3.1

BEDROCK STRATIGRAPHIC THICKNESS SUMMARY
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Well No.	*Overburden Thickness (ft)*	*Oak Orchard Thickness (ft)*	*Eramosa Thickness (ft)*	*Goat Island Thickness (ft)*
OW652C	14.5	84.0	14.3	13.4
OW653C	20.8	83.4	18.8	13.3
OW657D	18.0	78.0	20.0	12.6
OW658D	17.5	80.1	19.7	11.5
OW659D	20.3	79.3	17.7	11.0
BH11D-92	16.8	–	–	–

TABLE 3.2

HYDRAULIC MONITORING - OVERBURDEN
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Well No.	*May 1993 Water Elevation (ft AMSL)*	*July 1993 Water Elevation (ft AMSL)*
SDCP Wells		
BH1A-88	555.66	555.58
BH1B-88	565.09	565.34
OW306	568.19	567.58
OW308	570.54	569.79
OW309	565.88	568.71
OW310	570.87	570.71
OSI Wells		
OW553	569.71	568.73
OW554	570.93	568.84
OW555	570.99	570.36
OW556	570.92	569.26
OW557	567.92	566.54
OW558	569.38	569.26
OW559	569.30	568.95
UDG Wells		
MW-3	570.79	569.72
MW-2	570.84	NA
MW-1	NM	569.31

Notes:

NM - Not Measured
NA - Not Available

TABLE 3.3

HYDRAULIC MONITORING - BEDROCK
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Well No.	*May 1993 Water Elevation (ft AMSL)*	*July 1993 Water Elevation (ft AMSL)*
SDCP Wells		
OW400D	555.32	556.49
OW400C	555.14	556.07
OW400B	555.30	556.17
OW401D	554.98	556.06
OW401C	555.06	556.01
OW401B	554.96	555.90
OW402D	554.83	555.70
OW402C	555.01	555.81
OW402B	554.74	555.46
OW403D	555.26	555.60
OW403C	555.02	555.73
OW403B	554.93	555.59
OW404D	554.97	554.86
OW404C	567.46	555.99
OW404B	560.49	558.69
OW405D	554.94	555.24
OW405C	555.27	555.87
OW405B	554.08	554.65
OW406D	553.96	554.47
OW406C	555.28	555.74
OW406B	552.86	555.01
OW407D	553.99	553.99
OW407C	555.01	555.56
OW407B	556.14	556.81
OW408D	554.15	554.59
OW408C	555.51	555.83
OW408B	552.58	552.66
OW409D	554.92	555.38
OW409C	557.66	557.93
OW409B	552.72	552.99
OW410D	555.19	555.67
OW410C	558.10	552.94
OW410B	552.49	554.12
OW411D	560.16	560.38
OW411C	558.05	558.00
OW411B	553.10	553.08
OW412D	559.56	559.98
OW412C	558.03	557.96
OW412B	556.97	556.90
OW413D	560.66	560.81
OW413B	566.03	surcharged
OW414D	559.30	559.69
OW414C	559.17	560.04

TABLE 3.3

HYDRAULIC MONITORING - BEDROCK
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Well No.	*May 1993 Water Elevation (ft AMSL)*	*July 1993 Water Elevation (ft AMSL)*
OW414B	556.89	557.75
OW415D	555.59	555.92
OW415C	555.12	555.48
OW415B	555.42	555.81
OW416D	556.09	557.32
OW416C	555.13	555.84
OW416B	554.22	554.84
OW417D	554.00	554.38
OW417C	555.33	555.85
OW417B	555.52	556.02
OSI Wells		
OW649D	555.65	555.56
OW649C	555.67	555.55
OW650D	553.33	552.83
OW651D	554.36	554.14
OW651C	554.73	554.57
OW652D	551.37	551.59
OW652C	553.87	554.57
OW652B	553.24	553.86
OW653D	550.75	550.75
OW653C	551.27	551.68
OW653B	552.79	553.49
OW654D	549.04	549.19
OW654C	554.02	554.00
OW654B	553.69	553.54
OW655D	546.35	546.67
OW656D	552.75	553.13
OW657D	553.08	553.79
OW657C	553.81	554.64
OW657B	553.19	553.85
OW658D	548.26	548.18
OW658C	550.96	551.20
OW658B	552.39	552.40
OW659D	551.41	551.96
OW659C	553.50	553.76
OW659B	552.90	552.88
BH11D-92	550.26	550.37
Wells by Others		
PASNY139	553.67	553.75
MW-88-6B	546.16	546.01
MW23C	554.54	554.52

TABLE 4.1

SUMMARY OF PARAMETERS AND PARAMETER GROUPS SELECTED FOR GRAPHICAL PRESENTATION OSI PROGRAM - PHASE 2 OCCIDENTAL CHEMICAL CORPORATION BUFFALO AVENUE PLANT

General Parameter Survey Analysis List	*Figure Title*	*Figure #* Bedrock	*Figure #* Overburden
pH	pH Levels	4.2.1	--
Total Organic Halides (TOX)	Total Organic Halides (TOX)	4.2.2	4.1.1
Total Organic Carbon (TOC)	Total Organic Carbon (TOC)	4.2.3	4.1.2
Specific Conductance	Specific Conductance Level	4.2.4	--
Phosphorus, Total Soluble (as P)	Total Soluble Phosphorus Concentration	4.2.5	4.1.3
Mercury	Total Mercury Concentration	4.2.6	--
Lead	Total Lead Concentration	4.2.7	--
Arsenic	Total Arsenic Concentration	4.2.8	--
Toluene	Toluene Concentration	4.2.9	--
2-Chlorotoluene 4-Chlorotoluene 2,5/2,4-Dichlorotoluene 2,3/3,4-Dichlorotoluene 2,6-Dichlorotoluene 2,3,6-Trichlorotoluene 2,4,5-Trichlorotoluene	Total Chlorotoluenes Concentration	4.2.10	--
Benzene	Benzene Concentration	4.2.11	--
Chlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,3,4-Tetrachlorobenzene 1,2,4,5-Tetrachlorobenzene Hexachlorobenzene	Total Chlorobenzenes Concentration	4.2.12	--
Trichloroethylene Tetrachloroethylene	Total Chloroethylenes Concentration	4.2.13	

