ATTACHMENT IV

IM-32 (REV. 5-78)

Shell Oil Company
Interoffice Memorandum

ANALYTICAL-CHEMICAL FILE
RECD. 10/17 FILE 252

	ACTION	INFO
JJ O'NEAL		
VE LEGATE		
EL HODGSON		
AC JONES		
HC FLEMING		
MA MUHS		
CE DAVIS		
JF KESLINGER		
DR HOLECEK		
JT SUCHMA	(LAST)	

OCTOBER 16, 1981

FROM: MANAGER QUALITY ASSURANCE/ENVIRONMENTAL CONSERVATION

TO: MR. T. R. WILLIAMS - ENVIRONMENTAL CONSERVATION - OPRNS. - HEAD OFFICE

SUBJECT: PIEZOMETER TEST DATA

Attached for your information are the data from the piezometers drilled around our Solid Waste Disposal Basin. Samples for Total Organic Halogen will be shipped to Westhollow Research Center for analysis.

We have also attached data on sulfide concentration of the solids from our effluent Pond 1, Pond 2, and North and South Polishing Lagoons, and elevation data for the piezometers.

Please note that samples "P-13 Lower" and "P-14 Upper" were added as controls, with "P-13 Lower" being distilled water and "P-14 Upper" being a duplicate of "P-8 Lower".

C. G. Walls

C. G. Walls

Attachments

cc: Mr. J. O'Neal - Westhollow Research Center

EPA Region 5 Records Ctr.
379831

SHELL OIL COMPANY
WOOD RIVER MANUFACTURING COMPLEX
GROUNDWATER MONITORING PROGRAM PURSUANT TO REGULATIONS AT 40 CFR 265.92

Sampling Date SEPT/OCT 1981 PIEZOMETER DATA

Tests (Max Specs.[1])	WELL NUMBERS					
	P-1 Upper	P-1 Lower	P-2 Upper	P-2 Lower	P-3 Upper	P-3 Lower
Ground Water Surface Elevation, MSL ft						
Ground Water Contamination Parameters						
pH	7.0	7.6	7.6	7.3	7.6	7.5
Specific Conductance, μmho/cm@25°C	2050	2000	2375	2175	2150	1850
Total Organic Carbon, mg/l	45	43	49	40	37	36
Total Organic Halogen, mg/l	*	*	*	*	*	*
Ground Water Quality Parameters						
Chloride, mg/l	397	383	440	440	355	326
Iron, mg/l	1.4	0.6	0.5	0.4	0.3	0.3
Manganese, mg/l	1.3	1.3	1.1	2.3	1.0	1.5
Phenols, mg/l	0.002	0.002	0.002	0.002	0.002	0.002
Sodium mg/l	310	300	330	210	240	130
Sulfate, mg/l	422	458	452	504	285	280
Drinking Water Parameters						
Arsenic, mg/l (0.05)	0.011	0.006	0.012	0.010	0.008	0.012
Barium, mg/l (1.0)	0.22	0.11	0.16	0.45	0.11	0.21
Cadmium, mg/l (0.01)	0.001	L.T. 0.001	L.T. 0.001	0.005	0.004	0.004
Chromium, mg/l (0.05)	L.T. 0.1	0.1	L.T. 0.1	0.1	L.T. 0.1	0.1
Fluoride, mg/l (1.4-2.4)	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1
Lead, mg/l (0.05)	0.009	0.004	0.009	0.004	0.005	0.014
Mercury, mg/l (0.002)	L.T. 0.0005	L.T. 0.0005	L.T. 0.0005	0.0005	L.T. 0.0005	L.T. 0.0005
Nitrate (as N) (10.0)	1.6	2.0	2	L.T. 1	1	1.2
Selenium, mg/l (0.01)	0.006	L.T. 0.001	0.004	0.004	0.007	0.005
Silver, mg/l (0.05)	0.003	0.003	0.004	0.001	0.006	0.005
Coliform Bacteria, No./100 ml (1.0)	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10
Other Test Parameters						
Volatile Organics, ppm, V/V	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1
Sulfonates, mg/l	1	1	L.T. 1	1	1	1
Oil and Grease, mg/l	2	3	3	5	2	2
Cyanide, mg/l	0.004	0.006	0.004	0.007	0.008	0.011
Odor Detected (Yes - No)	Yes	No	Yes	No	Yes	Yes
Sulfide, mg/l	0.005	0.008	0.008	0.008	0.005	0.005
Hexavalent Chromium, mg/l	L.T. 0.005	L.T. 0.005	L.T. 0.005	L.T. 0.005	L.T. 0.005	L.T. 0.005

