SITE CONDITIONS REPORT
Former Barksdale Works
Washburn, Wisconsin

December 15, 1997 **DERS Project No. 7191**

Prepared by

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CONTENTS

CONTENTS
(Continued)

FIGURES

TABLES

CONTENTS
(Continued)

APPENDIXES

EXECUTIVE SUMMARY

The former Barksdale Works was used for manufacturing explosives from 1904 to 1971. Operations ceased more than 25 years ago. Since that time, the property has undergone decommissioning activities using standard protocol typical of a former explosives operation. Decommissioning activities conducted from 1971 through 1984 were extensive and included the evaluation, location, and detonation of all pertinent explosives manufacturing and process waste system areas. After decommissioning, the site was sold to Bretting Manufacturing Co., Inc. in 1986 and has been used for game hunting and minor storage since that time.

Recent sampling (June 1997) of five wells by the Wisconsin Department of Natural Resources (WDNR) within the former Barksdale Works boundaries revealed low levels of two dinitrotoluene (DNT) isomers in the well serving the Bretting residence. DuPont was notified of this event and responded immediately. DuPont met with the WDNR representatives and Bretting Manufacturing and proposed to address the issue. This proposal included

- ❑ Evaluating and installing appropriate treatment for the Bretting well.
- ❑ Together with the WDNR, developing and implementing a sampling plan for the Bretting well and wells to the north and south of the Bretting well for a comprehensive list of analytes.
- ❑ Conducting records retrieval and review, as well as interviewing former employees to document site decommissioning activities.
- ❑ Using existing well logs and published data to develop an understanding of the geological and hydrogeological nature of the area.
- ❑ Evaluating the results of the actions listed above and making the appropriate recommendations for the continued protection of human health and the environment.

The recent sampling event confirmed the presence of low levels (less than 2 parts per billion) of two DNT isomers in the Bretting well. Explosives and volatiles were not detected in the wells sampled immediately to the north and south of the Bretting well.

The presence of DNT in the Bretting well only suggests either the presence of some anomolous condition or a more discrete source to the Bretting well. The results of the site activity and decommissioning investigations revealed the presence of an abandoned 10-inch water pipe leading directly from the former site operating areas to the present Bretting residence.

Based on a review of site operating activities, site decommissioning activities, interviews with former employees, aerial photograph and process diagram review, and past and recent groundwater sampling results, DuPont concludes that a more specific source is the most probable explanation for the constituent levels found in the Bretting well. DuPont believes that addressing this possible source, along with a routine monitoring program of existing wells, sufficiently addresses the release event pursuant to the Hazardous Substances Spills Law.

To continue to ensure the protection of human health and the environment, DuPont proposes to

- Continue carbon treatment on the Bretting well.
- Routinely monitor residential wells to the north and south of the Bretting well.
- Close the unused wells in disrepair immediately north of the Bretting well.
- Continue routine monitoring of the Bretting well.
- Close the 10-inch water pipeline with cement grout.

1.0 INTRODUCTION AND SITE BACKGROUND

1.1 Introduction

The former Barksdale Works, consisting of 1,800 acres, is located in Bayfield County, south of Washburn, Wisconsin, on Lake Superior (see Figure 1). DuPont operated the plant from 1904 to 1971, producing primarily explosives. The site is located on Chequamegon Bay, Lake Superior. The site produced mainly trinitrotoluene (TNT) and dynamite to support major war efforts and the local mining industry.

DuPont ceased operations at Barksdale Works in 1971, and most existing buildings were dismantled or demolished within the decade. The Barksdale property was sold in 1986 to Bretting Manufacturing of Ashland, Wisconsin. The main manufacturing area is currently being used as a private game preserve and for minor storage. The Bretting residence and several other residences are located east of the former main manufacturing area, between Route 13 and the Lake Superior shoreline (see Figure 2).

Groundwater samples collected by the WDNR in June 1997 from a drinking water well located within the property boundary of the former Barksdale Works at the Bretting residence (CX533) showed detectable levels of 2,4-DNT and 2,6-DNT. Additional investigation was deemed appropriate by the WDNR and DuPont. Groundwater sampling was conducted in the fourth quarter of 1997 to confirm the results obtained from the Bretting well sample and determine if other wells had been adversely impacted.

1.2 Objectives

The objectives of this Site Conditions Report are as follows:

- Gather and summarize all available data pertaining to closure activities of the site.
- Summarize all published and site-specific data that describes subsurface and hydrogeologic conditions.
- Evaluate data to assess the potential source(s) of the constituents found in CX533 (Bretting residence well).
- Provide recommendations for additional work or activities.

1.3 Site Location

The former Barksdale Works is located in northeastern Bayfield County, Wisconsin, along the southwestern shore of Chequamegon Bay between the towns of Ashland and Washburn (see Figure 1). Route 13 crosses the former site on the eastern side. The property is bordered by roads along its north and west sides. The southern boundary is marked by the fence surrounding the former site. Lake Superior borders the property to the east. Boyd Creek meanders across the property from roughly west to east, terminating in Chequamegon Bay. Route 13 runs northeast across the eastern portion of the site.

Approximately three miles north of the former Barksdale Works is the town of Washburn. The town of Ashland (Ashland County Seat) is located approximately four miles to the southeast.

1.4 Current and Surrounding Land Use

Currently, the former Barksdale Works is being utilized as a game preserve and pasture by the owners, Bretting Manufacturing of Ashland, Wisconsin. Cows graze on a portion of the central part of the site where manufacturing areas were once located. Bretting Manufacturing also maintains several warehouses.

Along the eastern edge of the site between Route 13 and the shore of Chequamegon Bay, several residences exist, including the eight houses of Barksdale Village to the north, the Tad Bretting residence, and about nine residences to the south (see Figure 2). An area north of the Ted Bretting residence has been leased to the Boy Scouts for intermittent summer use. Residences are also scattered along the roads that border the site to the north, west, and south. Ondassagon School is located approximately one-half mile south of the southwestern corner of the former site.

A zoning ordinance was passed by Bayfield County in approximately 1976. The majority of the former Barksdale Works is zoned Forestry-1 (forest programs and compatible recreational development). Agricultural-1 (general agricultural and minor nonfarm residences, with no commercial and industrial enterprises) zoning is limited to small areas near the southern portion of the site. The property area between Route 13 and the shore of Chequamegon Bay is zoned Residential-1 (permanent residential development). A portion of the former Barksdale Works, approximately 196 acres, carries a deed restriction. The restricted area roughly corresponds to the former acid production area and the former TNT manufacturing area. The deed restriction limits use in this area to hunting, stocking small game, or planting of groundcover. Agricultural, livestock breeding, playground, sporting, recreational, or public park use is prohibited.

The lands surrounding the former Barksdale Works are predominantly zoned Agricultural-1. Minor areas are zoned Forestry-1. Air photos from 1938, 1953, 1963, 1975, 1978, and 1990 are consistent with these land uses. Cleared areas were and continue to be used for agricultural purposes.

1.5 Meteorology, Surface Water Hydrology, Topography, and Drainage

1.5.1 Meteorology

Bayfield County contains 1,476 square miles of land, 83 percent of which is forest land. The Lake Superior region averages 31 inches of precipitation a year with 20 to 35 percent of the precipitation in the form of snowfall. Bayfield County averages 27 inches of rainfall per year and 53 inches of snowfall per year. The average range in temperatures for spring, summer, fall, and winter are 39° to 45°F, 65° to 71°F, 42° to 47°F, and 18° to 23°F, respectively. In general, wind direction in the Ashland area is from the southwest during the spring and fall, from the northeast in the winter, and variable the during the rest of the year.

1.5.2 Surface Water Hydrology

Surface waters drain toward Lake Superior. Regionally, annual average surface-water discharge to Lake Superior is approximately 640 billion gallons (Young and Skinner 1974). For the portion of Wisconsin that contacts Lake Superior, most of the surface water discharge comes from rivers in Ashland County. This discharge averages approximately 1,000 cubic feet/second (cfs), equaling about 42 percent of the discharge from Wisconsin into Lake Superior (Young and Skinner 1974). The Whittlesey and Fish Creeks, located approximately one mile south of the site, discharge 60 and 100 cfs, respectively, to Lake Superior. Boyd Creek was not shown on the discharge maps by Young and Skinner (1974) indicating that its discharge averages less than 25 cfs.