TABLE 4.1

SUMMARY OF PARAMETERS AND PARAMETER GROUPS SELECTED FOR GRAPHICAL PRESENTATION OSI PROGRAM - PHASE 2 OCCIDENTAL CHEMICAL CORPORATION BUFFALO AVENUE PLANT

General Parameter Survey Analysis List	*Figure Title*	*Figure #* Bedrock	*Figure #* Overburden
2-Chlorobenzotrifluoride 4-Chlorobenzotrifluoride 2,4-Dichlorobenzotrifluoride 3,4-Dichlorobenzotrifluoride	Total Chlorobenzotrifluorides Concentrations	4.2.14	--
Hexachlorobutadiene Hexachlorocyclopentadiene Octachlorocyclopentene Perchloropentacyclodecane (MIREX)	Total Hexachlorobutadiene, Hexachlorocyclopentadene, Octachlorocyclopentene, and Perchloropentacyclodecane Concentration	4.2.15	--
2,4,5-Trichlorophenol	2,4,5-Trichlorophenol Concentration	4.2.16	--
a-Hexachlorocyclohexane b-Hexachlorocyclohexane g-Hexachlorocyclohexane d-Hexachlorocyclohexane	Total Hexachlorocyclohexane Concentration	4.2.17	--
Benzoic Acid	Benzoic Acid Concentrations	4.2.22	--
Total Chlorobenzoic Acids	Total Chlorobenzoic Acid Concentrations	4.2.23	--
Chlorendic Acid	Chlorendic Acid Concentrations	4.2.24	--

TABLE 4.2

SUMMARY OF ANALYTICAL METHODOLOGY
AMERICAN REF-FUEL
MARCH 1993

Parameter	*Analytical Method*
Target Compound List Volatile Organic Compounds	624(2)
Priority Pollutant Volatile Organic Compounds	8240(1)
Priority Pollutant Base/Neutral Acid Extractables	625(2)
Target Compound List Base/Neutral Acid Extractables	8270(1)
Priority Pollutant Pesticides/Polychlorinated Biphenyls	608(2)
Dechlorane Plus	8080(1)
Priority Pollutant Metals	6000/7000 Series(1)
Resource Conservation and Recovery Act Metal	6000/7000 Series(1)
Sulfate	9038(1)

Notes:
(1) Referenced from USEPA SW-846, 3rd Edition, 1986.
(2) Referenced from USEPA "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", July 1982.

TABLE 4.3

COMPARISON OF D-ZONE AVERAGE CHEMICAL CONCENTRATIONS WITH DISTANCE FROM NORTH PLANT BOUNDARY OSI PROGRAM - PHASE 2 OCCIDENTAL CHEMICAL CORPORATION BUFFALO AVENUE PLANT

Parameters/Parameter Groups	*Unit*	*Plant Boundary Wells 404D, 405D, 406D, 408D & 417D* (1)	*1st Line of Wells 651D, 652D, 653D, 657D, 658D & 659D*	*Royal Avenue Wells 654D & 655D* (2)
pH	S.U.	6.8	NA	7.4
Total Organic Halides (TOX)	µg/L	12,000	R	3,200
Total Organic Carbon (TOC)	mg/L	7	2	5
Specific Conductance	µmhos/cm	4,100	NA	1,400
Total Soluble Phosphorus	µg-P/L	190	23	24
Total Mercury	µg/L	ND	ND	ND
Total Lead	µg/L	ND	26	ND
Total Arsenic	µg/L	ND	ND	ND
Toluene	µg/L	230	1	5
Total Chlorotoluenes	µg/L	840	140	200
Benzene	µg/L	48,000	180	220
Total Chlorobenzenes	µg/L	15,000	270	5,300
Total Chloroethylenes	µg/L	44	69	420
Total Chlorobenzotrifluorides	µg/L	200	28	130
Total C46, C56, C58 and Mirex	µg/L	130	ND	160
2,4,5-Trichlorophenol	µg/L	3	ND	ND
Total Hexachlorocyclohexanes	µg/L	130	ND	86
Total Organic SSI	µg/L	65,000	640	6,500
Benzoic Acid	µg/L	40	ND	ND
Chlorobenzoic Acid	µg/L	220	ND	ND
Chlorendic Acid	µg/L	200	ND	ND

Notes:

R - Associated results were qualified as unusable.
NA - Not Available
(1) SDCP SSI analytical results.
(2) Phase 1 analytical results.

