

# **REMEDIAL ACTION PLAN**

**(Revised)**

**for the**

## **Moose Junction Lounge**

**WDNR Case #03-16-000301**

**Prepared for:**

**Chris Saari  
Hydrogeologist  
WDNR - Brule Area Headquarters  
PO Box 125  
Brule, WI 54820**

**Prepared by:**

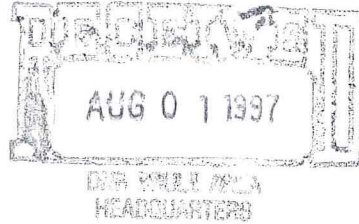
**Earth Burners, Inc.  
P.O. Box 16083  
Duluth, MN 55816  
(218) 628-0454**

**July 30, 1997**



P O Box 16083 • Duluth, MN 55816-0083  
Office: 218-628-0454  
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July 30, 1997



Christopher A. Saari  
Hydrogeologist  
WDNR - Brule Area Headquarters  
PO Box 125  
Brule, WI 54820-0125

RE: Remedial Action Plan - Revised  
Moose Junction Lounge  
WI Case #03-16-000301

Dear Mr. Saari:

As per your request of July 25, 1997, I have enclosed two copies of the Remedial Action Plan (RAP) as revised from the previously submitted RAP dated October 30, 1995. The RAP provides detail on the installation of Oxygen Release Compound (ORC) for the remediation of the contamination at the Moose Junction Lounge. The specific use of the ORC was determined by Mr. Jeff Johnson of Regenesis. The technical proposal of Mr. Johnson has been included as an appendix in the RAP. The differences between the RAP and the technical proposal are the use of hollow stem augers instead of probes and the number of installation points per given treatment area. Mr. Johnson indicated the method of deposition of the ORC does not matter along as the amount deposited remains consistent with the technical proposal.

I have been the approval to go ahead with this project by the Officers of Earth Burners, Inc. A number of items need to be finalized in order for this RAP to be completed. Before EBI can secure financing, the bank needs a signed copy of the Form 4B. EBI needs the monies to purchase the ORC from Regenesis. It is my understanding you would be willing to sign the Form once the RAP is initiated. Once I receive word from you regarding the approval/amendment of this revised RAP, I can initiate the RAP by obtaining the necessary access agreements. EBI will make a request of Mr. Schultz to order new PECFA forms for this RAP. EBI will submit for the costs of the installation of the RAP as well as the outstanding invoices in one application.

Another item is EBI will require a written statement from a PECFA representative regarding the eligibility of EBI to conduct the field work with our equipment as EBI has done in the past in accordance with the rules that were in effect the contract between EBI and Mr. Schultz was signed.

I trust the information contained in this letter and the attached report is satisfactory. Please call me at (218) 628-0454. EBI wishes to do the best for the environment at this site as required by the WDNR. EBI will appreciate any comments, suggestions and/or assistance with the carrying out of the RAP.

Sincerely,

EARTH BURNERS, INC.



James R. Warren  
Office Manager

Attachment

**MOOSE JUNCTION LOUNGE  
REMEDIAL ACTION PLAN (Revised)  
WDNR Case #03-16-000301**

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## 1.0 INTRODUCTION

Earth Burners, Inc. (EBI) provides this Remedial Action Plan (RAP) to satisfy the request made by Chris Saari of the Wisconsin Department of Natural Resources (WDNR) in a letter dated July 25, 1997. The RAP is for the Leaking Underground Storage Tank (LUST) site is located north of the village of Dairyland, Wisconsin (Figure 1). The geographic location is the SE1/4, SE1/4, SE1/4 of Section 18, Township 44 north, Range 14 West. The WDNR case number is 03-16-000301 with Mr. Dale Schultz the current responsible party. Figure 2 provides a layout for the site. A meeting was held on April 28, 1997 between EBI, Wisconsin Department of Commerce (WISCOMM), WDNR and Norwest Bank to discuss the standing of this LUST site. The resultant consensus was to use Oxygen Release Compound as the means to remediate the site. The RAP to be used at this site consists of placing ORC within the groundwater to enhance the natural biodegradation of the petroleum contamination as it exists at this site. The cost for this plan, as submitted to WISCOMM, have been approved with the use of ORC has received approval by the WDNR. This document provides a greater detail in the implementation of the RAP.

## 2.0 REMEDIAL ACTION PLAN

### 2.1 Objectives

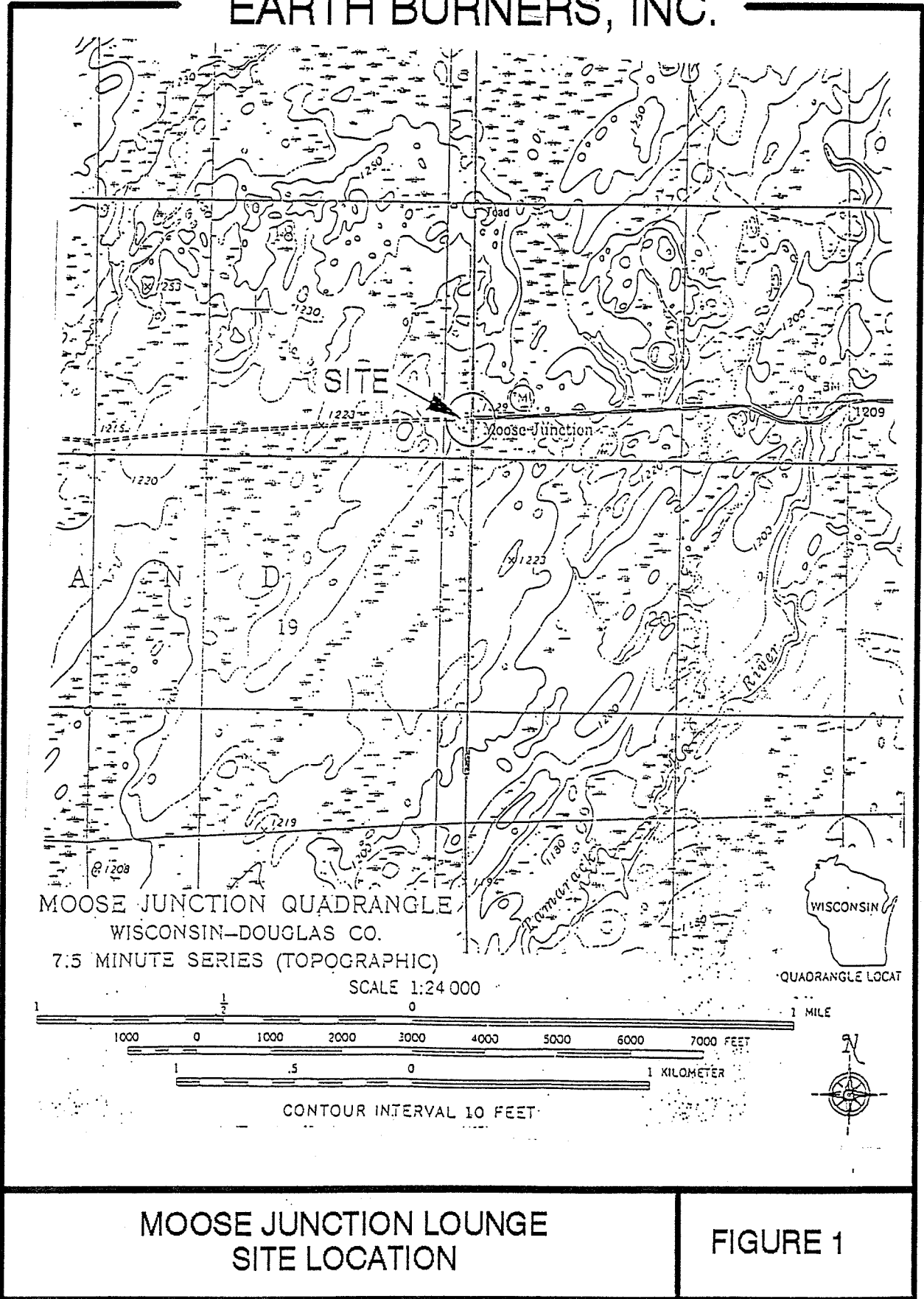
The objective of the RAP is to provide a remedial design which will address the groundwater and remaining soil contamination at this site. The extent of contamination is shown in Figure 3. Other methods have been proposed at this site including pump and treat, passive biodegradation and vapor extraction system. Neither of these two systems meet the approval of both the WDNR and WISCOMM. The design of the RAP had to overcome numerous obstacles including how to address the contamination residing below Wisconsin State Highway 35. In discussions with representatives of Regenesis, placing the ORC in an up gradient position would allow the use of the natural flow of groundwater to provide the necessary remediation for areas below the highway. The technical proposal provided by Regenesis has been attached to this document.

### 2.2 RAP Alternatives

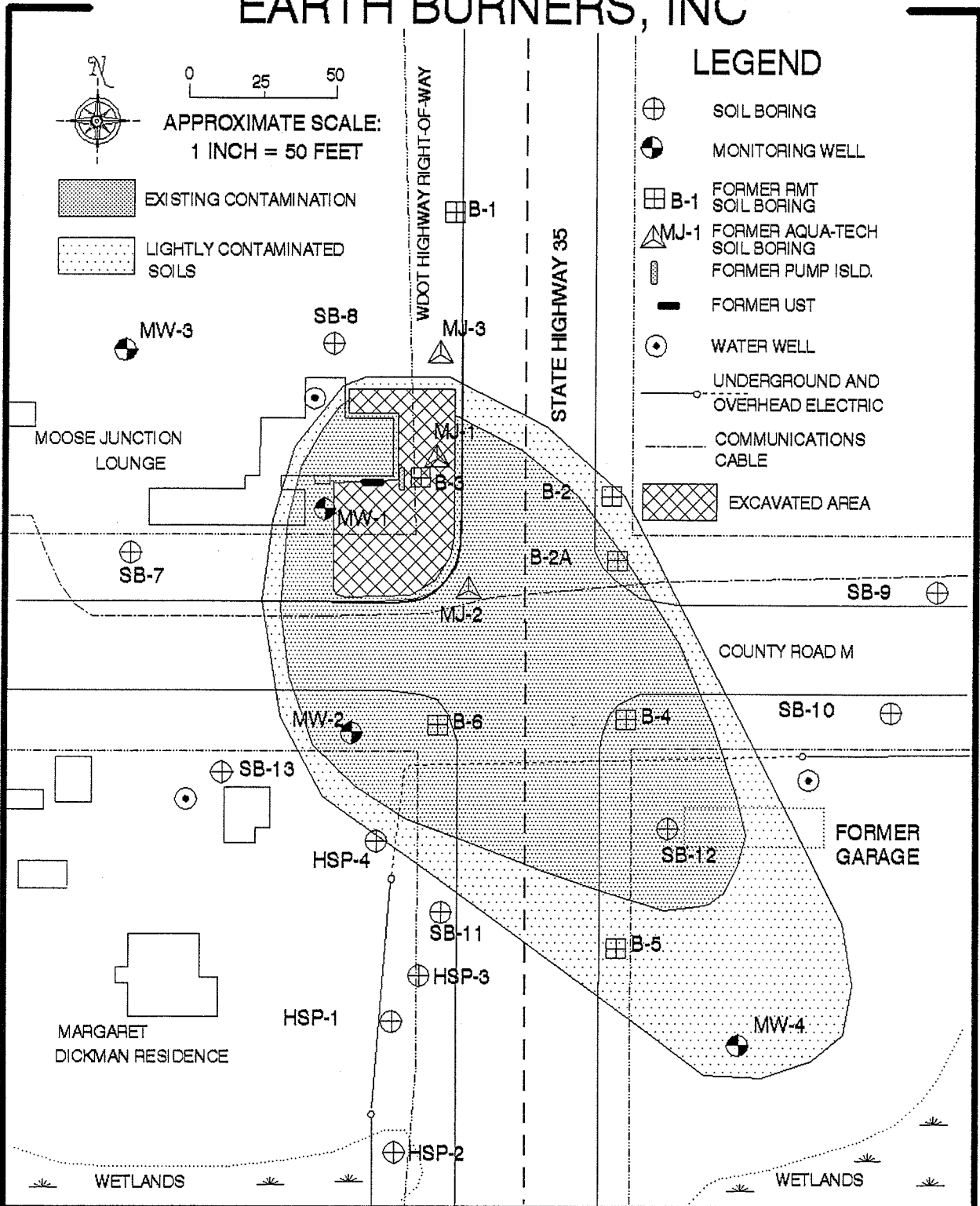
EBI proposed the following RAP options as required by the DILHR to be eligible for PECFA reimbursement. EBI had considered three options in proposing this RAP which were included in the June 5, 1997 letter to Shanna Laube of WISCOMM. The options were as follows:

- o ORC Injection - This option would use approximately 6,750 of ORC inserted into the groundwater through a total of 340 holes located in three separate treatment areas. Anticipated costs were calculated to be just less than \$125,000. The costs included a year of groundwater sampling with associated reporting. The alternative has been viewed as acceptable by both the WDNR and WISCOMM.

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## LEGEND

- ⊕ SOIL BORING
- ⊙ MONITORING WELL
- ⊠ B-1 FORMER RMT SOIL BORING
- △ MJ-1 FORMER AQUA-TECH SOIL BORING
- ▭ FORMER PUMP ISLD.
- FORMER UST
- ⊙ WATER WELL
- UNDERGROUND AND OVERHEAD ELECTRIC
- COMMUNICATIONS CABLE
- ⊠ EXCAVATED AREA

0 25 50  
 APPROXIMATE SCALE:  
 1 INCH = 50 FEET

EXTENT OF CONTAMINATION

FIGURE 3

- o Combination pump & Treat with ORC - This method would incorporate the use of ORC at a reduced volume in combination with the use of two recovery wells. This method would have provided an active remedial system to recover and remediate the contaminated groundwater. The ability of ORC to remediate the contamination would be increased as a result of the removal of highly contaminated water. The calculated cost for this dual RAP would be just less than \$145,000.
- o Excavation with ORC - This option would provide the best means of removing the remaining source areas of contamination and the placement of ORC would allow for the remediation of the remaining contamination that could not be excavated. A total of approximately 4,305 cubic yards of contaminated soil would need to be excavated and treated. The cost, anticipated at \$449,336.50, would be hard to justify, if on of the other RAP would be able to remediate the site at one quarter the cost.

### 2.3 RAP Proposal

The technical basis for the use of ORC can be found in the proposal from Regensis. In summary Jeff Johnson determine the site would be divided into three treatment areas. A grid with five foot spacing would be set up on each treatment area. Figure 4 shows the treatment areas with the associated grid. An auger hole would be complete at each grid intersection point to an average depth of 15 feet below the surface. The outer diameter of the borehole would be either 4.25" or a 2.25". The final determination would be made in the field based on the results of a number of bore holes are completed using each diameter. The key would be to make sure approximately 19.6 pounds of ORC is deposited into each hole as per the specification of Regensis. A total of 340 borehole is required for this RAP which results in approximately 5,100 feet of drilling. It has been anticipated, the construction of the RAP would take approximately 18 days to complete.

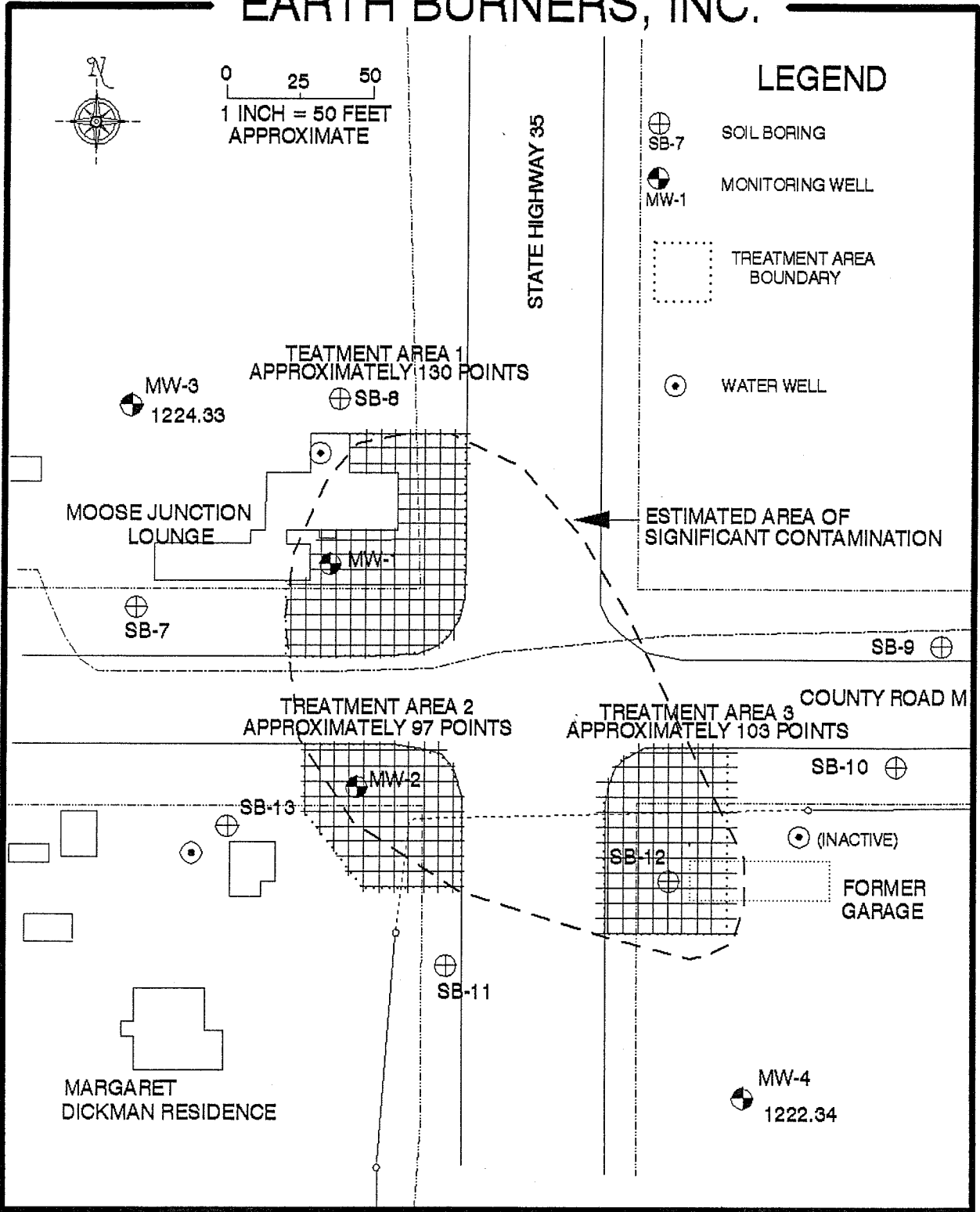
The ORC would be mix with the native soil and placed back into the created void through the auger. The mixture would be backfilled to the same thickness of the water column. The remaining void would be backfilled with the remaining native soil. Any excess soil would be containerized and temporarily stored on-site until the project is completed. The soil would be disposed of at an appropriate facility. For the purpose of this RAP, all excess soil will be classed as contaminated. No soil sampling is anticipated during the implementation of this RAP.

Samples of groundwater would be collected from the existing monitoring wells prior to initiation of the RAP. In addition to the required petroleum compounds (GRO, PVOC, MTBE and lead) the wells would be analyzed for the concentrations of dissolved oxygen. The sampling would be repeated approximately 30 days after the RAP construction was completed. All subsequent sampling events would require the collection of petroleum compounds and dissolved oxygen.

Access agreements would have to be secured from the Wisconsin Department of Transportation for the road right-of-way of Highway 35. Access would also have to be secured for the properties occupying the southeast and southwest corner lots adjoining the intersection. Additional access would have to be secured from Douglas County and the Town of Diaryland.



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TREATMENT AREAS AND GRID LAYOUT

FIGURE 4

## 2.4 Schedule/Monitoring

The installation of the ORC RAP system could be accomplished once and if financing is secured from a lending institution. The following Table indicates the possible scenario for the implementation of the ORC RAP.

Table 1 Anticipated work schedule

| Week# | Activity  |
|-------|---|
| 1.    | Conduct groundwater sampling for petroleum compounds and dissolved oxygen. Conduct preconstruction meeting with drilling company. Order ORC from Regenesis. Layout five foot spaced grid in Treatment Area 3. |
| 2.    | Move materials to site and begin installation in Treatment Area 3. Construct grid in Treatment Area 1. Complete ORC installation in Treatment Area 3.   |
| 3.    | Begin installation of ORC in Treatment Area 1.  |
| 4.    | Complete installation of ORC in Treatment Area 1. Construct grid in Treatment Area 2. Begin ORC installation in Treatment Area 2.   |
| 5.    | Complete ORC installation in Treatment Area 2. Complete site cleanup and surface restoration as necessary. Collect an analytical sample from the stockpiled soil.   |
| 7.    | Arrange for disposal of contaminated soil after analytical results are received.  |
| 8.    | Conduct post installation groundwater sampling.   |
| 10.   | Provide a report to WDNR detailing the ORC installation and the results of the groundwater sampling.  |
| 20.   | Second groundwater sampling.  |
| 22.   | Second quarter report.  |
| 33.   | Third groundwater sampling event.   |
| 35.   | Third quarter report.   |
| 56.   | Fourth groundwater sampling event.  |
| 58.   | Completion of the Annual Report.  |

The Annual report will contain results of the RAP and would recommend whether additional remediation is necessary or if the RAP was successful at this site.


## 2.5 CONCLUSION

At least in theory, the implementation of this ORC RAP should adequately address the contamination at this site. EBI realizes the relative new level of technology the ORC represents. While the technology has worked in more southern areas of the state, to my knowledge ORC has yet to be proven in a climate experienced by and having the specific soil characteristics of this site.

## 2.6 STANDARD OF CARE

The conclusions contained in this report represent our professional opinion. These opinions were arrived at in accordance with currently accepted environmental practices. No warranty is implied or intended.

Prepared by:

  
James R. Warren, M.S.  
Hydrologist

**APPENDIX A**

**Regenesis Proposal - May, 1997**

**REGENESIS**  
Bioremediation Products

27130A Paseo Espada, Suite 1407  
San Juan Capistrano, CA 92675

*Craig* Phone: (714) 443-3136  
Fax: (714) 443-3145

Homepage: <http://www.regenesis.com>  
e-mail: [regenesisis@aol.com](mailto:regenesisis@aol.com)

**FAX TRANSMITTAL**  
PAGES INCLUDING COVER: 5

*505 271-2566*

TO: Jim Warren, Earth Burners, Inc.

FROM: Jeff Johnson *Jeff Johnson*

FAX: (218) 628-0455      PHONE: (218) 628-0454

DATE: May 15, 1997

RE: Estimate for use of ORC® at Moose Junction Lounge Site

\*\*\*\*\*

Dear Mr. Warren:

Attached are spreadsheets of ORC calculations for ORC treatment as per your discussion with me. The ORC will be used to oxygenate the aquifer to support bioremediation of dissolved phase hydrocarbons. We have divided the site into three treatment areas. This will allow better coverage of the site where the application of ORC may be limited due to access problems caused by roadways. Ideally ORC application should be considered under the roadways since there is little groundwater movement. We recommend a slurry injection application of ORC using probe holes (Geoprobe or equivalent) to treat the residual contamination at the site. The total cost for the initial dose of ORC is estimated to be \$66,780.00. Details on the ORC requirements for the treatment areas follow.

Treatment Area 1

The first treatment area is in the vicinity of the Moose Junction Lodge (see GRO/Benzene Concentrations in Groundwater PPM Map, attached). We have estimated that the size of the treatment area to be 50 x 70 feet. This will allow for the treatment of any residual contamination covered by the building. The thickness of the saturated treatment zone was estimated to be 15 feet. Although MW-3 has a 46 ppm GRO Regenesisis has assumed a representative hydrocarbon concentration of 15 ppm. A dissolved oxygen usage ratio of 3:1 and an additional demand factor of 8 was also used. The additional demand factor is used to compensate for the sorbed fraction and other oxygen sinks such as COD and BOD. To support bioremediation it is desirable to maintain a minimum of 1 to 2 mg/L concentration of dissolved oxygen. The calculations show that a total of 2,748 pounds of ORC would be required to provide sufficient oxygen to remediate the estimated contamination. The cost of the ORC for the recommended treatment will be \$27,480.00 plus

applicable taxes and shipping. Depending on monitoring results and treatment goals it may be necessary to repeat the ORC application.

We have used a spacing of 5 feet on-center to calculate the injection of the ORC. Because there may be residual contamination remaining under the building the ORC should be emplaced to as close to the building as possible.

#### Treatment Area 2 and 3

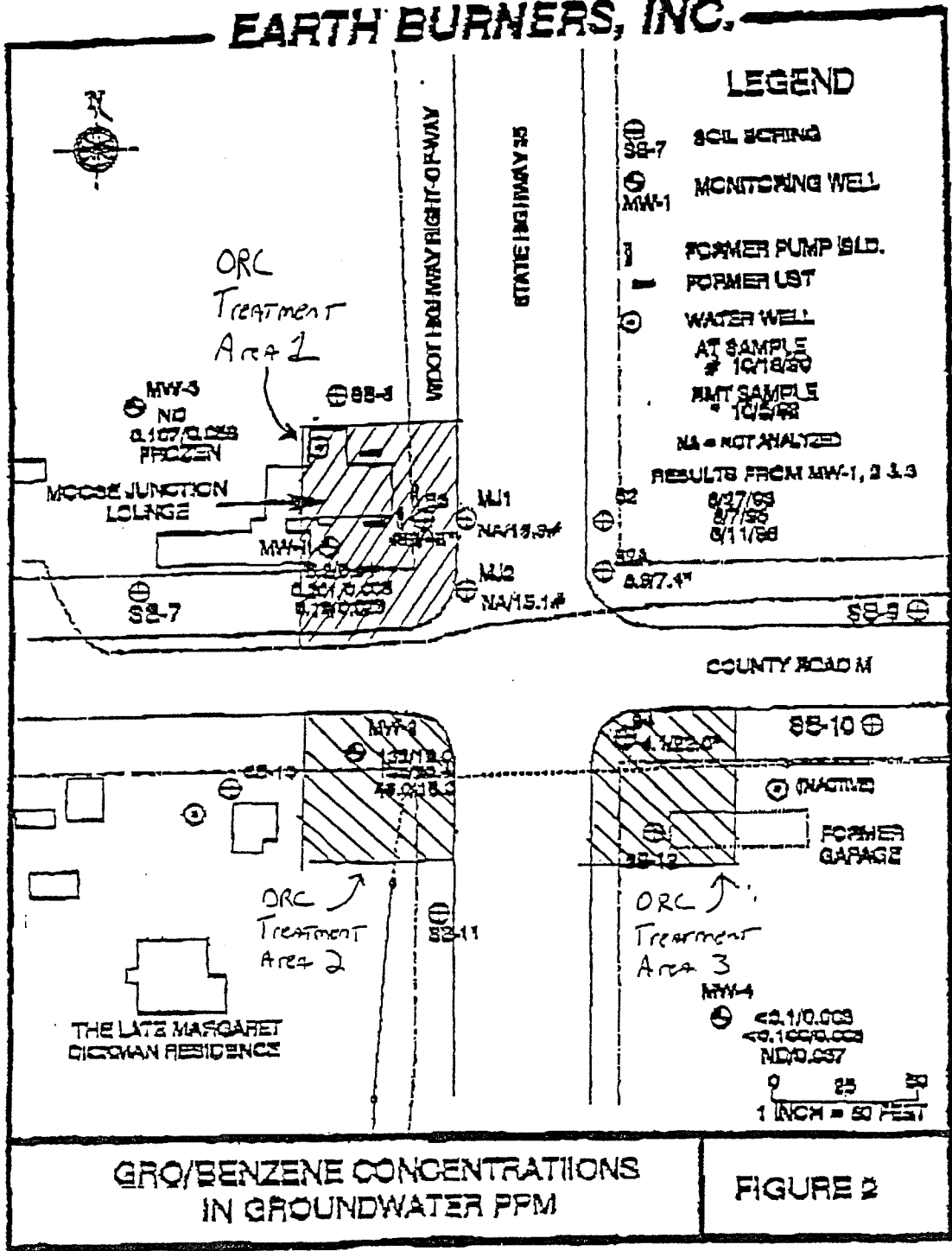
The other two treatment areas are located downgradient of the Moose Junction Lounge and are located on the south-east and south-west corners of the intersection of County Road M and State Highway 35 (see GRO/Benzene Concentrations in Groundwater PPM Map, attached). We have estimated that the size of each treatment area to be 50 x 50 feet. These treatment areas will treat the downgradient portion of the plume. The same contamination levels and other site factors that were assumed for treatment area 1 were assumed for treatment area 2 and 3. This will require 1,965 pounds of ORC for each area or a total of 3,930 pounds of ORC. The cost of the ORC for these two treatment areas will be \$39,300.00 plus applicable taxes and shipping. Depending on monitoring results and treatment goals it may be necessary to repeat the ORC application.

Please call me at (505) 271-2566 to discuss the application estimate. Thank you for this opportunity to suggest the use of ORC for enhanced bioremediation at your site.

SK  
P.58

RR 23 '97 4/12/97 EARTH BURNERS

# EARTH BURNERS, INC.



**APPENDIX B**

**Remedial Alternative Cost Comparison**





P O Box 16083 • Duluth, MN 55816-0083  
Office: 218-628-0454  
Fax: 218-628-0455

June 5, 1997

Shanna L. Laube  
Hydrogeologist  
WI Dept. of Commerce  
PO Box 530  
Park Falls, WI 54552

RE: Remedial Alternative Cost Comparison  
Moose Junction Lounge  
WI Unique #0301

Dear Ms. Laube:

I have enclosed the Remedial Alternative Cost Comparison for the above referenced site. In speaking with Stan Springer he indicated that 47.335 was applicable to this site since the investigation conducted by Mr. Schultz did not commence until March 1993. My understanding of 47.33 is that since the actual contract was signed December 1992, which was prior to February 1, 1993, the date 47.33 took effect, competitive bids are not required for the installation of the RAP. Costs for drilling services were requested and were received from drilling companies. If my interpretation of 47.33 is not correct, please advise me on the proper interpretation.

The consensus reached at our meeting was the use of Oxygen Release Compound (ORC) would be appropriate for the remediation of the site. EBI is recommending use of ORC for the RAP. In theory ORC should work, but I am leery of the costs if the site would need a second application of ORC. I would be open for consideration of a combination of technologies to address the contamination at this site.

The following offers a short explanation of each proposed RAP

#### PROPOSED RAP #1 - ORC INJECTION

This method employs the use of ~6,750 pounds of ORC. The ORC is to be placed in 340 holes located in three different treatment sites. The deposit points are to be located by grid at a spacing distance of five feet. The proposed system is based on enhanced biodegradation through the release

of oxygen into the groundwater to facilitate natural biological activity. Mr. Jeff Johnson of REGENESIS developed the application design and requirements. The attached figure indicates three treatment areas. Mr. Johnson feels the spacing of the holes should provide adequate coverage even for the contamination under the roadways. The first treatment area is in the vicinity of the former tank basins on the northwest corner of the intersection of Highway 35 and County Road M. The second treatment area is in the vicinity of MW-2 in the southwest corner of the intersection. The third area is situated in the southeast corner of the intersection around SB-12.

This method entails 5,100 feet of which would take approximately 18 days. The Rap includes costs for installation supervision, groundwater sampling for the following year and reporting costs. The information from Mr. Johnson is attached for your information. It was anticipated that no soil sampling would be conducted in conjunction with the insertion of the ORC.

#### PROPOSED RAP #2 - COMBINATION PUMP & TREAT WITH ORC

This proposed RAP would use two recovery wells in a combination with the ORC to remediate the site. One well would be located in the vicinity of SB-12 and the other one would be installed in MW-2. The use of the ORC would be reduced by half in Sites 2 and 3 with the majority of the points down gradient of the recovery well. Site 1 would still receive the full amount as indicated by Mr. Johnson. It is important to maintain oxygen saturation in an up gradient location. This would allow for the contamination under the roadways to be affected by the ORC. It was anticipated that no soil sampling would be conducted in conjunction with the insertion of the ORC.

The cost of this is significantly higher than just using the ORC. The removal of contaminated water would increase the ability of the ORC to remediate the site.

#### PROPOSED RAP #3 - EXCAVATION WITH ORC

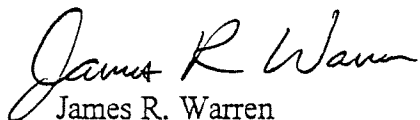
This RAP proposes three areas for excavation with the installation of ORC modified to reflect the excavated areas. The first excavation area would be in the vicinity of SB-12. It has been calculated an area 60' by 40' with a 14' excavation depth exists. The approximate volume of soil to be removed would be 1,245 cubic yards. The second area is in the vicinity of monitoring well MW-2. This area is 40' by 50' with a 14' excavation depth. The estimated volume of material to be removed is 2,282 cubic yards. The final area would be the contaminated soil residing beneath County Road M. The dimensions of this area are 50' by 30' by a 14' excavated depth. This area equals 778 cubic yards. The removal of this contaminated material would benefit the successful use of ORC. It was anticipated that no soil sampling would be conducted in conjunction with the insertion of the ORC.

Road right of way access from the Wisconsin Department of Transportation (WISDOT) is required for the completion of any of these three proposed RAP. Because the anticipated costs for the recommended RAP are at least double than that expected, EBI will require the ability to submit and recover the outstanding eligible costs incurred by EBI on this project up to and including this submittal. Once the funds are approved for reimbursement from PECFA, EBI will apply for funds to conduct the installation of the approved RAP. EBI is not in a position to risk credit standing without recovering the outstanding costs.

Please call me at (218) 628-0454 if you have any questions concerning this information.

Sincerely,

EARTH BURNERS, INC.

A handwritten signature in cursive script that reads "James R. Warren".

James R. Warren  
Office Manager

cc: Chris Saari, WDNR

Attachment

**REGENESIS**  
Bioremediation Products

27130A Paseo Espada, Suite 1407  
San Juan Capistrano, CA 92675  
Phone: (714) 443-3136  
Fax: (714) 443-3145  
Homepage: <http://www.regenesis.com>  
e-mail: [regensis@aol.com](mailto:regensis@aol.com)

Craig

505 271-2566

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FROM: Jeff Johnson *Jeff Johnson*

FAX: (218) 628-0455      PHONE: (218) 628-0454

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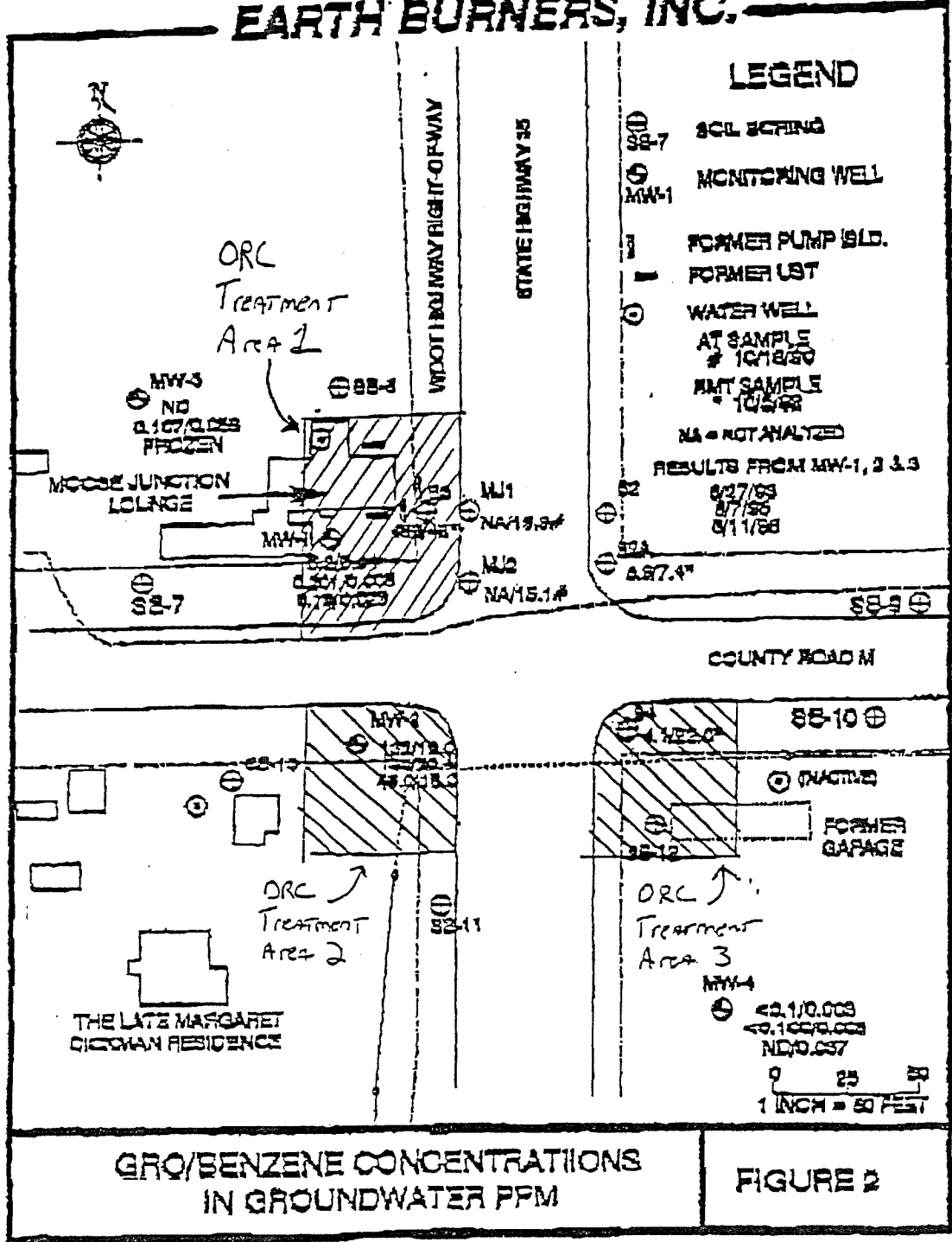
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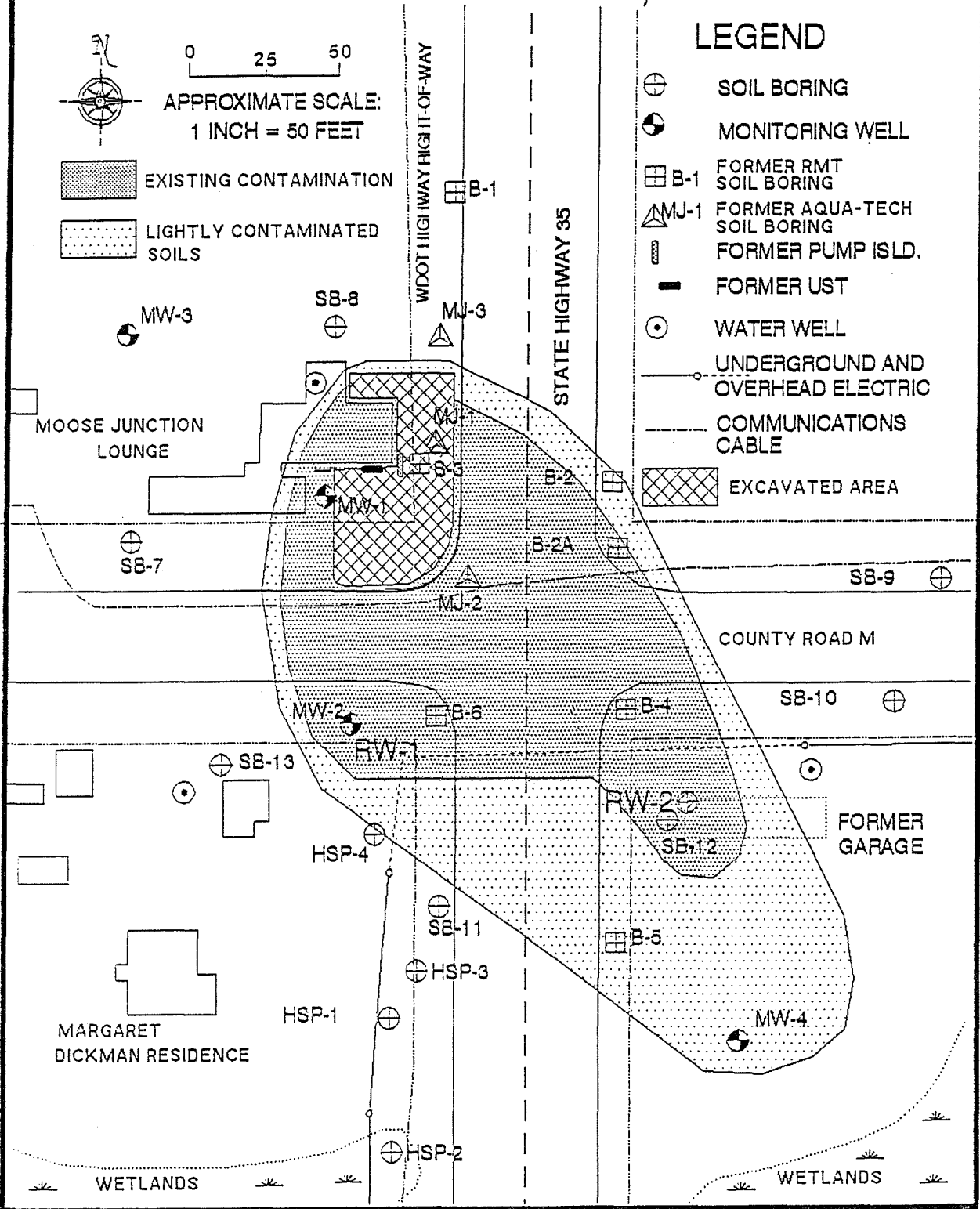
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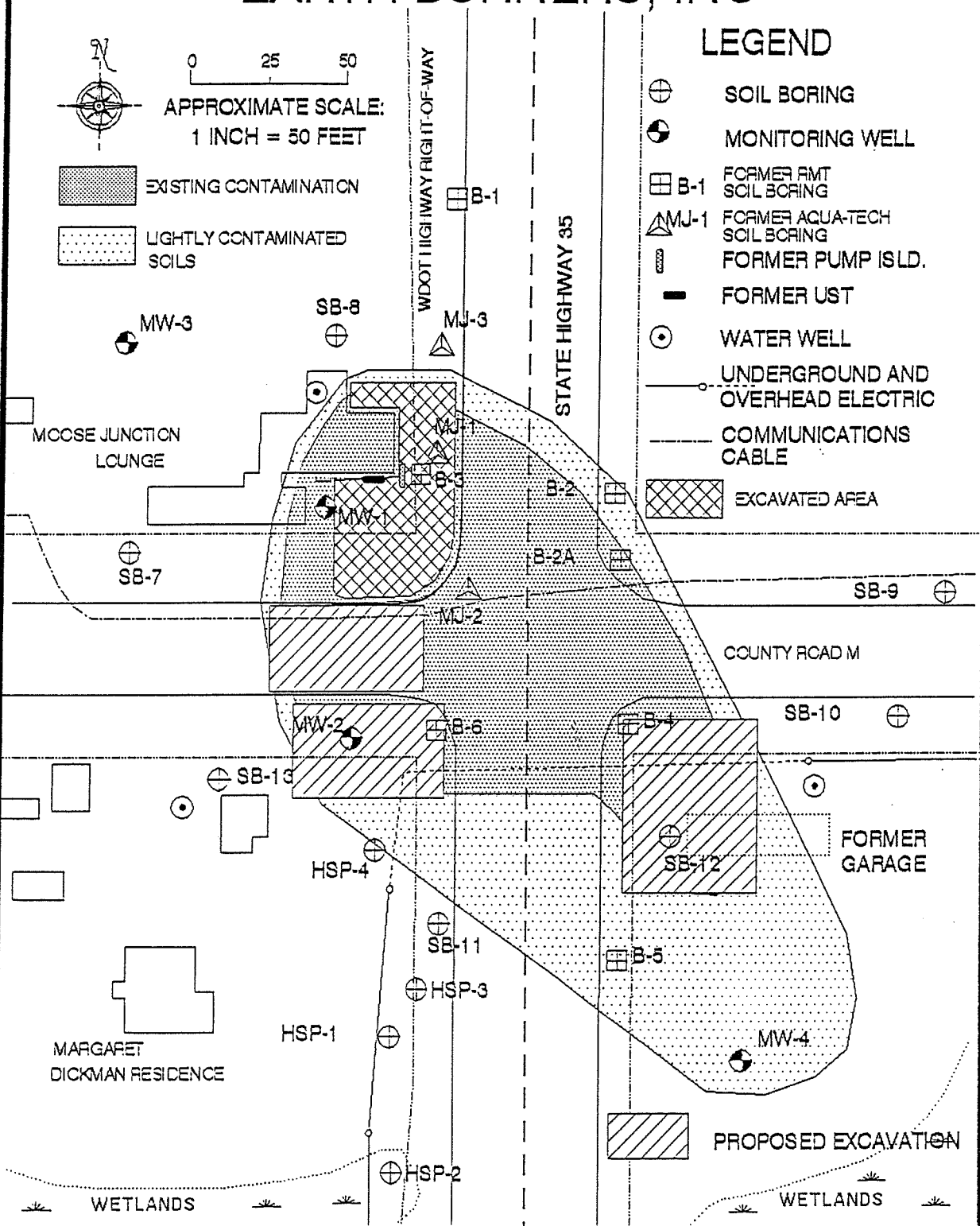


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RECOVERY WELL LOCATIONS

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PROPOSED EXCAVATION AREAS