Water from Lake Superior is utilized as a water supply for municipal, industrial, rural, domestic and stock supplies (Young and Skinner 1974). It is also used for recreational purposes and is suitable for fish and wildlife habitat.

Surface water quality in the Lake Superior region is generally good with the exception of high sediment yields (Young and Skinner 1974). Dissolved solids content varies inversely with stream discharge and is lowest during high stream flow. In general, dissolved solids in streams range from 91 to 240 milligrams/liter (mg/l) in areas adjacent to the lake and from 0 to 90 mg/l inland. In the area of the former Barksdale Works, dissolved solids in streams are estimated to range from 91 to 240 mg/l.

1.5.3 Topography and Drainage

Topography in the region is shaped by the stream profiles, which are a function of the conformance of drainage to the postglacial land surface (Young and Skinner 1974). The stream gradients are erratic and change abruptly. Gradients in flat areas, as low as 0.2 to 1.8 feet/mile, can be observed on glacially formed plains. On bedrock escarpments, gradients can reach 30 to 60 feet/mile. The topography is fairly rugged to the north and west of the former Barksdale Works. However, approximately one mile south, the terrain levels out into a wide, flat, marshy, wetlands area where the Whittlesey and Fish Creeks drain into Chequamegon Bay (see Figure 1).

The surface elevation on-site varies from 793 feet mean sea level (MSL) in the northwestern corner of the property to 602 feet MSL at the Lake Superior shoreline. The site is drained by a number of creeks. Boyd Creek is the main stream that bisects the site into northern and southern sections. Intermittent streams are located in both the northern and southern sections and flow is a function of precipitation amounts. Boyd Creek is approximately 1.7 miles in length and flows from the western boundary to the

Chequamegon Bay of Lake Superior. The elevation of the Boyd Creek streambed decreases from approximately 740 feet along the western boundary to about 602 feet where it enters Chequamegon Bay (an approximate stream gradient of 80 feet/mile). Surface water drainage recharges Boyd Creek. Available water quality data for Boyd Creek is provided in Appendix A.

2.0 GEOLOGY AND HYDROGEOLOGY

2.1 Regional Geological Setting

The former Barksdale Works is located in the Southern Province of the Canadian Shield. There are two main geological units of interest in the area of the former Barksdale Works, Pleistocene-aged glacial sediments of the Miller Creek Formation and the underlying Chequamegon sandstone, a Precambrian-aged rock. A generalized stratigraphic column is presented in Figure 3.

2.1.1 Precambrian Rock—Chequamegon Sandstone

Lake Superior fills a topographic depression approximately 570 kilometers (km) long and 250 km wide with a maximum depth of 390 meters (Davidson 1982). This basin is composed of volcanic, intrusive, and sedimentary rocks of the late Precambrian age. The Precambrian rocks unconformably overlie older Precambrian rocks.

The Lake Superior Basin is believed to have formed as a result of geologic activity during the Precambrian age along a major continental rift zone. Formation of the basin began with the extrusion of lava in sub-basins. Continued subsidence and coalescence of these sub-basins followed to complete the overall shape of the Lake Superior basin (Davidson 1982).

The volcanics, intrusives, and interflow sedimentary units of Keweenawen age, which formed during the basin's development, outcrop extensively in the Lake Superior region. The rocks of the late Keweenawen Supergroup can be subdivided, with decreasing age, into the interflow sedimentary rocks, the Oronto Group and the Bayfield Group. The latest member of the Bayfield Group is the Chequamegon sandstone, which underlies the former Barksdale Works. The Chequamegon sandstone is locally known as the Lake Superior sandstone.

The Bayfield Group is thought to be over 4,100 feet thick (1,250 meters) in Wisconsin (Ojakangas and Morey 1982). Evidence from paleocurrents indicates a dominant direction of transport of sediments towards the center of the basin (northeast of the site in west central Lake Superior) compatible with fluvial deposition. In addition, other aspects such as fining upward sequences and argillaceous units indicate deposition by meandering streams (Ojakangas and Morey 1982). Compositionally, the Bayfield Group consists primarily of quartz and feldspar. The Chequamegon sandstones consist of predominantly red feldspathic to arkosic sandstone and siltstone with locally abundant intercalated layers of shale and conglomerate. The conglomerate clasts are predominantly quartz and quartzite (Thwaites 1912). The estimated thickness of the Chequamegon sandstone in the area of the former Barksdale Works is 500 feet based on outcrop data (Ojakangas and Morey 1982). Locally, the Chequamegon sandstone is the main drinking water aquifer.

Three logs for deep wells located on the Barksdale property have been obtained. Two of these logs are for wells installed by Atlantic Manufacturing. Logs from these wells (Well Nos. 3 and 5) were found in DuPont archives. The other well log from 1906 was obtained by the Wisconsin Geological and Natural History Survey (WGNHS) and was also presented in Thwaites (1912). These three well logs give the most detailed information of the specific geology of the Chequamegon sandstone under the former Barksdale Works and are provided in Appendix B. These logs show the Chequamegon sandstone to be variable, describing color changes from red to white within the sandstone and correspond to the Washburn beds described by Thwaites (1912). A 22-foot thick layer of shale in one log was not observed in another well located approximately 500 feet away. Thwaites (1912) noted that small lenticular beds of shale, usually 5 feet or less in thickness, are commonly found in the Chequamegon sandstone. The 1906 well log does not correlate well with the other two logs, which may indicate a high degree of variability over short distances.

Other details of the specific geology in the vicinity of the site is limited due to the lack of detailed description provided on the well construction records available. Most of the logs available merely describe the sandstone as "sandstone," "brownstone," or "water sand." Cross sections were developed and present the general site geology based on available data (see Section 2.3).

2.1.2 Pleistocene Sediments—Miller Creek Formation

The Pleistocene deposits of the Superior region of Wisconsin include the Copper Falls Formation, the Miller Creek Formation, and postglacial sediments. The area of the former Barksdale Works lies in the Superior lowland region. The Pleistocene sediments in this area are of the Miller Creek Formation, which consists primarily of clayey silty till.

The most recent Pleistocene glaciation began approximately 20,000 years ago. The Miller Creek Formation is a clayey till that was deposited by supraglacial flow and in glacial lake Post-Duluth as the ice margin retreated northward into the Superior basin. The Miller Creek Formation can be further divided into the Hanson Creek Member and the Douglas Creek Member. The Douglas Creek Member overlies the Hanson Creek Member.

The Hanson Creek Member is described as unlaminated till, and usually contains between 45 and 75 percent clay, 20 and 45 percent silt, 3 and 20 percent sand and a few percent or less of pebbles, cobbles, and boulders. The color is commonly a dull reddish-brown to dark reddish-brown. The Hanson Creek Member is calcareous with the silt and clay fractions containing approximately 10 percent carbonates (Clayton 1984).

The till of the Douglas Member is similar to the Hanson Creek Member but tends to contain more clay. The Douglas till typically contains between 45 and 85 percent clay; 10 and 40 percent silt; 3 and 20 percent sand; and a few percent or less of pebbles, cobbles, and boulders. The surficial till may have been modified further by lake wave action or may have flowed somewhat in its water-logged state.

It is reported the glacial till reaches a thickness of greater than 400 feet in the central portion of Bayfield County (Young and Skinner 1974). according to Clayton (1984), the thickness of the Pleistocene sediments in the area surrounding the former Barksdale Works ranges from approximately 197 feet in the northwest to nonexistent in some locations along the shoreline of Chequamegon Bay. This seems to be in general agreement with the logs available for the area. A log for a well located west of the northwest corner of the former Barksdale Works indicates an overburden or till thickness of 169 feet. Near the Chequamegon Bay, the glacial sediments thin to approximately 5 feet.

