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Kennecott

December 20, 1989

87K10

Mr. Roger Gerhardt
Private Water Section
Wisconsin Department of Natural Resources
P. O. Box 7921
Madison, WI 53707

Dear Mr. Gerhardt:

RE: Revised Groundwater Withdrawal Permit Application
Flambeau Project

Flambeau Mining Company (Flambeau) is submitting to the Wisconsin Department of Natural Resources (WDNR) for review and approval, a revised Groundwater Withdrawal Permit Application for its Flambeau open pit mining project, located approximately 1.6 miles south of Ladysmith on STH 27. Groundwater will be withdrawn to dewater the mine pit and will also be withdrawn through existing wells and a new potable water well.

Pursuant to discussions with representatives of the Department, this permit is being submitted under Wis. Stat. s. 144.855(3), which the Department maintains requires that groundwater withdrawal be approved under Wis. Stat. s. 144.025(2)(e), the so-called high capacity well provisions. Obviously, many of the technical requirements for high capacity wells are not applicable to dewatering an open pit mine. Nevertheless, at the Department's request we have attempted to apply the provisions of Wisconsin Administrative Code ch. NR 112 where possible. Reference will be made to the Environmental Impact Report and Mining Permit Application where appropriate. A general description of the project is also enclosed.

As per an agreement developed with the Department, it is our understanding that the WDNR will distribute this application to all appropriate state and federal agencies. Flambeau will distribute the document to appropriate local public officials.

Flambeau is requesting that the WDNR review this application as expeditiously as possible such that permitting activities associated with the project can continue in a timely manner.

Mr. Roger Gerhardt
Wisconsin Department of Natural Resources
December 20, 1989
Page 2

In reviewing the application, please note that the title blocks for the figures have not been changed to reflect the name of Flambeau Mining Company. Since the document is filed by the Flambeau Mining Company, the fact that this change has not been made is immaterial.

As we have previously indicated, Flambeau does not believe that a groundwater withdrawal permit is required for the Flambeau Project, but we are submitting this application pursuant to WDNR's request. Submittal of this permit application should thus not be construed as any waiver of Flambeau's right to contest the necessity of obtaining such a permit for this project.

If you have any questions regarding this application please contact Gerald W. Sevick, P.E. at (414) 497-2500 or myself. Mr. Sevick is an engineer with Foth & Van Dyke and Associates Inc., Green Bay, Wisconsin, Flambeau's consultant for this project.

Sincerely,

FLAMBEAU MINING COMPANY

Lawrence E. Mercando

Lawrence E. Mercando
Vice President

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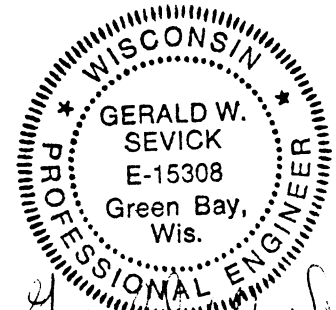
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GROUNDWATER WITHDRAWAL
PERMIT APPLICATION
FOR THE
FLAMBEAU PROJECT



Gerald W. Sevick
12-18-89

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REVISED DECEMBER 1989

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1.0 DESCRIPTION OF THE PROPOSED PROJECT

1.1 Introduction

The project facilities will consist of an open pit mine; an unlined (Type I) stockpile for storage of overburden, saprolite, sandstone, and waste rock containing very low levels of sulfide mineralization; a lined (Type II) stockpile for storage of saprolite and waste rock containing slightly higher levels of sulfide mineralization; a topsoil stockpile; water control features; a wastewater treatment plant; and ancillary facilities such as an office, railroad spur line, and maintenance building.

Figure No. 1 has been prepared to graphically illustrate the proposed project. The figure is a plan view of the mine area showing the location and relative size of key project elements.

1.2 Geology

1.2.1 Description of Site Geology

Precambrian volcanic rock, Cambrian sandstone, and Quarternary glacial and fluvial sediments are present beneath the project area. The geology has been defined from hundreds of soil borings and core samples drilled on site and from scattered outcrops along the banks of Meadowbrook Creek.

The steeply dipping Precambrian rock has been highly altered during mountain building processes to schist, which was later weathered and further altered. The top ten to 20 feet of Precambrian waste rock has been weathered to a silty-clay rock termed saprolite.

Small amounts of disseminated pyrite have been oxidized below the saprolite to several tens of feet in depth. This rock is termed Type I waste rock, and contains less than one percent sulfur. Type I material has been leach column-tested and found to produce water of quality that can be discharged without treatment. Type II waste rock occurs in the lower levels of the proposed open pit. Because this material contains greater than one percent sulfur, it will be stored on a lined stockpile area.

The Precambrian rock is overlain by Cambrian sandstone which consists of a poorly cemented, fine to coarse-grained quartz sand. Thickness of the sandstone varies from zero to greater than 30 feet within the proposed pit perimeter.

Near-surface materials consist of unconsolidated Quarternary glacial-fluvial sediments. Most of the deposit is covered by a dense, silty-sand glacial till. Glacial-fluvial sand and gravel generally occur in the northwest part of the project area in the vicinity of the abandoned gravel pit.

1.2.2 Deposit Description

The Flambeau deposit is tabular in shape, strikes in a northeast direction, and dips steeply to the northwest. The upper portion of the sulfide mineralization has been enriched in copper as a result of ancient fluctuating groundwater tables to about 225 feet below the present land surface. The deposit to be mined is 2,600 feet long, averages 50 feet wide, and contains approximately 1.9 million tons of material. The upper part of the deposit consists of zero to 30 feet of iron oxide-rich gossan. Below the gossan are varying proportions of chalcocite and bornite (copper sulfide minerals) in a matrix of chert (crypto- crystalline quartz) and pyrite (iron sulfide). No significant or economic amounts of sulfide mineralization have been found by drilling in either direction from the deposit.

Sulfide mineralization occurring beneath the proposed pit has been determined by Flambeau to be uneconomical based upon projected metal prices.

1.3 Description of Key Project Elements

1.3.1 General Mine Plan

Enriched ore will be mined from an oval-shaped open pit designed to cover approximately 32 acres to a maximum pit depth of 225 feet. All excavated materials will be hauled to the surface, which is at about 1,140 feet Mean Sea Level. Ore will be transported by truck to a crushing facility adjacent to the pit and crushed to minus 12 inches for rail shipment to an out-of-state processing facility.

Two open pit mining phases will be used. The first will mine the southwest half of the deposit to the 970-foot elevation. The second mines the balance of the pit to its final lateral limits and extends the pit bottom to the 900-foot elevation. Due to variation in the orebody grades, two ore-mining faces will be available at all times. Hydraulic shovels will operate from 20-foot high benches. The next bench is prepared as soon as working room becomes available to allow for construction of a sump to handle in-pit water flows and for emergency storage during heavy precipitation.

Waste material will be classified in the pit by sulfur content and stored on either lined or unlined storage sites adjacent to the pit. Eventually waste materials from the separate stockpiles will be returned to the pit as backfill. Upon completion of the mining operation, the project site will be contoured and reclaimed. Land owned by Flambeau but not included in the project area will mostly remain in its current use.

1.3.2 Mining Operation

Preproduction activities will take approximately 10 months to develop the open pit, the waste rock stockpiles, and plant facility. Chief tasks will be clearing the site; preproduction stripping; construction of access roads, the railroad spur, powerline, wastewater treatment plant, storage areas, etc. Disturbed soil areas will be stabilized and water control measures installed at that time.

The Flambeau orebody will be mined from the open pit over a period of approximately six years. The pit area at the end of the mine life will embrace an oval-shaped area of approximately 32 acres. The pit will be 2,600 feet long and average about 550 feet wide. Open pit mining will take place five to six days a week, eight hours per day, to produce approximately 320,000 dry short tons of ore per year.

The steeply dipping rocks will accommodate a pit, with slopes at 36 degrees for the glacial till and 50 degrees interramp for rock sections. Twenty-seven-foot wide catch benches will be left at 60-foot intervals for safety considerations. The access ramp has a design width of 60 feet and a gradient of ten percent.

Overburden and waste rock will be excavated from 20-foot high benches and ore from ten foot benches using conventional mining equipment. The excavated overburden will be transported to the Type I stockpile or to construction areas elsewhere on the project site.

It is anticipated that most of the Cambrian sandstone, all of the saprolite and some of the oxidized waste rock (Type I) can be broken by using a dozer with a ripper blade. However, certain areas of the deposit, such as those portions of the

orebody that contain quartz or hard waste rock, will require drilling and blasting. Fresher and harder rock and ore can be expected as the open pit deepens during the first year of full production. Therefore, blasting during preproduction and into the first year of production will likely be performed only on an infrequent basis.

Controlled blasting procedures will be used to minimize the generation of seismic waves and noise. Due to the small scale of the mining method and operations, ore blasts will be relatively small. Blasting is anticipated to occur from one to five times per week. A set of blasting standards will be carefully followed to keep risks of flyrock, ground vibrations, and noise to a minimum.

Two four-cubic yard shovels and a seven-cubic yard loader will be used to load the broken ore and other materials into 35-ton or 50-ton trucks. At first, only four trucks will be required. The truck fleet will be increased to a maximum of seven trucks as the pit deepens and haul distance increases. A 4,000-gallon water truck will wet haul roads and truck unloading areas for dust control.

Anticipated production and operation schedules are found in Table No. 1-1. The tonnages shown in the table are averages since ore and spoils production vary from year to year.

1.3.3 Water Inflow Controls

When topsoil is stripped and excavation begins, control methods will be provided for surface water and groundwater that could flow into the open pit. Hydrologic studies indicate that a simple system of grading and ditching to a series of sumps can capture and control most of the water expected to inflow. The water will then be diverted to settling ponds or to the

TABLE NO. 1-1

Anticipated Production and Operation Data

Preproduction Stripping	1,500,000 tons
Daily Ore Production	1,300 tons
Annual Ore Production	320,000 tons
Total Ore Production	1,900,000 tons
Total Overburden & Waste Rock	8,000,000 tons
Total Material Moved (Includes Backfill)	17,500,000 tons
Open Pit Size	32 acres
Project Area	300 acres
Total Project Life	8 to 9 years
Preproduction and Construction	1 year
Mining	6 years
Rehabilitation & Backfilling	1 to 2 years
Open Pit Operating Schedule	5 to 6 days/week 8 hours/day, 1 shift
Crushing Plant	5 to 6 days/week 8 hours/day, 1 shift
Employment During Operations	
Initial	56
Peak	61
Average	55

wastewater treatment plant. A slurry wall of either grout or bentonite clay will be constructed at the end of the pit adjacent to the river to minimize potential inflow from that direction. Detailed geologic mapping will be routinely conducted to identify, monitor, and control any areas of significant water inflow which might develop.

Two water collection systems are planned for the pit. During preproduction stripping, an upper sump will catch surface and groundwater inflows from the glacial overburden and Cambrian sandstone. This water, which will not come into contact with sulfide mineralization, but which could carry suspended solids such as clays, will be pumped to settling ponds to remove suspended materials and colloids. The clear overflow will be discharged to the Flambeau River or possibly used to provide water to an adjacent wetland. A lower sump will collect all groundwater inflow and precipitation that comes into contact with ore and waste rock. Water from the lower sump will be pumped to the wastewater treatment plant, treated, and then separately discharged to the Flambeau River or an adjacent wetland.

A flood control dike will be constructed at the west end of the open pit to prevent overflow of the river into the pit during potential severe flooding conditions (100-year flood). The dike will be constructed using specially selected materials overlying the orebody. The west toe of the flood-control dike would be approximately 70 to 90 feet from the east edge of the current Flambeau River channel. The edge of the open pit will be no closer than 140 feet from east edge of the river channel.

1.3.4 Crushing Facilities

The crushing facility consisting of a crusher, crushed ore stockpile, and railcar loading area will be built on the southwest side of the Type II waste rock stockpile. The crusher will be separated from the Type II stockpile by a retaining wall to contain rock and runoff water. The proximity of the crusher facility and stockpile to the pit minimizes haul distances. The crushing and ore loading areas will be contoured and underlain with a 60-mil HDPE liner to direct water to a runoff catchment pond for transfer to the wastewater treatment plant. All crushing will occur during daylight operations. The crusher will be oriented in a southwest direction to direct noise away from populated areas. The crusher is designed to crush coarse ore to minus 12 inches. A dust suppression spray system will control dust generated by the crusher and conveyor belt discharge point.

The crushing facility is designed for 250 tons per hour and allows for production variations and maintenance. Crushed and bypassed ore will be discharged onto a conveyor belt and transported to the crushed ore stockpile, where a front-end loader will load railroad cars at an average rate of approximately 12 cars per working day. It is planned to ship an average of approximately 24 loaded cars every other operating day.

1.3.5 Infrastructure

1.3.5.1 General

Several buildings will be erected to support the open pit operation and crushing plant. Chief infrastructure components will consist of a wastewater treatment plant, railroad spur, utilities, administrative building and shop, storage tanks, and explosives magazine. Most of these ancillary facilities will be clustered east of the crushing plant.

1.3.5.2 Wastewater Collection and Treatment Plant

The wastewater treatment plant, located southeast of the crushing facility, will be designed to treat water from four sources: 1) pit contact water, 2) ore haul road drainage, 3) Type II waste material storage pad drainage and runoff, and 4) site runoff from the crushing and loadout facilities and other ancillary facilities. Water from these combined sources will average approximately 296 gallons per minute on an annual basis.

A uniform feed of untreated wastewater to the treatment plant aids optimum plant performance. It is important, though, to consider surge capacity in its design, since water volume and metal loading can change with the seasons. Therefore, the wastewater treatment plant design provides for water storage in both a lined runoff catchment pond and a lined wastewater treatment surge reservoir. The open pit will also be used for emergency water storage. A 25-year rainfall event has been used as the design basis for the wastewater treatment system.

The wastewater treatment plant has been designed to process wastewater for acid neutralization and metal removal in a three-stage process. The process consists of lime treatment, sulfide precipitation, and mixed media filtration.

Sludge handling and treated water disposal make up the final components of the wastewater treatment system. Some of the treated water will be recycled for plant operations, makeup water, washdowns, and dust control with the balance discharged to the Flambeau River or an adjacent wetland. Sludge at approximately 25 percent solids will be trucked from the treatment plant to the Type II stockpile where it will be stored with the waste rock.

1.3.5.3 Access Roads and Railroad Spur

Two access roads and a railroad spur will be constructed for the project. A new, paved plant site access road will be built from State Highway 27 into the project site. The road will be constructed opposite the intersection of Jansen Road and State Highway 27. A second access road to a visitors' observation platform is planned to be constructed approximately 2,700 feet north of the plant access road.

A single line railroad spur approximately 6,500 feet long will be constructed from the Wisconsin Central Ltd. railroad line southwesterly to the crusher plant site to provide access to railroad cars used for shipping ore. The spur line at the crusher plant site will consist of two parallel tracks for ease in loading and switching railroad cars. The primary route for the railroad spur is north of Jansen Road along a location which avoids as much of existing wetlands as possible.

1.3.5.4 Utilities

The electrical power supply for the Flambeau Project will be delivered at 13.8 Kv from the Northern States Power Company power grid to a main substation adjacent to the wastewater treatment plant. Natural gas will be extended to the site for space heating needs.

A low-capacity potable water well will be drilled to supply water to field offices and shops.

1.3.5.5 Buildings and Shops

A maintenance shop, office building, and guard house will be erected south and east of the crushing plant. The existing utility building east of the pit will be used to house a limited

inventory of equipment and supplies. A peripheral security fence will be constructed around the entire plant site and open pit.

1.3.5.6 Mining Materials and Storage Tanks

Two portable magazines will be located in a remote bunkered area north of the Type I stockpile settling ponds. A blasting cap storage building will also be located in the same general area, but separated from the magazines. A 15,000-gallon diesel fuel tank and associated piping will be installed to provide fuel for mining equipment.

1.3.6 Solid Materials Stockpiles

Topsoil, overburden, and Type I and Type II material will be removed and segregated in accordance with their characteristics, then stockpiled in the appropriate location for use in reclamation following the completion of mining.

1.3.6.1 Topsoil Stockpile

The top 12 to 18 inches of soil will be removed from all construction sites and placed in the topsoil stockpile. In some areas, such as the railroad spur cut and fill banks, access road slopes, and exposed berms, the topsoil will be moved to one side and then returned to stabilize and support temporary revegetation of these areas upon completion of construction. Topsoil from the open pit, crusher plant and excess topsoil from the storage areas will be removed and stockpiled. The topsoil stockpile area will be located east of the pit. This stockpile will serve as a visitors' viewing area. Stockpiled topsoil will be used to reclaim the site after mining activities are completed. The topsoil stockpile area will cover approximately seven acres.

1.3.6.2 Overburden/Type I Stockpile

Overburden and Type I material (less than one percent sulfur) will be stored on an unlined area located between the open pit and Blackberry Lane. A bermed swale at the base of the stockpile will contain internal runoff and direct it to the settling ponds. The stockpile will occupy about 40 acres, reach a height of about 60 feet, and have a design capacity of approximately 2.8 million cubic yards.

1.3.6.3 Type II Stockpile

Type II material (more than one percent sulfur) will be stockpiled separately in a lined area located southeast of the open pit and northeast of the crushing plant site. Approximately 27 acres will be required for this stockpile, which has been designed with a capacity of 2.2 million cubic yards. The Type II stockpile will be built with an impervious liner and leachate collection system at its base. A lined berm and runoff containment swale will encircle the area to collect all precipitation that comes into contact with this material. Collected leachate and runoff will ultimately be directed via piping to the surge reservoir and then to the wastewater treatment plant.