TABLE 4.4

COMPARISON OF C-ZONE AVERAGE CHEMICAL CONCENTRATIONS WITH DISTANCE FROM NORTH PLANT BOUNDARY OSI PROGRAM - PHASE 2 OCCIDENTAL CHEMICAL CORPORATION BUFFALO AVENUE PLANT

Parameters/Parameter Groups	*Unit*	*Plant Boundary Wells 404C, 405C, 406C, 408C & 417C (1)*	*1st Line of Wells 652C, 653C, 657C, 658C & 659C*	*Royal Avenue Well 654C (2)*
pH	S.U.	7.6	NA	6.9
Total Organic Halides (TOX)	µg/L	3,300	R	2,100
Total Organic Carbon (TOC)	mg/L	4	3	ND
Specific Conductance	µmhos/cm	1,100	NA	350
Total Soluble Phosphorus	µg-P/L	30	ND	33
Total Mercury	µg/L	ND	ND	ND
Total Lead	µg/L	ND	ND	ND
Total Arsenic	µg/L	ND	ND	ND
Toluene	µg/L	10	1	ND
Total Chlorotoluenes	µg/L	450	100	ND
Benzene	µg/L	1,600	200	ND
Total Chlorobenzenes	µg/L	4,100	260	3
Total Chloroethylenes	µg/L	650	210	2,300
Total Chlorobenzotrifluorides	µg/L	180	31	9
Total C46, C56, C58 and Mirex	µg/L	ND	ND	ND
2,4,5-Trichlorophenol	µg/L	ND	ND	ND
Total Hexachlorocyclohexanes	µg/L	120	ND	ND
Total Organic SSI	µg/L	7,100	800	2,300
Benzoic Acid	µg/L	ND	ND	ND
Chlorobenzoic Acid	µg/L	ND	ND	ND
Chlorendic Acid	µg/L	ND	ND	ND

Notes:

R - Associated results were qualified as unusable.
NA - Not Available
(1) SDCP SSI analytical results.
(2) Phase 1 analytical results.

TABLE 4.5

COMPARISON OF B-ZONE AVERAGE CHEMICAL CONCENTRATIONS WITH DISTANCE FROM NORTH PLANT BOUNDARY OSI PROGRAM - PHASE 2 OCCIDENTAL CHEMICAL CORPORATION BUFFALO AVENUE PLANT

Parameters/Parameter Groups	*Unit*	*Plant Boundary Wells 404B, 405B, 406B, 408B & 417B(1)*	*1st Line of Wells 652B, 653B, 657B, 658B & 659B*	*Royal Avenue Well 654B (2)*
pH	S.U.	7.4	NA	7.2
Total Organic Halides (TOX)	µg/L	7,300	R	230
Total Organic Carbon (TOC)	mg/L	6	6	ND
Specific Conductance	µmhos/cm	4,800	NA	2,900
Total Soluble Phosphorus	µg-P/L	ND	12	44
Total Mercury	µg/L	ND	ND	ND
Total Lead	µg/L	ND	ND	ND
Total Arsenic	µg/L	ND	ND	ND
Toluene	µg/L	72	ND	ND
Total Chlorotoluenes	µg/L	490	65	69
Benzene	µg/L	11,000	300	130
Total Chlorobenzenes	µg/L	11,000	500	100
Total Chloroethylenes	µg/L	13	21	2
Total Chlorobenzotrifluorides	µg/L	220	26	ND
Total C46, C56, C58 and Mirex	µg/L	11	ND	ND
2,4,5-Trichlorophenol	µg/L	ND	ND	ND
Total Hexachlorocyclohexanes	µg/L	105	ND	1
Total Organic SSI	µg/L	23,000	900	300
Benzoic Acid	µg/L	ND	ND	ND
Chlorobenzoic Acid	µg/L	ND	ND	ND
Chlorendic Acid	µg/L	ND	ND	ND

Notes:

R - Associated results were qualified as unusable.
NA - Not Available.
(1) SDCP SSI analytical results.
(2) Phase 1 analytical results.

TABLE 4.6

COMPARISON OF BEDROCK GROUNDWATER AVERAGE CHEMICAL CONCENTRATIONS
PLANT BOUNDARY WELLS(1)
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Parameters/Parameter Groups	*Unit*	*D-Zone*	*C-Zone*	*B-Zone*
pH	S.U.	6.8	7.6	7.4
Total Organic Halides (TOX)	µg/L	12,000	3,300	7,300
Total Organic Carbon (TOC)	mg/L	7	4	6
Specific Conductance	µmhos/cm	4,100	1,100	4,800
Total Soluble Phosphorus	µg-P/L	190	30	ND
Total Mercury	µg/L	ND	ND	ND
Total Lead	µg/L	ND	ND	ND
Total Arsenic	µg/L	ND	ND	ND
Toluene	µg/L	230	10	72
Total Chlorotoluenes	µg/L	840	450	490
Benzene	µg/L	48,000	1,600	11,000
Total Chlorobenzenes	µg/L	15,000	4,100	11,000
Total Chloroethylenes	µg/L	44	650	13
Total Chlorobenzotrifluorides	µg/L	200	180	220
Total C46, C56, C58 and Mirex	µg/L	130	ND	11
2,4,5-Trichlorophenol	µg/L	3	ND	ND
Total Hexachlorocyclohexanes	µg/L	130	120	105
Total Organic SSI	µg/L	65,000	7,100	23,000
Benzoic Acid	µg/L	40	ND	ND
Chlorobenzoic Acid	µg/L	220	ND	ND
Chlorendic Acid	µg/L	200	ND	ND

Notes:

R - Associated results were qualified as unusable.
NA - Not Available
(1) Plant Boundary Wells 404, 405, 406, 408 and 417.