COMMENTS:

[1] EPA Interim primary drinking water standards, Federal Register, May 19, 1980, p. 33257.

* Analyses to be done by WRC.

SHELL OIL COMPANY
WOOD RIVER MANUFACTURING COMPLEX
GROUNDWATER MONITORING PROGRAM PURSUANT TO REGULATIONS AT 40 CFR 265.92

Sampling Date SEPT/OCT 1981 PIEZOMETER DATA

Tests (Max Specs.[1])	WELL NUMBERS					
	P-4 Upper	P-4 Lower	P-5 Upper	P-5 Lower	P-6 Upper	P-6 Lower
Ground Water Surface Elevation, MSL ft						
Ground Water Contamination Parameters						
pH	6.9	7.1	8.0	8.0	7.3	7.2
Specific Conductance, mho/cm@25°C	2240	2700	1230	870	1070	880
Total Organic Carbon, mg/l	27	35	74	56	29	70
Total Organic Halogen, mg/l	*	*	*	*	*	*
Ground Water Quality Parameters						
Chloride, mg/l	440	468	28	28	197	42
Iron, mg/l	0.1	0.2	0.2	0.2	0.2	0.3
Manganese, mg/l	1.5	1.7	1.5	0.3	1.6	2.7
Phenols, mg/l	0.006	0.002	0.062	0.018	0.002	0.220
Sodium mg/l	270	280	130	28	84	47
Sulfate, mg/l	447	488	135	110	340	145
Drinking Water Parameters						
Arsenic, mg/l (0.05)	0.015	0.02	0.018	0.017	0.009	0.005
Barium, mg/l (1.0)	0.18	0.10	0.88	0.58	0.25	0.95
Cadmium, mg/l (0.01)	L.T. 0.001	L.T. 0.001	0.002	0.006	0.001	0.003
Chromium, mg/l (0.05)	0.1	0.1	L.T. 0.1	L.T. 0.1	L.T. 0.1	L.T. 0.1
Fluoride, mg/l (1.4-2.4)	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1
Lead, mg/l (0.05)	0.008	0.004	0.009	0.005	0.009	0.005
Mercury, mg/l (0.002)	0.0005	0.0005	L.T. 0.0005	L.T. 0.0005	L.T. 0.0005	L.T. 0.0005
Nitrate (as N) (10.0)	L.T. 1	L.T. 1	1.4	1.2	2.4	2.6
Selenium, mg/l (0.01)	0.002	0.002	0.006	0.008	0.007	0.009
Silver, mg/l (0.05)	0.006	0.005	0.004	0.006	0.003	0.003
Coliform Bacteria, No./100 ml (1.0)	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10
Other Test Parameters						
Volatile Organics, ppm, V/V	5	5	L.T. 1	1.1	L.T. 1	15
Sulfonates, mg/l	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1
Oil and Grease, mg/l	4	4	13	9	1	1
Cyanide, mg/l	0.064	0.033	0.003	0.004	0.002	0.001
Odor Detected (Yes - No)	Yes	Yes	Yes	Yes	Yes	Yes
Sulfide, mg/l	L.T. 0.001	0.003	0.035	0.096	0.008	0.001
Hexavalent Chromium, mg/l	L.T. 0.005	L.T. 0.005	L.T. 0.005	L.T. 0.005	L.T. 0.005	L.T. 0.005

COMMENTS:

1 EPA Interim primary drinking water standards, Federal Register, May 19, 1980, p. 33257.

* Analyses to be done by WRC.