Most of the well construction records from the local area describe the Pleistocene sediments overlying the Chequamegon sandstone as "clay," "red clay," or "sandy clay." Based on site knowledge, much of the surface soils consist of clay or silt. The base of the glacial unit often contains pebble or cobbles. Section 2.3 contains more discussion of site-specific stratigraphy.

2.2 Hydrogeology

The ultimate discharge area for groundwater in the Lake Superior region is Lake Superior, and the average discharge rate to the lake from the Wisconsin shoreline is about 100 cfs (Young and Skinner 1974). The main recharge area for the Chequamegon sandstone is located in the central portion of the Bayfield Peninsula (Young and Skinner 1974). The permeability of this high recharge area is 5 to 10 inches/hour under a 0.5-inch head. In the Barksdale area, recharge to the Pleistocene glacial till is much lower (permeabilities of 0.2 to 0.8 inches/hour under a 0.5-inch head).

In general, the depth to the water table increases inland as distance from Lake Superior increases. However, in much of the region, the water table is less than 50 feet below ground surface (BGS). Local artesian wells flow mainly due to the thick confining layer of clay limiting vertical groundwater movement.

In the area near the former Barksdale Works, groundwater flow in the Chequamegon sandstone is toward Chequamegon Bay from the northwest toward the southeast. Based on static water level readings taken during well installations, an approximate hydraulic gradient of 0.013 to 0.015 feet/feet is estimated in the area of the former Barksdale Works. This is somewhat higher than the published gradient of 0.012 feet/feet (Young and Skinner 1974).

The United States Geological Survey (USGS) is currently working on a aquifer testing project for the Bad River Indian Reservation (located approximately 20 miles east of the former Barksdale Works) and the Red Cliff Indian Reservation (located approximately 20 miles north of the former Barksdale Works; Krohelski 1997). While this study is still in the preliminary stages, a regional groundwater flow model has been developed and calibrated. The area modeled for this study encompasses approximately all of Bayfield and Ashland counties. The modeled hydraulic conductivity for the Chequamegon sandstone is estimated at about 20 feet/day or 150 gallons per day/square foot (gpd/ft^2; Krohelski 1997). Field verification is scheduled to begin in the spring 1998.

In general, specific capacities for wells in the sandstone are small, and large yields are uncommon. Wells must penetrate a thicker section of sandstone than glacial sand and gravel because the sandstone is much less permeable. High-capacity wells range in depth from 103 to 1,100 feet BGS (averaging 225 feet) and have specific capacities of 1 to 3 gpm per foot drawdown (Young and Skinner 1974). In the area of the former Barksdale Works, sandstone aquifers are estimated to yield between 150 and 200 gpm (Young and Skinner 1974). Pump tests were conducted on Wells Nos. 3 and 5 in December 1903 and November 1904.. Delivery with air lift and both wells pumping was 225 gallons. When the wells were pumped separately, delivery was 200 gallons for Well No. 3 and 100 gallons for Well No. 5. Pumping times and rates were not noted.

For the wells in the immediate vicinity of the former Barksdale Works, hydraulic conductivities have been estimated using yield test data. The estimation method and results are presented in Appendix C.

Using data from 63 of the records, the calculated hydraulic conductivity ranged from 0.5 to 670 feet/day, with 16.5 feet/day being the log average. The values calculated from the well logs and the model-estimated value are all within the range given in Freeze and Cherry (1979) for clean to silty sands. The USGS' modeled estimate of 20 feet/day and the log average estimate from the local well records of 16.5 feet/day agree closely. The small difference may reflect variations in the nature of the sandstone. Wells located within the former Barksdale property boundary show even lower estimated hydraulic conductivities with a range of 4.8 to 10.3 feet/day and an average of about 7 feet/day.

2.3 Local Hydrogeology

Several statigraphic lines were constructed using well logs, topographic information, and local geological data. A summary of wells included in the cross sections is provided in Table 1. The locations of these sections are shown on Figure 4. Figures 5, 6, 7, 8, and 9 present the cross sections.

Cross section A-A' runs from a well off-site near the northwest corner of the former Barksdale Works to Chequamegon Bay near the Bretting well (see Figure 5). In this cross section, the Miller Creek Formation thins toward Chequamegon Bay from approximately 170 to 30 feet. The glacial till sediments of the Miller Creek Formation are capped by a clay layer, which persists across the area.. The peizometric surface is also indicated on the cross section. Based on static water levels recorded on driller's logs, the Chequamegon sandstone appears to be confined in the western and central areas of the site and is unconfined in the eastern portion of the site (west of Route 13), where the peizometric surface dips below the base of the Pleistocene till.

Cross section B-B' runs from an off site well to the west of the site to Chequamegon Bay near the Bretting well (see Figure 6). This figure shows an interpretation of the thinning of the Pleistocene Miller Creek Formation in the vicinity of Boyd Creek where the Chequamegon sandstone may be exposed (approximately 500 feet west of Route 13). The hydraulic relationship between groundwater and Boyd Creek is uncertain.

Cross section C-C' trends generally west to east (see Figure 7) and intersects Boyd Creek in the western portion of the site. This cross section shows the stream bed of Boyd Creek to lie in the glacial till is well above the peizometric surface. Cross sections A-A', B-B', and C-C' show the direction of groundwater flow toward Chequamegon Bay.

Cross section D-D' runs from the southwest to the northeast and intersects Boyd Creek (where the Chequamegon Sandstone may be exposed) and another intermittent stream (see Figure 8). Cross section E-E' runs parallel to the Chequamegon shoreline (see Figure 9). The Pleistocene till, expressed as a clay layer only, is considerably thinner (about 5 to 30 feet thick) than in the upgradient western areas of the site. The aquifer appears to be unconfined near the bayshore north of the Bretting well.

2.4 Local Groundwater Flow and Estimated Velocities

Groundwater flow is toward Chequamegon Bay in a direction roughly perpendicular to the shoreline. Site-specific information that precisely describes aquifer properties is not available. However, ranges of groundwater velocities are given below using published data and limited site-specific data.

The velocity of the groundwater can be estimated by the equation

$$V = KI$$

where:

V is the velocity
K is the horizontal hydraulic conductivity
I is the hydraulic gradient

The modeled USGS hydraulic conductivity gives the highest estimate available, which is 20 feet/day. The highest hydraulic gradient was obtained using static water elevations on-site from drillers' logs, and is estimated to be 0.015 feet/feet. Substituting these maximum values, a maximum groundwater velocity is estimated as follows:

$$V = KI$$

$$V = \left(\frac{20ft}{day}\right)\left(\frac{0.015ft}{ft}\right)$$

$$V = \frac{0.3ft}{day} \text{ or } 109.5 \text{ feet / year}$$

Low-end hydraulic conductivites and hydraulic gradients for the Chequamegon sandstone have also been estimated. Hydraulic conductivity based on yield tests for on-site wells averages less than 7 feet/day (see Appendix C for hydraulic conductivity calculations). Regional hydraulic gradients are estimated to be 0.012 foot/foot.

$$V = KI$$

$$V = \left(\frac{7ft}{day}\right)\left(\frac{0.012ft}{ft}\right)$$

$$V = \frac{0.084ft}{day} \text{ or } 30.7 \text{ feet / year}$$

2.5 Local Water Supply and Well Search

2.5.1 Local Water Supply Sources

In the Lake Superior region, water needs are met primarily through the use of surface waters. Only 6 percent of the needs are met using groundwater (Young and Skinner 1974). Regional groundwater resources include glacial sand and gravel, sandstone (Precambrian), and lava flow aquifers (Young and Skinner 1974).

Precambrian sandstone aquifers yield sufficient quantities of water to meet drinking water needs. In the area of the former Barksdale Works (and around the edge of the Bayfield Pennisula), drinking water is supplied mainly by wells completed in the Precambrian sandstone. Locally, these wells can be artesian, as is observed in one of the wells located at the former Barksdale Works and in several wells south of the site near Chequamegon Bay.

