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Lake Michigan intake water that is used as the Co-Gen cooling tower make-up water. However, increases in sulfates and the concurrent increase in TDS would be due to both the presence of these constituents in the make-up water and the use of sulfuric acid for pH control under 5-cycle operations. If NALCO 23230 is used as a corrosion inhibitor, increases in zinc would be due to the presence of this constituent in the make-up water and the inhibitor. If NALCO 23230 is not used as a corrosion inhibitor, increases in zinc would be solely due to the presence of this constituent in the make-up water, similar to arsenic, chlorides, and copper.

Subsection (a)(1) - Applicability of Antidegradation Implementation Procedures

Subsection (a)(1) is used to evaluate antidegradation implementation for the water treatment constituents of sulfate, TDS, dispersant, and corrosion inhibitors. The corrosion inhibitors, dispersant, and use of sulfuric acid for pH control as water treatment additives for the Co-Gen cooling tower are not new chemicals and do not represent a change from current cooling tower operating practices at BP Amoco.

The basic question presented in (a)(1), as applied to sulfate, TDS, dispersant, and corrosion inhibitors in the Co-Gen cooling tower blowdown:

Is:

$$PEQ_{CTB} + PEQ_{001} < WLA_{CTB} + WLA_{001};$$

and, before the addition of Co-Gen cooling tower blowdown, is

$$PEQ_{001} < WLA_{001} \qquad \text{(Eq. 1)}$$

Where:

PEQ_{CTB} = Projected Effluent Quality for Co-Gen Cooling Tower Blowdown
PEQ_{001} = Projected Effluent Quality for Outfall 001 - 1994 Form 2C or BPJ Calculated
WLA_{CTB} = Wasteload Allocation for Co-Gen Cooling Tower Blowdown set equal to the Background Wasteload Allocation for the constituent
WLA_{001} = Wasteload Allocation for Outfall 001 for the constituent

If the Equation 1 conditions, ($PEQ_{001} < WLA_{001}$ and $PEQ_{CTB} + PEQ_{001} < WLA_{CTB} + WLA_{001}$), are met, then antidegradation is verified for the increased discharge of constituents from the Co-Gen water treatment additives and no further antidegradation analysis is needed.

The current permit does not include a wasteload allocation for TDS and sulfate (or any water treatment additives). Hence, the "existing" wasteload allocation for Outfall 001 for TDS and sulfate should be based on the procedures presented in 327 IAC 5-2-11.4 for developing wasteload allocations. The in-stream chronic aquatic values for the dispersant and corrosion inhibitors are derived using the 327 IAC 2-1.5 Tier II methodology as a guidance. Table 2 presents the sulfate, TDS, dispersant and

corrosion inhibitor wasteload allocations for Outfall 001, the wasteload allocation for Outfall 001 plus background, and the corresponding PEQs. At the dispersion ratio defined in the BP Amoco 1994 NPDES Permit Renewal Application for Outfall 001, Equation 1 conditions are met.

For demonstrative purposes only, in order to evaluate at what level Equation 1 conditions are satisfied, Tables 3 and 4 present modified wasteload allocations based on minimal dispersion ratios. Table 3 presents the situation of 2:1 dispersion where Equation 1 is not satisfied as $PEQ_{001} > WLA_{001}$ for sulfate and TDS. However, Table 4 shows the situation of 3:1 dispersion where Equation 1 conditions are met for all parameters. This minimal change in dispersion ratio, where all the conditions of Equation 1 are satisfied for all parameters, further confirms that the Co-Gen cooling tower blowdown meets the antidegradation requirements.

Conclusion

Based on the above discussion and among other reasons, the interim antidegradation rules for Lake Michigan are not applicable to the Co-Gen cooling tower blowdown. Specifically, based on the provisions of (a)(1) and (b)(4), the Co-Gen cooling tower blowdown, as treated by the NPDES-permitted BP Amoco WWTP and discharged to Lake Michigan via Outfall 001, will not degrade Lake Michigan water quality. Subsequently, a formal antidegradation demonstration is not necessary or required for the Co-Gen cooling tower blowdown and no alterations to the current Outfall 001 permit conditions and limits are required to accommodate this blowdown.

TABLE 1. BACKGROUND LAKE MICHIGAN CONCENTRATIONS FOR CONSTITUENTS WITH WATER QUALITY CRITERIA

PARAMETER	LAKE MICHIGAN BACKGROUND CONCENTRATION (a) (µg/L)
Arsenic	0.84
Chloride	12,642
Copper	1.75 (b)
Sulfate	25,870
TDS	167,300
Zinc	5.27

(a) Based on geometric mean of 1992 to 1995 Whiting STORET data
(b) Copper background concentration = geometric mean of USS five intakes from 6-wk monitoring program (submitted to IDEM 1/26/99)

TABLE 2. 327 IAC 5-2-11.7(a)(1) ANTIDEGRADATION ASSESSMENT FOR PRIMARY ENERGY CO-GEN BLOWDOWN

Dispersion Ratio (DR) = 54 :1

Parameter	Current Outfall 001 PEQ (lb/day)	Post-WWTP Co-Gen Blowdown Max Load (lb/day)	Co-Gen Blowdown and Outfall 001 PEQ (lb/day)	"Existing" Wasteload Allocation (based on DR) (lb/day)	Background (BG) Wasteload Allocation (lb/day)	"Existing" Plus Background Wasteload Allocation (lb/day)	Is "Existing" Outfall 001 PEQ > "Existing" Wasteload Allocation	Is Co-Gen & Outfall 001 PEQ > "Existing" Plus Background Wasteload Allocation
TDS	418,497	17,247	435,744	6,045,295	1,557	6,046,852	No	No
Sulfate	150,139	5,826	155,965	2,318,044	241	2,318,285	No	No
NALCO 8304T Dispersant	667	372	1,039	74,745	0	74,745	No	No
NALCO 1326 C.I.	33	14	47	22,053	0	22,053	No	No
NALCO 23230 C.I.								
ortho-phosphate	Total P = 65	0.6	Total P = 65.2	N/C	Total P = 0.3	N/C	NA	NA
zinc	24.0	1.0	25	1,611	0.05	1,611	No	No
OR								
NALCO 8363 C.I.								
ortho-phosphate	Total P = 65	1.1	Total P = 65.4	N/C	Total P = 0.3	N/C	NA	NA
pyrophosphate	Total P = 65	0.1	incld. above	N/C	Total P = 0.3	N/C	NA	NA

Notes:

Column 1: Parameters of concern are those detected in BP Amoco Lake Michigan intake or water treatment additives to the Co-Gen cooling tower

Column 2: 1991 to 1994 Outfall 001 Projected Effluent Quality (PEQ) concentrations converted to mass with effluent flow = 22.5 mgd (max mon avg)
NALCO 8304T and 1326 Outfall 001 effluent mass based on 2 mgd total blowdown flow for Cooling Towers 1 through 6 and 5-cycle blowdown concentration used in Column 3

Column 3: TDS = Boiler Blowdown adjustment + NALCO additive concentration at 5 cycles (including BG) = 1853 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
Sulfate = Boiler Blowdown adjustment + NALCO additive concentration at 5 cycles (including BG) = 626 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
NALCO 8304T = NALCO additive concentration at 5 cycles = 40 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
NALCO 1326 C.I. = NALCO corrosion inhibitor additive concentration at 5 cycles = 1.5 mg/L at Co-Gen flow (1.116 mgd) with 0% removal
NALCO 23230 C.I.= NALCO corrosion inhibitor with listed active ingredient concentrations at 5 cycles at Co-Gen flow (1.116 mgd); 5-cycle zinc concentration includes background zinc levels; 85% of zinc is removed by the WWTP, phosphate is utilized by WWTP hence 99% consumption of PO4 is assumed
If NALCO 23230 is not used, NALCO 8363 will be used.
NALCO 8363 C.I.= NALCO corrosion inhibitor with listed active ingredient concentrations at 5 cycles at Co-Gen flow (1.116 mgd) with 99% consumption at WWTP
Background concentrations are geometric mean of 1992 to 1995 BP Amoco Lake Michigan intake database
Percent removals based on 1992 Amoco source survey confirmed by BPJ

Column 4: Equal to Column 2 + Column 3

Column 5: 4-day WLA based on CAC (except zinc which is based on the AAC) including dispersion ratio and converted to mass using 22.5 mgd
N/C = Not Calculable as no aquatic toxicity data found

Column 6: BG concentrations (same as column 3 with TDS = 167,300 µg/L; sulfate = 25,870 µg/L; zinc = 5.3 µg/L; Total P = 31 µg/L) converted to mass using 1.116 mgd

Column 7: Equal to Column 5 + Column 6

TABLE 3. 327 IAC 5-2-11.7(a)(1) ANTIDEGRADATION ASSESSMENT FOR PRIMARY ENERGY CO-GEN BLOWDOWN

Dispersion Ratio (DR) = 2 :1

Parameter	Current Outfall 001 PEQ (lb/day)	Post-WWTP Co-Gen Blowdown Max Load (lb/day)	Co-Gen Blowdown and Outfall 001 PEQ (lb/day)	"Existing" Wasteload Allocation (based on DR) (lb/day)	Background (BG) Wasteload Allocation (lb/day)	"Existing" Plus Background Wasteload Allocation (lb/day)	Is "Existing" Outfall 001 PEQ > "Existing" Wasteload Allocation	Is Co-Gen & Outfall 001 PEQ > "Existing" Plus Background Wasteload Allocation
TDS	418,497	17,247	435,744	359,425	1,557	360,982	Yes	Yes
Sulfate	150,139	5,826	155,965	131,028	241	131,269	Yes	Yes
NALCO 8304T Dispersant	667	372	1,039	4,077	0	4,077	No	No
NALCO 1326 C.I.	33	14	47	1,203	0	1,203	No	No
NALCO 23230 C.I.								
ortho-phosphate	Total P = 65	0.6	Total P = 65.2	N/C	Total P = 0.3	N/C	NA	NA
zinc	24.0	1.0	25	89	0.05	89	No	No
OR								
NALCO 8363 C.I.								
ortho-phosphate	Total P = 65	1.1	Total P = 65.4	N/C	Total P = 0.3	N/C	NA	NA
pyrophosphate	Total P = 65	0.1	incld. above	N/C	Total P = 0.3	N/C	NA	NA

Notes:

Column 1: Parameters of concern are those detected in BP Amoco Lake Michigan intake or water treatment additives to the Co-Gen cooling tower

Column 2: 1991 to 1994 Outfall 001 Projected Effluent Quality (PEQ) concentrations converted to mass with effluent flow = 22.5 mgd (max mon avg)
NALCO 8304T and 1326 Outfall 001 effluent mass based on 2 mgd total blowdown flow for Cooling Towers 1 through 6 and 5-cycle blowdown concentration used in Column 3

Column 3: TDS = Boiler Blowdown adjustment + NALCO additive concentration at 5 cycles (including BG) = 1853 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
Sulfate = Boiler Blowdown adjustment + NALCO additive concentration at 5 cycles (including BG) = 626 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
NALCO 8304T = NALCO additive concentration at 5 cycles = 40 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
NALCO 1326 C.I. = NALCO corrosion inhibitor additive concentration at 5 cycles = 1.5 mg/L at Co-Gen flow (1.116 mgd) with 0% removal
NALCO 23230 C.I.= NALCO corrosion inhibitor with listed active ingredient concentrations at 5 cycles at Co-Gen flow (1.116 mgd); 5-cycle zinc concentration includes background zinc levels; 85% of zinc is removed by the WWTP, phosphate is utilized by WWTP hence 99% consumption of PO4 is assumed
If NALCO 23230 is not used, NALCO 8363 will be used.
NALCO 8363 C.I.= NALCO corrosion inhibitor with listed active ingredient concentrations at 5 cycles at Co-Gen flow (1.116 mgd) with 99% consumption at WWTP
Background concentrations are geometric mean of 1992 to 1995 BP Amoco Lake Michigan intake database
Percent removals based on 1992 Amoco source survey confirmed by BPJ

Column 4: Equal to Column 2 + Column 3

Column 5: 4-day WLA based on CAC (except zinc which is based on the AAC) including dispersion ratio and converted to mass using 22.5 mgd
N/C = Not Calculable as no aquatic toxicity data found

Column 6: BG concentrations (same as column 3 with TDS = 167,300 µg/L; sulfate = 25,870 µg/L; zinc = 5.3 µg/L; Total P = 31 µg/L) converted to mass using 1.116 mgd

Column 7: Equal to Column 5 + Column 6

TABLE 4. 327 IAC 5-2-11.7(a)(1) ANTIDEGRADATION ASSESSMENT FOR PRIMARY ENERGY CO-GEN BLOWDOWN

Dispersion Ratio (DR) = 3 :1

Parameter	Current Outfall 001 PEQ (lb/day)	Post-WWTP Co-Gen Blowdown Max Load (lb/day)	Co-Gen Blowdown and Outfall 001 PEQ (lb/day)	"Existing" Wasteload Allocation (based on DR) (lb/day)	Background (BG) Wasteload Allocation (lb/day)	"Existing" Plus Background Wasteload Allocation (lb/day)	Is "Existing" Outfall 001 PEQ > "Existing" Wasteload Allocation	Is Co-Gen & Outfall 001 PEQ > "Existing" Plus Background Wasteload Allocation
TDS	418,497	17,247	435,744	468,768	1,557	470,326	No	No
Sulfate	150,139	5,826	155,965	173,086	241	173,327	No	No
NALCO 8304T Dispersant	667	372	1,039	5,436	0	5,436	No	No
NALCO 1326 C.I.	33	14	47	1,604	0	1,604	No	No
NALCO 23230 C.I.								
ortho-phosphate	Total P = 65	0.6	Total P = 65.2	N/C	Total P = 0.3	N/C	NA	NA
zinc	24.0	1.0	25	118	0.05	118	No	No
OR								
NALCO 8363 C.I.								
ortho-phosphate	Total P = 65	1.1	Total P = 65.4	N/C	Total P = 0.3	N/C	NA	NA
pyrophosphate	Total P = 65	0.1	incld. above	N/C	Total P = 0.3	N/C	NA	NA

Notes:

Column 1: Parameters of concern are those detected in BP Amoco Lake Michigan intake or water treatment additives to the Co-Gen cooling tower

Column 2: 1991 to 1994 Outfall 001 Projected Effluent Quality (PEQ) concentrations converted to mass with effluent flow = 22.5 mgd (max mon avg)
NALCO 8304T and 1326 Outfall 001 effluent mass based on 2 mgd total blowdown flow for Cooling Towers 1 through 6 and 5-cycle blowdown concentration used in Column 3

Column 3: TDS = Boiler Blowdown adjustment + NALCO additive concentration at 5 cycles (including BG) = 1853 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
Sulfate = Boiler Blowdown adjustment + NALCO additive concentration at 5 cycles (including BG) = 626 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
NALCO 8304T = NALCO additive concentration at 5 cycles = 40 mg/L at Co-Gen flow (1.116 mgd) with 0% removal by WWTP
NALCO 1326 C.I. = NALCO corrosion inhibitor additive concentration at 5 cycles = 1.5 mg/L at Co-Gen flow (1.116 mgd) with 0% removal
NALCO 23230 C.I.= NALCO corrosion inhibitor with listed active ingredient concentrations at 5 cycles at Co-Gen flow (1.116 mgd); 5-cycle zinc concentration includes background zinc levels; 85% of zinc is removed by the WWTP, phosphate is utilized by WWTP hence 99% consumption of PO4 is assumed
If NALCO 23230 is not used, NALCO 8363 will be used.
NALCO 8363 C.I.= NALCO corrosion inhibitor with listed active ingredient concentrations at 5 cycles at Co-Gen flow (1.116 mgd) with 99% consumption at WWTP
Background concentrations are geometric mean of 1992 to 1995 BP Amoco Lake Michigan intake database
Percent removals based on 1992 Amoco source survey confirmed by BPJ

Column 4: Equal to Column 2 + Column 3

Column 5: 4-day WLA based on CAC (except zinc which is based on the AAC) including dispersion ratio and converted to mass using 22.5 mgd
N/C = Not Calculable as no aquatic toxicity data found

Column 6: BG concentrations (same as column 3 with TDS = 167,300 µg/L; sulfate = 25,870 µg/L; zinc = 5.3 µg/L; Total P = 31 µg/L) converted to mass using 1.116 mgd

Column 7: Equal to Column 5 + Column 6

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Whiting Clean Energy, Inc.
801 E. 86th Avenue, Merrillville, IN 46410
Tel: (219) 647-6071 Fax: (219) 647-6341

July 13, 1999

Mr. Steven K. Roush
Permits Section
Industrial NPDES Permits
Office of Water Management
Indiana Department of
Environmental Management
100 North Senate Avenue
Indianapolis, IN 46206-6015

Subject: Whiting Clean Energy, Inc. Co-Generation Facility
at the BP Amoco Whiting Refinery - NPDES Permit No. IN0000108

Dear Mr. Roush:

Whiting Clean Energy Inc., a subsidiary of NiSource, Inc., is in the process of siting a natural gas-fired co-generation facility at the BP Amoco Whiting refinery. The cogeneration plant will utilize two (2) combustion turbine units with heat recovery steam generators, and a 213 MW (rated) condensing steam turbine with a closed cooling water system. Operations are scheduled to commence during June 2001. Since the cooling water system will consist of a mechanical draft cooling tower supplied by Lake Michigan water, cooling tower blowdown water will need to be treated and discharged to Lake Michigan. Therefore, this letter serves as a request for IDEM to document the NPDES permitting requirements deemed necessary to allow the discharge of treated cooling water blowdown to Lake Michigan via BP Amoco Outfall 001.

In regards to the cooling tower specifications (at maximum steam flow), the following information is offered:

- Temperature drop across cooling tower = approximately 20 °F.
- Water flow rate = 223 MGD
- Design heat duty = 1,550 MM BTU/Hr.
- Configuration = Two 5-cell bays (10 cells total)
- Make-up water source = existing BP Amoco water supply (i.e., Lake Michigan)
- Water treatment additives = corrosion inhibitor, scale inhibitor, and biocide
- Concentration cycles = 3
- Maximum blowdown flowrate = approximately 2 MGD

The blowdown will be treated at the existing BP Amoco wastewater treatment plant and subsequently discharged via NPDES-permitted Outfall 001. Although, this represents an additional flow to Outfall 001, Whiting Clean Energy Inc. does not feel that a permit renewal is required since:

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1. Whiting Clean Energy Inc. is aware that the current BP Amoco NPDES permit expired February 28, 1995, but was administratively extended as a permit renewal application was submitted August 29, 1994. Hence, the limits and conditions of the current permit are in effect, and are based on the 1989 permit renewal application.

2. Cooling tower blowdown is already identified as a source of wastewater to Outfall 001 in the 1989 permit renewal application and current NPDES permit.

3. Cooling tower make-up water source is Lake Michigan, so that there are no elevated constituent concentrations compared to the background.

4. Three-cycle cooling tower blowdown will not significantly concentrate parameters characterized in BP Amoco's Outfall 001 discharge.

5. The water treatment additives are similar to ones used currently at BP Amoco.

An increase in Outfall 001 flow and constituent mass would occur with the addition of the cooling tower blowdown. However, Whiting Clean Energy Inc. projects the increase to be insignificant (i.e., less than 10%) when added to recent chemical characteristics relative to the reported values in the 1994 permit renewal application, as well as 1994 to 1995 historical performance. For example, the maximum monthly average flows are:

- 1994 permit renewal application = 22.5 MGD
- 1997 to 1998 DMR data = 20.2 MGD
- Projected = 20.8 mgd to 23.1 MGD

Therefore, Whiting Clean Energy Inc. proposes to resummarize the Outfall 001 flows and relevant chemical characterizations given in the 1994 BP Amoco permit renewal application to account for the new co-generation facility cooling tower blowdown.

Please advise us as to the specific NPDES permitting requirements necessary to incorporate the cogeneration cooling tower blowdown discharge into BP Amoco Outfall 001. If any additional requirements are necessary, Whiting Clean Energy Inc. requests that these be documented in a timely fashion to avoid any conflicts with proposed construction/operation schedules. To facilitate the dialogue of relevant water permitting issues, Whiting Clean Energy Inc. (along with BP Amoco and ADVENT Group representatives) proposes a meeting with IDEM personnel in Indianapolis on Wednesday, July 28, 1999 to discuss cogeneration project objectives and associated water permitting issues.

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In the meantime, if you should any questions or comments regarding the planned cogeneration cooling water tower details, please do not hesitate to call Tom Tarpley, Primary Energy, Inc. at 219-647-6343, or Kevin Hoge at NIPSCO at (219) 647-5254.

Thank you in advance for your timely attention to this matter.

Sincerely,

Jackson L. Mathis / for

Arthur E. Smith, Jr.
Environmental Officer and Counsel
NiSource, Inc.

AES:ch

cc: Kevin Hoge - NIPSCO
Pete Beronio - BP Amoco
Joe Quinn – DFD
Tom Tarpley – Primary Energy, Inc.
Dean Vlachos - The ADVENT Group

FACILITY DESCRIPTION

General Description

The Facility is a combined-cycle cogeneration plant which utilizes two gas-fired combustion turbine units with duct fired heat recovery steam generators and a condensing steam turbine with a closed cooling water system. The Facility will supply high pressure steam to Amoco's Whiting Refinery. All of the power will be sold on the grid with a future option of selling some of the power directly to Amoco. The Facility will be located on a land parcel adjacent to the Whiting Refinery with a long term lease from Amoco.

Mechanical Equipment

The combustion turbines are General Electric Model 7241FA which are fired on pipeline quality natural gas. The fuel conditioning system consists of compressors, particulate filters, preheaters and coalescing filtration for the heavy hydrocarbon removal from the natural gas prior to combusting the fuel in the turbines. The fuel compressors are three 50% capacity units. A Dry Low NOx combustion system is supplied on each turbine for emissions control. Each turbine is rated at 166 MW (ISO Conditions). The auxiliary equipment includes lube oil system, self cleaning air inlet filters, compressor on line & off line water wash systems, vibration monitoring and fire detection protection systems and a Mark V control system. Also a common LCI starting system will be shared by both turbines. The generator is cold end direct drive with hydrogen cooling.

A Heat Recovery Steam Generator (HRSG) is connected to each combustion turbine which utilizes the hot exhaust gases to generate high pressure steam, low pressure steam and feedwater preheating. The high pressure steam conditions are 1300 psi and 860 F. The low pressure steam is utilized for pegging steam for the external deaerators. Each HRSG produces 580,000 lbs/hr (MCR) in an unfired condition. Natural gas fired duct burners provide each HRSG with the ability to raise the steam flow to 1,188,000 lbs/hr. The duct burners consists of a burner management system with flame scanners and the fuel control valves. A Selective Catalyst Reduction (SCR) System is provided with each HRSG and consists of an anhydrous ammonia system with a storage tank, vaporizers and associated injection equipment. Also provisions have been made in the ductwork to add a Carbon Monoxide Catalyst Oxidizer in the future, if necessary. Each HRSG has its own stack with a continuous emission monitoring system.

The steam turbine is a General Electric bottom discharged, condensing unit with a closed cooling water system. The inlet conditions are 1240 psi, 855 F with a maximum throttle flow of 1,600,000 lbs/hr. The turbine auxiliary equipment consists of a lube oil system, hydraulic system, steam seal system and a Mark V control system. Also there is a steam turbine bypass letdown valve which dumps the steam directly to the surface condenser. The generator is hydrogen cooled with a rating of 213 MW.

The cooling water system consists of a surface condenser, mechanical draft cooling tower, cooling water pumps and an auxiliary equipment cooling system. The surface condenser is a two pass divided water box type which is designed to satisfy the entire operating range of the steam turbine. The mechanical draft cooling tower is a multi-cell counter flow type with a wood or fiberglass framework. The induced draft system consists of fans, gearboxes and two speed motors. The tower will be protected by a fire sprinkler system. The cooling water pumps are three 50% capacity vertical wet-pit type. The auxiliary cooling water system provides the cooling media for the plant auxiliary equipment with the water being returned to the cooling tower. Also the condenser is equipped with an air removal system which includes two multi-stage steam ejectors with an inter and after condenser and a hogger ejector for start-up purposes.

The feedwater system consists of vacuum condensate pumps, deaerators and feedwater pumps. The condensate pumps are two 100% capacity wet-pit type which supply water to the two 50% capacity deaerators (1,200,000 lbs/hr each). The three 40% capacity (960,000 lbs/hr) feedwater pumps take suction from the deaerators and supply high pressure feedwater to the HRSGs. Also the feedwater pumps supply water to the low pressure section of the HRSGs. Treated make-up water is furnished by Amoco's existing water treatment plant. Two new 100% capacity treated water pumps located at the existing water treatment plant will transfer the water to the condensate system.

The Facility includes the following auxiliary equipment:

- Two 100% Instrument Air Compressor Skids
- Two 100% HRSG Attemperation Water Pumps
- Two 100% Steam Turbine Letdown Valve Attemperation Water Pumps
- Two Sets of 100% Blowdown Drums and Sump Pumps
- Two 100% Auxiliary Cooling Water Pumps
- Steam & Water Sampling / Analyzing System
- Plant Fire Detection & Protection System
- Feedwater & HRSG Chemical Dosing System
- Cooling Water Chemical Dosing System

Electrical Equipment, Switchyard & Transmission Line

The electrical equipment consists of the generator & auxiliary switchgear, motor control centers and breakers. The generator bus voltage is 18 kv which is raised to 138 kv through an individual step-up transformer for each turbine. The auxiliary switchgear voltages are 5 kv and 600 v. The larger motors are fed from the 4160 v motor control centers (MCCs) while the small motors are operated from the 480 v MCCs. The MCCs for the combustion turbine equipment are fed from their internally supplied auxiliary system located in the Packaged Electrical / Electronic Control Cabinet (PEECC). Transformers for the 18 kv - 4160 v are connected to the 4160 kv switchgear in a secondary selective radial configuration. Also the transformers for the 4160 v - 480 v are connected to the 480 v switchgear in a secondary selective radial configuration. A 120 VAC Uninteruptible Power Supply (UPS) System is fed from a 125 VDC System. Critical instrumentation, control systems and other equipment is fed from the UPS. Station service batteries with two battery chargers are provided.

The switchyard is a 138 kv air insulated switchyard system arranged in a ring bus configuration. The step-up tranformers from the combustion turbines and steam turbine are connected to the ring bus with overhead cables routed on the take-off towers. The required relay protection and control panels are housed in the electrical equipment building. There are two overhead 138 kv transmission lines which are connected to the NIPSCO electrical system at the Marktown Substation.

Control Systems

Each combustion turbine and steam turbine is controlled by a separate Mark V System. Each combustion turbine has a control station in the PEECC. Also the combustion turbines along with the steam turbine are operated through two independent control stations located in the Control Room.

A distributed control system (DCS) operates the balance of plant equipment. The DCS monitors and controls equipment through a Windows NT platform, dedicated state-of-the-art microprocessor based system located in the Control Room. This system consists of two independent data highways, input/output modules and redundant controllers, power supplies, operator stations and historian. The DCS has a communication link to the Mark V for monitoring key parameters on the combustion & steam turbines.

Buildings and Enclosures

The steam turbine and auxiliary equipment are housed in an insulated, heated building. Also a 60-ton overhead crane is provided for maintenance purposes. The Control Room, locker facilities and adminstration offices are located in a complex adjacent to the steam turbine building. These areas are heated and air conditioned. The electrical equipment is housed in a building which is heated and air conditioned. The fuel compressors are protected by a shelter which is ventilated. The cooling water pumps are located in a heated building at the cooling tower. The HRSGs have a heated penthouse enclosure over the steam drums.

BP Amoco

Whiting Refinery
2815 Indianapolis Boulevard
Post Office Box 710
Whiting, Indiana 46394-0710
219-473-7700

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

March 23, 1999

Indiana Department of Environmental Management
Office of Water Management
100 North Senate Street
P.O. Box 6015
Indianapolis, IN 46206-6015

NPDES Permit No. 0000108, Serials 001, 002, 003, and 004

Effluent quality data and Discharge Monitoring Report forms from Amoco Oil Company's Whiting Refinery for the month of February, 1999, are attached. Effluent quality from the wastewater treatment plant for the month was excellent.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Colin H. J. Maclean

Colin H. J. Maclean
Business Unit Leader

Woodward-Clyde

Engineering & sciences applied to the earth & its environment.

Via C. fied Mail No. Z 441 085 233
Return Receipt Requested

September 11, 1998

RECEIVED
SEP 18 1998
By

Mr. Steven Judeth
Office of Enforcement
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

IN 0000108

Subject: Amoco Oil Company and Amoco Pipeline Company, Cause No. B-1545, August 1998 Groundwater Sampling Analytical Results

Dear Mr. Judeth:

Woodward-Clyde International America (WCIA), on behalf of Amoco Pipeline Company, has performed groundwater sampling at the Amoco Pipeline Xylene Area located at 129th Street and Calumet Avenue in Hammond, Indiana. Fluid level measurements were performed at all site monitoring wells prior to sampling. Free-phase xylenes (FPX) were present in all wells except for monitoring well JLM032. Groundwater samples were not collected from the wells where FPX was present. A minimum of three well volumes of groundwater was purged from well JLM032 prior to collecting the groundwater sample on August 19, 1998. The sample was analyzed for total xylenes only by Pace Analytical Services, Inc. located in Minneapolis, Minnesota. The analysis indicated that 3,800 ug/L of xylenes were present in the well. Please see the attached laboratory report. If you have any questions regarding this letter, please call me at (312) 697-7224.

Sincerely,

Laurence F. Verkoulen
Assistant Project Manager

Timothy M. Black
Project Manager

LFV:lfv

Attachments

cc: Mark W. Stanifer (IDEM)
V. Kremesec (Amoco)
K. Fase (Amoco)
M. Kruszynski (HDEM) via Certified Mail No. Z 441 085 234
C.K. Yukawa (WCIA)
L. Malnor (Amoco)

Woodward-Clyde International (Formerly Woodward-Clyde Consultants) A subsidiary of Woodward-Clyde Group, Inc.
122 South Michigan Avenue • Suite 1920 • Chicago, Illinois 60603
312-939-1000 • Fax 312-939-4198

I:\88C3114\XYLENE\1998\3Q\0910IDEM.DOC\11-Sep-98\CODE

Pace Analytical

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

DATE: 08/28/98
PAGE: 1

Woodward Clyde
2918 Indianapolis Blvd.
Whiting, IN 46394

Pace Project Number: 109178
Client Project ID: Project: 88C3114-8X001

Attn: Ms. Joann Montgomery
Phone:

Solid results are reported on a wet weight basis

Pace Sample No: 10800860 Date Collected: 08/19/98 Matrix: Water
Client Sample ID: JLM032 Date Received: 08/20/98

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
GC/MS -- VOA							
GC/MS VOCs by 8260 MN	Method: EPA 8260				Prep Method: EPA 8260		
Xylene (Total)	3800	ug/L	50	08/24/98	TAW	1330-20-7	
Dibromofluoromethane (S)	108	%		08/24/98	TAW	1868-53-7	
Toluene-d8 (S)	110	%		08/24/98	TAW	2037-26-5	
4-Bromofluorobenzene (S)	96	%		08/24/98	TAW	460-00-4	
1,2-Dichloroethane-d4 (S)	102	%		08/24/98	TAW	17060-07-0	

Pace Sample No: 10800878 Date Collected: 08/19/98 Matrix: Water
Client Sample ID: TRIP BLANK Date Received: 08/20/98

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
GC/MS -- VOA							
GC/MS VOCs by 8260 MN	Method: EPA 8260				Prep Method: EPA 8260		
Xylene (Total)	ND	ug/L	5	08/24/98	TAW	1330-20-7	
Dibromofluoromethane (S)	98	%		08/24/98	TAW	1868-53-7	
Toluene-d8 (S)	96	%		08/24/98	TAW	2037-26-5	
4-Bromofluorobenzene (S)	76	%		08/24/98	TAW	460-00-4	1,2
1,2-Dichloroethane-d4 (S)	94	%		08/24/98	TAW	17060-07-0	

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc.

Pace Analytical

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

DATE: 08/28/98
PAGE: 2

Pace Project Number: 109178
Client Project ID: Project: 88C3114-8X001

PARAMETER FOOTNOTES

ND	Not Detected
NC	Not Calculable
PRL	Pace Reporting Limit
(S)	Surrogate
[1]	Spiked sample recovery is not within control limits.
[2]	Confirmed by second analysis.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc.

P- Comp

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Controller's Dept., Attention: Cashier, 100 N. Senate Ave., P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

1998 ANNUAL NPDES PERMIT FEE ASSESSMENT

DATE: 03/11/1998

INVOICE NO.: 98993224
REVENUE CODE: 2830-433200-100600

PERMIT NO.: IN0000108
FACILITY TYPE: MAJORIND

MAILING ADDRESS:

AMOCO OIL COMPANY
2815 INDIANA BLVD (MC242)
PO BOX 710
WHITING, IN 46394-0710

BASE FEE:	1000.00
ADDITIONAL FEE*:	34800.00
FLOW 132.691667 MGD	
CREDIT:	-00
DISCOUNT:	-6960.00
AMOUNT DUE:	**28840.00**

*Additional fees are based upon flow, # of outfalls, or # of pipes.

NOTE: IF YOU HAVE ALREADY PAID YOUR 1998 NPDES PERMIT FEE, PLEASE DISREGARD THIS NOTICE.

DATE PAYMENT DUE: 05/09/1998

PLEASE KEEP TOP PORTION FOR YOUR RECORDS

IMPORTANT: PLEASE RETURN BOTTOM PORTION WITH YOUR PAYMENT

REMIT PAYMENT TO: IDEM
Controller's Dept.
Attention: Cashier
100 N. Senate Ave.
P.O. Box 7060, Room 1324
Indianapolis, IN 46207-7060

DATE: 03/11/1998

1998 ANNUAL NPDES PERMIT FEE ASSESSMENT

PERMIT NO.: IN0000108
FACILITY TYPE: MAJORIND

INVOICE NO.: 98993224
REVENUE CODE: 2830-433200-100600

MAILING ADDRESS:

AMOCO OIL COMPANY
2815 INDIANA BLVD (MC242)
PO BOX 710
WHITING, IN 46394-0710

AMOUNT DUE: **28840.00**

DATE PAYMENT DUE: 05/09/1998

ADDRESS CORRECTION: _____

1998 NPDES FEE ASSESSMENT PAYMENT COUPONS

If you choose to pay your annual fee assessment in quarterly installments, please include ONE payment coupon (below) WITH EACH PAYMENT. This will allow us to properly credit your payment to your account.

Water Management Partial Payment for
Quarter 4
Payment: 7210.00
DATE DUE: FEBRUARY 11, 1999

PERMIT NUMBER: IN0000108
INVOICE NUMBER: 98993224
PERMIT NAME: AMOCO OIL COMPANY
REVENUE CODE: 2830-433200-100600

MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

Water Management Partial Payment for
Quarter 3
Payment: 7210.00
DATE DUE: NOVEMBER 11, 1998

PERMIT NUMBER: IN0000108
INVOICE NUMBER: 98993224
PERMIT NAME: AMOCO OIL COMPANY
REVENUE CODE: 2830-433200-100600

MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

Water Management Partial Payment for
Quarter 2
Payment: 7210.00
DATE DUE: AUGUST 11, 1998

PERMIT NUMBER: IN0000108
INVOICE NUMBER: 98993224
PERMIT NAME: AMOCO OIL COMPANY
REVENUE CODE: 2830-433200-100600

MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

Water Management Partial Payment for
Quarter 1
Payment: 7210.00
DATE DUE: MAY 11, 1998

PERMIT NUMBER: IN0000108
INVOICE NUMBER: 98993224
PERMIT NAME: AMOCO OIL COMPANY
REVENUE CODE: 2830-433200-100600

MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

PRE-SIGNED CLAIM FORM

This form is intended for use by municipalities that require signed claim forms in order to insure that payments are made by the due date.

PERMIT NO.: IN0000108 **INVOICE NO.:**98993224

FACILITY INFORMATION:
AMOCO OIL COMPANY
2815 INDIANA BLVD (MC242)
PO BOX 710
WHITINGIN 46394-0710

TOTAL FEE: 28840.00

The following certification, according to the State Board of Accounts, satisfies the claim certification required under IC 5-11-10-1. Therefore, permittees need not send a claim to IDEM to be certified by IDEM.

> "I hereby certify that the foregoing account is just and correct, that the amount claimed is legally due, after allowing all just credits, and that no part of the same has been paid."

Date: 03/11/1998 Claimant: _____ Title Chief, Operations Section

Please contact the State Board of Accounts with any questions regarding this certification.

Lake co

Amoco Petroleum Products
Refining Business Group
Whiting Business Unit

2815 Indianapolis Boulevard
Post Office Box 710
Whiting, Indiana 46394-0710
219-473-7700

D. H. Wilson
Manager, Whiting Business Unit

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

December 19, 1997

Indiana Department of Environmental Management
Office of Water Management
100 North Senate Street
P.O. Box 6015
Indianapolis, IN 46206-6015

NPDES Permit No. 0000108, Serials 001, 002, 003, and 004

Effluent quality data and Discharge Monitoring Report forms from Amoco Oil Company's Whiting Refinery for the month of November, 1997, are attached.

Effluent quality from the wastewater treatment plant for the month was excellent. Unfortunately, the refinery experienced an estimated one-gallon oil release in its once through cooling water (OTCW) system on November 22. Please reference the attached addendum for further information.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

D. H. Wilson /PE Hower

D. H. Wilson

1998 NPDES FEE ASSESSMENT PAYMENT COUPONS

If you choose to pay your annual fee assessment in quarterly installments, please include ONE payment coupon (below) WITH EACH PAYMENT. This will allow us to properly credit your payment to your account.

Water Management Partial Payment for
Quarter 4
Payment: 7210.00
DATE DUE: FEBRUARY 11, 1999

PERMIT NUMBER: IN0000108
INVOICE NUMBER: 98993224
PERMIT NAME: AMOCO OIL COMPANY
REVENUE CODE: 2830-433200-100600

MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

Water Management Partial Payment for
Quarter 3
Payment: 7210.00
DATE DUE: NOVEMBER 11, 1998

PERMIT NUMBER: IN0000108
INVOICE NUMBER: 98993224
PERMIT NAME: AMOCO OIL COMPANY
REVENUE CODE: 2830-433200-100600

MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

Water Management Partial Payment for
Quarter 2
Payment: 7210.00
DATE DUE: AUGUST 11, 1998

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PERMIT NAME: AMOCO OIL COMPANY
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Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

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Quarter 1
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MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

PRE-SIGNED CLAIM FORM

This form is intended for use by municipalities that require signed claim forms in order to insure that payments are made by the due date.

PERMIT NO.: IN0000108 **INVOICE NO.:**98993224

FACILITY INFORMATION:
AMOCO OIL COMPANY
2815 INDIANA BLVD (MC242)
PO BOX 710
WHITINGIN 46394-0710

TOTAL FEE: 28840.00

The following certification, according to the State Board of Accounts, satisfies the claim certification required under IC 5-11-10-1. Therefore, permittees need not send a claim to IDEM to be certified by IDEM.

> "I hereby certify that the foregoing account is just and correct, that the amount claimed is legally due, after allowing all just credits, and that no part of the same has been paid."

Date: 03/11/1998 Claimant: _____ Title Chief, Operations Section

Please contact the State Board of Accounts with any questions regarding this certification.

Lake co

Amoco Petroleum Products
Refining Business Group
Whiting Business Unit

2815 Indianapolis Boulevard
Post Office Box 710
Whiting, Indiana 46394-0710
219-473-7700

D. H. Wilson
Manager, Whiting Business Unit

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

December 19, 1997

Indiana Department of Environmental Management
Office of Water Management
100 North Senate Street
P.O. Box 6015
Indianapolis, IN 46206-6015

NPDES Permit No. 0000108, Serials 001, 002, 003, and 004

Effluent quality data and Discharge Monitoring Report forms from Amoco Oil Company's Whiting Refinery for the month of November, 1997, are attached.

Effluent quality from the wastewater treatment plant for the month was excellent. Unfortunately, the refinery experienced an estimated one-gallon oil release in its once through cooling water (OTCW) system on November 22. Please reference the attached addendum for further information.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

D. H. Wilson /P.E. Hower

D. H. Wilson

Woodward-Clyde

Engineering & sciences applied to the earth & its environment.

Via C ified Mail No. P 863 954 517
Return Receipt Requested

September 18, 1997

Mr. Steven Judeth
Office of Enforcement
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

Subject: Amoco Oil Company and Amoco Pipeline Company, Cause No. B-1545, August 1997 Groundwater Sampling Analytical Results

Dear Mr. Judeth:

Woodward-Clyde International, on behalf of Amoco Pipeline Company, has performed groundwater sampling at the Amoco Pipeline Xylene Area located at 129th Street and Calumet Avenue in Hammond Indiana. Fluid level measurements were performed at all site monitoring wells prior to sampling. Free-phase hydrocarbons (FPH) were present in all wells except for monitoring well JLM032. Groundwater samples were not collected from the wells where FPH was present. Fifteen gallons of groundwater was purged from well JLM032 prior to collecting the groundwater sample. The groundwater sample was analyzed for total xylenes only by American Environmental Network (formerly IEA) located in Schaumburg, Illinois. The analysis indicated that 1,300 ug/L of xylenes were present in the well. Please see the attached laboratory report. If you have any questions regarding this letter, please call me at (312) 697-7224.

Sincerely,

Laurence VerKoulen
Assistant Project Scientist

Tim Black
Project Manager

LFV:lfv

Attachments

cc: Mark W. Stanifer (IDEM)
D. Beckmann (Amoco)
K. Fase (Amoco)
File
S. Hutts (HDEM) via Certified Mail No. P 863 954 518
K. Sprague (Amoco)
C.K. Yukawa (WCIA)
L. Malnor (Amoco)

Woodward-Clyde International (Formerly Woodward-Clyde Consultants) A subsidiary of Woodward-Clyde Group, Inc.
122 South Michigan Avenue • Suite 1920 • Chicago, Illinois 60603
312-939-1000 • Fax 312-939-4198

I:\88C3114\XYLENE\1997\0918IDEM.DOC\18-Sep-97\CODE

Client : Woodward-Clyde Consultants
Project ID : WHITING

EPA Target Compound List (TCL)
GCMS Volatiles Analysis

Lab Sample Number : L72972089-001 **Method:** 8240B
Client ID : JLM032 **Matrix :** WATER

Compound	Result	PQL	Units	Dilution Factor	Sample Date	Analysis Date
Xylenes, Total	1,300	100	ug/L	10	8/28/97	9/ 4/97

P-comp

WATER

MAR 13

Amoco Petroleum Products
Refining Business Group
Whiting Business Unit
2815 Indianapolis Boulevard
Post Office Box 710
Whiting Indiana 46394-0710
219-473-7700

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

March 10, 1997

Whiting

Mr. Gary Starks
Office of Water Management
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015

NPDES Permit No. IN 0000108
Exceedance of Discharge pH at Outfall 004

Dear Mr. Starks:

This note is a follow-up to our notification earlier today regarding an exceedance of pH in storm water Outfall 004 on March 9, 1997. The discharge pH was 9.1, which is outside the 6.0 to 9.0 range specified in our NPDES permit. Discharge from the outfall was immediately stopped by closing the valve at the outfall.

Storm water from the eastern part of the J&L area of the refinery is discharged through Outfall 004 to the Lake George Canal. Water quality for the first discharge of every week is sampled, analyzed in the laboratory and reported in the Discharge Monitoring Report (DMR) as required in the permit. In addition, we also perform field measurements of water quality on a daily basis. The DMR sample collected the previous week (March 2, 1997) showed that pH, which was 8.3, was within permit limits. A field measurement of pH on March 8, 1997, also showed that pH, which was 8.3, was within the permit limits. A pH analysis of DMR samples collected the next morning, March 9, 1997, resulted in a pH value of 9.1. Discharge from Outfall 004 was stopped the same morning, within 10 minutes of obtaining the pH result, by closing the valve at the outfall point. Samples collected later the same afternoon at the outfall sampling point (even though the outfall was closed and there was no discharge) showed that the pH was 8.9.

We are making changes to our procedure to manage storm water in the area to reduce the likelihood of a reoccurrence. Please contact me at (219) 473-3740 if you have any questions or would like additional information.

Sincerely,

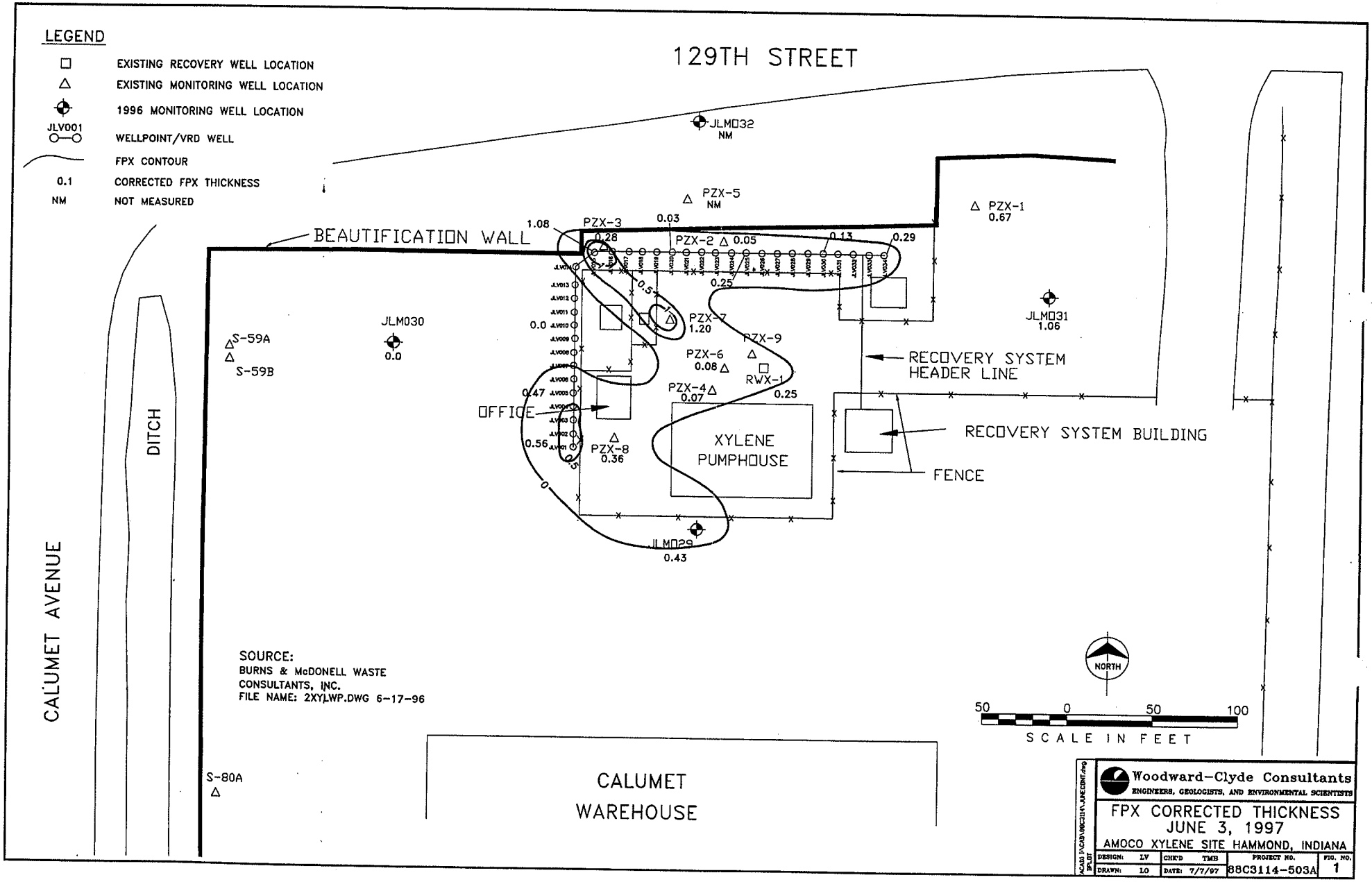
Shiv Baloo

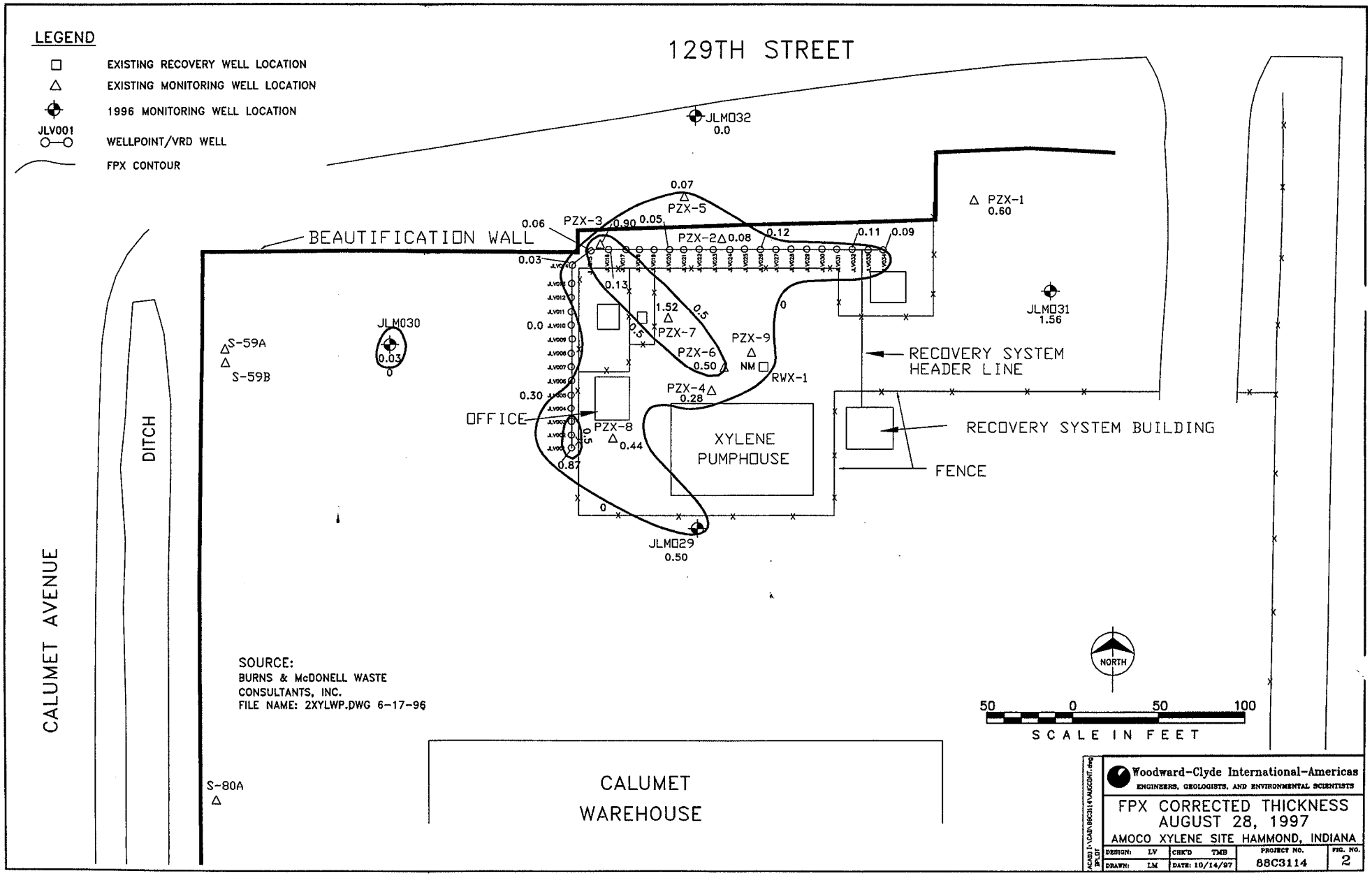
Shiv Baloo
Team Leader - Water

TABLE 1
JUNE 3, 1997 AND AUGUST 28, 1997
FLUID LEVEL MEASUREMENTS
AMOCO PIPELINE XYLENE AREA
AMOCO OIL COMPANY
HAMMOND, INDIANA

LOCATION	TOP OF CASING ELEVATION, NGVD FT	TOTAL DEPTH	June 3, 1997				August 28, 1997			
			DEPTH TO GW	CORRECTED GW ELEVATION[1]	DEPTH TO FPX	CORRECTED FPX THICKNESS[2]	DEPTH TO GW	CORRECTED GW ELEVATION[1]	DEPTH TO FPX	CORRECTED FPX THICKNESS[2]
JLM029	585.64	12.68	8.08	579.86	5.41	0.43	8.35	579.96	5.25	0.50
JLM030	584.75	13.57	2.64	582.11	ND	0.00	2.57	582.36	2.36	0.03
JLM031	584.84	15.80	10.05	580.41	3.52	1.06	12.59	580.51	2.99	1.56
JLM032	583.65	15.23	NM	NM	NM	NM	1.87	581.78	ND	0.00
PZX-1	588.06	16.73	10.95	580.64	6.85	0.67	10.40	580.83	6.71	0.60
PZX-2	588.16	19.48	9.21	579.21	8.91	0.05	9.18	579.39	8.70	0.08
PZX-3	587.53	18.36	7.52	581.46	5.83	0.28	11.11	581.16	5.60	0.90
PZX-4	585.43	16.83	6.60	579.20	6.17	0.07	7.63	579.28	5.91	0.28
PZX-5	583.75	16.11	NM	NM	NM	NM	5.50	578.59	5.10	0.07
PZX-6	585.46	17.95	6.90	578.97	6.42	0.08	9.38	578.71	6.32	0.50
PZX-7	585.00	17.28	13.29	578.03	5.94	1.20	16.38	576.67	7.02	1.52
PZX-8	588.15	18.22	10.87	579.16	8.68	0.36	11.45	579.04	8.73	0.44
JLV001	NA	NA	12.55	NA	9.12	0.56	14.75	NA	9.43	0.87
JLV005	NA	NA	13.30	NA	10.40	0.47	12.30	NA	10.43	0.30
JLV010	NA	NA	8.50	NA	ND	0.00	8.93	NA	ND	0.00
JLV014	NA	NA	8.56	NA	8.41	0.02	9.34	NA	9.13	0.03
JLV015	NA	NA	13.14	NA	6.51	1.08	7.63	NA	7.29	0.06
JLV016	NA	NA	6.92	NA	5.72	0.20	6.83	NA	6.01	0.13
JLV020	NA	NA	7.10	NA	6.93	0.03	7.52	NA	7.21	0.05
JLV026	NA	NA	7.08	NA	ND	0.00	8.04	NA	7.32	0.12
JLV030	NA	NA	8.23	NA	7.41	0.13	NM	NA	NM	NM
JLV032	NA	NA	8.64	NA	8.11	0.09	8.89	NA	8.22	0.11
JLV034	NA	NA	9.29	NA	7.51	0.29	7.77	NA	7.23	0.09
RWX-1	NA	NA	12.34	NA	10.83	0.25	NM	NA	NM	NM

NOTES:
All measurements are in feet.
ND Not detected
NM Not measured
NA The surveyed elevations and total depths for the JLV well points are not available. The total depths are approximately 16 feet.
FPX Free Phase Xylenes
[1]If FPX was detected the groundwater elevations were corrected according to the following formula:
$GW_c = GW_m * (SG + (FPX_m))$ where GW_c = corrected groundwater elevation, GW_m = measured groundwater elevation, SG = specific gravity of free phase xylenes, and FPX_m = measured thickness of FPX.
[2]Corrected free phase xylenes thickness in the formation was calculated according to the following formula:
$FPX_c = FPX_m * ((1-SG) / SG)$ where FPX_c = corrected free phase xylenes thickness, FPX_m = measured free phase xylenes thickness, and SG = specific gravity of free phase xylenes


LEGEND
EXISTING RECOVERY WELL LOCATION
EXISTING MONITORING WELL LOCATION
1996 MONITORING WELL LOCATION
JLV001
WELLPOINT/VRD WELL
FPX CONTOUR
0.1
CORRECTED FPX THICKNESS
NM
NOT MEASURED
129TH STREET
JLM032
NM
PZX-5
NM
PZX-1
0.67
BEAUTIFICATION WALL
1.08
PZX-3
0.28
0.03
PZX-2
0.05
0.13
0.29
0.25
0.5
1
PZX-7
1.20
JLM031
1.06
JLM030
0.0
S-59A
S-59B
PZX-9
PZX-6
0.08
RWX-1
0.25
RECOVERY SYSTEM
HEADER LINE
PZX-4
0.07
0.47
OFFICE
XYLENE
PUMPHOUSE
RECOVERY SYSTEM BUILDING
0.56
PZX-8
0.36
FENCE
JLM029
0.43
CALUMET AVENUE
DITCH
SOURCE:
BURNS & McDONELL WASTE
CONSULTANTS, INC.
FILE NAME: 2XYLWP.DWG 6-17-96
NORTH
50
0
50
100
SCALE IN FEET
S-80A
CALUMET
WAREHOUSE
Woodward-Clyde Consultants
ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS
FPX CORRECTED THICKNESS
JUNE 3, 1997
AMOCO XYLENE SITE HAMMOND, INDIANA
DESIGN: LV
CHK'D TMB
DRAWN: LO
DATE: 7/7/97
PROJECT NO. 88C3114-503A
FIG. NO. 1


LEGEND
EXISTING RECOVERY WELL LOCATION
EXISTING MONITORING WELL LOCATION
1996 MONITORING WELL LOCATION
JLV001
WELLPOINT/VRD WELL
FPX CONTOUR
129TH STREET
JLM032
0.0
0.07
PZX-5
PZX-1
0.60
0.06
PZX-3
0.90
0.05
PZX-2
0.08
0.12
0.11
0.09
BEAUTIFICATION WALL
0.03
0.13
1.52
PZX-7
0.5
0.5
0
JLM031
1.56
JLM030
0.03
0
0.0
S-59A
S-59B
PZX-9
NM
PZX-6
0.50
RWX-1
RECOVERY SYSTEM
HEADER LINE
PZX-4
0.28
0.30
OFFICE
PZX-8
0.44
0.5
0.87
XYLENE
PUMPHOUSE
RECOVERY SYSTEM BUILDING
FENCE
0
JLM029
0.50
DITCH
CALUMET AVENUE
SOURCE:
BURNS & McDONELL WASTE
CONSULTANTS, INC.
FILE NAME: 2XYLWP.DWG 6-17-96
NORTH
50
0
50
100
SCALE IN FEET
S-80A
CALUMET
WAREHOUSE
Woodward-Clyde International-Americas
ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS
FPX CORRECTED THICKNESS
AUGUST 28, 1997
AMOCO XYLENE SITE HAMMOND, INDIANA
DESIGN: LV
CHK'D TMB
DRAWN: LM
DATE: 10/14/97
PROJECT NO.
88C3114
FIG. NO.
2

Client : Woodward-Clyde Consultants
Project ID : WHITING

EPA Target Compound List (TCL)
GCMS Volatiles Analysis

Lab Sample Number : L72972089-001 **Method:** 8240B
Client ID : JLM032 **Matrix :** WATER

Compound	Result	PQL	Units	Dilution Factor	Sample Date	Analysis Date
Xylenes, Total	1,300	100	ug/L	10	8/28/97	9/ 4/97

Woodward-Clyde

Engineering & sciences applied to the earth & its environment.

Via Certified Mail No. P 863 954 522
Return Receipt Requested

RECEIVED
OCT 20 1997
By

October 14, 1997

Mr. Steven Judeth
Office of Enforcement
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

Subject: Amoco Oil Company and Amoco Pipeline Company, Cause No. B-1545, Free Phase Xylene Recovery - 3rd Quarter 1997 Report

Dear Mr. Judeth:

Woodward-Clyde International (WCI), formerly Woodward-Clyde Consultants, on behalf of Amoco Pipeline Company is pleased to submit this free phase xylene (FPX) quarterly report for the Amoco Pipeline Xylene Site located at 129th Street and Calumet Avenue in Hammond Indiana. This quarterly report is for the period from June 4, 1997 through August 28, 1997.

The previous quarterly report dated July 14, 1997 included information collected from the site between March 19, 1997 and June 3, 1997.

Groundwater Elevations

The corrected groundwater elevations for the third quarter are presented in Table 1. Generally, the groundwater elevations are slightly higher than the previous reporting period. The groundwater elevations are depressed between the wellpoint system and the xylene pumphouse due to pumping of groundwater by the wellpoint system.

FPX Thickness

WCI performed fluid level measurements in site monitoring wells on August 28, 1997. Table 1 presents the groundwater elevations and FPX thickness which have been corrected based on the specific gravity value of xylene (0.86).

Woodward-Clyde International (Formerly Woodward-Clyde Consultants) A subsidiary of Woodward-Clyde Group, Inc.
122 South Michigan Avenue • Suite 1920 • Chicago, Illinois 60603
312-939-1000 • Fax 312-939-4198

The formula used to correct the FPX thickness is:

$FPX_c = FPX_m * ((1-SG) / SG)$ *where:*

FPX_c = *corrected FPX thickness;* FPX_m = *measured FPX thickness; and SG = specific gravity of FPX*

Figures 1 and 2 present the extent of corrected FPX thickness at the site on June 3, 1997 and August 28, 1997, respectively. The volume of FPX present was calculated using the average thickness of FPX between each contour line assuming a porosity of 0.30 for fine to medium sand (Applied Hydrogeology, Fetter, 1980). The volume of FPX in the soil was calculated using a methodology that is consistent with other Amoco Whiting projects. The calculated volumes are a best estimate of FPX in the ground and can be influenced by site conditions including varying groundwater elevations and FPX buildup around remediation systems. This information is best used to evaluate long-term trends of FPX volumes.

The approximate volume of FPX present at the site on August 28, 1997 was 15,000 gallons. Some increases of FPX thickness were measured at PZX-3 and JLV001 which are located along the wellpoints and at an area between the wellpoint system and the pumphouse including PZX-4, PZX-6, and PZX-7. FPX decreased along the northern wellpoint leg at JLV032 and JLV034. A trace of FPX was measured at well JLM030.

During this reporting period (June 4 through August 28, 1997), the J-162 recovery system at the xylene area recovered approximately 3,885,381 gallons of groundwater containing dissolved phase xylenes and FPX. The recovery system consists of a series of 34 well points and vacuum recovery devices (VRDs). The recovery well, RWX-1, has a VRD in it and is not used for pumping groundwater.

Annual Groundwater Sampling

Amoco performed annual groundwater sampling at the site on August 28, 1997. A groundwater sample was collected from well JLM032. The other site monitoring wells were not sampled because they contained FPX. The analytical report for well JLM032 is attached to this report and indicates that a concentration of 1.3 mg/L of xylene was present in the groundwater. During the installation of well JLM032 in May 1996, a sample of shallow soil was collected and indicated a concentration of 1.3 mg/kg of xylene. The source of dissolved phase xylene in the 1997 groundwater sample from well JLM032 is likely due to the flushing of xylene from the soil as a result of infiltration of precipitation.

Woodward-Clyde

Fluctuations of the concentrations in groundwater may occur due to seasonal variations in groundwater elevations, as well as the amount of precipitation. The xylene concentrations are expected to reduce over time as a result of attenuation and recovery of FPX. The dissolved phase xylene concentrations detected in well JLM032 are not a risk to human health and are below the 10 mg/L federal MCL drinking water standard.

If you have any questions regarding this report please call either of the undersigned at (312) 939-1000.

Sincerely,

Laurence F. VerKoulen
Assistant Project Scientist

Timothy M. Black
Project Manager

LFV:lfv

Attachments

cc: Mark W. Stanifer
D. Beckmann (Amoco)
K. Fase (Amoco)
L. Malnor (Amoco)
K. Sprague (Amoco)
C.K. Yukawa (WCIA)
S. Hutts (HDEM) via Certified Mail No. P 863 954 523
File

P-File

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We make Indiana a cleaner, healthier place to live

Frank O'Bannon
Governor

Michael O'Connor
Commissioner

100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
Telephone 317-232-8603
Environmental Helpline 1-800-451-6027

March 27, 1997

Mr. Shiv Baloo
Amoco Corporation
Whiting Refinery & Area Business Units
Mail Code 242
2815 Indianapolis Boulevard
Whiting, IN 46394-1692

Dear Mr. Baloo:

Re: Warning of Noncompliance
Amoco - Whiting Business Unit
NPDES Permit Number IN0000108
Cause No. B-2006

This letter is to advise you that it has been determined by this Office, subsequent to the issuance of the above-referenced Warning of Noncompliance (WONC) on October 31, 1996, that you have complied with the terms of the WONC and the enforcement action may now be closed.

A new enforcement action can be initiated if compliance is not maintained with applicable rules and regulations.

If you have any questions concerning this action, please contact Mr. Steven Judith at 317/232-8409.

Sincerely,

Mark W. Stanifer, Chief
Water Enforcement Section
Office of Enforcement

cc: Jim Filippini, Chief, Compliance Unit 2
U.S. EPA, Region 5, Water Section
Lake County Health Department

1997 NPDES FEE ASSESSMENT PAYMENT COUPONS

If you choose to pay your annual fee assessment in quarterly installments, please include ONE payment coupon (below) WITH EACH PAYMENT. This will allow us to properly credit your payment to your account.

NPDES PERMIT NO: **IN0000108** INVOICE NO: **9702991**

PAYMENT DUE: **$7450.00**
INSTALLMENT: (please check one)

☐ PAYMENT 1 DUE BY MARCH 15, 1997 ☐ PAYMENT 2 DUE BY JUNE 15, 1997

☐ PAYMENT 3 DUE BY SEPT. 15, 1997 ☐ PAYMENT 4 DUE BY DEC. 15, 1997

MAIL TO: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Controller's Department, Attention: Cashier, 100 North Senate Avenue, P.O. Box 7060, Room 1324, Indianapolis, IN 46207-7060

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If you have any questions regarding your fee assessment, please contact Laurie Maudlin at 317/233-0569. Due to the high volume of telephone inquiries received during the billing period, it may be necessary for you to leave a voicemail message. If you do so, please include your permit number with your message.

Sincerely,

R. J. Henley

R. J. Henley
Assistant Commissioner
Office of Water Management

Enclosures