Distribution: WS/ESP/HLC/CGH/JTG/JGE/JDL/JDR/RLC/JLT/Quality Assurance File 332

SHELL OIL COMPANY
WOOD RIVER PETROCHEMICAL COMPLEX
GROUNDWATER MONITORING PROGRAM PURSUANT TO REGULATIONS AT 40 CFR 265.92

Sampling Date SEPT/OCT 1981 PIEZOMETER DATA

Tests (Max Specs.[1])	WELL NUMBERS					
	P-7 Upper	P-7 Lower	P-8 Upper	P-8 Lower	P-9 Upper	P-9 Lower
Ground Water Surface Elevation, MSL ft						
Ground Water Contamination Parameters						
pH	7.4	7.5	7.2	7.6	7.2	7.1
Specific Conductance, μmho/cm@25°C	1300	1225	990	2125	1890	1850
Total Organic Carbon, mg/l	53	35	46	27	35	38
Total Organic Halogen, mg/l	*	*	*	*	*	*
Ground Water Quality Parameters						
Chloride, mg/l	198	194	56	426	284	312
Iron, mg/l	0.5	0.9	0.1	0.4	0.1	0.4
Manganese, mg/l	1.9	0.9	2.7	2.2	1.4	1.2
Phenols, mg/l	0.002	0.002	0.002	0.006	0.002	0.002
Sodium mg/l	200	170	31	268	260	234
Sulfate, mg/l	225	270	83	102	432	398
Drinking Water Parameters						
Arsenic, mg/l (0.05)	0.024	0.016	0.020	0.018	0.019	0.007
Barium, mg/l (1.0)	0.03	0.01	0.26	0.24	0.42	0.49
Cadmium, mg/l (0.01)	L.T. 0.001	0.002	L.T. 0.001	0.005	L.T. 0.001	L.T. 0.001
Chromium, mg/l (0.05)	L.T. 0.1	0.1	0.05	0.1	0.02	0.02
Fluoride, mg/l (1.4-2.4)	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1
Lead, mg/l (0.05)	0.005	0.004	0.004	0.004	0.004	0.004
Mercury, mg/l (0.002)	L.T. 0.0005	L.T. 0.0005	L.T. 0.0005	L.T. 0.0005	L.T. 0.0005	L.T. 0.0005
Nitrate (as N) (10.0)	1.7	1.2	L.T. 1	1.0	1.	1.
Selenium, mg/l (0.01)	0.006	0.009	0.005	0.011	0.006	0.006
Silver, mg/l (0.05)	0.001	0.001	0.004	0.008	0.004	L.T. 0.001
Coliform Bacteria, No./100 ml (1.0)	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10
Other Test Parameters						
Volatile Organics, ppm, V/V	L.T. 1	L.T. 1	166	L.T. 1	4	3
Sulfonates, mg/l	L.T. 1	L.T. 1	L.T. 1	1	1	L.T. 1
Oil and Grease, mg/l	5	1	1	9	5	6
Cyanide, mg/l	0.006	0.006	0.005	0.004	0.002	0.002
Odor Detected (Yes - No)	Yes	Yes	Yes	No	Yes	Yes
Sulfide, mg/l	0.005	0.005	0.015	0.014	0.003	0.041
Hexavalent Chromium, mg/l	L.T. .005	L.T. .005	L.T. 0.005	L.T. 0.005	L.T. 0.005	L.T. 0.005

COMMENTS:

[1] EPA Interim primary drinking water standards, Federal Register, May 19, 1980, p. 33257.