2.5.2 Well Search Results

A well search through the WGNHS indicated that there were 62 wells recorded in the area surrounding the former Barksdale Works. All wells are reported as being water production wells. Figure D-1 in Appendix D shows the distribution of these wells surrounding the site. Well constructions reports (see Appendix B) show that there were 13 wells installed within the property boundaries of the former Barksdale Works. Well construction records maintained at the WGNHS and wells known to exist on the site do not consistently correspond. Included in Appendix D is a discussion of this well search and some of these discrepancies.

2.6 Site Geology/Hydrogeology Key Findings

Groundwater is encountered at approximately 80 feet BGS in the western portion of the site. At the eastern boundary of the site, groundwater is encountered only a few feet BGS. Some wells may actually be flowing wells.

The main aquifer in the area is the Precambrian Chequamegon sandstone, a red arkosic sandstone, and is estimated to be 500 feet thick in the Barksdale area. Overlying the Precambrian sandstone is Pleistocene glacial till. The till thickness varies from approximately 170 feet near the western boundary of the site to five feet in places along the bayshore. The till is clayey and silty material with occasional sand and pebbles. The top portion of the till is a red clay which persists over most of the site and along the shore. This clay may represent deposits from glacial lake Post-Duluth.

Groundwater from the Chequamegon sandstone discharges to Lake Superior. Estimated hydraulic conductivities based on regional modeling and estimates calculated for this report range from approximately 15 to 20 feet/day, which is average for a silty to clean sand. Evaluation of yield tests for wells within the former Barksdale Works boundary suggest a lower hydraulic conductivity of about 7 feet/day. The hydraulic gradient is estimated to be between 0.012 feet/feet (published) and 0.015 feet/feet (calculated for this report). Correspondingly, the estimated groundwater velocity on the site is within the range of 30.7 to 109.5 feet/year.

The permeability of the surficial glacial till unit is very low, and, according to published information, the probable main recharge for the aquifer is located in the central portion of the Bayfield Peninsula, west of the site.

In the western portion of the site, the peizometric surface lies within the Pleistocene glacial till, suggesting confined aquifer conditions for the Chequamegon sandstone. The Boyd Creek streambed is approximately 25 feet above the peizometric surface.

In the eastern portion of the site, the peizometric surface is closer to ground surface. To the south, some wells are artesian. The wells north of the Bretting well along the bayshore suggest unconfined Chequamegon aquifer conditions.

3.0 HISTORICAL OPERATIONS

Manufacturing activities at the Barksdale Works began in 1905. During the operating years of the plant, production rates were cyclic and closely tied to the war effort. The primary products were dynamite and TNT. During World War I, 130 million pounds of TNT was produced between 1913 and 1918. Although production was scaled down substantially after the war and again during the depression it was increased during World War II, with an estimated 226 million pounds of TNT produced for the war effort. Once the war ended, the production of explosives at Barksdale Works was decreased, once again, primarily to meet regional mining and farming needs. Also, various grades of sulfuric and nitric acids were produced and consumed onsite in the manufacture of TNT and nitroglycerin (NG; the explosive ingredient in dynamite).

Based on available records, the maximum number of TNT production lines (10 in all) were constructed to support World War I. In addition, five TNX production lines were constructed to support the effort. At the end of World War I, all of the TNX and all but two of the TNT production lines were demolished and burned to the ground. These production lines were not reconstructed during the World War II production effort.

A large volume of water is required for manufacturing and purifying of explosives. During the initial production years, water was supplied by production wells. In the latter 1910s, a water line was constructed (over one mile in length) that ran from Lake Superior to the water tower (which still stands) in the former acid production area. The main water line, a 10-inch diameter cast iron pipe, is approximately 7 to 10 feet BGS and passes through the current Bretting residence property close to well CX533.

During World War II, NG and dynamite production continued. A second TNT line began producing in 1941. Because of more efficient production methods, only two TNT lines were necessary to support the World War II effort. After World War II, TNT production dwindled. NG and dynamite production continued. In 1946, a flood within the Boyd Creek floodplain washed out a portion of the dynamite line on the south side of the creek. This line was not rebuilt.

Other products associated with the explosives industry were produced at the Barksdale Works, including trinitroxylene (TNX), trivelene, nitramon, soda amatol, nitramon, and nitramex. In addition, the Barksdale Works reprocessed excess smokeless powder (i.e., nitrocellulose) from the United States military after World War I. DuPont ceased all manufacturing at the Bardsdale works in 1971.

Appendix E shows a site plan from 1918 (map of Barksdale Works, Figure B No 35). Based on available production history, this figure reveals the maximum areal extent of TNT production at the former Barksdale Works. Details of the production for the different products and raw materials manufactured at the former Barksdale Works, as well as a production history, are included in Appendix F. Appendix F is based on interviews with former DuPont employees (see Appendix G) and information obtained from DuPont archives (see Appendix H). Figure 10 shows the main manufacturing areas on a site plan.

4.0 SITE DECOMMISSIONING ACTIVITIES

4.1 World War I Decommissioning

Demand for TNT for munitions was high during World War I. At the end of World War I, the demand for TNT production virtually disappeared. As a result, most of the World War I TNT production facilities at Barksdale Works were dismantled immediately after the war. The powder buildings were burned. There is no written information addressing spills, releases, or remediation activities. 1951, the remnants of the World War I expansion were burned, including the old nitric acid (HNO_3) recovery area and the remaining TNT buildings.

4.2 Final Plant Shutdown and Post-shutdown Decontamination

In 1971, all explosives manufacturing at Barksdale Works ceased. Between 1971 and 1984, the plant was demolished and soils suspected of containing explosives were burned in the decontamination burning area (see Figure 10) near the TNT manufacturing area. Available records of plant decommissioning and decontamination are provided in Appendix I.

The powder buildings were razed by burning them to the ground. The remaining buildings were demolished. Burned building debris was buried in 25 foot deep pits in the area of the decontamination burning ground (see Figure 10).

The ditches that flowed from the TNT and powder production facilities were "shot" in an attempt to sympathetically detonate any residual explosive materials in these areas. Soil samples were collected and tested to evaluate explosivity. Explosives-contaminated material uncovered after the plant was shut down was burned in the decontamination burning ground located in the TNT area. This burning ground, approximately 4 acres in area, was located north of the area where reeds had been planted to absorb red water discharge (see Figure 10). After decontamination activities were completed, the decontamination burn area was capped with clay, graded, and seeded.

A summary of the decontamination activities that occurred at the Barksdale Works is provided below based on the information contained in various DuPont memos addressing the site decontamination. These memos are provided in Appendix I.

- 1977
  - Approximately 200 building foundations were staked out and auger cored.
  - TNT on the ground surface was collected and burned in the decontamination open burning ground (see Figure 10).
  - Wooden NG and dynamite equipment was burned.
- 1978
  - Location of catch boxes were marked, and catch boxes were excavated and their contents burned.
  - Soil around catch boxes were soaked with oil and burned.
  - NG ditches and drains were shot with water gel.
  - World War I TNT ravine was examined, and material was collected and burned. This ravine is probably the Boyd Creek ravine near the western border of the TNT area (see Figure 10).
- 1979
  - World War I TNT ravine was examined further, and material from suspicious areas was excavated and burned.
  - One catch box from the World War I plant was excavated.
- 1980
  - Contractor barricades and other noncontaminated construction debris were removed.
- 1981
  - The empty barrel dump was cleaned up. The drums were cleaned, crushed, and landfilled on the site (see Figure 10 for drum landfill locations) east of the barrel dump.
  - Acid area culvert and ditch contaminated soils were excavated. The remaining soil was neutralized with sodium carbonate and seeded with grass.

- HNO_3 production area was neutralized with sodium carbonate and seeded with grass.
- Old TNT area was examined, and additional catch box material was removed.

