Docs Supporting EPA's Decision - Withdraw Marathon

1044b UIC - MT EAST POPLAR OIL FIELD
ENFORCEMENT CASE SDWA 1431
Folder ID: 118382 2002 Privileged

Release in full

118382 - R8 FRED

Addressee	Full Enclosures?	(C)ertified or (U)ncertified
Deb Madison	Yes	C
Steve Leifer	Yes	C
John Fognani	Yes	C
Elizabeth Mack	Yes	C
Scott DuBoff	Yes	C
George Hudak	Yes	U
Kevin Buckles	Yes	C
Anita Scheetz (library)	Yes	C
Arlyn Headdress	No	U
Doug Endreson	No	U
Dave Carson	Yes	bcc
Jim Eppers	No	bcc
Steven Moores	No	bcc
Barbara Burkland	Yes	bcc
Tillman McAdams	No	bcc
John Wardell	No	bcc
Gary Carlson	No	bcc
Nathan Wiser	Yes	bcc

DOCUMENTS ATTACHED TO EPA'S PUBLIC NOTICE OF DRAFT DECISION TO WITHDRAW MARATHON OIL COMPANY FROM SDWA-8-2001-33 AND SDWA-8-99-68 *

Document No.	Date	Description	Originator	Recipient	No. Pages
1	August 6, 2002	Copies of Powerpoint presentation pages	Hamp, Mathews & Associates, Inc.	EPA	47
2	August 6, 2002	Technical review of EPA's admin. rcd. with regard to Marathon Oil Co.	Hamp, Mathews & Associates, Inc.	EPA	26
3	August 23, 2002	Fax of map with proposed soil boring locations	Hamp, Mathews & Associates, Inc.	Nathan Wiser	3
4	September 5, 2002	Chain-of-custody for lab samples	Hamp, Mathews & Associates, Inc.	Energy Laboratories	2
5	September 6, 2002	Chain-of-custody for lab samples	Hamp, Mathews & Associates, Inc.	Merit Laboratories, Inc	1
6	September 10, 2002	Lab QA/QC results - inorganics	Energy Laboratories	Hamp, Mathews & Associates, Inc.	5
7	September 10, 2002	Lab results	Merit Laboratories, Inc	Hamp, Mathews & Associates, Inc.	7
8	September 11, 2002	Lab QA/QC results - organics	Energy Laboratories	Hamp, Mathews & Associates, Inc.	3
9	September 13, 2002	Lab results	Energy Laboratories	Hamp, Mathews & Associates, Inc.	10
10	September 18, 2002	Cover letter transmitting preliminary findings with soil borings	John Fognani	DOJ	1
11	September 18, 2002	Preliminary findings in investigation with soil borings	Hamp, Mathews & Associates, Inc.		6
12	September 20, 2002	Cover letter transmitting sample results	Hamp, Mathews & Associates, Inc.	EPA	2
13	September 20, 2002	Groundwater sample summary table	Hamp, Mathews & Associates, Inc.	EPA	1
14	September 20, 2002	Map showing soil boring locations	Hamp, Mathews & Associates, Inc.	EPA	1
15	October 16, 2002	Cover letter transmitting lab QA/QC CD-R	Hamp, Mathews & Associates, Inc.	EPA	1
16	October 16, 2002	CD containing detailed lab QA/QC information and environmental sample analytical results from both Merit and Energy Labs in pdf format	Energy Labs and Merit Labs		433
				total pages:	549

*These documents were provided to EPA by the Marathon Oil Company as part of confidential, mediated discussions under the local rules of the United States Court of Appeals for the Tenth Circuit. Some information has been redacted from some of the documents as settlement confidential at the request of Marathon Oil Company. The redacted information is not technical in nature and is not pertinent to the merits of EPA's proposed decision to withdraw Marathon Oil Company from SDWA-8-2001-33 and SDWA-8-99-68.

Documents Supporting EPA's Proposal to Withdraw Marathon Oil Company from Emergency Administrative Orders No. SDWA-8-99-68 and SDWA-08-2001-33

Document No. 1

Technical Assessment Of Potential Groundwater Impacts At The Former TXO / Buckles Wells East Poplar Oil Field, Montana

Marathon Oil Company

Prepared by

Hamp, Mathews & Associates, Inc.

Introduction / Purpose

- Review EPA's rationale for including Marathon Oil Company (MOC) in the 2001 Emergency Administrative Order (EAO)

- Respond to EPA's allegations based on relevant data from the Administrative Record that show the potential for impacts to area groundwater from past construction and operation of MOC's former TXO wells

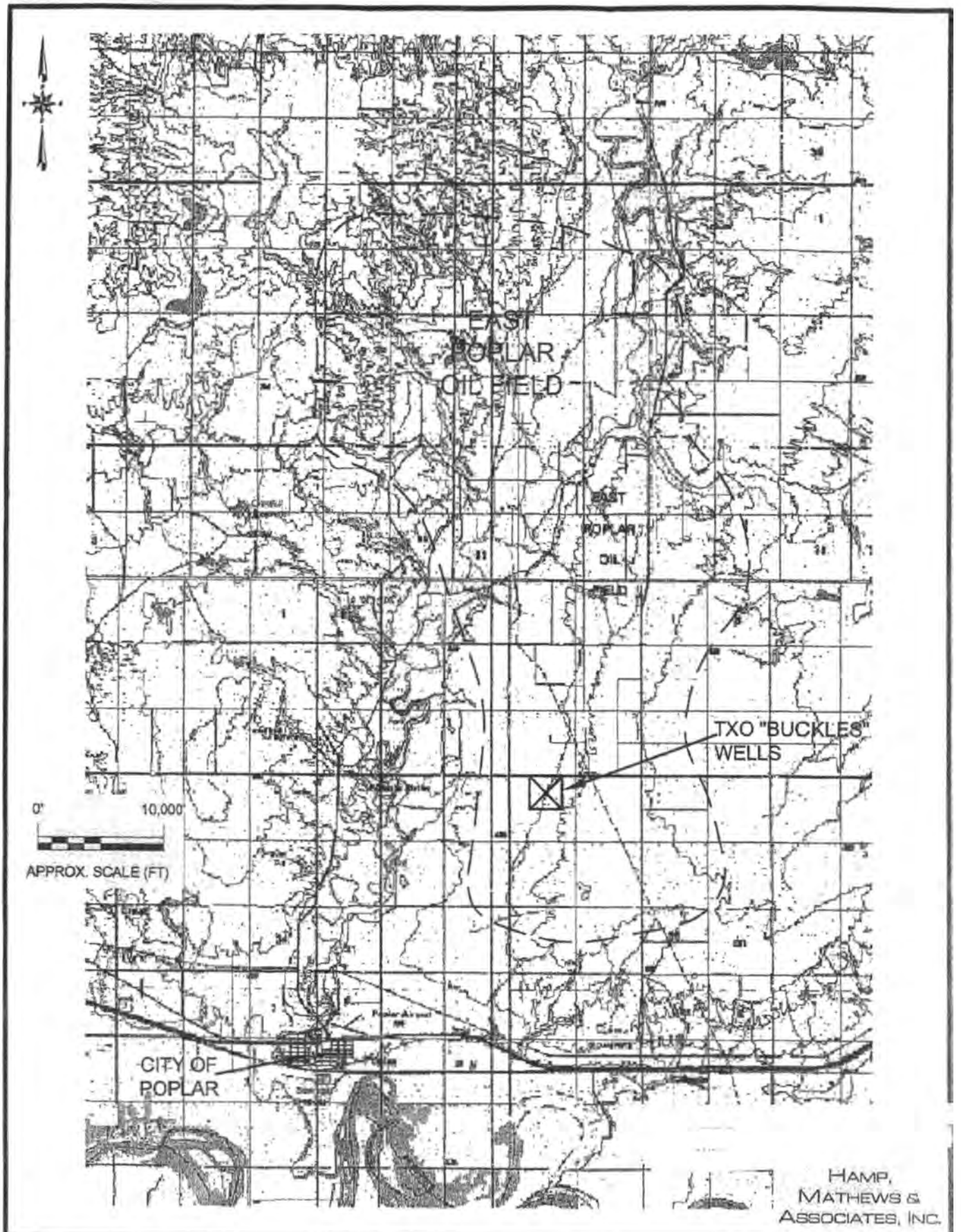


FIGURE. REGIONAL TOPOGRAPHIC MAP OF EAST POPLAR OIL FIELD.

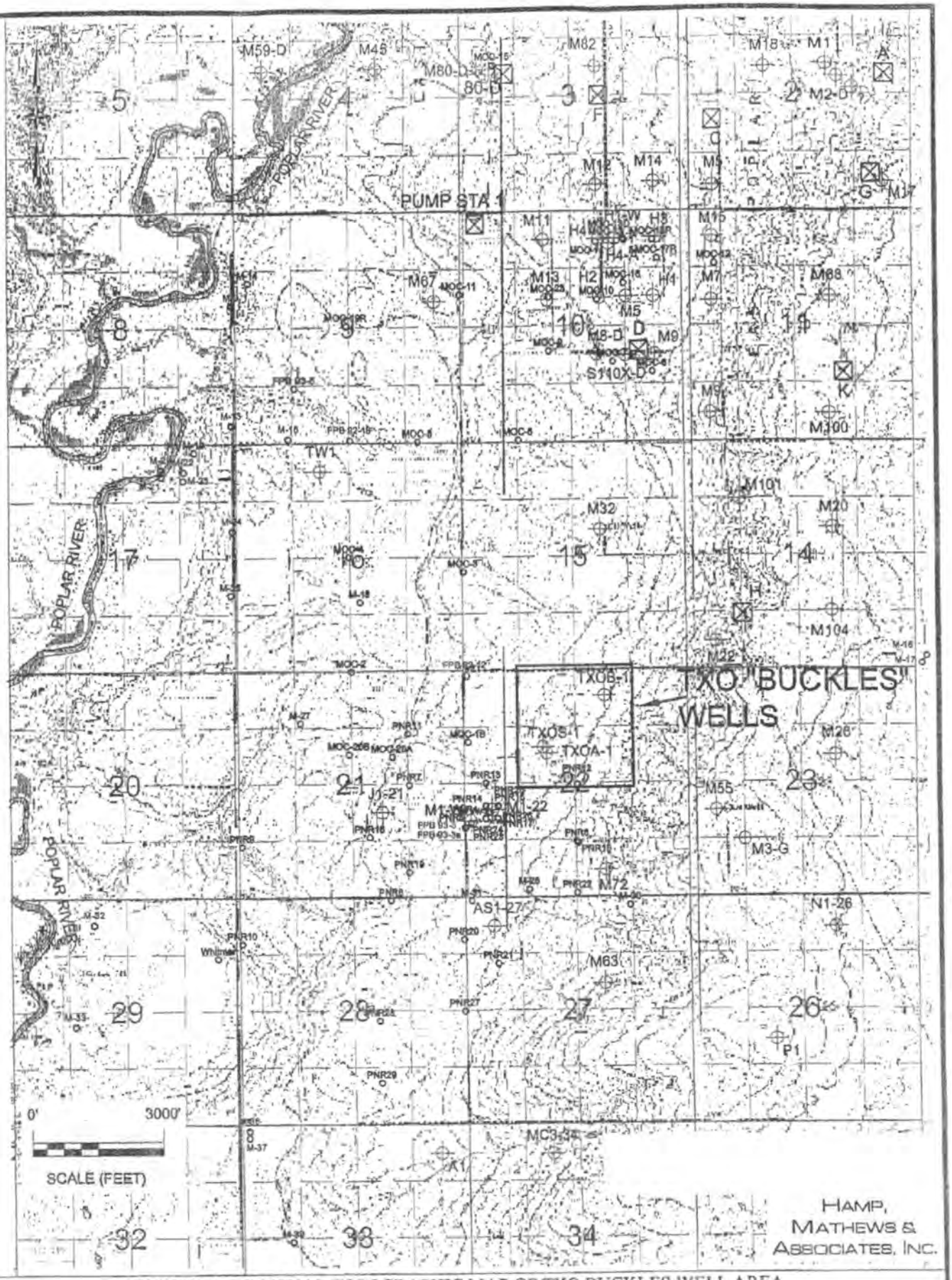


FIGURE 1. REGIONAL TOPOGRAPHIC MAP OF TXO BUCKLES WELL AREA.

EPA's Rationale

- During installation of the Buckles SWD #1, water flowed up the well bore from the Judith River Formation to the ground surface over a 3-day period in May 1981 – EPA alleges this event may have created a permanent channel behind the casing allowing water injected to the Judith River Formation to migrate to the Quaternary Aquifer

EPA's Rationale (cont.)

- August 20, 1982 TXO internal memorandum stating the Buckles A #1 had been shut in since May 9, 1982 due to leaks in the brine pipeline to the disposal well

- October 19, 1982 TXO spill report: 200 bbl of crude oil within tank battery dike; 190 bbl recovered; 10 bbl remaining on surface

EPA's Rationale (cont.)

- February 24, 1984 TXO internal memorandum recommended the plugging and abandonment of the Buckles SWD #1, A #1, and B #1 due to piping corrosion – EPA alleges these conditions threatened the Quaternary aquifer and may have allowed produced fluids to escape to the Quaternary aquifer

EPA's Rationale (cont.)

- May 7, 2001 interview of local residents and August 28, 2001 telephone interview of Pioneer representative indicate performance of seismic survey in mid 1980s – EPA alleges that shot detonations may have fractured the Bear Paw Shale allowing water injected into the Judith River Formation to migrate upward to the Quaternary aquifer

Responses to EAO Allegations

- Cement channeling at the Buckles SWD #1
  - Buckles SWD #1 drilling reports
  - Data developed by U.S. Geological Survey:
    - Thamke et al. 1996. Hydrogeologic Data for the East Poplar Oil Field, Fort Peck Indian Reservation, Northeastern Montana; and
    - Thamke and Craigg, 1997. Saline-Water Contamination in Quaternary Deposits and the Poplar River, East Poplar Oil Field, Northeastern Montana
  - File data provided by Pioneer Natural Resources:
    - CH2MHILL. August 2000. Field Investigation, Biere Well Evaluation, Poplar, Montana
  - File data provided by Murphy Oil Company

Responses to EAO Allegations (cont.)

- Brine releases from surface pipelines
  - Modeling of potential chloride transport through glacial till (silty clay) does <u>not</u> predict impacts to the Quaternary aquifer
- Crude oil releases in dike area of tank battery
  - Risk based corrective action (RBCA) modeling of potential hydrocarbon (BTEX) transport through glacial till (silty clay) does <u>not</u> predict impacts to the Quaternary aquifer

Cement Channeling at the Buckles SWD #1 Conclusions

- Monitoring wells downgradient of the Buckles wells show ***no impact*** due to chloride or hydrocarbons

- Data support the conclusion that groundwater impacts ***are absent*** due to the construction and operation of the Buckles SWD #1 with ***no imminent and substantial endangerment to the Quaternary aquifer***

Cement Channeling at the Buckles SWD #1 Drilling Reports

- During initial cementing on May 28, 1981 water under pressure within the Judith River Formation (JRF) flowed into well annulus diluting the cement behind the casing; fluid flowed to surface

- Drilling operations ceased to allow the surface flow to be promptly addressed; well casing was perforated at top of JRF with new cement squeezed into the annular space until competent cement flowed to the surface; secondary cement in place May 30, 1981

- ***No further water flow was encountered during construction, operation, and final abandonment of the well in 1984; total duration of fluid flow limited to no more than 3 days***

Cement Channeling at the Buckles SWD #1 Hydrogeologic Data

- Regional monitoring wells
- Hydrostratigraphic cross sections
- Potentiometric surface maps
- Isoconcentration maps of chloride

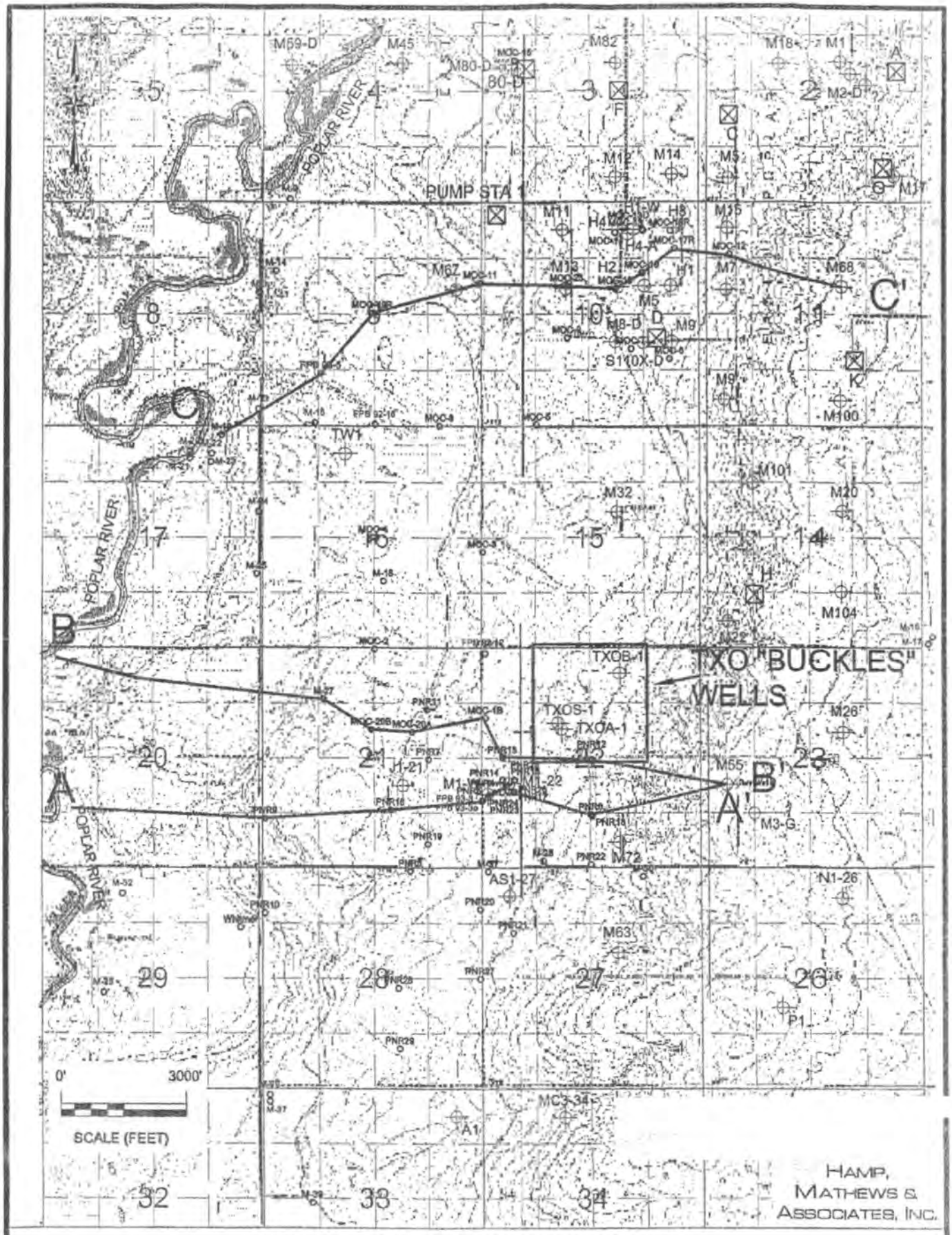


FIGURE 2. LOCATION OF CROSS SECTION LINES.

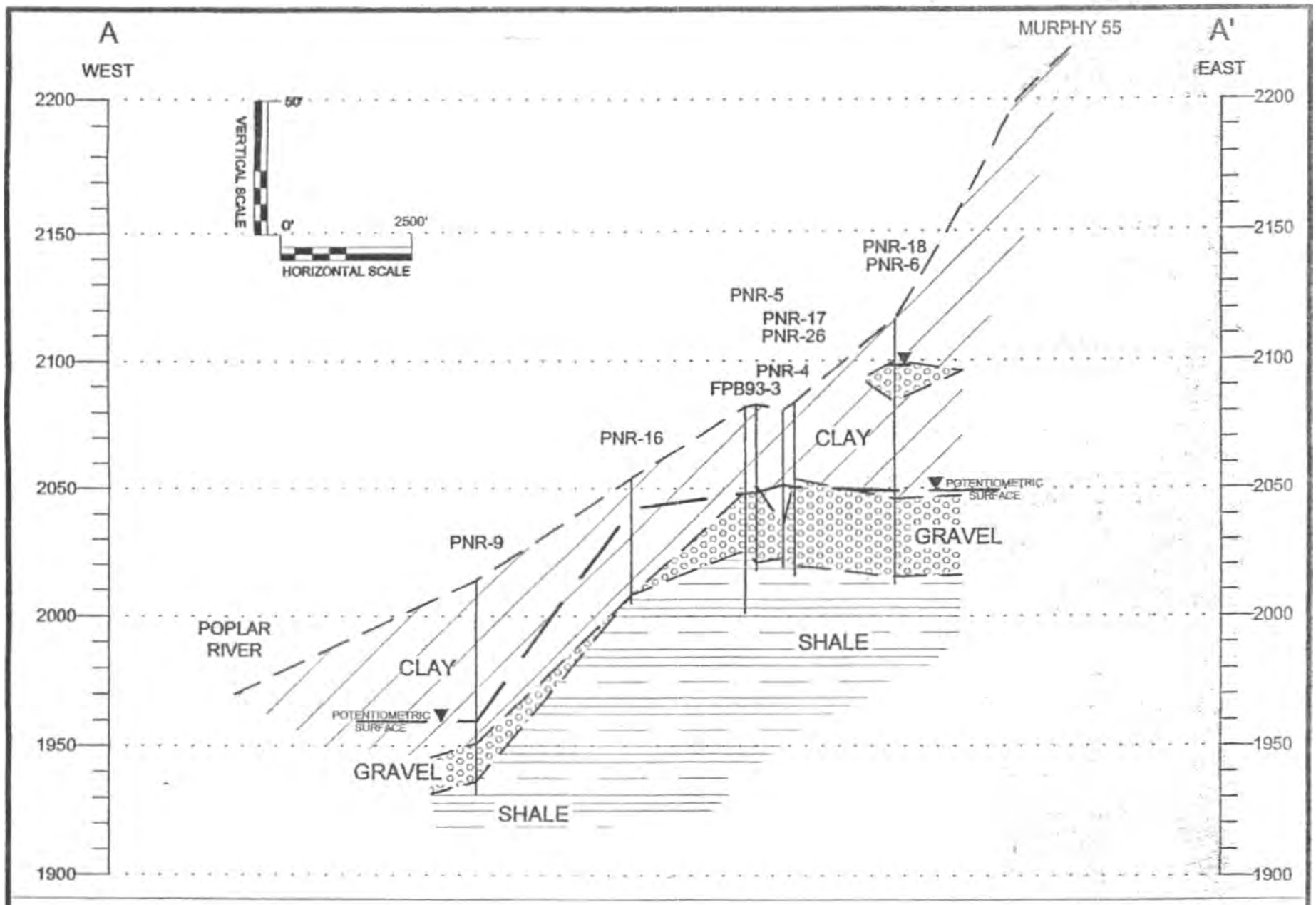


FIGURE 3. CROSS SECTION A-A' : SOUTH OF BIERE 1-22.

HAMP, MATHEWS & ASSOCIATES, INC.

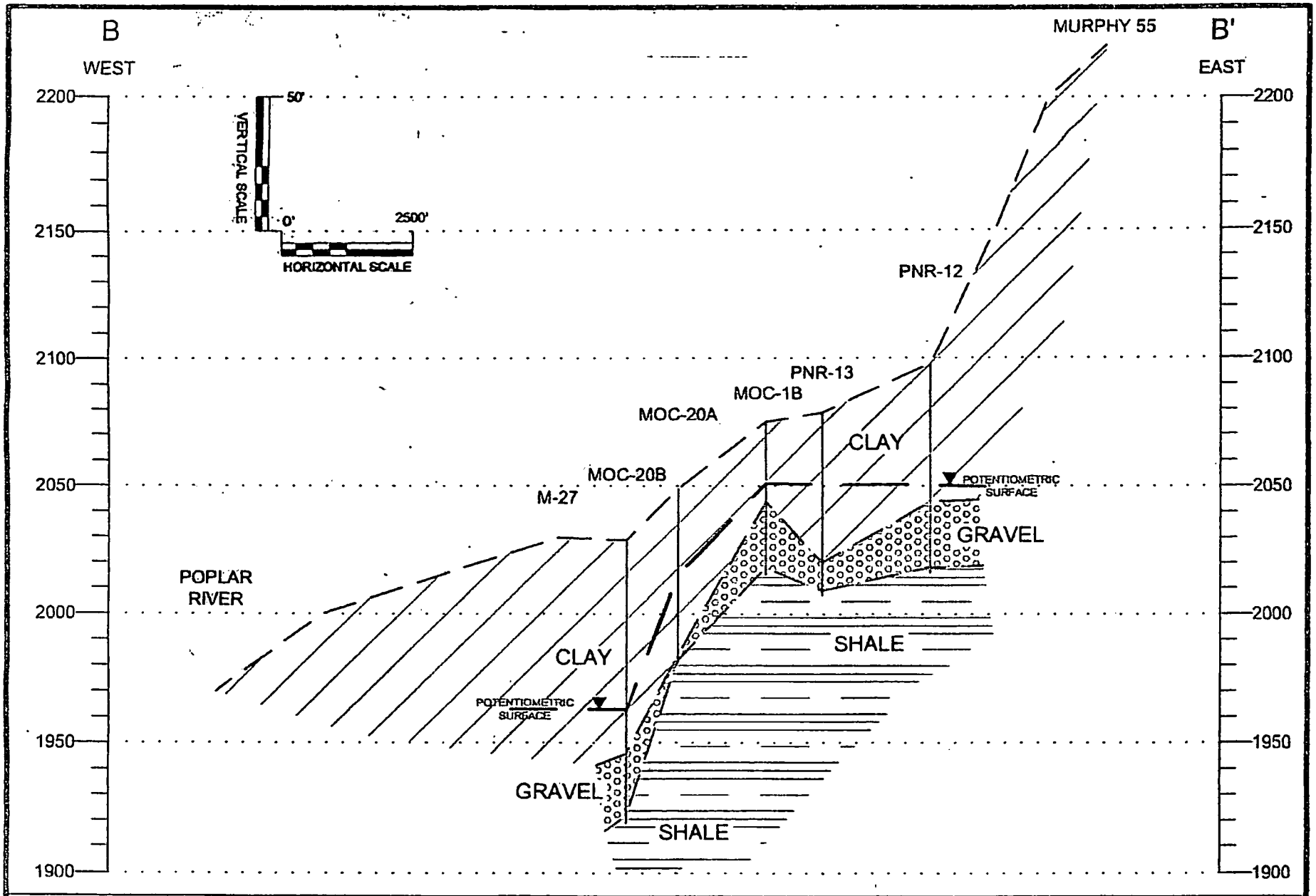


FIGURE 4. CROSS SECTION B-B' : SOUTH OF BUCKELS A #1.

HAMP, MATHEWS & ASSOCIATES, INC.

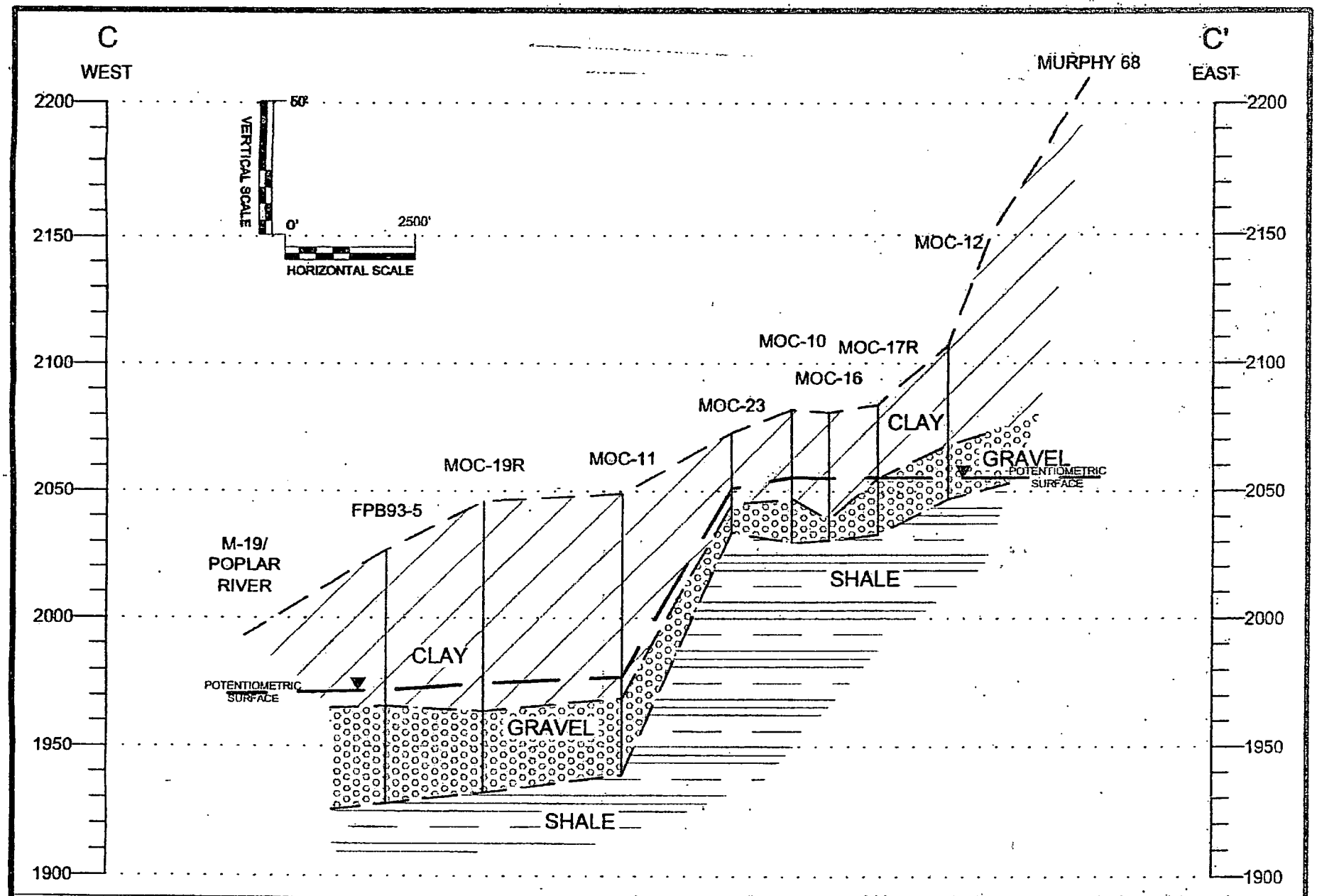


FIGURE 5. CROSS SECTION C-C' : NORTH OF BUCKLES WELLS.

HAMP, MATHEWS & ASSOCIATES, INC.

Cement Channeling at the Buckles SWD #1 Hydrogeologic Data (cont.)

