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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA)
UNDERGROUND INJECTION CONTROL PERMIT: CLASS II

Permit Number: MI-055-2D-0042

Facility Name: Cherry Berry B1-25 SWD

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (40 CFR),

O.I.L. Energy Corp. of Traverse City, Michigan

is hereby authorized to drill and operate an injection well located in Michigan, Grand Traverse County, T28N, R10W, Section 25, 1/4 Section NW, for injection into the Dundee Limestone at depths between 1920 and 2130 feet, upon the express condition that the permittee meet the restrictions set forth herein. Injection shall not commence until the operator has received authorization in accordance with Part I(E)(10) of this permit.

The purpose of the injection is limited to noncommercial brine disposal from production wells owned or operated by O.I.L. Energy Corp..

All references to Title 40 of the Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on _____ and shall remain in full force and effect during the operating life of the well, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR §§ 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan, unless that State chooses to adopt this permit as a State permit. The permit will expire in one (1) year if the permittee fails to commence construction, unless a written request for an extension of this one (1) year period has been approved by the Director. The permittee may request an expiration date sooner than the one (1) year period, provided no construction on the well has commenced. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated: _____

DRAFT

Tinka G. Hyde
Director, Water Division

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following information will be denied:

- (1) The name and address of the permittee; and,
- (2) Information which deals with the existence, absence or level of contaminants in drinking water.

E. DUTIES AND REQUIREMENTS

1. **Duty to Comply**

The permittee shall comply with all conditions of this permit, except to the extent and for the duration such non-compliance is authorized by an emergency permit pursuant to 40 CFR § 144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance or modification.

2. **Penalties for Violations of Permit Conditions**

Any person who operates this well in violation of permit conditions is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions under the Resource Conservation and Recovery Act. Any person who willfully violates a permit condition is subject to criminal prosecution.

3. **Need to Halt or Reduce Activity not a Defense**

It shall not be a defense for a permittee in an enforcement action to state that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. **Duty to Mitigate**

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

5. **Proper Operation and Maintenance**

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar

contained in Part III(B) of this permit. The owner or operator shall continue to retain the records after the three (3) year retention period unless he delivers the records to the Regional Administrator or obtains written approval from the Regional Administrator to discard the records.

- c. Records of monitoring information shall include:
- (i) The date, exact place, and the time of sampling or measurements;
 - (ii) The individual(s) who performed the sampling or measurements;
 - (iii) A precise description of both sampling methodology and the handling of samples;
 - (iv) The date(s) analyses were performed;
 - (v) The individual(s) who performed the analyses;
 - (vi) The analytical techniques or methods used; and,
 - (vii) The results of such analyses.

9. **Notification Requirements**

- a. **Planned Changes** - The permittee shall notify and obtain the Director's approval at least thirty (30) days prior to any planned physical alterations or additions to the permitted facility, or changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director for approval in accordance with Parts II(B)(2) and II(B)(3) of this permit.
- b. **Anticipated Noncompliance** - The permittee shall give at least thirty (30) days advance notice to the Director for his/her approval of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- c. **Transfer of Permits** - This permit is not transferable to any person except after notice is sent to the Director at least thirty (30) days prior to transfer and the requirements of 40 CFR § 144.38 have been met. The Director may require modification or revocation of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.
- d. **Compliance Schedules** - Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any

The permittee shall not commence injection into any newly drilled or converted well until:

- a. Formation data and injection fluid analysis have been submitted in accordance with Parts II(A)(6) and II(B)(2), respectively;
- b. A report on any logs and tests required under Parts II(A)(5) and III(D) of this permit has been submitted.
- c. Mechanical integrity of the well has been demonstrated in accordance with Part I(E)(17);
- d. Any required corrective action has been performed in accordance with Parts I(E)(16) and III(C); and,
- e. Construction is complete and the permittee has submitted to the Permit Writer, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-10 and either:
 - (i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or,
 - (ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the report required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.

11. **Signatory Requirements**

All reports or other information requested by the Director shall be signed and certified according to 40 CFR § 144.32.

12. **Notice of Plugging and Abandonment**

The permittee shall notify the Director at least forty-five (45) days before conversion or abandonment of the well.

13. **Plugging and Abandonment**

The permittee shall plug and abandon the well as provided in the plugging and abandonment plan contained in Part III(B) of this permit. Plugging shall occur as soon as practicable after operation ceases but not later than two (2) years thereafter. During the period of non-operation, the well must be tested to ensure

permit. If the permittee or the USEPA determines that the permitted well is not in compliance with 40 CFR § 146.8, the permittee will immediately shut in the well until such time as appropriate repairs can be effected and written approval to resume injection is given by the Director. In addition, the permittee shall not commence injection until any and all corrective action has been taken in accordance with any plan contained in Part III(C) of this permit and the requirements in Part I(E)(10) of this permit have been met.

17. **Mechanical Integrity**

- a. The permittee must establish (prior to receiving authorization to inject), and shall maintain mechanical integrity of this well, in accordance with 40 CFR § 146.8.
- b. A demonstration of mechanical integrity, in accordance with 40 CFR § 146.8, shall be performed at least every five (5) years from the date of the last approved demonstration. The permittee shall notify the Director of his/her intent to demonstrate mechanical integrity at least thirty (30) days prior to such demonstration.
- c. The permittee shall demonstrate the mechanical integrity of the well by pressure testing whenever:
 - (i) the tubing is removed from the well or replaced;
 - (ii) the packer is reset; or,
 - (iii) a loss of mechanical integrity occurs. Operation shall cease whenever one of the aforementioned conditions occurs and not resume until the Director gives approval to recommence injection.
- d. The Director may, by written notice, require the permittee to demonstrate mechanical integrity at any time.
- e. The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated prior to the demonstration.
- f. The permittee shall cease injection if a loss of mechanical integrity occurs or is discovered during a test, or a loss of mechanical integrity as defined by 40 CFR § 146.8 becomes evident during operation. Operations shall not be resumed until the Director gives approval to recommence injection.
- g. The permittee shall notify the Director of the loss of mechanical integrity, in accordance with the reporting procedures in Parts II(B)(3)(d) and I(E)(9)(e) of this permit.

PART II

WELL SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

1. **Siting**

Notwithstanding any other provision of this permit, the injection well shall inject only into a formation which is separated from any USDW by a confining zone that is free of known open faults or fractures within the area of the review.

2. **Casing and Cementing**

Injection wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement to be used in the construction of the well shall be as contained in Attachments L and M of the administrative record corresponding to this permit action which is hereby incorporated by reference as if they appeared fully set forth herein.

3. **Tubing and Packer Specifications**

Injection shall only take place through tubing with a packer set in the long string casing within or below the nearest cemented and impermeable confining system immediately above the injection zone. Tubing and packer specifications shall be as represented in engineering drawings contained in Attachments L and M of the administrative record corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein. Any proposed changes shall be submitted by the permittee in accordance with Part I(E)(9)(a) and (b) of this permit.

4. **Wellhead Specifications**

For every injection well, the operator shall provide a female fitting, with a cutoff valve, to the tubing at the wellhead, so that the amount of injection pressure being used may be measured by a representative of the USEPA by attaching a gauge having a male fitting.

5. **Logs and Tests**

Upon approval of the surface casing and cementation records by the Director, any logs and tests noted in Part III of this permit shall be performed, unless already provided. Prior to commencement of injection, the permittee shall submit a descriptive report prepared by a knowledgeable log analyst interpreting the results

2. **Monitoring Requirements**

- a. Samples and measurements, taken for the purpose of monitoring as required in Part II(B)(3), shall be representative of the monitored activity. Grab samples shall be used to obtain a representative sample of the fluid to be analyzed. Part III(A) of this permit describes the sampling location and required parameters for injection fluid analysis. The permittee shall identify the types of tests and methods used to generate the monitoring data. The monitoring program shall conform to the one described in Part III(A) of this permit.
- b. **Analytical Methods** - Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR § 136.3 or in Appendix III of 40 CFR Part 261 or by other methods that have been approved by the Director.
- c. **Injection Fluid Analysis** - The nature of the injection fluids shall be monitored as specified in Part III(A) of this permit. An initial analysis of the injection fluid is contained in Attachment H of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The Director may, by written notice require the permittee to sample and analyze the injected fluid at any time.
- d. **Injection Pressure, Annulus Pressure, Annulus Liquid Loss, Flow Rate and Cumulative Volume** - Injection pressure, annulus pressure, flow rate and cumulative volume shall be recorded at least weekly and shall be reported monthly as specified in Part III(A) of this permit. Annulus liquid loss shall be recorded at least quarterly and shall be reported in accordance with the provisions of Part II(B)(3)(b), as the volume of liquid added to the annulus to keep it filled in accordance with Part II(B)(1)(d). All gauges used in monitoring shall be calibrated in accordance with Part I(E)(17)(e) of this permit.

3. **Reporting Requirements**

Copies of the monitoring results and all other reports shall be submitted to the Director at the following address:

**U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
Attn: UIC Branch, Direct Implementation (WU-16J)**

PART III

SPECIAL CONDITIONS

These special conditions include, but are not limited to plans for maintaining correct operating procedures, monitoring conditions and reporting, as required by 40 CFR Parts 144 and 146. These plans are described in detail in the permittee's application for a permit, and the permittee is required to adhere to these plans as approved by the Director, as follows:

- A. OPERATING, MONITORING AND REPORTING REQUIREMENTS (ATTACHED)
- B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)
- C. CORRECTIVE ACTION PLAN (ATTACHED)

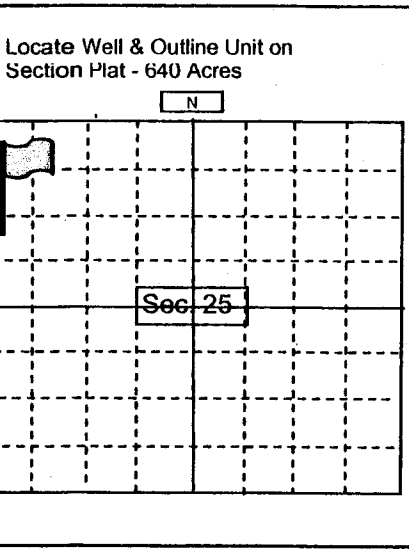
PLUGGING & ABANDONMENT PLAN

WELL NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER

CHERRY BERRY B1-25 SWD

NAME, ADDRESS, & PHONE NUMBER OF OWNER / OPERATOR

O.I.L. Energy Corp.
954 Business Park Dr., Suite #5
Traverse City, MI 49636



STATE MI	COUNTY Antrim	STATE PERMIT NUMBER Pending
SURFACE LOCATION DESCRIPTION NW 1/4 of SW 1/4 of NW 1/4 of Section 25 Township T28N Range R10W		
LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION & DRILLING UNIT Surface Location 1428 ft. From (N/S) NORTH Line of Quarter Section & 23 ft. From (E/W) EAST Line of Quarter Section		
TYPE OF AUTHORIZATION <input checked="" type="checkbox"/> Individual Permit <input type="checkbox"/> Rule <input type="checkbox"/> Area Permit		WELL ACTIVITY <input type="checkbox"/> Class I <input type="checkbox"/> Hazardous <input type="checkbox"/> Nonhazardous <input checked="" type="checkbox"/> Class II <input checked="" type="checkbox"/> Brine Disposal <input type="checkbox"/> Hydrocarbon Storage <input type="checkbox"/> Enhanced Recovery <input type="checkbox"/> Class III <input type="checkbox"/> Class IV
Number of Wells in Area Permit 1		
US EPA Permit Number pending		

CASING/TUBING/CEMENT RECORD AFTER PLUGGING & ABANDONMENT						
Size	Wt (lb/ft) TBG/CSG	Original Amount (CSG)	CSG to be Left in Well	Hole Size	Sacks Cement Used	Type
13 3/8"	Conductor	50'	50'	Driven	Driven	none
8 5/8"	20#	515'	515'	12 1/4"	C to S	Cl A/Lite
5 1/2"	14#	1935'	1935'	7 7/8"	C to S	Cl A/Lite

METHOD OF EMPLACEMENT OF CEMENT PLUGS	
<input checked="" type="checkbox"/>	Balance Method
<input type="checkbox"/>	Dump Bailer Method
<input type="checkbox"/>	Two Plug Method
<input type="checkbox"/>	Other

CEMENT TO PLUG & ABANDON DATA								
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	Plug # 1	Plug #	Plug # 2	Plug# 3	Plug # 4	Plug #	Plug #	Plug #
Calculated Top of Plug (ft.)	1900'		1650'	0'				
Measured Top of Plug (ft.)								
Depth to Bottom of Plug (ft.)	2130'		1900'	565'				
Sacks of Cement to be Used	34		30	66				
Curry Volume to be Used (cu. Ft.)	38.04		34.25	77.41				
Curry Weight (lb./gal.)	15.6		15.6	15.6				
Type of Cement, Spacer or Other Material Used	Class A		Class A	Class A				
Type of Preflush Used	FW		FW	FW				

DESCRIPTION OF PLUGGING PROCEDURE

Run tubing & packer, TIH to total depth 2130' & circulate 35 sx Class A. cement to a depth of 1900'. TOOH w/tubing & pick up Cmt. Ret. TIH & set Ret. 1900'. Release from Cmt. Ret., circulate 30 sx Class A cmt to 1650'. Trip up hole to 565'. Circulate 66 sx Class A cmt to surface. Cut casing off 4' below ground level. Weld 1/2" steel plate in stub with permit number welded on it. Back fill & restore location.

ESTIMATED COST OF PLUGGING & ABANDONMENT			
Cement	\$ 700.00	Cast Iron Bridge Plug	\$ -
Logging	\$ -	Cement Retainer	\$ 1,000.00
Grinding or Pulling Unit	\$ 3,000.00	Miscellaneous	\$ 1,300.00
	\$ -	Total	\$ 6,000.00

CERTIFICATION

I certify under the penalty of law that I have examined & am familiar with the information submitted in this document & all attachments & that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, & complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine & imprisonment. (Ref.40 CFR 144.32)

NAME & OFFICIAL TITLE Michael N. Coy, President	SIGNATURE <i>Michael N. Coy</i>	DATE SIGNED 10-15-09
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ORIGINAL WELL CONSTRUCTION DURING OPERATION