❑ 1982

- Three soil samples were collected in the TNX area. Samples were composited and sent for analysis. Results indicated no detectable constituents of concern.
- Metal caps were sealed onto the casings of the main gate and powerhouse wells.
- Catch box removal continued, and contents were burned.
- Barrel dump cleanup continued. Barrels were crushed and landfilled on-site.
- Old TNT manufacturing area was stripped to virgin soil along the ditch. A large catch box was excavated, and the material was removed and burned. Soil removed from this area was spread out in several 6-inch layers, and catch box waste was manually removed from the soil. This material was burned. Approximately 400 cubic yards of soil were managed in this way. A 1 foot thick clay cap was placed on top of these layers.
- A second catch box was located but not excavated.
- The surface of the old acid area was examined for bare spots. Bare spot areas were excavated and burned (resin coated prills had been dumped in this area and had not dissolved).
- Asbestos was bagged and taken to a local landfill.
- Two buildings in the TNX area were excavated to audit cleanliness.
- TNX area was examined and TNX-triton drainage collection system was excavated.

❑ 1983

- World War I TNT area excavation was completed. All drains, catch boxes, and foundations were unearthed and material was burned.
- Chloride refine, lydol, and trivelene areas were excavated. Excavated dirt was spread in 6-inch layers to examine and remove contaminated material. A clay cap was placed over the entire examination area.
- Old OV dump areas were reexamined for cleanliness.
- Many surface drainage ditches in the TNX and TNT areas were regraded to avoid stagnant water pools.

- Five small transformers were disposed of as polychlorinated biphenyl (PCB) equipment at a landfill in Emille, Alabama.

4.3 Site Inspections and Results

During decommissioning activities and after 1986 when the property was sold, a number of site inspections were conducted and environmental samples were collected. A summary of these events and results are provided in Appendix A.

5.0 SITE EVALUATION

5.1 Hydrogeology and Groundwater Quality

Groundwater flow is generally from northwest to southeast toward Chequamegon Bay in the Chequamegon aquifer. The former manufacturing areas are situated upgradient of the current residences, which are located near the bayshore of the former Barksdale Works.

Overlying the Chequamegon sandstone is a clayey low permeability glacial till. The upper portion of the till is a persistent red clay that is areally extensive (Clayton 1984). The glacial till thins from approximately 170 feet at the western border of the property to approximately 5 feet near the bayshore. Beneath the former manufacturing areas, the till is approximately 100 feet thick.

Currently, there are two accessible wells located within the former manufacturing area. Several wells are located downgradient, including two residence wells located near the southeastern property boundary, the Bretting residence well, two wells rarely used located approximately 700 feet northeast of the Bretting residence, and several wells that service the Barksdale Village residences located closer to the northeastern property boundary.

As part of the groundwater quality evaluation, the following seven wells were sampled and analyzed: the two wells located in the former manufacturing area (IW882 and IW883), a residential well located near the southeastern boundary (IW711), the Bretting well (CX533), one of the wells located north of the Bretting residence (IW707), and two of the Barksdale Village wells (IW884 and IW902; see Figure 2). Explosives-related constituents were detected only in the Bretting well (CX533).

5.2 Site-related Constituents—2,4-DNT and 2,6-DNT

In June, August, and October 1997, explosive-related constituents (i.e., 2,4-DNT and 2,6-DNT) were detected in groundwater samples from the Bretting residence well (CX533). Both 2,4-DNT and 2,6-DNT were detected at trace levels of 0.12 and

1.9 micrograms/liter (μg/l), respectively. These levels are above the Wisconsin enforcement standard and preventive action limits (PALs). Maximum contaminant levels (MCLs) defined in the Safe Drinking Water Act are based on human health and feasibility of treatment and have not yet been promulgated for these constituents.

Although DuPont's response as presented in this report is triggered by Wisconsin's enforcement standards, DuPont believes that some discussion of DNT's health-based concentrations, and biodegradability is appropriate in gauging the level of risk posed by the DNT levels found. Acceptable health-based concentrations for these two compounds were calculated using federal risk assessment guidelines (EPA 1989) and the assumption of consuming 2 liters of water on a daily basis for 70 years. The concentrations were calculated to be 73 μg/l for 2,4 DNT and 37 μg/l for 2,6-DNT. Although the concentrations of 2,4-DNT and 2,6-DNT exceed the state enforcement standard, the detected concentrations were well below their respective health-based concentration. Based on low K_{OW} values, DNT isomers are not likely to bioaccumulate or biomagnify (EPA, 1986).

The isomers of DNT are solid at room temperature and are moderately soluble in water (e.g., 2,4-DNT, 300 mg/l at 22°C). DNT isomers released in water will primarily remain in the water column and only have a slight tendency to sorb to sediments, suspended material in the water, or biota (log K_{ow} 1.98; EPA 1986). However, chemical binding with humus and clay components of soil may occur, thus reducing the probability of leaching (EPA 1988).

Both photochemical degradation and biodegradation can decrease 2,4 DNT and 2,6 DNT concentrations in all media. Half-lives for degradation by sunlight varies depending on various factors. Reported half-lives range from 12 minutes to several days. Biodegradation rates for DNT and TNT varied widely in the literature, but may potentially occur under both aerobic and anaerobic processes (Kaplan 1991).

NG has been demonstrated to biodegrade by aerobic bacteria and fungi (Werndt, et al. 1978; Spanggord, et al. 1980; Ducrocq, et al. 1989). NG and other nitrate ester compounds are biodegraded through a series of successive de-nitration steps. Therefore, neither NG, TNT or DNT is persistent in the environment, but have a high potential to degrade through various natural processes, including biodegradation and photolysis.

Boyd Creek received site-related constituents from the manufacturing processes. However, because of the high potential for photolysis and degradation, persistence of these constituents is not likely. Investigations conducted in 1974 by the Wisconsin Water Quality Program indicates that Boyd Creek met surface water quality standards. The report noted benthic diversity in the sediments.

5.3 Discussion

A total of seven groundwater wells were sampled between June and October, 1997. No site-related constituents were detected in the two wells located within the former manufacturing area. Five wells in downgradient locations, spanning a distance near the bayshore of over one mile, were sampled. Of these five downgradient wells, only one well, CX533, detected explosives constituents at trace amounts. The closest well to CX533, IW707, is located approximately 700 feet north, and no explosives constituents were detected in the sample from IW707.

Groundwater sampling results suggest that the constituents found in CX533 resulted from a local source. The main water line that runs from the former manufacturing area (water tower) to Lake Superior is located close to CX533. The water line was emplaced below the frostline (about 7 to 10 feet BGS) and is of questionable integrity after more than 80 years. Based on available drillers logs and published data, the glacial till thins to approximately five feet in the areas near the bayshore. There is a possibility that the water line is located within the Chequamegon aquifer near the shore and in the area of well CX533, resulting in a pathway between the water line and the well through groundwater. Thus, the water line may be the source of the constituents found in CX533.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions can be made:

- Information regarding the decommissioning and decontamination of the former Barksdale Works has been gathered and is summarized in this report. Documents and interviews indicate that conventional and accepted protocols were used to remove and destroy explosives-contaminated soil to the extent that no explosive hazard exists on-site.
- Very little site infrastructure remains; however, the 10-inch water main line from Lake Superior to the water tower in the manufacturing area was abandoned but never sealed closed. This pipeline runs close to the Bretting residence well.
- The site is well vegetated, with no active erosion of site soil.
- Boyd Creek, which accepted wastewater from explosives production lines in the past, has recovered well since operation shutdown. According to a biological investigation conducted by the State of Wisconsin as part of the Lake Superior Basin Areawide Water Quality Management Plan, Boyd Creek is meeting fish and aquatic life standards.
- The sampling of several residential wells and two wells located in the former manufacturing area has revealed trace amounts of site-related constituents in one well—the Bretting residence well. Concentrations of 2,4-DNT and 2,6-DNT are less than 2 μg/l, but above the WDNR enforcement level of 0.05 μg/l.
- Although above the enforcement standards, these concentrations do not pose a human health risk based upon accepted EPA Superfund risk assessment guidance. Human health-based drinking water concentrations for 2,4-DNT and 2,6-DNT are 73 and 37 μg/l, respectively.
- Published data indicates that the site-related constituents (i.e., TNT and DNT) readily degrade by photolysis and anaerobic and aerobic biodegradation. These constituents do not bioaccumulate or biomagnify.
- A possible source of the constituents found in CX533 is the 10-inch water main line which runs close to the well.