- Relevance of data shown on cross sections:
  - Large displacement of groundwater table with an unusually high horizontal hydraulic gradient
  - Groundwater flow from east to west toward the Poplar River probably is limited
  - Two interpretations of groundwater flow direction possible

Cement Channeling at the Buckles SWD #1 Hydrogeologic Data

- Regional monitoring wells
- Hydrostratigraphic cross sections
- <u>Potentiometric surface maps</u>
- Isoconcentration maps of chloride

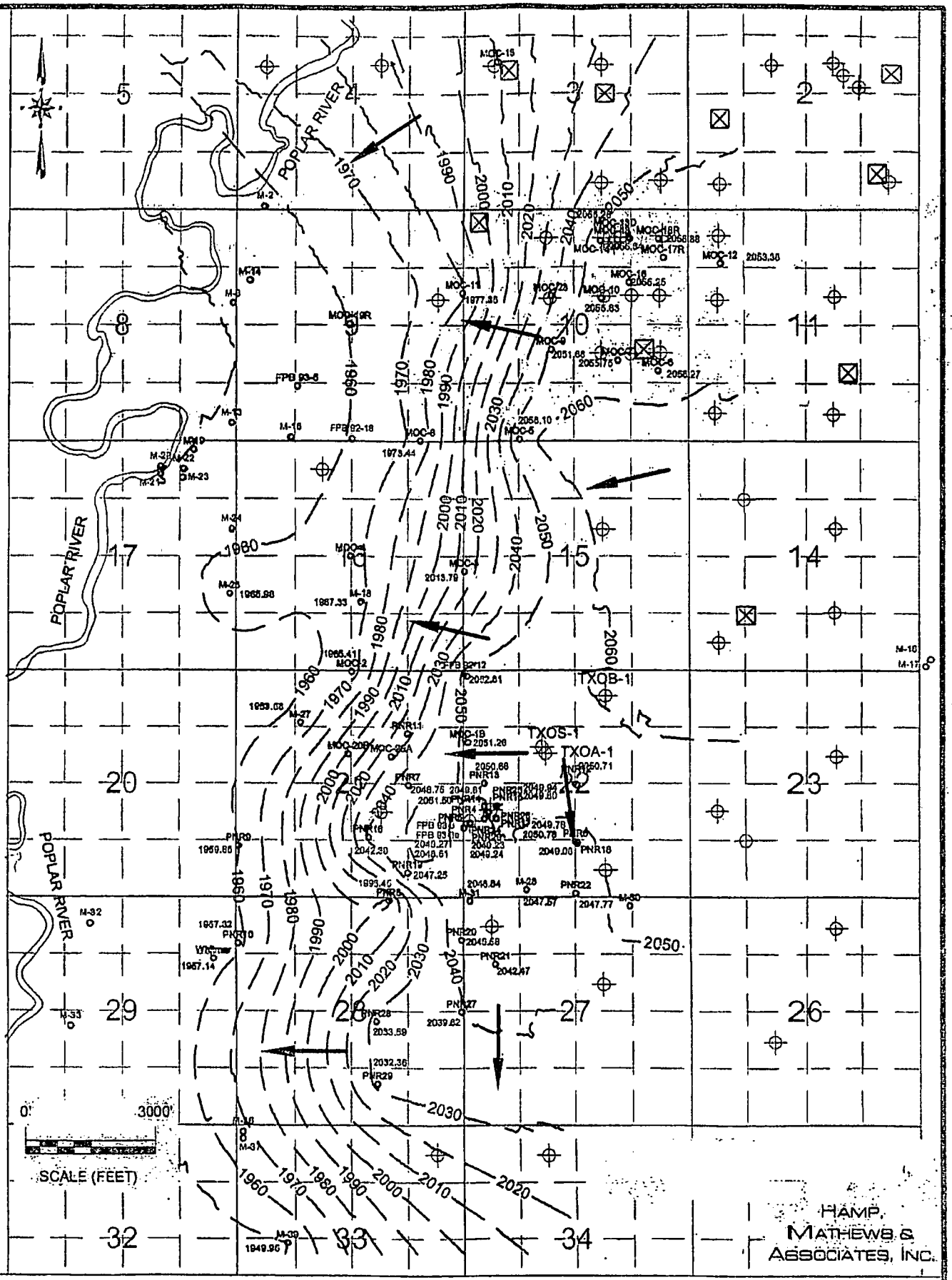


FIGURE 7. NOVEMBER 2001 POTENTIOMETRIC SURFACE MAP CONTOURS.

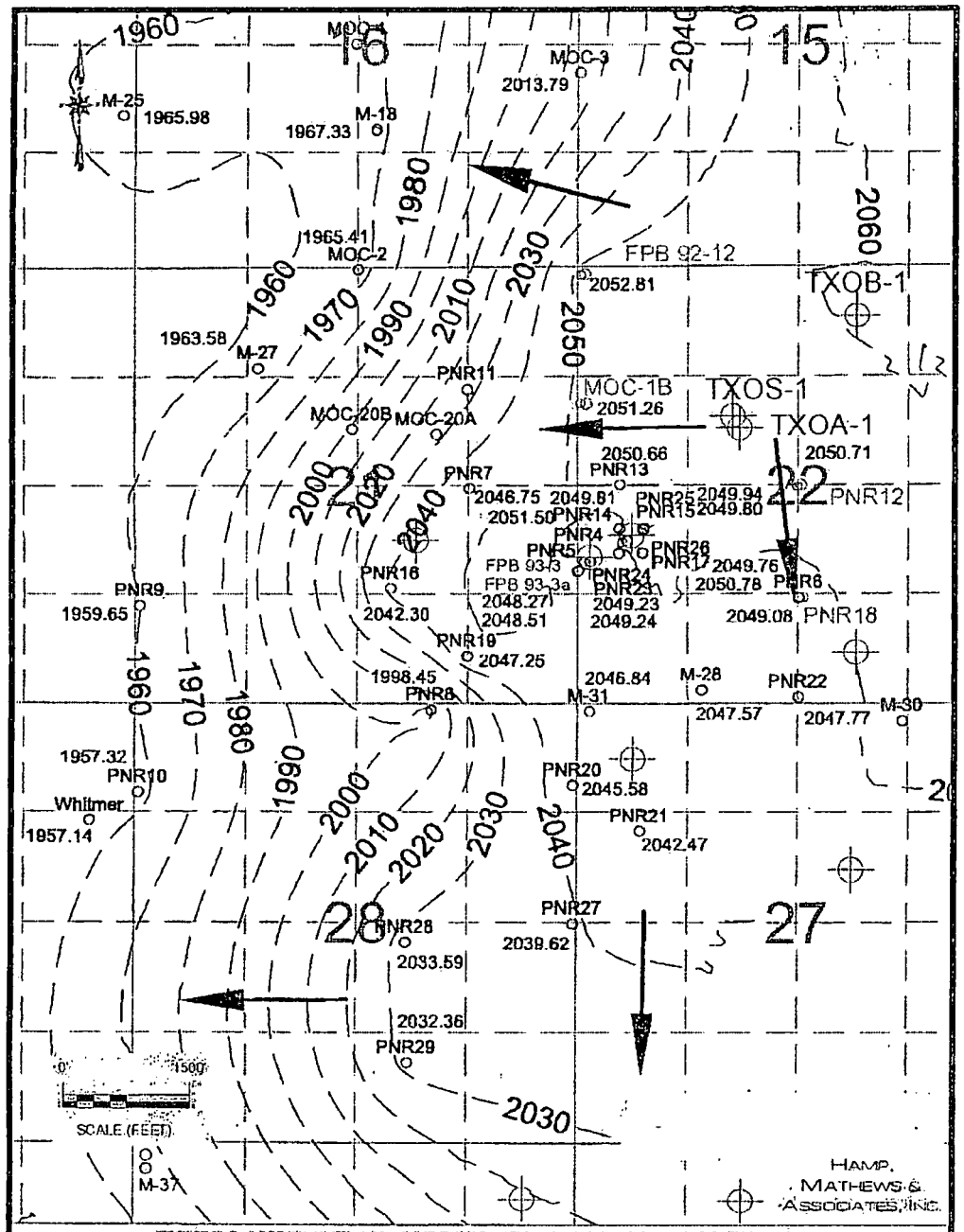


FIGURE 7. NOVEMBER 2001 POTENTIOMETRIC SURFACE MAP CONTOURS.

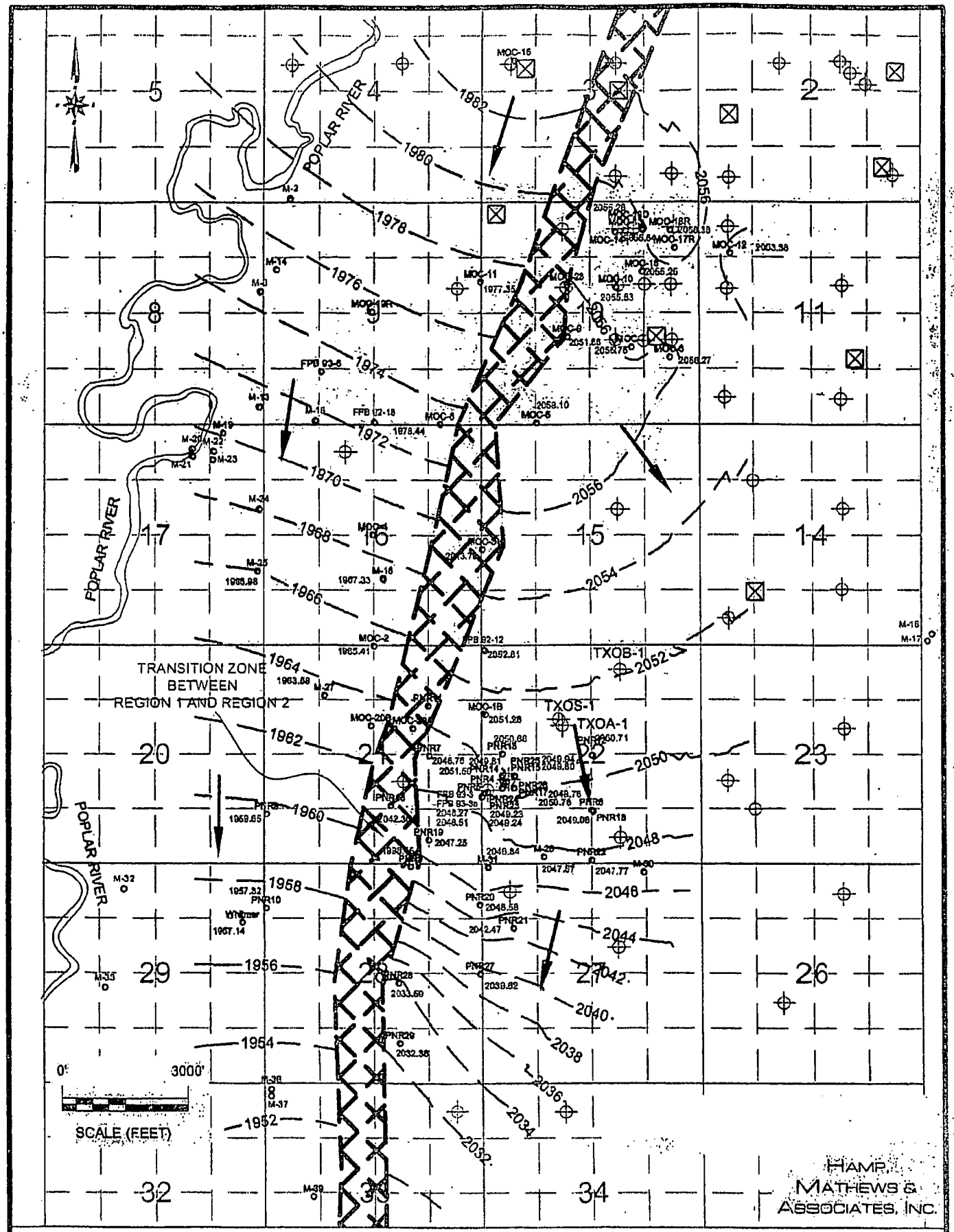


FIGURE 8. NOVEMBER 2001 POTENTIOMETRIC SURFACE MAP CONTOURS.

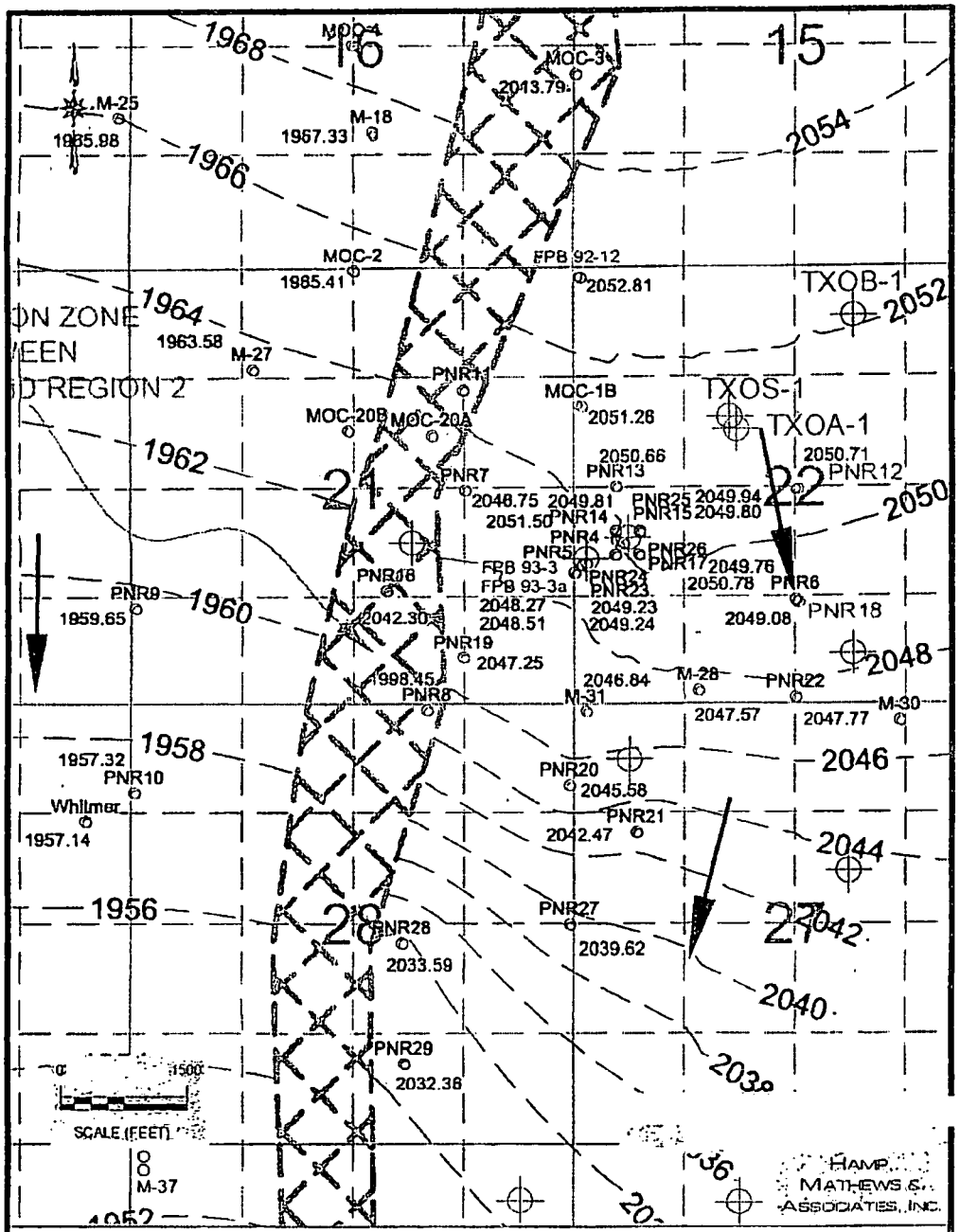


FIGURE 7. NOVEMBER 2001 POTENTIOMETRIC SURFACE MAP CONTOURS.

Cement Channeling at the Buckles SWD #1 Hydrogeologic Data

- Regional monitoring wells
- Hydrostratigraphic cross sections
- Potentiometric surface maps
- <u>Isoconcentration maps of chloride</u>

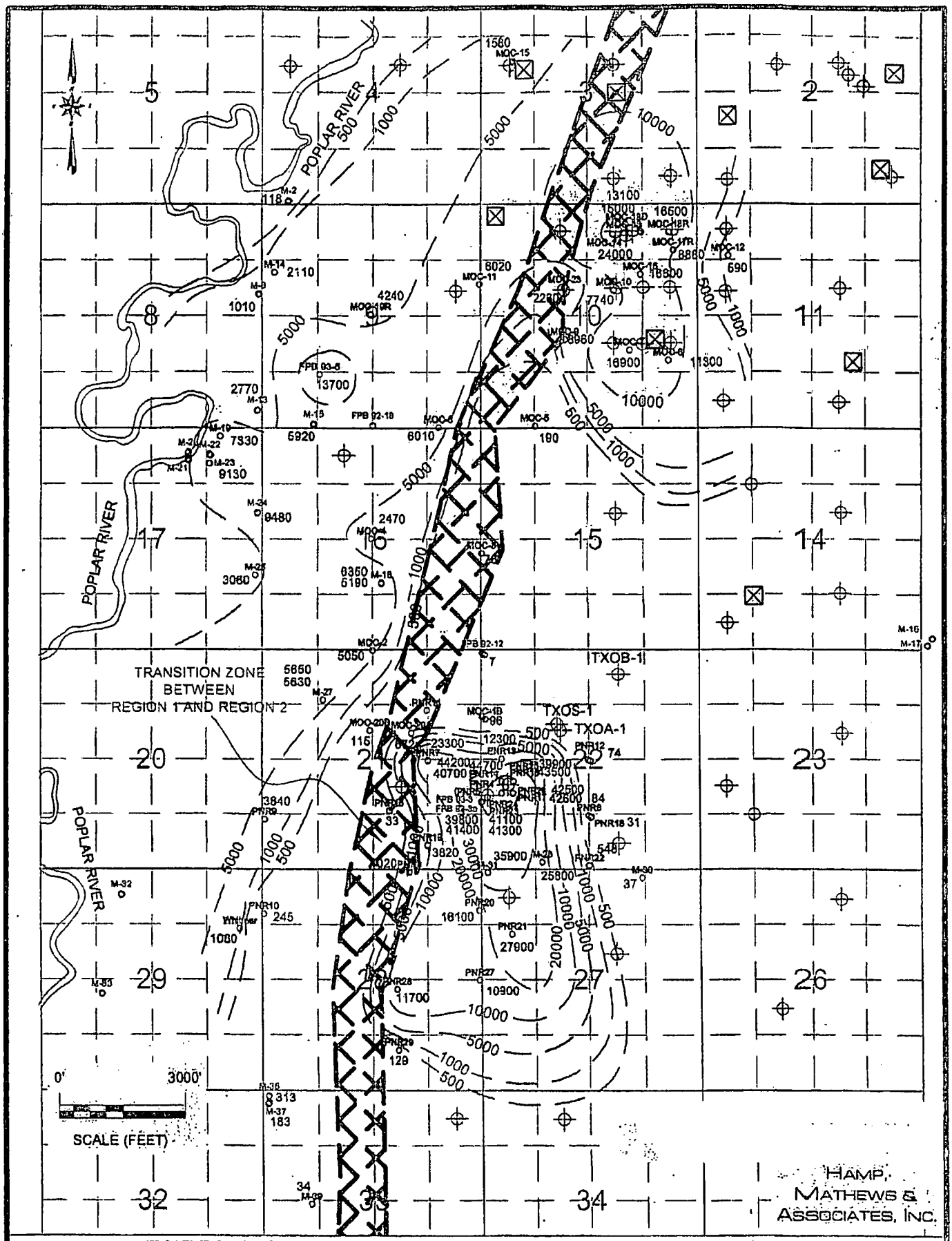


FIGURE 9. GROUNDWATER CHLORIDE CONCENTRATION CONTOURS (mg/L).

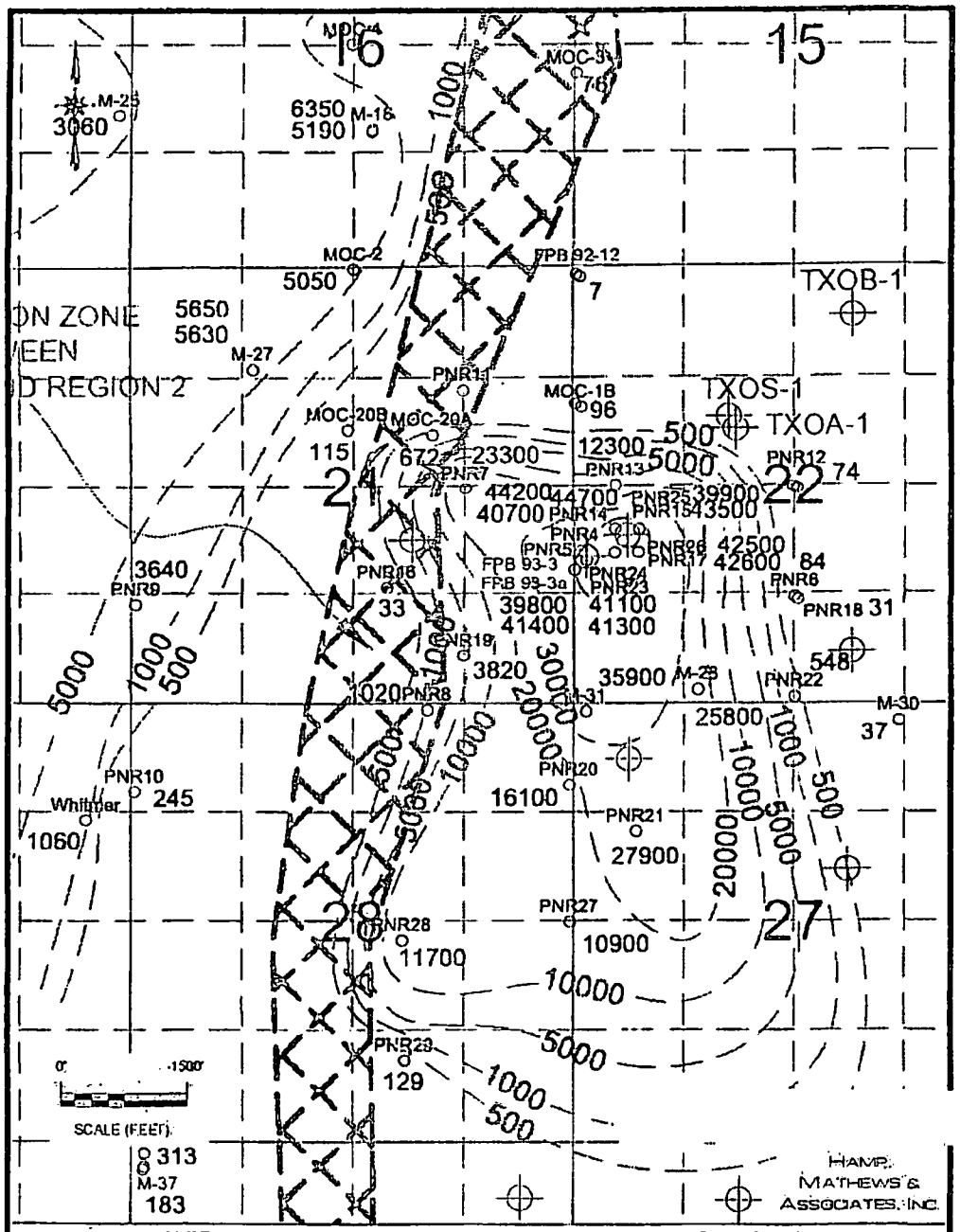


FIGURE 9. GROUNDWATER CHLORIDE CONCENTRATION CONTOURS (mg/L).

Cement Channeling at the Buckles SWD #1 Hydrogeologic Data (cont.)

- Monitoring wells FPB92-12, MOC-1B, PNR-12, and PNR-18 are downgradient of the Buckles wells and show ***no impact*** due to chloride or hydrocarbons ***regardless of groundwater flow interpretation***

- Dispersion pattern of chloride associated with the Biere 1-22 and the Murphy wells ***is absent*** at the Buckles SWD #1

- These data further support the conclusion that groundwater impacts ***are absent*** due to the construction and operation of the Buckles SWD #1 with ***no imminent and substantial endangerment to the Quaternary aquifer***

Responses to EAO Allegations (cont.)

- Brine releases from surface pipelines
  - Modeling of potential chloride transport through glacial till (silty clay) to the Quaternary aquifer
- Crude oil releases in dike area of tank battery
  - Risk based corrective action (RBCA) modeling of potential hydrocarbon (BTEX) transport through glacial till (silty clay) to the Quaternary aquifer

Surface Brine Releases Hydrogeologic Modeling

- Administrative record lacks information as to the magnitude of surface releases of brine at the Buckles facility
- Any releases were of short duration due to regular facility inspections performed by field personnel
- Conservative fate and transport modeling was performed to simulate chloride migration to the Quaternary aquifer
- Modeling shows chloride is sufficiently impeded by clay soils to prevent impacts to the Quaternary aquifer

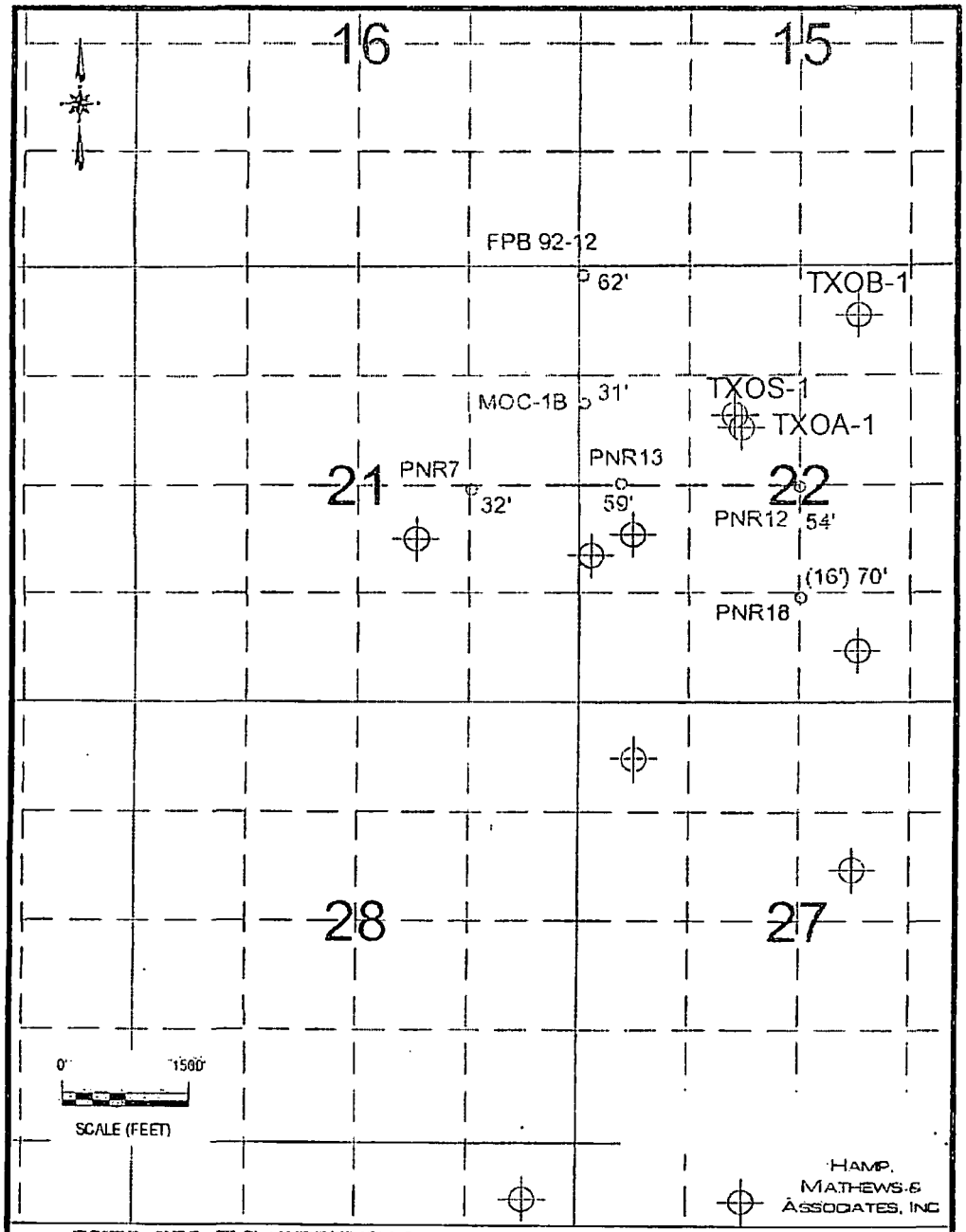


FIGURE. SURFACE CLAY THICKNESS OF MONITORING WELLS IN AREA OF BUCKLES WELLS.

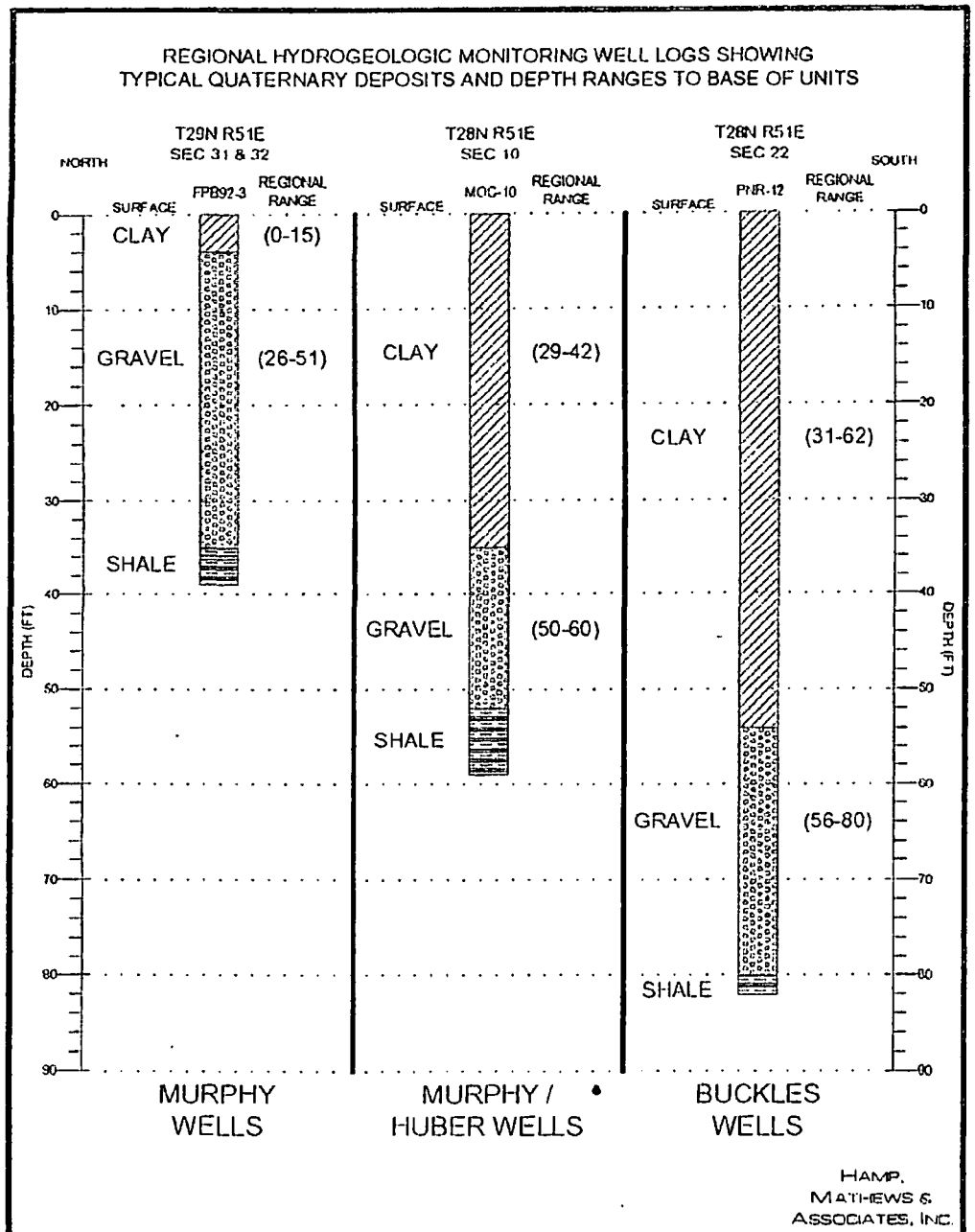
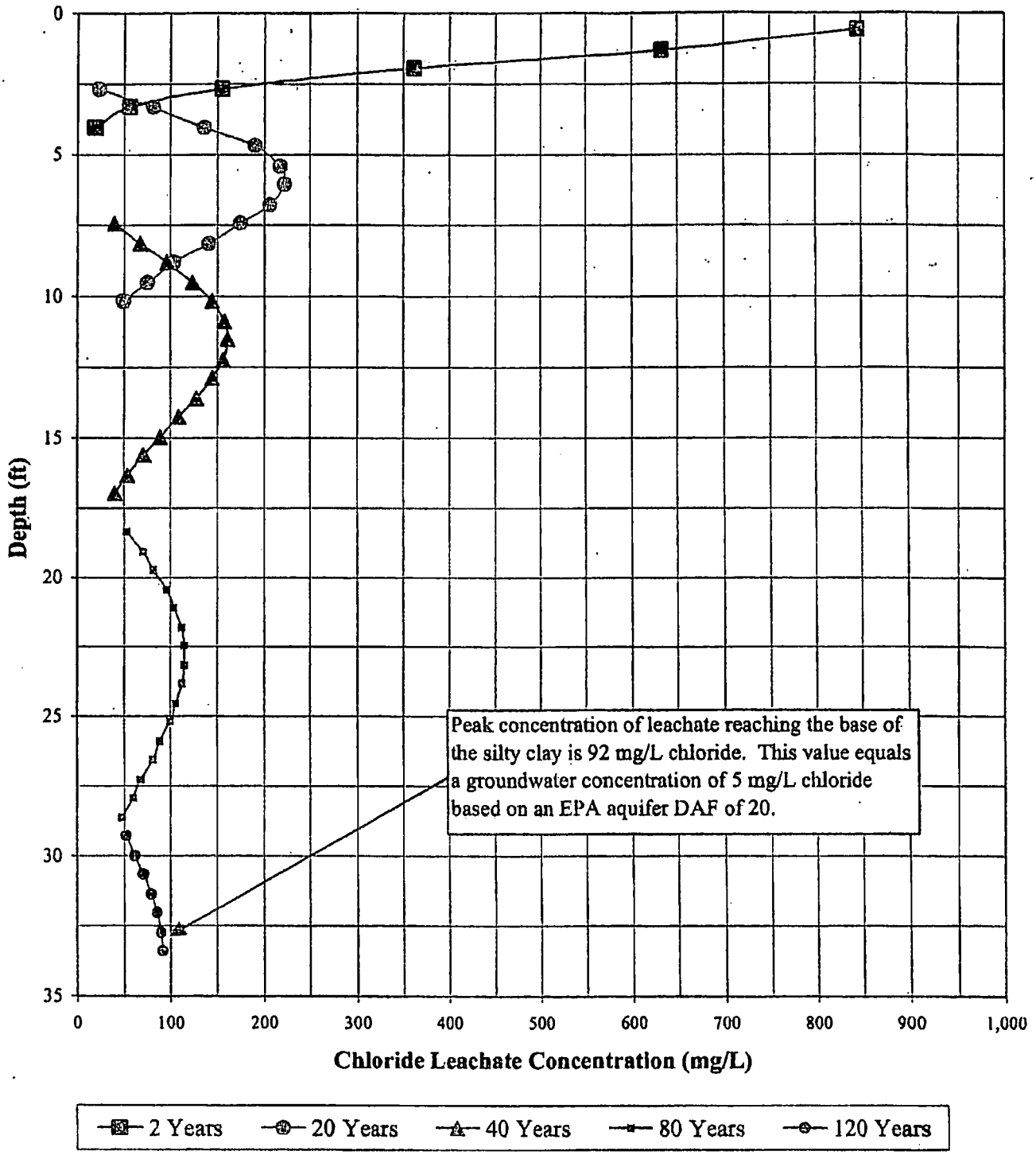


FIGURE. REGIONAL HYDROGEOLOGIC MONITORING WELL LOGS.