TABLE 4.7

COMPARISON OF BEDROCK GROUNDWATER AVERAGE CHEMICAL CONCENTRATIONS
FIRST LINE OF WELLS (1)
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Parameters/Parameter Groups	*Unit*	*D-Zone*	*C-Zone*	*B-Zone*
pH	S.U.	NA	NA	NA
Total Organic Halides (TOX)	µg/L	R	R	R
Total Organic Carbon (TOC)	mg/L	2	3	6
Specific Conductance	µmhos/cm	NA	NA	NA
Total Soluble Phosphorus	µg-P/L	23	ND	12
Total Mercury	µg/L	ND	ND	ND
Total Lead	µg/L	26	ND	ND
Total Arsenic	µg/L	ND	ND	ND
Toluene	µg/L	1	1	ND
Total Chlorotoluenes	µg/L	140	100	65
Benzene	µg/L	180	200	300
Total Chlorobenzenes	µg/L	270	260	500
Total Chloroethylenes	µg/L	69	210	21
Total Chlorobenzotrifluorides	µg/L	28	31	26
Total C46, C56, C58 and Mirex	µg/L	ND	ND	ND
2,4,5-Trichlorophenol	µg/L	ND	ND	ND
Total Hexachlorocyclohexanes	µg/L	ND	ND	ND
Total Organic SSI	µg/L	640	800	900
Benzoic Acid	µg/L	ND	ND	ND
Chlorobenzoic Acid	µg/L	ND	ND	ND
Chlorendic Acid	µg/L	ND	ND	ND

Notes:

R - Associated results were qualified as unusable.
NA - Not Available
(1) First Line Wells 651, 652, 653, 657, 658 and 659.

TABLE 4.8

COMPARISON OF BEDROCK GROUNDWATER AVERAGE CHEMICAL CONCENTRATIONS
ROYAL AVENUE WELLS (1)
OSI PROGRAM - PHASE 2
OCCIDENTAL CHEMICAL CORPORATION
BUFFALO AVENUE PLANT

Parameters/Parameter Groups	*Unit*	*D-Zone*	*C-Zone(2)*	*B-Zone(2)*
pH	S.U.	7.4	6.9	7.2
Total Organic Halides (TOX)	µg/L	3,200	2,100	230
Total Organic Carbon (TOC)	mg/L	5	ND	ND
Specific Conductance	µmhos/cm	1,400	350	2,900
Total Soluble Phosphorus	µg-P/L	24	33	44
Total Mercury	µg/L	ND	ND	ND
Total Lead	µg/L	ND	ND	ND
Total Arsenic	µg/L	ND	ND	ND
Toluene	µg/L	5	ND	ND
Total Chlorotoluenes	µg/L	200	ND	69
Benzene	µg/L	220	ND	130
Total Chlorobenzenes	µg/L	5,300	3	100
Total Chloroethylenes	µg/L	420	2,300	2
Total Chlorobenzotrifluorides	µg/L	130	9	ND
Total C46, C56, C58 and Mirex	µg/L	160	ND	ND
2,4,5-Trichlorophenol	µg/L	ND	ND	ND
Total Hexachlorocyclohexanes	µg/L	86	ND	1
Total Organic SSI	µg/L	6,500	2,300	300
Benzoic Acid	µg/L	ND	ND	ND
Chlorobenzoic Acid	µg/L	ND	ND	ND
Chlorendic Acid	µg/L	ND	ND	ND

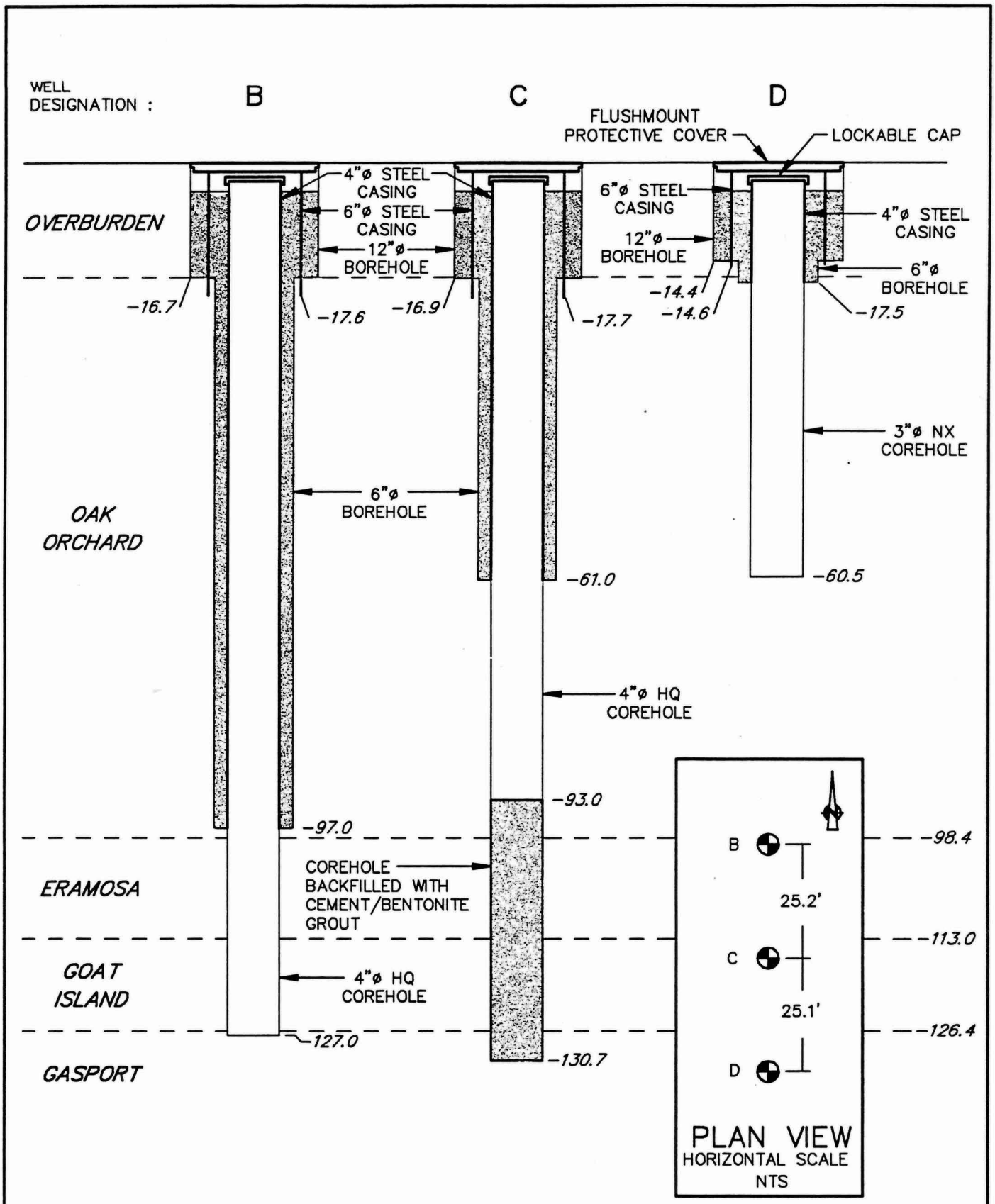
Notes:

(1) Royal Avenue Wells: 654 and 655
(2) Well 654 only.

APPENDIX A

STRATIGRAPHIC AND INSTRUMENTATION LOGS

- BEDROCK WELLS
- IROQUOIS SANITARY SEWER BEDDING BOREHOLES
- OVERBURDEN WELLS



VERTICAL SCALE 1"=20'

WELL CLUSTER OW652
SDCP – OFF SITE INVESTIGATION
Occidental Chemical Corporation–Niagara Plant

CRA

2583 (87) NOV 16/93(W) REV.0 (LD24)

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

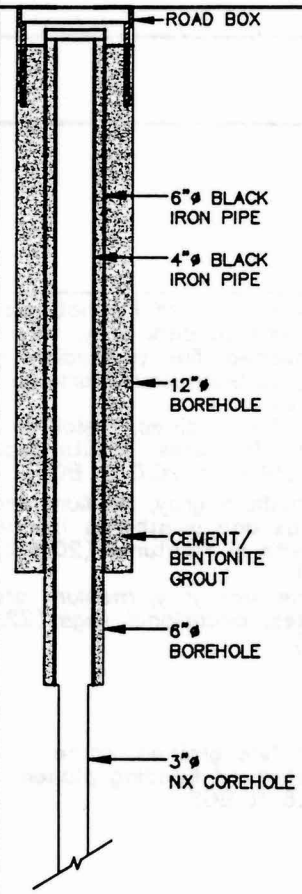
(L285)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: WEST OF UNION CARBIDE PLANT

HOLE DESIGNATION: OW652D (Page 1 of 6)
DATE COMPLETED: AUGUST 26, 1991
DRILLING METHOD: 12" OD HSA
CRA SUPERVISOR: A.P. KISIEL

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	SAMPLE NUMBER	STATE	'N' VALUE
	REFERENCE POINT (Top of Riser)	569.93			
	GROUND SURFACE	570.2			
	Brown SILT, little clay, trace sand, moist, FILL	569.7			
2.5	Blue, green and gray SLAG, some gravel and sand, dry	568.4	1SS		16
	Mottled brown and rust brown SILT, some clay, moist	568.2	2SS		7
5.0	Mottled brown and gray fine SAND, some silt, trace fine gravel, trace clay, moist to wet, NATIVE	564.4	3SS		8
7.5	Same, with trace fine subangular gravel, trace shells, moist to wet		4SS		19
	Red brown SILT, some clay, moist	562.2			
10.0	Same, except laminating, increased clay content, moist to wet		5SS		5
	Laminated red brown and gray CLAY, some silt, trace fine sand lenses, moist	559.6	6SS		1
12.5	Same, except red brown and brown, trace coarse gravel, trace sand, moist to wet				
	Red brown SAND, little to some fine to coarse gravel, little silt, trace to little clay, wet, TILL	556.7	7SS		6
15.0	Red brown SILT, some sand, little fine to coarse gravel, trace clay, moist to wet	555.8	8SS		>50
	Same, with increased gravel content, moist				
17.5	NON COMPETENT BEDROCK – auger to 14.6 ft BGS and set 6"ø casing, advanced roller bit to 17.5 ft BGS and set 4"ø casing	552.7			
	END OF OVERBURDEN HOLE @ 17.5 FT. BGS				
20.0					
22.5					
25.0					
27.5					
30.0					
32.5					

MONITOR INSTALLATION



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L286)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: WEST OF UNION CARBIDE PLANT

HOLE DESIGNATION: OW652D (Page 2 of 6)
DATE COMPLETED: SEPTEMBER 16, 1991
DRILLING METHOD: NX
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CORE RECOVERY	RQD	WRATETURN
ft BGS		ft. AMSL				%	%	%
	Overburden		6"ø BLACK IRON PIPE; 4"ø BLACK IRON PIPE; 12"ø BOREHOLE; CEMENT/ BENTONITE GROUT					
12.5		555.8						
15.0	DOLOSTONE(Oak Orchard Formation): bituminous, light to dark gray, very thin to medium bedded, fine to medium grained, saccharoidal, carbonaceous partings and trace stylolites		6"ø BOREHOLE		1	67	17	17
17.5	– light gray, fine grained, stylolites, few weathered fractures, calcite deposits in fractures (14.4 to 20.0 ft BGS)				2	90	0	17
20.0	– light to medium gray, medium grained, abundant vugs and weathered fractures, calcite deposits in fractures (20.0 to 22.1 ft BGS)				3	83	19	0
22.5	– light to medium gray, medium grained, some stylolites, occasional vugs (22.1 to 33.0 ft BGS)							
25.0								
27.5	– light gray, fine grained, some stylolites, deformed bedding planes (26.4 to 27.6 ft BGS)				4	100	80	0
30.0			3"ø NX COREHOLE		5	98	98	0
32.5	– large calcite filled vug (@ 33.6 ft BGS)							
35.0	– large calcite filled vug (@ 34.7 ft BGS) – weathered fracture (@ 35.4 ft BGS)				6	87	64	0
37.5	– vertical fracture (@ 36.7 ft BGS) – highly fractured zone, calcite deposits in fractures (37.1 to 38.2 ft BGS)							
40.0	– highly fractured zone, some calcite deposits in fractures, bands of pitted rock, few stylolites (40.6 to 47.5 ft BGS)				7	89	55	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L286)