6.2 Recommendations

The following actions are recommended:

- A treatment system (as specified by the WDNR) has been be installed on the Bretting residential well. Monitoring of the Bretting well should continue to ensure the effective performance of the treatment system.
- Routine monitoring of residential wells (i.e., CX533, IW711, and IW884) will be performed.
- The abandoned water main pipe running from Lake Superior to the water tower in the former manufacturing area will be closed and sealed.

7.0 REFERENCES

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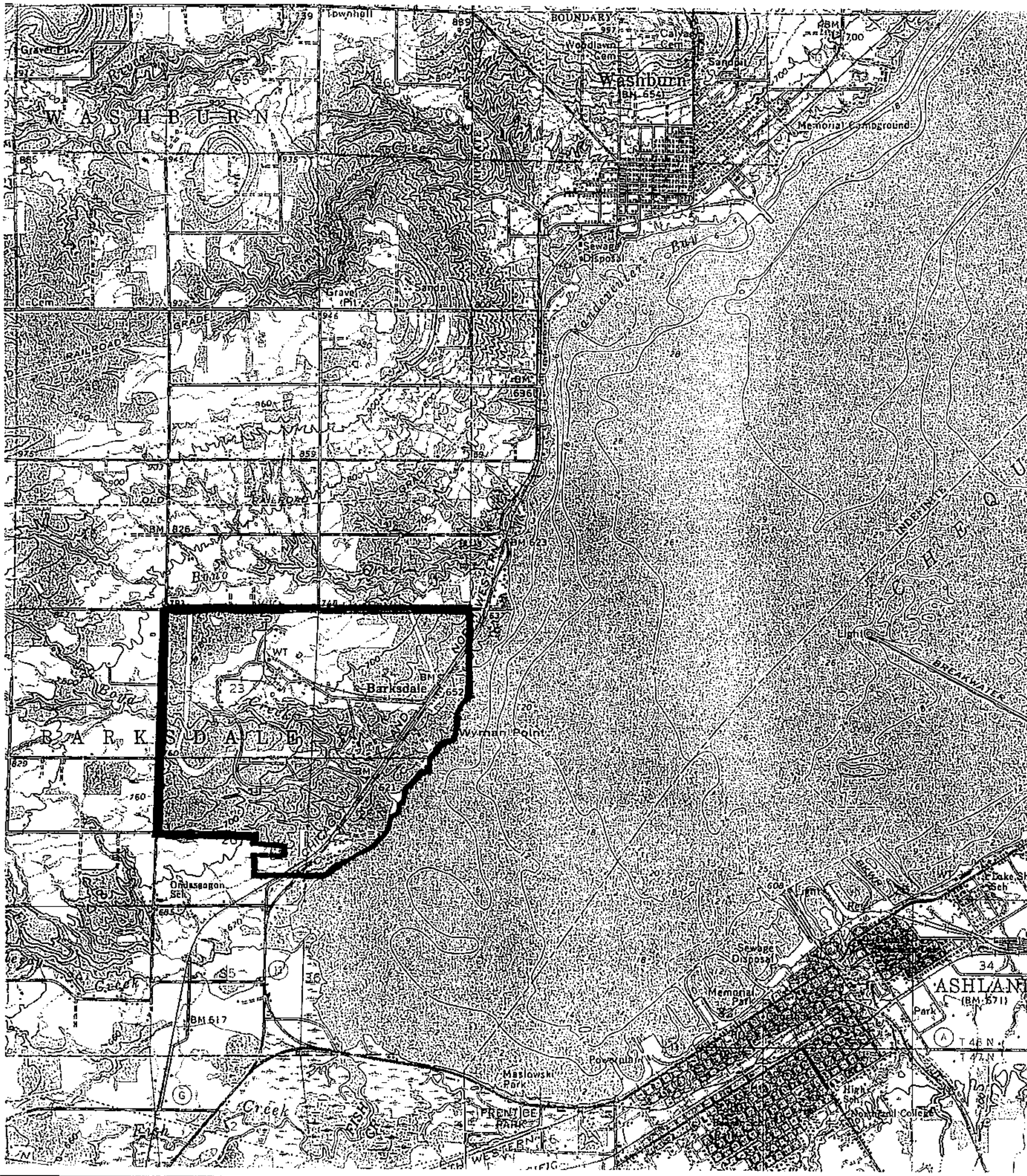
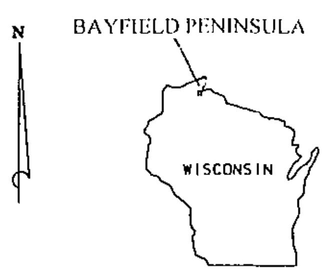
FIGURES