Surface Brine Releases Hydrogeologic Modeling (cont.)

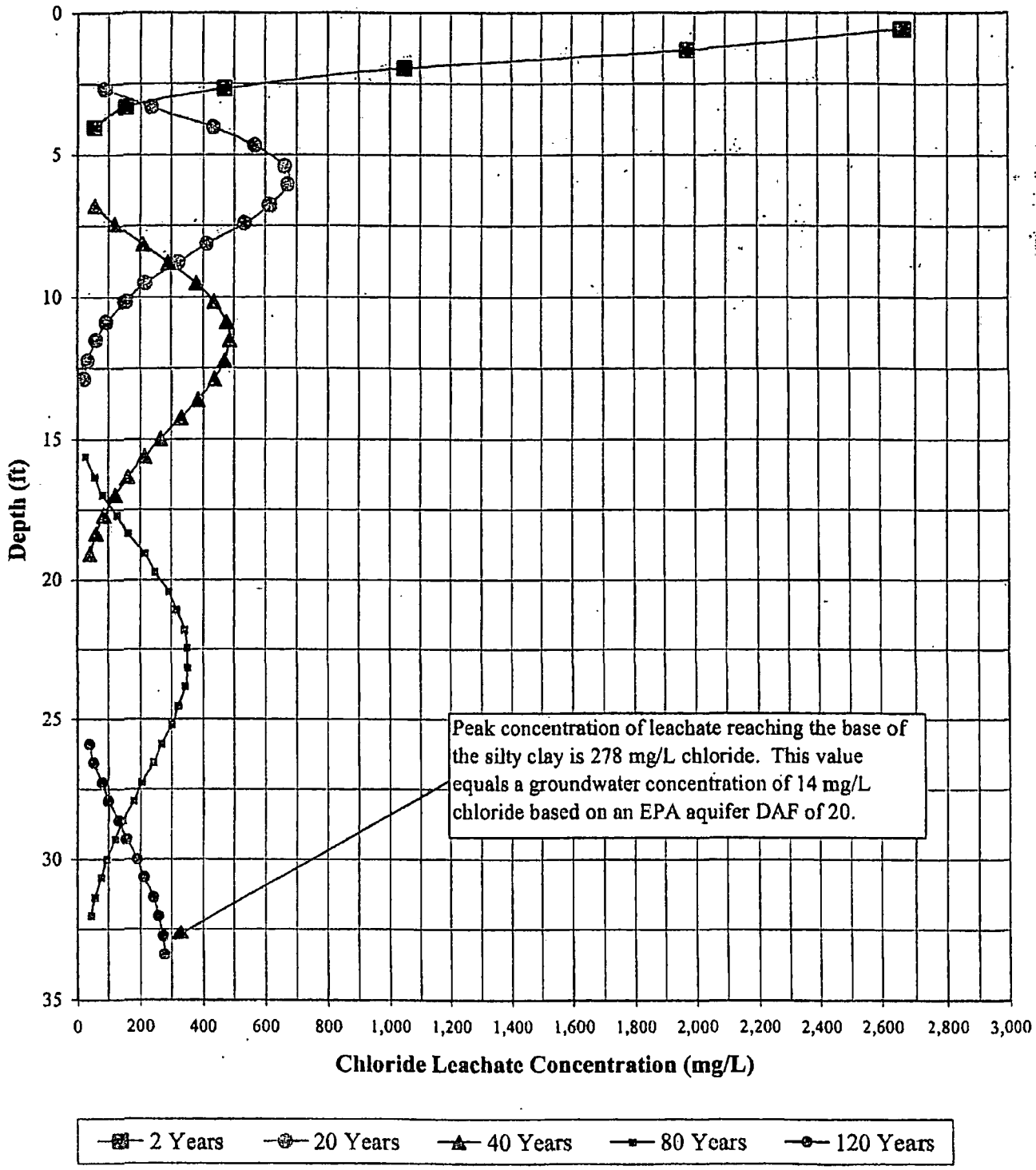
- Fate and transport model: *Hydrus-2D software for simulating two-dimensional movement of water, heat, and multiple solutes in variably saturated media, Version 2.0, 1999*
- Modeling assumes the presence of 33 feet of silty clay soil (approximately 1000 cm) between the ground surface and the underlying Quaternary aquifer
- Initial chloride concentrations of 50,000 mg/L (based on analytical testing of brine from the Buckles A #1)
- Simulated brine losses of 30, 90, and 365 days duration

FIGURE 11. 120-YEAR SIMULATION OF CHLORIDE MIGRATION THROUGH SILTY CLAY (30-DAY SURFACE RELEASE AT 50,000 mg/L CHLORIDE).



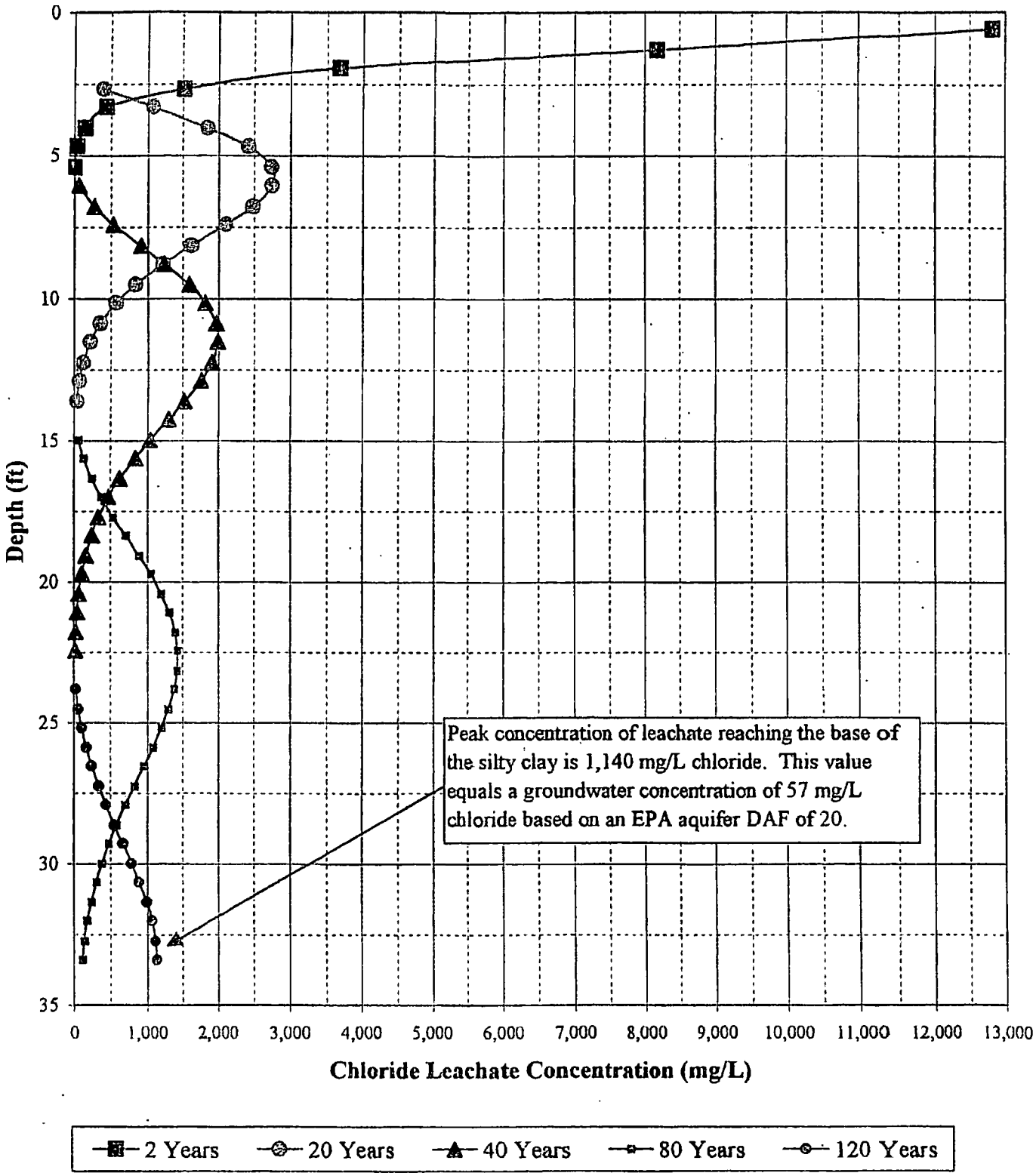
HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 12. 120-YEAR SIMULATION OF CHLORIDE MIGRATION THROUGH SILTY CLAY (90-DAY SURFACE RELEASE AT 50,000 mg/L CHLORIDE).



HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 13. 120-YEAR SIMULATION OF CHLORIDE MIGRATION THROUGH SILTY CLAY (365-DAY SURFACE RELEASE AT 50,000 mg/L CHLORIDE).



HAMP, MATHEWS & ASSOCIATES, INC.

Surface Brine Releases Hydrogeologic Modeling (cont.)

- All simulations show peak chloride concentrations reaching base of silty clay in 120 years

- All simulations show chloride concentrations at the Quaternary aquifer of less than 60 mg/L -- well below established aesthetic criteria of 250 mg/L

Surface Brine Releases Hydrogeologic Modeling (cont.)

- Any surface releases of brine over the 36 month lease life would have been significantly less than the extreme conditions modeled

- Results of the modeling are also supported by the lack of groundwater impacts in monitoring wells downgradient of the Buckles well facility

- Modeling confirms prolonged surface release (up to one year) causes no chloride exceedances and thus ***no imminent and substantial endangerment to the Quaternary aquifer***

Responses to EAO Allegations (cont.)

- Brine releases from surface pipelines
  - Modeling of potential chloride transport through glacial till (silty clay) to the Quaternary aquifer
- <u>Crude oil releases in dike area of tank battery</u>
  - Risk based corrective action (RBCA) modeling of potential hydrocarbon (BTEX) transport through glacial till (silty clay) to the Quaternary aquifer

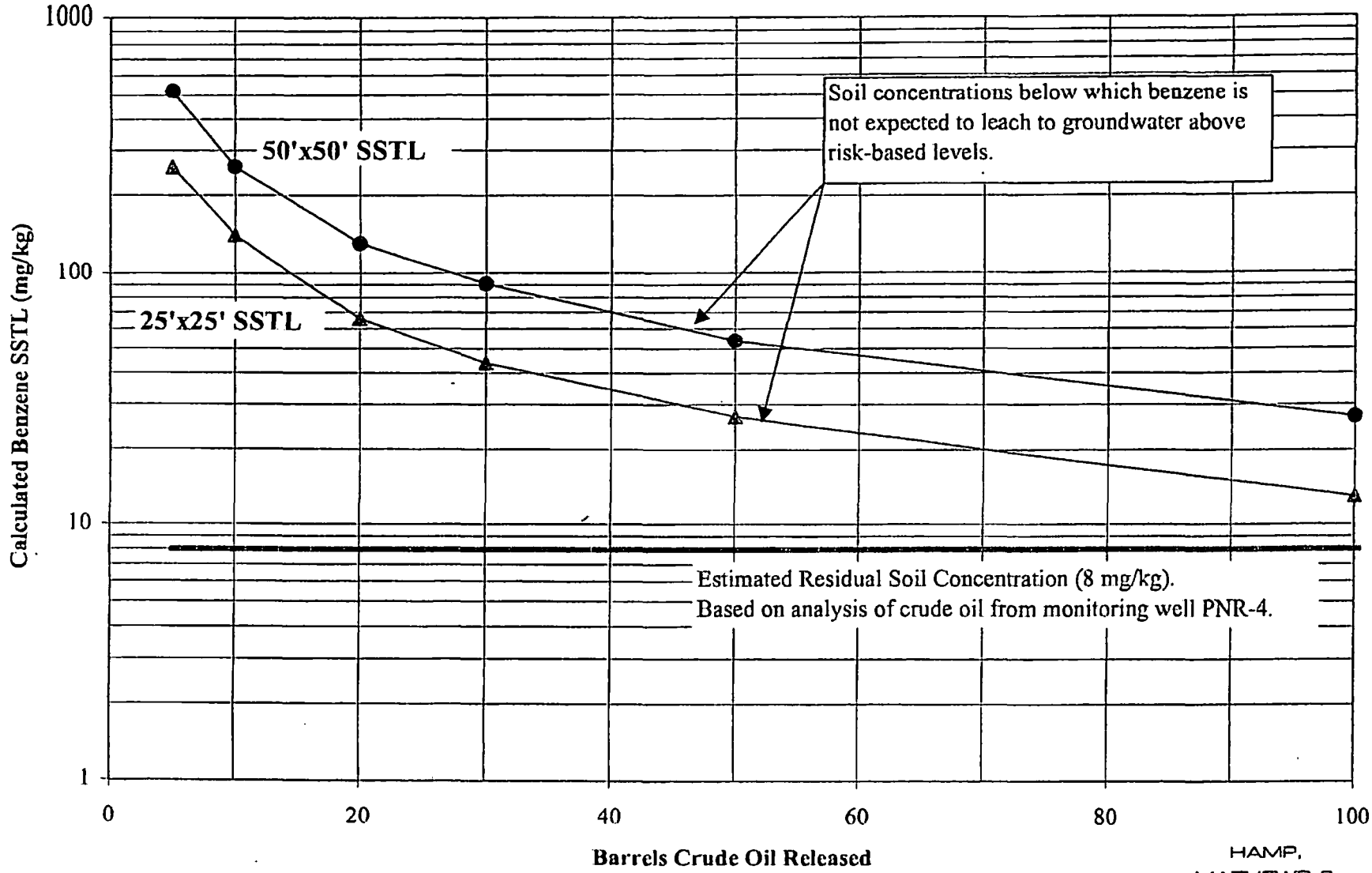
Surface Crude Oil Releases
RBCA Modeling

- EPA's EAO identifies one crude oil release of 10 barrels in diked area of the tank battery

- Conservative risk based evaluation of potential hydrocarbon (BTEX) fate and transport to the Quaternary aquifer: *ASTM. 1995. Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites, E-1739-95*

- Site specific target limits (SSTLs) developed – soil concentrations that create leachable concentrations of BTEX above risk based levels

FIGURE 14. RBCA ANALYSIS OF CRUDE OIL RELEASE AND BENZENE MIGRATION THROUGH SILTY CLAY.



HAMP, MATHEWS & ASSOCIATES, INC.

Surface Crude Oil Releases RBCA Modeling (cont.)

- Groundwater monitoring data from downgradient wells show no hydrocarbon impacts and thus support the modeling results
- Results obtained from the RBCA modeling are consistent with field conditions evaluated by HMA at over 300 production sites with impacted glacial drift soils
- Hence, hydrocarbon impacts to groundwater not probable based on the limited quantities of crude oil released at the tank battery

Seismic Fracturing of the Bearpaw Shale

- Assistance of an expert in rock mechanics has been retained to evaluate the potential of seismic impact to the Bearpaw Shale

- Expert concludes that the expected radius of seismic impact to the shale is limited to 15 feet relative to the shot point

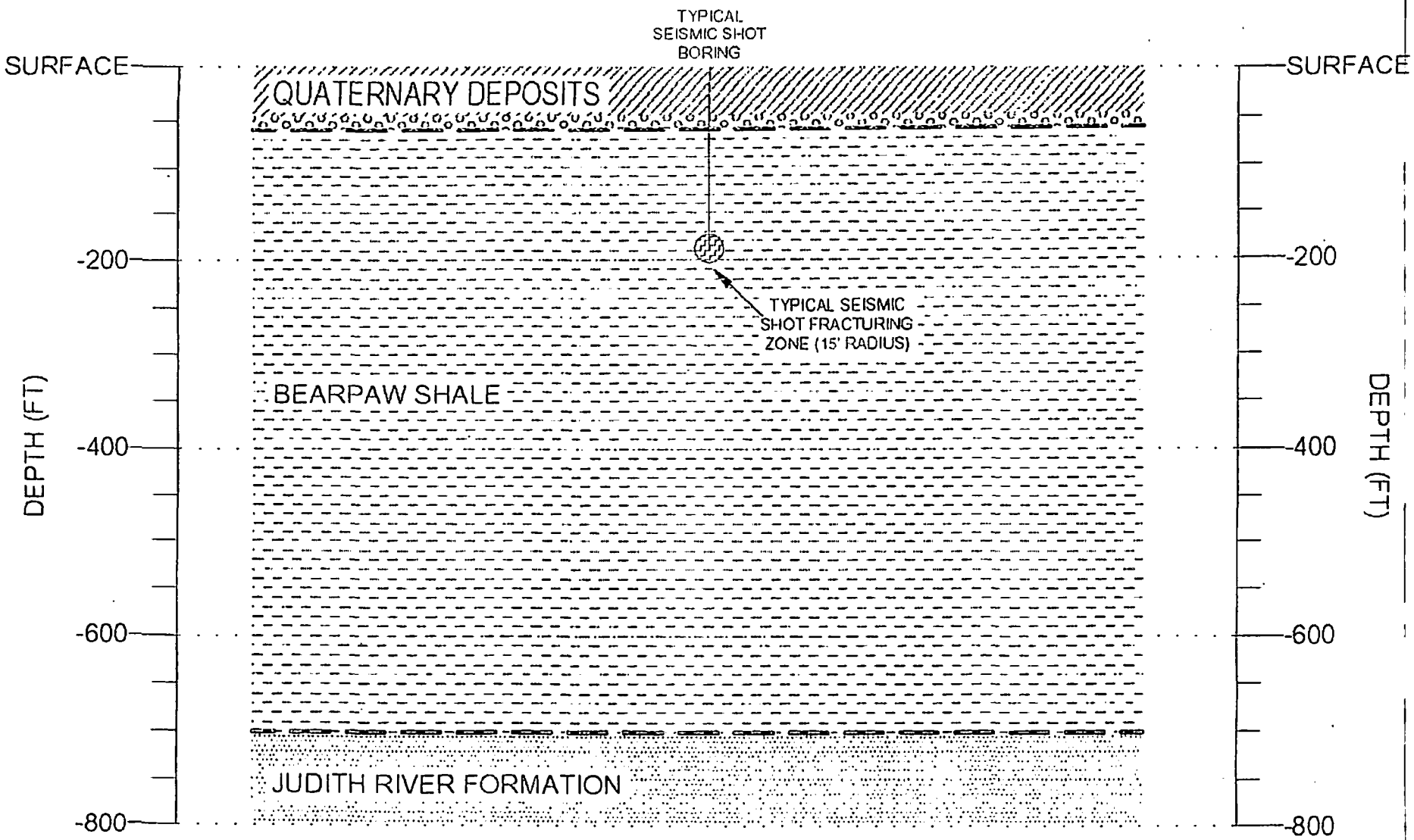


FIGURE . TYPICAL CROSS SECTION SHOWING SEISMIC SHOT DEPTH AND FRACTURING ZONE.

HAMP,
MATHEWS &
ASSOCIATES, INC

Summary of EPA's Rationale

- Cement channeling at the Buckles SWD #1 in May 1981
- Shut in of Buckles A #1 in May 1982 due to pipeline leaks
- February 1984 TXO memo recommending P&A of all wells due to corrosion of surface pipelines
- Release of 10 bbl of crude oil in tank battery dike in October 1982
- Potential fracturing of Bearpaw Shale during seismic survey

Conclusions

- All available data support the conclusion that upward migration of saline water from the Judith River Formation by means of channeling in the annulus of the Buckles SWD #1 did not occur beyond the 3-day period in May 1981

- The lack of chloride impacts at downgradient monitoring wells proves that upward migration of saline water from the Judith River Formation at the Buckles SWD #1 in May 1981 was remedied by the secondary cementing of the well casing

Conclusions (cont.)

- Modeling results show that low permeability silty clay soils above the Quaternary aquifer are sufficient to attenuate surface losses of brine and crude oil protecting groundwater quality in the area – this is supported by the absence of impacts to monitoring wells downgradient of the facility

- Past construction, operation, and abandonment of the Buckles wells did not impact the Quaternary aquifer, and certainly not in a manner consistent with imminent and substantial endangerment

Documents Supporting EPA's Proposal to Withdraw Marathon Oil Company from Emergency Administrative Orders No. SDWA-8-99-68 and SDWA-08-2001-33

Document No. 2

FOGNANI GUIBORD HOMSY & ROBERTS, LLP

CHICAGO
20 N. CLARK STREET
THIRTY SECOND FLOOR
CHICAGO, ILLINOIS 60601
TELEPHONE: (312) 596-7777
FACSIMILE: (312) 596-7788

DENVER
555 SEVENTEENTH STREET
TWENTY-SIXTH FLOOR
DENVER, COLORADO 80202
TELEPHONE: (303) 382-6200
FACSIMILE: (303) 382-6210
WWW.FGHR.COM

NEW YORK
1350 AVENUE OF THE AMERICAS
THIRTY FIRST FLOOR
NEW YORK, NEW YORK 10019
TELEPHONE: (212) 974-0060
FACSIMILE: (212) 974-0648

August 6, 2002

2

VIA HAND DELIVERY

David A. Carson, Esq.
U.S. Department of Justice
Environment and Natural Resources Division
Suite 945 – North Tower, 999 18th Street
Denver, CO 80202

Re: ***Marathon Oil Company v. U.S. EPA***

Dear Dave:

Enclosed herewith is a copy of a technical review of the Administrative Record for the Emergency Administrative Order issued against Marathon Oil Company with regard to the East Poplar Oil Field prepared by Hamp, Mathews and Associates, Inc. This report was prepared on behalf of Marathon Oil Company.

Thank you very much for your assistance and cooperation. Please do not hesitate to contact me with any questions or concerns.

Very truly yours,

John D. Fognani
of FOGNANI GUIBORD HOMSY & ROBERTS, LLP

JDF/sjr
Enclosures

#17366

HAMP, MATHEWS & ASSOCIATES, INC.
15266 Ann Drive
Bath, Michigan 48808
(517) 641-7333
Fax (517) 641-7337

August 6, 2002

Mr. Nathan Wiser
US Environmental Protection Agency
Office of Enforcement
Compliance and Environmental Justice
Technical Enforcement Program 8ENF-T
999 18th Street, Suite 300
Denver, CO 80202-2466

Jim Eppers, Esq.
US Environmental Protection Agency
Office of Enforcement
Compliance and Environmental Justice
Legal Enforcement Program, 8ENF-L
999 18th Street, Suite 300
Denver, CO 80202-2466

RE: Technical Review of the US EPA Administrative Record for USEPA's Allegations and Emergency Administrative Order Against Marathon Oil Company; East Poplar Oil Field Groundwater Contamination, Poplar, Montana

Gentlemen:

Executive Summary

All available local and regional monitoring well evidence supports the conclusion that upward migration of impacted groundwater from the Judith River Formation within the annular space behind the casing of the Buckles SWD #1 was not persistent beyond the limited surface flows observed during drilling activities over three days in late May 1981. The lack of chloride impacts in local and regional downgradient monitoring wells proves the upward migration of impacted groundwater from the Judith River Formation at the Buckles SWD #1 was remedied by

the secondary cementing of the well casing. Impacts were limited to the three day period between the preliminary and secondary remedial cementing of the well casing.

Fate and transport modeling was used to analyze the effects of any residual surface impacts. Due to the presence of low permeability soils between the ground surface and the underlying Quaternary aquifer in the area of the Buckles wells, BTEX or chloride impacts to groundwater above health-based or aesthetic criteria are not probable. EPA's assertion that limited releases of crude oil and salt water at the Buckles facility impacted groundwater in the area has no merit.

In our opinion, based on the available data, past construction, operation, and abandonment of the Buckles wells did not impact the Quaternary aquifer in a manner consistent with "imminent and substantial endangerment." Available file information does not support EPA's conclusion that MOC has created an imminent and substantial endangerment to local residents.

EPA's Basis for the EAO

Four of the five items that were cited by the EPA as rationale to include MOC in the EAO are to be addressed in this review.[1] These are excerpted from the EAO and listed below.

EAO Paragraph 66

During the 1981 construction of the Buckles SWD #1 well, located in T28N, R51E, S22, the TXO Production Company had difficulties. Twice during construction, TXO Production Company, in daily drilling reports dated May 28-30, 1981, reported that water from the Judith River Formation at around 800 feet below ground surface flowed up the wellbore to the surface, breaking through the newly placed cement behind the casing. This could have resulted in a permanent channel behind the casing allowing movement of injected water from the Judith River Formation into the Quaternary deposits aquifer. At a minimum, this threatened the Quaternary deposits aquifer. This may have actually allowed fluids from the well to escape into the Quaternary deposits aquifer.

[1] A fifth item includes the allegation that a seismic survey conducted in the mid 1980s may have fractured the Bearpaw Shale allowing impacted water from the Judith River Formation to migrate upward to the Quaternary aquifer (See EAO paragraphs 70 and 71). An expert in rock mechanics has been retained to address the potential of the seismic fracturing of the Bearpaw Shale. Hence, this item is not addressed in this technical review.

EAO Paragraph 67

On August 20, 1982, TXO Production Corporation issued an internal memorandum from R.A. Varela to E.J. Quinlan III. In the memorandum it is stated that the Buckles A #1 well located in T28N, R51E, S22 had been shut in since May 9, 1982 due to leaks in the produced brine water pipeline leading to the salt water injection well.

EAO Paragraph 68

On October 19, 1982, TXO Production Company issued a spill report. The report stated that 200 barrels of oil overflowed tanks located at T28N, 51E, S22 and spilled onto the ground inside the tank battery. The report further stated that a vacuum truck picked up 190 barrels of oil and returned it to the tank, thereby leaving about 10 barrels on the ground.

EAO Paragraph 69

On February 24, 1984, TXO Production Company issued an internal memorandum from R.E. Dashner to P.A. Kriz. The memorandum recommended plugging the Buckles "A" #1, Buckles "B" #1 and Buckles SWD wells, all of which were located in T28N, R51E, S22. The reason stated in the memorandum is that the wells had been plagued by leaks in pipes due to the corrosive nature of the produced brine water. At a minimum, these leaks threatened the Quaternary deposits aquifer. The leaks may have actually allowed fluids from the well to escape into the Quaternary deposits aquifer.

Each item enumerated by EPA is discussed in the following sections in terms of the potential that each event or condition caused significant impact to groundwater in the area of the Buckles wells for which MOC is responsible.

Casing/Cement Problems Causing Leaks from Judith River Formation (Paragraph 66)

Well Completion Data

EPA used drilling reports of short-term water flow from the Judith River Formation during construction of the Buckles SWD #1 as evidence of the potential formation of a permanent annular channel creating a long-term hydraulic connection between the disposal zone and the shallow glacial drift aquifer. An internal TXO AFE evaluation stated that the flow probably occurred due to a "pump kick" during the initial cementing of the 7-inch diameter casing that allowed water under pressure in the Judith River to enter the annular space, thus watering down the cement and causing the diluted fluid to flow to the surface. The flow was stopped by reperforating the 7-inch diameter casing at the top of the Judith River and pressuring

cement into the annular space between the casing and the formation. Cement returns reached the ground surface indicating placement of cement from the Judith River to the ground surface.

No further problems with water flow were encountered during well construction, operation, or during plugging and abandonment of the well in 1984. These data do not support the conclusion that water continued to flow upward from the Judith River to potentially impact the Quaternary aquifer. EPA apparently discounted the drilling and abandonment reports that describe prompt sealing of the annular space behind the casing on May 30, 1981 and the lack of evidence of water flow during abandonment in 1984. Nothing in the EAO or the record indicates that EPA took this information into account.

Hydrogeologic Data

The U. S. Geological Survey (USGS) conducted a regional hydrogeologic study in the East Poplar Oil Field prior to the EAO.[2] Murphy Oil Company and Pioneer Natural Resources[3] have both conducted more detailed hydrogeologic investigations near some of their well locations in response to the EAO. Relevant data from these reports are discussed below with respect to EPA-alleged or asserted releases from the Buckles SWD #1.

Figure 1 shows locations of the regional oil and gas wells and monitoring wells installed as part of the hydrogeologic studies performed in the area. The Buckles wells are identified as TXOS-1, TXOA-1, and TXOB-1 on all figures. East-west cross sections that illustrate the Quaternary deposits are shown in Figures 2 through 5. As shown on the cross sections, water levels are present at approximately 1960 feet amsl in monitoring wells located in the Region 1 area of Figure 6 (*i.e.*, immediately east of the Poplar River flood plain); whereas, water levels at wells in Region 2 to the east are present at approximately 2050 feet amsl.

The degree of vertical separation between water levels in Region 1 and 2 indicates a potential horizontal hydraulic gradient of at least 0.3 between Regions 1 and 2. Monitoring well borings near the transition zone between Regions 1 and 2 also show a decreased thickness of aquifer materials. These relationships support the interpretation of limited groundwater flow between the two regions. Figure 7 shows the typical hydrogeologic interpretation presented in existing reports that depict groundwater flow from east to west across Regions 1 and 2 toward

---

[2] *Thamke et al. January 1996. Hydrologic Data for the East Poplar Oil Field, Fort Peck Indian Reservation, Northeastern Montana. U.S. Geological Survey Open-File Report 95-749.*

[3] *CH2MHILL. August 2000. Field Investigation Biere Well Evaluation, Poplar, Montana.*

the Poplar River. A more probable interpretation of groundwater flow is to the south beneath each region as shown in Figure 8.

If the typical interpretation of water levels is assumed, groundwater flow from the Buckles wells is to the west and/or south (Figure 7). Groundwater mounding around the Biere 1-22 well (located southwest of the Buckles wells) potentially splits groundwater flow from the area of the Buckles SWD #1 to the west and south. If groundwater flow is southerly as shown in Figure 8, groundwater mounding at the Biere 1-22 well probably deflects groundwater flow from the area of the Buckles SWD #1 to the southeast for a short distance, after which groundwater flow resumes a southerly course.

Non-impacted monitoring wells installed during previous investigations near the Buckles wells include FPB92-12, MOC-1B, PNR-12, and PNR-18. These monitoring wells are present downgradient of the Buckles wells assuming a split groundwater flow regime as illustrated in Figure 7. PNR-12 and PNR-18 are downgradient of the Buckles wells if the interpretation shown in Figure 8 is assumed. Figures 9 and 10 show chloride and conductivity isoconcentration contours, which are based on a compilation of available data. Conductivity values range from 1700 to 4900 µS/cm. Chloride concentrations range from 7 to 96 mg/L that are below the recognized aesthetic criterion of 250 mg/L. The elevated conductivity values are due to the regionally high dissolved solids in the groundwater (*i.e.*, bicarbonate and sulfate[4]). All monitoring wells immediately downgradient of the Buckles wells show ***no impact*** (regardless of groundwater flow interpretation). These data further support the conclusion that groundwater impacts due to the construction and operation of the Buckles SWD #1 are absent.

Chloride and conductivity contour lines on Figures 9 and 10 illustrate the likely area of impact associated with the Biere 1-22 to the southwest and the Huber/Murphy wells to the north. Each area of impact is generally elliptical with the long axis of dispersion oriented to the south. These plume outlines clearly support the interpretation of southward groundwater flow beneath the Region 2 area containing the Biere, Buckles, and Huber/Murphy wells. The absence of groundwater impacts at monitoring wells PNR-12 or MOC-1B also indicates that the Buckles SWD #1 did not experience long-term loses of brine from the Judith River Formation because a pattern of dispersed chloride similar to that present around the Biere and Huber/Murphy wells is absent. Groundwater velocities in the Quaternary aquifer range from 0.5 to 1.2 feet/day (182 to 438 feet/year) based on pumping test data developed by the USGS (see footnote 4). These travel times indicate that releases at the Buckles SWD #1 would reach the nearest monitoring wells in 3

---

[4] *Thamke and Craigg. May 1997. Saline-Water Contamination in Quaternary Deposits and the Poplar River, East Poplar Oil Field, Northeastern Montana. U.S. Geological Survey Water-Resources Investigations Report 97-4000.*

to 10 years (i.e., by 1995 at the latest). Thus, any ongoing losses of brine at the Buckles SWD #1 should have impacted the nearby downgradient monitoring wells. Groundwater monitoring data collected through at least 2001 continue to show no impact at downgradient monitoring wells, hence the groundwater data contradict the allegation that SWD #1 impacted the Quaternary aquifer.

Flow Line Leaks of Brine to the Surface Soils (Paragraphs 67 and 69)

Evidence of the magnitude of brine releases associated with leaking near-surface distribution piping is absent in the available file information. Any releases probably were of limited quantity and duration due to daily site inspections performed by contract pumpers. Fate and transport modeling was used to analyze the effects of any residual surface impacts. By means of conservative input parameters (*e.g.*, allowing a prolonged surface leak of up to 365 days duration), the model showed residual chlorides are impeded by the clay soils thus preventing impacts to the underlying Quaternary aquifer at concentrations above recognized aesthetic levels.

Geologic logs for nearby monitoring wells (*i.e.*, PNR-7 and PNR-12) show the presence of 32 to 57 feet of silty clay or clay present between the ground surface and the underlying sand and gravel of the Quaternary aquifer. All fate and transport modeling conducted assumes the presence of approximately 33 feet of silty clay overlying the aquifer zone in the immediate area of the Buckles wells. Chloride concentrations of 50,000 mg/L were used in the model and are based on an existing laboratory analysis of brine collected from the Buckles A #1.

Modeling of chloride migration through the silty clay soil was conducted by means of HYDRUS-2D software.[5] Solute transport was numerically simulated on a rectangular vertical plane (finite element grid with 25 vertical and 2 horizontal nodes). Conservative boundary conditions were applied (*e.g.*, a constant pressure head at the upper surface simulating standing water, maintaining saturated soil conditions during transport, and limited soil sorption sites). In order to estimate peak concentrations of chloride at the base of the silty clay, the model simulated transport for 120 years. Only the duration of the initial chloride pulse at the upper surface was varied from 30 days to one year. In all simulations, chloride concentrations reaching the base of

---

[5] *Hydrus-2D Software Package for Simulating the Two-Dimensional Movement of Water, Heat, and Multiple Solutes in Variably-Saturated Media. Version 2.0. April 1999. International Ground Water Modeling Center, Colorado School of Mines, Golden, Colorado 80401.*

the silty clay are below the level required to exceed a groundwater concentration of approximately 60 mg/L based on a dilution attenuation factor of 20.[6]

Model outputs are summarized in Figures 11 through 13. Each simulated brine loss (*i.e.*, 30, 90, and 365 days) shows chloride reaching the base of the silty clay after approximately 80 years of migration time. The model shows that in approximately 120 years the peak concentration of chloride reaches the base of the silty clay and may enter the aquifer zone. The range in chloride leachate concentrations potentially entering the aquifer is 92 to 1140 mg/L depending on the duration of the initial brine release at the upper surface of the silty clay (*i.e.*, 92 mg/L for a 30-day release and 1,140 mg/L for a one-year long brine loss). When EPA's generic default groundwater dilution factor of 20 is applied to the modeled leachate concentrations, the expected groundwater concentrations range from approximately 5 to 57 mg/L in the aquifer zone. These values are well below established aesthetic criteria for chloride in groundwater (*e.g.*, 250 mg/L) and not even remotely supportive of EPA's assertion of imminent and substantial endangerment as set forth in the EAO, paragraphs 19 and 20.

Modeling confirms that even with a prolonged surface release (up to one year) there are no groundwater exceedances and thus no imminent and substantial endangerment to the Quaternary aquifer. Any surface releases of brine over the 16 to 36 month lease life would have been significantly less than the extreme conditions modeled.

10 Barrel Oil Loss at Tank Battery (Paragraph 68)

In its EAO, EPA cites one 10 barrel loss of crude oil at the tank battery. Conservative risk-based methods were applied to determine the potential significance of this reported loss.[7] Site specific target limit concentrations (SSTLs) of benzene, toluene, ethylbenzene, and xylenes (BTEX) in surface soils were calculated by means of risk-based corrective action (RBCA) software.[8] SSTL values represent conservative soil concentration values below which BTEX should not leach to groundwater at concentrations above risk-based levels.

---

[6] Considered by EPA as protective for sources up to 0.5 acre in size; see *U.S. EPA. May 1996. Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response (EPA/540/R-95/128).*

[7] *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites. American Society for Testing and Materials, E-1739-95.*

[8] *RBCA Tool Kit for Chemical Releases (Version 1.3a). 2000. Groundwater Services, Inc., Houston, Texas.*

The risk-based evaluation is based on two different size areas of soil impact (*i.e.*, 625 and 2,500 square feet of impacted soils based on crude oil pools of 25 by 25 feet and 50 by 50 feet) with leaching of BTEX through 33 feet of silty clay. Assumptions regarding potential surface concentrations of BTEX are based on reported concentrations of BTEX in crude oil from monitoring well PNR-4 near the Biere 1-22.[9] A range of crude oil loss of 5 to 100 barrels was used to determine the potential thickness of soils at residual oil saturation at the ground surface. The estimated thickness value was used in the ASTM model calculation to set the source thickness at the upper surface of the soil column (*i.e.*, 0.3 to 23 feet of impacted soil at residual saturation). The model assumes rainfall of 30 cm (11.8 inches) per year. No allowance was made for biodegradation losses during transport. Consistent with the conservative end point of EPA guidance, SSTLs are based on a risk level of 10^{-6} for benzene. The remaining noncarcinogenic compounds are modeled at a total hazard quotient equal to 1.

---

[9] Concentrations of hydrocarbon present in surface soil was estimated by first determining the volume and mass of soil impacted per volume of hydrocarbon released. Secondly, the mass of hydrocarbon in each barrel of crude oil released to the soil was divided by the mass of soil impacted at residual saturation.

The volume of soil at residual saturation (in barrels) per volume of hydrocarbon released is estimated from (*API. 1972. The Migration of Petroleum Product in Soil and Groundwater, Principles and Counter-Measures*):

(0.2)(barrels of hydrocarbon released) / (soil porosity)(residual hydrocarbon saturation capacity)

For a silty clay soil, a porosity of 0.36 was assumed. A residual hydrocarbon saturation capacity of 30 percent of the water saturation capacity of 0.34 was used (*i.e.*, 0.10). Hence, for each barrel of hydrocarbon released, 5.6 barrels (4,282 liters) of soil is impacted at residual saturation. The mass of soil was calculated by multiplying the volume of impacted soil by a soil density of 1.7 kg/L (*i.e.*, 1.7 g/cc). This gives 7,279 kg of soil per barrel of hydrocarbon released.

Analytical testing of crude oil at PNR-4 showed concentrations of BTEX of 330, 1270, 1950, and 3190 mg/L, respectively. The mass of benzene in the surface soils (as shown on Figure 14) was estimated by multiplying the crude oil concentration (330 mg/L) by 166.54 liters per barrel to get the mass of benzene of 54,958 mg per barrel of crude oil. The final soil concentration of 8 mg/kg benzene was determined by dividing the mass of benzene (54,958 mg/bbl) by the mass of soil (7,279 kg).

Figure 14 summarizes the model output from the RBCA evaluation. The estimated concentration of benzene of 8 mg/kg in soils at residual saturations at the time of the crude oil loss is less than the calculated range of SSTLs of 13 to 520 mg/kg representing losses ranging from 100 to 5 barrels over an area of 625 to 2,500 square feet, respectively. A 10 barrel loss of crude oil corresponds to an SSTL of 140 to 260 mg/kg benzene over 625 to 2,500 square feet, respectively.

SSTL values for the remaining compounds (TEX) default to the soil saturation concentrations (800, 650, and 510 mg/kg, respectively) because the health-based levels exceed the soil saturation concentrations. Therefore, none of the estimated TEX concentrations at residual saturation at the time of the release exceed the calculated SSTLs. Thus, impacts in terms of toluene, ethylbenzene, and xylenes are not expected.

These model results are consistent with our experience working at other production sites with impacted glacial drift soils. The depth of hydrocarbon impact in these soils is typically limited to less than 15 feet. Data from 314 production sites located in Michigan are plotted on Figure 15 in terms of the volume of soil impacted by crude oil and the depth of soil impact (depth limit based on post excavation analytical testing). These data represent all soil types encountered (*i.e.*, gravel, sands, silty sands, clayey sand, sandy clay and clay). Of these sites, only 18 were impacted to depths greater than 15 feet. However, in all cases, the depth of impact did not exceed 28 feet. This maximum depth of 28 feet is less that the total soil thickness (regardless of soil type and texture) from the ground surface to the water bearing Quaternary aquifer at all monitoring wells near the Buckles wells.

Conclusions

All available local and regional monitoring well evidence supports the conclusion that upward migration of saltwater from the Judith River Formation within the annular space behind the casing of the Buckles SWD #1 was not persistent beyond the limited surface flows observed over three days in late May 1981. The lack of chloride impacts in local and regional downgradient monitoring wells proves the upward migration of impacted groundwater from the Judith River Formation at the Buckles SWD#1 was remedied by the secondary cementing of the well casing. Impacts were limited to the three day period between the preliminary and secondary remedial cementing of the well casing.

Fate and transport modeling was used to analyze the effects of any residual surface impacts. Due to the presence of low permeability soils between the ground surface and the underlying Quaternary aquifer in the area of the Buckles wells, BTEX or chloride impacts to groundwater above health-based or aesthetic criteria are not probable. EPA's assertion that

limited releases of crude oil and salt water at the Buckles facility impacted groundwater in the area has no merit.

In our opinion, based on the available data, past construction, operation, and abandonment of the Buckles wells did not impact the Quaternary aquifer in a manner consistent with "imminent and substantial endangerment." All data presented in this technical assessment show no evidence that the Buckles SWD #1 contributed to the diminishment of groundwater quality in the East Poplar Field.

We appreciate the opportunity to provide this information to you. Please contact us with any questions you may have.

Sincerely,

Hamp, Mathews & Associates, Inc.

Lorin P. Hamp, P.G.
Principal Hydrogeologist

Attachments - Figures 1 through 15

cc: Dave Carson, Esq.
John Brown, Esq.
John D. Fognani, Esq./R. Kirk Mueller, Esq.

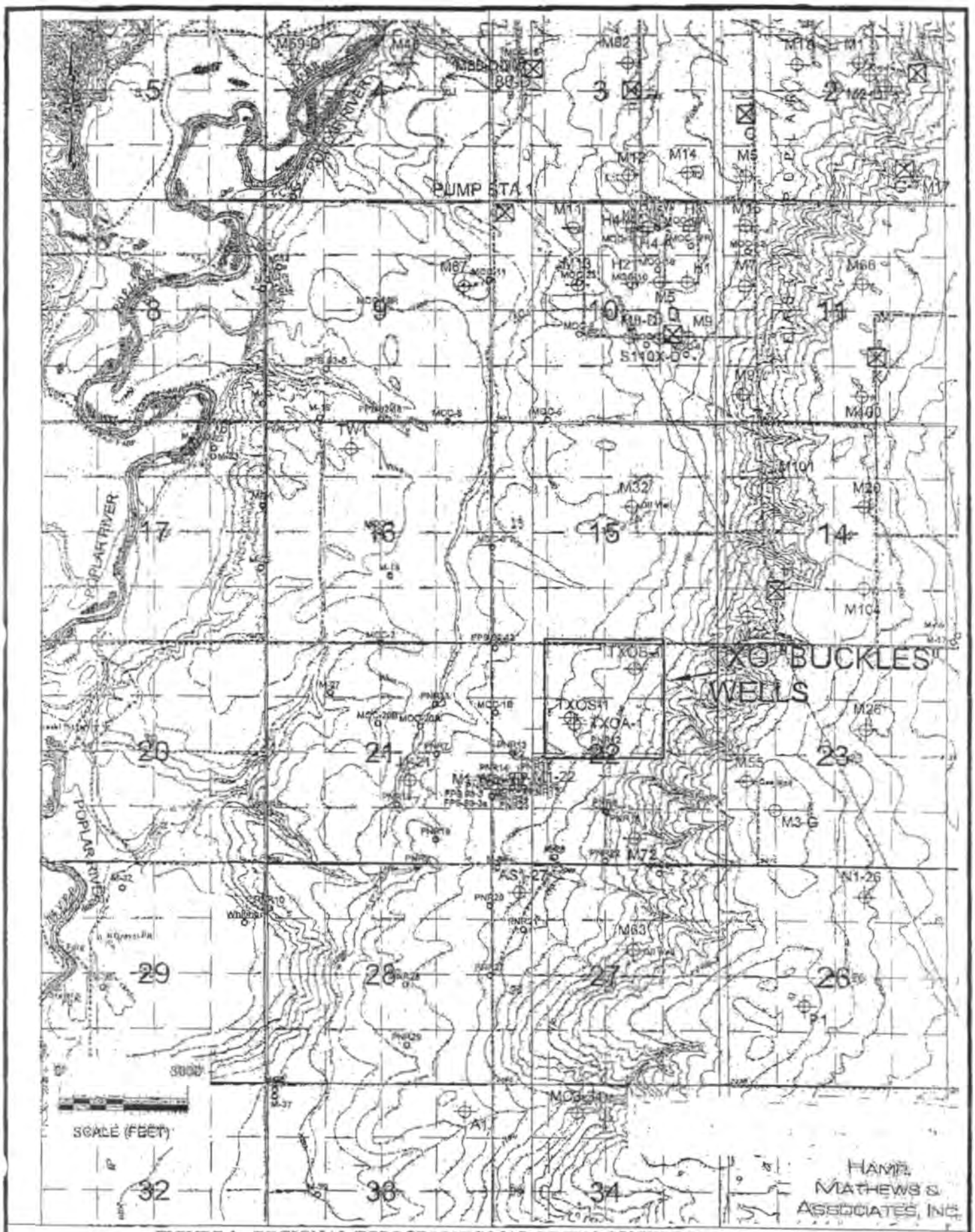


FIGURE 1. REGIONAL TOPOGRAPHIC MAP OF TXO BUCKLES WELL AREA.

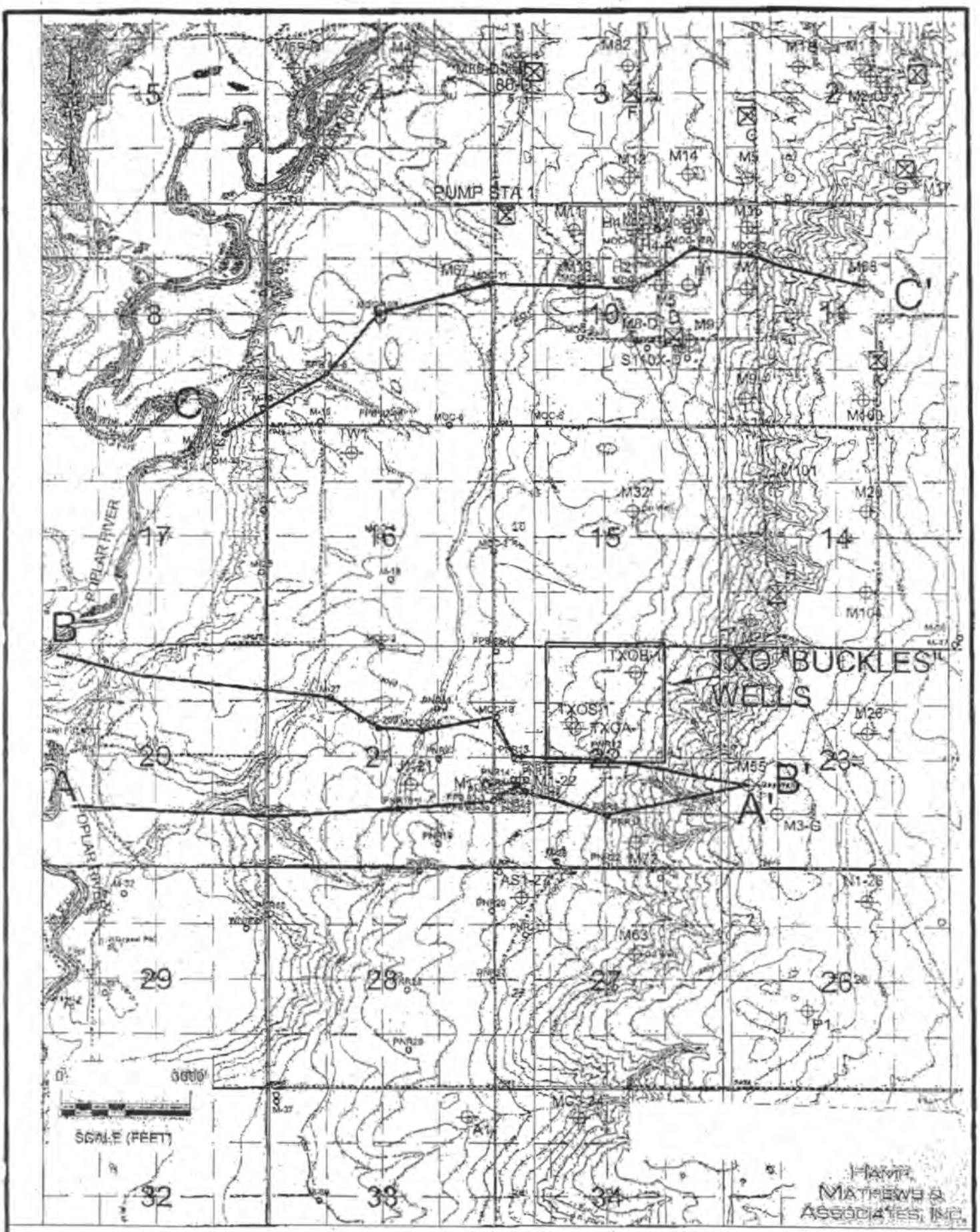


FIGURE 2. LOCATION OF CROSS SECTION LINES.

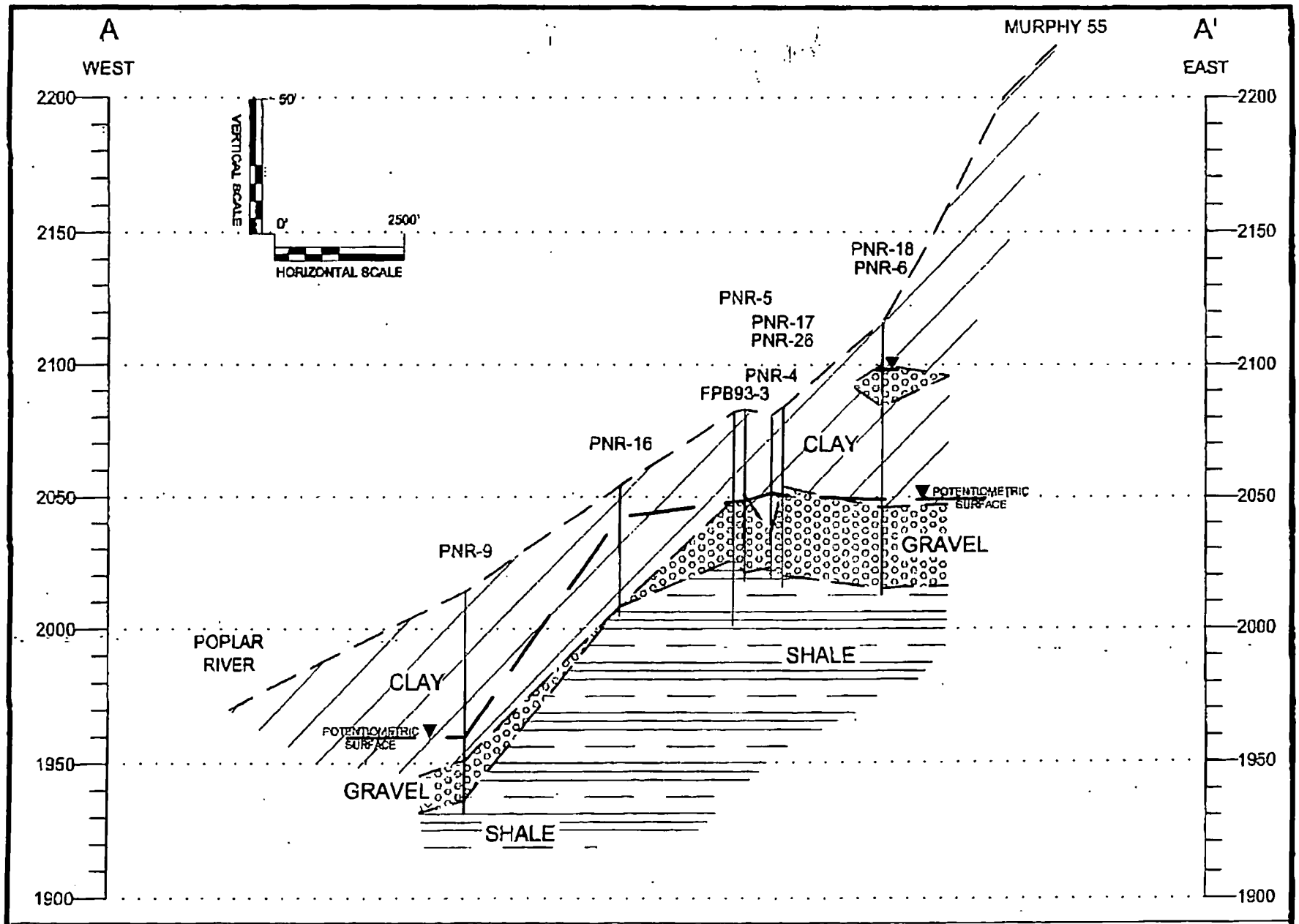


FIGURE 3. CROSS SECTION A-A' : SOUTH OF BIERE 1-22.

HAMP, MATHEWS & ASSOCIATES, INC.

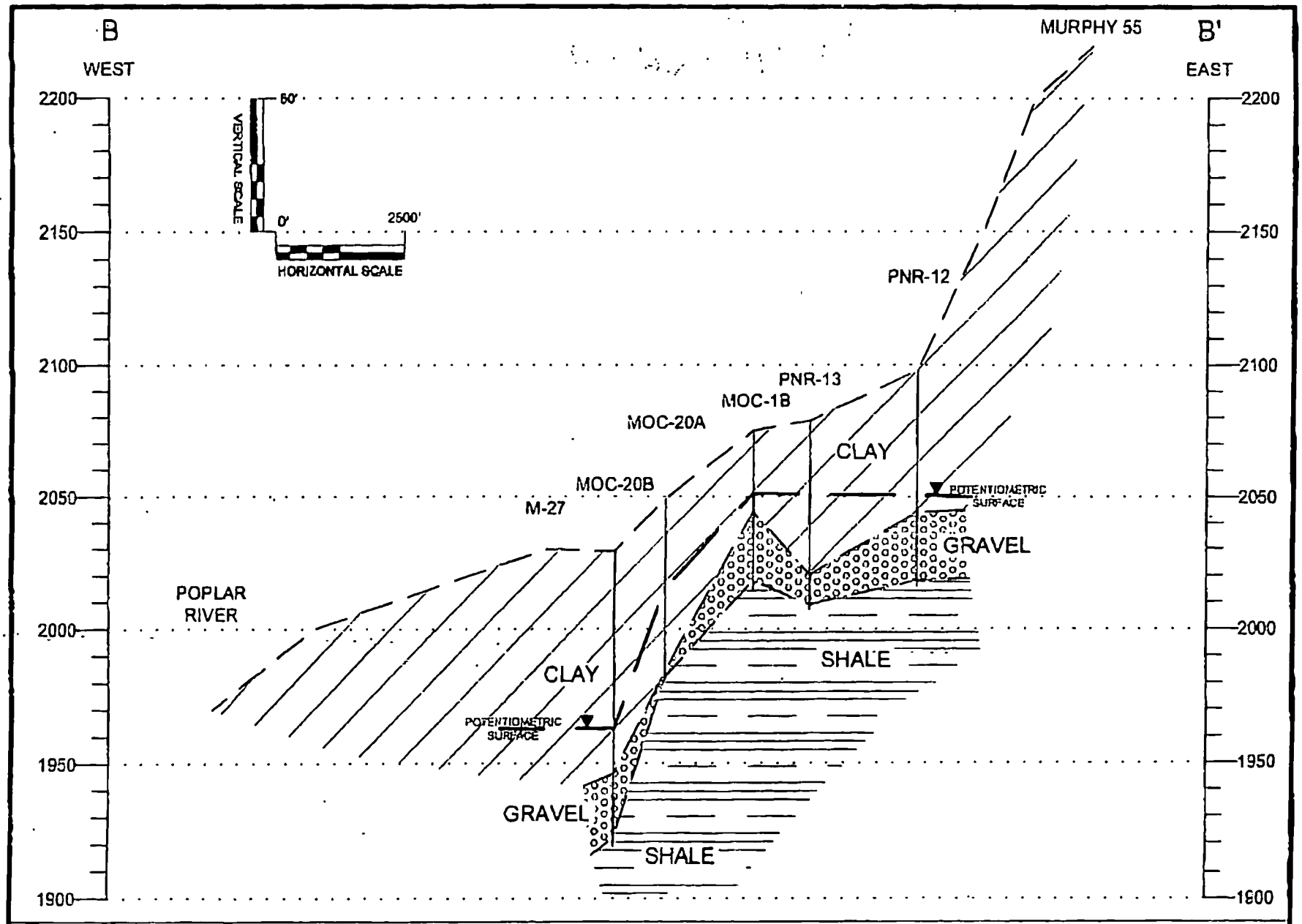


FIGURE 4. CROSS SECTION B-B' : SOUTH OF BUCKELS A #1.

HAMP, MATHEWS & ASSOCIATES, INC.

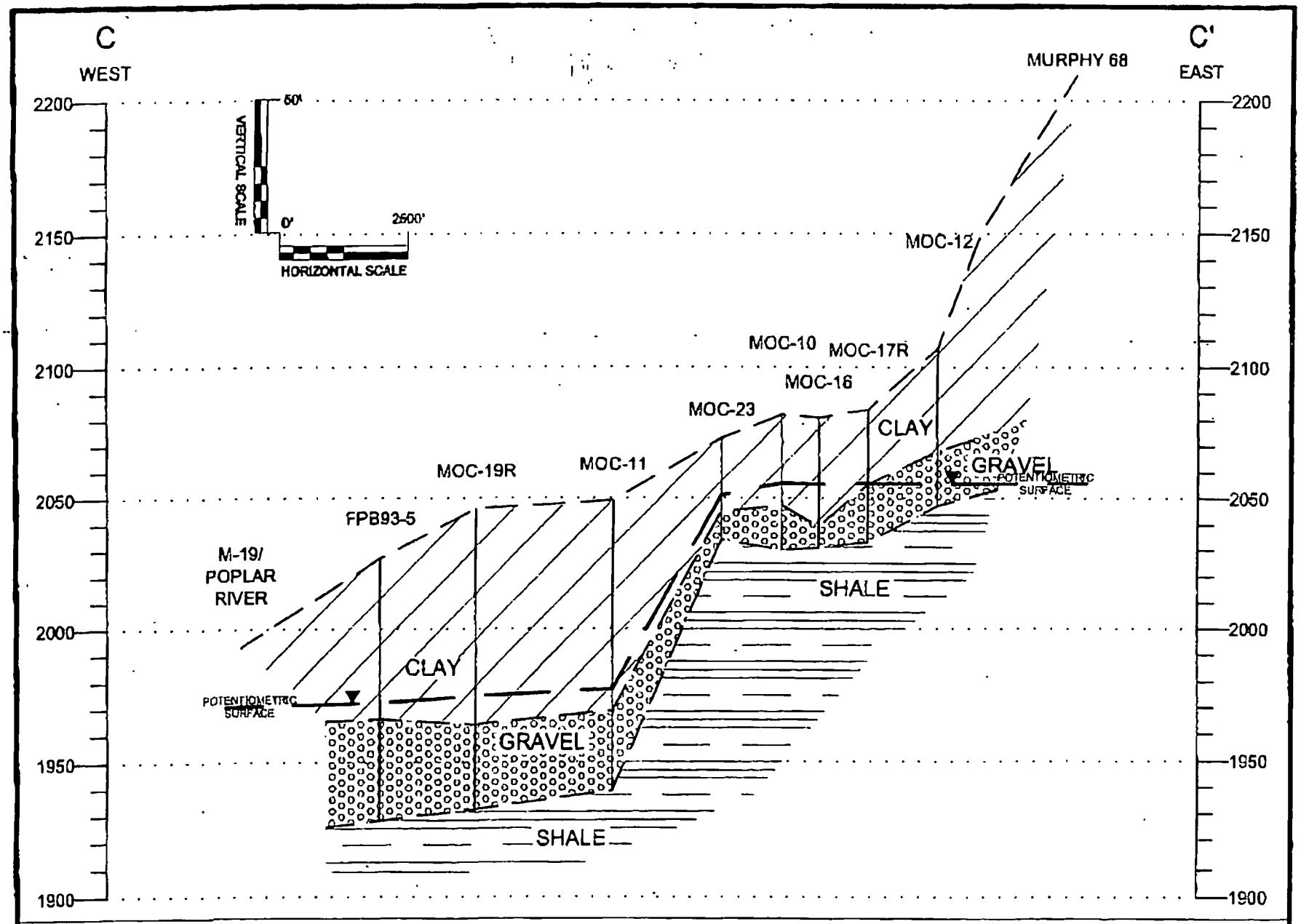


FIGURE 5. CROSS SECTION C-C' : NORTH OF BUCKLES WELLS.

HAMP, MATHEWS & ASSOCIATES, INC.

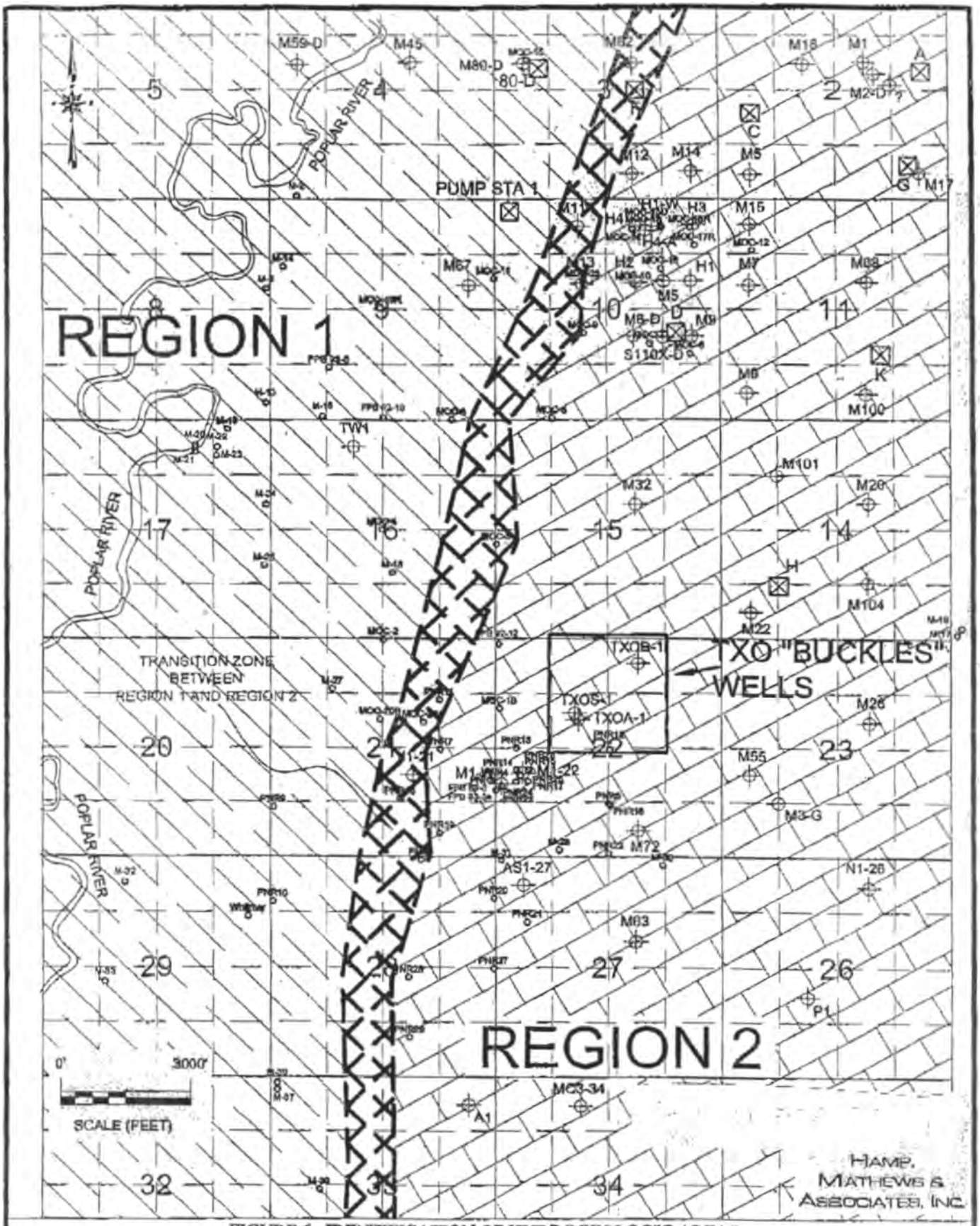


FIGURE 6. IDENTIFICATION OF HYDROGEOLOGIC AREAS.

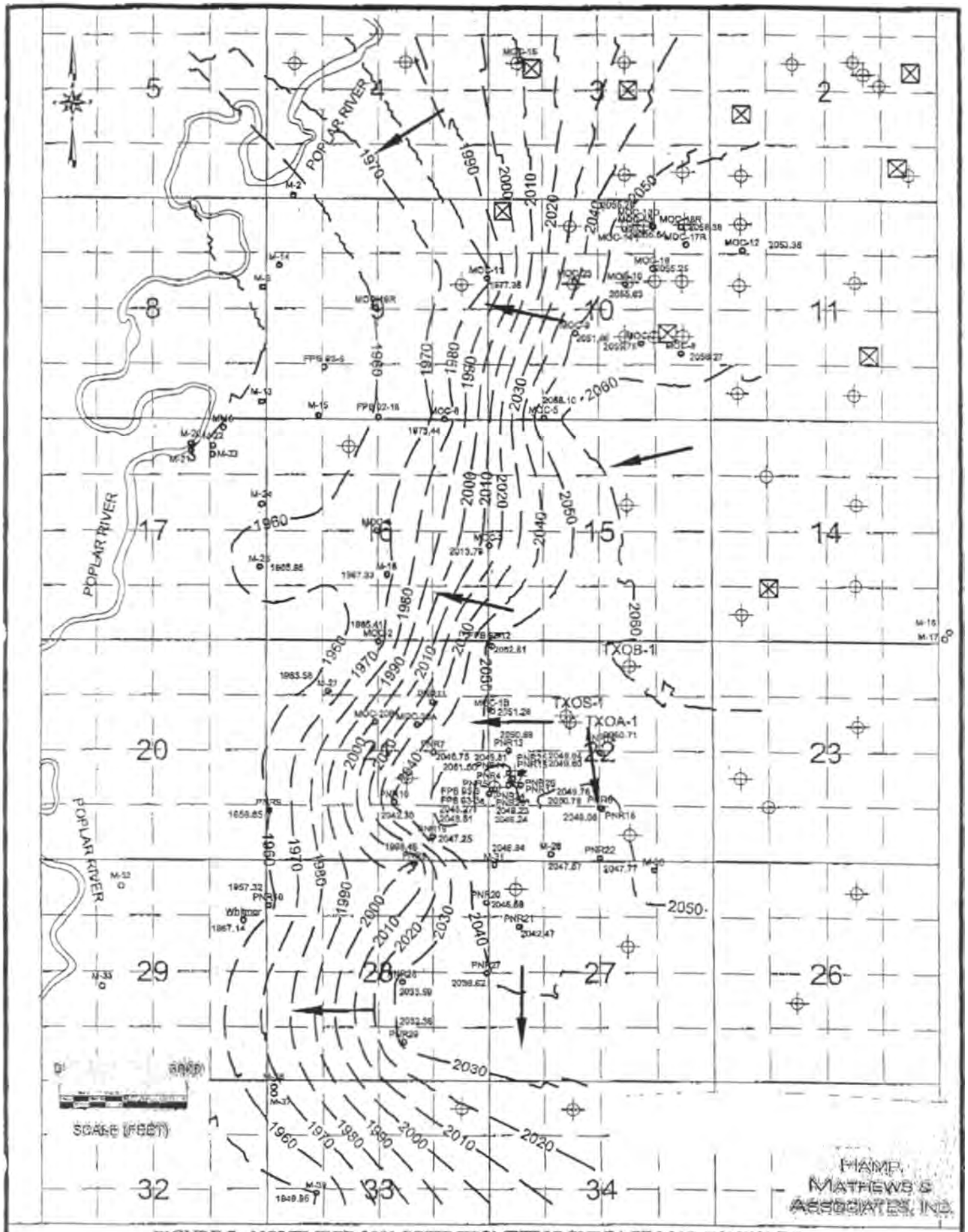


FIGURE 7. NOVEMBER 2001 POTENTIOMETRIC SURFACE MAP CONTOURS.

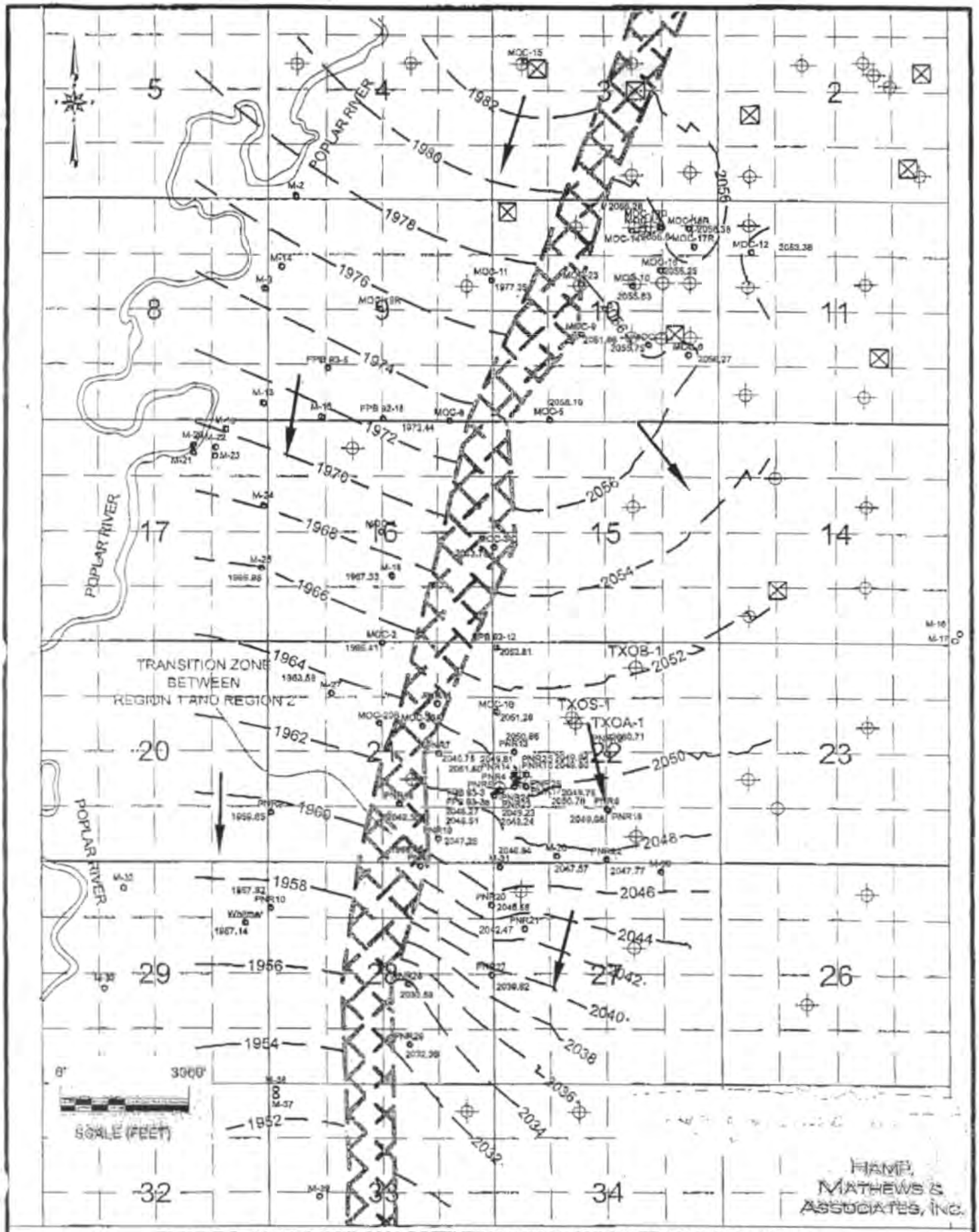


FIGURE 8. NOVEMBER 2001 POTENTIOMETRIC SURFACE MAP CONTOURS.

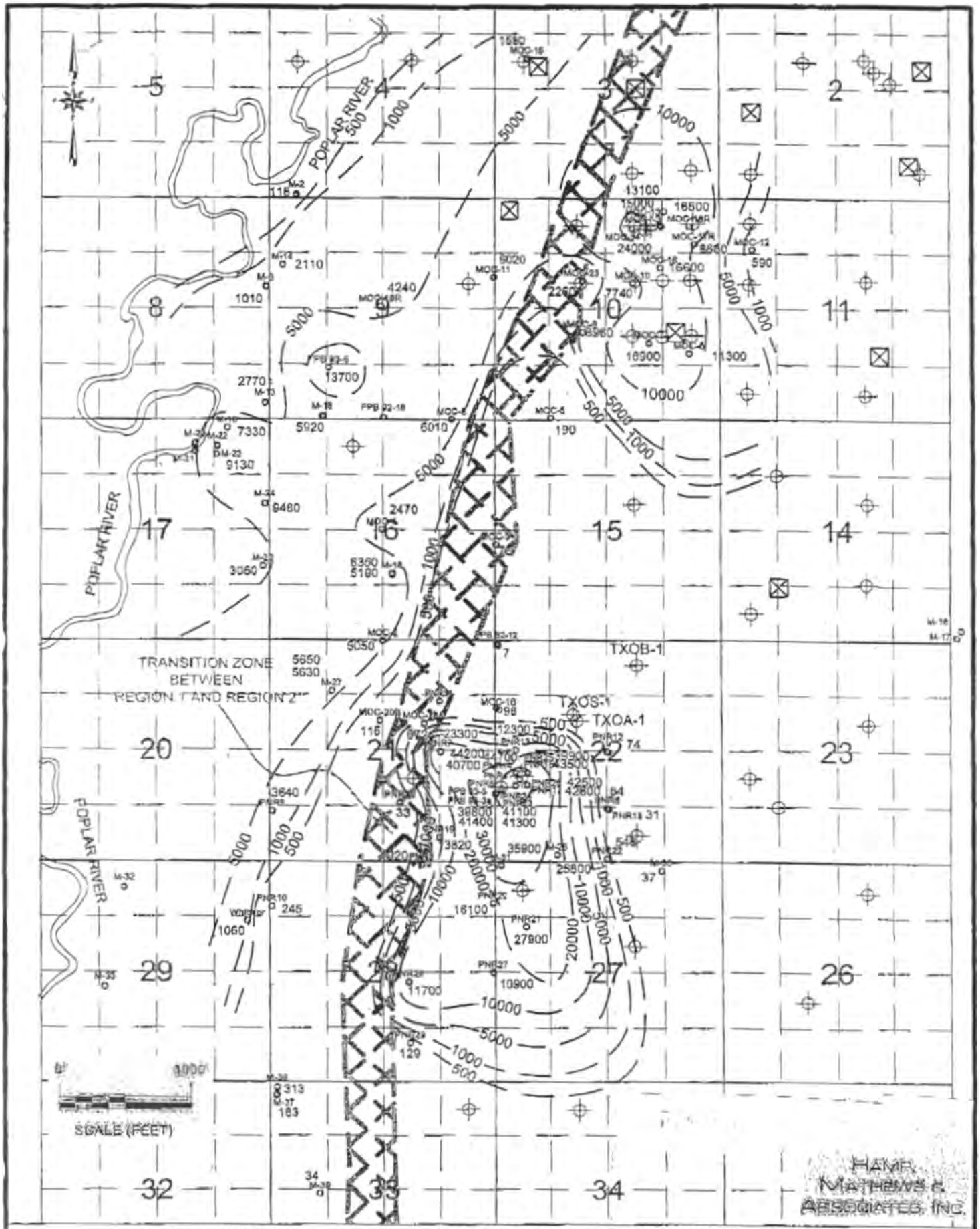


FIGURE 9. GROUNDWATER CHLORIDE CONCENTRATION CONTOURS (mg/L).

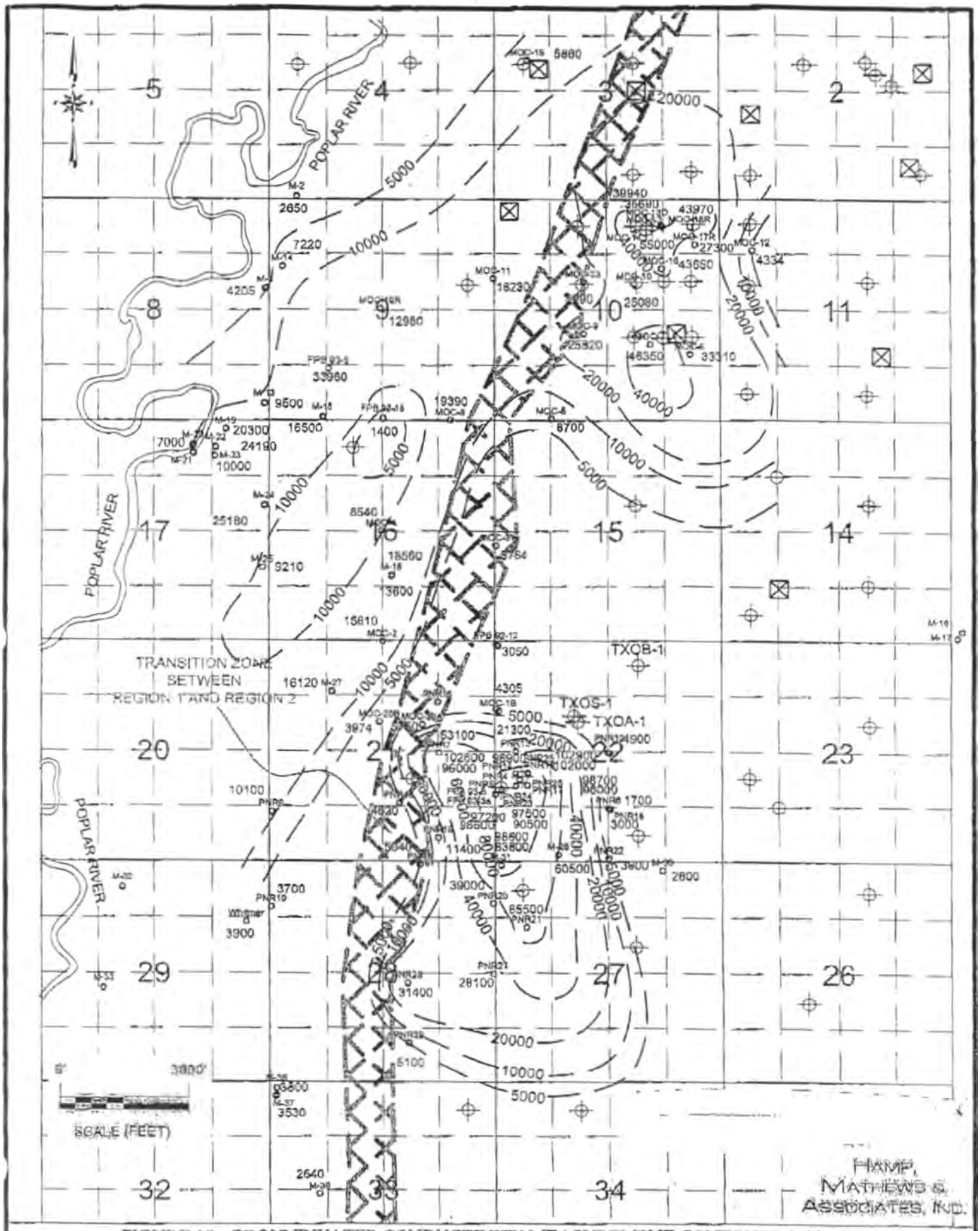
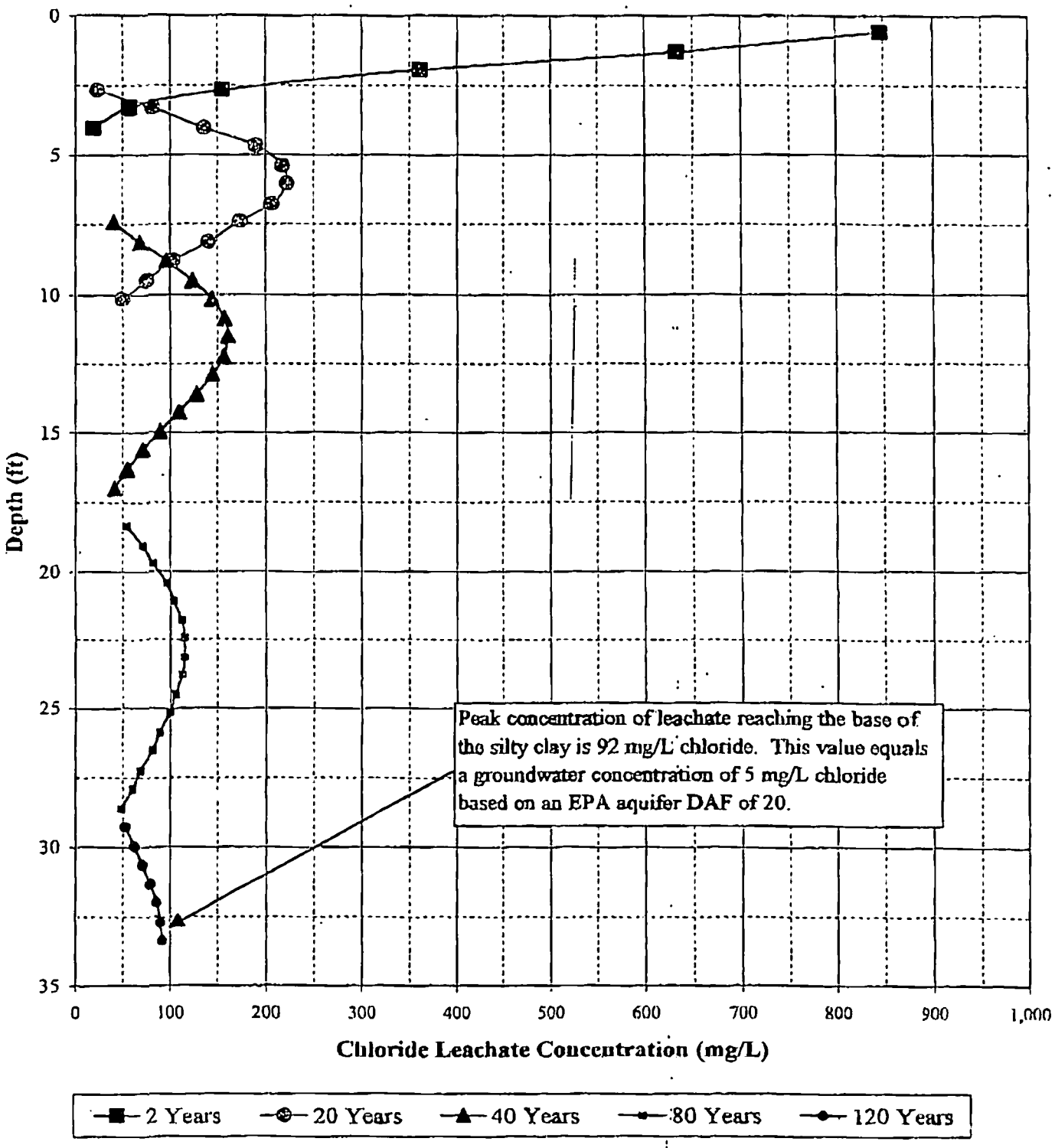


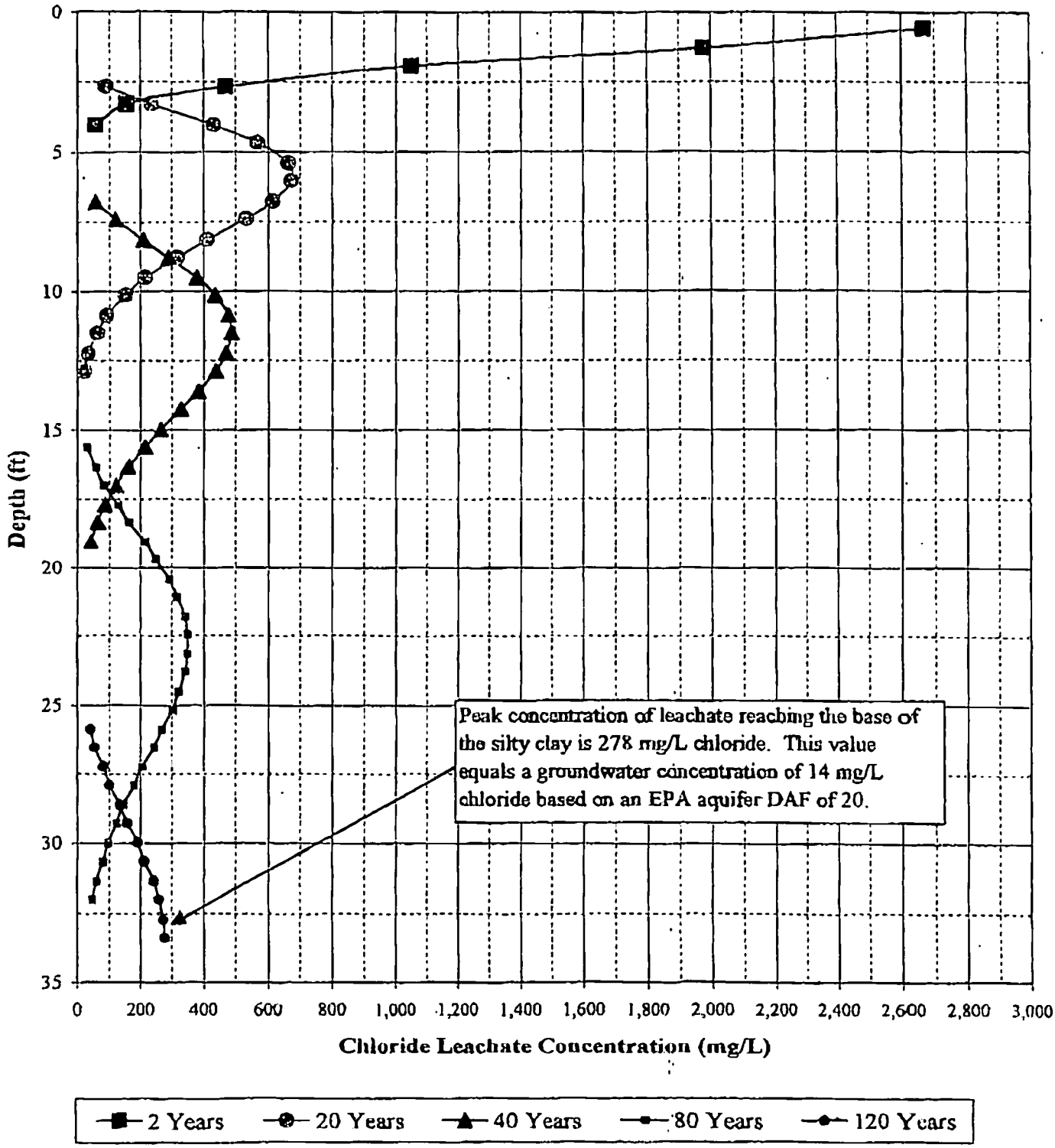
FIGURE 10. GROUNDWATER CONDUCTIVITY MEASUREMENT CONTOURS (uS/cm).

FIGURE 11. 120-YEAR SIMULATION OF CHLORIDE MIGRATION THROUGH SILTY CLAY (30-DAY SURFACE RELEASE AT 50,000 mg/L CHLORIDE).



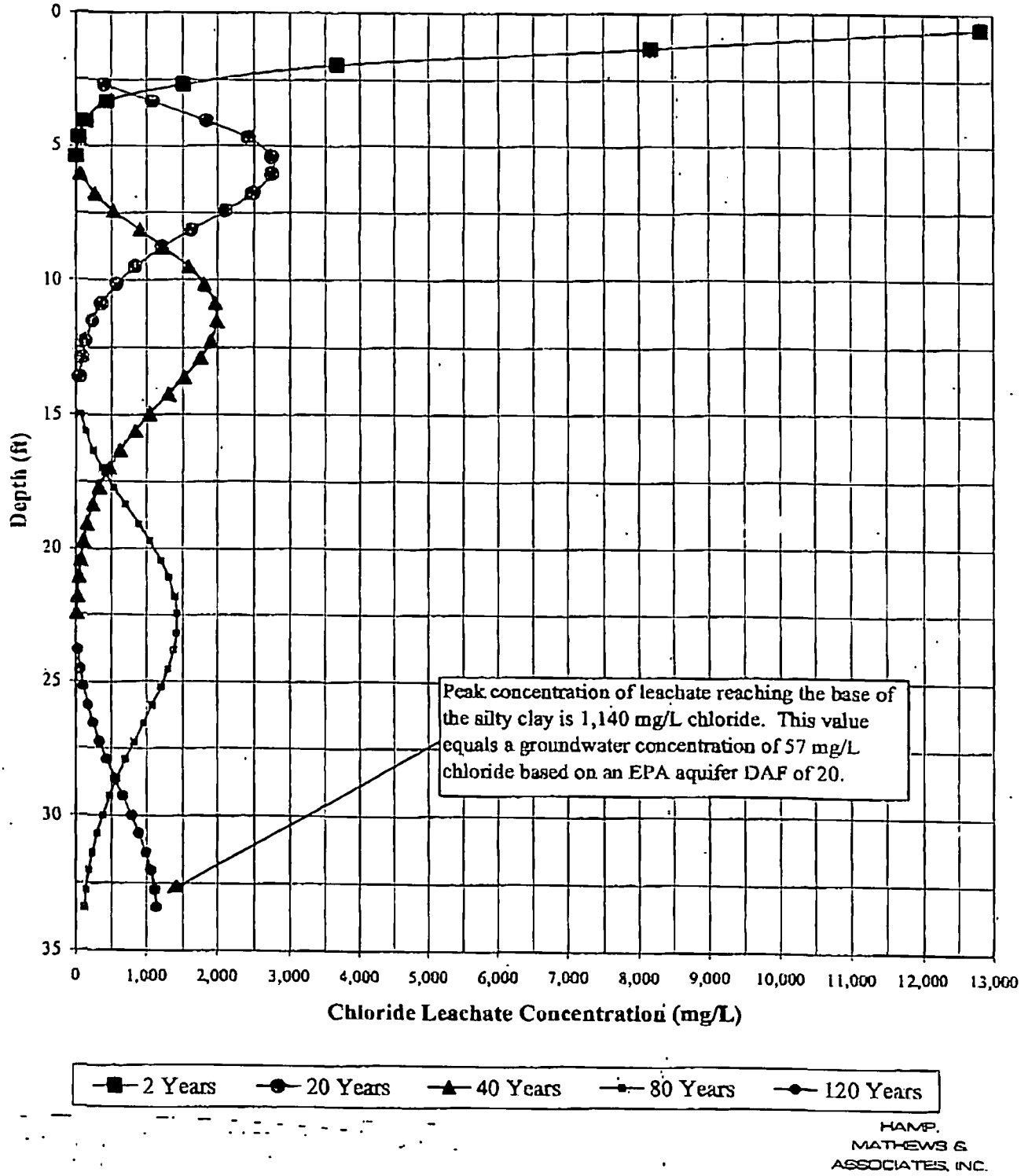
HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 12. 120-YEAR SIMULATION OF CHLORIDE MIGRATION THROUGH SILTY CLAY (90-DAY SURFACE RELEASE AT 50,000 mg/L CHLORIDE).



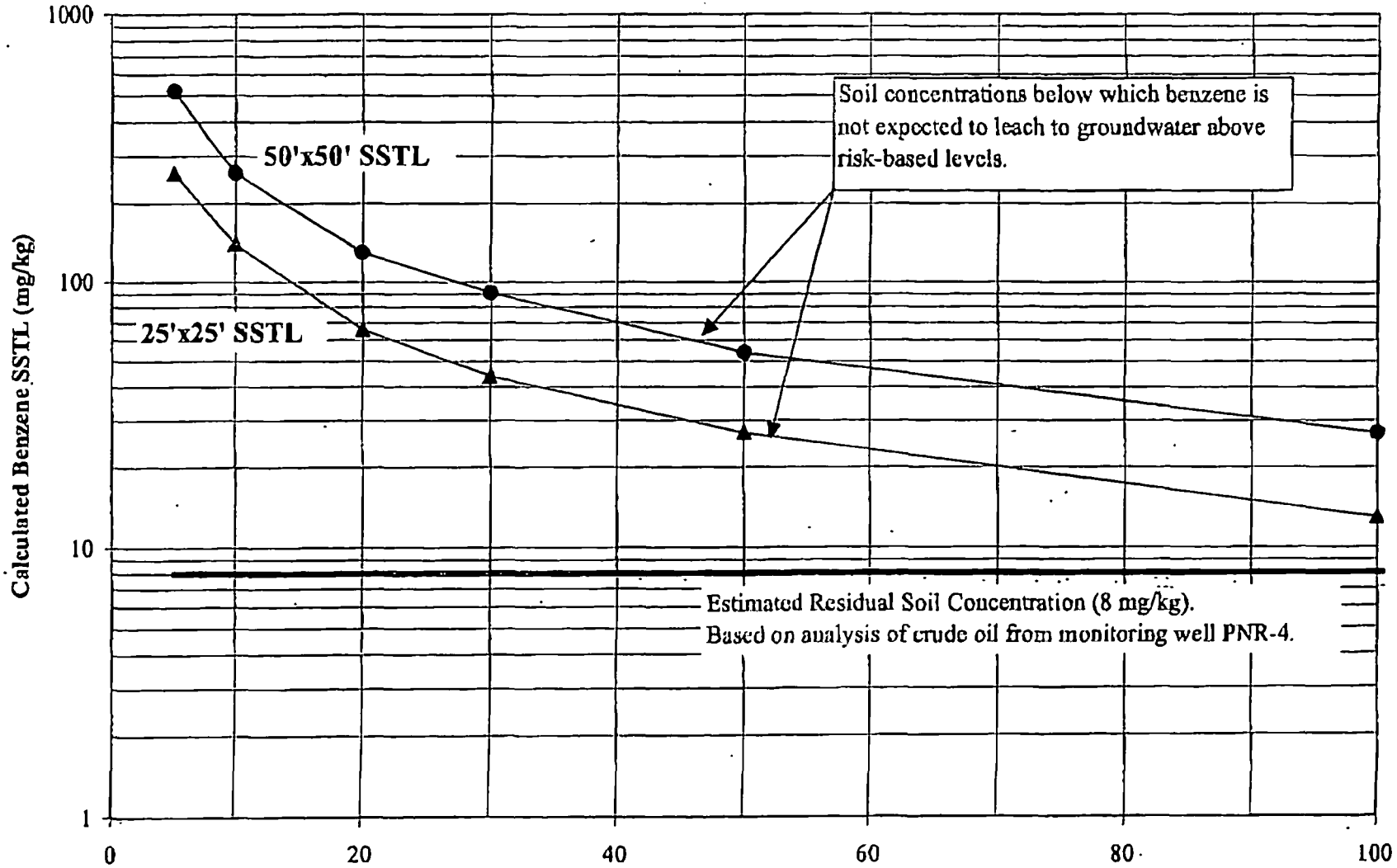
HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 13. 120-YEAR SIMULATION OF CHLORIDE MIGRATION THROUGH SILTY CLAY (365-DAY SURFACE RELEASE AT 50,000 mg/L CHLORIDE).



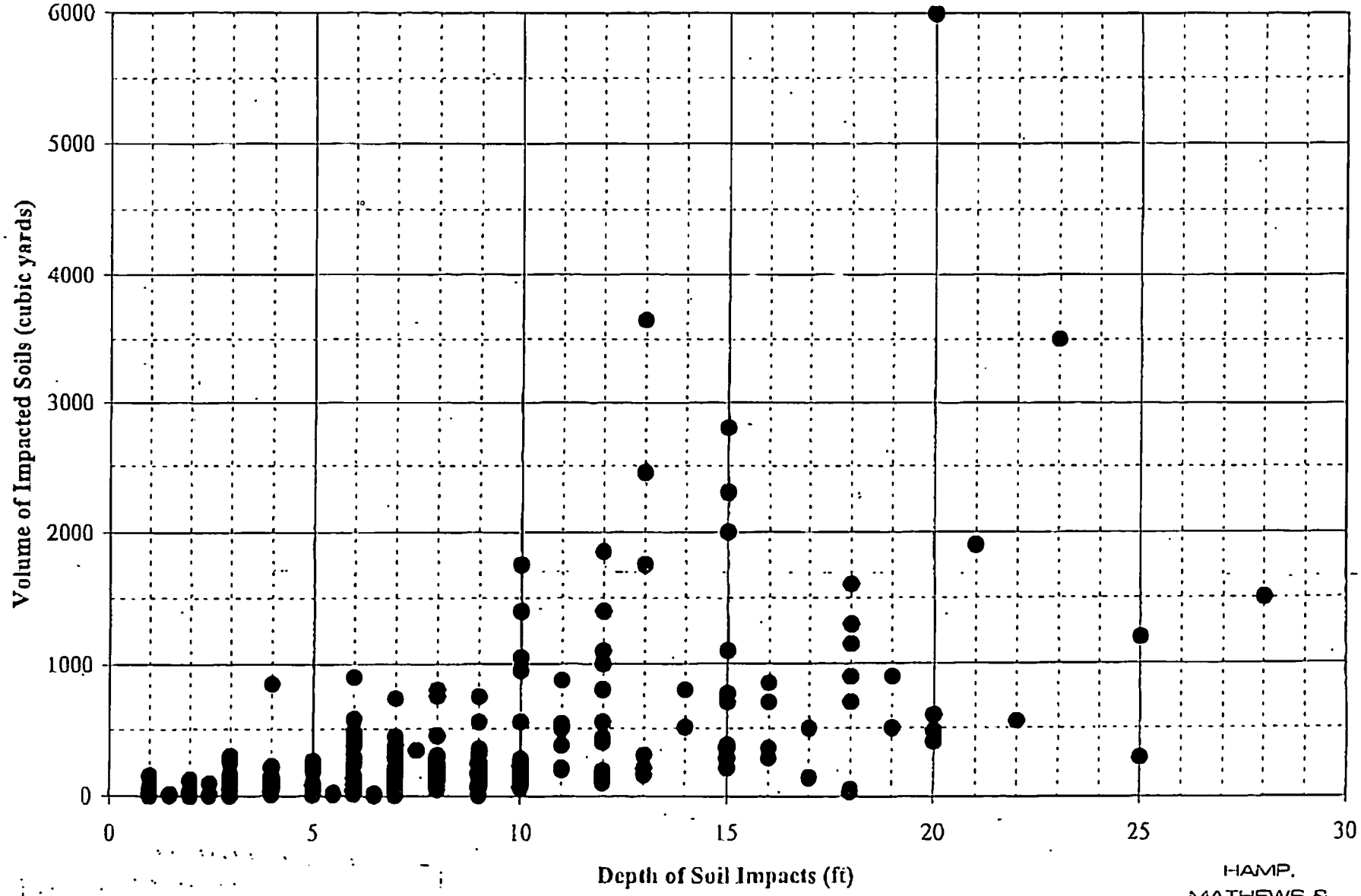
HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 14. RBCA ANALYSIS OF CRUDE OIL RELEASE AND BENZENE MIGRATION THROUGH SILTY CLAY.



HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 15. DEPTH OF SOIL IMPACTS VS. VOLUME OF IMPACTED SOILS.



HAMP, MATHEWS & ASSOCIATES, INC.

Documents Supporting EPA's Proposal to Withdraw Marathon Oil Company from Emergency Administrative Orders No. SDWA-8-99-68 and SDWA-08-2001-33

Document No. 3

HAMP, MATHEWS & ASSOCIATES, INC.
15266 Ann Drive
Bath, Michigan 48808
(517) 641-7333
Fax (517) 641-7337

August 23, 2002

Mr. Nathan M. Wiser
Environmental Scientist
999 18th Street, Suite 500 (8ENF-T)
Denver, CO 80202

RE: Summary of Technical Teleconference with U.S. EPA Regarding Additional Groundwater Testing at Marathon Oil Company's Former Buckles Wells, East Poplar Oil Field Groundwater Contamination, Poplar, Montana

Dear Mr. Wiser:

The purpose of this letter is to summarize our a technical discussion conducted telephonically earlier today among yourself, Mr. Doug Kinnett (MAP), Mr. Lonn Hamp (HMA), and myself.

Parties to the technical discussion concluded that two groundwater samples will be collected at the locations shown on the attached site map. These locations are located approximately 500 feet from the former Buckles SWD #1. Each boring will be drilled by means of hollow-stem augers (4.25-inch ID) and water samples will be collected through 2-inch diameter well screen and casing temporarily set in the Quaternary aquifer zone. The aquifer zone will be sampled vertically every 10 feet.

Each temporary well setting will be initially developed by a screw-type pump to remove sediment from the temporary well. After development, at least three standing well volumes will be purged from the temporary well by means of a clean disposable bailer. The bailer will also be used to collect water samples for field screening (electrical conductivity, pH, and chloride) and shipment to Energy Laboratories in Billings, Montana for analysis (pH, total dissolved solids, chloride, sodium, magnesium, potassium, carbonate, bicarbonate, sulfate, calcium, benzene, toluene, ethylbenzene, and xylenes with Level III Qa/Qc documentation for all testing). Duplicate samples will be collected and shipped overnight to the testing laboratory in separate coolers under standard chain-of-custody procedures. The water level at the uppermost well screen setting at each boring will be determined to the nearest foot relative to the ground surface. Once the water samples are collected each boring will be plugged and abandoned in accordance with State of Montana requirements and the site returned to its original condition.

Based on our discussion, you concluded that should Marathon demonstrate the absence of groundwater impacts at the two boring locations shown on the attached map, you would support the removal of Marathon from the Emergency Administrative Order.

Please contact us with any questions you may have.

Sincerely,

Hamp, Mathews & Associates, Inc.

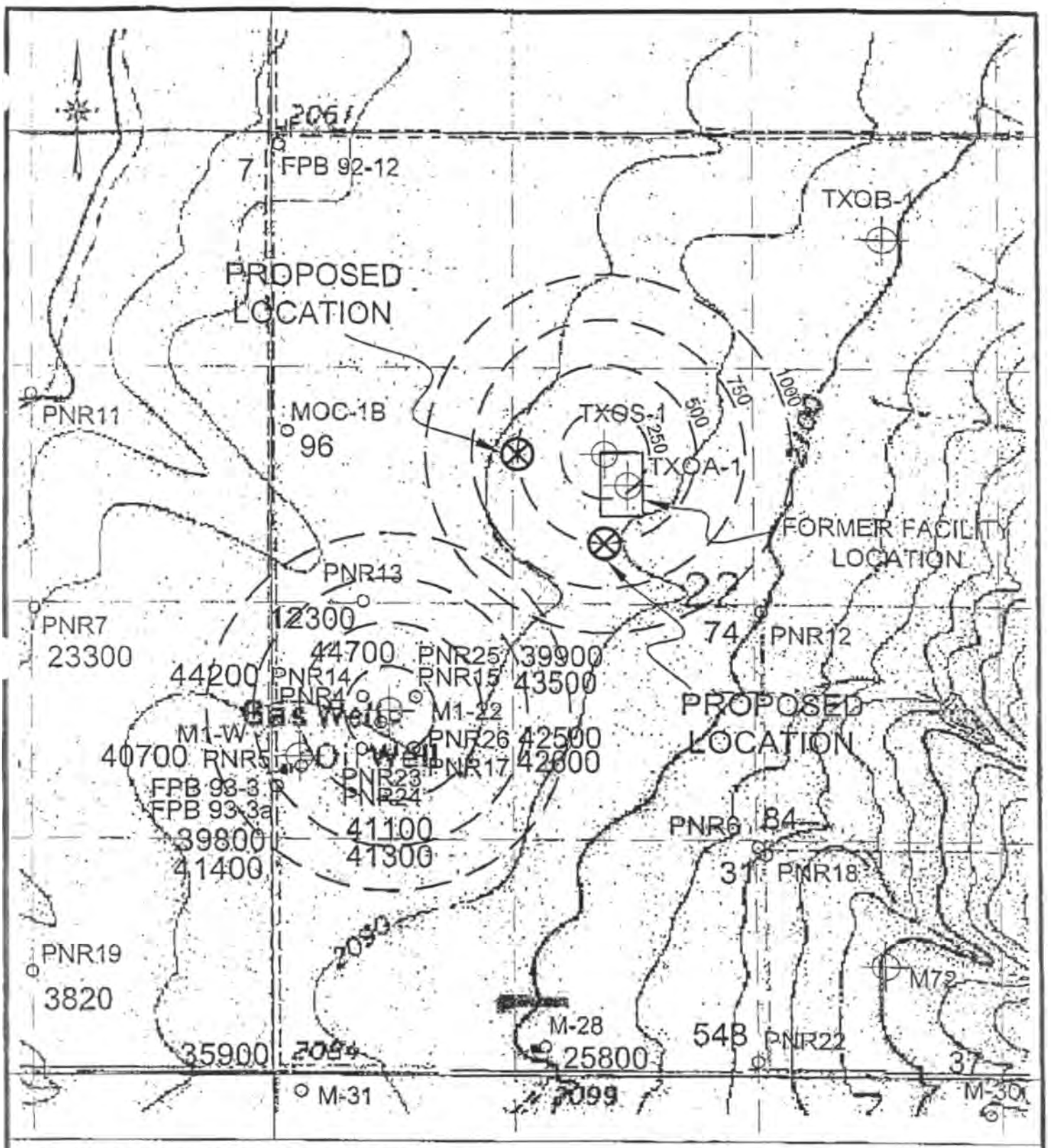
Alan R. Mathews

Alan R. Mathews, P.E.
Principal Environmental Engineer

Attachments - Figure 1

cc: John D. Fognani, Esq., FGHR, Denver, Colorado
Mr. Doug G. Kinnett, MAP, Hillsdale, Michigan
John Brown, Esq., MOC, Houston, Texas
Ms. Jennifer S. Bracey, MOC, Houston, Texas
R. Kirk Mueller, Esq., FGHR, Denver, Colorado

David A. Carson, Esq., U.S. DOJ, Denver, Colorado
James H. Eppers, Esq., U.S. EPA



NOTE: VALUES SHOWN ARE CHLORIDE CONCENTRATIONS (mg/L)

0' 750'

SCALE (FEET)

HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 1. PROPOSED TEST BORING LOCATIONS NEAR THE FORMER TXO BUCKLES SWD WELL.

Documents Supporting EPA's Proposal to Withdraw Marathon Oil Company from Emergency Administrative Orders No. SDWA-8-99-68 and SDWA-08-2001-33

Document No. 4

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible.
Refer to corresponding notes on reverse side.

Page 1 of 1

Company Name: Hamp, Mathews + Assoc.

Project Name, PWS #, Permit #, Etc.: East Poplar

Report Address: 15266 Ann Drive, Bath, MI 48808

Contact Name, Phone, Fax, E-mail: Alan Mathews 517-641-7333 517-641-7337 Fax mathews@voyager.net

Sampler Name if other than Contact:

Invoice Address: 15266 Ann Drive, Bath, MI 48808

Invoice Contact & Phone #: Alan Mathews 517-641-7333

Purchase Order #: 7-3-0202

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other _____

Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other _____
EDD/EDT ☐ Format _____

Number of Containers
Sample Type: A W S V U O
Air Water Soils/Solids Vegetation Urine Other

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: 48 hr TAT

Fax Results

Receipt Temp 13 °C
Cooler ID(s)
Custody Seal (Y) N
Intact (Y) N
Signature Match (Y) N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	BTEX	TDS	Chloride	Carbonate/Bicarbonate	Sulfate	Sodium (Na) Dissolved	Calcium (Ca) Dissolved	Magnesium (Mg) Dissolved	Potassium (K) Dissolved	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	TXOSB-1(40-45) Dup1	9/3/02	1400	4W	X	X	X	X	X	X	X	X	X			X	BU2090325-1
2	TXOSB-1(55-60) Dup1	9/3/02	2000	4W	X	X	X	X	X	X	X	X	X			X	2
3	TXOSB-1(48-53) Dup1	9/4/02	0800	4W	X	X	X	X	X	X	X	X	X			X	3
4	TXOSB-2(45-50) Dup1	9/4/02	1400	4W	X	X	X	X	X	X	X	X	X			X	4
5	TXOSB-2(55-60) Dup1	9/4/02	1800	4W	X	X	X	X	X	X	X	X	X			X	5
6																	
7																	
8																	
9																	
10																	

4

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by: Alan Mathews Date/Time: 9/5/02 800 Shipped by: UPS Received by: Date/Time:

Relinquished by: Date/Time: Shipped by: VARS GK Received by: Michael McDonald Date/Time: 09/09/02

Sample Disposal: Return to client: _____ Lab Disposal: X

LABORATORY USE ONLY
Sample Type: _____ # of fractions 0915

Visit our web site at www.energylab.com

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 1

PLEASE PRINT, provide as much information as possible.
Refer to corresponding notes on reverse side.

Company Name: Hamp Mathews + Assoc.	Project Name, PWS #, Permit #, Etc.: East Poplar
Report Address: 15266 Ann Drive Bath, MI 48808	Contact Name, Phone, Fax, E-mail: Alan Mathews 517-641-7333 641-7337 — Sampler Name if other than Contact:
Invoice Address: Same	Invoice Contact & Phone #: Same — Purchase Order #: 7-3-0202 — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other _____

Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other _____
EDD/EDT ☐ Format _____

Number of Containers
Sample Type: A W S V U O
Air Water Soils/Solids Vegetation Urine Other

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: 48 hr TAT Fax Results

Receipt Temp 13 °C
Cooler ID(s)
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	BTEX	TDS	Chloride	Carbonate/Bicarbonate	Bicarbonate Sulfate	Sodium	Magnesium	Calcium	Potassium	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	TXOSB-1 (40-45) Dup2	9/3/02	1400	4W	X	→	→	→	→	→	→	→	→			X	B0209 0325-6
2	TXOSB-1 (55-60) Dup2	9/3/02	2000	4W	X	→	→	→	→	→	→	→	→			X	7
3	TXOSB-1 (48-53) Dup2	9/4/02	0800	4W	X	→	→	→	→	→	→	→	→			X	8
4	TXOSB-2 (45-50) Dup2	9/4/02	1400	4W	X	→	→	→	→	→	→	→	→			X	9
5	TXOSB-2 (55-60) Dup2	9/4/02	1800	4W	X	→	→	→	→	→	→	→	→			X	10
6																	
7																	
8																	
9																	
10																	

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by: Alan Mathews	Date/Time: 9/5/02 0800	Shipped by: UPS	Received by: — Date/Time:
Relinquished by:	Date/Time:	Shipped by: ARSGR	Received by: Wrightel McDonald 09/09/02 0915

Sample Disposal: Return to client: _____ Lab Disposal: X

LABORATORY USE ONLY
Sample Type: _____ # of fractions _____

Visit our web site at www.energylab.com for additional information, downloadable for ...

Document No. 5

Merit Laboratories, Inc.
2680 East Lansing Dr. East La., MI 48823
Phone (517) 332-0167 Fax (517) 332-6333

C.O.C. PAGE # 1 OF 1

010956

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME: Alan Mathews
COMPANY: Hamp, Mathews + Assoc.
ADDRESS: 15266 Ann Drive
CITY: Bath
STATE: MI
ZIP CODE: 48808
PHONE NO.: 517-641-7333
FAX NO.: 641-7337
P.O. NO.: 7-3-0202
E-MAIL ADDRESS: mathews@voyager.net
QUOTE NO.:
PROJECT NO./NAME: East Poplar
SAMPLER(S) - PLEASE PRINT NAME: Alan Mathews

INVOICE TO

CONTACT NAME:
☐ SAME
COMPANY: Same
ADDRESS:
CITY:
STATE:
ZIP CODE:
PHONE NO.:
FAX NO.:
P.O. NO.:

PRESERVATIVE CODE: E / B / A
REFRIGERATE (Y/N): Y / N / Y
BOTTLE TYPE: 40 ml Vial / 250 ml Plastic / 500 ml Plastic

SAMPLE TYPE: GW ☒ WW ☐ OIL ☐ SOIL ☐ PRODUCT ☐ SLUDGE ☐ OTHER

A = NONE, B = HNO_3, C = H_2SO_4, D = NaOH, E = HCL, F =

RUSH ANALYSES ☒ DUE DATE 9/9/02
RUSH PICK-UP ☐ APPROVED BY:

MERIT LAB NO.	SAMPLE COLLECTION YEAR: 02 DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	# OF BOTTLES	40 ml Vial	250 ml Plastic	500 ml Plastic	ANALYSES
0339 01	9/3	1400	TXOSB-1 (40-45)	4	2	1	1	BTEX, TDS, Chloride, Carbonate, Bicarbonate, Sulfate, Sodium (Na), Magnesium (Mg), Calcium (Ca), Potassium (K)
02	9/3	2000	TXOSB-1 (55-60)	4	2	1	1	
03	9/4	0800	TXOSB-1 (48-53)	4	2	1	1	
04	9/4	1400	TXOSB-2 (45-50)	4	2	1	1	
05	9/4	1800	TXOSB-2 (55-60)	4	2	1	1	
06			Trip Blank					

Rush 24hr TAT

5

RELINQUISHED BY: SIGNATURE: Alan Mathews ☒ SAMPLER	DATE 9/6/02	TIME	
RECEIVED BY: SIGNATURE: [illegible]	DATE 09-06-02	TIME 1415	
RELINQUISHED BY: SIGNATURE	DATE	TIME	
RECEIVED BY: SIGNATURE	DATE	TIME	

RELINQUISHED BY: SIGNATURE	DATE	TIME	
RECEIVED AT MERIT BY: SIGNATURE	DATE	TIME	
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	NOTES: TEMP. ON ARRIVAL
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	

PLEASE NOTE: SIGNING ACKNOWLEDGES ACCEPTANCE OF TERMS & CONDITIONS ON REVERSE SIDE

12/27/02 17:30 FAX 7202640510 FOGNANI GUIBORD 055

Document No. 6

ENERGY LABORATORIES P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/10/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									
								Batch: TDS020909A	
Sample ID: LFB1	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	1140	mg/L	10.0	98.7	80	120		09/09/02 21:33	
Sample ID: B02090294-001A MS	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	7550	mg/L	10.0	92.7	80	120		09/09/02 21:35	
Sample ID: B02090294-001A MSD	Sample Matrix Spike Duplicate								
Solids, Total Dissolved TDS @ 180 C	7500	mg/L	10.0	92	80	120	0.7	09/09/02 21:35 20	
Sample ID: LFB2	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	1190	mg/L	10.0	101	80	120		09/09/02 21:54	
Sample ID: B02090314-004A MS	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	2220	mg/L	10.0	101	80	120		09/09/02 21:56	
Sample ID: B02090314-004A MSD	Sample Matrix Spike Duplicate								
Solids, Total Dissolved TDS @ 180 C	2190	mg/L	10.0	101	80	120	1.6	09/09/02 21:56 20	
Method: A2540 C									
								Batch: TDS020909B	
Sample ID: LFB3	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	1070	mg/L	10.0	100	80	120		09/09/02 22:14	
Sample ID: B02090325-008A MS	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	5410	mg/L	10.0	100	80	120		09/09/02 22:18	
Sample ID: B02090325-008A MSD	Sample Matrix Spike Duplicate								
Solids, Total Dissolved TDS @ 180 C	5310	mg/L	10.0	99.5	80	120	1.9	09/09/02 22:19 20	
Sample ID: LFB4	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	1050	mg/L	10.0	99.8	80	120		09/09/02 22:36	
Sample ID: B02090346-008A MS	Sample Matrix Spike								
Solids, Total Dissolved TDS @ 180 C	2670	mg/L	10.0	101	80	120		09/09/02 22:39	
Sample ID: B02090346-008A MSD	Sample Matrix Spike Duplicate								
Solids, Total Dissolved TDS @ 180 C	2590	mg/L	10.0	102	80	120	3.3	09/09/02 22:39 20	

6

Qualifiers: ND - Not Detected at the Reporting Limit
R - RPD outside of recommended recovery limits
S - Spike Recovery outside of recommended recovery limits

ENERGY LABORATORIES
ENERGY LABORATORIES, INC. - P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • elf@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/10/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Batch: R13803	
Sample ID: B02081403-019FMS2	Sample Matrix Spike							09/09/02 12:03	
Calcium	270	mg/L	0.600	72.5	70	130			
Magnesium	112	mg/L	0.200	78	70	130			
Sodium	102	mg/L	0.0600	75.7	70	130			
Sample ID: B02081403-019FMSD2	Sample Matrix Spike Duplicate							09/09/02 12:07	
Calcium	261	mg/L	0.600	64.3	70	130	3.1	20	S
Magnesium	111	mg/L	0.200	75.2	70	130	0.7	20	
Sodium	102	mg/L	0.600	75.8	70	130	0	20	
Sample ID: B02081405-003DMS2	Sample Matrix Spike							09/09/02 12:56	
Calcium	273	mg/L	0.600	87.7	70	130			
Magnesium	152	mg/L	0.200	77.9	70	130			
Sodium	98.1	mg/L	0.600	72.7	70	130			
Sample ID: B02081405-003DMSD2	Sample Matrix Spike Duplicate							09/09/02 13:00	
Calcium	265	mg/L	0.600	80.5	70	130	2.7	20	
Magnesium	153	mg/L	0.200	78.9	70	130	0.7	20	
Sodium	102	mg/L	0.600	78.4	70	130	5.8	20	
Sample ID: B02081458-012DMS2	Sample Matrix Spike							09/09/02 13:49	
Calcium	95.1	mg/L	0.300	96.9	70	130			
Magnesium	63.5	mg/L	0.100	93.5	70	130			
Sodium	68.6	mg/L	0.300	91.5	70	130			
Sample ID: B02081458-012DMSD2	Sample Matrix Spike Duplicate							09/09/02 13:53	
Calcium	96.6	mg/L	0.300	99.8	70	130	1.5	20	
Magnesium	64.6	mg/L	0.100	95.8	70	130	1.8	20	
Sodium	70.5	mg/L	0.300	95.2	70	130	2.7	20	
Sample ID: B02090325-002BMS2	Sample Matrix Spike							09/09/02 14:43	
Calcium	592	mg/L	0.150	91.4	70	130			
Magnesium	501	mg/L	0.500	98.7	70	130			
Sodium	573	mg/L	1.50	101	70	130			
Sample ID: B02090325-002BMSD2	Sample Matrix Spike Duplicate							09/09/02 14:54	
Calcium	610	mg/L	0.150	98.6	70	130	3.0	20	
Magnesium	517	mg/L	0.500	105	70	130	3.3	20	
Sodium	588	mg/L	1.50	107	70	130	2.6	20	
Sample ID: B02091261-002BMS2	Sample Matrix Spike							09/09/02 15:47	
Calcium	606	mg/L	1.50	99.1	70	130			
Magnesium	598	mg/L	0.500	97.2	70	130			
Sodium	509	mg/L	1.50	104	70	130			

Qualifiers: ND - Not Detected at the Reporting Limit
S - Spike Recovery outside of recommended recovery limits
R - RPD outside of recommended recovery limits

ENERGY LABORATORIES
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/10/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									
								Batch: R13803	
Sample ID: B02081261-002BMSD2	Sample Matrix Spike Duplicate								
Calcium	608	mg/L	1.50	100	70	130	0.4	09/09/02 16:51	
Magnesium	593	mg/L	0.500	95.1	70	130	0.9	20	
Sodium	501	mg/L	1.50	101	70	130	1.6	20	
Sample ID: B02081261-019BMS2	Sample Matrix Spike								
Calcium	501	mg/L	1.50	98.5	70	130		09/09/02 16:44	
Magnesium	503	mg/L	0.500	92.7	70	130			
Sodium	348	mg/L	1.50	97.9	70	130			
Sample ID: B02081261-019BMSD2	Sample Matrix Spike Duplicate								
Calcium	489	mg/L	1.50	93.9	70	130	2.4	09/09/02 16:48	
Magnesium	489	mg/L	0.500	88.9	70	130	3.0	20	
Sodium	336	mg/L	1.50	92.9	70	130	3.6	20	
Sample ID: B02081510-016CMS2	Sample Matrix Spike								
Calcium	176	mg/L	0.300	90.2	70	130		09/10/02 03:44	
Magnesium	61.0	mg/L	0.100	95.3	70	130			
Sodium	58.2	mg/L	0.300	95.4	70	130			
Sample ID: B02081510-016CMSD2	Sample Matrix Spike Duplicate								
Calcium	181	mg/L	0.300	98.9	70	130	2.5	09/10/02 03:47	
Magnesium	63.0	mg/L	0.100	99.3	70	130	3.3	20	
Sodium	60.7	mg/L	0.300	100	70	130	4.1	20	
Sample ID: B02081532-006BMS2	Sample Matrix Spike								
Calcium	440	mg/L	1.50	89.1	70	130		09/10/02 04:45	
Magnesium	490	mg/L	0.500	96.3	70	130			
Sodium	428	mg/L	1.50	103	70	130			
Sample ID: B02081532-006BMSD2	Sample Matrix Spike Duplicate								
Calcium	459	mg/L	1.50	97	70	130	4.4	09/10/02 04:49	
Magnesium	504	mg/L	0.500	102	70	130	2.8	20	
Sodium	441	mg/L	1.50	108	70	130	2.9	20	

Qualifiers: ND - Not Detected at the Reporting Limit
R - RPD outside of recommended recovery limits
S - Spike Recovery outside of recommended recovery limits

ENERGY LABORATORIES
1120 South 27th Street • Billings, MT 59101-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • ell@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/10/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Batch: R13818
Sample ID: B02081356-001DMS2	Sample Matrix Spike								09/10/02 11:15
Calcium	85.0	mg/L	0.306	94.7	70	130			
Magnesium	61.4	mg/L	0.102	101	70	130			
Potassium	53.8	mg/L	0.0510	105	70	130			
Sodium	58.5	mg/L	0.306	104	70	130			
Sample ID: B02081356-001DMSD2	Sample Matrix Spike Duplicate								09/10/02 11:18
Calcium	84.6	mg/L	0.306	94	70	130	0.4	20	
Magnesium	61.1	mg/L	0.102	100	70	130	0.6	20	
Potassium	53.1	mg/L	0.0510	103	70	130	1.5	20	
Sodium	56.0	mg/L	0.306	103	70	130	0.9	20	
Sample ID: B02090325-006BMS2	Sample Matrix Spike								09/10/02 12:19
Calcium	604	mg/L	1.53	89.1	70	130			
Magnesium	517	mg/L	0.510	98.5	70	130			
Potassium	263	mg/L	0.255	101	70	130			
Sodium	566	mg/L	1.53	106	70	130			
Sample ID: B02090325-006BMSD2	Sample Matrix Spike Duplicate								09/10/02 12:23
Calcium	611	mg/L	1.53	91.8	70	130	1.1	20	
Magnesium	511	mg/L	0.510	95.9	70	130	1.3	20	
Potassium	260	mg/L	0.255	99.8	70	130	1.1	20	
Sodium	557	mg/L	1.53	103	70	130	1.6	20	
Sample ID: B02090162-006AMS2	Sample Matrix Spike								09/10/02 13:13
Calcium	132	mg/L	0.612	94.3	70	130			
Magnesium	127	mg/L	0.204	97.4	70	130			
Potassium	118	mg/L	0.102	101	70	130			
Sodium	351	mg/L	0.612	92.6	70	130			
Sample ID: B02090162-006AMSD2	Sample Matrix Spike Duplicate								09/10/02 13:16
Calcium	134	mg/L	0.612	96.4	70	130	1.6	20	
Magnesium	127	mg/L	0.204	97.2	70	130	0.2	20	
Potassium	118	mg/L	0.102	101	70	130	0.3	20	
Sodium	351	mg/L	0.612	92.2	70	130	0.1	20	

Qualifiers: ND - Not Detected at the Reporting Limit
R - RPD outside of recommended recovery limits
S - Spike Recovery outside of recommended recovery limits

ENERGY LABORATORIES
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/10/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: R13801
Sample ID: B02090325-001AMS	Sample Matrix Spike								09/09/02 14:02
Chloride	354	mg/L	1.53	112	80	120			
Sulfate	9450	mg/L	13.3	119	80	120			
Sample ID: B02090325-001AMSD	Sample Matrix Spike Duplicate								09/09/02 14:13
Chloride	370	mg/L	1.53	119	80	120	4.4	20	
Sample ID: B02090167-001AMS	Sample Matrix Spike								09/09/02 16:28
Chloride	3620	mg/L	1.53	82.7	80	120			
Sulfate	1200	mg/L	13.3	116	80	120			
Sample ID: B02090167-001AMSD	Sample Matrix Spike Duplicate								09/09/02 16:38
Chloride	3670	mg/L	1.53	103	80	120	1.4	20	
Sulfate	1220	mg/L	13.3	119	80	120	1.9	20	

Qualifiers: ND - Not Detected at the Reporting Limit
R - RPD outside of recommended recovery limits
S - Spike Recovery outside of recommended recovery limits

Document No. 7

Merit Laboratories, Inc.

Analytical Laboratory Report

Report ID: S10339.01(01)
nerated on 09/10/2002

Report to

Attention: Mr. Alan Mathews
Hamp, Mathews & Associates, Inc.
15266 Ann Dr.
Bath, MI 48808

Phone: 641-7333 FAX: 641-7337

Report produced by

Merit Laboratories
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Report Summary

Lab Sample ID(s): S10339.01-S10339.06
Project: East Poplar
Submitted Date/Time: 09/06/2002 15:15
Sampled by: AM
P.O. #: 7-3-0202

7

Report Notes

Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
Results relate only to items tested.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Violetta F. Murshak

Violetta F. Murshak
Laboratory Director

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S10339.01
ple Tag: TXOSB-1 (40-45)
lected Date/Time: 09/03/2002 14:00
Matrix: Groundwater
COC Reference: 010956

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	HNO3	Yes	4	4025
1	500ml Plastic	None	Yes	4	4025
2	40 ml Glass	HCL	Yes	4	4025

Analysis	Results	Units	RDL	Method	Date Run	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			3015A	09/09/02	PER		
Inorganics								
Carbonate Alkalinity	Not detected	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate Alkalinity	500	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate	660	mg/L	10		09/09/02	MJC		
Carbonate	Not detected	mg/L	10		09/09/02	MJC		
Chloride	66	mg/L	1	300.0	09/09/02	JDP		
Sulfate	2,000	mg/L	1	300.0	09/09/02	JDP		
Total Dissolved Solids	3937	mg/L	1	160.1	09/10/02	JANB		
Metals								
lium	435	mg/L	0.05	200.8	09/09/02	PER	7440-70-2	
lesium	281	mg/L	0.05	200.8	09/09/02	PER	7439-95-4	
Potassium	10.1	mg/L	0.05	200.8	09/09/02	PER	7440-09-7	
Sodium	319	mg/L	0.05	200.8	09/09/02	PER	7440-23-5	
Organics								
BTEX, GC/MS								
Benzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	71-43-2	
Toluene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-88-3	
Ethylbenzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	100-41-4	
p,m-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-42-3	
o-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	95-47-6	

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S10339.02
Sample Tag: TXOSB-1 (55-60)
Collected Date/Time: 09/03/2002 20:00
Matrix: Groundwater
COC Reference: 010956

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	HNO3	Yes	4	4025
1	500ml Plastic	None	Yes	4	4025
2	40 ml Glass	HCL	Yes	4	4025

Analysis	Results	Units	RDL	Method	Date Run	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			3015A	09/09/02	PER		
Inorganics								
Carbonate Alkalinity	Not detected	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate Alkalinity	460	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate	600	mg/L	10		09/09/02	MJC		
Carbonate	Not detected	mg/L	10		09/09/02	MJC		
Chloride	79	mg/L	1	300.0	09/09/02	JDP		
Sulfate	1,590	mg/L	1	300.0	09/09/02	JDP		
Total Dissolved Solids	3530	mg/L	1	160.1	09/10/02	JANB		
Metals								
Calcium	341	mg/L	0.05	200.8	09/09/02	PER	7440-70-2	
Magnesium	235	mg/L	0.05	200.8	09/09/02	PER	7439-95-4	
Potassium	9.61	mg/L	0.05	200.8	09/09/02	PER	7440-09-7	
Sodium	307	mg/L	0.05	200.8	09/09/02	PER	7440-23-5	
Organics								
BTEX, GC/MS								
Benzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	71-43-2	
Toluene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-88-3	
Ethylbenzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	100-41-4	
p,m-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-42-3	
o-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	95-47-6	

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S10339.03
nple Tag: TXOSB-1 (48-53)
.. ollected Date/Time: 09/04/2002 08:00
Matrix: Groundwater
COC Reference: 010956

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	HNO3	Yes	4	4025
1	500ml Plastic	None	Yes	4	4025
2	40 ml Glass	HCL	Yes	4	4025

Analysis	Results	Units	RDL	Method	Date Run	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			3015A	09/09/02	PER		
Inorganics								
Carbonate Alkalinity	Not detected	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate Alkalinity	480	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate	630	mg/L	10		09/09/02	MJC		
Carbonate	Not detected	mg/L	10		09/09/02	MJC		
Chloride	75	mg/L	1	300.0	09/09/02	JDP		
Sulfate	1,660	mg/L	1	300.0	09/09/02	JDP		
Total Dissolved Solids	3422	mg/L	1	160.1	09/10/02	JANB		
Metals								
·lum	361	mg/L	0.05	200.8	09/09/02	PER	7440-70-2	
,nesium	240	mg/L	0.05	200.8	09/09/02	PER	7439-95-4	
Potassium	10.6	mg/L	0.05	200.8	09/09/02	PER	7440-09-7	
Sodium	302	mg/L	0.05	200.8	09/09/02	PER	7440-23-5	
Organics								
BTEX, GC/MS								
Benzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	71-43-2	
Toluene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-88-3	
Ethylbenzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	100-41-4	
p,m-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	106-42-3	
o-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	95-47-6	

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S10339.04
Sample Tag: TXOSB-2 (45-50)
Collected Date/Time: 09/04/2002 14:00
Matrix Groundwater
COC Reference: 010956

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	HNO3	Yes	4	4025
1	500ml Plastic	None	Yes	4	4025
2	40 ml Glass	HCL	Yes	4	4025

Analysis	Results	Units	RDL	Method	Date Run	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			3015A	09/09/02	PER		
Inorganics								
Carbonate Alkalinity	Not detected	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate Alkalinity	400	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate	520	mg/L	10		09/09/02	MJC		
Carbonate	Not detected	mg/L	10		09/09/02	MJC		
Chloride	90	mg/L	1	300.0	09/09/02	JDP		
Sulfate	2,070	mg/L	1	300.0	09/09/02	JDP		
Total Dissolved Solids	3694	mg/L	1	160.1	09/10/02	JANB		
Metals								
[illegible]um	401	mg/L	0.05	200.8	09/09/02	PER	7440-70-2	
[illegible]nesium	292	mg/L	0.05	200.8	09/09/02	PER	7439-95-4	
Potassium	10.5	mg/L	0.05	200.8	09/09/02	PER	7440-09-7	
Sodium	360	mg/L	0.05	200.8	09/09/02	PER	7440-23-5	
Organics								
BTEX, GC/MS								
Benzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	71-43-2	
Toluene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-88-3	
Ethylbenzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	100-41-4	
p,m-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	106-42-3	
o-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	95-47-6	

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S10339.05
Sample Tag: TXOSB-2 (55-60)
Collected Date/Time: 09/04/2002 16:00
Matrix: Groundwater
COC Reference: 010955

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	HNO3	Yes	4	4025
1	500ml Plastic	None	Yes	4	4025
2	40 ml Glass	HCL	Yes	4	4025

Analysis	Results	Units	RDL	Method	Date Run	Analyst	CAS #	Flags
Extraction / Prep.								
Metal Digestion	Completed			3015A	09/09/02	PER		
Inorganics								
Carbonate Alkalinity	Not detected	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate Alkalinity	440	mg/L	10	310.1	09/09/02	MJC		
Bicarbonate	580	mg/L	10		09/09/02	MJC		
Carbonate	Not detected	mg/L	10		09/09/02	MJC		
Chloride	92	mg/L	1	300.0	09/09/02	JDP		
Sulfate	1,980	mg/L	1	300.0	09/09/02	JDP		
Total Dissolved Solids	3862	mg/L	1	160.1	09/10/02	JANB		
Metals								
Calcium	378	mg/L	0.05	200.8	09/09/02	PER	7440-70-2	
Magnesium	275	mg/L	0.05	200.8	09/09/02	PER	7439-95-4	
Potassium	11.6	mg/L	0.05	200.8	09/09/02	PER	7440-09-7	
Sodium	373	mg/L	0.05	200.8	09/09/02	PER	7440-23-5	
Organics								
BTEX, GC/MS								
Benzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	71-43-2	
Toluene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-88-3	
Ethylbenzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	100-41-4	
p,m-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	106-42-3	
o-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	95-47-6	

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S10339.06
Sample Tag: Trip Blank
Collected Date/Time: 09/03/2002
Matrix: Groundwater
COC Reference: 010956

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	40 ml Glass	HCL	Yes	4	4025

Analysis	Results	Units	RDL	Method	Date Run	Analyst	CAS #	Flags
Organics								
BTEX, GC/MS								
Benzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	71-43-2	
Toluene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-88-3	
Ethylbenzene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	100-41-4	
p,m-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	108-42-3	
o-Xylene	Not detected	mg/L	0.001	8260B	09/08/02	JGH	95-47-6	

Documents Supporting EPA's Proposal to Withdraw Marathon Oil Company from Emergency Administrative Orders No. SDWA-8-99-68 and SDWA-08-2001-33

Document No. 8

ENERGY LABORATORIES
P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/11/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									
									Batch: R13852
Sample ID: blk	Method Blank								09/10/02 10:35
Benzene	ND	ug/L	0.500						
Ethylbenzene	ND	ug/L	0.500						
Toluene	ND	ug/L	0.500						
m+p-Xylenes	ND	ug/L	0.500						
o-Xylene	ND	ug/L	0.500						
Xylenes, Total	ND	ug/L							
Surr: 1,2-Dichloroethane-d4				104	70	130			
Surr: Dibromofluoromethane				102	77	126			
Surr: p-Bromofluorobenzene				95.2	76	127			
Surr: Toluene-d8				101	79	122			

8

Qualifiers: ND - Not Detected at the Reporting Limit
R - RPD outside of recommended recovery limits
S - Spike Recovery outside of recommended recovery limits

ENERGY LABORATORIES
800-735-4489 • 406-252-6325 • 406-252-6069 fax • all@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/11/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R13913
Sample ID: blk	Method Blank								09/11/02 10:13
Benzene	ND	ug/L	0.500						
Ethylbenzene	ND	ug/L	0.500						
Toluene	ND	ug/L	0.500						
m+p-Xylenes	ND	ug/L	0.500						
o-Xylene	ND	ug/L	0.500						
Xylenes, Total	ND	ug/L							
Surr: 1,2-Dichloroethane-d4				103	70	130			
Surr: Dibromofluoromethane				98	77	126			
Surr: p-Bromofluorobenzene				96.4	76	127			
Surr: Toluene-d8				99.2	79	122			
Sample ID: LCS	Laboratory Control Spike								09/11/02 14:24
Benzene	4.96	ug/L	0.500	99.2	74	120			
Ethylbenzene	5.84	ug/L	0.500	117	74.6	120			
Toluene	5.92	ug/L	0.500	118	70.5	129			
m+p-Xylenes	10.7	ug/L	0.500	107	72.8	125			
o-Xylene	5.56	ug/L	0.500	111	71.5	127			
Surr: 1,2-Dichloroethane-d4				104	70	130			
Surr: Dibromofluoromethane				104	77	126			
Surr: p-Bromofluorobenzene				96.4	76	127			
Surr: Toluene-d8				92	79	122			
Sample ID: B02090325-010CMS	Sample Matrix Spike								09/11/02 15:03
Benzene	4.80	ug/L	0.500	96	74	120			
Ethylbenzene	5.00	ug/L	0.500	100	74.6	120			
Toluene	5.36	ug/L	0.500	107	70.5	129			
m+p-Xylenes	9.88	ug/L	0.500	98.8	72.8	125			
o-Xylene	5.28	ug/L	0.500	106	71.5	127			
Xylenes, Total	15.2	ug/L		101	70	130			
Surr: 1,2-Dichloroethane-d4				107	70	130			
Surr: Dibromofluoromethane				98	77	126			
Surr: p-Bromofluorobenzene				96.4	76	127			
Surr: Toluene-d8				86	79	122			
Sample ID: B02090325-010CMSD	Sample Matrix Spike Duplicate								09/11/02 15:43
Benzene	4.84	ug/L	0.500	96.8	74	120	0.8	20	
Ethylbenzene	5.20	ug/L	0.500	104	74.6	120	3.9	20	
Toluene	5.66	ug/L	0.500	111	70.5	129	3.7	20	
m+p-Xylenes	10.2	ug/L	0.500	102	72.8	125	3.2	20	
o-Xylene	5.40	ug/L	0.500	108	71.5	127	2.2	20	
Xylenes, Total	15.6	ug/L		104	70	130	2.9	20	
Surr: 1,2-Dichloroethane-d4				99.2	70	130	0	0	
Surr: Dibromofluoromethane				101	77	126	0	0	

Qualifiers: ND - Not Detected at the Reporting Limit
S - Spike Recovery outside of recommended recovery limits
R - RPD outside of recommended recovery limits

ENERGY LABORATORIES
P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

QA/QC Summary Report

Client: Hamp Mathews and Associates
Project: East Poplar

Report Date: 09/11/02
Work Order: B02090325

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									
									Batch: R13913
Sample ID: B02090325-010CMSD	Sample Matrix Spike Duplicate								09/11/02 15:43
Surr: p-Bromofluorobenzene				98.4	76	127	0	0	
Surr: Toluene-d8				85.2	78	122	0	0	

Qualifiers: ND - Not Detected at the Reporting Limit
R - RPD outside of recommended recovery limits
S - Spike Recovery outside of recommended recovery limits

Document No. 9

ENERGY LABORATORIES
ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-001
Client Sample ID: TXOSB-1 (40-45) Dup 1

Report Date: 09/13/02
Collection Date: 09/03/02 14:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3860	mg/L		10		A2540 C	09/09/02 22:02 / ldv
INORGANICS							
Bicarbonate as HCO3	636	mg/L		2		A2320 B	09/09/02 14:26 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 14:26 / ldv
Chloride	74	mg/L	D	2		E300.0	09/09/02 13:52 / ldv
Sulfate	2250	mg/L	D	10		E300.0	09/09/02 13:52 / ldv
METALS, DISSOLVED							
Calcium	384	mg/L	D	2		E200.7	09/10/02 11:49 / rlh
Magnesium	275	mg/L		1		E200.7	09/10/02 11:49 / rlh
Potassium	11	mg/L		1		E200.7	09/10/02 11:49 / rlh
Sodium	306	mg/L	D	2		E200.7	09/10/02 11:49 / rlh
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	09/11/02 11:05 / trr
Ethylbenzene	ND	ug/L		1.0		SW8260B	09/11/02 11:05 / trr
Toluene	ND	ug/L		1.0		SW8260B	09/11/02 11:05 / trr
m+p-Xylenes	ND	ug/L		1.0		SW8260B	09/11/02 11:05 / trr
o-Xylene	ND	ug/L		1.0		SW8260B	09/11/02 11:05 / trr
Xylenes, Total	ND	ug/L		1.0		SW8260B	09/11/02 11:05 / trr
Surr: 1,2-Dichloroethane-d4	108	%REC			70-130	SW8260B	09/11/02 11:05 / trr
Surr: Dibromofluoromethane	99.2	%REC			77-126	SW8260B	09/11/02 11:05 / trr
Surr: p-Bromofluorobenzene	96.4	%REC			76-127	SW8260B	09/11/02 11:05 / trr
Surr: Toluene-d8	100	%REC			79-122	SW8260B	09/11/02 11:05 / trr

The reporting limit reflects a 2 times dilution. The sample was diluted due to low internal standard recovery in the undiluted analysis.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-002
Client Sample ID: TXOSB-1 (55-60) Dup 1

Report Date: 09/13/02
Collection Date: 09/03/02 20:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3220	mg/L		10		A2540 C	09/09/02 22:04 / ldv
INORGANICS							
Bicarbonate as HCO3	641	mg/L		2		A2320 B	09/09/02 14:48 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 14:48 / ldv
Chloride	82	mg/L	D	2		E300.0	09/09/02 14:23 / ldv
Sulfate	1750	mg/L	D	10		E300.0	09/09/02 14:23 / ldv
METALS, DISSOLVED							
Calcium	302	mg/L	D	2		E200.7	09/10/02 11:53 / rth
Magnesium	225	mg/L		1		E200.7	09/10/02 11:53 / rth
Potassium	10	mg/L		1		E200.7	09/10/02 11:53 / rth
Sodium	288	mg/L	D	2		E200.7	09/10/02 11:53 / rth
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	09/11/02 11:45 / trr
Ethylbenzene	ND	ug/L		1.0		SW8260B	09/11/02 11:45 / trr
Toluene	ND	ug/L		1.0		SW8260B	09/11/02 11:45 / trr
m+p-Xylenes	ND	ug/L		1.0		SW8260B	09/11/02 11:45 / trr
o-Xylene	ND	ug/L		1.0		SW8260B	09/11/02 11:45 / trr
Xylenes, Total	ND	ug/L		1.0		SW8260B	09/11/02 11:45 / trr
Surr: 1,2-Dichloroethane-d4	105	%REC			70-130	SW8260B	09/11/02 11:45 / trr
Surr: Dibromofluoromethane	98.8	%REC			77-126	SW8260B	09/11/02 11:45 / trr
Surr: p-Bromofluorobenzene	95.6	%REC			76-127	SW8260B	09/11/02 11:45 / trr
Surr: Toluene-d8	101	%REC			79-122	SW8260B	09/11/02 11:45 / trr

The reporting limit reflects a 2 times dilution. The sample was diluted due to low internal standard recovery in the undiluted analysis. The sample was not properly acidified to a pH<2. The pH as received was 7.

Report Definitions:
RL - Analyte reporting limit
QCL - Quality control limit
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES
ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com.

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-003
Client Sample ID: TXOSB-1 (48-53) Dup 1

Report Date: 09/13/02
Collection Date: 09/04/02 08:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3370	mg/L		10		A2540 C	09/09/02 22:05 / ldv
INORGANICS							
Bicarbonate as HCO3	647	mg/L		2		A2320 B	09/09/02 14:56 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 14:56 / ldv
Chloride	83	mg/L	D	2		E300.0	09/09/02 14:33 / ldv
Sulfate	1850	mg/L	D	10		E300.0	09/09/02 14:33 / ldv
METALS, DISSOLVED							
Calcium	321	mg/L	D	2		E200.7	09/10/02 11:56 / rth
Magnesium	235	mg/L		1		E200.7	09/10/02 11:56 / rth
Potassium	13	mg/L		1		E200.7	09/10/02 11:56 / rth
Sodium	295	mg/L	D	2		E200.7	09/10/02 11:56 / rth
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	09/11/02 12:25 / trr
Ethylbenzene	ND	ug/L		1.0		SW8260B	09/11/02 12:25 / trr
Toluene	ND	ug/L		1.0		SW8260B	09/11/02 12:25 / trr
m+p-Xylenes	ND	ug/L		1.0		SW8260B	09/11/02 12:25 / trr
o-Xylene	ND	ug/L		1.0		SW8260B	09/11/02 12:25 / trr
Xylenes, Total	ND	ug/L		1.0		SW8260B	09/11/02 12:25 / trr
Surr: 1,2-Dichloroethane-d4	106	%REC			70-130	SW8260B	09/11/02 12:25 / trr
Surr: Dibromofluoromethane	102	%REC			77-128	SW8260B	09/11/02 12:25 / trr
Surr: p-Bromofluorobenzene	100	%REC			76-127	SW8260B	09/11/02 12:25 / trr
Surr: Toluene-d8	96.4	%REC			79-122	SW8260B	09/11/02 12:25 / trr

The reporting limit reflects a 2 times dilution. The sample was diluted due to low internal standard recovery in the undiluted analysis.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES
ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • ell@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-004
Client Sample ID: TXOSB-2 (45-50) Dup 1

Report Date: 09/13/02
Collection Date: 09/04/02 14:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3920	mg/L		10		A2540 C	09/09/02 22:06 / ldv
INORGANICS							
Bicarbonate as HCO3	565	mg/L		2		A2320 B	09/09/02 15:04 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 15:04 / ldv
Chloride	92	mg/L	D	2		E300.0	09/09/02 14:44 / ldv
Sulfate	2310	mg/L	D	10		E300.0	09/09/02 14:44 / ldv
METALS, DISSOLVED							
Calcium	357	mg/L	D	2		E200.7	09/10/02 12:00 / rlh
Magnesium	277	mg/L		1		E200.7	09/10/02 12:00 / rlh
Potassium	11	mg/L		1		E200.7	09/10/02 12:00 / rlh
Sodium	335	mg/L	D	2		E200.7	09/10/02 12:00 / rlh
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	09/11/02 13:04 / trr
Ethylbenzene	ND	ug/L		1.0		SW8260B	09/11/02 13:04 / trr
Toluene	ND	ug/L		1.0		SW8260B	09/11/02 13:04 / trr
m+p-Xylenes	ND	ug/L		1.0		SW8260B	09/11/02 13:04 / trr
o-Xylene	ND	ug/L		1.0		SW8260B	09/11/02 13:04 / trr
Xylenes, Total	ND	ug/L		1.0		SW8260B	09/11/02 13:04 / trr
Surr: 1,2-Dichloroethane-d4	108	%REC			70-130	SW8260B	09/11/02 13:04 / trr
Surr: Dibromofluoromethane	103	%REC			77-126	SW8260B	09/11/02 13:04 / trr
Surr: p-Bromofluorobenzene	94.4	%REC			76-127	SW8260B	09/11/02 13:04 / trr
Surr: Toluene-d8	97.2	%REC			79-122	SW8260B	09/11/02 13:04 / trr

The reporting limit reflects a 2 times dilution. The sample was diluted due to low internal standard recovery in the undiluted analysis.The sample was not properly acidified to a pH<2. The pH as received was 4 .

Report Definitions:
RL - Analyte reporting limit
QCL - Quality control limit
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-005
Client Sample ID: TXOSB-2 (55-60) Dup 1

Report Date: 09/13/02
Collection Date: 09/04/02 18:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3800	mg/L		10		A2540 C	09/09/02 22:08 / ldv
INORGANICS							
Bicarbonate as HCO3	581	mg/L		2		A2320 B	09/09/02 15:14 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 15:14 / ldv
Chloride	95	mg/L	D	2		E300.0	09/09/02 14:54 / ldv
Sulfate	2140	mg/L	D	10		E300.0	09/09/02 14:54 / ldv
METALS, DISSOLVED							
Calcium	335	mg/L	D	2		E200.7	09/10/02 12:04 / rth
Magnesium	262	mg/L		1		E200.7	09/10/02 12:04 / rth
Potassium	12	mg/L		1		E200.7	09/10/02 12:04 / rth
Sodium	351	mg/L	D	2		E200.7	09/10/02 12:04 / rth
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50		SW8260B	09/10/02 15:43 / trr
Ethylbenzene	ND	ug/L		0.50		SW8260B	09/10/02 15:43 / trr
Toluene	ND	ug/L		0.50		SW8260B	09/10/02 15:43 / trr
m+p-Xylenes	ND	ug/L		0.50		SW8260B	09/10/02 15:43 / trr
o-Xylene	ND	ug/L		0.50		SW8260B	09/10/02 15:43 / trr
Xylenes, Total	ND	ug/L		0.50		SW8260B	09/10/02 15:43 / trr
Surr: 1,2-Dichloroethane-d4	106	%REC			70-130	SW8260B	09/10/02 15:43 / trr
Surr: Dibromofluoromethane	106	%REC			77-126	SW8260B	09/10/02 15:43 / trr
Surr: p-Bromofluorobenzene	94.0	%REC			76-127	SW8260B	09/10/02 15:43 / trr
Surr: Toluene-d8	96.8	%REC			79-122	SW8260B	09/10/02 15:43 / trr

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES
ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-006
Client Sample ID: TXOSB-1 (40-45) Dup 2

Report Date: 09/13/02
Collection Date: 09/03/02 14:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3880	mg/L		10		A2540 C	09/09/02 22:09 / ldv
INORGANICS							
Bicarbonate as HCO3	632	mg/L		2		A2320 B	09/09/02 15:22 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 15:22 / ldv
Chloride	69	mg/L	D	2		E300.0	09/09/02 15:05 / ldv
Sulfate	2240	mg/L	D	10		E300.0	09/09/02 15:05 / ldv
METALS, DISSOLVED							
Calcium	381	mg/L	D	2		E200.7	09/10/02 12:08 / rth
Magnesium	271	mg/L		1		E200.7	09/10/02 12:08 / rth
Potassium	11	mg/L		1		E200.7	09/10/02 12:08 / rth
Sodium	301	mg/L	D	2		E200.7	09/10/02 12:08 / rth
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50		SW8260B	09/10/02 16:23 / trr
Ethylbenzene	ND	ug/L		0.50		SW8260B	09/10/02 16:23 / trr
Toluene	ND	ug/L		0.50		SW8260B	09/10/02 16:23 / trr
m+p-Xylenes	ND	ug/L		0.50		SW8260B	09/10/02 16:23 / trr
o-Xylene	ND	ug/L		0.50		SW8260B	09/10/02 16:23 / trr
Xylenes, Total	ND	ug/L		0.50		SW8260B	09/10/02 16:23 / trr
Surr: 1,2-Dichloroethane-d4	106	%REC			70-130	SW8260B	09/10/02 16:23 / trr
Surr: Dibromofluoromethane	101	%REC			77-126	SW8260B	09/10/02 16:23 / trr
Surr: p-Bromofluorobenzene	98.4	%REC			76-127	SW8260B	09/10/02 16:23 / trr
Surr: Toluene-d8	98.4	%REC			79-122	SW8260B	09/10/02 16:23 / trr

Report Definitions:
RL - Analyte reporting limit
QCL - Quality control limit
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES
P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-007
Client Sample ID: TXOSB-1 (55-60) Dup 2

Report Date: 09/13/02
Collection Date: 09/03/02 20:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3240	mg/L		10		A2540 C	09/09/02 22:11 / ldv
INORGANICS							
Bicarbonate as HCO3	643	mg/L		2		A2320 B	09/09/02 15:32 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 15:32 / ldv
Chloride	81	mg/L	D	2		E300.0	09/09/02 15:36 / ldv
Sulfate	1760	mg/L	D	10		E300.0	09/09/02 15:36 / ldv
METALS, DISSOLVED							
Calcium	313	mg/L	D	2		E200.7	09/10/02 12:27 / rth
Magnesium	228	mg/L		1		E200.7	09/10/02 12:27 / rth
Potassium	10	mg/L		1		E200.7	09/10/02 12:27 / rth
Sodium	294	mg/L	D	2		E200.7	09/10/02 12:27 / rth
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50		SW8260B	09/10/02 17:03 / trr
Ethylbenzene	ND	ug/L		0.50		SW8260B	09/10/02 17:03 / trr
Toluene	ND	ug/L		0.50		SW8260B	09/10/02 17:03 / trr
m+p-Xylenes	ND	ug/L		0.50		SW8260B	09/10/02 17:03 / trr
o-Xylene	ND	ug/L		0.50		SW8260B	09/10/02 17:03 / trr
Xylenes, Total	ND	ug/L		0.50		SW8260B	09/10/02 17:03 / trr
Surr: 1,2-Dichloroethane-d4	110	%REC			70-130	SW8260B	09/10/02 17:03 / trr
Surr: Dibromofluoromethane	99.6	%REC			77-126	SW8260B	09/10/02 17:03 / trr
Surr: p-Bromofluorobenzene	94.0	%REC			76-127	SW8260B	09/10/02 17:03 / trr
Surr: Toluene-d8	96.0	%REC			79-122	SW8260B	09/10/02 17:03 / trr

The sample was not properly acidified to a pH<2. The pH as received was 4.

Report Definitions:
RL - Analyte reporting limit
QCL - Quality control limit
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-008
Client Sample ID: TXOSB-1 (48-53) Dup 2

Report Date: 09/13/02
Collection Date: 09/04/02 08:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3370	mg/L		10		A2540 C	09/09/02 22:18 / ldv
INORGANICS							
Bicarbonate as HCO3	573	mg/L		2		A2320 B	09/09/02 15:40 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 15:40 / ldv
Chloride	80	mg/L	D	2		E300.0	09/09/02 15:46 / ldv
Sulfate	1660	mg/L	D	10		E300.0	09/09/02 15:46 / ldv
METALS, DISSOLVED							
Calcium	329	mg/L	D	2		E200.7	09/10/02 12:31 / rth
Magnesium	237	mg/L		1		E200.7	09/10/02 12:31 / rth
Potassium	11	mg/L		1		E200.7	09/10/02 12:31 / rth
Sodium	299	mg/L	D	2		E200.7	09/10/02 12:31 / rth
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	09/11/02 13:44 / trr
Ethylbenzene	ND	ug/L		1.0		SW8260B	09/11/02 13:44 / trr
Toluene	ND	ug/L		1.0		SW8260B	09/11/02 13:44 / trr
m+p-Xylenes	ND	ug/L		1.0		SW8260B	09/11/02 13:44 / trr
o-Xylene	ND	ug/L		1.0		SW8260B	09/11/02 13:44 / trr
Xylenes, Total	ND	ug/L		1.0		SW8260B	09/11/02 13:44 / trr
Surr: 1,2-Dichloroethane-d4	106	%REC			70-130	SW8260B	09/11/02 13:44 / trr
Surr: Dibromofluoromethane	102	%REC			77-126	SW8260B	09/11/02 13:44 / trr
Surr: p-Bromofluorobenzene	93.6	%REC			76-127	SW8260B	09/11/02 13:44 / trr
Surr: Toluene-d8	94.4	%REC			79-122	SW8260B	09/11/02 13:44 / trr

The reporting limit reflects a 2 times dilution. The sample was diluted due to low internal standard recovery in the undiluted analysis.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES
ENERGY LABORATORIES, INC. - P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-009
Client Sample ID: TXOSB-2 (45-50) Dup 2

Report Date: 09/13/02
Collection Date: 09/04/02 14:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3950	mg/L		10		A2540 C	09/09/02 22:21 / ldv
INORGANICS							
Bicarbonate as HCO3	565	mg/L		2		A2320 B	09/09/02 15:46 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 15:46 / ldv
Chloride	91	mg/L	D	2		E300.0	09/09/02 15:57 / ldv
Sulfate	2280	mg/L	D	10		E300.0	09/09/02 15:57 / ldv
METALS, DISSOLVED							
Calcium	358	mg/L	D	2		E200.7	09/10/02 12:34 / rlh
Magnesium	277	mg/L		1		E200.7	09/10/02 12:34 / rlh
Potassium	10	mg/L		1		E200.7	09/10/02 12:34 / rlh
Sodium	338	mg/L	D	2		E200.7	09/10/02 12:34 / rlh
/OLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50		SW8260B	09/10/02 18:24 / trr
Ethylbenzene	ND	ug/L		0.50		SW8260B	09/10/02 18:24 / trr
Toluene	ND	ug/L		0.50		SW8260B	09/10/02 18:24 / trr
m+p-Xylenes	ND	ug/L		0.50		SW8260B	09/10/02 18:24 / trr
o-Xylene	ND	ug/L		0.50		SW8260B	09/10/02 18:24 / trr
Xylenes, Total	ND	ug/L		0.50		SW8260B	09/10/02 18:24 / trr
Surr: 1,2-Dichloroethane-d4	106	%REC			70-130	SW8260B	09/10/02 18:24 / trr
Surr: Dibromofluoromethane	98.4	%REC			77-126	SW8260B	09/10/02 18:24 / trr
Surr: p-Bromofluorobenzene	95.6	%REC			78-127	SW8260B	09/10/02 18:24 / trr
Surr: Toluene-d8	93.2	%REC			79-122	SW8260B	09/10/02 18:24 / trr

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES
ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Hamp Mathews and Associates
Project: East Poplar
Lab ID: B02090325-010
Client Sample ID: TXOSB-2 (55-60) Dup 2

Report Date: 09/13/02
Collection Date: 09/04/02 18:00
Date Received: 09/09/02
Matrix: AQUEOUS

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Dissolved TDS @ 180 C	3840	mg/L		10		A2540 C	09/09/02 22:23 / ldv
INORGANICS							
Bicarbonate as HCO3	683	mg/L		2		A2320 B	09/09/02 15:54 / ldv
Carbonate as CO3	ND	mg/L		1		A2320 B	09/09/02 15:54 / ldv
Chloride	95	mg/L	D	2		E300.0	09/09/02 16:07 / ldv
Sulfate	2140	mg/L	D	10		E300.0	09/09/02 16:07 / ldv
METALS, DISSOLVED							
Calcium	341	mg/L	D	2		E200.7	09/10/02 12:38 / rth
Magnesium	263	mg/L		1		E200.7	09/10/02 12:38 / rth
Potassium	11	mg/L		1		E200.7	09/10/02 12:38 / rth
Sodium	356	mg/L	D	2		E200.7	09/10/02 12:38 / rth
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		0.50		SW8260B	09/10/02 19:04 / trr
Ethylbenzene	ND	ug/L		0.50		SW8260B	09/10/02 19:04 / trr
Toluene	ND	ug/L		0.50		SW8260B	09/10/02 19:04 / trr
m+p-Xylenes	ND	ug/L		0.50		SW8260B	09/10/02 19:04 / trr
o-Xylene	ND	ug/L		0.50		SW8260B	09/10/02 19:04 / trr
Xylenes, Total	ND	ug/L		0.50		SW8260B	09/10/02 19:04 / trr
Surr: 1,2-Dichloroethane-d4	114	%REC			70-130	SW8260B	09/10/02 19:04 / trr
Surr: Dibromofluoromethane	98.0	%REC			77-126	SW8260B	09/10/02 19:04 / trr
Surr: p-Bromofluorobenzene	96.4	%REC			76-127	SW8260B	09/10/02 19:04 / trr
Surr: Toluene-d8	93.6	%REC			79-122	SW8260B	09/10/02 19:04 / trr

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

Document No. 10

FOGNANI GUIBORD HOMSY & ROBERTS, LLP

CHICAGO
20 N. CLARK STREET
THIRTY-SECOND FLOOR
CHICAGO, ILLINOIS 60601
TELEPHONE: (312) 596-7777
FACSIMILE: (312) 596-7788

DENVER
555 SEVENTEENTH STREET
TWENTY-SIXTH FLOOR
DENVER, COLORADO 80202
TELEPHONE: (303) 382-6200
FACSIMILE: (303) 382-6210
WWW.FGHR.COM

NEW YORK
1350 AVENUE OF THE AMERICAS
THIRTY-FIRST FLOOR
NEW YORK, NEW YORK 10019
TELEPHONE: (212) 974-0060
FACSIMILE: (212) 974-0648

September 18, 2002

VIA FACSIMILE

David A. Carson, Esq.
U.S. Department of Justice
Environment and Natural Resources Division
Suite 945 – North Tower, 999 18th Street
Denver, CO 80202

10a

Re: Marathon Oil Company v. U.S. EPA

Dear Dave:

As we recently discussed, attached are the preliminary findings related to the groundwater samples taken in areas at or near the Buckles in the East Poplar Field, as requested by the United States Environmental Protection Agency ("EPA"). Hamp, Mathews and Associates, Inc. gathered the samples in support of Marathon Oil Company's ("MOC") efforts to be excluded from EPA's Emergency Administrative Order regarding the East Poplar Oil Field. Sample splits were delivered to a laboratory designated by EPA in Billings, Montana. The analytical results from the Montana lab are expected in the next week or two

Thank you very much for your continuing assistance and cooperation. Please do not hesitate to contact me with any questions, comments or concerns you may have.

Very truly yours,

John D. Fognani
of FOGNANI GUIBORD HOMSY & ROBERTS, LLP

JDF/so
Enclosure
#17734

Document No. 11

Project Name:	EAST POPLAR	Boring/Well Number:	TXOSB-1
Owner/Client:	MARATHON		
Project Number:	7-3-0202	Boring/Well Location:	500' SOUTH OF BUCKLES SWD-1
Date Drilled:	3 SEP 02	Drilling Contractor:	HANSEN ENVIRONMENTAL
Logged By:	A MATHEWS	Drilling Method:	4- 1/4" HSA Rig Type: CME 55
First Occurence of G.W.:	37' Reference Point:	Boring Depth (ft):	67'
Dates Measured:	3 SEP 02 SURFACE (2087.5')	Boring Diameter (in):	8"

DEPTH (FT)	SAMPLE LOC	WATER LEVEL	GRAPHICAL LOG	LITHOLOGIC DESCRIPTION	USCS
0				TOPSOIL: Light gray, dry, sandy.	
				SANDY CLAY: Grayish brown to gray, dry to slightly moist, firm and crumbly, high sand content at top, decreasing sand content with depth, trace coarse sand and gravel.	CL
5				CLAY: Grayish brown to gray, slightly moist to moist, firm to stiff, trace sand and gravel, some reddish brown mottling around gravel grains.	CL
10					
20				SILTY SAND: Gray, fine to medium grained with silt and clay, moist, poorly graded, medium dense.	SM
				SANDY CLAY: Grayish brown to brown, moist, stiff, trace gravel.	CL
25					
30				SILT: Grayish brown, moist, firm, few fine grained sand layers, clayey.	ML
				SANDY CLAY: Grayish brown with reddish brown mottling, moist, firm to stiff, trace gravel, high content of very fine grained sand , crumbly texture.	CL
35		▽			
40				SILTY SAND: Grayish brown to brown, fine to medium grained with silt, wet, well graded, medium dense, decreasing silt content and increasing grain size with depth.	SM
				GRAVELLY SAND: Brown, medium to coarse grained with gravel, wet, well graded, dense.	SW
45				SAND: Grayish brown, medium grained, wet, well graded, medium dense, no gravel, decreasing grain size with depth, some black silty layers present toward base.	SW
50					

HYDROGEOLOGIC LOG

Project Name:	EAST POPLAR	Boring/Well Number:	TXOSB-1
Owner/Client:	MARATHON		
Project Number:	7-3-0202	Boring/Well Location:	500' SOUTH OF BUCKLES SWD-1
Date Drilled:	3 SEP 02	Drilling Contractor:	HANSEN ENVIRONMENTAL
Logged By:	A MATHEWS	Drilling Method:	4- 1/4" HSA Rig Type: CME 55
First Occurence of G.W.:	37' Reference Point:	Boring Depth (ft):	67'
Dates Measured:	3 SEP 02 SURFACE (2087.5')	Boring Diameter (in):	8"

DEPTH (FT)	SAMPLE LOC	WATER LEVEL	GRAPHICAL LOG	LITHOLOGIC DESCRIPTION	USCS
				SAND: Continued	
55				SAND & GRAVEL: Brown to grayish brown, medium to coarse grained sand and fine to medium grained gravel, wet, well graded, dense, gravel is predominantly brown in coloring.	GW
60					
				SHALE: Black, mix of hard black clay/shale and cobbles.	
70					
75					
80					
85					
90					
100					

Project Name: EAST POPLAR Owner/Client: MARATHON	Boring/Well Number: TXOSB-2
Project Number: 7-3-0202	Boring/Well Location: 500' WEST OF BUCKLES SWD-1
Date Drilled: 4 SEP 02 Logged By: A MATHEWS	Drilling Contractor: HANSEN ENVIRONMENTAL Drilling Method: 4-1/4" HSA · Rig Type: CME 55
First Occurence of G.W.: 34.5' Reference Point: Dates Measured: 3 SEP 02 SURFACE (2085.6')	Boring Depth (ft): 67' Boring Diameter (in): 8"

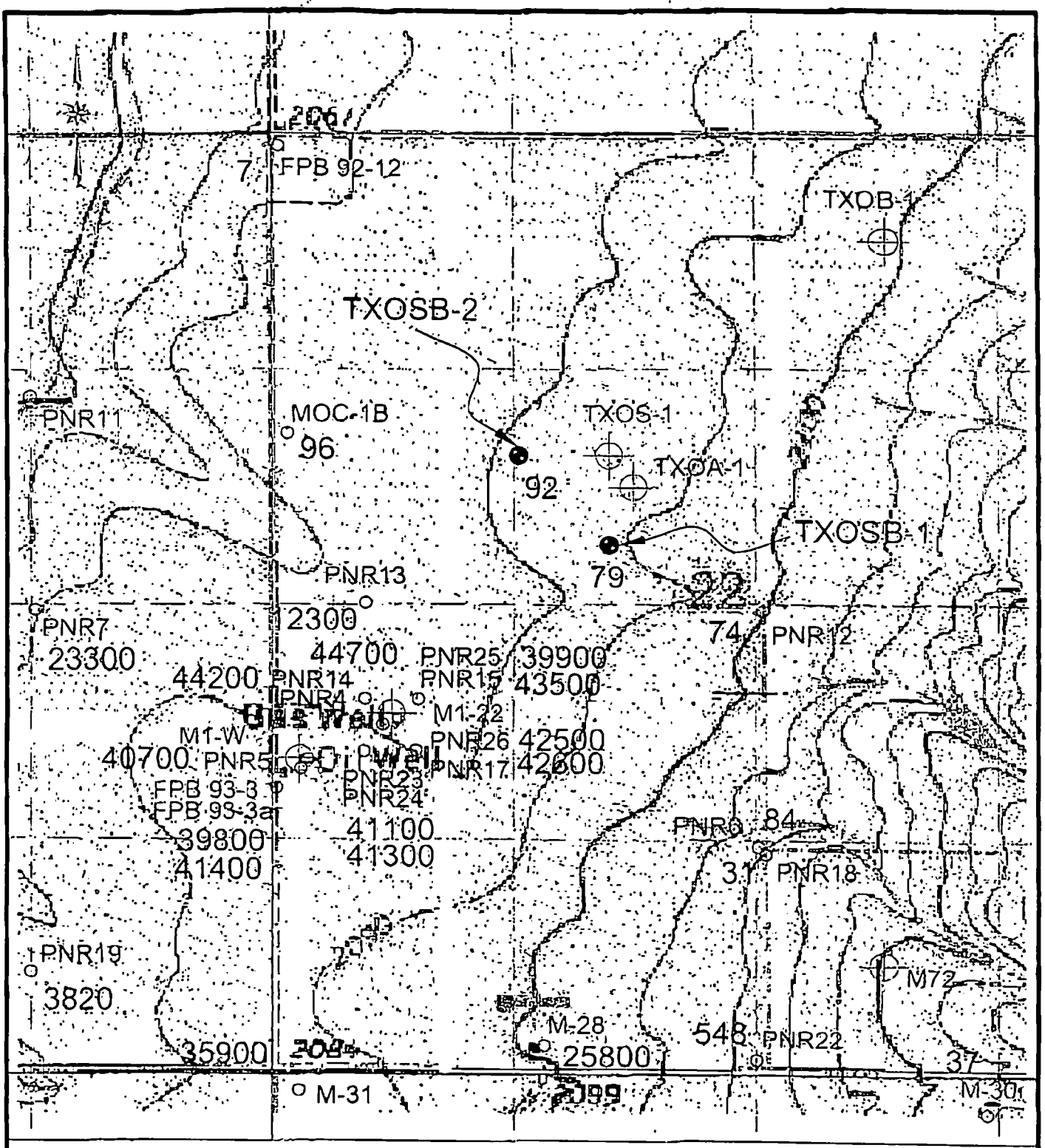
DEPTH (FT)	SAMPLE LOC	WATER LEVEL	GRAPHICAL LOG	LITHOLOGIC DESCRIPTION	USCS
0				TOPSOIL: Light gray, dry, sandy.	
				SANDY CLAY: Grayish brown with brown mottling, slightly moist, firm to stiff, trace gravel, crumbly texture.	CL
5					
10					
20				SILT: Grayish brown to brown, slightly moist, firm to stiff, trace gravel, crumbly texture.	ML
25					
30				SANDY SILT: Grayish brown, slightly moist to wet, firm to stiff, interbedded with wet, fine grained silty sand layers from 35.0' - 35.3' and 35.8' - 36.4'.	ML
35		▽			
40				SAND: Brown to dark brown, medium to coarse grained, wet, well graded, medium dense, gravelly.	SW
45					
50					

Project Name: EAST POPLAR Owner/Client: MARATHON	Boring/Well Number: TXOSB-2
Project Number: 7-3-0202	Boring/Well Location: 500' WEST OF BUCKLES SWD-1
Date Drilled: 4 SEP 02 Logged By: A MATHEWS	Drilling Contractor: HANSEN ENVIRONMENTAL Drilling Method: 4 -1/4" HSA Rig Type: CME 55
First Occurence of G.W.: 34.5' Reference Point: Dates Measured: 3 SEP 02 SURFACE (2086.6')	Boring Depth (ft): 67' Boring Diameter (in): 8"

DEPTH (FT)	SAMPLE LOC	WATER LEVEL	GRAPHICAL LOG	LITHOLOGIC DESCRIPTION	USCS
55				SAND: Continued	
60					
				SHALE: Black, slightly moist, hard.	
70					
75					
80					
85					
90					
100					

Table 1
Summary of Field Measurements and Analytical Results

Sample Location		TXOSB-1			TXOSB-2	
Sample Interval Depth (ft)		40-45	48-53	55-60	45-50	55-60
Field Measurements	Conductivity (uS)	4,200	3,800	3,900	4,400	4,200
	Chloride (mg/L)	110	140	120	110	110
	pH	7.12	7.10	7.03	7.04	7.04
	Temp (C)	-	14.4	14.2	15.2	14.5
	Alkalinity (mg/L)	770	770	770	770	770
	Sulfate (mg/L)	>250	>250	>250	>250	>250
	Water Elevation (ft)	2,050.4	2,050.7	2,049.3	2,045.5	2,051.0
Laboratory Analyses	TDS (mg/L)	3,937	3,422	3,530	3,894	3,882
	Chloride (mg/L)	66	76	79	90	92
	Alkalinity (mg/L)	500	480	460	400	440
	Sulfate (mg/L)	2,000	1,660	1,590	2,070	1,980
	Sodium (mg/L)	319	302	307	360	373
	Calcium (mg/L)	435	361	341	401	378
	Magnesium (mg/L)	281	240	235	292	275
	BTEX (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001



NOTE: VALUES SHOWN ARE CHLORIDE CONCENTRATIONS (mg/L)

0' 750'

SCALE (FEET)

HAMP, MATHEWS & ASSOCIATES, INC.

FIGURE 1. TEST BORING LOCATIONS NEAR THE FORMER TXO BUCKLES SWD WELL.

Document No. 12

HAMP, MATHEWS & ASSOCIATES, INC.
15289 Ann Drive
Bath, Michigan 48808
(517) 641-7333
Fax (517) 641-7337

September 20, 2002

Via UPS Red

12

Mr. Nathan Wiser
US Environmental Protection Agency
Office of Enforcement
Compliance and Environmental Justice
Technical Enforcement Program 8ENF-T
999 18th Street, Suite 300
Denver, CO 80202-2466

Jim Eppers, Esq.
US Environmental Protection Agency
Office of Enforcement
Compliance and Environmental Justice
Legal Enforcement Program, 8ENF-L
999 18th Street, Suite 300
Denver, CO 80202-2466

RE: Results of Groundwater Sample Analyses, Former TXO Buckles Lease, East Poplar Oil Field, Poplar, Montana

Gentlemen:

Hamp, Mathews & Associates, Inc. (HMA) recently acquired groundwater quality data at the former TXO Buckles lease area for Marathon Oil Company (MOC) in order to satisfy the request of the United States Environmental Protection Agency (EPA) that MOC further demonstrate the absence of evidence of impacted groundwater at the site. These data strongly support MOC's technical arguments that groundwater impacts due to the former TXO wells are absent in the East Poplar oil field. HMA performed the tests, which were requested by EPA, in order for the EPA to support the removal or withdrawal of MOC from the Emergency Administrative Order (EAO).

We selected the boring locations, sampling methods, analytical parameters, and analytical laboratory after consultation with Mr. Wiser on August 23, 2002. On September 3 and 4, 2002, we installed temporary wells and obtained groundwater samples from two soil borings advanced with hollow stem augers (Figure 1). Each boring was plugged and abandoned after collection of the groundwater samples. One boring was located approximately 500 feet south of the former Buckles SWD #1 well. The other boring was located approximately 500 feet west of the former Buckles SWD #1 well. Hydrogeologic logs for these borings are attached.

The Quaternary aquifer is present at depths of 39 to 64 feet (TXOSB-1) and 39 to 63 feet (TXOSB-2) at the respective boring locations. We obtained vertical profiles of the water quality in both borings by setting temporary well screens in the Quaternary aquifer. We obtained three groundwater samples from the TXOSB-1 location and two groundwater samples from the TXOSB-2 location. Field measurements and analytical results for each sample horizon within the Quaternary aquifer are presented in Table 1. Laboratory reports and a brief Qa/Qc summary of sample spike analyses prepared by Energy Laboratories (Billings, MT) is also attached. The Level 4 Qa/Qc package, to be completed by October 1, 2002, will be forwarded to EPA after receipt and review by HMA.

As summarized in Table 1, all chloride values are less than 95 mg/L, and are well below the recognized aesthetic criterion of 250 mg/L. These values are consistent with chloride concentrations determined by others at wells MOC-1B, PNR-12, and PNR-18, that are also hydraulically downgradient of the former TXO facility. The attached information is consistent with and further supports MOC's previous technical arguments that installation, operation, and abandonment of the former TXO wells have not impacted groundwater quality in the Quaternary aquifer. Hence, MOC should be removed or allowed to withdraw from the EAO.

Should you have questions regarding the information provided, please contact Mr. Douglas G. Kinnett of Marathon (517-439-0937).

Sincerely,

Alan R. Mathews

Alan R. Mathews, P.E.
Principal Environmental Engineer

Attachment - Table 1
Figure 1
Hydrogeologic Logs
Laboratory Reports/QaQc Summary

cc: John D. Fognani, Esq. - FGHR, Denver, Colorado

Documents Supporting EPA's Proposal to Withdraw Marathon Oil Company from Emergency Administrative Orders No. SDWA-8-99-68 and SDWA-08-2001-33

Document No. 13

Messrs. Wiser and Eppers
Results of Groundwater Sample Analyses
Former TXO Lease
Poplar, Montana

September 20, 2002

TABLE 1
SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL RESULTS

Location	Depth	Sample	Field Measurements		Inorganic Laboratory Results (mg/L)							
			Conductivity	pH	TDS	Chloride	Alkalinity	Sulfate	Sodium	Potassium	Calcium	Magnesium
TXOSB-1	40-45	SB-1	4,200 uS/cm	7.12	3,937	66	660	2,000	319	10	435	281
		Dup-1			3,860	74	636	2,250	306	11	384	275
		Dup-2			3,880	69	632	2,240	301	11	381	271
	48-53	SB-1	3,800	7.10	3,422	76	630	1,660	302	11	361	240
		Dup-1			3,370	83	647	1,850	295	13	321	235
		Dup-2			3,370	80	573	1,860	299	11	329	237
	55-60	SB-1	3,900	7.03	3,530	79	600	1,590	307	10	341	235
		Dup-1			3,220	82	641	1,750	288	10	302	225
		Dup-2			3,240	81	643	1,760	294	10	313	228
TXOSB-2	45-50	SB-1	4,400	7.04	3,894	90	520	2,070	360	11	401	292
		Dup-1			3,920	92	565	2,310	335	11	357	277
		Dup-2			3,950	91	565	2,280	338	10	358	277
	55-60	SB-1	4,200	7.04	3,882	92	580	1,980	373	12	378	275
		Dup-1			3,800	95	581	2,140	351	12	335	262
		Dup-2			3,840	95	583	2,140	356	11	341	263

Location	Depth	Sample	Organic Laboratory Results (mg/L)			
			Benzene	Toluene	Ethylbenzene	Xylenes
TXOSB-1	40-45	SB-1	<0.001	<0.001	<0.001	<0.001
		Dup-1	<0.001	<0.001	<0.001	<0.001
		Dup-2	<0.001	<0.001	<0.001	<0.001
	48-53	SB-1	<0.001	<0.001	<0.001	<0.001
		Dup-1	<0.001	<0.001	<0.001	<0.001
		Dup-2	<0.001	<0.001	<0.001	<0.001
	55-60	SB-1	<0.001	<0.001	<0.001	<0.001
		Dup-1	<0.001	<0.001	<0.001	<0.001
		Dup-2	<0.001	<0.001	<0.001	<0.001
TXOSB-2	45-50	SB-1	<0.001	<0.001	<0.001	<0.001
		Dup-1	<0.001	<0.001	<0.001	<0.001
		Dup-2	<0.001	<0.001	<0.001	<0.001
	55-60	SB-1	<0.001	<0.001	<0.001	<0.001
		Dup-1	<0.001	<0.001	<0.001	<0.001
		Dup-2	<0.001	<0.001	<0.001	<0.001

Document No. 14

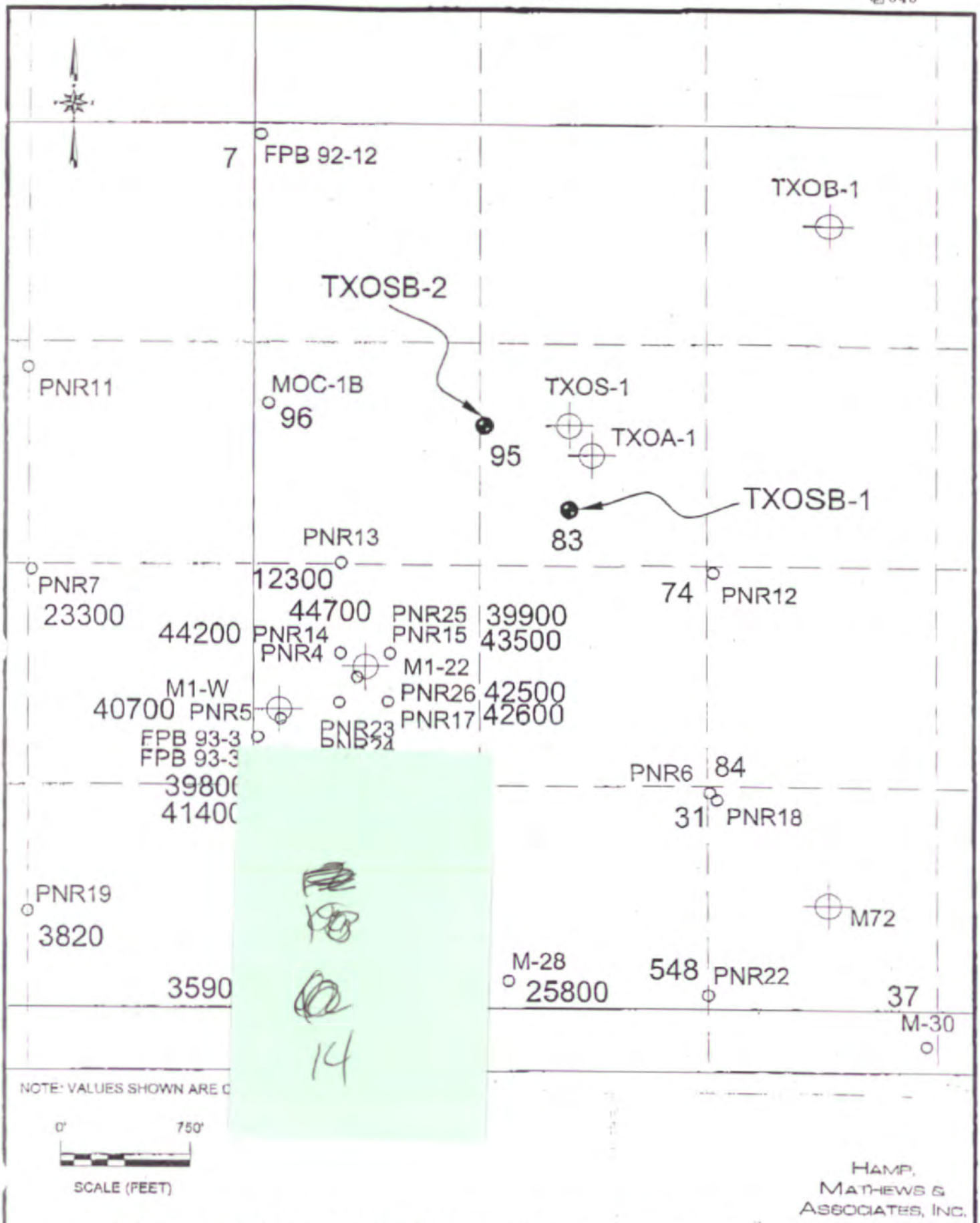


FIGURE 1. TEST BORING LOCATIONS NEAR THE FORMER TXO BUCKLES SWD WELL.

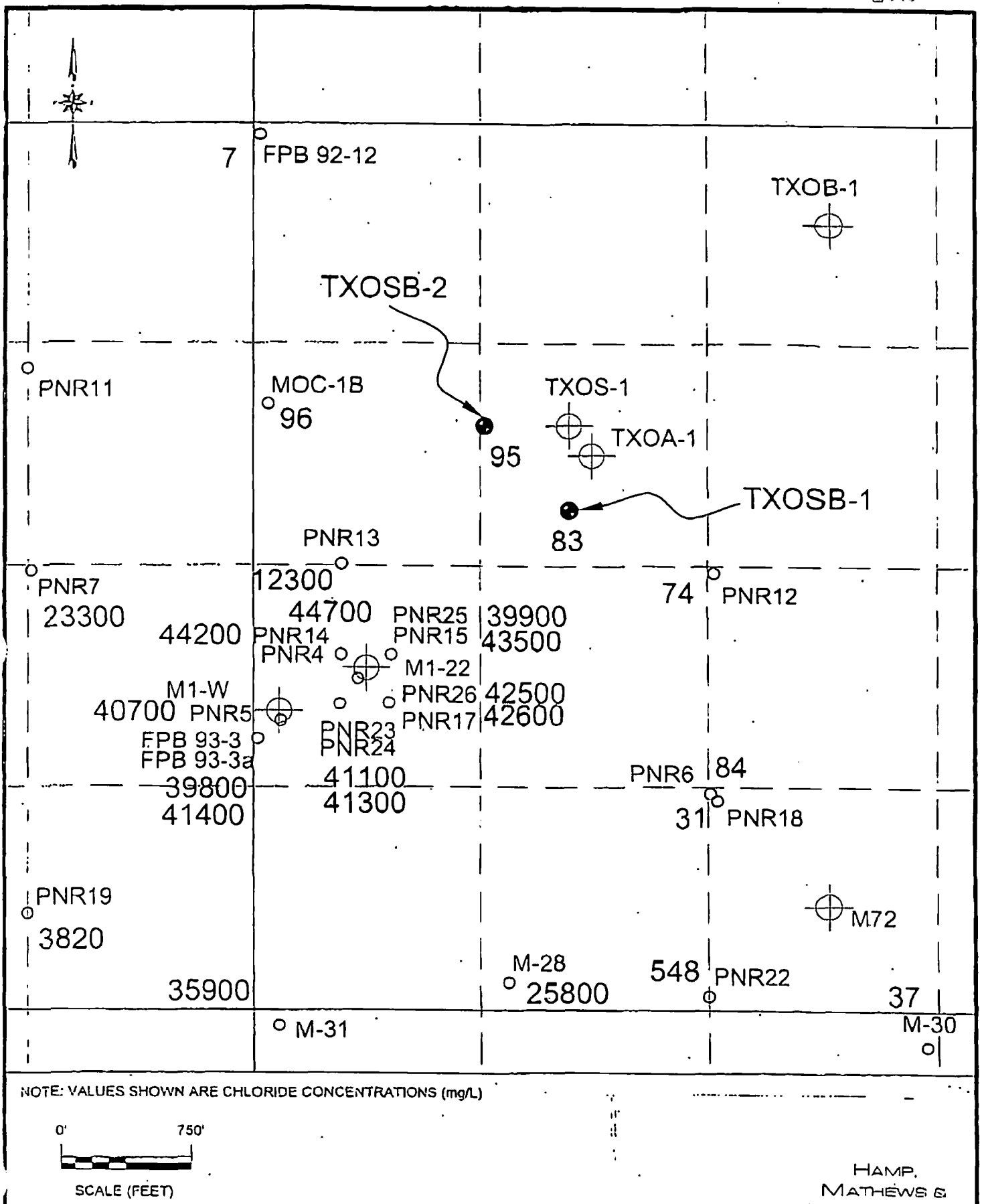


FIGURE 1. TEST BORING LOCATIONS NEAR THE FORMER TXO BUCKLES SWD WELL.

Document No. 15

HAMP, MATHEWS &
ASSOCIATES, INC.
15266 Ann Drive
Bath, Michigan 48808
(517) 641-7333
Fax (517) 641-7337

October 16, 2002

15

Via UPS Red

Mr. Nathan Wiser
US Environmental Protection Agency
Office of Enforcement
Compliance and Environmental Justice
Technical Enforcement Program 8ENF-T
999 18th Street, Suite 300
Denver, CO 80202-2466

Jim Eppers, Esq.
US Environmental Protection Agency
Office of Enforcement
Compliance and Environmental Justice
Legal Enforcement Program, 8ENF-L
999 18th Street, Suite 300
Denver, CO 80202-2466

RE: Marathon Oil Company / Emergency Administrative Order SDWA-08-2001-33 Quality Assurance Documents for Groundwater Sample Analyses, Former TXO Buckles Lease, East Poplar Oil Field, Poplar, Montana

Gentlemen:

Hamp, Mathews & Associates, Inc. (HMA) submitted groundwater quality data results on September 20, 2002 for the former TXO Buckles lease area (Poplar, Montana) on behalf of Marathon Oil Company (MOC). Enclosed is a compact disk containing quality assurance documents (PDF format) for these data results generated by Energy Laboratories (Billings, Montana) and Merit Laboratories (East Lansing, Michigan).

Should you have questions regarding the information provided, please contact Mr. Douglas G. Kinnett of MOC (517-439-0937).

Sincerely,

Alan R. Mathews

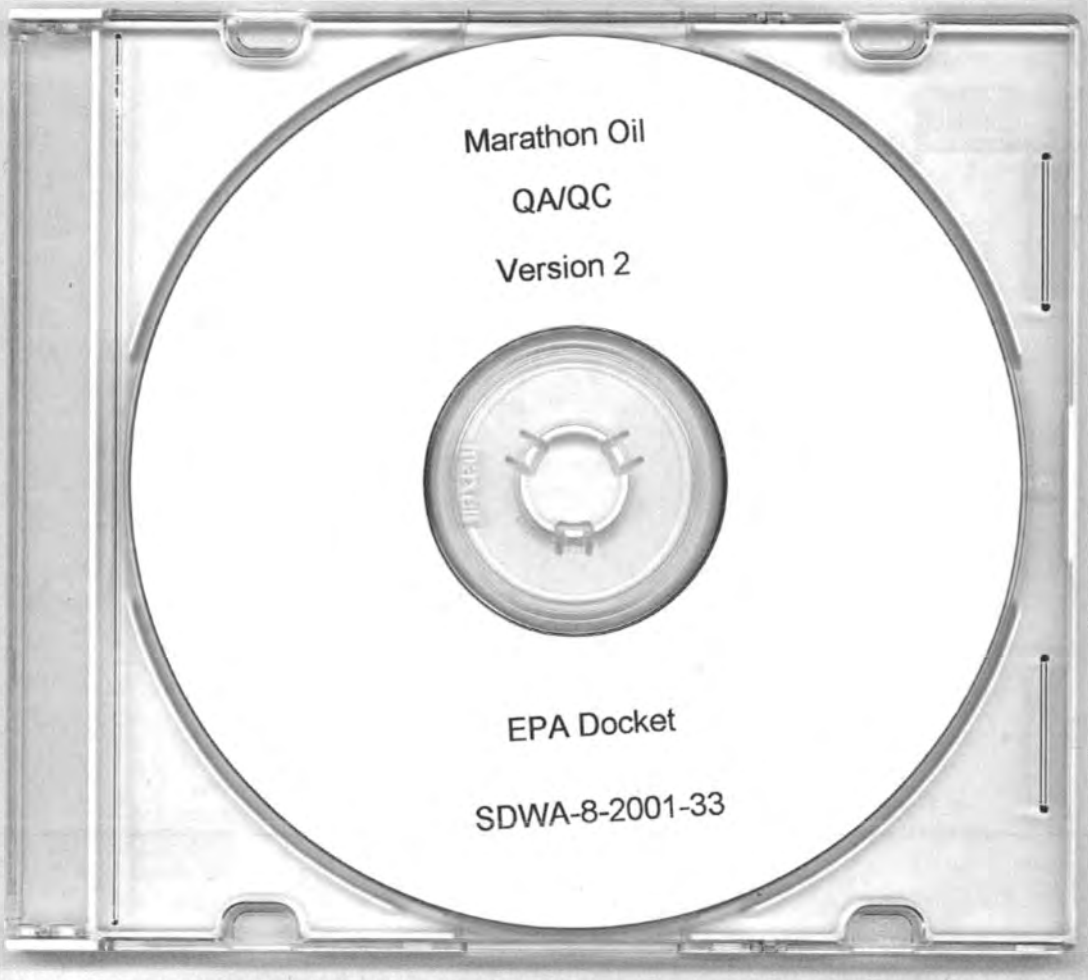
Alan R. Mathews, P.E.
Principal Environmental Engineer

Enclosure

cc: David A. Carson, Esq., U.S. DOJ, Denver, Colorado
John D. Fognani, Esq. - FGHR, Denver, Colorado

Document No. 16

19
16
CD-R


Marathon Oil
QA/QC
Version 2
EPA Docket
SDWA-8-2001-33

TARGET SHEET

EPA REGION VIII

[redacted]

DOCUMENT NUMBER: FRED 118382

SITE NAME: UIC - MT East Poplar Oil Field

DOCUMENT DATE: 2002

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☐ OVERSIZED
- ☑ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
  (Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

5 copies Marathon Oil QA/QC Version 2 EPA Docket, SDWA-8-2001-33

Contact the Superfund Records Center to view available document.
(303) 312-6473