Perimeter berms for the Type II stockpile will be constructed using overburden or soil excavated during base grade preparation. A protective layer of coarse-grained soils will be placed over the HDPE liner to protect the liner as waste rock is hauled onto the stockpile. The projected height of the stockpile is approximately 70 feet. The outside of the perimeter berm will be topsoiled and vegetated.

1.3.7 Surface Water Controls

As previously discussed, precipitation falling within the limits of the open pit, Type I and II storage piles, and plant area will be collected and directed to either the settling ponds or the wastewater treatment plant. Some of the surface water drainage originating from outside the active mine area will be intercepted by a series of drainage swales and directed to existing natural drainage features.

1.3.8 Reclamation

Disturbed soil areas will be revegetated and woodlands maintained during the life of the mining project. The open pit will be backfilled once mining is complete. The plan is to return the project site to close to approximate original contours, such that it will be suitable for other land uses. Stockpiled Type II material will be placed at the bottom of the pit, with Type I waste rock placed over it and compacted as part of normal traffic of equipment used for backfilling. Saprolite, followed by sandstone and till will then be placed within the pit over the Type I waste rock. Finally, the pit site will be covered with topsoil and the area revegetated. Surface facilities, including the railroad spur, will be dismantled at the end of mine operations unless a beneficial plan for keeping all or some of the facilities is developed by Flambeau, the WDNR, and local residents.

2.0 SUPPLEMENTAL INFORMATION

2.1 Introduction

As part of the construction and operation of the proposed mining project, groundwater will be withdrawn from the project area through dewatering of the open pit mine and through a new low capacity potable water well to be constructed on the project site. In addition, water will continue to be withdrawn from wells on existing rental residences owned by Flambeau in and around the mine site. In an April 24, 1989 internal WDNR memorandum, the Bureau of Water Supply recommended that since water usage from these residential wells is so small, that they need not be considered as part of the groundwater withdrawal permit application.

Pursuant to discussions with the WDNR, the WDNR maintains that the withdrawal of groundwater from the open pit and the new low capacity potable well requires approval by WDNR under Wis. Stat. s144.025 (2)(e), the so-called high capacity well provisions. Many of the technical requirements for high capacity well approval submittals are not applicable to dewatering of an open pit mine. Notwithstanding the above, the following sections of this report have been prepared to address those submittal requirements that are deemed to be relevant.

2.2 Project Area and Property Description

The area in which the mine site will be located is shown on Figure No. 2. The figure also depicts the extent of property contiguous to the project area owned by Flambeau. A full legal description of the project area and contiguous property owned by Flambeau is included in Appendix A.

2.3 Owner and Operator

The owner of the project area and proposed project is Flambeau Mining Company, 10 East South Temple, Salt Lake City, Utah 84147. Lawrence E. Mercado, Vice President is the contact person for Flambeau Mining Company. Flambeau will also own and operate all wells associated with the project.

2.4 Open Pit Mine

A general description of the open pit mine and its operation are presented in Section 1.3 of this report. A more detailed description can be found in Section 4.7 of the Revised Mining Permit Application. Presented below is a discussion of open-pit water inflow and control, predicted drawdown due to dewatering and planned monitoring for inflow and drawdown.

2.4.1 Water Inflow

During excavation of overburden and mining of waste rock and ore, it will be necessary to manage water entering the open pit. Runoff into the open-pit from direct precipitation will originate from a small drainage area located between the pit and the Type II stockpile and from the ore haul road. During excavation of overburden in both Phases I and II of mining, this water will be collected in sumps and pumped to the Type I stockpile settling ponds. Once stripping has been completed and mining of ore and the Type II waste rock commences, this water will be pumped to the wastewater treatment plant. A discussion of the two water streams follows.

During Phase I preproduction stripping which is projected to occur over a four month period, the average inflow of groundwater to the open pit is estimated to be approximately 120 gpm. The 120 gpm figure consists of the "best engineering

judgement" (BEJ) estimate of the four month average pit inflow rate as shown on Figure 8 of the report titled *Groundwater Model for the Kennecott Project, Ladysmith, Wisconsin* (Kennecott Model) prepared by Thomas A. Prickett & Associates, Inc. and Engineering Technologies Associates, Inc. This report was submitted to the WDNR in July of 1989.

As discussed in the modeling report, the actual total flow of groundwater will vary with the stage of the stripping process. For instance, during the first month of the stripping process, the groundwater inflow rate is projected to be equivalent to 296 gpm. During the fourth and final month of stripping, the inflow rate is expected to be approximately 55 gpm. Figure No. 3 is a reproduction of the BEJ graph produced by the modeling work that depicts predicted inflow rates. The precipitation contribution of water that will be pumped from the pit during Phase I preproduction stripping is projected to be 19 gpm on an average annual basis.

The peak flow to be removed from the pit during Phase I preproduction stripping will be governed by in pit pump capacity which is estimated to be 1,350 gpm. The pump capacity was selected based on an acceptable length of downtime that would be required to remove excess water from the pit during a major storm.

The average annual rate at which water will be pumped from the pit during Phase II stripping is estimated to be less than that during Phase I stripping since: 1) some dewatering of the Phase II overburden will have taken place during Phase I mining; and 2) only a minor portion of the small drainage area between the open pit and Type II stockpile will drain into the Phase II area.

Following the completion of stripping, precipitation and groundwater that collects in the pit will come into contact with ore or sulfide-bearing waste rock. In addition during this stage of mining, water from the ore haul road will be directed back into the pit where it will be collected and sent to the wastewater treatment plant. The contact water will have a pH less than neutral and may contain metals. The water will be treated at the wastewater treatment plant.

Pit area not only increases with time, but also deepens. As a result, the pit inflow rate will vary with time, reaching a peak during preproduction stripping and then declining until shortly after mining commences. As the pit deepens the rate will then gradually increase, but will not exceed the rate encountered during initial preproduction stripping. The BEJ maximum peak inflow rate for post preproduction stripping as estimated in Figure 8 in the Kennecott Model report is 260 gpm. The steady state estimate of annual average pit inflow at the end of mining is 113 gpm (Figure No. 4). Since the maximum pit inflow rate will occur during overburden stripping, and since inflow will decrease thereafter, the maximum contribution of pit inflow to the wastewater treatment plant under the BEJ scenario is expected to fall between 113 and 260 gpm.

In addition to pit inflow, precipitation falling on the open pit area and the ore haul road both will contribute to water that will need to be pumped from the pit when mining is underway. The annual average contribution from these two sources is estimated to be 50 gpm and 5 gpm, respectively. Actual flows will vary according to precipitation events. However as stated above, since the pit can act as a detention basin, the delivery rate of all water from the pit following preproduction stripping will be based on wastewater treatment plant capacity. That is, the delivery rate will be controlled by the total capacity of the wastewater treatment plant and the volume of water from other sources also being delivered to the plant for treatment at any one given time.

2.4.2 Water Removal From the Open Pit

As the mine pit excavation into the overburden approaches the water table, a series of in-pit dewatering sumps and trenches will be installed. These water collection points are designed to intercept overburden groundwater only and to lower the water table within the preproduction pit area. This will be accomplished by excavating a series of narrow trenches parallel to the length of the deposit using backhoe equipment. Water will drain freely through the trenches or through lined pipe trenches, in case of excavation collapse, to several water collection sumps equipped with pumps. Dewatering will facilitate movement of equipment during site preparation and remove groundwater away from the site during preproduction stripping. Water will be pumped to the settling ponds for clarification before discharge.

After the preproduction period, mining operations will initially consist of mining ore and waste from Phase I and stripping overburden from Phase II. Open pit operation is defined as that period beginning after preproduction and before backfilling.

Mining operations for any ore bench will begin with a dropcut in the hanging wall portion of the pit. Upon reaching grade, a flat area of sufficient width for a truck to access the ramp and for the development of a waste mining face will be left. The dropcut will continue down, and a water collection sump will be established below the grade of the bench under development. Sumps will normally be from ten to 15 feet deep. Pumps will be barge-mounted as shown in Figure No. 5. It is anticipated that two pumps will be used during mining operations with one sump located at each end of the pit. Water from the sump will be directed to the wastewater treatment plant. As mining progresses from bench to bench, the sumps will be progressively lowered. A detailed description the placement and lowering of sumps follows.

The open-pit mining plan for the project is configured so as to peel the hanging wall waste away from the ore in order to minimize dilution. In order to accomplish this objective, the pit access ramp has been designed on the hanging wall (northwest) side of the pit. This requires that the dropcut for a new bench be routinely driven to the southwest, adjacent to the northwest pit wall. Once the cut reaches bench grade, mining is turned to the southeast and the waste face is advanced to the ore zone hanging wall. When an adequate ore face is cleanly exposed, waste mining will turn and advance to the northwest and/or to the southeast.

With this mining sequence, a logical position for the pit sump is in the southwest corner of the pit. This area does not interfere with the development of the ramp system for much of the operating life of the mine and is also away from the ore zone for much of the mine life. Initially, the sump will be established as an extension of the dropcut to the next bench. In this instance, the ramp is mined to grade to the next lower bench, a flat area is left for access from the working bench to the ramp system, and the ramp (now above grade) is continued to the required sump depth. In cases where the ramp reaches the working bench too far to the northeast for practical continuation as a sump (approximately end of Year 4 of mining), an independent sump will be established in the southwest corner of the pit. In this instance, it may be necessary to temporarily pump from a small sump to the main sump until the working bench is expanded to the main sump area.

In all instances, ditching will be used to direct water to the sump. Ditches will be positioned so as not to interfere with haulage as much as possible. Temporary buried culverts may occasionally be required. When Phase II drops below the high spot in the center of the final pit, a secondary sump on the east side will be pumped to the main sump for final removal from the pit.

The present mine production schedule includes a provision for the establishment of a sump by always mining one bench below the current ore bench and by scheduling approximately 40,000 tons of waste from this bench. This tonnage is more than adequate for the dropcut and a large sump.

2.4.3 Drawdown

Extent of drawdown due to dewatering of the open pit is addressed in the Kennecott Model report. Based on the modeling work, the maximum extent of drawdown, as defined by the two-foot contour, occurs 2.3 years after mining ceases and backfilling of the pit begins.

During backfilling, groundwater will continue to flow from the aquifer into the open-pit. As this flow occurs, water levels will continue to fall away from the mine. Two and three tenths years after backfilling begins, water levels in the open pit will have recovered to the point where the extent of drawdown will cease expanding away from the pit and commence contracting to the pit.

Figure No. 6 shows the predicted extent of drawdown at the end of mining. Figure No. 7 shows the predicted maximum extent of drawdown at 2.3 years after backfilling begins.

The modeling work concluded that the post reclamation steady state water table will be in approximately the same configuration as it was before mining, except in the immediate vicinity of the reclaimed pit. Residual differences in the pre- and post water table conditions are shown in Figure No. 8. The figure represents the difference between the premining steady state water table and the post reclamation steady state water table.

2.4.4 Monitoring of Pit Inflows

As part of the monitoring program included in the Mining Permit Application, Flambeau has stated it intends to calculate estimates of groundwater inflow into the open pit during stripping of overburden and mining. The estimates will be calculated using the following procedures.

The total estimated amount of water pumped from the open pit will be recorded through the use of either flow measurement equipment or by calculating flow using recorded pump running time and the specific discharge rate-versus-head relationship for the pumps used to remove water from the pit. Groundwater inflow will be calculated by subtracting precipitation recorded using the precipitation gauge to be located in the vicinity of the project, less evaporation, from the volume of water pumped. In addition, adjustments to the calculation will be made to reflect the volume of runoff that flows into the pit from the area immediately surrounding the pit and from the pit access road, and to reflect overflows from the runoff pond back into the pit. Given the adjustments that are required, it should be recognized that the calculated inflow rate will be a reasonable estimate of the actual rate.

Inflow will be calculated in the above fashion on a monthly basis. Average monthly inflow rates will be reported to the WDNR on an annual basis.

In addition to the above, water levels will be recorded quarterly in numerous groundwater monitoring wells located both in the project area and in the vicinity of the project area. A detailed discussion of the wells on the program, including figures depicting their location, can be found in Sections 7.0 and 10.0 of the Revised Mining Permit Application. Collected water level data will be used to assess the lateral extent of drawdown in comparison to model predictions.

2.5 Construction of New Low Capacity Potable Water Well

2.5.1 Well Location and Use

A new well will be constructed approximately 300 feet east of the surge pond (Figure No. 9) to supply a reliable source of potable water in close proximity to the project's various buildings. An existing potable water well, located near the intersection of the plant site access road and STH 27 will be used to furnish both potable and construction water to the mine/facilities until the new well is constructed. This existing well is being replaced because it does not meet present-day standards. No other alternative water supply systems that are economically feasible exist. For instance, the project area is not serviced by a municipal water supply system and trucking water in would be impractical and more costly than constructing the proposed well.

The new potable well will be constructed in accordance with the provisions of Wis. Admin. Code NR 112. Expected annual average usage from this well is approximately five gallons per minute. A discussion of site geology and well construction follows.

2.5.2 Site Geology

A summary of the site geology is presented in Section 1.0 of this application. A more detailed discussion of this topic can be found in Section 3.5 of the EIR and Section 4.0 of the Revised Mining Permit Application.

A generalization of the geological profile which will be penetrated by the proposed low capacity well can be obtained by reviewing available construction reports for wells in the mine area (Appendix B). In general, existing potable water wells

penetrate layers of glacial till deposits described as "clay" or "hard pan" in the well construction reports which are underlain by water bearing "sand", "gravel", or "sand and gravel." The wells are typically terminated in this sand and gravel aquifer, and they are usually shallow, ranging in depth from 22 feet to 95 feet.

2.5.3 Specifications for Low Capacity Potable Water Well Construction and Pump Installation

The details of the proposed construction of the low capacity well are illustrated on Figure No. 10. Specifications for the construction of this well and installation of the pump are provided in Appendix C. The drilling method to be used for well construction will be selected by the contractor based on site geology.

It is expected that the pump will be installed to meet the following specifications.

- The submersible pump will be set to within five feet of the top of the well screen.
- A 1-1/4 inch galvanized steel drop pipe with a WDNR approved pitless adapter will be installed a minimum of seven feet below grade.
- The submersible pump will have a minimum one-half horsepower motor.

2.6 Public and Private Water Supply Well Locations

Figure No. 11 shows the approximate location of private wells located in the vicinity of the project area. Flambeau owned wells are identified by the Flambeau property number (i.e., numbers less than 100) and privately owned wells by an asterisked number of 100 or greater. Inactive wells, Flambeau owned and privately owned, are designated by "IW" behind the well number. Also included on the figure is a composite outline of the 2,500-foot study area radius referred to in NR112.26(1)(d)12 and the maximum extent of drawdown (2.3 years after reclamation begins) that is predicted to occur as a result of pit dewatering.

The wells on Figure No. 11 were identified during a windshield survey conducted by a Foth and Van Dyke project geologist with the help of Flambeau's local representative. Wells on the figure represent the following:

- 25 active wells owned by Flambeau.
- 29 privately owned active wells.
- 5 inactive wells owned by Flambeau.
- 5 privately owned inactive wells.

Figure No. 11 also shows the location of a public utility well used to supply potable water to the City of Ladysmith. This is the only public utility well located in the vicinity of the project area.

2.7 Description of Existing Flambeau Water Supply Wells

2.7.1 General

Private water supply wells owned by Flambeau were surveyed in the fall of 1988 to gather data related to well characteristics. A discussion of the results of the survey follows.

In addition to the survey of Flambeau-owned wells, private water supply wells located on property not owned by Flambeau, but in the "Well Guarantee Area" as defined in the Local Agreement entered into between the Town of Grant, City of Ladysmith, Rusk County and Flambeau, were also surveyed at this time. Detailed data on these private water supply wells is not included in this report because it is considered proprietary with respect to individual well owners.

2.7.2 Active Flambeau Owned Wells

Table No. 2-1 summarizes the well characteristics for active wells on Flambeau-owned properties. The location of these wells is shown on Figure No. 11. All of these properties had tenants/occupants at the time of the survey except for the following:

- #18 - N4245 Hwy 27S - Flambeau Mining Storage Building
- #21 - N4109 Hwy 27S - Vacant as of 10/31/88
- #28 - N4021 Hwy 27S - Flambeau office

Flambeau #18 is used occasionally as a source of water for various drilling operations, while #28 is used on an intermittent basis as the Flambeau mining project office. Flambeau #21 is a vacant property.