PROJECT NAME:	SDCP – OFF SITE INVESTIGATION	HOLE DESIGNATION:	OW652D (Page 3 of 6)
PROJECT NO.:	2583	DATE COMPLETED:	SEPTEMBER 16, 1991
CLIENT:	OXYCHEM – NIAGARA PLANT	DRILLING METHOD:	NX
LOCATION:	WEST OF UNION CARBIDE PLANT	CRA SUPERVISOR:	A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	– calcite filled vug (@ 40.9 ft BGS)		3"ø NX COREHOLE					
42.5					7	89	55	0
45.0								
47.5								
50.0	– highly fractured, highly weathered fractures, abundant vugs, calcite deposits in fractures, few stylolites (49.9 to 51.2 ft BGS)				8	92	74	0
52.5								
55.0	– highly fractured zone, weathered fractures, little calcite deposits in fractures, occasional vug and stylolite (55.5 to 60.5 ft BGS)							
57.5					9	62	20	0
60.0	END OF HOLE @ 60.5 FT. BGS	509.7						
62.5	NOTES: 1. In January and February 1993 a "B" zone and "C" zone monitoring well were installed at this well cluster.							
65.0								
67.5								
70.0								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L304)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: WEST OF UNION CARBIDE PLANT

HOLE DESIGNATION: OW652C (Page 4 of 6)
DATE COMPLETED: FEBRUARY 5, 1993
DRILLING METHOD: HQ
CRA SUPERVISOR: J. WILLIAMS

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BLOW COUNT	RUN NUMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	REFERENCE POINT (Top of Riser) GROUND SURFACE	*570.06* *570.35*						
60.0	NOTE: Overburden Stratigraphy and Bedrock Stratigraphy from 14.6 to 60.5 ft BGS is from OW652D well located 2.0 ft south.	*509.2 (Cont.)*						
62.5 65.0 67.5 70.0	DOLOSTONE(Oak Orchard Formation): bituminous, light to medium gray, fine to medium grained, thin to medium bedded, saccharoidal, carbonaceous partings, some gypsum lined partings, highly fractured and weathered zone – slightly weathered, occasional stylolites, vugs and solution pitting (61.0 to 64.2 ft BGS) – horizontal fracture, no weathering (@ 61.9 ft BGS) – horizontal fracture, no weathering (@ 63.2 ft BGS) – moderately weathered, numerous vugs, some gypsum filled, occasional stylolites, trace coral (64.2 to 66.6 ft BGS) – horizontal fracture, no weathering (@ 66.2 ft BGS)		← 4"ø HQ COREHOLE		10	96	96.0	100
72.5 75.0 77.5 80.0	– trace weathering, occasional stylolites, trace vugs, abundant coral (66.6 to 71.3 ft BGS) – moderately weathered, numerous vugs and solution pits, some coral, few stylolites (71.3 to 80.4 ft BGS) – horizontal fracture, slightly weathered (@ 72.9 ft BGS) – horizontal fracture, moderately weathered, shaly (@ 75.7 ft BGS) – 45° fracture, moderately weathered, shaley (@ 75.8 ft BGS) – no weathering, no vugs (80.4 to 81.2 ft BGS)				11	100	98.0	100
82.5 85.0 87.5	– highly fractured zone occuring at shaley partings, horizontal and conchoidal, no weathering to mildly weathered (81.2 to 83.5 ft BGS) – lost water return (@ 82.0 ft BGS) – vertically fractured (82.8 to 83.1 ft BGS) – moderately weathered, numerous vugs and solution pits, occasionally infilled with gypsum, trace stylolites (83.5 to 86.6 ft BGS) – horizontal fracture, slightly weathered (@ 85.0 ft BGS) – trace weathering, trace vugs, few stylolites (86.6 to 92.5 ft BGS) – partial water return (@ 88.0 ft BGS)				12	100	93.0	48

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L304)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: WEST OF UNION CARBIDE PLANT

HOLE DESIGNATION: OW652C (Page 5 of 6)
DATE COMPLETED: FEBRUARY 5, 1993
DRILLING METHOD: HQ
CRA SUPERVISOR: J. WILLIAMS

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CORE RECOVERY	RQD	WRATEERETURN
ft BGS		ft. AMSL				%	%	%
90.0					12	100	93.0	48
92.5	– horizontal fracture, no weathering (91.9 ft BGS) – moderately weathered, numerous gypsum filled vugs, occasional unweathered shaley fracture, few stylolites (92.5 to 98.4 ft BGS)							
95.0			4"ø HQ COREHOLE		13	95	82.0	30
97.5	– finer grained (@ 97.6 ft BGS)							
100.0	ARGILLACEOUS DOLOSTONE(Eramosa Formation): bituminous, light to medium gray, thin to medium bedded, fine grained, trace chert nodules, weathered fractures – mildly weathered, numerous slightly weathered shaley fractures, occasional horizontal and vertical stylolite, few gypsum filled vugs (98.4 to 108.7 ft BGS)	471.8						
102.5			CEMENT/ BENTONITE GROUT					
105.0					14	104	85.0	0
107.5								
110.0	– moderately weathered, numerous partially gypsum infilled vugs, numerous moderately weathered fractures trace stylolites (108.7 to 111.0 ft BGS) – no weathering, occasional gypsum filled vugs and stylolites (111.0 to 113.0 ft BGS)							
112.5	DOLOSTONE(Goat Island Formation): bituminous, medium to dark gray, thin to medium bedded, fine to medium grained, cherty, trace stylolites	457.2						
115.0	– slightly weathered, medium grained, light gray, occasional stylolite, few chert nodules (113.0 to 120.0 ft BGS)				15	103	100.0	0
117.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L304)