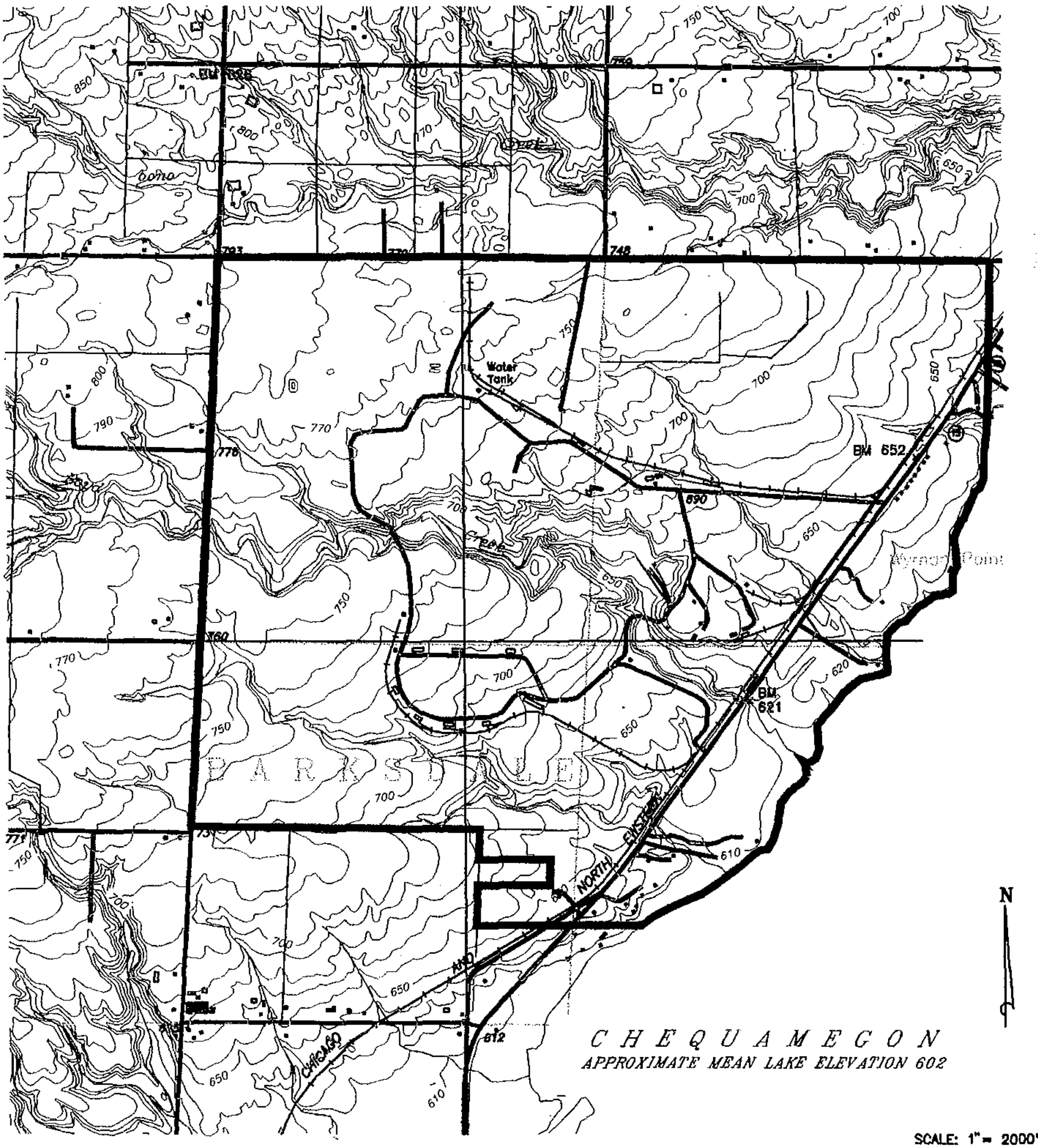


SCALE

1 MILE 0 1 MILE

SOURCE: U.S.G.S. BARKSDALE WISCONSIN QUADRANGLE 7.5 SERIES

SITE LOCATION MAP				FIGURE 1
SCALE 1" = 2000'	DESIGNED BY	DRAWN BY DHB	CAD DRAWING NO SITEMAPS	
DATE 10/16/97	CHECKED	APPROVED	PROJECT NO 7191	
FORMER E.I. DuPont BARKSDALE WORKS BARKSDALE, WISCONSIN SITE CONDITIONS REPORT				DUPONT
DuPont Environmental Remediation Services				



SCALE: 1" = 2000'

FIGURE 2	FORMER BARKSDALE WORKS DETAILED SITE MAP		
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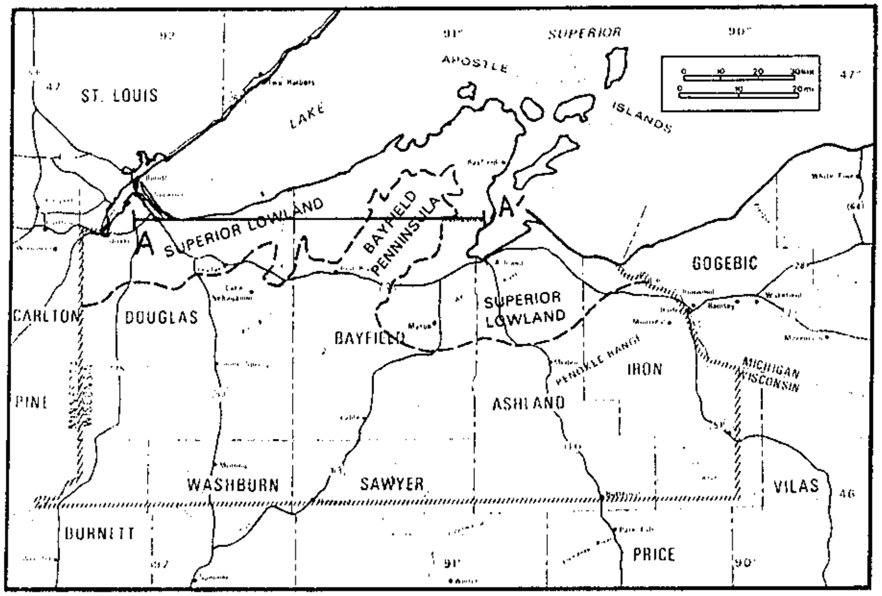
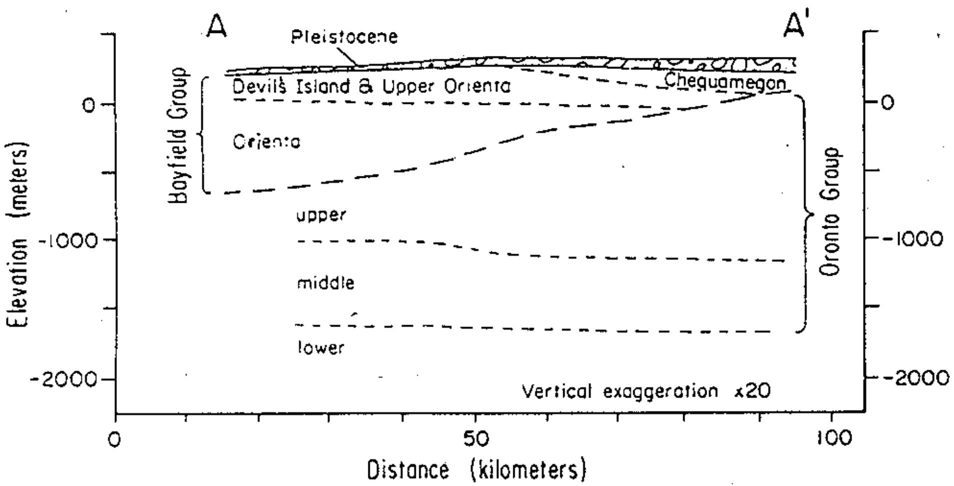
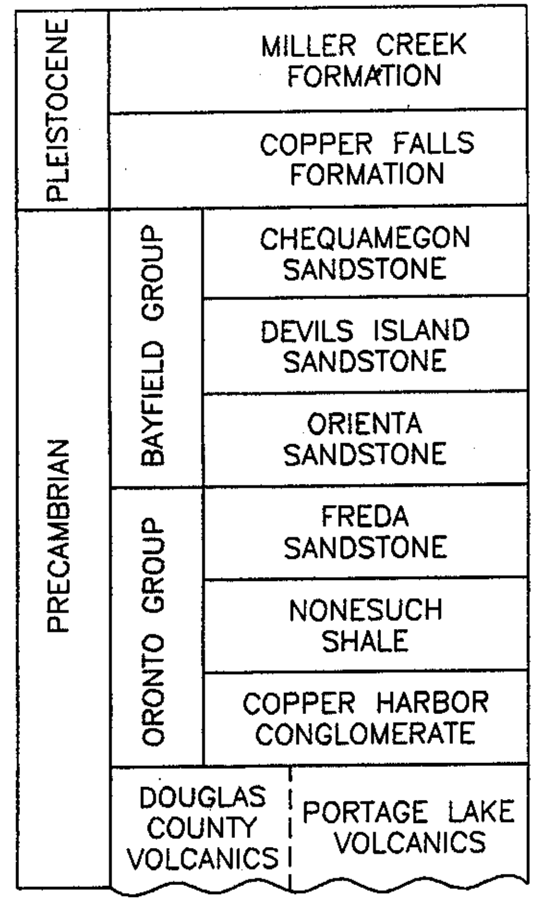
	DATE 11/18/97	CHECKED	APPROVED	PROJECT NO 7191
DUPONT	FORMER E.I. DuPont BARKSDALE WORKS BARKSDALE, WISCONSIN SITE CONDITIONS REPORT			
	DuPont Environmental Remediation Services			







[NOTE: MODIFIED FROM CLAYTON (1984), DAVIDSON (1982) AND MOREY AND OJAKANGAS (1982)]