TABLE NO. 2-1

Summary of Well Characteristics for Active Wells on Flambeau Properties

FLB#	Well Information				Est. Surface Elevation****	Est. G.W. Elevation	Observations and Comments	Estimated Current Water Usage (gal/day)
	Depth (ft)**	Date Water Lv.	Casing Dia. (in.)	Pump Type				
2	44.0 (46')****	11/2/88 30' (18')****	5	Submersible	1103	1074	Water very rusty brown (dissolved iron)	---
3	≈33.0	11/9/88 24.4'	4	Submersible	≈1112	1088	Pump is pumping well dry	60
7	≈36.0	11/1/88 21.1'	4	Submersible	1101	1081	Water rusty brown (dissolved iron)	120
10A	48.3 (52')	10/31/88 40.4' (21')****	5	Submersible	1154	1115	Pump is pumping well dry Water blackish (manganese) and rusty brown (dissolved iron)	120
12	46.3	11/2/88 37.2'	5	Jet Pump	1145	1109	---	60
13	≈59 Much sand and rust in well	10/31/88	5	Submersible 42.5'	1152	1111	---	60
15	≈44	11/1/88 23.0'	4	Submersible	1155	1133	---	15
16	41.5	11/2/88 17.5'	4	Submersible	1155	1138	Water light rusty brown (iron)	120
18	36.8	11/2/88 8.0'	5	Submersible	1145	1138	---	Vacant
20	23.0 (25')	11/3/88 18' (9')	4	Jet Pump	1101	1085	Water rusty brown	60
21	45.6	11/2/88 12.6'	4	Submersible	1143	1132	---	Vacant
22	49.3 (52)	10/31/88 13.5' (12)	5	Submersible	1145	1132	---	150

TABLE NO. 2-1 (Cont.)

FLB#	Depth (ft)**	Well Information			Est. G.W. Elevation	Observations and Comments	Estimated Current Water Useage (gal/day)	
		Date Water Lv.	Casing Dia. (in.)	Pump Type				
23	37.8	11/3/88 13.3'	5	Submersible	1146	1134	---	60
24	29.8 (30')	11/8/88 15.4' (16')	4	Jet Pump	1146	1131	Water blackish (manganese) and has slight hydrogen sulfide (rotten eggs) odor	60
26	41.7 (44')	11/2/88 32.8 (29')	4	Jet Pump	1149	1116	Water blackish (manganese)	60
28	≈43	11/8/88 35.5'	4	Submersible	1149	1114	Water rusty brown only 2.5' of water over pump	Vacant
30	45.0	11/3/88 36.1'	5	Submersible	1149	1114	Water rusty brown	90
31	38.0	11/8/88 28.0'	4	Jet Pump	1147	1120	Water rusty brown (iron)	90
32	35.7	11/1/88 24.4'	4	Jet Pump	1147	1124	---	120
53*****	***	***	4	Submersible	---	---	---	---
70	24.0	10/31/88 15.3'	4	Submersible	1152	1137	Water rusty brown	120
73	≈62.1	11/9/88 37.7'	4	Submersible	1173	1137	---	---
76	49.0	11/9/88 19.9'	5	Jet Pump	1157	1138	Slightly rusty brown water (iron)	---
GPW	65.0	11/8/88 23.2'	8	Submersible	1110	1089	Olynick Construction well at gravel wash plant. Land is leased from Kennecott plant	---

NOTES:

*FLB# Flambeau Mining Company Property Number - See Figure No. 11 for well locations.
 ** Measured well depth - drilled depth may be greater if well has "sanded in."
 *** Unable to measure water level because well cap could not be removed.
 **** () Well information from well drillers construction reports which are found in Appendix B.
 ***** Surface elevation interpolated from U.S.G.S. topographic maps.
 FLB #53 (Jim Kruz - Tenant) - was sampled in Round 1 but this well is outside the Well Guarantee Area (i.e., west of the river).
 Estimated current water useage assume 30 gallons/day/capita. Estimates provided for wells with 2500' radius or within the maximum extent of drawdown.

The table also includes data relating to estimated current water useage for the surveyed wells. Since no records were available relating to current water use, the figures presented in the table were calculated based on occupancy. A 30-gallon per day per occupant useage rate was used. This rate was selected based on comparable water useage figures for wastewater treatment system design. The usage rates projected in the table represent the number of occupants in the residence at the time the survey was conducted.

A review of the data collected for the Flambeau-owned wells has resulted in the following comments.

- Well casings are generally four-inch or five-inch diameter with four inch being most prevalent.
- Water levels are generally near the well bottoms, with several wells being easily pumped dry.
- Many wells have water quality problems caused by excessive amounts of manganese and iron.
- Several wells show evidence of pumping sand.

2.7.3 Flambeau Owned Inactive Wells

Table No. 2-2 summarizes what is known about the inactive wells located on Flambeau-owned properties that were surveyed. The location of these wells is shown on Figure No. 11. All of these inactive wells were located on property which is currently vacant and on which the structures have been razed.

TABLE NO. 2-2

Inactive Wells on Flambeau Property

Well I.D. 1	Location	Description of Well
6 (IW) Vacant	SE 1/4, NE, Sec. 9 Tn. Grant, (Northwest Corner STH 27 and Blackberry Road)	Well for former Brashir property, home burned down. Drilled well with submersible pump, out of service.
65 (IW) Vacant	NE 1/4, NW 1/4, Sec. 10 Tn. Grant, (North end of Barite Road)	Well for former Robinson Farm, home burned down. Drilled well with submersible pump.
71 (IW) Vacant	SE 1/4, NW 1/4, Sec. 10 Tn. Grant, (Southwest Corner Meadowbrook and Doughty Roads)	Well for former Lindahl farm, may be drilled well.
72 (IW) Vacant	SW 1/4, NE 1/4, Sec. 10 Tn. Grant (Southwest Corner Meadow Brook and Doughty Roads)	Dug well for former Drum farm.

1 See Figure No. 11 for location of wells.

2.7.4 Well Construction Reports for Private Water Supply Wells

Both the Wisconsin Department of Natural Resources (WDNR) private water supply section and the Wisconsin Geological and Natural History Survey have been contacted regarding the availability of well construction reports for wells around the mine area. Well construction reports are not on record with these agencies for all wells shown on Figure No. 11. Some reports that are available have inadequate or inaccurate well locations or the well ownership has changed, making matching the well records to well locations impossible. Those well construction reports which could be identified with certainty are found in Appendix B. The private water supply wells for which records are available have their location number circled on Figure No. 11. Specific information available from the well construction reports is parenthetically included in Table No. 2-1.

Based on a review of the available well construction reports, the following summary regarding well characteristics can be made.

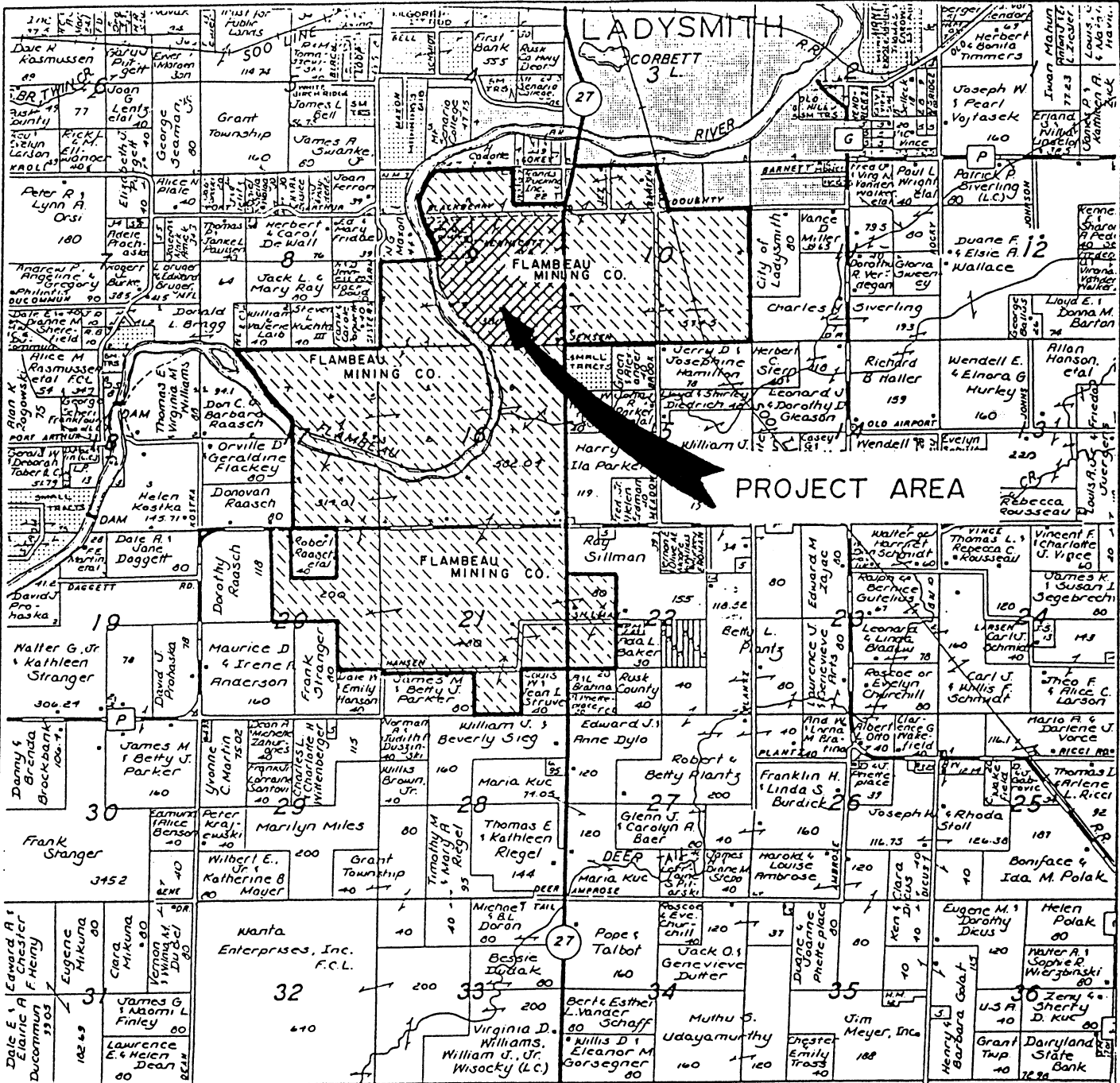
Wells in the area generally penetrate glacial tills (clay and hard pan on well construction reports) and are screened or terminated in a sand and/or gravel formation below the till.

- The well drillers yield tests ranged from 2 to 18 gallons per minute (gpm) with most wells falling in the 6 to 8 gpm range.
- The normal water surface in the wells was typically at a depth at least half the total well depth.
- Most wells were drilled using cable tool methods.

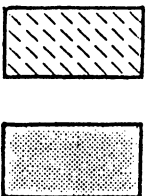
2.8 Mine Dewatering Impacts on Private Wells

The maximum extent of drawdown and steady state post reclamation water table conditions were discussed in Section 2.3.4 above. Based on the results of the modeling study, there are only five non-Flambeau owned private wells known to be located within the maximum extent of drawdown. These five wells are located near the northernmost edge of the predicted maximum extent of drawdown. At four of the wells the maximum drawdown will range from two to four feet, and at the fifth well, it will be approximately eight feet. Based on the modeling results, the Flambeau owned private well survey information, and information available relating to non Flambeau owned private wells, it can be concluded that the four private wells which are located within an area where a two to four foot drawdown could occur will not be significantly impacted by the predicted drawdown. The fifth well, which is in an area where a drawdown of eight feet could occur, could be impacted by the predicted drawdown. This well in addition to the other four are, however, located in the well guarantee area as defined in the Local Agreement which contains provisions whereby Flambeau is required to provide water or replace wells within that area if impacts are noted.

Figures for Groundwater
Withdrawal Permit Application



LEGEND



FLAMBEAU PROPERTIES

CITY OF LADYSMITH

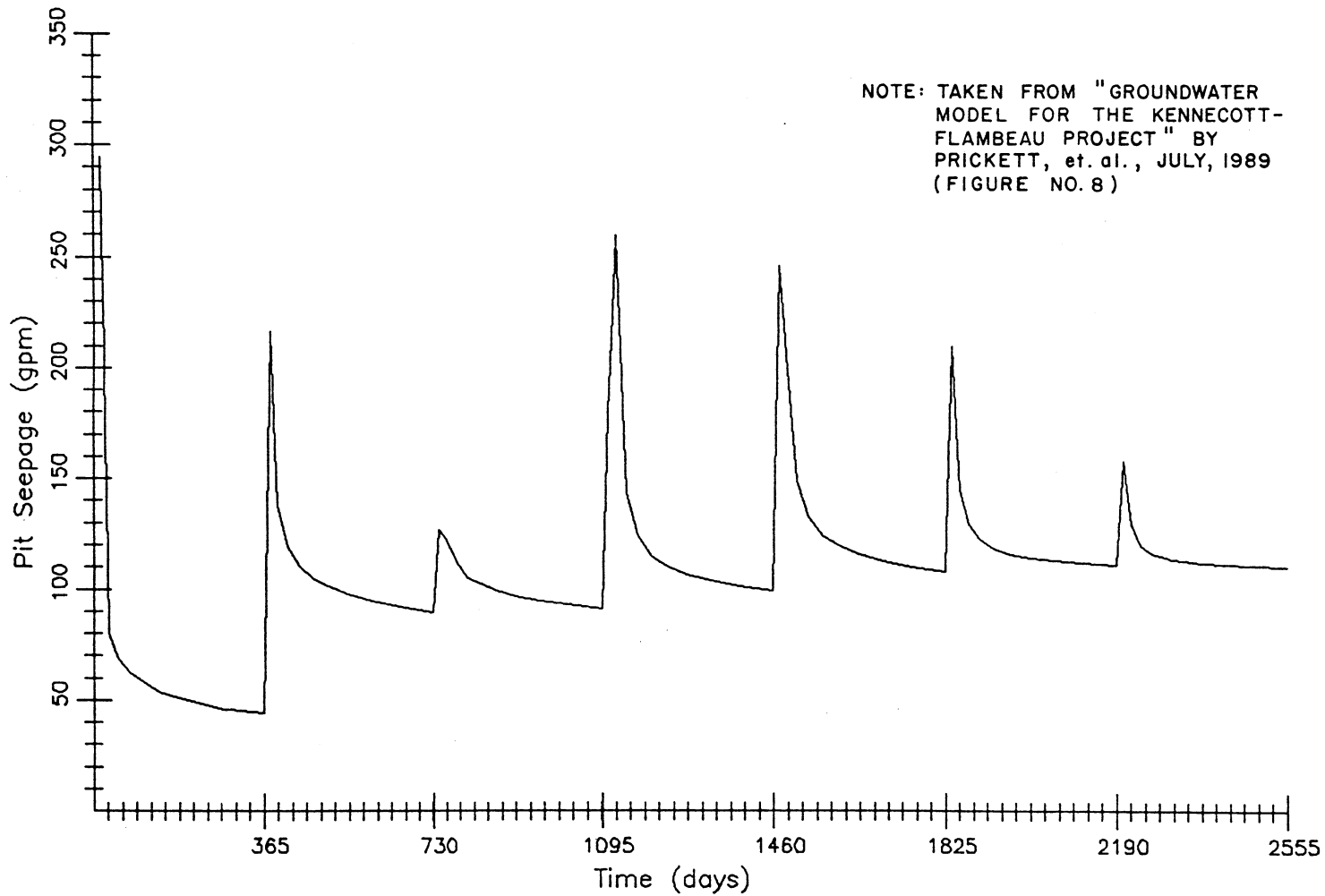
NOTES

PROJECT AREA INCLUDES A 36 FOOT WIDE CORRIDOR ALONG RAILROAD SPURLINE EAST OF STH 27.

BASE MAP PREPARED FROM LAND ATLAS AND PLAT BOOK RUSK COUNTY, WISCONSIN.

FOTH & VAN DYKE GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION GREEN BAY, WISCONSIN		
NOTES	APPROVAL	DATE
	DESIGNED BY	
	DRAWN BY DHS	5/89
	CHECKED BY MJO	6/89
	APPROVED BY	
CAD No.	SCALE NONE	Job No

KENNECOTT MINERALS COMPANY FLAMBEAU PROJECT LADYSMITH, WISCONSIN		
FIGURE NO. 2 PROPERTY OWNERSHIP		
Job No	Dwg No	REV



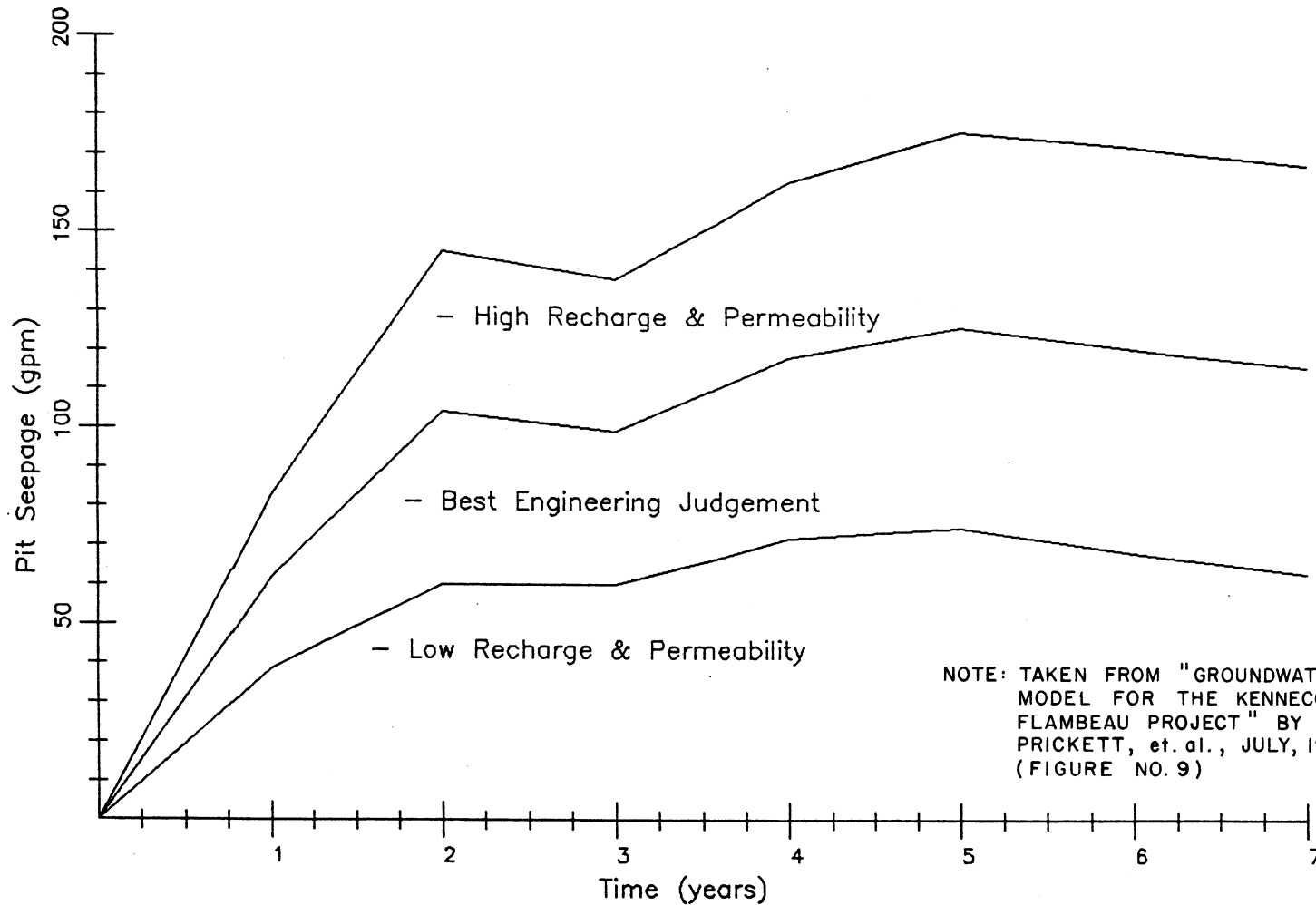
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 GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
 GREEN BAY, WISCONSIN

KENNECOTT MINERALS COMPANY
FLAMBEAU PROJECT
 LADYSMITH, WISCONSIN

No	REVISIONS	NOTES	APPROVAL	DATE
△			DESIGNED BY	
△			DRAWN BY IDH	12/89
△			CHECKED BY GWS	12/89
△			APPROVED BY	
△			CAD No.	SCALE

FIGURE NO. 3
 PIT INFLOW FOR BEJ PARAMETERS

Job No	Dwg No	REV
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 GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
 GREEN BAY, WISCONSIN

KENNECOTT MINERALS COMPANY
FLAMBEAU PROJECT
 LADYSMITH, WISCONSIN

No	REVISIONS	NOTES	APPROVAL	DATE
△			DESIGNED BY	
△			DRAWN BY IDH	12/89
△			CHECKED BY GWS	12/89
△			APPROVED BY	
△			CAD No.	SCALE

FIGURE NO. 4
 AVERAGE ANNUAL PIT INFLOW

Job No	Dwg No	REV
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NOT TO SCALE

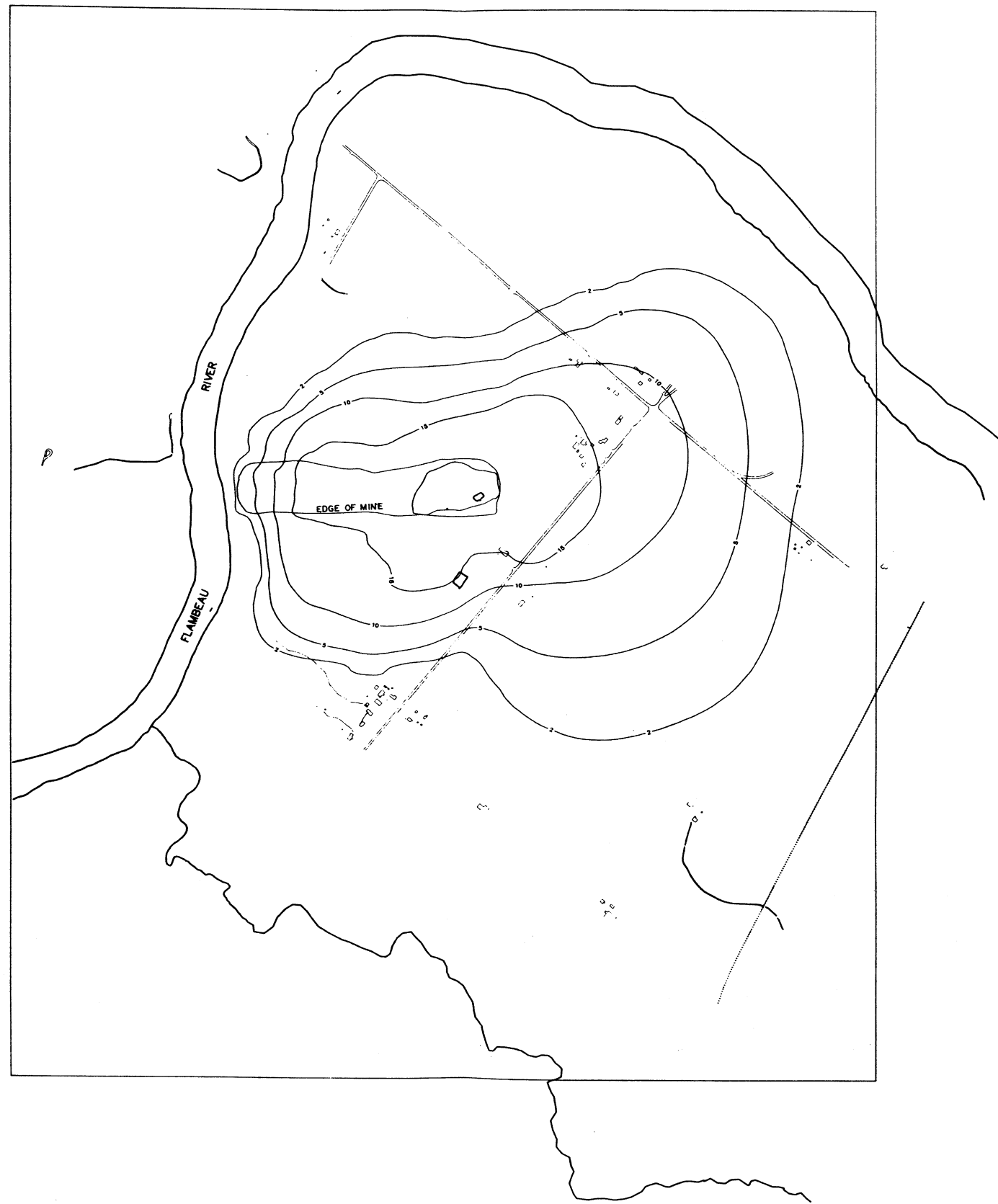
		REVISIONS	
DESIGNED	DATE	DATE	DESCRIPTION
DRAWN	JMY 7-13		
CHECKED			
APPROVED			

THOMAS A. PRICKETT & ASSOCIATES
 CONSULTING WATER RESOURCES ENGINEERS
 6 G.H. BAKER DRIVE
 URBANA, ILLINOIS 61801
 (217) 384 - 0615

ENGINEERING TECHNOLOGIES ASSOCIATES, INC.
 ENGINEERS • PLANNERS • SURVEYORS
 3458 ELLICOTT CENTER DRIVE SUITE 101
 ELLICOTT CITY, MARYLAND 21043
 (301) 461 - 9920

OWNER
 Kennecott Minerals Company
 1515 Mineral Square
 Salt Lake City, Utah

FLAMBEAU PROJECT			
FIGURE NO. 6			
DRAWDOWN AT END OF MINING			
SCALE: 1"=600'	CONTRACT NO.: 89302.10	DATE: 7-18/89	SHEET: 10 OF 19



NOT TO SCALE

		REVISIONS	
DATE	DESCRIPTION	DATE	BY
DESIGNED _____			
DRAWN <u>JMY</u> <u>7-13</u>			
CHECKED _____			
APPROVED _____			

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 ELLICOTT CITY, MARYLAND 21043
 (301) 461 - 9920

OWNER
 Kennecott Minerals Company
 1515 Mineral Square
 Salt Lake City, Utah

FLAMBEAU PROJECT
FIGURE NO. 7
MAXIMUM EXTENT OF DRAWDOWN
2.3 YEARS AFTER RECLAMATION BEGINS
 SCALE: 1"=600' CONTRACT NO.: 89302.10 DATE: 7/18/89 SHEET: 12 OF 19



NOT TO SCALE

		REVISIONS	
DESIGNED	DATE	DATE	DESCRIPTION
DRAWN	JMY 7-13		
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APPROVED			

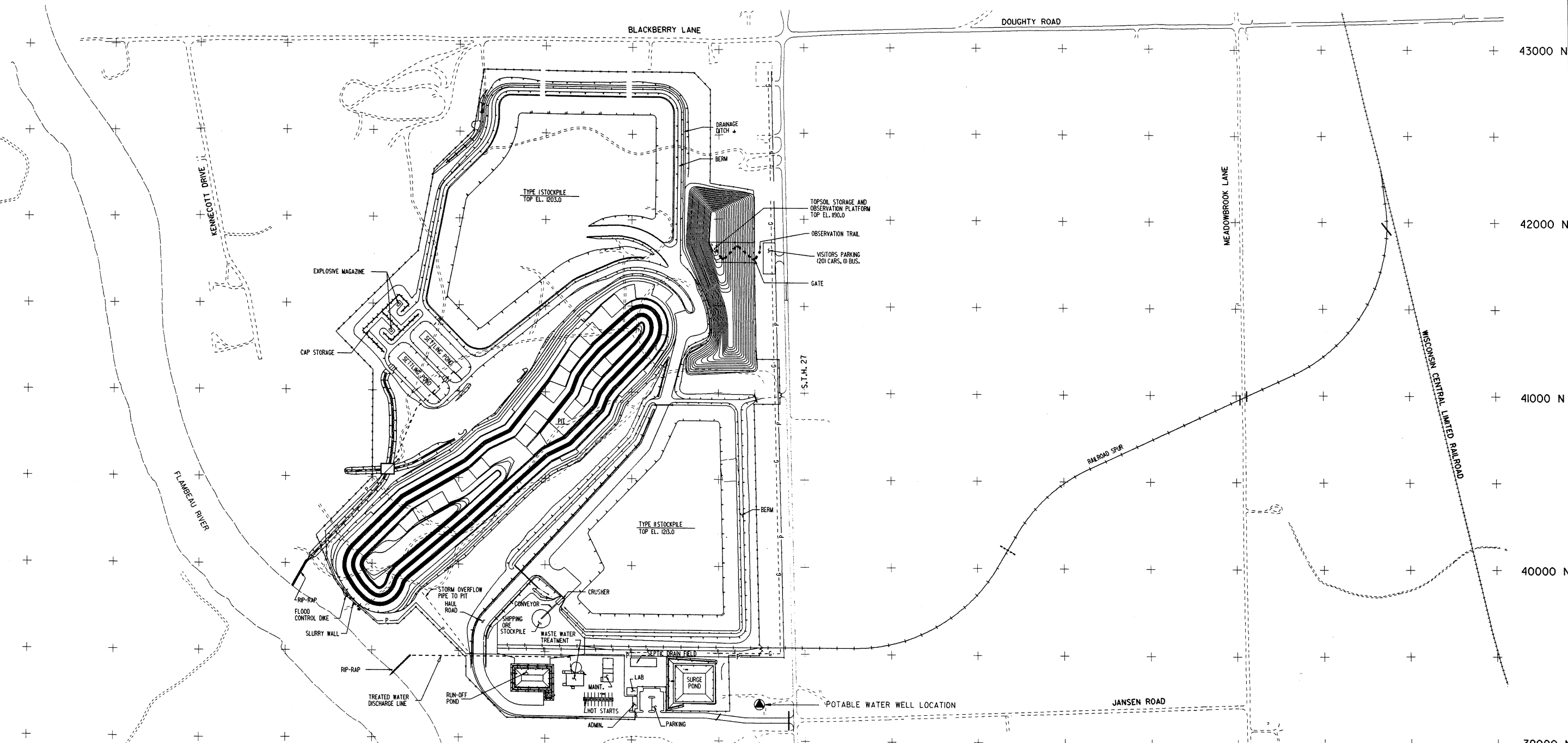
THOMAS A. PRICKETT & ASSOCIATES
 CONSULTING WATER RESOURCES ENGINEERS
 6 G.H. BAKER DRIVE
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 (301) 461 - 9920

OWNER
 Kennecott Minerals Company
 1515 Mineral Square
 Salt Lake City, Utah

FLAMBEAU PROJECT			
FIGURE NO. 8			
DIFFERENCE BETWEEN STEADY STATE PREMINING AND POSTMINING WATER TABLES			
SCALE: 1"=600'	CONTRACT NO.: 89302.10	DATE: 7/17/89	SHEET: 5 OF 5

37000 E 38000 E 39000 E 40000 E 41000 E 42000 E 43000 E 44000 E 45000 E



- NOTES:**
1. SITE LOCATION: SECTIONS 9, 10, 15 & 16, T34N, R6W, RUSK COUNTY, WISCONSIN.
 2. TOPOGRAPHIC BASE MAP PREPARED FROM AERIAL SURVEY BY SURDEX CORPORATION, CHESTERFIELD, MISSOURI, DATE OF PHOTOGRAPHY - APRIL 24, 1970. ROADS, TREES AND BUILDINGS WERE UPDATED AS PER AERIAL PHOTOGRAPH TAKEN BY MARKHURD CORPORATION, MINNEAPOLIS, MINNESOTA. DATE OF PHOTOGRAPHY - SEPTEMBER 14, 1987.
 3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
 4. HORIZONTAL DATUM BASED ON PROJECT SITE GRID SYSTEM. SITE GRID COORDINATES CORRELATION TO STATE PLANE COORDINATES DERIVED AS FOLLOWS:

LEGEND

— EXISTING PAVED ROADWAY

- - - EXISTING TRAIL/GRAVEL SURFACE

SITE GRID COORDINATES CONTROL MONUMENT F-1

STATE PLANE COORDINATES

40000 N = 587,357.0087 N

40000 E = 1,713,516.1229 E

THE ANGULAR ROTATION FROM STATE PLANE BEARINGS TO SITE GRID BEARINGS IS 359°-13'-23" RIGHT WITH CONTROL POINT F-1 AS THE BASE POINT.

5. MINE FACILITIES DESIGN BY FORD, BACON & DAVIS, INCORPORATED, SALT LAKE CITY, UTAH AND PINCOCK, ALLEN & HOLT, INCORPORATED, LAKEWOOD, COLORADO.

FOTH & VAN DYKE
 GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
 GREEN BAY, WISCONSIN

FLAMBEAU PROJECT
 LADYSMITH, WISCONSIN

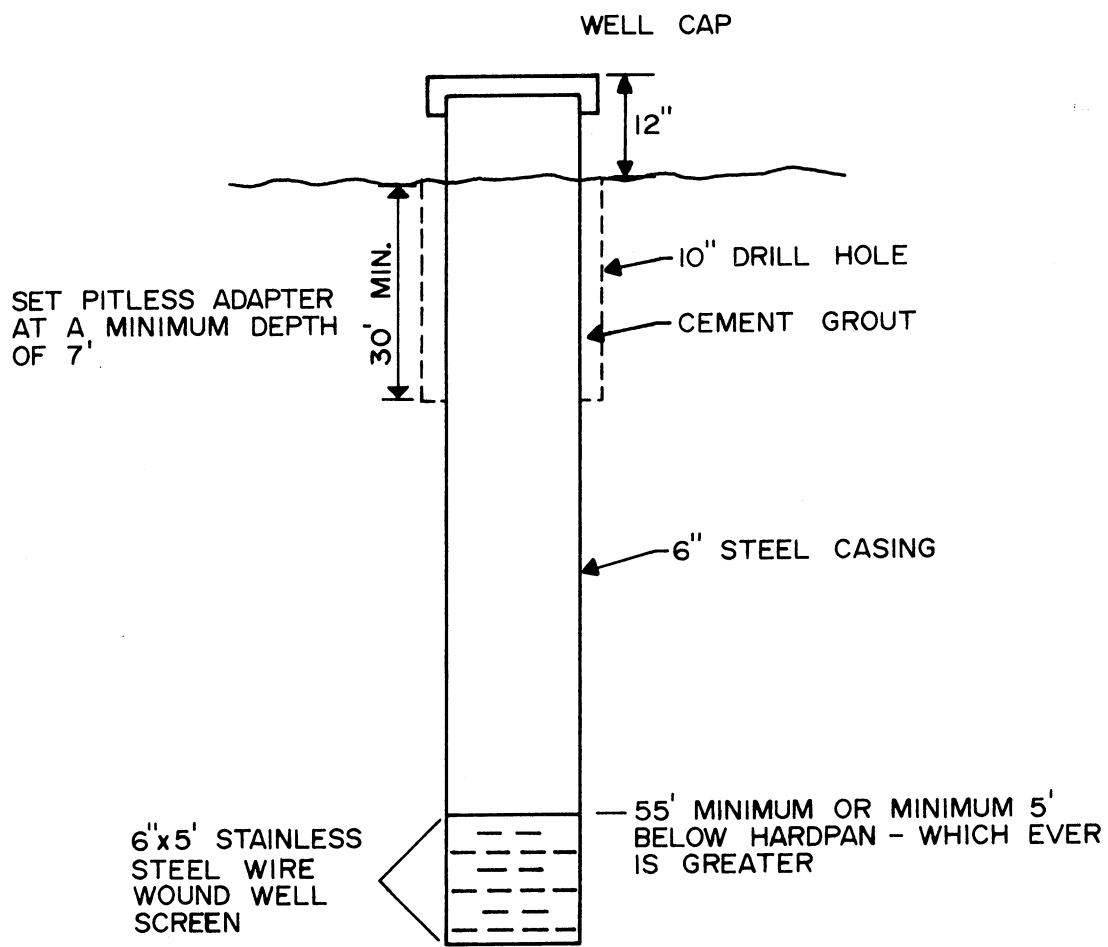
DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION	NO.	DATE	REVISIONS	BY	CHK'D	ENGR	ENGR	NO.	DATE	REVISIONS	BY	CHK'D	ENGR	ENGR	NO.	DATE	REVISIONS	BY	DATE	
																							NO.

PROJ. ENGR	DESIGN	BY	DATE
MGR. PROCESS ENGR	DRAWN	M.J.O.	3/89
ENGR MGR.	CHK'D	G.W.S.	3/89
	DES. ENGR		
	SECT ENGR		

KENNECOTT MINERALS COMPANY
 1515 MINERAL SQUARE
 SALT LAKE CITY, UTAH
 8412

FIGURE NO. 9
 SITE PLOT PLAN
 POTABLE WATER WELL LOCATION

MICROFILM	JOB
DRAWING NO.	REV.
DIVISION DRAWING NO.	
SCALE	SEE BAR SCALE



FOTH & VAN DYKE
 GEOSCIENCES & ENVIRONMENTAL MANAGEMENT DIVISION
 GREEN BAY, WISCONSIN

KENNECOTT MINERALS COMPANY
FLAMBEAU PROJECT
LADYSMITH, WISCONSIN

NOTES	APPROVAL	DATE
	DESIGNED BY	
	DRAWN BY JRB	12/89
	CHECKED BY JWS	12/89
	APPROVED BY	
	CAD No.	SCALE NONE

FIGURE NO. 10 LOW CAPACITY WELL CONSTRUCTION DIAGRAM		
Job No	Dwg No	REV

APPENDIX A

Legal Description

EXHIBIT A

The real estate premises are described as follows:

The South one-half of the South one-half of the Northeast Quarter of the Northeast Quarter, the Northwest Quarter of the Northeast Quarter, except beginning at the Northeast (NE) corner of said Northwest Quarter of the Northeast Quarter, thence West along the South line of the existing road Four Hundred Ten (410') feet, thence South Two Hundred Twelve and 5/10 (212.5') feet, thence East Four Hundred Ten (410') feet, thence North Two Hundred Twelve and 5/10 (212.5') feet to the point of beginning, the Southeast Quarter of the Northeast Quarter, the Northeast Quarter of the Southeast Quarter, the Southeast Quarter of the Southeast Quarter, Government Lots Three (3), Four (4), Five (5), Six (6), Seven (7), and Eight (8), Section Nine (9), Township Thirty-four (34) North, Range Six (6) West.

That part of the Northwest Quarter of the Northeast Quarter lying East of the Railroad, Section Ten (10), Township Thirty-four (34) North, Range Six (6) West, except that part of Lot One (1) of Certified Survey Map, Page 284; That part of Government Lot Seven (7), Section Three (3), Township Thirty-four (34), Range Six (6) West lying West of Railroad, that Part of the Northwest Quarter of the Northeast Quarter of Section Ten (10), Township Thirty-four (34) North, Range Six (6) West lying West of Railroad; that Part of the Southwest Quarter of the Northeast Quarter lying East of Railroad, that Part of the Southwest Quarter of the Northeast Quarter lying West of Railroad, the Southeast Quarter of the Northeast Quarter, the Northeast Quarter of the Northwest Quarter, that Part of the Northwest Quarter of the Northwest Quarter lying East of State Highway 27, excepting parcels described as follows:

A parcel in the Northwest Quarter of the Northwest Quarter commencing at the Northeast corner, thence 200 feet West, thence 66 feet South, thence 200 feet East, thence 66 feet North to the point of beginning; and

Commencing at the intersection of the South right-of-way line of a Town Road with the East right-of-way line of State Highway 27; thence Southerly along said East right-of-way line 175 feet, thence Easterly at right angle, 150 feet, thence Northerly at right angles and parallel to said East right-of-way line, 215 feet to the South line of Town Road, thence Westerly along town road 156 feet, to the point of beginning; and

Commencing at the intersection of the South right-of-way line of a Town Road with the East right-of-way line of State Highway 27, thence Southerly along said East right-of-way line, 175 feet, to the point of beginning of the land to be herein described; thence Southerly along the East line of Highway 208.7 feet, thence Easterly at right angles, 208.7 feet, thence Northerly at right angles and parallel to said East right-of-way line, 208.7 feet; thence Westerly at right angles, 208.7 feet to the point of beginning.

The Southwest Quarter of the Northwest Quarter, the Southeast Quarter of the Northwest Quarter, the Northeast Quarter of the Southwest Quarter, the Northwest Quarter of the Southwest Quarter, the Southwest Quarter of the Southwest Quarter, the Southeast Quarter of the Southwest Quarter, the Northeast Quarter of the Southeast Quarter, the Northwest Quarter of the Southeast Quarter lying East of Railroad, the Northwest Quarter of the Southeast Quarter lying West of Railroad, the Southwest Quarter of the Southeast Quarter lying East of Railroad, the Southwest Quarter of the Southeast Quarter lying West of Railroad, the Southeast Quarter of the Southeast Quarter of Section Ten (10), Township Thirty-four (34) North, Range Six (6) West.

Government Lots One (1), Two (2) except a parcel of land lying within Government Lot Two (2), Section Sixteen (16), Township Thirty-four (34) North, Range Six (6) West described as follows: Commencing at the Northwest corner of said Section Sixteen (16), said corner being the center line of North and South Town Road and intersection of East and West fence, thence North $89^{\circ}0'E$ along the North line of Section Sixteen (16) a distance of 594.4 feet; thence South $37^{\circ}30'E$ a distance of 2860.9 feet; thence South $56^{\circ}15'E$ a distance of 341.1 feet to the point of beginning; thence South $33^{\circ}45'W$ a distance of 50.0 feet, thence South $56^{\circ}15'E$ a distance of 197.0 feet to an intersection with the Northwesterly edge of the Flambeau River; thence North $37^{\circ}11'E$ a distance of 50.09 feet; thence North $27^{\circ}17'E$ a distance of 150.96 feet, thence North $56^{\circ}15'W$ a distance of 183.0 feet; thence South $33^{\circ}45'W$ a distance of 150.0 feet to the point of beginning, Three (3),

Four (4), Five (5), Six (6) except a parcel of land lying within Government Lot Six (6), Section Sixteen (16), Township Thirty-four (34) North, Range Six (6) West, said parcel being more particularly described as follows: Commencing at the southeast corner of said Section Sixteen (16), said corner being the intersection of the corner line of State Highway 27 and the center line of County Road T, thence north no (0) degrees, three (03) minutes west along the center line of State Highway 27 a distance of eight hundred forty and one-tenths (840.0) feet; thence north fifty-three (53) degrees fifty-one (51) minutes west a distance of eighteen hundred fifty-four and two-tenths (1854.2) feet; thence north fifty-six (56) degrees, fifteen (15) minutes west a distance of six hundred forty-seven and no-tenths (647.0) feet to the point of beginning; thence south thirty-three (33) degrees forty-five (45) minutes west a distance of fifty and no-tenths (50.0) feet; thence north fifty-six (56) degrees, fifteen (15) minutes west a distance of one hundred ninety eight and two-tenths (198.2) feet to an intersection with the southeasterly edge of the Flambeau River; thence north thirty-one (31) degrees, forty-one (41) minutes east a distance of fifty and three one-hundredths (50.03) feet; thence north thirty (30) degrees forty (40) minutes east a distance of one hundred fifty and twenty-two one-hundredths (150.22) feet, thence south fifty-six (56) degrees, fifteen (15) minutes east a distance of two hundred eight and 08/100 (208.08) feet, thence south thirty-three (33) degrees, forty-five (45) minutes west a distance of one hundred fifty and no-tenths (150.0) feet to the point of beginning, Seven (7), and Eight (8); the Northwest Quarter of the Northwest Quarter, the Northeast Quarter of the Southeast Quarter, the Southwest Quarter of the Southeast Quarter, the Southeast Quarter of the Southeast Quarter of Section Sixteen (16), Township Thirty-four (34) North, Range Six (6) West.

Government Lots Three (3), Four (4), Five (5), Six (6), and Seven (7), the Northeast Quarter of the Northeast Quarter, the Northwest Quarter of the Northeast Quarter, of Section Seventeen (17), Township Thirty-four (34) North, Range Six (6) West.

The Northeast Quarter of the Northeast Quarter, the Southwest Quarter of the Northeast Quarter, the Southeast Quarter of the Northeast Quarter, the East one-half of the East one-half of the Northwest Quarter, the Northeast Quarter of the Southeast Quarter of Section Twenty (20), Township Thirty-four (34) North, Range Six (6) West.

the Southwest Quarter of
the Southeast Quarter,

The Northeast Quarter of the Northeast Quarter, the Northwest Quarter of the Northeast Quarter, the Southwest Quarter of the Northeast Quarter, the Southeast Quarter of the Northeast Quarter, the Northeast Quarter of the Northwest Quarter, the Northwest Quarter of the Northwest Quarter, the Southwest Quarter of the Northwest Quarter, the Southeast Quarter of the Northwest Quarter, the Northeast Quarter of the Southwest Quarter, the Northwest Quarter of the Southwest Quarter, the Northeast Quarter of the Southeast Quarter, the Northwest Quarter of the Southeast Quarter, the Southwest Quarter of the Southeast Quarter of Section Twenty-one (21), Township Thirty-four (34) North, Range Six (6) West.

The Southwest Quarter of the Northwest Quarter, and the Northwest Quarter of the Southwest Quarter of Section Twenty-two (22), Township Thirty-four (34) North, Range Six (6) West.

Located in the City of Ladysmith, and Township of Grant, Rusk County, State of Wisconsin.

APPENDIX B

Well Construction Reports for
Private Water Supply Wells

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH
See Instructions on Reverse Side

Well 6

RECEIVED

1. County Rush Town Grant
 Village
 City Check one and give name

2. Location SE of NE Sec 9 T34N - R6W lot 7 SEP 6 1962
 Name of street and number of premise or Section, Town and Range numbers

3. Owner or Agent J. V. Whittenberger SANITARY ENGINEERING
 Name of individual, partnership or firm

4. Mail Address Ladysmith Wis N4349 Kennecott RD.
 Complete address required

5. From well to nearest: Building 15 ft; sewer None ft; drain None ft; septic tank None ft;
 dry well or filter bed None ft; abandoned well None ft.

6. Well is intended to supply water for: Trailer House

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	0	28			

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sand	0	3
Gravel	3	22
Sand & Gravel	22	28

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Standard Steel	0	28

9. GROUT:

Kind	From (ft.)	To (ft.)
None		

11. MISCELLANEOUS DATA:

Yield test: 2 Hrs. at 7 GPM.
 Depth from surface to water-level: 14 ft.
 Water-level when pumping: 16 ft.
 Water sample was sent to the state laboratory at:
Madison on Aug 30 1962
 City

Construction of the well was completed on:
Aug 29 1962

The well is terminated 12 inches
 above, below the permanent ground surface.

Was the well disinfected upon completion?
 Yes No

Was the well sealed watertight upon completion?
 Yes No

Signature E. P. Miffet Registered Well Driller
 Signature Sheldon Complete Mail Address

Please do not write in space below

Rec'd SEP 1 1962 No. 33135
 Ans'd 3/2
 Interpretation UNSAFE—BACTERIOLOGICALLY

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	+	+	+	+	+
48 hrs.	+	+	+	+	+
Confirm	+	+	+	+	+
B. Coli	+	+	+	+	+

B1 Examiner _____

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH
See Instructions on Reverse Side

Well 6

1. County Rush Town Grant Village City Check one and give name

2. Location SE 1/4 Sec 9 T34N R6W Lot 7 Name of street and number of premise or Section, Town and Range numbers

3. Owner or Agent Prof. Whittenberger Name of individual, partnership or firm

4. Mail Address Lady Smith WED Complete address required

5. From well to nearest: Building 11 ft; sewer _____ ft; drain 25 ft; septic tank 48 ft; dry well or filter bed 90 ft; abandoned well 20 ft.

6. Well is intended to supply water for: Cottage

RECEIVED
SEP 6 1962
SANITARY
ENGINEERING

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	0	28			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Stand Steel	0	28

9. GROUT:

Kind	From (ft.)	To (ft.)
None		

11. MISCELLANEOUS DATA:

Yield test: 3 Hrs. at 7 GPM.

Depth from surface to water-level: 14 ft.

Water-level when pumping: 14 ft.

Water sample was sent to the state laboratory at: Madison on Aug 30 1962
City

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sand	0	3
Gravel	3	22
Sand & Gravel	22	28

Construction of the well was completed on: Aug 28 1962

The well is terminated 10 inches above, below the permanent ground surface.

Was the well disinfected upon completion? Yes No _____

Was the well sealed watertight upon completion? Yes No _____

Signature EP Muffit Registered Well Driller Complete Mail Address Sheldon Was

Please do not write in space below

Rec'd SEP 1 1962 No. 33136

Ans'd _____

Interpretation SAFE - BACTERIOLOGICALLY

10 ml 10 ml 10 ml 10 ml 10 ml

Gas—24 hrs. _____

48 hrs. _____

Confirm OOOO

B. Coli _____

B2 Examiner _____

NOTE: APR 12 1977

WELL CONSTRUCTOR'S REPORT
Form 3300-15
Rev. 10-75

White Copy - Division's Copy
Green Copy - Driller's Copy
Yellow Copy - Owner's Copy

MAY BE KMC # 22

1. COUNTY Bush CHECK (✓) ONE: Town Village City Name Grant N 4095 Hwy 295

2. LOCATION 1/4 Section 16 Township 34 Range 6W 3. NAME OWNER AGENT AT TIME OF DRILLING CHECK (✓) ONE Manning Co.
OR - Grid or Street No. Street Name ADDRESS Kenwood Home

AND - If available subdivision name, lot & block No. POST OFFICE Adamsville Wis 54848

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain	Sanitary Bldg. Sewer	Floor Drain Connected To:	Storm Bldg. Drain	Storm Bldg. Sewer
8	C.I. Other	C.I. Other	C.I. Sewer Other Sewer	C.I. Other	C.I. Other

Street Sewer	Other Sewers	Foundation Drain Connected to:	Sewage Sump	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit
San. Storm	C.I. Other	Sewer	Sewage Sump C.I. Other	Clearwater Sump	50		Seepage Pit Seepage Bed Seepage Trench
		Clearwater Dr.					70

Privy	Pet Waste Pit	Pit: Nonconforming Existing	Subsurface Pumproom	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit
		Well Pump Tank	Nonconforming Existing							

Temporary Manure Stack	Watertight Liquid Manure Tank	Solid Manure Storage Structure	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Other (Give Description)

5. Well is intended to supply water for: House 9. FORMATIONS

DRILLHOLE						Kind	From (ft.)	To (ft.)
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)			
9	Surface	20	5	20	52	TOP	Surface	2
						Clay		10
						hard pan		44
						Sand gravel		52

CASING, LINER, CURBING AND SCREEN			
Material, Weight, Specification & Method of Assembly			
Dia. (in.)	From (ft.)	To (ft.)	
5	Surface	49	New black steel pipe
			1 1/2" pipe ASTN 53
			Japanese steel
	49	52	Screen-jacked

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drill Slurry	Surface	20

10. TYPE OF DRILLING MACHINE USED

<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Rotary-hammer w/drilling mud & air	<input type="checkbox"/> Jetting with
<input type="checkbox"/> Rotary-air w/drilling mud	<input type="checkbox"/> Rotary-hammer & air	<input type="checkbox"/> Air
<input type="checkbox"/> Rotary-w/drilling mud	<input type="checkbox"/> Reverse Rotary	<input type="checkbox"/> Water

Well construction completed on 3/14 1977

11. MISCELLANEOUS DATA
Yield Test: 6 Hrs. at 12 GPM Well is terminated 10 inches above below final grade

Depth from surface to normal water level 12 Ft. Well disinfected upon completion Yes No

Depth of water level when pumping 22 Ft. Stabilized Yes No Well sealed watertight upon completion Yes No

Water sample sent to Madison's laboratory on 4/6 1977

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature H. D. Sh. Blanton Complete Mail Address 114...

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

Well 6

See Instructions on Reverse Side

1. County Rush Town Grant
Village
City Check one and give name **RECEIVED**

2. Location NE 1/4 SW sec 9 T34N-R6W
 Name of street and number of premise or Section, Town and Range numbers

3. Owner or Agent Louis Jony KMC # 20
 Name of individual, partnership or firm

4. Mail Address Lody Smith Wis
 Complete address required

JUL 15 1963
 N4277 Kennecott
SANITARY ENGINEERING

5. From well to nearest: Building 4 ft; sewer _____ ft; drain 20 ft; septic tank 30 ft;
 dry well or filter bed 60 ft; abandoned well None ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
<u>4</u>	<u>0</u>				<u>25</u>

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
<u>sand & silt</u>	<u>0</u>	<u>7</u>
<u>Gravel</u>	<u>7</u>	<u>23</u>
<u>sand & gravel</u>	<u>23</u>	<u>25</u>

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
<u>4</u>	<u>Standard Steel</u>	<u>0</u>	<u>25</u>

9. GROUT:

Kind	From (ft.)	To (ft.)
<u>None</u>		

11. MISCELLANEOUS DATA:

Yield test: 2 Hrs. at 6 GPM.
 Depth from surface to water-level: 9 ft.
 Water-level when pumping: 11 ft.
 Water sample was sent to the state laboratory at:
Madison on July 8 1963
 City

Construction of the well was completed on:
July 8 1963

The well is terminated 8 inches
 above, below the permanent ground surface.

Was the well disinfected upon completion?
 Yes No _____

Was the well sealed watertight upon completion?
 Yes No _____

Signature EP Miffit Sheldon Wis
 Registered Well Driller Complete Mail Address
 Please do not write in space below

Rec'd JUL 9 - 1963 No. 26382

Ans'd _____
 Interpretation _____
SAFE - BACTERIOLOGICALLY
 B. Coli 0/5
 B4 _____

10 ml 10 ml 10 ml 10 ml 10 ml
 Gas—24 hrs. _____
 48 hrs. _____
 Confirm _____
 Examiner _____

NOV 4 1977

NOTE:
White Copy - Division's Copy
Green Copy - Driller's Copy
Yellow Copy - Owner's Copy

WELL CONSTRUCTOR'S REPORT
Form 3300-15
Rev. 10-75

1. COUNTY <u>Rusk</u>		CHECK (✓) ONE: <input checked="" type="checkbox"/> Town <input type="checkbox"/> Village <input type="checkbox"/> City		Name <u>Grant</u>	
2. LOCATION <u>S48E04</u> Section <u>9</u> Township <u>34</u> Range <u>6W</u>		3. NAME <input type="checkbox"/> OWNER <input type="checkbox"/> AGENT AT TIME OF DRILLING CHECK (✓) ONE <u>Ministry Co.</u>		ADDRESS <u>KMC 310A (Donalga)</u>	
OR - Grid or Street No. Street Name		AND - If available subdivision name, lot & block No.		POST OFFICE <u>Ladysmith Wis 54848</u>	
4. Distance in feet from well to nearest: (Record answer in appropriate block)		Building <u>8</u>	Sanitary Bldg. Drain C.I. Other	Sanitary Bldg. Sewer C.I. Other	Floor Drain Connected To: C.I. Sewer Other Sewer
Street Sewer	Other Sewers C.I. Other	Foundation Drain Connected to: Sewer Sewage Sump Clearwater Dr. Clearwater Sump	Sewage Sump C.I. Other	Clearwater Sump	Septic Tank <u>50</u>
Privy	Pet Waste Pit	Pit: Nonconforming Existing Well Pump Tank	Subsurface Pumphouse Nonconforming Existing	Barn Gutter <u>200</u>	Animal Barn Pen <u>200</u> Animal Yard <u>200</u>
Temporary Manure Stack	Watertight Liquid Manure Tank	Solid Manure Storage Structure	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Other (Give Description)
5. Well is intended to supply water for: <u>House & Barn</u>			9. FORMATIONS		
6. DRILLHOLE			Kind		
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
<u>9</u>	<u>Surface</u>	<u>20</u>	<u>5</u>	<u>20</u>	<u>49</u>
				<u>52</u>	<u>52</u>
7. CASING, LINER, CURBING AND SCREEN			10. TYPE OF DRILLING MACHINE USED		
Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)	<input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary-air w/drilling mud <input type="checkbox"/> Rotary-w/drilling mud <input type="checkbox"/> Jetting with <input type="checkbox"/> Air <input type="checkbox"/> Water <input type="checkbox"/> Reverse Rotary	
<u>5</u>	<u>New black t/c ASTM 53 15 lb pft japanized Johnson screen</u>	<u>Surface</u>	<u>49</u>		
8. GROUT OR OTHER SEALING MATERIAL			Well construction completed on <u>10 / 24</u> 19 <u>77</u>		
Kind	From (ft.)	To (ft.)	Well is terminated <u>12</u> inches <input checked="" type="checkbox"/> above <input type="checkbox"/> below final grade		
<u>Dull Slurry</u>	<u>Surface</u>	<u>20</u>	Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
11. MISCELLANEOUS DATA			Well sealed watertight upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Yield Test: <u>12</u> Hrs. at <u>3</u> GPM	Depth from surface to normal water level <u>21</u> Ft.		Water sample sent to <u>Madison</u> laboratory on <u>10 / 31</u> 19 <u>77</u>		
Depth of water level when pumping <u>39</u> Ft. Stabilized <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.				

Signature Stephen Shackleton B5 Complete Mail Address Holecomb Wis 54745
Registered Well Driller

MAY 13 1985

1. COUNTY Rusk CHECK (✓) ONE: Town Village City Name Grant

2. LOCATION SE-SE Section 4 Township 34N Range 6W 3. NAME OWNER AGENT AT TIME OF DRILLING CHECK (✓) ONE
 ADDRESS John Cadotte (Ho)
W 8606 Hakey Rd. (Madison)
 POST OFFICE Ladysmith Wis. ZIP CODE 54848

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain	Sanitary Bldg. Sewer	Floor Drain Connected To:	Storm Bldg. Drain	Storm Bldg. Sewer
<u>5'</u>	C.I. Other	C.I. Other	C.I. Sewer Other Sewer	C.I. Other	C.I. Other

Street Sewer San. Storm Other Sewers C.I. Other Foundation Drain Connected to: Sewage Sump Clearwater Sump Septic Tank Holding Tank Sewage Absorption Unit Seepage Pit Seepage Bed Seepage Trench 55'

Privy Pet Waste Pit Pit: Nonconforming Existing Well Pump Tank Subsurface Pumphouse Nonconforming Existing Barn Gutter Animal Barn Pen Animal Yard Silo With Pit Glass Lined Storage Facility Silo w/o Pit Earthen Silage Storage Trench Or Pit Manure Hopper or Retention or Pneumatic Tank Manure Basin

Temporary Manure Stack or Platform Watertight Liquid Manure Tank or Basin Manure Pressure Pipe Subsurface Gasoline or Oil Tank Waste Pond or Land Disposal Unit (Specify Type) Manure Storage Basin Concrete Floor Only Concrete Floor and Partial Concrete Walls Other (Describe)

5. Well is intended to supply water for: Trailer home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
<u>10</u>	<u>Surface</u>	<u>21</u>				<u>top soil</u>	<u>Surface</u>	<u>1</u>
<u>5</u>	<u>surface</u>	<u>58</u>				<u>clay</u>	<u>1</u>	<u>5</u>
						<u>Hard Pan</u>	<u>5</u>	<u>52</u>
						<u>sand and gravel</u>	<u>52</u>	<u>58</u>

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification	From (ft.)	To (ft.)
<u>5"</u>	<u>new black standard steel, threaded and Coupled. 1200 psi Pt. 15' per ft. ASTM-A-120VSP</u>	<u>Surface</u>	<u>58</u>

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
<u>clay slurry</u>	<u>Surface</u>	<u>21</u>

10. TYPE OF DRILLING MACHINE USED

Cable Tool Rotary-hammer w/drilling mud & air Jetting with Air Water

Rotary-air w/drilling mud Rotary-hammer & air

Rotary-w/drilling mud Reverse Rotary

Well construction completed on April 23, 1985

11. MISCELLANEOUS DATA

Yield Test: 2 Hrs. at 7 GPM Well is terminated 16 inches above final grade below

Depth from surface to normal water level 22 Ft. Well disinfected upon completion Yes No

Depth of water level when pumping 32 Ft. Stabilized Yes No Well sealed watertight upon completion Yes No

Water sample sent to Madison laboratory on April 29, 1985

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature Dale W. Atwood
 Registered Well Driller B6

Business Name and Complete Mailing Address
Atwood Well Drilling
N 36 37 Hwy. 40
Bruce Wis. 54819

WELL CONSTRUCTION REPORT

WISCONSIN STATE BOARD OF HEALTH

WELL CONSTRUCTION DIVISION

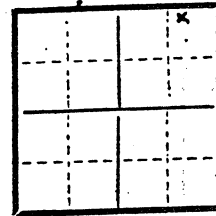
Note: Section 31 of the Wisconsin Well Construction Code, having the force and effect of law, provides that within thirty days after completion of every well the driller shall submit a report covering all essential details of construction to the State Board of Health on a form provided by the Board.

Owner A. J. Smith (Ho) Driller Kramer & Calkins
 Street or RFD # 3 W 8591 Govey Rd Post Office Weyerhausen Wis
 Post Office Lady Smith Wis Date _____ Permit No. 227

LOCATION OF PREMISES

Rush County Grant Town

The square below represents a section of land divided into 40 ~~acre~~ tracts. Mark the position of the premises in the section.



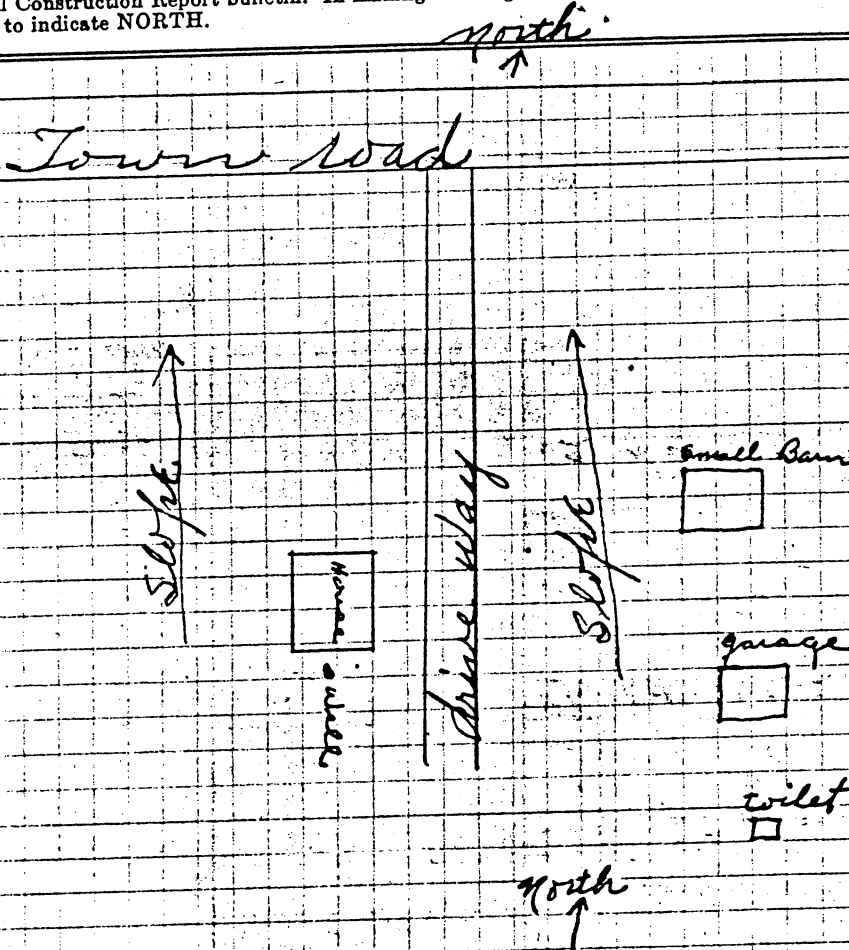
Sec. No. 9
 Twp. North 34-7
 Range 6 { E/W

Describe further by subdivision, plat, district, lake, lot.

block, nearest principal highway, etc., whichever apply.

DIAGRAM OF PREMISES

See Well Construction Report bulletin. In making the diagram in the space below consider 10 ft. as the distance between lines. Be sure to indicate NORTH.



The Flambeau river is about 20 rods north of these premises

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH
See Instructions on Reverse Side

Put on card
T34 R6W

1. County Rusk Town Village City Grant
Check one and give name

2. Location North West Corner of Sec. 10 town of Grant
Name of street and number of premise & Section, Town and Range numbers

3. Owner or Agent Cliff (or Carl C.) Anderson Ho N 4496 Hwy 215
Name of individual, partnership or firm

4. Mail Address Ludyanville Wis
Complete address required

5. From well to nearest: Building 4 ft; sewer _____ ft; drain _____ ft; septic tank 28 ft;
dry well or filter bed 85 ft; abandoned well _____ ft.

6. Well is intended to supply water for: Home use

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	0	85			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind	From (ft.)	To (ft.)
4"	Blind Steel	0	85

9. GROUT:

Kind	From (ft.)	To (ft.)

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 11 GPM.
Depth from surface to water-level: 30 ft.
Water-level when pumping: 45 ft.
Water sample was sent to the state laboratory at:
Madison on 8/16 1955
City

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	39
Hard pan	39	82
gravel	82	85

RECEIVED
JUL 9 1956
ENVIRONMENTAL
SANITATION

Construction of the well was completed on:

Aug 30 1955

The well is terminated 9 inches
 above, below the permanent ground surface.

Was the well disinfected upon completion?
Yes No _____

Was the well sealed watertight upon completion?
Yes No _____

Signature William F. Frazier Bruce Wain
Registered Well Driller Complete Mail Address

Please do not write in space below

Rec'd _____ No. _____
Ans'd _____
Interpretation _____

5 ml 10 ml 10 ml 10 ml 10 ml
Gas—24 hrs. _____
48 hrs. _____
Confirm _____
B. Coli _____
B8 Examiner _____

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH
See Instructions on Reverse Side

1. County Rusk } Town
 } Village
 } City Grant T34 R6W
 Check one and give name

2. Location Northwest corner of Sec. 16 town Grant
 Name of street and number of premise or Section, Town and Range numbers

3. Owner or Agent Carl Cliff Anderson
 Name of individual, partnership or firm

4. Mail Address Ladysmith, Wis.
 Complete address required

5. From well to nearest: Building 4 ft; sewer _____ ft; drain _____ ft; septic tank _____ ft;
 dry well or filter bed 85 ft; abandoned well _____ ft.

RECEIVED
JUL 26 1956

6. Well is intended to supply water for: House

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	0	85			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind	From (ft.)	To (ft.)
4"	Black Steel	0	85
		85	89

Deepened July 16, '56

9. GROUT:

Kind	From (ft.)	To (ft.)

11. MISCELLANEOUS DATA:

Yield test: _____ Hrs. at _____ GPM.
 Depth from surface to water-level: _____ ft.
 Water-level when pumping: _____ ft.
 Water sample was sent to the state laboratory at:
 _____ on _____ 19____
 City _____

10. FORMATIONS: ENVIRONMENTAL SANITATION

Kind	From (ft.)	To (ft.)
Clay	0	39
Hard pan	39	82
Gravel	82	85
Black water gravel	85	89

Aug 30, 1955
 Construction of the well was completed on:
deepened again July 15, '56 1956
 The well is terminated 9" inches
 above, below the permanent ground surface.
 Was the well disinfected upon completion?
 Yes No _____
 Was the well sealed watertight upon completion?
 Yes No _____

Signature William C. Fagan Brussels
 Registered Well Driller Complete Mail Address

Please do not write in space below

Rec'd JUL 20 1956 No. 25061
 Ans'd UNSAFE. much iron
 Interpretation is present causing a decided turbidity. Suggest another round of chlorination.

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	+	+	+	+	+
48 hrs. Confirm	+	+	+	+	+
B. Coli	+	+	+	+	+

B9 501 Examiner _____

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

WEL 6

RECEIVED

1. County Rusk Town Grant
 Village
 City Check one and give name

2. Location SE of Mead sec 9, T34W-R6W W8783 Blm Highway 1 lane
 Name of street and number of premise or Section, Town and Range numbers

3. Owner or Agent Serald V Vaughn KMC# 2
 Name of individual, partnership or firm

4. Mail Address Conrath Wis
 Complete address required

5. From well to nearest: Building 5 ft; sewer _____ ft; drain 35 ft; septic tank 30 ft;
 dry well or filter bed 50 ft; abandoned well _____ ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	0	22			

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sand	0	6
Gravel + sand	6	15
Sand	15	20
Gravel	20	22

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Stand steel	0	22

9. GROUT:

Kind	From (ft.)	To (ft.)
None		

11. MISCELLANEOUS DATA:

Yield test: 1 Hrs. at 6 GPM.
 Depth from surface to water-level: 9 ft.
 Water-level when pumping: 11 ft.
 Water sample was sent to the state laboratory at:
Madison on Nov 13 1962
 City

Construction of the well was completed on:
Nov 13 1962

The well is terminated 10 inches
 above, below the permanent ground surface.

Was the well disinfected upon completion?
Yes No _____

Was the well sealed with grout upon completion?
Yes No _____

Signature E.P. Miller
 Registered Well Driller

Sheldon was cat owner
 Complete Mail Address

Rec'd NOV 14 1962 No. 43181

Ans'd _____

Interpretation SAFE—BACTERIOLOGICALLY

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	_____	_____	_____	_____	_____
48 hrs.	_____	_____	_____	_____	_____
Confirm	_____	_____	_____	_____	_____
B. Coli	_____	_____	_____	_____	_____

B10 Examiner _____

N3

1. COUNTY Rusk		CHECK (✓) ONE: <input checked="" type="checkbox"/> Town <input type="checkbox"/> Village <input type="checkbox"/> City		Name Grant	
2. LOCATION OR - Grid or Street No. Street Name		1/4 Section NW 1/4 NW 1/4 Section 9 Township 34 Range 6		3. NAME <input checked="" type="checkbox"/> OWNER <input type="checkbox"/> AGENT AT TIME OF DRILLING CHECK (✓) ONE Mining Co. (Vaughn House)	
AND - If available subdivision name, lot & block No.		POST OFFICE Ladysmith, Wis. 54848			
4. Distance in feet from well to nearest: (Record answer in appropriate block)		Building		Sanitary Bldg. Drain	
		Sanitary Bldg. Sewer		Floor Drain Connected To:	
		C.I. Other		C.I. Sewer Other Sewer	
		C.I. Other		Storm Bldg. Drain	
		C.I. Other		C.I. Other	
Street Sewer		Other Sewers		Foundation Drain Connected to:	
San. Storm		C.I. Other		Sewage Sump	
				Clearwater Sump	
				Septic Tank	
				Holding Tank	
				Sewage Absorption Unit	
				Seepage Pit	
				Seepage Bed	
				Seepage Trench	
Privy		Pet Waste Pit		Pit: Nonconforming Existing	
				Subsurface Pumphouse	
				Barn Gutter	
				Animal Barn Pen	
				Animal Yard	
				Silo With Pit	
				Glass Lined Storage Facility	
				Silo w/o Pit	
				Earthen Silage Storage Trench Or Pit	
Temporary Manure Stack		Watertight Liquid Manure Tank		Solid Manure Storage Structure	
				Subsurface Gasoline or Oil Tank	
				Waste Pond or Land Disposal Unit (Specify Type)	
				Other (Give Description)	
5. Well is intended to supply water for: House				9. FORMATIONS	
				Kind	
				From (ft.) To (ft.)	
6. DRILLHOLE				Top	
Dia. (in.) From (ft.) To (ft.) Dia. (in.) From (ft.) To (ft.)				Surface	
9 Surface 20 5 20 46				2	
				2 46	
7. CASING, LINER, CURBING AND SCREEN					
Material, Weight, Specification & Method of Assembly					
Dia. (in.) From (ft.) To (ft.)					
5 New Blk Steel T&C Surface 44					
ASTHM A-53					
15#/Ft.					
Japanese Steel					
Screen 44 46					
8. GROUT OR OTHER SEALING MATERIAL				10. TYPE OF DRILLING MACHINE USED	
Kind				From (ft.) To (ft.)	
Drill Slurry				Surface 20	
				<input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary-air w/drilling mud <input type="checkbox"/> Rotary-w/drilling mud <input type="checkbox"/> Rotary-hammer w/drilling mud & air <input type="checkbox"/> Rotary-hammer & air <input type="checkbox"/> Reverse Rotary <input type="checkbox"/> Jetting with <input type="checkbox"/> Air <input type="checkbox"/> Water	
11. MISCELLANEOUS DATA				Well construction completed on 10-8-76 19__	
Yield Test: 10 Hrs. at 2 GPM				Well is terminated 12 inches <input checked="" type="checkbox"/> above final grade <input type="checkbox"/> below	
Depth from surface to normal water level 18 Ft.				Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Depth of water level when pumping 33 Ft. Stabilized <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				Well sealed watertight upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Water sample sent to Madison laboratory on 10-27 19 76					
Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.					
Signature <i>Stephen Shuckleton</i> Registered Well Driller				Complete Mail Address B11	

1. COUNTY Rusk CHECK ONE Town Village City NAME Grant RECEIVED

2. LOCATION (Number and Street or 1/4 section, section, township and range. Also give subdivision name, lot and block numbers when available.) S16 T34NR6W N4031 Hwy 27 JUL 20 1965

3. OWNER AT TIME OF DRILLING Ed Thummel KMC #26

4. OWNER'S COMPLETE MAIL ADDRESS Lady Smith, Wisc. SANITARY ENGINEERING

5. Distance in feet from well to nearest: BUILDING SANITARY SEWER FLOOR DRAIN FOUNDATION DRAIN WASTE WATER DRAIN
 (Record answer in appropriate block) Bare lot C. I. TILE C. I. TILE SEWER CONNECTED INDEPENDENT C. I. TILE

6. NEAR WATER DRAIN SEPTIC TANK PRIVY SEEPAGE PIT ABSORPTION FIELD BARN SILO ABANDONED WELL SINK HOLE
 C. I. TILE

7. OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.) None

6. Well is intended to supply water for:

Home

7. DRILLHOLE						10. FORMATIONS		
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
10	Surface	23				Top soil	Surface	2
4	23	44				Hard Pan	2	26
8. CASING, LINER, CURBING, AND SCREEN						Hard gravel	26	40
						Dia. (in.)		Kind and Weight
4	Standard Black Steel		Surface	44				

9. GROUT OR OTHER SEALING MATERIAL			
Kind	From (ft.)	To (ft.)	
<u>Day Shury</u>	Surface	23	

11. MISCELLANEOUS DATA

Yield test: 2 Hrs. at 8 GPM

Well is terminated 24 inches above below final grade

Depth from surface to normal water level 29 ft. Well disinfected upon completion Yes No

Depth to water level when pumping 33 ft. Well sealed watertight upon completion Yes No

Water sample sent to _____ laboratory on: 19

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

15. SIGNATURE Dale W. Stwood Registered Well Driller COMPLETE MAIL ADDRESS Bruce, Wisc. R.R. # 54819

Please do not write in space below B12

12. INFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS

1. COUNTY Rusk CHECK ONE Town Village City NAME Grant

2. LOCATION (Number and Street or 1/4 section, section, township and range. Also give subdivision name, lot and block numbers when available.) 10-34-6

3. OWNER AT TIME OF DRILLING Ernest Lindahl KMC# 71

4. OWNER'S COMPLETE MAIL ADDRESS Ladysmith Wis.

5. Distance in feet from well to nearest: BUILDING C.I. 4' SANITARY SEWER C.I. TILE FLOOR DRAIN C.I. TILE FOUNDATION DRAIN SEWER CONNECTED INDEPENDENT WASTE WATER DRAIN C.I. TILE

CLEAR WATER DRAIN C.I. TILE SEPTIC TANK 30' PRIVY SEEPAGE PIT ABSORPTION FIELD 55' BARN SILO ABANDONED WELL SINK HOLE

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for: Home

7. DRILLHOLE						10. FORMATIONS		
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
<u>10</u>	<u>Surface</u>	<u>23</u>				<u>Top soil</u>	<u>Surface</u>	<u>2</u>
<u>5</u>	<u>0</u>	<u>95</u>				<u>clay</u>	<u>2</u>	<u>8</u>

8. CASING, LINER, CURBING, AND SCREEN				
Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)	
<u>5</u>	<u>Standard Black Steel</u> <u>14# per ft</u>	<u>Surface</u>	<u>95</u>	

9. GROUT OR OTHER SEALING MATERIAL			
Kind	From (ft.)	To (ft.)	
<u>clay slurry</u>	<u>Surface</u>	<u>23</u>	

11. MISCELLANEOUS DATA

Well construction completed on June 30, 1968

Yield test: 4 Hrs. at 8 GPM Well is terminated 12 inches above below final grade

Depth from surface to normal water level 28 ft. Well disinfected upon completion Yes No

Depth to water level when pumping 34 ft. Well sealed watertight upon completion Yes No

Water sample sent to Madison laboratory on: 6-30-1968

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, subsurface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE William T. Feagin Registered Well Driller COMPLETE MAIL ADDRESS Bruce Wis.

Please do not write in space below B13

COLIFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS

NOTE:

White Copy - Division's Copy
 Green Copy - Driller's Copy
 Yellow Copy - Owner's Copy

AUG 18 1982

1. COUNTY Rusk		CHECK (✓) ONE: <input checked="" type="checkbox"/> Town <input type="checkbox"/> Village <input type="checkbox"/> City			Name Grant																						
2. LOCATION OR - Grid or Street No. 15 Street or Road Name 34N 6W		3. NAME <input type="checkbox"/> OWNER <input type="checkbox"/> AGENT AT TIME OF DRILLING CHECK (✓) ONE Clynick Concrete		ADDRESS Hwy 275 R. # 2 Relay Mix Plant (Ho)																							
AND - If available subdivision name, lot & block No.		POST OFFICE Sheldon, Wis.		ZIP CODE 54766																							
4. Distance in feet from well to nearest: (Record answer in appropriate block) 40		Building		Sanitary Bldg. Drain		Sanitary Bldg. Sewer		Floor Drain Connected To:		Storm Bldg. Drain		Storm Bldg. Sewer															
		C.I.		Other		C.I.		Other		C.I.		Other															
		-100-				100																					
Street Sewer		Other Sewers		Foundation Drain Connected to:		Sewage Sump		Clearwater Sump		Septic Tank		Holding Tank		Sewage Absorption Unit		Manure Hopper or Retention or Pneumatic Tank											
San.		Storm		C.I.		Other		Sewer		Clearwater Dr.		Sewage Sump		Clearwater Sump		C.I.		Other		150		Seepage Pit		Seepage Bed		Seepage Trench	
Privy		Pet Waste Pit		Pit: Nonconforming Existing		Subsurface Pumproom		Barn Gutter		Animal Barn Pen		Animal Yard		Silo With Pit		Glass Lined Storage Facility		Silo w/o Pit		Earthen Storage Trench Or Pit		Earthen Manure Basin					
Temporary Manure Stack or Platform		Watertight Liquid Manure Tank or Basin		Manure Pressure Pipe		Subsurface Gasoline or Oil Tank		Waste Pond or Land Disposal Unit (Specify Type)		Manure Storage Basin		Concrete Floor Only		Concrete Floor and Partial Concrete Walls		Other (Describe)											
5. Well is intended to supply water for: ready mix plant				9. FORMATIONS								Kind		From (ft.)		To (ft.)											
6. DRILLHOLE				Dia. (in.)		From (ft.)		To (ft.)		Dia. (in.)		From (ft.)		To (ft.)		Kind		From (ft.)		To (ft.)							
				10		Surface		20		6		20		42		clay		Surface		36							
				6		20		42								Sand and gravel		36		42							
7. CASING, LINER, CURBING AND SCREEN				Dia. (in.)		Material, Weight, Specification		Mfg. & Method of Assembly		From (ft.)		To (ft.)															
				6		new nlk stl t&c		19.45		Surface		39															
				6		API 5L USS																					
				6		# 18 S.S. Screen &																					
						Packer				39		42															
8. GROUT OR OTHER SEALING MATERIAL				Kind		From (ft.)		To (ft.)		10. TYPE OF DRILLING MACHINE USED		<input checked="" type="checkbox"/> Cable Tool		<input type="checkbox"/> Rotary-hammer w/drilling mud & air		<input type="checkbox"/> Jetting with		<input type="checkbox"/> Air		<input type="checkbox"/> Water							
				Drill cuttings		Surface		20				<input type="checkbox"/> Rotary-air w/drilling mud		<input type="checkbox"/> Rotary-hammer & air		<input type="checkbox"/> Reverse Rotary											
												<input type="checkbox"/> Rotary-w/drilling mud															
11. MISCELLANEOUS DATA				Yield Test: 3 Hrs. at 7 GPM		Well construction completed on July 21 19 82		Well is terminated 16 inches <input checked="" type="checkbox"/> above final grade <input type="checkbox"/> below		Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Well sealed watertight upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No															
				Depth from surface to normal water level 14 Ft.																							
				Depth of water level when pumping 28 Ft. Stabilized <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																							
				Water sample sent to Wis App Lab. # 59 RRR MK laboratory on Aug. 9 19 82																							

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature **William D. Bunnell** Registered Well Driller B14 Business Name and Complete Mailing Address **B. S. R. Melford**

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

SEP 27 1970

NOTE

WHITE COPY - DIVISION'S COPY
GREEN COPY - DRILLER'S COPY
YELLOW COPY - OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

1. COUNTY **Rusk** CHECK ONE Town Village City NAME **Grant**

2. LOCATION - 1/4 Section **NW 1/4 NW 1/4** Section **15** Township **34** Range **6**
3. OWNER AT TIME OF DRILLING **Jim Oechslin Hwy 275 (Hd)**
OR - Grid or street no. Street name ADDRESS **c/o KASIER**

AND - If available subdivision name, lot & block no. POST OFFICE **Ladysmith, Wis. 54848**

4. Distance in feet from well to nearest:
(Record answer in appropriate block)

BUILDING	SANITARY SEWER	FLOOR DRAIN	FOUNDATION DRAIN	WASTE WATER DRAIN
C. I.	TILE	C. I.	SEWER CONNECTED	INDEPENDENT
4				

CLEAR WATER DRAIN	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILLO	ABANDONED WELL	SINK HOLE
C. I.	TILE							

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

5. Well is intended to supply water for:
house

10. DRILLHOLE						9. FORMATIONS			
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)	
10	Surface	20	6	20	54	Top	Surface	3	
						Hard Pan	3	48	

7. CASING, LINER, CURBING, AND SCREEN				9. FORMATIONS	
Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)	Kind	To (ft.)
6	New Blk Steel T&C	Surface	52	Sand & Gravel	48
	ASTM A-53				54
	19.45/ft				
	Japanese Steel				
	Johnson Screen	52	54		

8. GROUT OR OTHER SEALING MATERIAL				10. TYPE OF DRILLING MACHINE USED			
Kind	From (ft.)	To (ft.)		<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Direct Rotary	<input type="checkbox"/> Reverse Rotary	
Drill Slurry	Surface	20		<input type="checkbox"/> Rotary - air w/drilling mud	<input type="checkbox"/> Rotary - hammer with drilling mud & air	<input type="checkbox"/> Jetting with <input type="checkbox"/> Air <input type="checkbox"/> Water	
				Well construction completed on 8/31 1976			

11. MISCELLANEOUS DATA				10. TYPE OF DRILLING MACHINE USED	
Yield test:	Hrs. at	GPM		Well is terminated	inches
	8	10		12	inches
Depth from surface to normal water level			34	Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Depth to water level when pumping			39	Well sealed watertight upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Water sample sent to			Madison	laboratory on: 9/16 1976	

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumphrooms, access pits, etc., should be given on reverse side.

SIGNATURE *Stephen Shackleton* Registered Well Driller COMPLETE MAIL ADDRESS **Holcombe, Wis. 54745**

Please do not write in space below **B15**

COLIFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS
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JUL 19 1977

NOTE:

White Copy - Division's Copy
Green Copy - Driller's Copy
Yellow Copy - Owner's Copy

1. COUNTY Rusk		CHECK (✓) ONE: <input checked="" type="checkbox"/> Town <input type="checkbox"/> Village <input type="checkbox"/> City				Name Grant	
2. LOCATION ¼ Section NW¼NW¼ Section 15 Township 34 Range 6		3. NAME <input checked="" type="checkbox"/> OWNER <input type="checkbox"/> AGENT AT TIME OF DRILLING CHECK (✓) ONE Steve Jensen - NW W.M. RANCO c/o RANCO Trucking				ADDRESS Cor. St 27 + Jensen Rd	
OR - Grid or Street No. _____ Street Name _____		AND - If available subdivision name, lot & block No. _____				POST OFFICE Ladysmith, WI 54848	
4. Distance in feet from well to nearest: (Record answer in appropriate block)		Building 100		Sanitary Bldg. Drain C.I. _____ Other _____		Sanitary Bldg. Sewer C.I. _____ Other _____	
		Floor Drain Connected To: C.I. Sewer _____ Other Sewer _____		Storm Bldg. Drain C.I. _____ Other _____		Storm Bldg. Sewer C.I. _____ Other _____	
Street Sewer		Other Sewers		Foundation Drain Connected to:		Sewage Sump	
<input checked="" type="checkbox"/> San. <input type="checkbox"/> Storm		C.I. _____ Other _____		Sewer _____ Sewage Sump _____ Clearwater Dr. _____ Clearwater Sump _____		C.I. _____ Other _____	
						Clearwater Sump 60	
Privy		Pet Waste Pit		Pit: Nonconforming Existing		Subsurface Pumproom	
				Well _____ Pump _____ Tank _____		Nonconforming Existing _____	
Temporary Manure Stack		Watertight Liquid Manure Tank		Solid Manure Storage Structure		Subsurface Gasoline or Oil Tank	
						Waste Pond or Land Disposal Unit (Specify Type) _____	
						Other (Give Description) _____	
5. Well is intended to supply water for: House				9. FORMATIONS			
				Kind		From (ft.)	To (ft.)
6. DRILLHOLE				Top		Surface	3
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)		
8	Surface	20	4	20	51	Hard Pan	3 50
						Sand & Gravel	50 51
7. CASING, LINER, CURBING AND SCREEN							
Material, Weight, Specification & Method of Assembly				From (ft.)		To (ft.)	
Dia. (in.)							
4	New Blk Steel T&C	Surface	51				
	ASTHM A-53						
	1 1/2 #/Ft						
	Japanese Steel						
8. GROUT OR OTHER SEALING MATERIAL				10. TYPE OF DRILLING MACHINE USED			
Kind				From (ft.)		To (ft.)	
Drill Slurry				Surface		20	
				<input checked="" type="checkbox"/> Cable Tool		<input type="checkbox"/> Rotary-hammer w/drilling mud & air	
				<input type="checkbox"/> Rotary-air w/drilling mud		<input type="checkbox"/> Rotary-hammer & air	
				<input type="checkbox"/> Rotary-w/drilling mud		<input type="checkbox"/> Reverse Rotary	
				<input type="checkbox"/> Jetting with		<input type="checkbox"/> Air	
						<input type="checkbox"/> Water	
11. MISCELLANEOUS DATA				Well construction completed on 6/22 19 77			
Yield Test: 12 Hrs. at 4 GPM				Well is terminated 12 inches <input checked="" type="checkbox"/> above final grade <input type="checkbox"/> below			
Depth from surface to normal water level 20 Ft.				Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Depth of water level when pumping 30 Ft. Stabilized <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				Well sealed watertight upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Water sample sent to Madison laboratory on 7/11 19 77							

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: *Stephen Shekleton*
Registered Well Driller

Complete Mail Address
B16 Holcombe, Wis. 54745

JAN 23 1974

DEC 27 1973

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

WELL CONSTRUCTOR'S REPORT
JRM 3300-15

NOTE
WHITE COPY - DIVISION'S COPY
GREEN COPY - DRILLER'S COPY
YELLOW COPY - OWNER'S COPY

1. COUNTY Rush CHECK ONE Town Village City NAME Grant

2. LOCATION - 1/4 Section Ne 1/4 N 1/2 Section 15 Township 34 Range 6W
R - Grid or street no. Street name
3. OWNER AT TIME OF DRILLING Steve Jensen
ADDRESS R.R.

AND - If available subdivision name, lot & block no. POST OFFICE Holcombe Wis

Distance in feet from well to nearest: (Record answer in appropriate block)	BUILDING	SANITARY SEWER	FLOOR DRAIN	FOUNDATION DRAIN	WASTE WATER DRAIN
	C. I.	TILE	C. I.	SEWER CONNECTED	C. I.
	<u>15</u>				

LEAR WATER DRAIN	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
C. I.	TILE							

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

5. Well is intended to supply water for: House

DRILLHOLE						9. FORMATIONS		
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
<u>9</u>	<u>Surface</u>	<u>20</u>	<u>5</u>	<u>20</u>	<u>53</u>	<u>clay</u>	<u>Surface</u>	<u>2</u>
						<u>hard pan</u>	<u>2</u>	<u>48</u>
						<u>sand gravel</u>	<u>48</u>	<u>53</u>

10. TYPE OF DRILLING MACHINE USED			
<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Direct Rotary	<input type="checkbox"/> Reverse Rotary	
<input type="checkbox"/> Rotary - air w/drilling mud	<input type="checkbox"/> Rotary - hammer with drilling mud & air	<input type="checkbox"/> Jetting with Air	<input type="checkbox"/> Water

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
<u>Drill Slurry</u>	<u>Surface</u>	<u>20</u>

11. MISCELLANEOUS DATA

Yield test: 6 Hrs. at 3 GPM

Well construction completed on 12/20 1973

Well is terminated 12 inches above below final grade

Depth from surface to normal water level 20 ft. Well disinfected upon completion Yes No

Depth to water level when pumping 40 ft. Well sealed watertight upon completion Yes No

Water sample sent to Madison laboratory on: 12/20 1973

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seal type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumphrooms, access pits, etc., should be given on reverse side.

SIGNATURE Stephen Shadluto Registered Well Driller COMPLETE MAIL ADDRESS Holcombe Wis 54745

COLIFORM TEST RESULT GAS - 24 HRS. GAS - 48 HRS. CONFIRMED REMARKS

1. COUNTY Rusk CHECK ONE Town Village City NAME Grant

2. LOCATION (Number and Street or 1/4 section, section, township and range. Also give subdivision name, lot and block numbers when available.) 16-34-6

3. OWNER AT TIME OF DRILLING Leland Peterson KMC# 24

4. OWNER'S COMPLETE MAIL ADDRESS Ladysmith Wis. N4071 Hwy 27

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING C. I.	SANITARY TILE	SEWER C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE

CLEAR WATER DRAIN C. I. TILE SEPTIC TANK PRIVY SEEPAGE PIT ABSORPTION FIELD BARN SILO ABANDONED WELL SINK HOLE

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for: Home

7. DRILLHOLE						10. FORMATIONS		
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
10	Surface	12				Top soil	Surface	2
4	0	30				hard pan	2	8
						sand	8	28
						gravel	28	30

8. CASING, LINER, CURBING, AND SCREEN			
Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Standard black steel 11 # per ft	Surface	30

9. GROUT OR OTHER SEALING MATERIAL		
Kind	From (ft.)	To (ft.)
Clay Slurry	Surface	12

11. MISCELLANEOUS DATA

Well construction completed on July 2, 196

Yield test: 1 1/2 Hrs. at 18 GPM Well is terminated 12 inches above below final grade

Depth from surface to normal water level 16 ft. Well disinfected upon completion Yes No

Depth to water level when pumping 19 ft. Well sealed watertight upon completion Yes No

Water sample sent to laboratory on: 7-2-196

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to near wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sul surface pumphrooms, access pits, etc., should be given on reverse side.

SIGNATURE William L. Fugim Registered Well Driller COMPLETE MAIL ADDRESS Brewster

Please do not write in space below B18

COLIFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS

DEC 20 1973

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

NOTE
WHITE COPY - DIVISION'S COPY
GREEN COPY - DRILLER'S COPY
YELLOW COPY - OWNER'S COPY

1. COUNTY Rusk CHECK ONE Town Village City NAME Grant

2. LOCATION - 1/4 Section N49 N 1/2 E 2 Section 15 Township 34N Range 6W
3. OWNER AT TIME OF DRILLING Jim W. Henshaw
ADDRESS 10000 Meadowbrook Rd
City N4090
POST OFFICE Halscombe Wis (*119)

AND - If available subdivision name, lot & block no.

4. Distance in feet from well to nearest:
(Record answer in appropriate block) BUILDING 12 SANITARY SEWER C. I. TILE FLOOR DRAIN C. I. TILE FOUNDATION DRAIN SEWER CONNECTED INDEPENDENT WASTE WATER DRAIN C. I. TILE

5. OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)
CLEAR WATER DRAIN C. I. TILE SEPTIC TANK PRIVY SEEPAGE PIT ABSORPTION FIELD BARN SILO ABANDONED WELL SINK HOLE

5. Well is intended to supply water for: House

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
9	Surface	20	5	20	58

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Clay	Surface	2
hard pan	2	51
Sand gravel	51	58

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
5	New black pipe	Surface	58
15	1/2 pipe		

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drill Slurry	Surface	20

10. TYPE OF DRILLING MACHINE USED

Cable Tool Direct Rotary Reverse Rotary
 Rotary - air w/drilling mud Rotary - hammer with drilling mud & air Jetting with Air Water

1. MISCELLANEOUS DATA

Yield test: 12 Hrs. at 10 GPM

Depth from surface to normal water level 16 ft.

Depth to water level when pumping 25 ft.

Well construction completed on 12/13 1973

Well is terminated 16 inches above below final grade

Well disinfected upon completion Yes No

Well sealed watertight upon completion Yes No

Water sample sent to Madison laboratory on: 12/13 1973

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE Stephen Shackleton Registered Well Driller COMPLETE MAIL ADDRESS Halscombe Wis 54745

Please do not write in space below B19

COLIFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS
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APPENDIX C

Low Capacity Potable Water Well
Construction Specifications

SECTION 02730

GENERAL PROVISIONS FOR CONSTRUCTING WATER WELLS

1.01 DESCRIPTION

- A. This section contains general provisions applying to the construction of water wells.
- B. Work under this contract consists of furnishing all materials, labor, equipment, shipping and storage necessary to construct the well with all appurtenances and shall include:
 - 1. Drilling.
 - 2. Casing installation.
 - 3. Grouting.
 - 4. Testing and sampling.
 - 5. Site and groundwater protection.
 - 6. Disinfection.
 - 7. Well abandonment.
 - 8. Safety and related matters.
 - 9. Clean-up.

1.02 REFERENCE STANDARDS

- A. American Water Works Association (AWWA):
 - 1. AWWA B-300 Standard for Hypochlorites
- B. American Standard for Testing and Materials:
 - 1. ASTM A-53 Specifications for Steel Pipe
 - 2. ASTM A-120 Specifications for Steel Pipe
 - 3. ASTM C-150 Specifications for Portland Cement
- C. Wisconsin Administrative Code
 - 1. NR112

1.03 QUALITY ASSURANCE

- A. The work shall be performed by an experienced well driller licensed in the state in which the well is to be located.
- B. If requested furnish information and references on similar wells constructed.

1.04 SUBMITTALS

- A. Samples
 - 1. Formation Samples:
 - a. Take at five foot intervals and at changes in geologic formations.
 - b. Submit to the State Geological Survey in containers provided for that purpose.

2. Water samples for bacteriological analysis.
 - a. Two shall be taken during the course of the test pumping.
 - b. Provide analysis as required by the governing State authority.
3. Water samples for chemical analysis.
 - a. Take during the test pumping.
 - b. Furnish to the Owner's representative.
 - c. Suitable bottles shall be used for sample collection.

B. Reports:

1. Submit one copy of following to governing State agency:
 - a. Well constructor's report.
2. Submit one copy of following to Owner's representative:
 - a. Well constructor's report.

PART 2 - PRODUCT

2.01 CASING AND LINERS

- A. Protective casing shall be prime steel pipe meeting one of the following standards.
 1. ASTM A-53
 2. ASTM A-120
- B. The protective casing shall have the following minimum weights and thicknesses.

	Size (Inches) <u>External</u>	Diameter (Inches) <u>Internal</u>	Thickness (Inches) <u></u>	Weight Per Foot (Pound) <u></u>	
				<u>Plain Ends</u>	<u>With Threads and Couplings</u>
6	6.625	6.049	0.288	19.49	20.00

2.02 CEMENT GROUT AND CONCRETE

- A. All cement shall be ASTM C150.
- B. Neat Cement Grout:
 1. Not contain more than six gallons of water per sack (94 lbs.) of cement.
 2. Additives shall not be used unless authorized in advance of time for grouting.

2.03 CHLORINE

- A. Chlorine compounds shall meet AWWA B-300.

- B. The following chlorine compounds are approved for use during well construction and for disinfection.
 - 1. Calcium Hypochlorite (HTH).
 - 2. Sodium Hypochlorite.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protect well and aquifer from following:
 - 1. Contaminated water.
 - 2. Oil, fuel, chemicals, and bacteria.
 - 3. Tampering.
- B. Perform work in a manner to avoid breakdown or caving-in of formations.
- C. Unattended wells shall be capped at all times.
- D. Completed wells shall have a steel plate tack welded to top of inner casing:
 - 1. Tack at a minimum of four locations.
- E. Aids and additives for drilling and development may be used only when authorized by Owner's representative.

3.02 WELL CONSTRUCTION SITE

- A. Protection of the Site
 - 1. Protect all structures, walks, pipelines, trees, shrubbery, lawns, etc. during the progress of his work.
 - 2. Remove drill cuttings, debris, and unused materials.
 - 3. Upon completion of work restore site to its original conditions.
- B. Mud Pond and Storage Pond
 - 1. Provide a mud and waste pond and allow only clear water to overflow. Point of discharge shall be as approved by Owner's representative.
 - 2. Provide a water storage pond and water supply when required.
 - 3. Ponds shall not be located on location of proposed building or utilities.
 - 4. Dispose of excess mud and wastes from ponds an approved site as required.
 - 5. Ponds shall be filled in upon completion of well construction in a manner approved by the Owner's representative.

3.03 WELL GROUTING

- A. Notify and submit the proposed grouting method to Owner's representative 48 hours prior to the anticipated grouting time.
- B. Grouting shall not proceed unless Owner's representative is at the site.
- C. Grout shall be placed in one continuous operation.

- D. Neat cement grout shall be passed through a screen with openings which do not exceed one-half inch in size.
- E. Grout shall be pumped in place through a steel tremie pipe placed to bottom of annular opening.
- F. Pumping of grout shall continue until consistency of grout overflowing is equal to that being installed.
- G. If grout settles, additional grout shall be added to refill annular opening.
- H. Allow to set for 72 hours before continuing work.

3.04 CLEANING AND DISINFECTION

- A. A chlorine residual of at least 10 parts per million shall be maintained in well throughout construction period.
- B. Any water used in well construction shall contain a chlorine residual.
- C. After well construction is completed, well shall be cleaned of oil, grease, and foreign materials.
- D. Prior to test pumping the well shall be disinfected.
 - 1. A chlorine solution shall be added to the well so the concentration throughout is 50 to 100 parts per million the well.
 - 2. The casing and well above the water level shall be rinsed or brought into contact with the chlorinated water.
 - 3. Additional chlorinated water shall be added to the well to force the solution through the screen and into the formation.
 - 4. The chlorine solution shall remain in the well for a minimum of 12 hours.
- E. The pump should be disinfected as it is installed in the well.

3.05 WELL PERFORMANCE TESTING

- A. Wells shall be test pumped as described in the section: Well Performance Testing.

3.06 WELL ABANDONMENT

- A. Wells, test wells, and temporary wells to be abandoned either temporarily or permanently shall be sealed with material and procedures required by governing authority.
- B. A report shall be made to the governing authority for every well which has been abandoned or temporarily removed from service and include:
 - 1. Detailed description of location, construction, and geologic features.
 - 2. Method of sealing.

3.07 SAFETY AND RELATED MATTERS

- A. Comply with all federal, state, and local rules and regulations concerning:
 - 1. Construction safety.
 - 2. Noise control.
 - 3. Dust and smoke control.
- B. Access to Public Services
 - 1. Insure free access to all fire hydrants, valve boxes, manholes, curb stops, fire alarms, police call boxes.
- C. Protection of Work, Public and Property
 - 1. Provide safe passage for local traffic, pedestrian and vehicular.
 - 2. Provide access to properties abutting street where well is being constructed.
 - 3. Provide all necessary barricades, warning lights, and signs, signals, flagmen, etc. in accordance with federal, state, and local regulations.
 - 4. Obtain and comply with required permits.
 - 5. Machinery, equipment, and hazards shall be guarded in accordance with federal, state or local regulations.
 - 6. Excavations and trenching shall be made in accordance with safety practices formulated and enforced by federal, state, and local regulations.
 - 7. Notify police or sheriff's department and fire department before blocking off street, highway, alley or public thoroughfare.

3.08 EXISTING UTILITIES AND STRUCTURES

- A. When existing utilities and structures are indicated on drawing, it should not be assumed that all existing utilities and structures are shown.
 - 1. The location of existing utilities and structures when given are plotted on the drawings for information to the Contractor, but is not to be construed as a representation of the actual location.
 - 2. Contractor shall be responsible for injuries and damage to any structures, facilities, utilities, and public or private property resulting from construction and testing of wells.

3.09 NOTICE FOR STAKING

- A. Notify Engineer at least two days in advance of the time when staking will be required.

3.10 CLEANING OF PROJECT SITE

- A. Work Site
 - 1. Keep the site of the work including all private or public property involved in or adjacent to the work, free from any rubbish, surplus or waste materials deposited or which have accumulated as a result of the work.

2. Remove all materials, tools, and equipment leaving the site of the work clean, unobstructed and ready for use.

- END OF SECTION -

SECTION 02733

SCREENED WELL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work under this section covers construction of screened wells in unconsolidated formations.

1.02 QUALITY ASSURANCE

- A. Contractor shall be responsible for selection of screen opening size and screen strength.
 - 1. Samples of formation for sizing shall be obtained during drilling.
 - 2. Provide Owner's representative with screen data prior to installation.

PART 2 - PRODUCT

2.01 SCREENS

- A. Screen material and fittings shall be type 304 stainless steel, unless otherwise specified.
- B. Screen to be welded construction and stainless steel welded.
- C. Bottom plate and fittings to be of same material as screen.
- D. Telescopic size screens shall be attached to casing with Johnson Division, or equal, Fig. K packer.
- E. Openings shall be slots which are continuous around circumference of screen and widen inwardly.
- F. Slots shall have close spacings to provide maximum percent of open area.
- G. Entrance velocity of water shall not exceed 0.1 feet per second and head loss shall be minimal.
- H. Screens to be Johnson Division, UOP, or equal.

PART 3 - EXECUTION

3.01 WELL CONSTRUCTION

- A. Outer Casing (if used)
 - 1. Install to depth as shown and extend minimum of one foot above existing ground.
 - 2. Casing which is driven shall be equipped with drive shoe.

3. Outer casing shall be withdrawn a minimum of five feet during grouting.

B. Inner (Protective) Casing

1. Install to depth as shown and extend a minimum of one foot above existing ground.
2. Casing shall have minimum thickness as specified in section: General Provisions for Well Construction.
3. Casing shall be equipped with drive shoe if driven.

C. Screen

1. Casing and screen shall be plumb.
2. Screen shall be fitted and installed on inner casing.
 - a. Actual screen length will be determined after formation samples have been analyzed.

D. Grout Placement

1. Install impervious seal at bottom of annular opening as shown.
2. Maintain grout at least 10 feet above bottom of casing, if used, to prevent native formation from slumping into grout while withdrawing outer casing.

3.02 WELL DEVELOPMENT AND TEST PUMPING

- A. Start development of well only after grout has properly set.
 1. Continue development until water from well is free of sand.
 2. Well will not be considered fully developed until sand free.
- B. Test pump for eight hours at a minimum rate of 10 gallons per minute.

- END OF SECTION -