* Analyses to be done by WRC

Distribution: HS/RSP/WEC/CGP/JIC/AGF/ABF/JBE/PLG/JLT/Quality Assurance File 332

SHELL OIL COMPANY
WOOD RIVER MANUFACTURING COMPLEX
GROUNDWATER MONITORING PROGRAM PURSUANT TO REGULATIONS AT 40 CFR 265.92

Sampling Date SEPT/OCT 1981 PIEZOMETER DATA

Tests (Max Specs.[1])	WELL NUMBERS					
	P-10 Upper	P-10 Lower	P-11 Upper	P-11 Lower	P-12 Upper	P-12 Lower
Ground Water Surface Elevation, MSL ft						
Ground Water Contamination Parameters						
pH	6.8	7.1	8.4	8.2	7.2	7.1
Specific Conductance, μmho/cm@25°C	2450	2340	1850	1875	140	1020
Total Organic Carbon, mg/l	45	50	22	3	28	34
Total Organic Halogen, mg/l	*	*	*	*	*	*
Ground Water Quality Parameters						
Chloride, mg/l	497	454	312	397	312	340
Iron, mg/l	0.6	0.3	0.1	0.1	0.2	L.T. 0.1
Manganese, mg/l	3.0	2.3	2.2	0.7	0.8	0.6
Phenols, mg/l	0.004	0.008	0.008	0.004	0.002	0.002
Sodium mg/l	220	210	256	68	260	240
Sulfate, mg/l	492	544	357	369	367	370
Drinking Water Parameters						
Arsenic, mg/l (0.05)	0.014	0.020	0.021	0.023	L.T. 0.001	0.006
Barium, mg/l (1.0)	0.39	0.38	0.81	0.05	0.31	0.25
Cadmium, mg/l (0.01)	0.002	0.002	0.006	0.007	L.T. .001	0.010
Chromium, mg/l (0.05)	0.1	0.1	0.1	0.1	0.1	0.1
Fluoride, mg/l (1.4-2.4)	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1
Lead, mg/l (0.05)	0.008	0.004	0.004	0.004	L.T. 0.003	0.005
Mercury, mg/l (0.002)	L.T.0.0005	L.T.0.0005	L.T.0.0005	L.T.0.0005	L.T.0.0005	0.0005
Nitrate (as N) (10.0)	1.2	L.T. 1	0.7	2.1	0.3	0.6
Selenium, mg/l (0.01)	0.002	0.001	0.003	0.009	0.009	0.005
Silver, mg/l (0.05)	0.004	0.007	0.001	L.T. 0.001	0.005	0.003
Coliform Bacteria, No./100 ml (1.0)	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10	L.T. 10
Other Test Parameters						
Volatile Organics, ppm, V/V	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1
Sulfonates, mg/l	L.T. 1	L.T. 1	L.T. 1	L.T. 1	L.T. 1	1
Oil and Grease, mg/l	4	5	9	9	1	1
Cyanide, mg/l	0.104	0.133	0.004	0.003	0.002	0.002
Odor Detected (Yes - No)	Yes	Yes	No	No	No	No
Sulfide, mg/l	0.003	0.003	0.014	0.008	0.003	0.003
Hexavalent Chromium, mg/l	L.T. .005	L.T. .005	L.T. 0.005	L.T.0.005	L.T. 0.005	L.T. 0.005

COMMENTS:

[1] EPA Interim primary drinking water standards, Federal Register, May 19, 1980, p. 33257.

* Analyses to be done by WRC

Distribution: [illegible]/PSE/OLC/CGW/SIC/JEL/JPL/JDR/PLC/JLT/Quality Assurance File 332

SHELL OIL COMPANY
WOOD RIVER MANUFACTURING COMPLEX
GROUNDWATER MONITORING PROGRAM PURSUANT TO REGULATIONS AT 40 CFR 265.92

Sampling Date SEPT/OCT 1981 PIEZOMETER DATA

Tests (Max Specs.[1])	WELL NUMBERS						
	P-13 Lower	P-14 Upper					
Ground Water Surface Elevation, MSL ft							
Ground Water Contamination Parameters							
pH	6.5	7.6					
Specific Conductance, μmho/cm@25°C	9	2475					
Total Organic Carbon, mg/l	4	44					
Total Organic Halogen, mg/l	*	*					
Ground Water Quality Parameters							
Chloride, mg/l	14	411					
Iron, mg/l	0.7	0.5					
Manganese, mg/l	0.2	2.6					
Phenols, mg/l	0.004	0.006					
Sodium mg/l	23	316					
Sulfate, mg/l	82	93					
Drinking Water Parameters							
Arsenic, mg/l (0.05)	0.018	0.022					
Barium, mg/l (1.0)	L.T. 0.01	0.29					
Cadmium, mg/l (0.01)	L.T. 0.001	L.T. 0.001					
Chromium, mg/l (0.05)	0.1	0.1					
Fluoride, mg/l (1.4-2.4)	L.T. 1	L.T. 1					
Lead, mg/l (0.05)	0.004	0.004					
Mercury, mg/l (0.002)	L.T. 0.0005	L.T. 0.0005					
Nitrate (as N) (10.0)	L.T. 1	1.1					
Selenium, mg/l (0.01)	0.010	0.009					
Silver, mg/l (0.05)	L.T. 0.001	0.002					
Coliform Bacteria, No./100 ml (1.0)	L.T. 10	L.T. 10					
Other Test Parameters							
Volatile Organics, ppm, V/V	L.T. 1	L.T. 1					
Sulfonates, mg/l	L.T. 1	L.T. 1					
Oil and Grease, mg/l	1	3					
Cyanide, mg/l	0.001	0.004					
Odor Detected (Yes - No)	No	No					
Sulfide, mg/l	0.008	0.025					
Hexavalent Chromium, mg/l	L.T. 0.005	L.T. 0.005					

COMMENTS:

[1] EPA Interim primary drinking water standards, Federal Register, May 19, 1980, p. 33257.

* Analyses to be done by WRC.

Distribution: MS/RSP/MLC/CGH/AIC/JGF/ABL/JDR/RLG/JLT/Quality Assurance File 332

PIEZOMETER SAMPLING WATER ELEVATION

DATE SAMPLED	PIEZOMETER NUMBER	WATER ELEVATION (MSL) BEFORE PUMPING	AFTER PUMPING
10/5/81	P-1 UPPER	401.55	401.55
10/5/81	P-1 LOWER	401.53	401.56
10/5/81	P-2 UPPER	400.95	400.99
10/5/81	P-2 LOWER	400.91	400.96
10/6/81	P-3 UPPER	400.64	400.66
10/6/81	P-3 LOWER	400.65	400.67
10/2/81	P-4 UPPER	402.16	402.20
10/2/81	P-4 LOWER	399.12	399.15
10/8/81	P-5 UPPER	399.77	318.87
10/8/81	P-5 LOWER	400.98	400.74
10/7/81	P-6 UPPER	399.41	399.39
10/7/81	P-6 LOWER	400.42	400.27
10/6/81	P-7 UPPER	399.56	399.62
10/6/81	P-7 LOWER	399.54	399.61
9/30/81	P-8 UPPER	396.61	396.60
8/22/81	P-8 LOWER	396.42	396.76

DATE SAMPLED	PIEZOMETER NUMBER	WATER ELEVATION (MSL) BEFORE PUMPING	AFTER PUMPING
9/30/81	P-9 UPPER	395.55	395.74
9/30/81	P-9 LOWER	394.56	394.56
10/1/81	P-10 UPPER	395.31	395.40
10/1/81	P-10 LOWER	395.26	395.28
8/27/81	P-11 UPPER	396.37	396.42
8/27/81	P-11 LOWER	396.35	396.40
8/26/81	P-12 UPPER	406.89	406.91
8/26/81	P-12 LOWER	406.88	406.92
10/13/81	P-12 LOWER	405.74	405.71
8/27/81	P-13 LOWER = DISTURBED WATER	N/A	N/A
8/20/81	P-14 UPPER = P-8 LOWER	N/A	N/A

DMD
10/15/81