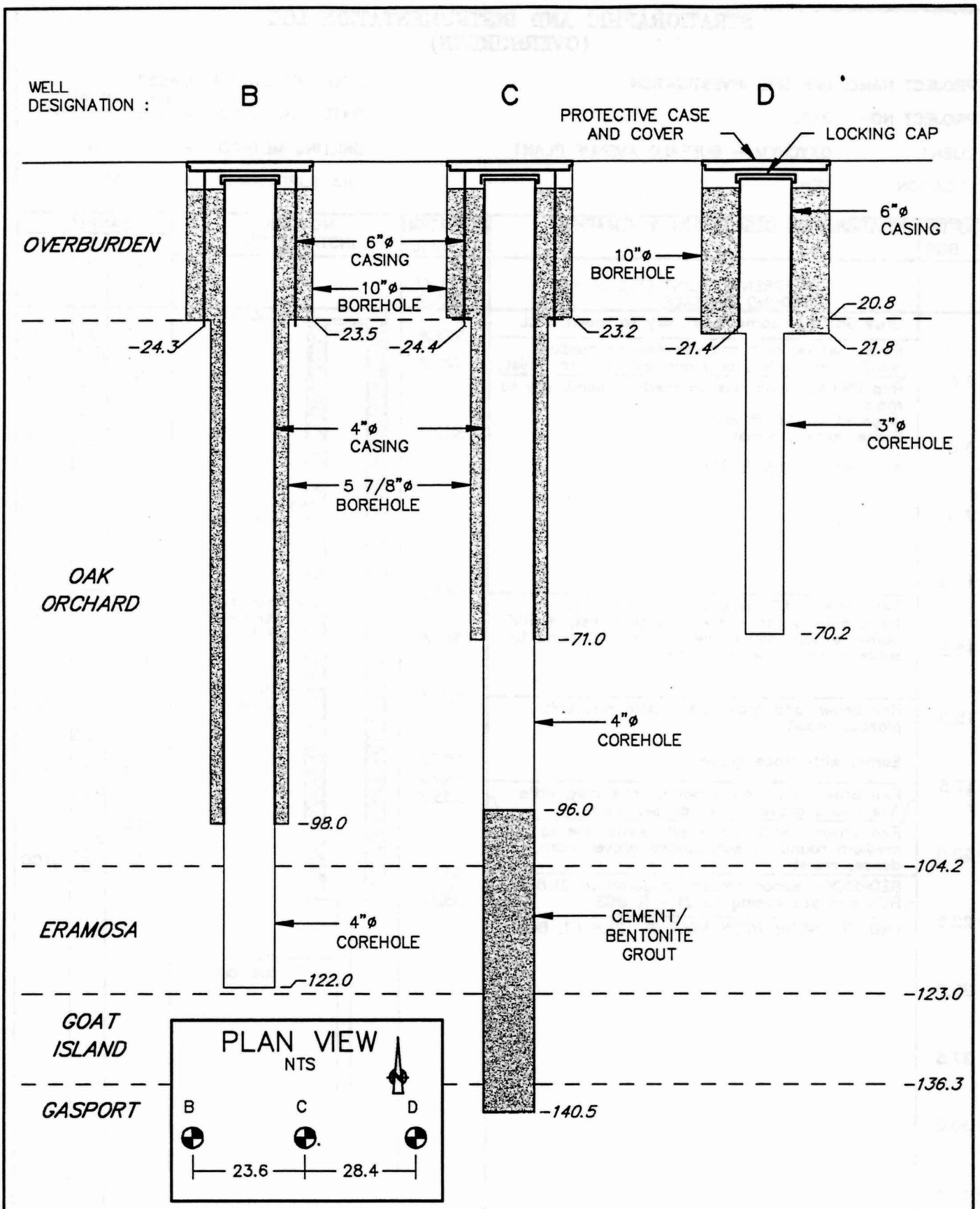
PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: WEST OF UNION CARBIDE PLANT

HOLE DESIGNATION: OW652C (Page 6 of 6)
DATE COMPLETED: FEBRUARY 5, 1993
DRILLING METHOD: HQ
CRA SUPERVISOR: J. WILLIAMS

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CRORCE CRECOVERY	RQD	WRATEETURRN
ft BGS		ft. AMSL				%	%	%
120.0	– no weathering, fine grained, light gray, chert nodules more abundant, few shaley layers (120.0 to 126.4 ft BGS)		CEMENT/ BENTONITE GROUT		15	103	100.0	0
122.5	– horizontal fracture, conchoidal, moderately weathered (@ 121.0 ft BGS) – horizontal fracture, conchoidal, slightly weathered (@ 122.9 ft BGS)							
125.0	– shaly partings, slightly weathered (@ 125.4 and 125.9 ft BGS)		4"ø HQ COREHOLE		16	99	95.0	0
127.5	DOLOSTONE LIMESTONE(Gasport Formation): bituminous, medium to dark gray, very thin to medium bedded, fine to medium grained, shaly partings, trace stylolites	443.8						
130.0	– shale parting, no weathering (@ 126.8 ft BGS) – shale parting, slightly weathered (@ 126.8 ft BGS)	439.2						
132.5	– horizontal fracture, conchoidal, moderately weathered (@ 130.1 ft BGS) – shale parting, slightly weathered (@ 130.7 ft BGS)							
	END OF HOLE @ 131 FT. BGS							
135.0	NOTE: At completion the OW652C well was backfilled with cement/bentonite grout to a depth of 93.0 ft BGS.							
137.5								
140.0								
142.5								
145.0								
147.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED



WELL INSTRUMENTATION SUMMARY OW653
OFF SITE INVESTIGATION
Occidental Chemical Corporation—Buffalo Avenue Plant

CRA

2583 (87) OCT 29/93(W) REV.0 (LD25)

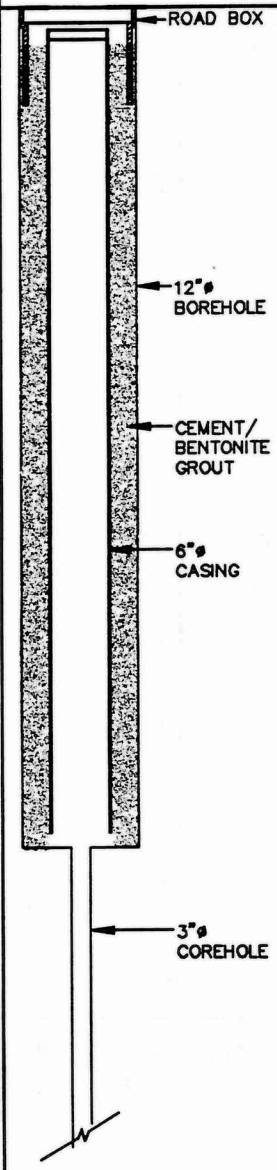
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(L277)

PROJECT NAME: OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – BUFFALO AVENUE PLANT
LOCATION: EFW

HOLE DESIGNATION: OW653D (Page 1 of 6)
DATE COMPLETED: AUGUST 21, 1991
DRILLING METHOD: 8 1/4" ID HSA
CRA SUPERVISOR: A.P. KISIEL

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
	REFERENCE POINT (Top of Riser)	573.47			
	GROUND SURFACE	573.8			
	Gray GRAVEL, some sand, dry to moist, FILL	572.8	1SS	X	48
	Black, yellow, buff and red fine to medium SAND, some brick, clay and ash, dry to moist	571.8	2SS	X	>100
2.5	Red BRICK, some fine to medium sand, dry to moist				
	Augered to 4.0 ft BGS				
5.0	Same, except moist	569.8	3SS	X	>100
	Augered to 10.5 ft BGS				
7.5					
10.0		563.3			
	Red brown SILT, little sand, trace clay, trace subrounded gravel, dry to moist, NATIVE		4SS	X	30
12.5	Same, except some fine to medium round to subrounded gravel, little clay	561.8	5SS	X	87
15.0	Red brown and gray CLAY, little silt, soft, plastic, moist	559.5	6SS	X	18
	Same, with trace gravel	557.8	7SS	X	22
17.5	Red brown SILT, some sand, little clay, little fine round gravel, hard, dense, moist	556.4 555.8	8SS	X	70
20.0	Red brown SAND, some silt, some fine to medium round to subrounded gravel, hard, dense, moist		9SS	X	>100
	BEDROCK– spoon refusal, augered to 21.8 ft BGS and set casing to 21.4 ft BGS	553.0 552.0			
22.5	END OF OVERBURDEN HOLE @ 21.8 FT. BGS				
25.0					
27.5					
30.0					
32.5					



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

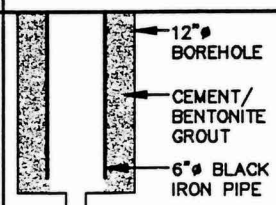
CHEMICAL ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

(L278)

PROJECT NAME: OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – BUFFALO AVENUE PLANT
LOCATION: EFW

HOLE DESIGNATION: OW653D (Page 2 of 6)
DATE COMPLETED: SEPTEMBER 10, 1991
DRILLING METHOD: WET ROTARY
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BENTONITE OR CVKAL	RUN NUMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	Overburden							
20.0								
22.5	DOLOSTONE(Oak Orchard Formation): bituminous, light to dark grey, very thin to medium bedded, saccharoidal, carbonaceous partings	551.6						
25.0	– rock fragments, trace solution pits, trace coral (22.2 to 23.6 ft BGS) – trace inclined bedding, slightly weathered, trace coral (24.2 to 25.4 ft BGS)				1	71	46	100
27.5	– slightly weathered, some fractures, some stylolites (28.1 to 31.0 ft BGS)							
30.0					2	90	41	100
32.5	– moderately to highly weathered fractures, trace gypsum lined partings, some small to medium vugs, solution pitting (31.4 to 34.4 ft BGS)							
35.0	– slightly weathered (34.4 to 36.1 ft BGS)				3	93	68	0
37.5	– disturbed bedding, moderately weathered, trace stylolites (36.1 to 36.7 ft BGS) – slightly weathered, trace stylolites (37.2 ft to 40.2 ft BGS)				4	100	100	0
40.0	– slightly weathered, trace stylolites, trace sphalerite (40.2 to 44.0 ft BGS) – fractured rock (41.5 to 41.7 ft BGS)							
42.5								
45.0	– slightly to moderately weathered, some small to medium vugs, some weathered coral, trace gypsum lined veinlets and partings (44.0 to 55.2 ft BGS)				5	98	95	0
47.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED