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EXECUTIVE SUMMARY

BEDROCK MONITORING SYSTEMS

NAPL PLUME CONTAINMENT SYSTEM

Hydraulic monitoring was performed during each of the three months comprising the third quarter (July, August and September) of 1999. Chemical and NAPL presence monitoring of the NAPL Plume Containment System at the Hyde Park Landfill (Site) were performed between July 27th and September 1st, 1999.

Hydraulic monitoring revealed that six of eight upper bedrock well pairs, six of eight middle bedrock well pairs, and two of six lower bedrock well pairs exhibited inward hydraulic gradients for at least two of three months during the third quarter of 1999.

Groundwater samples were collected from 22 bedrock monitoring wells for chemical analyses during the third quarter of 1999. The next round of chemical sampling and NAPL presence checks for the NAPL Plume Containment System monitoring will be conducted in October 1999.

NAPL presence checks were conducted at 49 bedrock wells. NAPL was present in six of the wells located within the 1996 Bedrock NAPL plume definitions.

APL PLUME CONTAINMENT SYSTEM

Hydraulic and seep flow performance monitoring of the APL Plume Containment System were performed monthly during the third quarter of 1999. Quarterly chemical monitoring was performed on August 12, 1999.

Hydraulic monitoring revealed that three of the four monitoring well pairs exhibited inward gradients for all periods this quarter. An inward gradient was not present in one well pair due abnormally high levels in well ABP-6; the well will be investigated in upcoming monitoring periods. Seep flows were similar to the previous quarter with two of the four seeps reported dry for the entire quarter. This is consistent with historical data.

Sampling of AFW / APW composites were collected on August 12, 1999. Analysis of the composite sample collected from the two APWs and five AFWs did detect two

parameters (TCDD and PCB's as Aroclor 1248) above the APL Plume Flux Detection Levels. Therefore, a calculation of APL Plume Flux was conducted and the results were below APL Plume Flux Action Levels.

OVERBURDEN MONITORING SYSTEMS

OVERBURDEN BARRIER COLLECTION SYSTEM

Hydraulic monitoring of the Overburden Barrier Collection System (OBCS) Monitoring Wells (OMWs) shows that inward hydraulic gradients were present at five of eight well pairs and two well pairs achieved downward hydraulic gradients for the entire quarter. The remaining well pair had an inward gradient one period during the quarter and the two other periods both inner and outer wells were dry.

COMMUNITY MONITORING PROGRAM

Hydraulic monitoring of the Community Monitoring Wells (CMWs) showed that the required downward hydraulic gradients were present at six of six well pairs where water was present. Air samples were collected from the two historically dry monitoring well locations (CMW-7OB & 8OB), with the results being reported as non-detect for all analyzed parameters.

LEACHATE TREATMENT SYSTEM

Chemical monitoring of the Leachate Treatment System was performed on a daily, weekly and monthly basis at midpoint and effluent locations. No exceedances of any parameters at any location were reported.

NAPL ACCUMULATION

Total NAPL accumulated from the bedrock collection system during the quarter was 899 gallons. A total of 3,329 gallons of NAPL was shipped out for disposal this quarter.

1.0 INTRODUCTION

Overburden and bedrock monitoring reports for the NAPL and APL Plume Containment Systems have been submitted quarterly since 1996. The bedrock and overburden monitoring data collected during the third quarter of 1999 is presented in this report. This report has been prepared by Miller Springs Remediation Management, Inc. (MSRM), which has been assigned the responsibility of managing the Hyde Park Requisite Remedial Technology (RRT) Program under the direction of Glenn Springs Holdings, Inc. (GSHI), a subsidiary of Occidental Petroleum Corporation.

2.0 NAPL PLUME CONTAINMENT SYSTEM

Hydraulic monitoring of the bedrock performance well pairs located at the perimeter of the NAPL plumes was performed to verify that the operation of the bedrock purge well system creates and maintains an inward hydraulic gradient across the NAPL plume boundary. Chemical monitoring and NAPL presence checks were performed to supplement the hydraulic evaluation as other indicators of overall system performance. This report presents the fifteenth round of monitoring data (since the first quarter of 1996) utilizing the revised performance monitoring well network presented in the "NAPL Plume Assessment and System Design Recommendations" report, dated July 1995.

2.1 PURGE WELL OPERATIONS

The complete network of 11 bedrock purge wells had been operated continuously since the second quarter of 1997, until pumping at PW-6UMR was stopped on December 15, 1997 due to the operational impact of NAPL at the bottom of the well. An exploratory drilling program was initiated during the first quarter of 1998 to determine the vertical and horizontal extent of the NAPL present in the area around PW-6UMR. The investigation resulted in the installation of one new upper bedrock purge well (PW-6UR), one new middle bedrock purge well (PW-6MR) and the conversion of one existing purge well to a manual NAPL recovery well (PW-6UMR). PW-6UR and PW-6MR were completed and started in April of 1999.

Several pumping maintenance/startup activities occurred during the third quarter of 1999. The following bullets identify the individual purge well situations and how each activity progressed:

- PW-2L upgraded to a 3hp motor from a 1hp motor in July 1999. Impact of new pump to be studied in the up coming quarters.
- PW-1L and PW-2M pumping test September 22nd through 30th , to evaluate the hydraulic response in the Northwest Corner, Middle Zone of the Site.
- PW-1U pump and motor replaced in September 1999.
- PW-3L pump and motor replaced in September 1999.

The average pumping rates at each of the bedrock purge wells for the past 3 months are presented in Table 2.1. Of note following startup of PW-6MR and PW-6UR, PW-4M de-watered and the water level remains below the set-point (although both the well and

pump are fully functional and on-line, it appears that the source of the water has been intercepted by PW-6UR and / or PW-6MR).

2.2 MONITORING WELLS

Routine hydraulic chemical and NAPL monitoring was conducted at the NAPL Plume Containment System wells, as indicated in Sections 2.3 and 2.4. No monitoring well maintenance problems were recorded during the third quarter of 1999.

2.3 HYDRAULIC MONITORING

2.3.1 Water Level Measurements

Hydraulic monitoring was performed on July 01, July 29, and September 17, 1999. Water levels were measured in the 52 wells using an electric water level gauge. The measured water level depths were recorded in a field notebook and then converted to elevations based on surveyed reference points (tops of casings). The cumulative hydraulic monitoring data for the bedrock performance wells from 1993 to present are included on the enclosed CD under the file name 3Q99HIST.pdf.

2.3.2 Gradient Evaluation

A review of the hydraulic monitoring data for the third quarter of 1999 shows that an inward hydraulic gradient has been achieved along the majority of the vectors in the two of the three bedrock zones. Table 2.2 summarizes the third quarter hydraulic gradients.

In the upper bedrock zone, an inward hydraulic gradient was present in six of the eight piezometer pairs (vectors B, D, F, G, H, and J) for all monitoring events this quarter. The following bullets describe the conditions of the well pairs where an inward gradient was not consistently present this past quarter:

- The C vector well pair did not exhibit an inward gradient for all periods this quarter. As noted in the 4th Quarter 1998 report, the gradient along the C vector switched to an outward direction in June 1998 and has remained outward. This well pairing

BC3U - C1U is being investigated in the 1999 Drilling Program and will be discussed in the 1999 Drilling Summary Report.

- The E vector well pair has historically had an outward gradient due to a lack of hydraulic response within E4U to pumping in the middle zone. During the 1999 Drilling Program it was determined that E4U has a hydraulic conductivity $<10^{-5}$ cm/sec. Based on historic criteria this well will be replaced during the remainder of the 1999 Drilling Program. Location and further details of the E4U replacement well will be addressed in the 1999 Drilling Summary Report.

In the middle bedrock zone, an inward hydraulic gradient was present in six of the eight well pairs (vectors B, C, F, G, H, and J) for at least two of three months during the third quarter of 1999. The following bullets describe the conditions of the well pairs where an inward gradient was not consistently present this past quarter:

- The gradient along the D vector maintained an inward gradient in July of this quarter. Historically the gradient along the D vector has been shallow. An evaluation of the D vector was included in the activities for the 1999-drilling program. The hydraulic evaluation of the D1M-D2M clearly identifies a strong hydraulic connection between PW-2M, D1M and D2M. *A summary of the evaluation was included in a CRA Services memo titled "Hydraulic Evaluation of Monitoring Wells D1M and D2M Hyde Park Landfill RRT" with the Hyde Park Quarterly Monitoring Report for the second quarter of 1999.*
- The gradient along the E vector was outward for the first two periods and an inward for the last period of this quarter. Historically the vector has shown inconsistent results. An evaluation of E4M and its impact on the other E vector wells is included in the 1999 drilling program and the results will be discussed in the 1999 Drilling Program Summary Report.

In the lower bedrock zone, an inward hydraulic gradient was present in two of the six well pairs (vector B and H) for at least two of three months during the third quarter of 1999. The following bullets describe the conditions of the well pairs where an inward gradient was not consistently present this past quarter:

- The C vector had an outward gradient the first two months of this quarter while the last month indicates an inward gradient. The primary pumping influence in this area is PW-2L. In March 1999 the recharge to PW-2L increased dramatically causing PW-2L to be above the chosen operational level. Historically this would occasionally occur and then steady state conditions would return after one/two month's time. MSRM believes the 5-gpm (1-hp) pump and motor in PW-2L was no longer

sufficient to handle the recharge of the well and able to achieve sufficient drawdown. An upgrade of PW-2L to a higher capacity pump and motor was conducted in the 3rd Quarter. The gradient returned 1 month after larger pump was installed. The impact of replacement from a 1-hp to 3-hp motor will be further studied in the upcoming months.

- The D vector did not achieve an inward gradient during this quarter. The outward gradient corresponds with a sudden increase in recharge at PW-2L. The current pump in PW-2L historically was able to achieve sufficient draw down with a 5gpm pump. An upgrade of PW-2L occurred this quarter as previously stated in Vector C.
- The G vector has consistently shown an outward gradient over the past several quarters. This vector is under evaluation as part of the 1999 Drilling Program. A new well (G5L) was drilled in the fourth quarter of 1999 and will be evaluated in the fourth quarter report and the 1999 Drilling Program Summary Report.
- The gradient along the J vector does not appear to be affected by the pumping activities in the lower bedrock zone west and south of the Hyde Park Landfill Site. This vector will be further evaluated during review of the groundwater contour plans as part of the 1999 Drilling Program.

2.3.3 NAPL Presence Checks

Prior to any purging or sampling activities, a check for NAPL presence was performed at each performance well using a 3-inch long, 2-inch diameter bailer. NAPL was not observed to be present in any of the outer wells or those inner wells that are located beyond the limits of the 1996 Bedrock NAPL plume definitions. Please note that wells drilled as part of the 1999 Drilling Program to redefine the NAPL definition are being used to define a new NAPL Plume definition which will be discussed in the 1999 Drilling Summary Report. Therefore, the presence of NAPL in any newly drilled wells is not discussed in this report. Table 2.3 presents the findings of the NAPL presence checks in a tabular format.

2.3.4 NAPL Accumulation Quarterly Ratio

In accordance with the Future Monitoring and Assessment Requirements document (1996) Section 4.1.2.2, a determination of the quarterly NAPL/APL ratio was made for the Bedrock NAPL Containment System. During the 3rd Quarter of 1999, approximately 899 gallons of NAPL were collected by the bedrock extraction system. During the same time frame (July 1 to September 30, 1999) approximately 6.41 million gallons of APL

were removed from the bedrock purge wells. The current quarterly APL/NAPL ratio and the ratios calculated from previous quarters are as follow:

Third quarter 1999	0.00014
Second quarter 1999	0.000058
First quarter 1999	0.00017

2.4 CHEMICAL MONITORING

2.4.1 Groundwater Purging

The standing volume of groundwater contained within each outer monitoring well was calculated based on water level measurements taken prior to any disturbance of the water surface. A minimum of three volumes was purged from each well using a 2-inch diameter submersible pump. In all cases, the pump intake was set approximately 1 foot from the bottom of the well. Purge water quality (color, odor, and sediment) was recorded in the field book as water was discharged into polyethylene storage tanks staged at each well location. Purging methods and water volumes removed for each well are summarized in Table 2.4. All purged groundwater was subsequently removed from the staged tanks and transported to the Site via the purge water tank trailer for treatment at the Hyde Park Treatment Facility.

2.4.2 Sampling Procedures

Following groundwater purging, sampling was conducted using the same pump as was used for purging. A field record of pH, conductivity, and temperature was made immediately prior to collecting the samples for chemical analyses (i.e., at the end of purging), along with the observed water quality. The sample key, pH, conductivity, temperature, and water quality observations are summarized in Table 2.5.

The collected samples were sent to Severn Trent Laboratories (STL) for analysis of the NAPL Plume Effectiveness Parameters, as defined in the RRT Stipulation (Section 9.2). Total organic halides (TOX) and phenol samples were preserved with sulphuric acid (H_2SO_4) to a pH of less than 2. All samples were transported to the analytical facilities in coolers maintained at approximately 4°C, in accordance with chain-of-custody protocols.

2.4.3 Quality Assurance/Quality Control

During the sampling program, quality assurance/quality control (QA/QC) samples were collected at a frequency of 10 percent. As a result, a total of two field duplicate samples, two equipment rinsate blank samples, and two matrix spike/matrix spike duplicate (MS/MSD) samples, were collected. These QA/QC samples are identified in Table 2.5. Duplicate samples were given blind label identities.

2.4.4 Equipment Cleaning

The submersible pump was decontaminated in accordance with established procedures approved by the New York State Department of Health (NYSDOH).

2.4.5 Program Modifications

All well purging and sampling activities were conducted in accordance with the methodologies indicated in Sections 2.4.1 and 2.4.2.

2.4.6 Analytical Results

The analytical results of the third quarter chemical monitoring event for 1999 are summarized in Table 2.6. The cumulative analytical data for all the quarterly sampling events dating back through 1996 is included on the enclosed CD under the file name 3Q99HIST.pdf. The analytical data was reviewed for conformance to standard QA/QC protocols and copies of the resultant data validations are kept on file at the Western New York MSRM Administration office.

2.4.7 Statistical Evaluation of Analytical Results

In accordance with Section 4.3.8.1 - Lateral NAPL Plume Migration of the RRT Stipulation, a statistical evaluation was performed on the Phenol, Benzoic Acid, Chlorendic Acid, Total Chlorobenzoic Acid and Total Organic Halides analytical data for the outer well of each gradient pair. This evaluation was performed in conjunction with the first quarter report of 1999. Future evaluation will be conducted on an annual basis in the first Quarter of each year.

2.5 CONCLUSIONS

This report presents the fifteenth round of monitoring data for the revised NAPL Plume Containment System monitoring network.

The water levels in the operating bedrock purge wells were generally at or close to their set point elevation levels during July, August and September 1999. The exception was PW-2L; due to the increased rate of recharge, an upgrade of the pump from a 5-gpm to higher capacity occurred in July of this quarter. The pump replacement will be evaluated over the coming months.

Hydraulic monitoring revealed that six of eight upper bedrock well pairs, six of eight middle bedrock well pairs, and two of six lower bedrock well pairs exhibited inward hydraulic gradients for at least two of three months during the third quarter of 1999.

NAPL presence checks were conducted at 49 bedrock wells. NAPL was not present in any of the wells located beyond the defined 1996 NAPL plumes.

Water levels will continue to be collected monthly for the well pairs along each vector in all three bedrock zones.

Hydraulic monitoring will continue at the current frequency until at least four quarterly monitoring periods have been completed following demonstration of NAPL Plume containment. Thereafter, a decision may be made regarding a reduction in the frequency of hydraulic monitoring (i.e., water level measurements) to quarterly, coincident with the chemical monitoring.

3.0 APL PLUME CONTAINMENT SYSTEM

The APL Plume Containment System consists of two purge wells (APW-1 and APW-2) and four monitoring well pairs (ABP-1/ABP-2, ABP-3/ABP-4, ABP-5/ABP-6, and ABP-7/ABP-8). The performance criteria for the APL Plume Containment System (remediated APL Plume) is to achieve flow convergence towards the purge wells and eliminate seepage at the Gorge Face to the extent practicable.

Three nests of APL Flux Monitoring Wells (AFW-1U/1M/1L, AFW-2U/2M/2L, and AFW-3U/3M/3L) monitor the remaining APL plume, oriented toward the east of the Site and located south of the remediated APL plume. The performance criteria for the APL Flux Monitoring Wells (AFWs) is to monitor the APL plume flux to the Niagara River through chemical sampling and to determine whether the flux measured in these wells exceeds the Flux Action Levels specified in the RRT Stipulation.

3.1 PURGE WELL OPERATIONS

During the third quarter of 1999, pump operations were continuous and groundwater levels within each purge well were generally maintained within their respective design settings. No maintenance activities were performed during the third quarter of 1999.

3.2 HYDRAULIC MONITORING

3.2.1 Water Level Measurements

Groundwater elevations were measured monthly during the third quarter of 1999. The calculated hydraulic gradients for the eight APBs (four pairs) are presented in Table 3.1. The cumulative hydraulic monitoring data from March 1997 to present is included on the enclosed CD under the file name 3Q99HIST.pdf.

Groundwater levels were also recorded at the nine AFWs prior to sample collection for APL flux monitoring. These levels are required as part of the hydraulic monitoring program, as well as to calculate the standing volume of groundwater in each well to determine the purging requirements. The cumulative hydraulic monitoring data from 1993 to present is included on the enclosed CD under the file name 3Q99HIST.pdf.

3.2.2 Gradient Evaluation

A review of the monthly hydraulic monitoring data for the third quarter of 1999 shows that inward hydraulic gradients were present at three of four monitoring well pairs (ABP-1/ABP-2, ABP-3/ABP-4, and ABP-7/ABP-8) for all three monthly monitoring events. The remaining well pair, ABP-5/ABP-6, exhibited an outward gradient for all of monitoring events this quarter, due to an elevated water level in the inner piezometer (ABP-6).

Elevated water levels in ABP-6 were historically present in this well due to overburden groundwater leakage past the casing set into the uppermost portion of the bedrock. A repair of the well casing was concluded in the first quarter on 1998. Based on current water elevations in ABP-6 it appears that some form of leaking is again occurring in the ABP-6. MSRM has made provisions, with DEC/EPA concurrence, to modify ABP-6 by installing a 2-inch casing and screen within the shallow bedrock well.

3.2.3 Seep Flows

The four gorge face seeps were inspected monthly in conjunction with hydraulic monitoring and the flow rates were visually estimated. (A cumulative history of the flow rate estimations is included on the enclosed CD under the file name 3Q99HIST.pdf). The estimated flow rates for the third quarter of 1999 show similar seep flow rates in compared to the previous quarter. Seep-1 and Seep-3 have effectively dried up, and Seep-2 has only minimal flow (dry to 0.2 gpm). Seep-4 continues to flow at approximately 5 to 15 gpm, but this seep originates below the Rochester Formation. The annual gorge seep inspection occurred on August 24, 1999. The details of the inspection will be referenced in the up coming annual report, Hyde Park RRT 1999 Annual Monitoring Report.

3.3 CHEMICAL MONITORING

3.3.1 Groundwater Purging

Groundwater purging prior to sampling was performed at the AFWs using the same protocols as described previously for the bedrock performance wells (Section 2.4.1).

Purging methods and water volumes removed for each well are summarized in Table 3.2.

3.3.2 Sampling Procedures

3.3.2.1 AFW / APW Flux Composite Sampling

The required contributing volume from each well was determined for the composite sample prior to initiation of groundwater sampling from the two APWs and five of the nine AFWs. The volumes presented in Table 3.3 were calculated based on the percentage of cross-sectional contributing area of groundwater flow past each well as compared to the total groundwater flow towards the Niagara River Gorge Face represented by all seven wells.

Groundwater sampling was performed using the protocols previously for the bedrock performance wells (Section 2.4.2), with the exception of the two APWs where samples were collected directly from the discharge of the operating pumps. The sample key, pH, conductivity, temperature, and water quality observations are summarized in Table 3.4.

A composite sample from the five AFWs and two APWs was collected in one large jar on August 12, 1999. This sample consisted of representative groundwater volumes from each well, except for samples collected for volatile organic compound (VOC) analysis, which were submitted in individual vials for compositing at the laboratory to ensure any VOCs present were preserved. The laboratory was given the predetermined percentages listed in Table 3.3. Analyses were performed at Severn Trent Laboratories (STL) for the APL Plume Flux Parameters and APL Plume Monitoring Parameters, as defined in the RRT Stipulation (Sections 9.3 and 9.4), with the exception of 2,3,7,8-TCDD analyses which were performed by Alta Labs and PCB analyses by SIM performed by Triangle Labs. The analytical results for the third quarter 1999 APL Plume Containment System monitoring event are summarized in Tables 3.5.

3.3.2.2 APW CLMP / Acids Sampling

In accordance with the RRT Stipulation (Section 11.1.3 Collected APL Monitoring), the APWs are sampled semi-annually for the Collected Liquids Monitoring Parameters (CLMP) as described in the RRT Stipulation (Section 9.9 Collected Liquids Monitoring Parameters) as well as benzoic, monochlorobenzoic (sum o, p and m isomers) and

chlorendic acids. This sampling was conducted on August 12, 1999 in conjunction with AFW/APW composite sampling discussed previously in Section 3.3.2.1. The samples were collected directly from the discharge of the APW pump at the well head. All results are summarized in Table 3.6.

3.3.3 Quality Assurance/Quality Control

QA/QC duplicates of the composite samples were collected during this quarter, QA/QC samples were performed on all five AFW sampling wells and the APW well sampling.

3.3.4 Equipment Cleaning

Equipment cleaning was performed in accordance with established procedures approved by the NYSDOH.

3.3.5 Analytical Results

The analytical results for the third quarter 1999 APL Plume Containment System monitoring event are summarized in Table 3.5 for the AFW/APW Flux Composite Samples. 2,3,7,8-TCDD was detected at 0.92 ng/L (920pg/L) which is above the RRT required detection limit of 0.5 ng/L. Additionally PCBs as Aroclor 1248 was detected at 3.5 ug/L, which is above the RRT-required detection level of 1.0 ug/L. Therefore calculations of the APL Plume Flux values were required. The detection and action levels for the APL Plume Flux Parameters are listed below.

APL Flux Parameters	***Detection Level***	***Flux Action Level***
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.5 ng/L	0.5g/year
Perchloropentacyclodecane (Mirex)	1.0 µg/L	0.005 lbs./day
Polychlorobiphenyls (PCBs) as Aroclor 1248*	1.0 µg/L	0.005 lbs./day
Chloroform	10 µg/L	1.7 lbs./day

* - analyze for tri-, tetra- and penta-chlorobiphenyls and report as Aroclor 1248.

3.3.6 APL Plume Flux Calculations

As discussed previously, the performance criteria for the APL Plume beyond the remediated APL Plume is based on no exceedance of the Flux Action Levels. If a parameter from the composite sample collected from the two APWs and five AFWs is reported at a level which exceeds the respective APL Plume Flux Parameter's detection level, the g/year or lbs./day of chemical flux for the respective parameter to the Niagara River from the Lockport bedrock must be calculated and compared to its Flux Action Level.

The ground water flow (Q) is based on the cross sectional area of the bedrock flow computed with the hydraulic transmissivities of the wells along the face of the gorge. The flow used (Q~60 GPD) is calculated in the 3rd Quarter 1997 Bedrock Monitoring Report, section 3.4 and 3.5.

The flux to the Niagara River for TCDD was calculated using the following equation:

$$\text{Flux} = Q \times 3.785 \text{ gal/L} \times \text{Conc} \times 10^{-9} \text{ (g/ng)} \times 365 \text{ (days/year)}$$

where:

Q = groundwater flow in gallons per day; and

Conc = reported concentration of exceedant parameter in ng/L.

The resultant APL Plume Flux for the 2,3,7,8 TCDD reported concentration is 7.6×10^{-5} g/year which is considerably below the allowable APL Plume Flux value of 0.5 g/year, as required under the RRT Stipulation, for TCDD.

The reported concentration for PCBs as Aroclor 1248 was 3.5 ug/L, above the RRT-required detection level for this parameter of 1.0 ug/L. Therefore, the flux to the Niagara River for PCBs as Aroclor 1248 was calculated using the following equation:

$$\text{Flux} = Q \text{ (lbs./day)} \times 3.785 \text{ L/Gal} \times \text{Conc ug/L} \times 10^{-9} \text{ kg/ug} \times 2.205 \text{ lbs./kg}$$

where:

Q = groundwater flow in gallons per day; and

Conc = reported concentration of exceedant parameter in ug/L.

The resultant APL Plume Flux for the PCBs as Aroclor 1248 reported concentration is $1.8x10^{-6}$ lbs./day which is considerably below the allowable APL Plume Flux value of 1.0 lbs./day, as required under the RRT Stipulation, for PCBs as Aroclor 1248.

3.4 CONCLUSIONS

The APL Plume Containment System (remediated APL Plume) achieved flow convergence towards the purge wells, as demonstrated by hydraulic monitoring at the monitoring well pairs, and reduced Gorge Face seeps to the extent practicable.

The following bullets describe the significant individual results from the APL Plume Containment System:

- Inward hydraulic gradients were achieved at three of four monitoring well pairs, while at the remaining well pair an outward gradient was present for all three monitoring periods this quarter (possibly due to an elevated water level in the inner piezometer (ABP-6) caused by groundwater leakage from the overburden).
- Two of the four Gorge Face seeps were dry and all seeps exhibited similar flows as compared to the previous quarter.
- Two APL Plume Flux Parameters were detected above their RRT required detection levels TCDD and PCBs as Aroclor 1248.

- TCDD was reported at a concentration (0.680 ng/L) above its RRT required detection level (0.5 ng/L). The resultant flux value for this parameter was 5.6×10^{-5} g/year, which does not exceed the APL Plume Flux Action Level of 0.5 g/year.

- PCBs as Aroclor 1248 was reported at a concentration (3.5 ug/L) above its RRT required detection level (1.0 ug/L). The resultant flux value for this parameter was $1.8x10^{-6}$ lbs./day, which does not exceed the APL Plume Flux value of 1.0 lbs./day.

The same five AFWs, along with the two APW purge wells, will form the composite sample during future APL Plume Containment System monitoring events, based on hydraulic conductivities measured in the third quarter of 1997. Hydraulic monitoring will continue to be performed monthly during the fourth quarter, and the gradient at well pair ABP-5/ABP-6 will be closely monitored. ABP-6 has been identified as the well

with an elevated water level and is scheduled for further maintenance rehabilitation in the upcoming months.

This report represents the second round of sampling for the APL Purge Wells for CLMP and Acid parameters. Results comparatively to first round and the current results sampling are similar. Future reports will assess any trends that develop in the APL Purge Well Sampling.

4.0 OVERBURDEN MONITORING DATA

The required quarterly overburden monitoring reports include monitoring data for the following programs:

i) Overburden Barrier Collection System (Section 4.1),

ii) Community Monitoring Program (Section 4.2), and

iii) Leachate Treatment System (Section 4.3).

This report presents the fifteenth round of overburden monitoring data and covers the months of July, August and September (third quarter) 1999.

4.1 OVERBURDEN BARRIER COLLECTION SYSTEM

Hydraulic monitoring of the Overburden Barrier Collection System (OBCS) is performed by water level measurements at the OBCS Monitoring Wells (OMWs) installed around the Hyde Park Landfill Site. Eight well pairs are located beyond the OBCS alignment, with one well from each pair installed within the overburden aqueous phase liquid (APL) plume limits and the second of each pair installed outside these limits. The purpose of these wells is to demonstrate that an inward hydraulic gradient is created at the APL plume boundary towards the operating OBCS.

4.1.1 Water Level Monitoring and Gradient Evaluation

Hydraulic monitoring of the sixteen OMWs was performed on July 01, July 29 and September 17, 1999. OMW-8R2, a new well drilled as part of the 1999 drilling program, was also monitored in the September monitoring period. Additionally, some shallow bedrock wells were monitored at locations where an inward horizontal gradient did not previously exist in order to demonstrate the presence of a downward vertical gradient. Table 4.1 summarizes the third quarter hydraulic gradients, where a negative number indicates the presence of an inward or upward gradient. The cumulative hydraulic monitoring data for the OMWs from 1992 to present is included on the enclosed CD under the file name 3Q99HIST.pdf.

From Table 4.1, it can be seen that an inward horizontal hydraulic gradient within the overburden regime has been achieved at least two of the periods during this quarter at five of the eight monitoring well pairs as follows:

OMW-3 / OMW-4R;
OMW-5R / OMW-6;
OMW-10R / OMW-9;
OMW-14R / OMW-13R;
OMW-16R / OMW-15R and.

In addition to identifying the presence of inward horizontal gradients at five of the eight monitoring well pairs, Table 4.1 indicates the presence of a downward vertical hydraulic gradient from the overburden to the bedrock at two of the remaining four monitoring well pairs as follows:

OMW-8R / OMW-7; and
OMW-12R / OMW-11.

The presence of a downward hydraulic gradient suggests that the bedrock pumping system would address any Hyde Park chemistry within the overburden APL plume. However, MSRM is still concerned about the lack of an inward gradient at these two well pairs and plans to address this deficiency by installing two new inner monitoring wells. Monitoring was initiated at well OMW-8R2, for evaluation of the OMW-7 / OMW-8R pairing and at OMW-11R in conjunction with OMW-11 / OMW-12R pairing during the third quarter 1999. These wells are included in the ongoing 1999 Drilling Program.

Well pair OMW-1 / OMW-2 had an inward horizontal gradient for the first period (July) of this quarter but both OMW-1 and OMW-2 were dry during the last two monitoring events of the quarter.

4.1.2 Overburden NAPL Presence Checks

In accordance with Section 3.6.2.3 of the RRT Stipulation, a NAPL presence check was conducted at all overburden wells within the APL plume but outside the defined (1996) overburden NAPL plume limit. Table 4.2 summarizes the NAPL presence checks for the

past year. During the third quarter of 1999 no NAPL was observed in any of the overburden monitoring wells.

4.1.3 Conclusions

A review of the hydraulic monitoring data for the third quarter of 1999 shows that inward horizontal hydraulic gradient were present at five of the eight monitoring well pairs. Downward vertical hydraulic gradients were present in two of the remaining well pairs and the remaining well pair was reported dry for the inner and outer wells for the last two periods of this quarter.

NAPL was not observed in any of the overburden monitoring wells, indicating that the OBCS continues to serves as an effective barrier to off-site NAPL migration.

4.2 COMMUNITY MONITORING PROGRAM

Eight nests of Community Monitoring Wells (CMWs), including one overburden and one shallow bedrock well, are located in the residential community areas around the Hyde Park Landfill Site. These wells provide an early warning for possible APL plume migration toward residential areas. The overburden wells are screened to within one foot of the top of bedrock or permeable material overlying the bedrock, while the shallow bedrock wells extend approximately 15 feet below the top of bedrock.

4.2.1 Gradient Evaluation and Sample Collection

The current data collection activities required for the Residential Community Monitoring Program are as follows:

a) Quarterly hydraulic monitoring of overburden and bedrock groundwater elevations;

b) Where no overburden groundwater is present, soil air samples will be collected and analyzed; and

c) Annual groundwater sampling and analysis of overburden well CMW-2OB located near the intersection of Hyde Park Boulevard and New Road.

Quarterly hydraulic monitoring of the 18 CMWs was performed on July 29, 1999. The resultant calculation of vertical hydraulic gradients (negative number indicates downward) shows that the required downward hydraulic gradient was present this past quarter at all well pairs where water levels were measured (one overburden well (CMW-8OB) was dry). The cumulative hydraulic monitoring data for the CMWs from 1987 to present is included on the enclosed CD under the file name 3Q99HIST.pdf.

At two CMW pair locations, the overburden wells (CMW-7OB and CMW-8OB) have historically contained little to no groundwater, indicative of unsaturated conditions in the overburden soils in these areas. Table 4.3 presents the analytical data for the soil air samples collected from these overburden wells. All parameters were non-detect at both well locations this past quarter and have historically always been "clean".

CMW-11, a manhole located at the corner of Hudson and Garrett has repeatedly provided questionable water level data. This manhole is being replaced with an overburden monitoring well as part of the 1999 Drilling Program.

4.2.2 Conclusions

The required downward hydraulic gradient was present where water levels were measured. At the two historically dry monitoring well locations (CMW-7 and CMW-8), collected air samples were reported as non-detect for all analyzed parameters.

4.3 LEACHATE TREATMENT SYSTEM

During continuing operations at the Hyde Park Leachate Storage and Handling Facility, the midpoint and effluent analyses for the APL treatment system are monitored. Sampling is required at daily, weekly, and monthly intervals for various parameter groups.

4.3.1 Effluent Analyses

The APL treatment system effluent was sampled daily, weekly, and monthly during the third quarter of 1999. The sample data is grouped by frequency of sample collection for discussion, in the following subsections.

4.3.1.1 Daily Sampling

Table 4.4 summarizes the results of the daily composite sampling. No exceedances of the treatment levels were reported this quarter for any of the three daily parameters; pH, TOC, and phenol.

4.3.1.2 Weekly Sampling

Table 4.5 summarizes the results of the weekly composite sampling. No exceedances of the treatment levels were reported this quarter for any of the five weekly parameters or their isomers from the collected effluent samples.

4.3.1.3 Monthly Sampling

Table 4.6 summarizes the results of the monthly composite sampling. No exceedances of the treatment levels were reported this quarter for any of the eight parameters or their isomers.

5.0 NAPL ACCUMULATION

The well extraction systems and manual extraction collected approximately 2,534 gallons of NAPL during the third quarter of 1999. Monthly NAPL recovery identified by source is reported in Table 5.0.

5.1 DECANTERS

Manual NAPL level measurements are conducted monthly in the three decanters. The levels are extrapolated to estimate the quantity of NAPL present in each of the decanters. A description of each decanter's source is provided below:

- Decanter No. 1 ..... Bedrock Well System
- Decanter No. 2 ..... Overburden Well System
- Decanter No. 3 ..... Source Control Well System

NAPL accumulated during the third quarter of 1999 was 2,431 gallons. The quantities from each decanter were:

Decanter No. 1, 899 gallons;
Decanter No. 2, 874 gallons; and
Decanter No. 3, 658 gallons.

5.2 MANUAL RECOVERY

In an effort to enhance NAPL recovery at the Site, MSRM has voluntarily initiated manual NAPL removal from monitoring wells where sufficient NAPL volumes exist. During the Third quarter of 1999, MSRM manually recovered NAPL from four extraction wells at the Hyde Park Landfill Site totaling 102 gallons.

- A2U: 8 gallons recovered July 21, 1999.
- CD1U: 24 gallons recovered this quarter, 14 gallons July 21 and 10 gallons September 30, 1999.
- E4U: 6 gallons recovered on July 22, 1999.
- PW-6UMR: 64 gallons recovered this quarter, 55 gallons July 19 and 9 gallons September 30, 1999.

Recovered NAPL is then drummed and scheduled for shipment for incineration.

5.3 INCINERATION

Two shipments were made this quarter totaling 3,329 gallons. The NAPL was sent for incineration to Safety-Kleen, Inc in Deer Park, TX. A total of 3,329 gallons have been sent thus far in 1999. Shipments this quarter consisted of an August (08/05/99) shipment of 2 drums totaling 119 gallons and a September (09/24/99) tanker trailer of 3,210 gallons of NAPL.