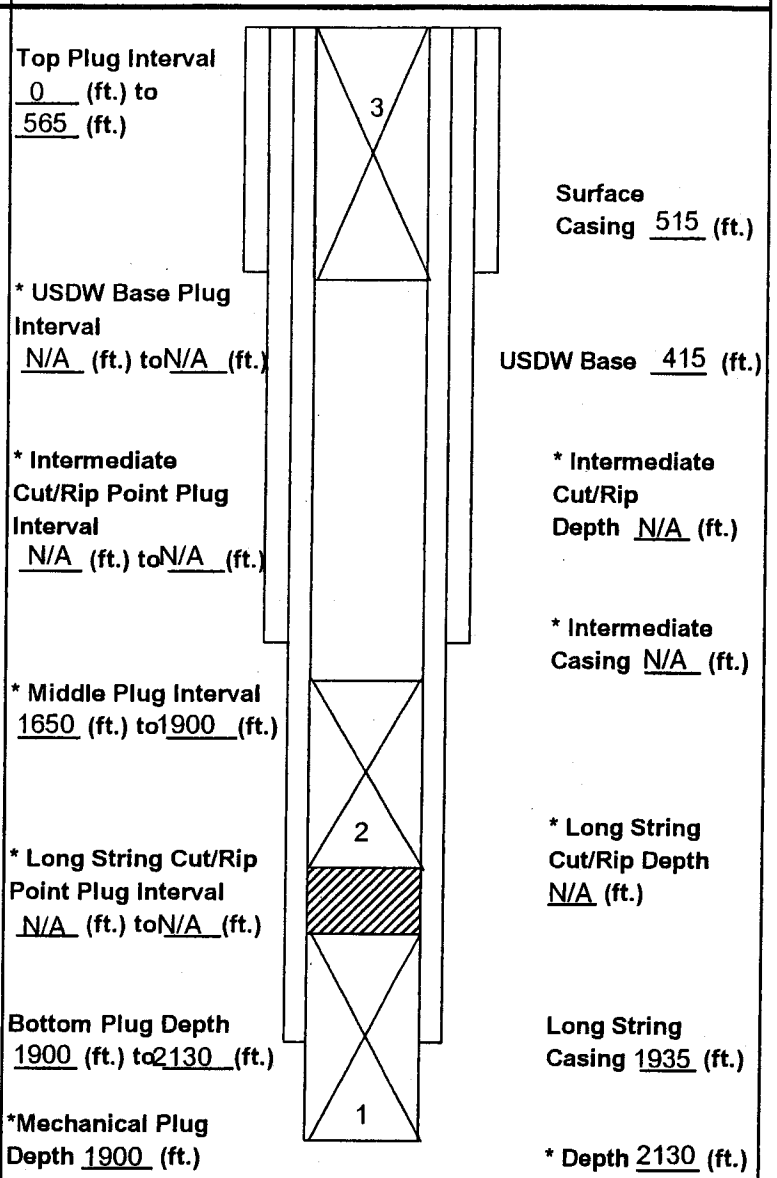
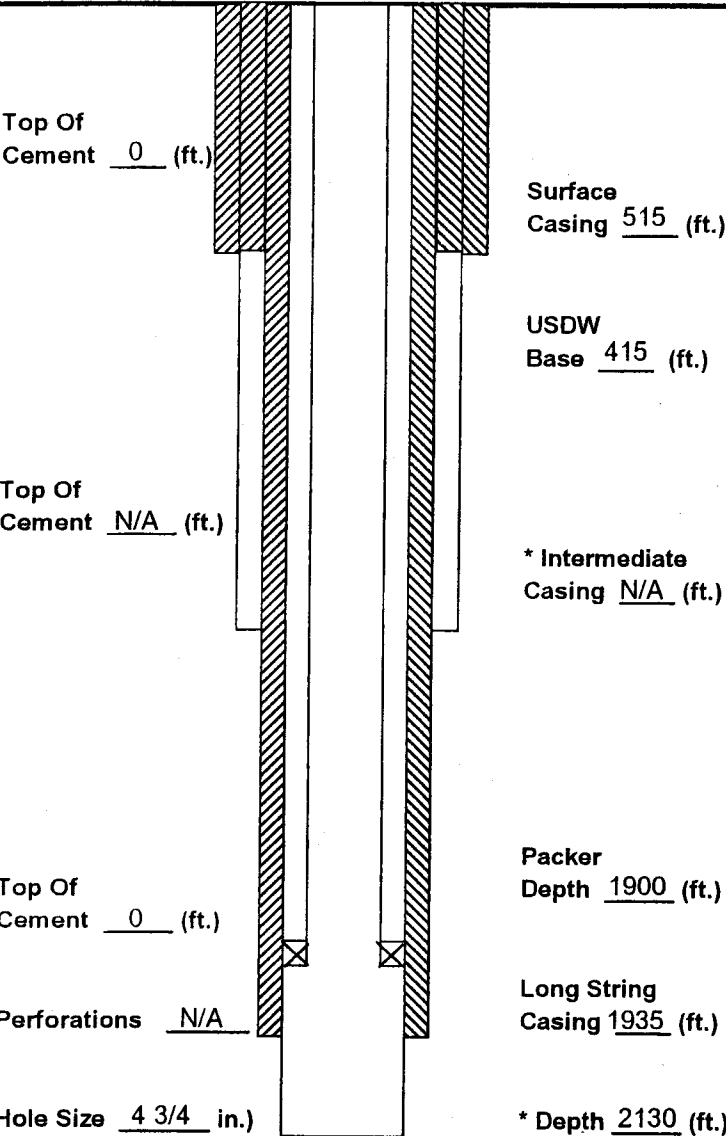
PLUGGING AND ABANDONMENT CONSTRUCTION

Cherry Berry B1-25 SWD

Cherry Berry B1-25 SWD
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Surface

Surface



* Add Any Additional Information
May Not Apply

** Add Any Additional Information
* May Not Apply

LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Open Hole/Perforated or Varied Casing	From	To	Formation Name
OPEN HOLE	1935'	2130'	DUNDEE FORMATION

CORRECTIVE ACTION PLAN

No corrective action is required at this time.

B-4



Grobbel Environmental & Planning Associates L.L.C.

800 Cottageview Dr., Ste 211B Traverse City, MI 49684
a Beckett & Raeder company

May 9, 2009

RECEIVED

MAY 13 2009

UIC BRANCH
EPA REGION 5

Mr. William Tong
U.S. EPA Region 5, UIC Branch
77 W. Jackson Blvd., (WU-16J)
Chicago, IL 60604

RE: Preliminary Review and Public Comment, Proposed Cherry Berry B1-25 SWD, Class II Injection Well Draft Permit #MI-055-2D-0042, NW ¼, SW ¼, NW ¼, Section 25, T28 R10W, Acme Township, Grand Traverse County, Michigan.

Dear Mr. Tong,

Grobbel Environmental & Planning Associates were retained by Acme Township residents and landowners to provide preliminary review and public comment regarding the above-referenced proposed deep injection well. Based on our review, please consider the following comments.

Deep Injection Well Proposal

O.I.L. Energy Corp. of Traverse City, Michigan has proposed a new deep injection well within Section 25, Acme Township, Grand Traverse County to dispose of an expected maximum daily volume of 3,000 barrels (or 94,500 gallons) of noncommercial, waste brine into a bedrock formation at between 1,920 and 2,130 feet below ground surface (b.g.s.). Waste gas well production brines are proposed to be injected into the Dundee limestone formation at a maximum 554 pounds per square inch gauge (psig).¹ O.I.L. Energy Corp. has reportedly also applied with the Michigan Department of Environmental Quality (MEDQ) pursuant to Michigan's Mineral Well Operations Regulations, Part 265 of the Natural Resources and Environmental Protection Act, P.A. 451 of 1994, as amended, R 299.2301 *et seq.*

U.S. EPA is authorized to regulate the underground injection of waste fluids through underground drinking water sources pursuant to the Safe Drinking Water Act, 40 C.F.R., Parts 144 and 146.

Proposed Deep Injection Well Site

The proposed Cherry Berry deep injection well would be located along or near the eastern boundary of parcel No. 01-226-002-02, owned by Cherries R Da Berries, LLC, of Kewadin, Michigan, and near the eastern boundary of parcel No. 01-225-009-00, also owned by Cherries R Da Berries, LLC.

¹ Statement of Basis for Issuance of Underground Injection Control (UIC) Permit, Class 2, Permit Number MI-055-2D-0042, Facility Name Cherry Berry B1-25 SWD, U.S. Environmental Protection Agency, Region 5, 77 West Jackson Boulevard, Chicago, IL.

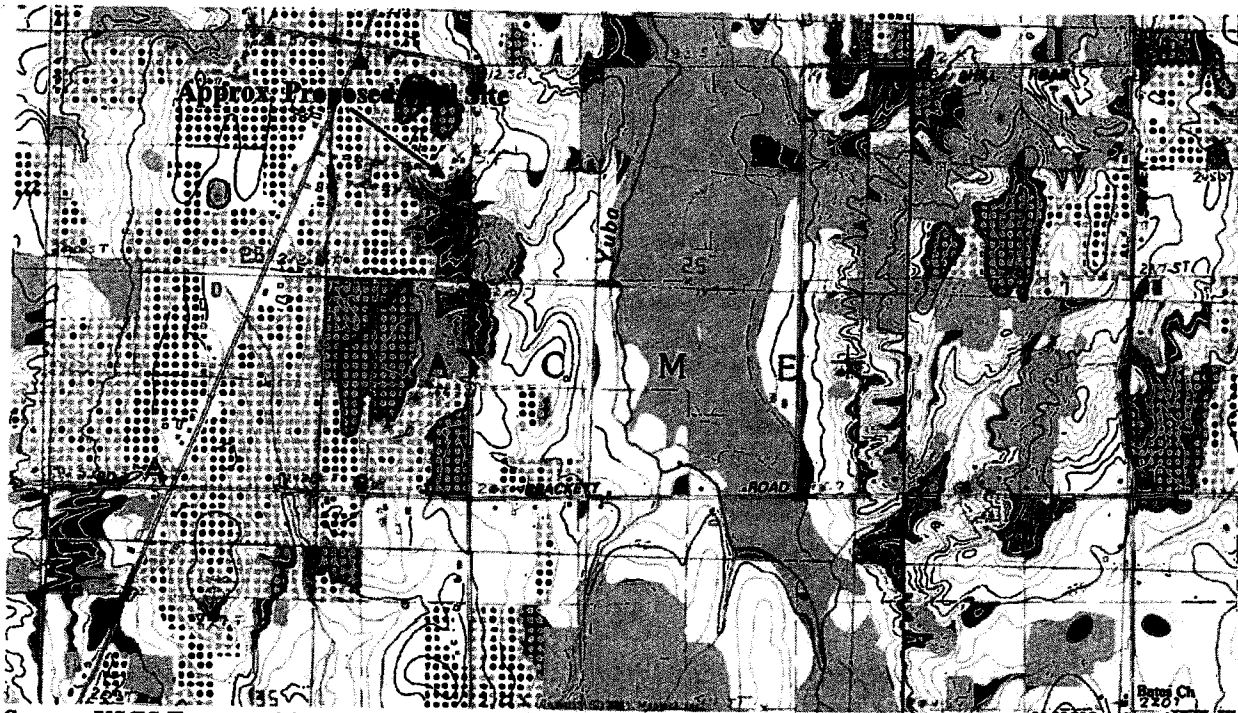


Source: 2005 Orthophotograph, Grand Traverse County website, <http://gis.co.grand-traverse.mi.us/gis>.

Site Topography

The vicinity of the proposed deep well steeply slopes eastward toward Yuba Creek, dropping a total of more than one-hundred and fifty (150) feet in elevation from approximately 750 feet above mean sea level (m.s.l.) at the proposed well site to approximately 600 feet above m.s.l. to the east-southeast at Yuba Creek. Importantly, drainage ways which include Emmet sandy loam (18-25% slope) and the wetland soil Tonkin sandy loam, exist at and near the site, and slope steeply from west to east toward a broad wetland complex along to Yuba Creek.² Good site planning principles would preclude the potential for any spillage of waste brines or other hazardous materials from within these natural drainage features.

² Natural Resources Conservation Service, Web Soil Survey 2.1, National Cooperative Soil Survey, April 13, 2009.



Source: USGS Topographic Map, Williamsburg Quad, Provisional Edition 1985.

Site Soils

Natural Resources Conservation Service soils and U.S. Geological Survey topographic maps indicate that the proposed deep well injection site is located within or near a former gravel pit. Gravel pits by their nature possess highly permeable soils that allow surface infiltration of precipitation or other fluids released to the ground surface. On-site soil types, slopes, characteristics and limitations for development are summarized in Table 1 below from the Grand Traverse Soil Survey.³

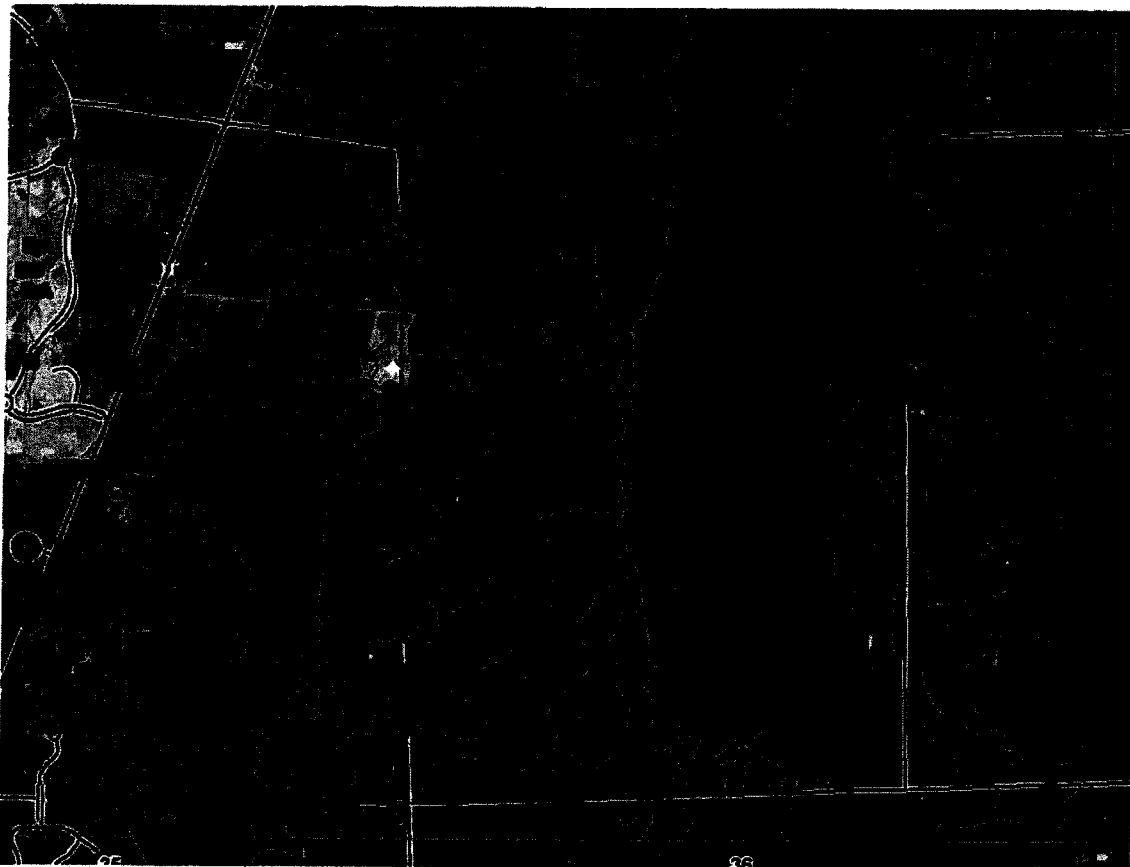
Table 1: Summary of Site Soils

Soil Association	Slope	Comments	Limitations
1. Gravel pits (Gt)	---		Typically highly permeable sand and/or gravel deposits therefore vulnerable to groundwater contamination.
2. Emmet sandy loam (EyB)	2-6 %	Well-drained calcareous soil developed in glacial outwash plains. Gently sloping soil mostly cleared for farming, orchard. Some reverted to woodlots.	Severe construction limitation due to caving cutbanks.
3. Emmet sandy loam (EyC)	6-12 %	Well-drained, moderately sloping calcareous soil developed in glacial outwash plains. Gently sloping soil mostly cultivated.	Severe construction limitation due to caving cutbanks.
4. Emmet sandy loam (EyE)	18-25 %	Within drainage way to Yuba Creek. Well-drained, steep calcareous soil developed in glacial outwash plains. Mostly cultivated. Subject to significant erosion. Some reverted to woodlots.	Severe construction limitation due to caving cutbanks and slope.
5. Leelanau-Kalkaska sandy	2-6%	Well-drained, gently sloping sandy loams soils formed in glacial outwash plains.	Severe construction limitation due to caving cutbanks.

³ Soil Survey of Grand Traverse County, Michigan, USDA, issued 1966, updated and reprinted August 1990.

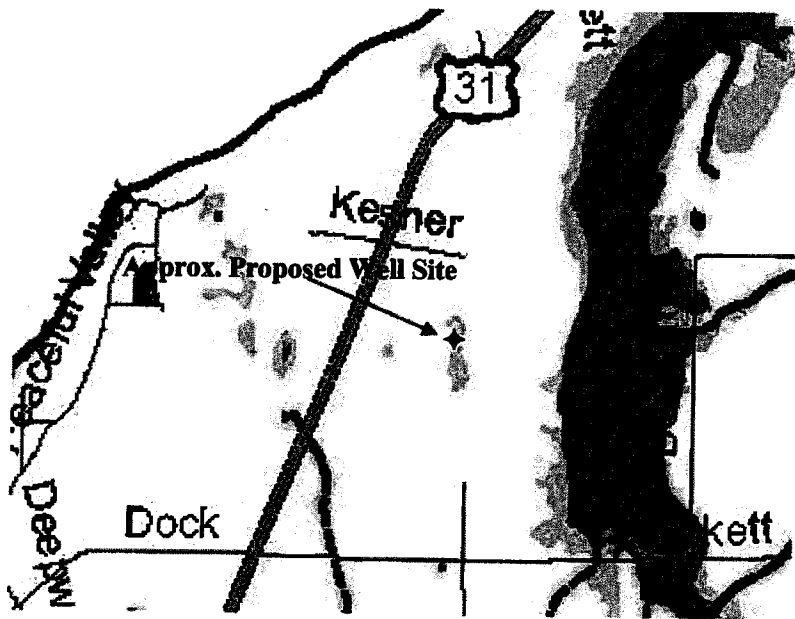
loams (LkB)			
6. Leelanau-Kalkaska sandy loams (LkE2)	18 – 25%	Well-drained, steeply sloping and moderated erode sandy loams soils formed in glacial outwash plains.	Severe construction limitation due to caving cutbanks and slope.
7. Kalkaska loamy sand (KaA)	0-2%	Well drained, nearly level and very sandy soils formed in glacial outwash plains. Primarily cultivated, many acres abandoned agricultural lands.	Severe construction limitation due to caving cutbanks.
8. Richter loams (RcA)	0-2%	Within drainage way to Yuba Creek. Imperfectly drained, nearly level sandy loam soil commonly adjacent to drainage ways. Used for orchard, farming, pasture and woodland.	Severe construction limitation due to caving cutbanks and wetness.
9. Tonkey sandy loam (To)	0-2%	Poorly drained wetland soil with sandy loam surface and gravelly loam subsurface ranging to mucky sand loam. Mostly wooded wetland.	Severe construction limitation due to caving cutbanks and ponding.

Importantly, the MDEQ Grand Traverse County Final Wetland Inventory reports the presence of soil areas which include wetland soils at and in the vicinity of the proposed deep well site.⁴ The presence of wetland or “hydric” soils indicates the presence of a high water table at and near the proposed deep injection well site.



Source: Natural Resources Conservation Service, Web Soil Survey 2.1, National Cooperative Soil Survey, <http://websoilsurvey.nrcs.usda.gov>, April 13, 2009.

⁴ Grand Traverse County Final Wetland Inventory, Michigan Department of Environmental Quality, compiled October 7, 2008.



Source: MDEQ, Grand Traverse County Final Wetland Inventory, October 7, 2008.

Hydrology

Based on the review of thirteen (13) available residential well logs within Section 25, Acme Township, site geology is typified by a surficial sand layer (i.e. an unconfined sandy aquifer, 57.5 feet in average thickness). This surface sandy aquifer is underlain by a thick confining, clay layer (i.e. 77.6 feet average thickness). Based on the review of thirteen (13) available residential well logs within Section 26, Acme Township, site hydrogeology is also typified by a surficial sand layer (i.e. an unconfined sandy aquifer, 13.2 feet in average thickness). This surface sandy aquifer is also underlain by a thick confining, clay layer (i.e. 47.8 feet average thickness). These geologic conditions have resulted in a high, near surface water table immediately east of the site discharging to Yuba Creek and its riparian wetlands. Yuba Creek exists approximately 1,900 feet east of the proposed deep injection well site, and East Grand Traverse Bay exists approximately one (1.0) mile northwest of the site.

Importantly, all residential water wells in Section 25 and 26 are screened within glacial drift, about half of which are screened within an upper aquifer at 85 feet below ground surface on average, and slightly more than one-half within a deeper confined sandy aquifer and screened at an average 302 feet b.g.s. in Section 25. Importantly, wells screened within the upper aquifer possess an average static water level of 34 feet b.g.s. and 153 feet b.g.s. within the deeper aquifer. Based on site geology, hydrogeology, topography and soils, near surface groundwater resources are interpreted to flow generally easterly, northeasterly toward Yuba Creek, and deep groundwater aquifer is interpreted to flow generally westerly toward East Grand Traverse Bay. Refer to Appendix A for copies of residential well logs.

The proposed Cherry Berry deep injection well site exists approximately one-thousand (1,000') feet north-northwest of a potable water well at an adjacent residence located at 7490 Lautner Road, parcel No. 01-225-011-00. Finally, the proposed Cherry Berry well site exists near, slightly north of and up groundwater flow direction from within the wellhead protection area (WHPA) as defined for the Lochenheath residential and golf course development.⁵ Refer to Appendix B for a copy of the MDEQ Lochenheath Well Head Protection Area map.

Conclusions

Section 18 of DRAFT Cherry Berry UIC Permit states that "the permittee shall be restricted to the injection of

⁵ Lochenheath Wellhead Protection Area, Michigan Department of Environmental Quality, Drinking Water and Radiological Protection Division, Ground Water Supply Section, Wellhead Protection Unit, January 2002.

fluids brought to the surface in connection with conventional oil or natural gas production or those fluids used in the enhancement of oil and gas production...Further, no fluids other than those from sources noted in the administrative record for this permit and approved by the (U.S. EPA) Director shall be injected.”⁶ However, the DRAFT permit allows for changes in permitted injection fluids following the notice and approval of the U.S. EPA. We are concerned that owners/operators of the proposed deep injection well may seek reclassification as a Class I well to be utilized over time for the disposal of liquid industrial wastes (i.e. “nonhazardous”⁷ chemical, food processing, petroleum refining, environmental remediation and/or other wastes) – without significant public input or involvement.

Based on the above findings, the site is unsuited for the proposed deep injection well for natural gas development brines. Importantly, and alternatives already exist to dispose of the applicant O.I.L. Energy Corp’s natural gas development wastes. Specifically, site soils, topography, and hydrogeological conditions – including the presence of a natural drainage way, vulnerable surficial aquifer, and steeply sloping site from west to east toward Yuba Creek and its associated wetlands, and existing neighboring resident’s use of and reliance upon groundwater for drinking water sources – render this site unsuitable for the proposed liquid waste disposal facility. Given this setting, environmental conditions and natural features, the site is best suited for agriculture or low density residential development as envisioned within the Acme Township Master Plan and embodied with Acme Township’s zoning ordinance.⁸

Recommendations

- **Surface Facilities.** A surface facility plan has not been provided to the U.S. EPA for the evaluation of this proposed permit. Specifically, a surface facility plan, including plans to contain and prevent surface spillage, pipeline loss or other potential releases to the environment from production brine waste conveyance, has apparently not yet been provided for public or U.S. EPA evaluation or review. Based on our experience, such plans are fundamental to assess potential environmental risk from proposed deep injection well facilities. Moreover, a surface facility plan for this facility will likely not be available until after final MDEQ decision-making pursuant to Part 625. *It is recommended and strongly urged that the U.S. EPA in fulfilling its Safe Drinking Water Act obligations to protect subsurface water resources deny this permit until such surface facility and containment plans are disclosed by the applicant. Such plans would enable the U.S. EPA to verify appropriate engineering design and operation and maintenance practices to protect drinking water at and downgradient of the proposed well site, and within all storage and conveyance apparatus or practices, i.e. above ground tanks, pipelines, truck on-loading and off-loading, truck routes, on-site truck circulation, etc.*⁹ Finally, at a minimum facility maintenance plans including anti-scaling methods, secondary containment of off-loading and brine tanks/storage facilities and/or brine conveyance pipelines, remotely monitored leak detection, spill prevention and response plans, and pass-through truck circulation for off loading are recommended should this facility be permitted.
- **Groundwater Monitoring.** Similarly, merely one (1) groundwater monitoring well will be required by the MDEQ’s Part 625 permitting process. At least three (3) groundwater monitoring wells are required as part of a reliable hydrogeologic study to determine the depth to groundwater, groundwater flow direction and gradient, etc. Such findings must be made before the appropriate location of a “sentinel” groundwater monitoring well or wells. *It is recommended and strongly urged that the U.S. EPA in fulfilling its Safe*

⁶DRAFT: United State Environmental Protection Agency (USEPA), Underground Injection Control Permit: Class II, Permit Number: MI-055-2D-0042, Facility Name: Cherry Berry B1-25 SWD, Region 5, 77 West Jackson Boulevard, Chicago, IL, p. 10.

⁷“Nonhazardous waste” as defined within the federal Resource Conservation and Recovery Act, 40 C.F.R., Part 261 et seq.

⁸ Acme Township Zoning Ordinance, adopted 11/18/08, effective 12/01/08. pp. 40 -43, and Acme Township Master Plan, created 1999 and updated in 2005.

⁹ O.I.L. Energy Corporation, Morrison A3-18 & Whitewater 9, Grand Traverse County Antrim Gas Units & Projects map dated May 30, 2008 indicates that O.I.L. Energy owns/operates production and brine pipelines at production facility A2-20 within the NW ¼, NW ¼, NW ¼ of Section 20, Acme Township, approximately 4.75 miles away from the proposed Cherry Berry deep well as measured along Lautner, Brackett, and Bates Road right of ways.

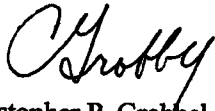
Drinking Water Act obligations to protect subsurface water resources deny this permit until such groundwater data is generated to properly locate and determine the appropriately determine screen intervals of sentinel well or wells.

- **Alternatives.** Plans previously provided by the applicant to the MDEQ indicate that it owns mineral rights and owns/operates and plans to expand an existing natural gas well and pipeline network (i.e. O.I.L. Energy Corps' Acme 18, Acme 25, Acme 31 and Whitewater 9 Antrim natural gas production units) that leads to its central production facility (CPF) within Section 9, Acme Township.¹⁰ This CPF facility includes a brine disposal well (i.e. the Hubbell B1-9 SWD), the subject concurrently of a request to change its use from production brine disposal (i.e. Class II) to cherry processing waste/brine disposal (i.e. Class I). Clearly, these two applications are related and it is recommended and strongly urged that the U.S. EPA deny the subject permit application, in effect requiring O.I.L. to continue with its ongoing plan to use the existing Hubbell B1-9 SWD deep well for production waste and requiring the Williamsburg Receiving and Storage facility to appropriately treat and/or pre-treat its cherry processing waste at its facility and/or properly dispose of it at a municipal waste water treatment plant (WWTP), or similar facility.

If you have any questions regarding this assessment, please contact me at 231-933-8400 or cgrobbel@grobbelenvironmental.com.

Sincerely,

Grobbel Environmental & Planning Associates, L.L.C.



Christopher P. Grobbel, Ph.D.
Senior Project Manager

file 1009-07

¹⁰O.I.L. Energy Corporation, Acme & Whitewater 9 Projects, Grand Traverse County Antrim Gas Units & Projects map, undated.

Appendix A

**Residential Well Logs
Sections 25 & 26, Acme Township
Grand Traverse County, Michigan**

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION
WATER WELL AND PUMP RECORD
 Completion is required under authority of Part 127 Act 368.PA 1978
 Failure to comply is a misdemeanor

2. FORMATION DESCRIPTION	
Red Clay & Gravel	
Gravel & Sand	
Sand, Fine & Med. Gravel	
Red Clay	
Sand, Fine & Med. Gravel	
Sand, Fine & Med. Gravel	
w/ Streaks Red Clay	
Gravel, Stones, Sand & Traces	
Red Clay	109
Sand & Fine Gravel	152
Sand	198

Height: Above/Below Surface: 1 ft.
 Weight: SDR21 lbs./ft.
 Drive Shoe
 Shale Packer

8. SCREEN: Not Installed Gravel-Packed
 Type PVC Diameter 4"
 Slot/Gauze #12 Length: 8'
 Set Between 190 ft. and 198 ft.
 FITTINGS: K-Packer Bremer Check
 Blank Above Screen ft. Other _____

9. STATIC WATER LEVEL:
99 ft. Below Land Surface Flowing

10. PUMPING LEVEL: Below Land Surface
 _____ ft. After _____ hrs. Pumping at _____ G.P.M.
 Plunger Bailor Air Test Pump

11. WELL HEAD COMPLETION:
 Plugless Adaptor 12" Above Grade
 Basement Offset Well House

12. WELL GROUTED? No Yes From 0 to 180 ft.
 Neat Cement Bentonite Other: Volclay
 No. of Bags 14 Additives _____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
 Type Septic Distance 500 ft. Direction E
 Type _____ Distance _____ ft. Direction _____

15. ABANDONED WELL PLUGGED? Yes No
 Casing Diameter _____ in. Depth _____ ft.
 PLUGGING MATERIAL: Neat Cement Bentonite Slurry
 Cement/Bentonite Slurry Concrete Grout Bentonite Chips
 No. of Bags _____ Casing Removed? Yes No

14. PUMP: Not Installed Pump Installation Only
 Manufacturer's Name Aermotor
 Model Number A12B-75 HP 3/4 Volts 220
 Length of Drop Pipe 180 ft. Capacity 12 G.P.M.
 TYPE: Submersible Jet Other _____
 PRESSURE TANK:
 Manufacturer's Name Challenger
 Model Number 100-03 Capacity 32 Gallons

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
 Employee Subcontractor
 Name Robert J. Rufka

18. WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
B & Z Well Drilling Co. 45-2130
 REGISTERED BUSINESS NAME REGISTRATION NO.
 Address 233 E. Kasson Rd., Maple City, MI 49664
 Signed [Signature] Date 8-19-98
 AUTHORIZED REPRESENTATIVE

RECEIVED AUG 27 1998

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION
WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

PERMIT NO:

6T25191

1. LOCATION OF WELL

County Cross Timbers

Well Name

Camp

Fraction

SE 1/4 SE 1/4 SE 1/4

Section No.

25

Town No.

28N.

Range No.

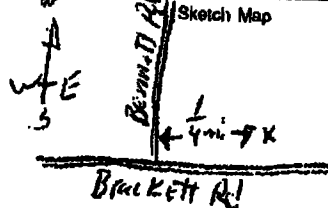
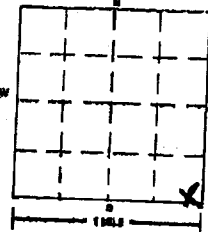
10W

Distance and Direction from Road Intersection

5959 Brackett Rd on north side 1/4 mile east of Bennett Rd. Williamsburg.

Street Address & City of Well Location

Locate with 'x' in Section Below



3. OWNER OF WELL

Address Jeff Lockman
5959 Brackett Rd
Williamsburg MI 49690
Address Same as Well Location Yes No

4. WELL DEPTH: 93 ft. Date Completed 9-4-97 New Well Replacement Well

5. Cable Tool Rotary Driven Dug
 Hollow Rod Auger/Bored Jetted

6. USE: Household Type I Public Type II Public
 Irrigation Type IIa Public Heat Pump
 Test Well Type IIb Public

7. CASING: Steel Threaded Plastic Welded
 Other Height above Below Surface: _____ ft.

Diameter: _____ in. to _____ ft. depth
5 in. to 8.5 ft. depth
BORE HOLE: Diameter: 7/8 in. to 93 ft. depth
_____ in. to _____ ft. depth
 Drive Shoe Shale Packer

8. SCREEN: Not installed Gravel-Packed
Type DVC Diameter 4"
Slot Size 10 Length: 8'
Set Between 85 ft and 93 ft.
FITTINGS: K-Packer Bromer Check
 Blank Above Screen 2 ft. Other _____

9. STATIC WATER LEVEL: 80 ft. Below Land Surface Flowing

10. PUMPING LEVEL: Below Land Surface
81 ft. After 1/2 hrs. Pumping at 10 G.P.M.
 Plunger Bailor Air Test Pump

11. WELL HEAD COMPLETION:
 Pileas Adapter 12" Above Grade
 Basement Offset Well House

12. WELL GROUTED? No Yes From _____ to 83 ft.
 Neat Cement Bentonite Other Volcan
No. of Bags 0 Additives _____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type Septic Distance 50 ft. Direction _____
Type _____ Distance _____ ft. Direction _____

14. PUMP: Not Installed Pump Installation Only
Manufacturer's Name Red Jacket
Model Number S-W HP 1/2 Volts 230
Length of Drop Pipe 80 ft. Capacity 10 G.P.M.
TYPE: Submersible Jet Other _____
PRESSURE TANK:
Manufacturer's Name Well Extrol
Model Number WT 203 Capacity 36 Gallons 9.9

2. FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand-Gravel	25	25
Sand-clay	54	79
Sand	14	93
Clay on Bottom		

RECEIVED
MICHIGAN DEPARTMENT OF
ENVIRONMENTAL QUALITY
JUN - 3 98
DWR P.D.
GROUND WATER SUPPLY SEC.

15. ABANDONED WELL PLUGGED? Yes No
Casing Diameter _____ in. Depth _____ ft.
PLUGGING MATERIAL: Neat Cement Bentonite Slurry
 Cement/Bentonite Slurry Concrete Grout Bentonite Chips
No. of Bags _____ Casing Removed? Yes No

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
 Employee Subcontractor
Name DOUG SCHETTER

18. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Phil's Well Drilling Inc 0421
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 3783 Rennie School Rd TC ME.
Signed Ken Johnson Date 9-8-97
AUTHORIZED REPRESENTATIVE

RECEIVED NOV 19 1997

GEOLOGICAL SURVEY NO.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD

28-011-323-093-00
20870
PERMIT NUMBER

1 LOCATION OF WELL		Fraction		Section Number	Town Number	Range Number																					
County GRAND TRAVERSE	Township Name PENINSULA	SE 1/4 SE 1/4 NE 1/4		25	28	10																					
Distance And Direction From Road Intersection																											
Street Address & City of Well Location 82 W. MCKINLEY RD																											
Locate with "X" in Section Below																											
		Sketch Map:																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">FORMATION DESCRIPTION</th> <th style="width: 17%;">THICKNESS OF STRATUM</th> <th style="width: 17%;">DEPTH TO BOTTOM OF STRATUM</th> </tr> </thead> <tbody> <tr> <td><i>sand gravel stone</i></td> <td><i>110</i></td> <td><i>110</i></td> </tr> <tr> <td><i>Clay</i></td> <td><i>60</i></td> <td><i>170</i></td> </tr> <tr> <td><i>sand</i></td> <td><i>10</i></td> <td><i>180</i></td> </tr> <tr> <td><i>Clay</i></td> <td><i>30</i></td> <td><i>210</i></td> </tr> <tr> <td><i>water sand</i></td> <td><i>20</i></td> <td><i>230</i></td> </tr> <tr> <td><i>Clay</i></td> <td></td> <td></td> </tr> </tbody> </table>		FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	<i>sand gravel stone</i>	<i>110</i>	<i>110</i>	<i>Clay</i>	<i>60</i>	<i>170</i>	<i>sand</i>	<i>10</i>	<i>180</i>	<i>Clay</i>	<i>30</i>	<i>210</i>	<i>water sand</i>	<i>20</i>	<i>230</i>	<i>Clay</i>			<p>3 OWNER OF WELL: MARK NADOLSKI Address 10 MCKINLEY RD, T.C. Address Same As Well Location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>4 WELL DEPTH: 238 FT. Date Completed 8/21/92 <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Replacement Well</p> <p>5 CASING: Diameter 5 in. to 229 ft. depth <input type="checkbox"/> Steel <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Threaded <input type="checkbox"/> Welded Height Above/Below Surface _____ ft. Weight _____ lbs./ft. Grooved Drill Hole Diameter 7 1/2 in. to 234 ft. depth Drive Shoe <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>6 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted</p> <p>8 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public</p> <p>7 SCREEN: <input type="checkbox"/> Not Installed Type <i>Standard</i> Diameter <i>4</i> Slot/Screen <i>1/2</i> Length <i>9</i> Set between <i>289</i> ft. and <i>238</i> ft. FITTINGS: <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Bremer Check <input type="checkbox"/> Blank above screen <i>2</i> ft. Other _____</p> <p>8 STATIC WATER LEVEL: <i>184</i> ft. below land surface <input type="checkbox"/> Flow</p> <p>10 PUMPING LEVEL: below land surface <i>210</i> ft. after <i>1</i> hrs. pumping at <i>46</i> G.P.M. _____ ft. after _____ hrs. pumping at _____ G.P.M.</p> <p>11 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit</p> <p>12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From <i>0</i> to <i>25</i> ft. <input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Other <i>polyurethane</i> No. of bags of cement <i>7</i> Additives _____</p> <p>13 Nearest source of possible contamination Type <i>Septic</i> Distance <i>60</i> ft. Direction <i>N</i> Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Was old well plugged? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>14 PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name <i>Walt & Waffling</i> Model number <i>4E1061D</i> HP <i>1</i> Volts <i>230</i> Length of Drop Pipe <i>210</i> ft. capacity <i>10-12</i> G.P.M. TYPE: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet PRESSURE TANK: Manufacturer's name <i>well kit</i> Model number <i>100-03</i> Capacity <i>32</i> Gallons</p>				
FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM																									
<i>sand gravel stone</i>	<i>110</i>	<i>110</i>																									
<i>Clay</i>	<i>60</i>	<i>170</i>																									
<i>sand</i>	<i>10</i>	<i>180</i>																									
<i>Clay</i>	<i>30</i>	<i>210</i>																									
<i>water sand</i>	<i>20</i>	<i>230</i>																									
<i>Clay</i>																											
<p style="text-align: center;">RECEIVED Mich. Dept. of Public Health OCT 29 1992</p>																											
<p>15. Remarks, elevation, source of water</p> <p style="text-align: center;">BUREAU OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH-SWOS</p>																											
<p>16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <i>Chadwick Williams, B-28-1244</i> REGISTERED BUSINESS NAME REGISTRATION NO. Address <i>410 Center St. Traverse City Mich</i> Signed <i>Alfred J. Williams</i> Date <i>8-21-92</i> AUTHORIZED REPRESENTATIVE</p>																											
<p>17. Rig Operator's Name: <i>Ken Mott</i></p>																											

D67d 2/85

Authority: Act 366 PA 1978
 Completion: Required
 Penalty: Conviction of a violation of any provision is a misdemeanor.

WATER WELL AND PUMP RECORD

3 OWNER OF WELL:
PAUL STEINORTH CONST.
 Address **103 Webster**
Traverse City, MI
 Address Same As Well Location? Yes No

4 WELL DEPTH: (completed) **108 ft.** **Date of Completion** **7/19/82**

5 Cable tool Rotary Driven Dug
 Hollow rod Auger Jetted

6 USE: Domestic Type I Public Type III Public
 Irrigation Type IIa Public Heat pump
 Test Well Type IIb Public

7 CASING
 Diameter: Steel Threaded Height Above/SURFACE: _____ ft.
 Plastic Welded Surface **1** ft.
5 in. to **104** ft. depth Weight **SDR21** lbs./ft.
 _____ in. to _____ ft. depth
 Grouted Drill Hole Diameter
 _____ in. to _____ ft. depth
 _____ in. to _____ ft. depth
 Drive Shoe Yes No

8 SCREEN: Not Installed
 Type **Stainless** Diameter **4"**
 Slot/Gauge **#10** Length **4'**
 Set between **104** ft. and **108** ft.
 FITTINGS: K-Packer Lead Packer Dremer Check
 Blank above screen **2** ft Other **Plug**

9 STATIC WATER LEVEL: **50** ft. below land surface Flow

10 PUMPING LEVEL: below land surface _____
 _____ ft. after _____ hrs. pumping at _____ G.P.M.
 _____ ft. after _____ hrs. pumping at _____ G.P.M.

11 WELL HEAD COMPLETION: Pitless adapter 12" above grade
 Basement offset Approved pit

12 WELL GROUTED? No Yes From **0** to **100** ft.
 Mortar cement Bentonite Other _____
 No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination
 Type **Septic** Distance _____ ft. Direction _____
 Well disinfected upon completion? Yes No

14 PUMP Not installed Pump Installation Only
 Manufacturer's name **Aermotor**
 Model number **SD8-50** HP **1/2** Volts **220**
 Length of Drop Pipe **90** ft. capacity **8** G.P.M.
 TYPE: Submersible Jet
 PRESSURE TANK:
 Manufacturer's name **Well-x-Trol**
 Model number **202** Capacity **20** Gallons

15. Remarks, elevation, source of data, etc.
 *ADDED INFO BY DRILLER, ITEM NO.
 *CORRECTED BY
 **ADDITION BY
 ELEVATION
 DEPTH TO ROCK.

16. WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
B & Z WELL DRILLING CO. 1647
 REGISTERED BUSINESS NAME REGISTRATION NO.
 Address **233 E. Kason Road, Maple City, MI**
 Signed *Edward J. Zientek* Date **7/22/82**
 AUTHORIZED REPRESENTATIVE

RECEIVED Mich. Dept. of Public Health Alls 2 13 82 Environmental and Occupational Health Services Administration

APR 5 1984

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

9063

PERMIT NUMBER

2 FORMATION DESCRIPTION

~~CLAY GRAVEL~~
SAND
CLAY
SAND

12 WELL GROUTED? No Yes From 0 to 30 ft.
 Neat cement Bentonite Other _____
 No. of bags of cement _____ Additives _____
 13 Nearest source of possible contamination
 Type SEPTIC Distance 70 ft. Direction N
 Well disinfected upon completion? Yes No
 14 PUMP: Not installed Pump installation only
 Manufacturer's name F+W
 Model number _____ HP 1/2 Volts 220
 Length of Drop Pipe _____ ft. capacity 10 G.P.M.
 TYPE: Submersible Jet
 PRESSURE TANK:
 Manufacturer's name WX 203
 Model number _____ Capacity _____ Gallons

15. Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO. _____
*CORRECTED BY _____
**ADDITION BY _____
ELEVATION _____
DEPTH TO ROCK _____

16. WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

McPHERSON & SONS 0672
REGISTERED BUSINESS NAME REGISTRATION NO.

Address NEWADAM, MI

Signed Charles McPherson 2-29-84
AUTHORIZED REPRESENTATIVE

GEOLOGICAL SURVEY NO.

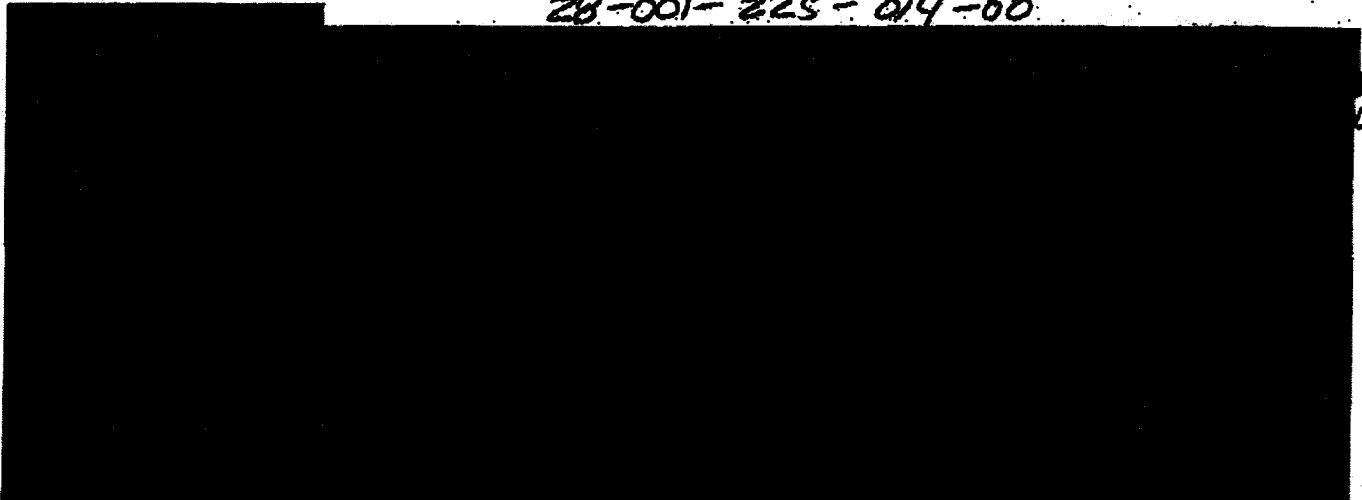
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

2 2570

PERMIT NUMBER

28-001-225-014-00



2 FORMATION DESCRIPTION	
Sand, Gravel & Stones	
Boulder	
Sand & Gravel	
Red Clay	
Sand w/ Streaks Red Clay	
Red Clay	
Grey Clay	
Sand	
Grey Clay	
Grey Clay w/ Fine Gravel	
Sand w/ Streaks Grey Clay	
Grey Clay & Fine Gravel	19
Sand	7
Grey Clay	1

16. Remarks, elevation, source of data, etc.

17. Rig Operator's Name:
Robert J. Bufka

18. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

B & Z Well Drilling Co. 46-2030
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 233 E. Kesson Rd., Maple City, MI
Signed Mark W. Zurek Date 12-9-94
AUTHORIZED REPRESENTATIVE

D67d 2/89

Authority: Act 368 FA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a misdemeanor.

NOV 28 1983

WATER WELL AND PUMP RECORD

7914 PERMIT NUMBER

PART 127 ACT 366, P.A. 1978

1 LOCATION OF WELL

County: GRAND TRAVERSE Township Name: ARME Fraction: SE 1/4 SW 1/4 Section Number: 25 Town Number: 28 Range Number: 10 EW

Distance And Direction From Road Intersection: 1 1/4 Mi EAST of U.S. 31 on BRACKET RD 200' No. of RD.

Street Address & City of Well Location: (BAYSHORE) 6105 BRACKETT RD WILLIAMS BURG 92690

Address Same As Well Location? Yes No

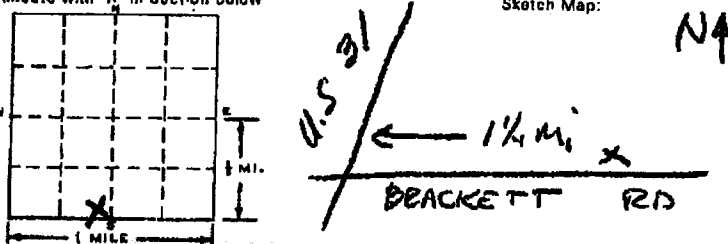
WELL DEPTH: (completed) 155 ft. Date of Completion: 6-30-83

6 Cable tool Rotary Driven Aug Hollow rod Auger Jetted

6 USE: Domestic Type I Public Type II Public Irrigation Type III Public Heat pump Test Well Type IV Public

7 CASING: Diameter Steel Threaded Plastic Welded Height: Above/Below Surface: 1 ft. Weight: SDR 21

5 in. to 150 ft. depth Grouded Drill Hole Diameter 6 3/4 in. to 155 ft. depth Drive Shoe Yes No



2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SAND	5	5
CLAY	1	6
SAND	4	10
CLAY	12	22
SAND	8	30
CLAY	102	132
SAND	3	135
SAND & clay	15	150
SAND & GROUT	5	155

8 SCREEN: Not installed Type: STAINLESS Diameter: 4 INCH Slot/Gauge: 12 Length: 5 FEET

Set between _____ ft and _____ ft

FITTINGS: K Packer Lead Packer Bremer Check Blank above screen 2 ft. Other: _____

9 STATIC WATER LEVEL: 50 ft. below land surface Flow

10 PUMPING LEVEL: below land surface _____ ft. after _____ hrs. pumping at _____ G.P.M.

11 WELL HEAD COMPLETION: Pileless adapter 12" above grade Basement offset Approved pit

12 WELL GROUTED? No Yes From 0 to 50 ft. Neat cement Bentonite Other: _____

No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination Type: SEPTIC Distance: 50 ft. Direction: NE

Well disinfected upon completion? Yes No

14 PUMP: Not installed Pump installation Only

Manufacturer's name: AERATOR Model number: SDR-75 HP: 3/4 Volts: 290

Length of Drop Pipe: 120 ft. capacity: 8 G.P.M. TYPE: Submersible Jet

PRESSURE TANK Manufacturer's name: X-TRUL Model number: WX 203 Capacity: 9.4 Gallons

RECEIVED

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, (ITEM NO.) OCT. 6 1983

*CORRECTED BY _____

** ADDITION BY _____

ELEVATION _____

DEPTH TO ROCK _____

Michigan Dept. of Public Health
Environmental and Occupational Health Services Administration

18. WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

KRUPP WELL DRILLING 0795
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 6010 M-72 W TC

Signed Russ Krupp Date 8/10/83
AUTHORIZED REPRESENTATIVE

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION

WATER WELL AND PUMP RECORD

Completion is required under authority of Part 127 Act 368 PA 1978
Failure to comply is a misdemeanor

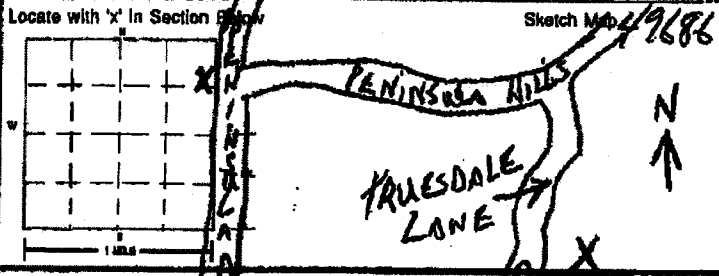
PERMIT NO:

25720

581-004-00
TION OF WELL

Township Name TRAVERSE PENINSULA Fraction SE 1/4 NE 1/4 Section No. 05 Town No. T18N Range No. R17W

Location and Direction from Road Intersection
LOT #4 TRUESDALE ESTATES
7780 TRUESDALE LANE, TRAVERSE CITY



FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
SAND-GRAVEL-ROCKS	41	41
CLAY-GRAVEL-SAND	8	49
SAND-GRAVEL	64	113
SAND-GRAVEL-ROCKS	86	199
SAND-GRAVEL-CLAY	119	318
CLAY	52	370
SAND	12	382

3. OWNER OF WELL HARBOR PARTNERS
Address 2150 A SOUTH AIRPORT
TRAVERSE CITY, MI 49684
Address Same as Well Location Yes No

4. WELL DEPTH: 382 ft. Date Completed 8-10-98
 New Well
 Replacement Well

5. Cable Tool Rotary Driven Dug
 Hollow Rod Auger/Bored Jetted

6. USE: Household Type I Public Type III Public
 Irrigation Type IIa Public Heat Pump
 Test Well Type IIb Public

7. CASING: Steel Threaded Plastic Welded
 Other
Diameter: 5 in. to 374 ft. depth
BORE HOLE: Diameter 7 7/8 in. to 382 ft. depth

8. SCREEN: Not Installed Gravel-Packed
Type Stainless Steel Diameter 3
Slot Gauge 10 Length 8'
Set Between 374 ft. and 382 ft.

9. STATIC WATER LEVEL: 180 ft. Below Land Surface Flowing

10. PUMPING LEVEL: Below Land Surface
185 ft. After 1 hrs. Pumping at _____ G.P.M.
 Plunger Baller Air Test Pump

11. WELL HEAD COMPLETION: Pileless Adapter 12" Above Grade
 Basement Offset Well House

12. WELL GROUTED? No Yes From 0 to 374 ft.
 Neat Cement Bentonite Other CLAY
No. of Bags 18 Additives _____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type SEPTIC Distance 50 ft. Direction _____
Type _____ Distance _____ ft. Direction _____

16. ABANDONED WELL PLUGGED? Yes No
Casing Diameter _____ in. Depth _____ ft.
PLUGGING MATERIAL: Neat Cement Bentonite Slurry
 Cement/Bentonite Slurry Concrete Grout Bentonite Chips
No. of Bags _____ Casing Removed? Yes No

14. PUMP: Not Installed Pump Installation Only
Manufacturer's Name RED JACKET
Model Number BW HP 2 Volts 30
Length of Drop Pipe 331' VARIAB ft. G.P.M. _____
TYPE: Submersible Jet Other
PRESSURE TANK:
Manufacturer's Name WELL-EXTROL
Model Number WY 302 Capacity 86 Gallons

18. REMARKS: (Elevation, Source of Data, etc.)
Well to be a minimum of 350' deep

19. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
REGISTERED BUSINESS NAME PEL'S WELL DRILLING INC
Address 3783 Ronnie School Road
Traverse City, MI 49684
Signed Steve Schmitt Date 8-15-98
AUTHORIZED REPRESENTATIVE

17. DRILLING MACHINE OPERATOR:
 Employee Subcontractor
Name Doug Schmitt

RECEIVED OCT 09 1998

GEOLOGICAL SURVEY COPY

EQP 2017 (12/96)

1 LOCATION OF WELL		
County Grand Traverse	Township Name AKME	Fraction SW 1/4 SE 1/4 NE 1/4
Distance And Direction From Road Intersection BENNETT RD - 7676		
Street Address & City of Well Location Locate with "X" in Section Below		
Sketch Map:		
3 OWNER OF WELL: RONALD RAMOIE Address 4366 Smile Rd - T.C. Address Same As Well Location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
4 WELL DEPTH: (completed) 57 ft. Date of Completion 85		
6 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted		
8 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public		
7 CASING: <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Threaded <input type="checkbox"/> Height: Above/Below <input type="checkbox"/> Plastic <input type="checkbox"/> Welded <input type="checkbox"/> Surface _____ ft. _____ in. to _____ ft. depth <input type="checkbox"/> Drive Shoe <input type="checkbox"/> Yes _____ in. to _____ ft. depth <input type="checkbox"/> No Grouted Drill Hole Diameter _____ in. to _____ ft. depth _____ in. to _____ ft. depth		
8 SCREEN: <input type="checkbox"/> Not Installed		
Type Spinner Diameter _____ Slot/Geuze _____ Length _____ Set between _____ ft. and _____ ft. FITTINGS: <input type="checkbox"/> K-Packer <input checked="" type="checkbox"/> Load Packer <input type="checkbox"/> Bremer Check <input type="checkbox"/> Blank above screen _____ ft. Other _____		
9 STATIC WATER LEVEL: 7 ft. below land surface <input type="checkbox"/> Flow		
10 PUMPING LEVEL: below land surface 2.6 ft. after _____ hrs. pumping at _____ G.P.M. _____ ft. after _____ hrs. pumping at _____ G.P.M.		
11 WELL HEAD COMPLETION: <input type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit		
12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From 0 to 7 ft. <input type="checkbox"/> Neat cement <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Other _____ No. of bags of cement _____ Additives _____		
13 Nearest source of possible contamination Type Septic Distance 75 ft. Direction S.E. Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
14 PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name Flint & Walling Model number _____ HP 5 Volts 230 Length of Drop Pipe 26 ft. capacity _____ G.P.M. TYPE: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet PRESSURE TANK: Manufacturer's name own tank Model number _____ Capacity _____ Gallons		
15. Remarks, elevation, source of data, etc.		
16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. Chas. J. Fleming Co. 28-1244 REGISTERED BUSINESS NAME _____ REGISTRATION NO. _____ Address 2414 Central St. Grand Traverse Sp. Mich. Signed Chas. J. Fleming Date 12-13-85 AUTHORIZED REPRESENTATIVE		

RECEIVED
 Mich. Dept. of Public Health
 JUN 26 1986
 Bureau of Environmental and
 Occupational Health - GWOS

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
 DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION
WATER WELL AND PUMP RECORD
 Completion is required under authority of Part 127 Act 388 PA 1978
 Failure to comply is a misdemeanor

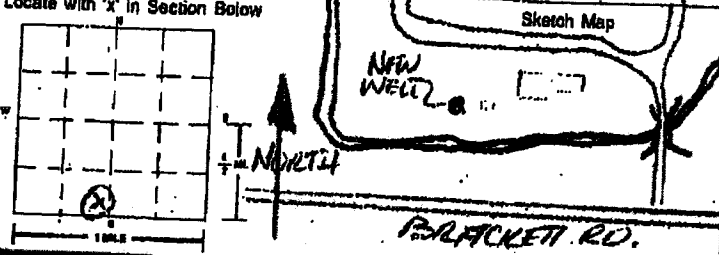
WSSN # 20191-28

PERMIT NO:
 26592

1. LOCATION OF WELL
 County: **GRAND TRAVERSE** Township: **ACME** Range: **10W**
 Fraction: **SE 1/4** Section No.: **25** Town No.: **28N**

Distance and Direction from Road Intersection
~ 350' NORTH OF BRACKETT ROAD.
1400' WEST OF BENNETT ROAD.
 Street Address & City of Well Location
5481 BRACKETT ROAD

3. OWNER OF WELL **DENNIS PENNEY**
 Address **5481 BRACKETT RD.**
EVER FLOWING WATER C. O.
 Address Same as Well Location Yes No



4. WELL DEPTH: **78** ft. Date Completed: **7/21/99**
 New Well Replacement Well
 5. Cable Tool Rotary Driven Dug
 Hollow Rod Auger/Bored Jetted

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Black Dirt	2	2
Muck	4	6
Grey Clay & Traces Gravel	10	16
Grey Clay & Rocks	25	41
Grey Clay & Traces Gravel & Few Stones	29	80
Grey Clay & Small Streaks		
Sand	8	78
Grey Clay & Gravel		78-?

7. CASING: Steel Threaded Welded
 Plastic Other: **70**
 Diameter: **70** in. to **78** ft. depth
 BORE HOLE: **7-7/8** Diameter: **78** in. to **78** ft. depth

8. SCREEN: Not Installed Gravel-Packed 4" Type **#12** Diameter **8'**
 Size/Gauze **70** Length: **78**
 Set Between **7** ft. and **7** ft.
 FITTINGS: K-Packer Bremer Check Blank Above Screen Other

9. STATIC WATER LEVEL: **78** ft. Below Land Surface Flowing

10. PUMPING LEVEL: Below Land Surface **78** ft. After **0** hrs. Pumping at **60** G.P.M.
 Plunger Baller Air Test Pump

11. WELL HEAD COMPLETION: Pitless Adapter 12" Above Grade Basement Offset Well House

12. WELL GROUTED? No Yes From **11** to **78** ft.
 Neat Cement Bentonite Other
 No. of Bags **11** Additives

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION: Type **Septic** Distance **50+** ft. Direction **N**

14. PUMP: Not Installed Submersible Only
 Manufacturer's Name **Well-Rite** Model Number **120-04** HP **33.4** Volts **115**
 Length of Drop Pipe **96** ft. Capacity **172** G.P.M.
 TYPE: Submersible Jet Other
 PRESSURE TANK: Manufacturer's Name **Well-Rite** Model Number **120-04** Capacity **33.4** Gallons

15. ABANDONED WELL PLUGGED? Yes No
 Casing Diameter **2** in. Depth **70** ft.
 PLUGGING MATERIAL: Neat Cement Bentonite Slurry Concrete Grout Bentonite Chips
 No. of Bags **3** Casing Removed? Yes No

16. REMARKS: (Elevation, Source of Data, etc.)
NOTE: PROPERLY ABANDON OLD WELL.
-THIS MAY BE A FLOWING WELL.

17. DRILLING MACHINE OPERATOR:
 Employee Subcontractor
 Name **Robert J. Rufka**

18. WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Well Drilling Co.
 REGISTERED BUSINESS ADDRESS: **45-2034 Kasan Rd., Maple City, MI 49661**
 Address **45-2034 Kasan Rd., Maple City, MI 49661**
 Signed **Mark W. Zittel** Date **6-1-99**
 AUTHORIZED REPRESENTATIVE

RECEIVED JUN 15 1999

GEOLOGICAL SURVEY NO.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD

14210
 PERMIT NUMBER

1 LOCATION OF WELL

County: GRAND TRAVEMERE	Township Name: ARME	Fraction: SW 1/4 SE 1/4	Section Number: 25	Town Number: 28 DS	Range Number: 10 E
Distance And Direction From Road Intersection (5831 BRACKETT Rd.)			3 OWNER OF WELL: VALDMANIS + MEYERS CONST. Address: 115 N. HALL ST. - TIC. Address Same As Well Location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Street Address & City of Well Location Locate with "X" in Section Below			4 WELL DEPTH: 90 FT. Data Completed 7-23-87 <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Replacement Well		
Sketch Map: 		5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jatted <input type="checkbox"/>			
		6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type II Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input type="checkbox"/>			
		7 CASING: Diameter <input type="checkbox"/> Steel <input type="checkbox"/> Threaded <input type="checkbox"/> Height: Above/Below Surface SDR 21 ft. <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Welded Weight SDR 21 lbs./ft. 5 in. to 26 ft. depth in. to _____ ft. depth Grouted Drill Hole Diameter _____ in. to _____ ft. depth in. to _____ ft. depth			

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay Loam	3	3
Sand	12	15
Clay-sand	55	70
Sand-gravel	20	90

8 SCREEN: **wire wound** Not installed
 Type **STAINLESS** Diameter **4" Tele**
 Slot/Gauze **10** Length **4'**
 Set between **86** ft. and **90** ft.
 FITTINGS: K-Packer Lead Packer Bremer Check
 Blank above screen **2** ft. Other _____

9 STATIC WATER LEVEL: **2.5** ft. below land surface Flow

10 PUMPING LEVEL: below land surface
 _____ ft. after _____ hrs. pumping at _____ G.P.M.
 _____ ft. after _____ hrs. pumping at _____ G.P.M.

11 WELL HEAD COMPLETION: Pileas adapter 12" above grade
 Basement offset Approved pit

12 WELL GROUTED? No Yes From **0** to **80** ft.
 Neat cement Bentonite Other _____
 No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination
 Type **Septic** Distance **50+** ft. Direction **W**
 Well disinfected upon completion? Yes No
 Was old well plugged? Yes No

14 PUMP: Not installed Pump installation Only
 Manufacturer's name **PLINT+WALLING**
 Model number **2081** HP **1/2** Volts **230**
 Length of Drop Pipe **60** ft. capacity **10** G.P.M.
 TYPE: Submersible Jet _____
 PRESSURE TANK: Manufacturer's name **AmTrol**
 Model number **WX 202** Capacity **20** Gallons

15. Remarks, elevation, source of data, etc.

17. Rig Operator's Name:
Robert Stachnik

18. WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Btz Well Drilling Co **1647**
 REGISTERED BUSINESS NAME **233 E KASSON RD, Maple City, MI 49664** REGISTRATION NO. _____
 Address _____
 Signed **Edward J. Benter** Date **4-30-87**
 AUTHORIZED REPRESENTATIVE

RECEIVED
 Mich. Dept. of Public Health
SEP 24 1987
 Bureau of Environmental and
 Occupational Health - GWOS

Authority: Act 368 PA 1978
 Completion: Required
 Penalty: Conviction of a violation of any provision is a misdemeanor.

GEOLOGICAL SURVEY NO.



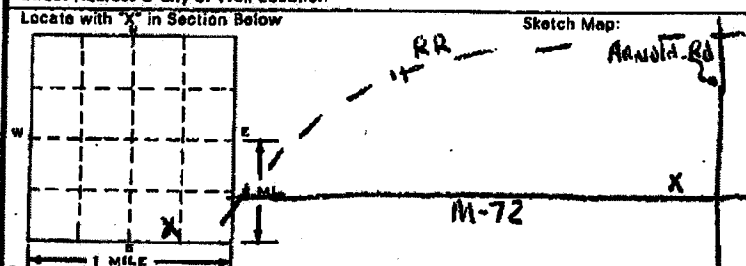
MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD

PERMIT NUMBER 13131

Form with fields: Township Name (KIME), Fraction (SE 1/4 SW 1/4 SE 1/4), Section Number (25), Town Number (28), Range Number (10). Includes a small grid for well location.

Distance And Direction From Road Intersection: M-72 - just west of Arnold Rd. (Security Storage Spices)

OWNER OF WELL: Wm Kerkhof
Address: 4843 Hampshire Dr - Williamsburg
Address Same As Well Location? No



WELL DEPTH (completed): 85 ft. Date of Completion: 5-21-86
Cable tool, Rotary, Driven, Dug, Hollow rod, Auger, Jetted.

2 FORMATION DESCRIPTION

USE: Domestic, Type I Public, Type II Public, Type III Public, Irrigation, Type IIa Public, Heat pump, Test Well, Type IIb Public.

Table with 3 columns: Formation Description, Thickness of Stratum, Depth to Bottom of Stratum.

7 CASING: Diameter (Steel, Plastic, Threaded, Welded), Height: Above/Below Surface (1 ft), Weight (3 lbs./ft.), Drive Shoe (Yes/No).

SAND 20 20

8 SCREEN: Not installed

CLAY & STONE 37 57

Type P.V.C, Diameter 4 INCH, Slot/Gauge 10, Length 5 FEET, Set between 80 ft. end 85 ft. FITTINGS: K-Packer, Load Packer, Gramer Check, Blank above screen.

SAND 28 85

9 STATIC WATER LEVEL: 40 ft. below land surface. Flow?

(Empty row)

10 PUMPING LEVEL: below land surface. ft. after ___ hrs. pumping at ___ G.P.M.

(Empty row)

11 WELL HEAD COMPLETION: Pitless adapter, 12" above grade, Basement offset, Approved pit.

(Empty row)

12 WELL GROUTED? No/Yes. Material: Neat cement, Bentonite, Other SAND. No. of bags of cement, Additives.

(Empty row)

13 Nearest source of possible contamination: Type SEPTIC, Distance 50 ft. Direction ____. Well disinfected upon completion? Yes/No.

(Empty row)

14 PUMP: Not installed/Pump installation Only. Manufacturer's name RED JACKET, Model number 2W, HP 1/2, Volts 230, Length of Drop Pipe ___ ft. capacity ___ G.P.M. TYPE: Submersible, Jet. PRESSURE TANK: Manufacturer's name WELL X-TROL, Model number WX302, Capacity 40 Gallons.

(Empty row)

(Empty row)

(Empty row)

(Empty row)

(Empty row)

(Empty row)

15. Remarks, elevation, source of data, etc.

RECEIVED

DEC 22 1986

Bureau of Environmental and Occupational Health - GVOCS

WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

PHIL'S WELL DRILLING 0481
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 10785 GRANDVIEW RD. T. E.
Signed Phil Sharma Date 8-15-86
AUTHORIZED REPRESENTATIVE

TAX NO:
25 011-600-010-00

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD

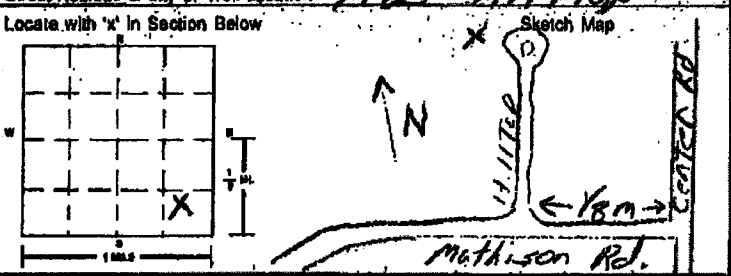
PERMIT NO:
24468

1. LOCATION OF WELL

County Grand Traverse Township Name Peninsula Fraction NE 1/4 SE 1/4 SE 1/4 Section No. 25 Town No. T 28N Range No. R 11W

Distance and Direction from Road Intersection
Peninsula Hills Lot #10

Street Address & City of Well Location 7185 Hilltop



3. OWNER OF WELL
Address R. J. Tucker Const. 1404 Bacdle St. T.C. 49686

Address Same as Well Location Yes No

4. WELL DEPTH: 461 ft. New Well Replacement Well

5. Cable Tool Rotary Driven Dug
 Hollow Rod Auger/Bored Jetted

6. USE: Household Type I Public Type III Public
 Irrigation Type IIa Public Heat Pump
 Test Well Type IIb Public

7. CASING: Steel Threaded Plastic Welded Other

Height: Above/Below Surface: 1 ft

Diameter: 5 in. to 196 ft. depth Weight: SDR21 lbs./ft.
5 in. to 456 ft. depth SDR17

BORE HOLE: Diameter 7-7/8 in. to 450 ft. depth Drive Shoe Shaft Packer

2. FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Loamy Sand & Gravel	3	3
Sand, Gravel & Stones	76	79
Sand & Fine Gravel	75	154
Red Clay & Traces Gravel		
w/ few small streaks fine sand	107	261
Gray Clay & Traces Gravel	46	307
Gray Clay & Gravel	136	443
Sand & Gravel	18	461
Sand & Gravel		461-?

Which Dept. of Public Health

JAN 16 1997

BUREAU OF REPT. & MAPPING

8. SCREEN: Not Installed Gravel-Packed
Type Stainless Steel Diameter 3"
Slot/Gauge #12 Length: 5'
Set Between 456 ft. and 461 ft.

PITTINGS: K-Packer Bremer Check Blank Above Screen 4 ft. Other 3" plug

9. STATIC WATER LEVEL: 220 ft. Below Land Surface Flowing

10. PUMPING LEVEL: Below Land Surface _____ ft. After _____ hrs. Pumping at _____ G.P.M.

Plunger Bailer Air Test Pump

11. WELL HEAD COMPLETION: Pileas Adapter 12' Above Grade
 Basement Offset Well House

12. WELL GROUTED? No Yes From 0 to 450 ft.
 Neat Cement Bentonite Other Volclay
No. of Bags 28 Additives _____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type septic Distance 20' ft. Direction NW
Type _____ Distance _____ ft. Direction _____

15. ABANDONED WELL PLUGGED? Yes No

Casing Diameter _____ in. Depth _____ ft.

PLUGGING MATERIAL: Neat Cement Bentonite Slurry
 Cement/Bentonite Slurry Concrete Grout Bentonite Chips
No. of Bags _____ Casing Removed? Yes No

14. PUMP: Not Installed Pump Installation Only

Manufacturer's Name Aeromotor
Model Number T12-150 HP 1/2 Volts 220
Length of Drop Pipe 300 ft. Capacity 12 G.P.M.
TYPE: Submersible Jet Other _____

PRESSURE TANK:
Manufacturer's Name Well-Rite
Model Number 120-01 Capacity 33.4 Gallons

16. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:
 Employee Subcontractor
Name Robert J. Blalock

15. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

R & Z Well Drilling Co. 45-2030
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 233 E. Kesson Rd., Maple City, MI 49664
Signed Mark W. Smith Date 12-12-96
AUTHORIZED REPRESENTATIVE

GW-9-224 9-83

GEOLOGICAL SURVEY COPY

Authority: Act 366 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a misdemeanor.

TAX NO:
28-011-537-024-00

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD

PERMIT NO:
23940

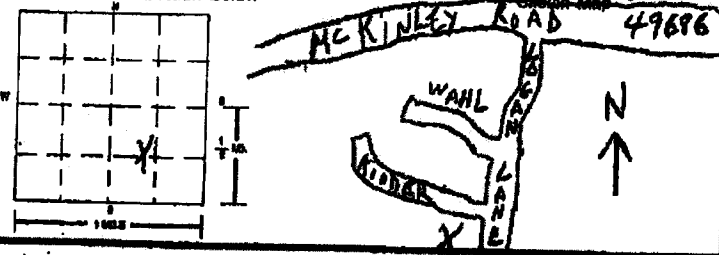
1. LOCATION OF WELL

County: GRAND TRAVERSE Township Name: PENINSULA Fraction: SE 1/4 NW 1/4 SE 1/4 Section No.: 05 Town No.: T.29N Range No.: R.11W

Distance and Direction from Road Intersection
Lot # 24 LOAN HILLS SUBDIVISION
7153 LOAN LANE, TRAVERSE CITY, MI.

Street Address & City of Well Location

Locate with 'x' in Section Below



3. OWNER OF WELL
Address: TODD NIEN HOUSE
2704 CHAMBLER ROAD
TRAVERSE CITY, MI. 49686

Address Same as Well Location Yes No

4. WELL DEPTH: 325 ft. Date Completed: 7-12-96

New Well
 Replacement Well

5. Cable Tool Rotary Driven Dug
 Hollow Rod Auger/Bored Jatted

6. USE: Household Type I Public Type III Public
 Irrigation Type IIa Public Heat Pump
 Test Well Type IIb Public

7. CASING: Steel Threaded Plastic Welded
 Other

Height: Above/Below Surface: _____ ft.

Diameter: 5 in. to 31.5 ft. depth
in. to _____ ft. depth

Weight: _____ lbs./ft.

BORE HOLE:
Diameter: 7 3/8 in. to 32.5 ft. depth
in. to _____ ft. depth

Drive Shoe
 Shale Packer

8. SCREEN: Not installed Gravel-Packed
Type: Wesco S-5 Diameter: 4
Slot/Gauge: 1/2 Length: 10
Set Between: 3/8 ft. and 3/8 ft.
FITTINGS: K-Packer Bremer Check
 Blank Above Screen 2 ft. Other _____

9. STATIC WATER LEVEL:
232 ft. Below Land Surface Flowing

10. PUMPING LEVEL: Below Land Surface _____ ft. After _____ hrs. Pumping at _____ G.P.M.

Plunger Bailer Air Test Pump

11. WELL HEAD COMPLETION:
 Pileless Adapter 12" Above Grade
 Basement Offset Well House

12. WELL GROUTED? No Yes From 0 to 325 ft.
 Neat Cement Bentonite Other gravel
No. of Bags: 15 Additives _____

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:
Type: drain Distance: 75 ft. Direction: W
Type _____ Distance _____ ft. Direction _____

14. PUMP: Not installed Pump Installation Only

Manufacturer's Name: Mylar
Model Number: 2NE150 HP: 1/2 Volts: 230
Length of Drop Pipe: 273 ft. Capacity: 15 G.P.M.
TYPE: Submersible Jet Other _____

PRESSURE TANK:
Manufacturer's Name: Well-Lite
Model Number: 240 Capacity: _____ Gallons 21

2. FORMATION DESCRIPTION

	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
<u>loamy sand</u>	<u>4</u>	<u>4</u>
<u>rock gravel sand</u>	<u>126</u>	<u>130</u>
<u>gravel sand</u>	<u>40</u>	<u>170</u>
<u>sand red clay</u>	<u>20</u>	<u>190</u>
<u>gray clay</u>	<u>125</u>	<u>315</u>
<u>silts</u>	<u>10</u>	<u>325</u>

RECEIVED
Mich. Dept. of Public Health
NOV 27 1996

BUREAU OF ENVIRONMENTAL AND
OCCUPATIONAL HEALTH-GWDS

USE A 2ND SHEET IF NEEDED

15. ABANDONED WELL PLUGGED? Yes No

Casing Diameter _____ In. Depth _____ ft.

PLUGGING MATERIAL: Neat Cement Bentonite Slurry
 Cement/Bentonite Slurry Concrete Grout Bentonite Chips

No. of Bags _____ Casing Removed? Yes No

16. REMARKS: (Elevation, Source of Data, etc.)
Well to be a minimum of 270' deep

17. DRILLING MACHINE OPERATOR:
 Employee Subcontractor
Name: Greg Williams

15. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

REGISTERED PROFESSIONAL ENGINEER
Address: 2040 East P. Traverse City, MI
Signed: Greg Williams Date: 7-12-96

GW-3-223 683

GEOLOGICAL SURVEY COPY

Authentic Act 308 PA 1976
Completion Required
Penalty: Conviction of a violation of any provision in a misdemeanor.

JUL 10 1978



WATER WELL RECORD

ACT 284 1966

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

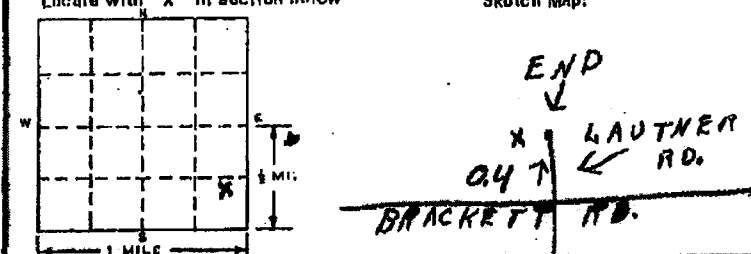
NE SE SE

1 LOCATION OF WELL

County Grand Traverse Township Name Arden Fraction 1/4 1/4 1/4 1/4

Distance And Direction from Road intersections 0.4 miles on N. Lautner Rd. from Brackett rd

Street address & City of Well Location Same



Remarks section with handwritten notes: 'mud clay' and 'lime sand'. The rest of the section is redacted with black boxes.

3 OWNER OF WELL: Dan Hanna

Address: Rt. 2 Williamsburg Mich 49690

4 WELL DEPTH: (completed) 110 ft. Date of Completion 5/16/78

5 Cable tool [] Rotary [] Driven [] Dup [] Hollow rod [] Jolted [] Bored [X]

6 USE: [X] Domestic [] Public Supply [] Industry [] Irrigation [] Air Conditioning [] Commercial [] Test Well []

7 CASING: Threaded [] Welded [] Diam 2" Height: Above/Below Surface 0 in. to 110 ft. Depth Weight 3.75 lbs./ft. Drive Shoe? Yes [X] No []

8 SCREEN: Type 1 1/2" STAINLESS Dia. 1 1/4" Gauze 20 Length 5" Set between 105 ft. and 110 ft. Fittings: Bramer Check

9 STATIC WATER LEVEL: 90 ft. below land surface

10 PUMPING LEVEL below land surface: ft. after hrs. pumping G.P.M.

11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness Other

12 WELL HEAD COMPLETION: [X] In Approved Pit [] Pitless Adapter [] 12" Above Grade

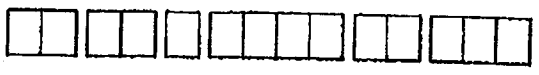
13 Well Grouted? [] Yes [] No [] Neat Cement [] Bentonite [] Depth: From ft. to ft.

14 Nearest Source of possible contamination THE FIELD 60 feet S Direction SOUTH Type Well disinfected upon completion [] Yes [] No

15 PUMP: [] Not Installed Manufacturer's Name SEARS Model Number HP 1/2 Volts 220 Length of Drop Pipe 100 ft. capacity 2 G.P.M. Type: [] Submersible [X] Jet [] Reciprocating

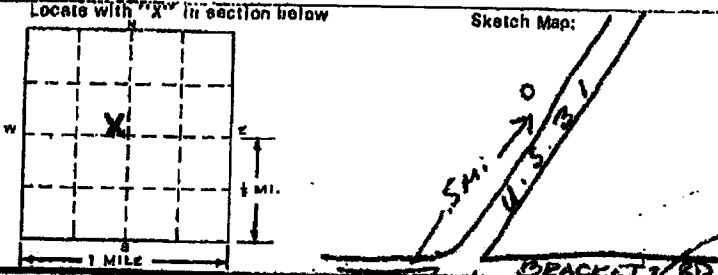
16 Remarks, elevation, etc. CORRECTED BY Addition BY ELEVATION DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. JULIUS WELL DRILLING 0017 REGISTERED BUSINESS NAME REGISTRATION NO. Address Williamsburg Mich. 49690 Signature Julius Soyars Date 5/16/78 AUTHORIZED REPRESENTATIVE



WATER WELL RECORD
 ACT 294 PA 1985

MICHIGAN DEPARTMENT
 OF
 PUBLIC HEALTH

1 LOCATION OF WELL																										
County GRAND TRAVERSE	Township Name ACME	Fraction SE 1/4 SE 1/4 NW 1/4	Suction Number 26	Town Number 28 N46	Range Number 10 E/W																					
Distance And Direction from Road Intersections .5 mile No. of Brackett Rd. on US 31 125' West of Rd. ACME, MI.			3 OWNER OF WELL: TOM LEMCOOL Rt. 2 US 31N WILLIAMSBURG, MI. 49690																							
Street address & City of Well Location Locate with "X" in section below 			4 WELL DEPTH: (completed) Date of Completion 161 ft. 6/7/76																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 40%;">2 FORMATION</th> <th style="width: 10%;">THICKNESS OF STRATUM</th> <th style="width: 10%;">DEPTH TO BOTTOM OF STRATUM</th> </tr> <tr> <td>SAND</td> <td>5</td> <td>5</td> </tr> <tr> <td>CLAY & GRAVEL</td> <td>30</td> <td>35</td> </tr> <tr> <td>GRAVEL</td> <td>25</td> <td>60</td> </tr> <tr> <td>SAND & GRAVEL</td> <td>70</td> <td>130</td> </tr> <tr> <td>CLAY</td> <td>15</td> <td>145</td> </tr> <tr> <td>SAND & GRAVEL</td> <td>16</td> <td>161</td> </tr> </table>			2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	SAND	5	5	CLAY & GRAVEL	30	35	GRAVEL	25	60	SAND & GRAVEL	70	130	CLAY	15	145	SAND & GRAVEL	16	161	6 USE: <input checked="" type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jatted <input type="checkbox"/> Bored <input type="checkbox"/> 6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>		
			2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM																					
			SAND	5	5																					
			CLAY & GRAVEL	30	35																					
			GRAVEL	25	60																					
SAND & GRAVEL	70	130																								
CLAY	15	145																								
SAND & GRAVEL	16	161																								
<div style="font-size: 4em; opacity: 0.5; transform: rotate(-15deg); position: absolute; top: 50%; left: 50%; pointer-events: none;">S-PV@</div>			7 CASING: Threaded <input type="checkbox"/> Welded <input checked="" type="checkbox"/> Height: Above GROUND Surface 1 ft. 5 in. to 154 ft. Depth WATER 280 lbs. TEST in. to _____ ft. Depth Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>																							
			8 SCREEN: JOHNSON Type: STAINLESS STEEL Dia.: 4 inch Slot/Screen 10 Length 3 feet Set between 154 ft. and 159 ft. Fittings: threaded drive screen K-packer, set length																							
			9 STATIC WATER LEVEL 118 ft. below land surface 10 PUMPING LEVEL below land surface 118 ft. after 1 hrs. pumping 15 o.p.m. _____ ft. after _____ hrs. pumping _____ o.p.m.																							
			11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Other _____																							
12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade 13 Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Depth: From _____ ft. to _____ ft. 14 Nearest Source of possible contamination 55 feet NW Direction septic Type Well disinfected upon completion <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name DEBSTER Model Number GL-50 HP 3/4 Volts 230 Length of Drop Pipe 138 ft. capacity 8 G.P.M. Type: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. KROFF WELL DRILLING 0795 REGISTERED BUSINESS NAME REGISTRATION NO. Address CEDAR, MI. 49621 Signed Walt Fry Date 6/9/76 AUTHORIZED REPRESENTATIVE																							
			16 Remarks, elevation, source of data, etc. ADDED INFO BY DRILLER, ITEM NO. *CORRECTED BY JL **ADDITION BY ELEVATION DEPTH TO ROCK																							

WATER WELL AND PUMP RECORD

PART 127 ACT 36B, P.A. 1978

PERMIT NUMBER

--	--	--	--	--	--

1 LOCATION OF WELL

County Grand Traverse	Township Name Acme	Fraction N 1/4 N 1/4 NW 1/4	Section Number 26	Town Number 728 N 1/2 R 10 W	Range Number 10 W
Distance And Direction From Road Intersection 1/2 mile EAST of US 31			OWNER OF WELL: ZIMMERMAN		
Street Address & City of Well Location 4450 Maitland Rd.			Address do Burkholder Const. TRAVERSE CITY.		
Locate with "X" in Section Below			Address Same As Well Location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
			4 WELL DEPTH (completed) 152 ft. Date of Completion 8-28-91 5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jotted <input type="checkbox"/>		
			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Hoist pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input type="checkbox"/>		
			7 CASING Diameter <input type="checkbox"/> Steel <input type="checkbox"/> Threaded <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Welded 5 in. to 142 ft depth Height: Above/Below Surface 1 ft. Weight SDR21 lbs./ft. Ground Drill Hole Diameter 7-1/8 in. to 25 ft. depth Drive Shoe <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	3	3
Red Clay	3	6
Sand	64	70
Clay & Sand	20	90
Fine Sand	48	138
Sand	14	152
Clay	152-	

8 SCREEN: <input type="checkbox"/> Not installed Type Stainless Diameter Full 4" Size/Gauge #12 Length 10' Set between 142 ft. and 152 ft. FITTINGS: <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Bromer Check <input checked="" type="checkbox"/> Blank above screen 1 ft. Other plug	
9 STATIC WATER LEVEL: 47 ft. below land surface <input type="checkbox"/> Flow	
10 PUMPING LEVEL: below land surface _____ ft. after _____ hrs. pumping at _____ G.P.M. _____ ft. after _____ hrs. pumping at _____ G.P.M.	
11 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit	
12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From 0 to 25 ft. <input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Other Holeplug No. of bags of cement _____ Additives _____	
13 Nearest source of possible contamination Type septic Distance 60' Direction S Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
14 PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name Aermotor Model number A20B-100 HP 1 Volts 230 Length of Drop Pipe 120 ft. capacity 20 G.P.M. TYPE: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet PRESSURE TANK: Manufacturer's name Well-Rite Model number 260-03(2) capacity 85 (gal.)	

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 Mich. Dept. of Public Health
JAN 27 1993

15. Remarks, elevation, source of data, etc.
Well Driller- Mark W. Zientek
BUREAU OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH

16. WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
B&Z Well Drilling Co. **1647**
 REGISTERED BUSINESS NAME REGISTRATION NO.
 Address **233 E. Kassen Rd., Maple City, MI**
 Signed **Edward J. Zientek** Date **4-21-92**
 AUTHORIZED REPRESENTATIVE

GEOLOGICAL SURVEY NO.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

28-001-226-004-00

21760

PERMIT NUMBER

2 FORMATION DESCRIPTION

SAND & Clay
Clay
SAND
SAND & Clay & Rocks
SAND & Gravel & Rocks
SAND

3 OWNER OF WELL: JOHN GARDNER
 Address 765 US 31 N
 Address Same As Well Location? Yes No

4 WELL DEPTH: 170 FT. Date Completed 8/30/93 New Well Replacement Well

5 Cable tool Rotary Driven Dug
 Hollow rod Auger Jetted

6 USE: Domestic Type I Public Type III Public
 Irrigation Type IIa Public Heat pump
 Test Well Type IIb Public

7 CASING: Diameter 5 1/4 in. Steel Threaded Height: Above/Below Surface
 Plastic Welded Surface 1 ft.
 in. to 170 ft. depth Weight 500-21 lbs./ft.
 in. to 170 ft. depth Drill Hole Diameter
 in. to 170 ft. depth Drive Shoe Yes No

8 SCREEN: Not installed
 Type PVC Diameter 4" Length 5 FT.
 Sat between 165 ft. and 170 ft.
 FITTINGS: K-Packer Lead Packer Uremer Check
 Blank above screen 2 ft. Other

9 STATIC WATER LEVEL: 120 FT. ft. below land surface Flow

10 PUMPING LEVEL below land surface
 ft. after hrs. pumping at G.P.M.
 ft. after hrs. pumping at G.P.M.

11 WELL HEAD COMPLETION: Wellhead adapter 2' above grade
 Basement offset Approved pit

12 WELL GROUTED? No Yes From 0 to 25 ft.
 Neat cement Bentonite Other red clay
 No. of bags of cement Additives

13 Nearest source of possible contamination
 Type septic Distance 50 ft. Direction
 Well disinfected upon completion? Yes No
 Was old well plugged? Yes No

14 PUMP: Not installed Pump Installation Only
 Manufacturer's name Home Owners Model number _____ HP _____ Volts _____
 Length of Drop Pipe _____ ft capacity _____ G.P.M.
 TYPE: Submersible Jet
 PRESSURE TANK: Manufacturer's name Home Owners Model number _____ Capacity _____ Gallons

RECORDED
Mich. Dept. of Public Health
SERIALIZED 103

15. Remarks, elevation, source of data, etc.

17. Rig Operator's Name:
Doug Schetter

WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Phil Well Drilling 0481
 REGISTERED BUSINESS NAME REGISTRATION NO.
 Address 3183 Kennick School Rd. TC
 Signed Phil Sgarrowski Date 8/31/93
 AUTHORIZED REPRESENTATIVE

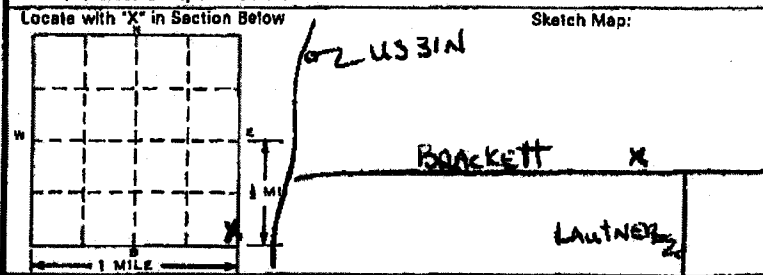
Authority: Completion: Penalty: Act 388 PA 1078 Required Conviction of a violation of any provision is a misdemeanor.

1 LOCATION OF WELL

County GRAND TRAVERSE Township Name ACME Fraction SE 1/4 SE 1/4 SE 1/4 Section Number 26 Town Number 28 Range Number 10E

Distance And Direction From Road Intersection
1/2 mile west of LAUTNER Rd ON North side of BRACKETT Rd. (4821 BRACKETT Rd)

Street Address & City of Well Location



3 OWNER OF WELL:
CINDY LARENZ
Address 4821 BRACKETT RD - T.C.
Address Same As Well Location? Yes No

4 WELL DEPTH: (completed) 143 ft. Date of Completion 9.24.86

5 Cable tool Rotary Driven Dug
 Hollow rod Auger Jetted

6 USE: Domestic Type I Public Type II Public
 Irrigation Type III Public Heat pump
 Test Well Type IV Public

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
TOP SOIL	0	1
SAND CLAY	9	10
CLAY	91	101
SAND	4	105
CLAY	6	111
CLAY SAND STRIPS	6	117
CLAY SAND LAYER	18	135
SAND	10	145
FINE SAND		

7 CASING: Steel Threaded Welded
 Plastic

Height: Above/Below Surface 1 ft
Weight _____ lbs./ft
Drive Shoe Yes No

5 in. to _____ ft. depth
7 3/8 in. to 143 ft. depth
Grouted Drill Hole Diameter _____ in. to _____ ft. depth

8 SCREEN: Not installed
Type STAINLESS Diameter 3
Slot/Gauge 10 Length _____
Set between 146 ft. and 143 ft.
FITTINGS: K-Packer Lead Packer Bremer Check
 Blank above screen _____ ft. Other _____

9 STATIC WATER LEVEL: 78 ft. below land surface Flow

10 PUMPING LEVEL: below land surface
160 ft. after _____ hrs. pumping at _____ G.P.M.
_____ ft. after _____ hrs. pumping at _____ G.P.M.

11 WELL HEAD COMPLETION: Pitless adaptor 12" above grade
 Basement offset Approved pit

12 WELL GROUTED? No Yes From _____ to _____ ft.
 Neat cement Bentonite Other _____
No. of bags of cement _____ Additives POLYCLAY

13 Nearest source of possible contamination
Type SEPTIC Distance 60 ft. Direction E
Well disinfected upon completion? Yes No

14 PUMP: Not installed Pump Installation Only
Manufacturer's name F1 WALLING
Model number F10 HP 1/4 Volts 230
Length of Drop Pipe 130 ft. capacity 10 G.P.M.
TYPE: Submersible Jet
PRESSURE TANK:
Manufacturer's name EXTRU
Model number 103 Capacity 9.30-50 Gallons

15. Remarks, elevation, source of data, etc.

RECEIVED
Mich. Dept. of Public Health
JUN 26 1986
Bureau of Environmental and Occupational Health - GWQS

USE A 2ND SHEET IF NEEDED

16. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

TRAPP WELL DRILLING 0795
REGISTERED BUSINESS NAME _____ REGISTRATION NO. _____
Address 6010 M 77 WEST TRAVELER P.M.
Signed J. Trapp Date 9.24.86
AUTHORIZED REPRESENTATIVE

PART OF

TAX NO: 28-01-226-012 00

MICHIGAN DEPARTMENT OF PUBLIC HEALTH WATER WELL AND PUMP RECORD

PERMIT NO:

23176

1. LOCATION OF WELL

County

GRAND TRAVERSE

Township Name

ACME

Fraction

SE 1/4 NE 1/4 SE 1/4

Section No.

26

Town No.

28-N

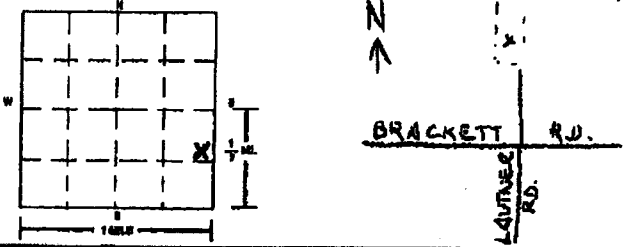
Range No.

10-W

Distance and Direction from Road Intersection

PROPERTY IS LOCATED AT EXTREME NORTH END OF N. LAUTNER RD. (SEE PERMIT DIAGRAM.)

Locate with 'x' in Section Below



2. FORMATION DESCRIPTION

Table with 3 columns: Formation Description, Thickness of Stratum, and Depth to Bottom of Stratum. Rows contain handwritten entries: SAND & clay (0-3), SAND & CLAY (53-56), SAND & clay & gravel (62-113), CLAY (41-159), SAND (9-168).

REMOVED FROM PART OF PUBLIC RECORDS BY ORDER OF SUPERVISOR AND COUNTY CLERK

3. OWNER OF WELL

GARY D. STREITWIESE P.O. BOX 4126 TRAVERSE CITY, MI. 49685

4. WELL DEPTH:

160 ft. Date Completed 7-24-95

5. Cable Tool, Hollow Rod, Rotary, Auger/Bored

6. USE: Household, Irrigation, Test Well, Type I Public, Type IIa Public, Type IIb Public, Type III Public, Heat Pump

7. CASING:

Steel, Plastic, Other, Threaded, Welded

Height: Above/Below Surface: 1 ft. Diameter: 160 in. to 160 ft. depth

BORE HOLE: Diameter: 8 1/2 in. to 11 1/8 in. depth

SCREEN:

Not Installed, Gravel-Packed, Type, Diameter 4"

Str/Gauze PVC Length: 8' Set Between 10 ft. and 8 ft.

FITTINGS:

K-locks, Bremer Check, Blank Above Screen, 168 ft. Other

8. STATIC WATER LEVEL:

100 Below Land Surface, Flowing

10. PUMPING LEVEL:

Below Land Surface, ft. After hrs. Pumping at G.P.M. Plunger, Baller, Air, Test Pump

11. WELL HEAD COMPLETION:

Flange Adapter, 12" Above Grade, Basement Offset, Well House

12. WELL GROUTED?

No, Yes, From 150 ft. to 150 ft. Neat Cement, Bentonite, Other Vol-clay

13. NEAREST SOURCE OF POSSIBLE CONTAMINATION:

Septic, Distance 50 ft. Direction

14. PUMP:

Not Installed, Pump Installation Only, Manufacturer's Name Myera

Model Number 2-w HP 3/4 Volts 230 Length of Drop Pipe 140 ft. Capacity 12 G.P.M.

TYPE: Submersible, Jet, Other, PRESSURE TANK: Manufacturer's Name Well Extrol

Model Number WX203 Capacity 32 Gallons 9.9

15. ABANDONED WELL PLUGGED?

Yes, No, Casing Diameter, Depth, Plugging Material: Neat Cement, Bentonite Slurry, Concrete Grout, Bentonite Chips, Casing Removed?

18. REMARKS: (Elevation, Source of Data, etc.)

17. DRILLING MACHINE OPERATOR:

Employee, Subcontractor, Name Doug Schettek

15. WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

PHIL'S WELL DRILLING

REGISTERED BUSINESS NAME 3783 RENNIE SCHOOL RD. TRAVERSE CITY, MI 49684-8245

Signed Phil Sharowski Date 8-2-95 AUTHORIZED REPRESENTATIVE



WATER WELL RECORD
ACT 204 PA 1965

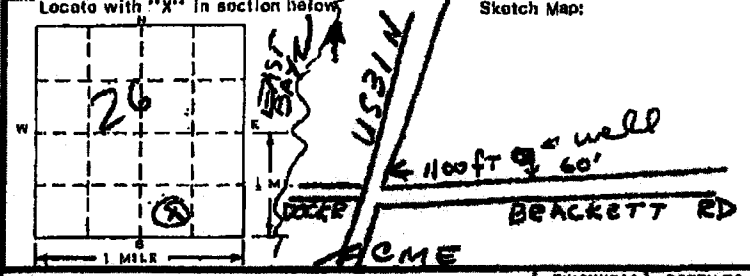
MICHIGAN DEPARTMENT
OF
PUBLIC HEALTH

NOV 9 1970

1 LOCATION OF WELL

County **GRAND TRAVERSE** Township Name **ACME** Fraction **SE 1/4 SW 1/4 SE 1/4** Section Number **26** Town Number **28** Range Number **10**

Distance And Direction from Road Intersections
60' OFF BRACKETT RD - 1100' EAST
OF US 31 N -
Street Address & City of Well Location **ACME, MI**
Locate with "X" in section below



3 OWNER OF WELL:
MOREY AMON
Address **US 31 N TRVERSE CITY**

4 WELL DEPTH: (completed) Data of Completion
192 ft. **10/22/70**

5 Cable tool Rotary Driven Dig
 Hollow rod Jetted Bored
6 USE: Domestic Public Supply Industry
 Irrigation Air Conditioning Commercial
 Test Well

7 CASING: Threaded Welded
Diam. **4"** Height: Above/surface **1** ft.
In. to **192** ft. Depth Weight **11** lbs./ft.
In. to _____ ft. Depth Drive Shoe? Yes No

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
BLACK DIRT	1	1
CLAY - LOAM	14	15
CLAY - GRAVEL	10	25
SAND	45	70
CLAY	30	100
SAND	18	118
CLAY	58	176
CLAY - GRAVEL	7	183
MUDDY SAND	2	185
SAND	7	192

8 SCREEN:
Type: **COOK-RED BRASS** Dia.: **4"**
Slot/Gauze **12** Length **5 ft**
Set between **187** ft. and **192** ft.
Fittings: **STANDARD BOTTOM, LEAD PACKER, ST. LEAD**

9 STATIC WATER LEVEL
135 ft. below land surface

10 PUMPING LEVEL below land surface
150 ft. after **2** hrs. pumping **25** g.p.m.
_____ ft. after _____ hrs. pumping _____ g.p.m.

11 WATER QUALITY in Parts Per Million (ppm)
Iron (Fe) _____ Chlorides (Cl) _____
Hardness _____ Other _____

12 WELL HEAD COMPLETION: Approved _____
 Jetless Adapter Above Ground _____

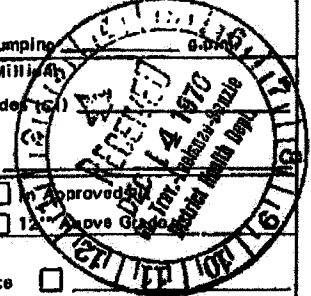
13 Well Grouted? Yes No
 Neat Cement Bentonite
Depth: From _____ ft. to _____ ft.

14 Nearest Source of possible contamination
100 foot **N6** Direction **SEPTIC** Type
Well disinfected upon completion Yes No

15 PUMP: Not installed
Manufacturer's Name **AERMOTOR**
Model Number **SA1004** HP **1** Volts **230**
Length of Drop Pipe **168** ft. capacity **12** G.P.M.
Type: Submersible Jet Reciprocating

16 Remarks, elevation, source of data, etc.
ADDED INFO. BY DRILLER, ITEM NO.:
CORRECTED BY:
REVISION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
KROPP WELL DRILLING **0795**
REGISTERED BUSINESS NAME REGISTRATION NO.
Address **CEDAR, MI 49621**
Signed **W. J. Kropp** Date **11/5/70**
AUTHORIZED REPRESENTATIVE





WATER WELL RECORD
 ACT 284 PA 1965

MICHIGAN DEPARTMENT
 OF
 PUBLIC HEALTH

1 LOCATION OF WELL			3 OWNER OF WELL:		
County GRAND TRAVERSE	Township Name ACME	Fraction NW 1/4 NW 1/4 SW 1/4	Section Number 26	Town Number 28 N.E.	Range Number 10 E/W.
Distance And Direction from Road Intersections 1/2 MILE WEST of US 31 off Maitland RD. ARME, MI 49610			Address BURKHOLDER CONSTRUCTION 1614 U.S. 31N. TRAVERSE CITY, MI. 49684		
Street address & City of Well Location Locate with "X" in section below			4 WELL DEPTH: (completed) Date of Completion 56 ft. 8/19/75		
Sketch Map: 			6 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>		
			8 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>		
2 FORMATION			7 CASING: Threaded <input type="checkbox"/> Welded <input checked="" type="checkbox"/> Height Above Surface 1 ft.		
			4 in. to 52 ft. Depth Weight 11 lbs./ft. In. to _____ ft. Depth Drives Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
SAND			8 SCREEN: COOK		
SAND & GRAVEL & ROCKS			Type: RED BRASS Dia.: 4 inch Slot/Gauge 10 Length 4 feet Set between 52 ft. and 56 ft. Fittings: standard bottom, lead packer, set length		
			9 STATIC WATER LEVEL 22 ft. below land surface		
			10 PUMPING LEVEL below land surface 22 ft. after 1 hrs. pumping 15 g.p.m. _____ ft. after _____ hrs. pumping _____ g.p.m.		
			11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Other _____		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		
			13 Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Depth: From _____ ft. to _____ ft.		
			14 Nearest Source of possible contamination 50 foot NW Direction septic Type Well disinfected upon completion <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
			15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name ARBORATOR Model Number 608-33 HP 1/3 Volts 230 Length of Drop Pipe 40 ft. capacity 8 G.P.M. Type: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc. ADDED INFO BY DRILLER, ITEM NO. *CORRECTED BY JZ **ADDITION BY _____ ELEVATION _____ DEPTH TO ROCK _____			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. KROPP WELL DRILLING 0795 REGISTERED BUSINESS NAME REGISTRATION NO. Address CEDAR, MI. 49621 Signed [Signature] Date 8/29/75 AUTHORIZED REPRESENTATIVE		

2 SEP 15 1975

WATER WELL RECORD
ACT 294 PA 1986

MICHIGAN DEPARTMENT
OF
PUBLIC HEALTH

3 OWNER OF WELL: **JAMES MAITLAND**
Address **RT. #2 WILLIAMSBURG, MI. 49690**

4 WELL DEPTH: (completed) Data of Completion
222 ft. **9/4/75**

5 Cable tool Rotary Driven Dig
 Hollow rod Jetted Bored

6 USE: Domestic Public Supply Industry
 Irrigation Air Conditioning Commercial
 Test Well

7 CASING: Threaded Welded
Diam. _____ Height: Above _____ Surface **1** ft.
6 in. to **207** ft. Depth Weight **19** lbs./ft.
_____ in. to _____ ft. Depth Drive Shoes? Yes No

8 SCREEN: **COOK**
Type: **RED BRASS** Dia.: **6 inch**
Slot ~~_____~~ **10** Length **15 feet**
Set between **207** ft. and **222** ft.
Fittings: **standard bottom, lead packer, set length**

9 STATIC WATER LEVEL
152 ft. below land surface

10 PUMPING LEVEL below land surface
152 ft. after **1** hrs. pumping **50** G.P.M.
_____ ft. after _____ hrs. pumping _____ G.P.M.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) _____ Chlorides (Cl) _____
Hardness _____ Other _____

12 WELL HEAD COMPLETION: In Approved Pit
 Pitless Adapter 12" Above Grade

13 Well Grouted? Yes No
 Non Cement Bentonite
Depth: From _____ ft. to _____ ft.

14 Nearest Source of possible contamination
300 feet **all** Direction **field** Type _____
Well disinfected upon completion Yes No

15 PUMP: Not installed
Manufacturer's Name **GOULDS**
Model Number **UDM** H.V. **5** Volts **230**
Length of Drop Pipe **188** ft. capacity **50** G.P.M.
Type: Submersible Jet Reciprocating

2 FORMATION	27
BLACK DIRT	
SAND	
CLAY	
SAND	
SAND & GRAVEL	
GRAVEL	
SAND	
FINE SAND	27
SAND	15

16 Remarks, elevation, source of data, etc.
ADD INFO BY DRILLER, ITEM NO.
CORRECTED BY **JL**
ADDITION BY _____
ELEVATION _____
DEPTH TO ROCK _____

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
KROPP WELL DRILLING **0795**
REGISTERED BUSINESS NAME REGISTRATION NO.
Address **CEDAR, MI. 49621**
Signed **Walt Frey** Date **9/8/75**
AUTHORIZED REPRESENTATIVE

GEOLOGICAL SURVEY NO.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER 10608

2	FORMATION DESCRIPTION	DEPTH TO BOTTOM OF STRATUM
	sand	16
	wet sand	9 24
	hard fine	3 27
	water sand	7 34
	clay	

3 OWNER OF WELL: **WENDELL CORNETT**
 Address **7143 DEEPWATER AV. WILLIAMSBURG**
 Address Same As Well Location? Yes No

4 WELL DEPTH: (completed) 34 ft. Date of Completion _____

5 Cable tool Rotary Driven Dig
 Hollow rod Auger Jettied

6 USE: Domestic Type I Public Type II Public
 Irrigation Type IIa Public Heat pump
 Test Well Type IIb Public

7 CASING: Steel Threaded Height: Above/Below
 Plastic Welded Surface _____ ft.
 Diameter 4 in. to 20 ft. depth Weight _____ lbs./ft.
 _____ in. to _____ ft. depth
 Grouted Drill Hole Diameter _____ in. to _____ ft. depth
 _____ in. to _____ ft. depth Drive Shoe Yes No

8 SCREEN: Not installed
 Type Submersible Diameter 4
 Slot/Gauge 10 Length 31
 Set between 30 ft. and 31 ft.
 FITTINGS: K-Packer Lead Packer Gravel Check
 Blank above screen _____ ft. Other _____

9 STATIC WATER LEVEL: 15 ft. below land surface Flow

10 PUMPING LEVEL: below land surface
24 ft. after 1 hrs. pumping at 24 G.P.M.
 _____ ft. after _____ hrs. pumping at _____ G.P.M.

11 WELL HEAD COMPLETION: Pitless adapter 12" above grade
 Basement offset Approved pit

12 WELL GROUTED? No Yes From 2 to 15 ft.
 Neat cement Bentonite Other _____
 No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination
 Type Septic Distance 60 ft. Direction E
 Well disinfected upon completion? Yes No

14 PUMP: Not installed Pump Installation Only
 Manufacturer's name Flint & Walling
 Model number 4K2405 HP 1 Volts 270
 Length of Drop Pipe 19 ft. capacity 12 G.P.M.
 TYPE: Submersible Jet
 PRESSURE TANK:
 Manufacturer's name Well & Tool
 Model number 203 Capacity 32 Gallons

15 Remarks, elevation, source of data, etc.

16. WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Cliff Well Drilling Co. 28-1244
 REGISTERED BUSINESS NAME REGISTRATION NO.
 Address 6410 Center Rd. Meridian, Md.
 Signed Robert J. Lumsden Date 4-5-84
 AUTHORIZED REPRESENTATIVE

2

GEOLOGICAL SURVEY NO. AUG 04 1981

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER 6993

11 WELL HEAD COMPLETION: Pitless adaptor 12" above grade
 Basement offset Approved pit

12 WELL GROUTED? No Yes From 0 to 59 ft.
 Neat cement Bentonite Other _____
 No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination
 Type Septic Distance 55 ft. Direction N
 Well disinfected upon completion? Yes No

14 PUMP: Not installed Pump installation Only
 Manufacturer's name Aermotor - Franklin
 Model number SD12-50 HP 1/2 Volts 220
 Length of Drop Pipe 46 ft. capacity 12 G.P.M.
 TYPE: Submersible Jet
 PRESSURE TANK: None
 Manufacturer's name Well-x-Trol
 Model number 250 Capacity 44.4 Gallons

15. Remarks, elevation, source of data, etc.

dtc

16. WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

B & Z WELL DRILLING CO. 1645
REGISTERED BUSINESS NAME REGISTRATION NO.

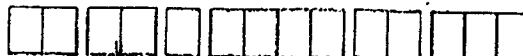
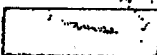
Address 233 E. Casson Road, Maple City, MI

Signed [Signature] Date 6/26/81
AUTHORIZED REPRESENTATIVE

D67d

(Rev. 10-80)

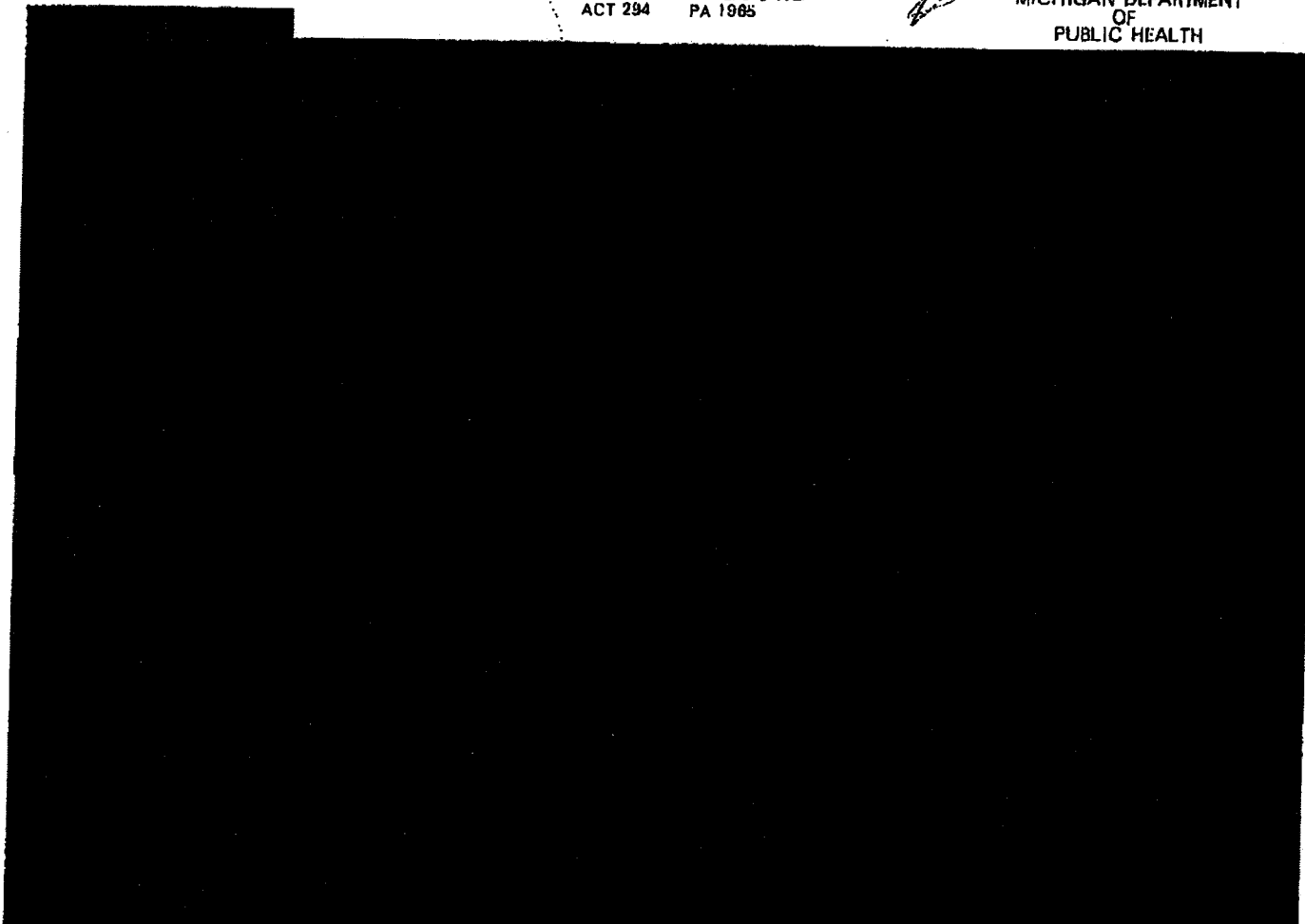
NOV 07 1973



WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT
OF
PUBLIC HEALTH



13 Well Grouted? Yes No
 Neat Cement Bentonite _____
 Depth: From _____ ft. to _____ ft.

14 Nearest Source of possible contamination
50 feet NW Direction SEPTIC Type
 Well disinfected upon completion Yes No

15 PUMP: Not installed
 Manufacturer's Name _____
 Model Number _____ HP _____ Volts _____
 Length of Drop Pipe _____ ft. capacity _____ G.P.M.
 Type: Submersible Jet Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.
 DRILLED INTO BY DRILLER. NAME NO.
 CORRECTED BY:
 ADDITION BY:

17 WATER WELL CONTRACTOR'S CERTIFICATION:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
CLIFF WELL DRILLING CO. #1244
REGISTERED BUSINESS NAME REGISTRATION NO.
 Address 6410 CENTER ROAD TRAVERSE CITY, MICHIGAN 49604
 Signed Frank W. [Signature] Date 10-10-73
AUTHORIZED REPRESENTATIVE

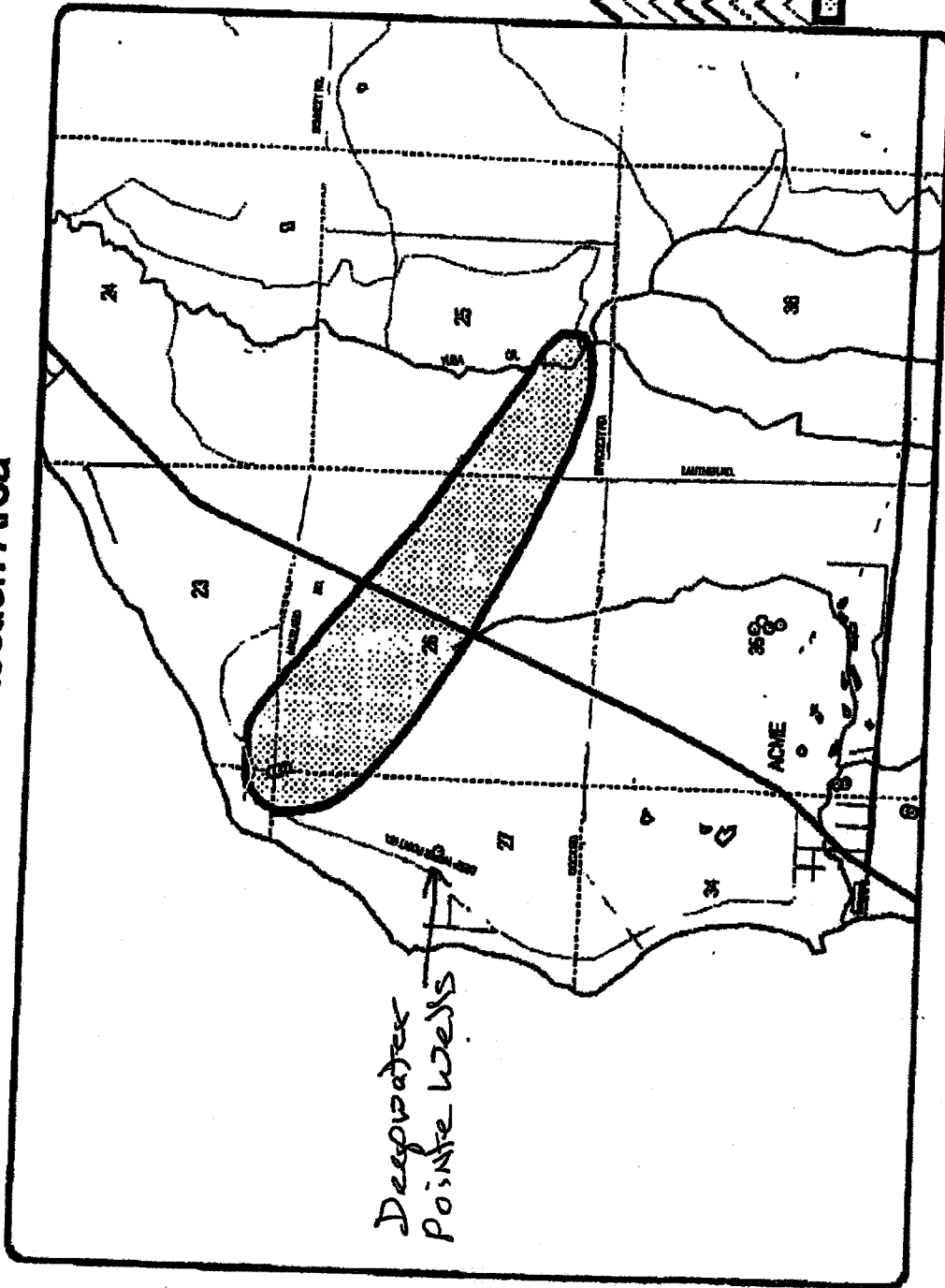
Appendix B

**MDEQ Well Head Protection Area
Lochenheath, Acme Township
Grand Traverse County, Michigan**

Lochenheath Wellhead Protection Area



- Public Well
- Highway
- County Road
- Road
- Railroad
- Townline
- Section
- River/Lake
- Drain
- Lochenheath WHPA



Map provided by
Michigan Department of Environmental Quality
Drinking Water and Radiological Protection Division
Ground Water Supply Section
Wellhead Protection Unit
January 2002