FIGURE 3	GENERALIZED STRATIGRAPHIC COLUMN AND CROSS SECTION FOR THE BARKSDALE AREA			
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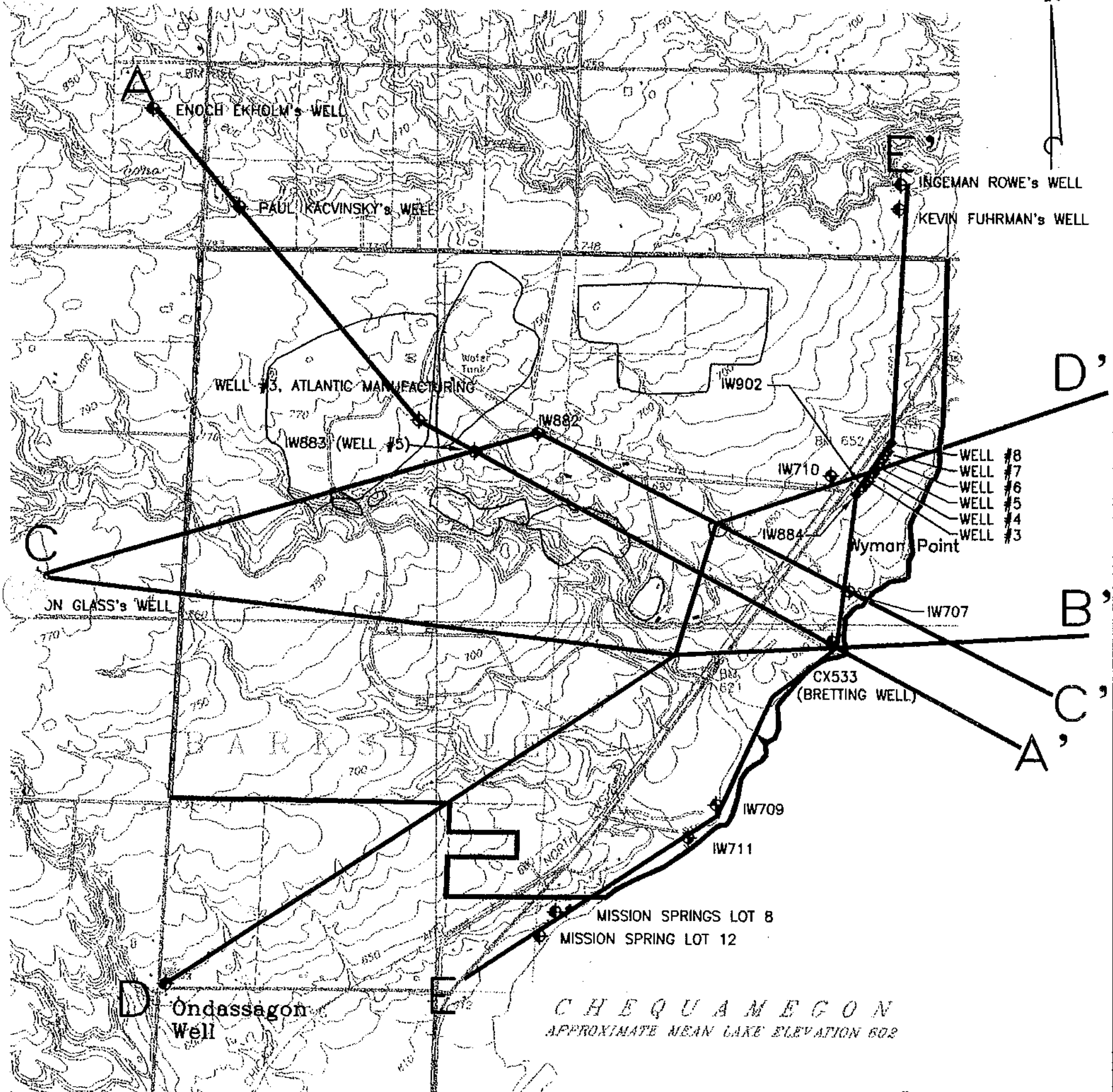
	DuPont Environmental Remediation Services			



SCALE: 1" = 2000'

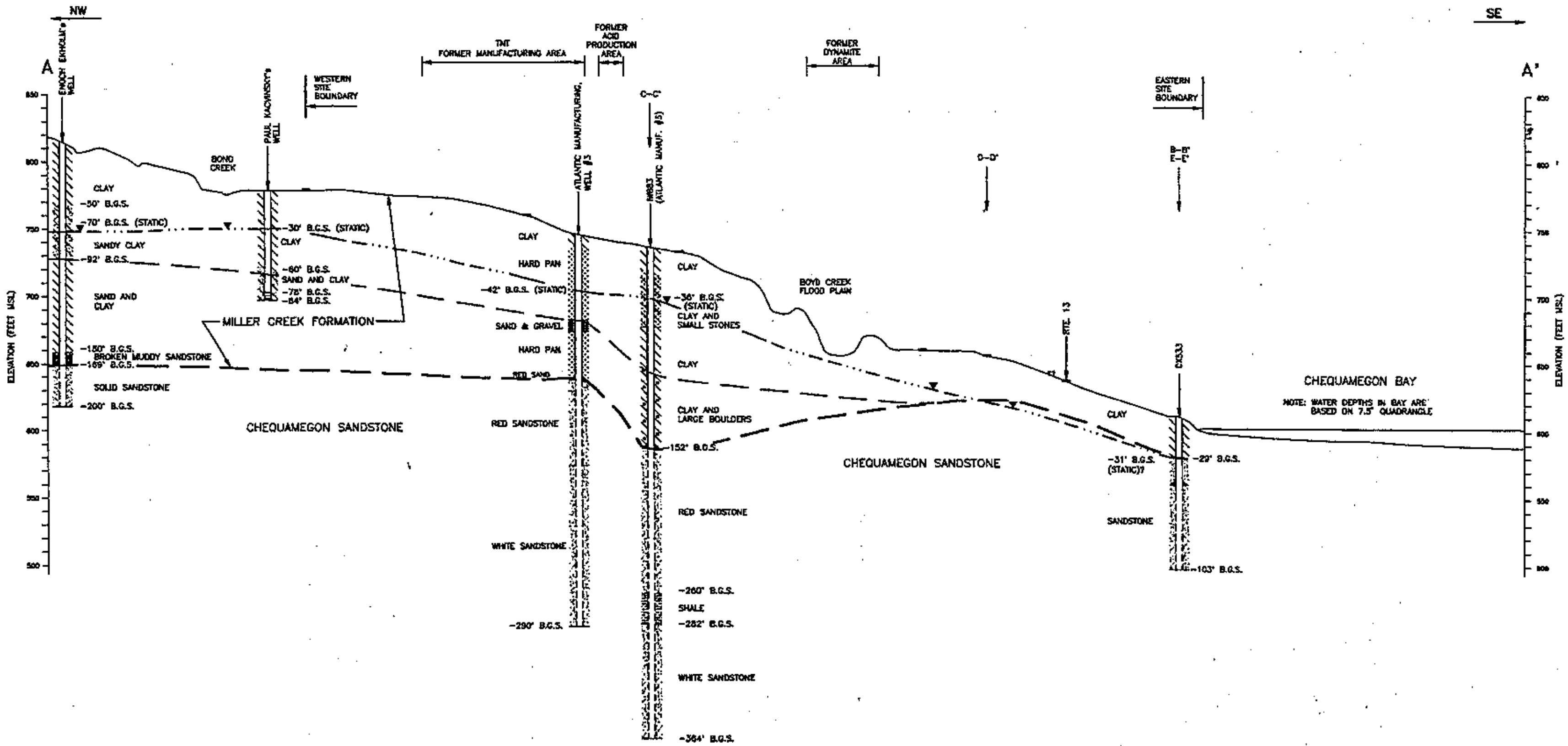
LEGEND

WELL LOCATION (KNOWN POSITION)

WELL LOCATION (APPROXIMATE POSITION)

FORMER MAIN MANUFACTURING AREAS

FIGURE 4	CROSS SECTIONS LOCATION MAP AND FORMER MAIN MANUFACTURING AREAS		
	SCALE 1" = 2000'	DESIGNED BY K.L. DAVIS	DRAWN BY DEL	CAD DRAWING NO FIG_7.DWG
	DATE 11/18/97	CHECKED	APPROVED	PROJECT NO 7191
DUPONT	FORMER E.I. DuPont BARKSDALE WORKS BARKSDALE, WISCONSIN SITE CONDITIONS REPORT			
	DuPont Environmental Remediation Services			



LEGEND

- ROAD
- RAILROAD TRACKS
- STATIC WATER LEVEL
- LITHOLOGIC CONTACT

NOTE: WELL LOCATIONS ARE APPROXIMATE.
STATIC WATER LEVELS ARE BASED ON DRILLER's LOGS.
THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE WELLS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE WELLS.

NO.	REVISIONS	BY	DATE

DESIGNED: K. L. DAVIS
DRAWN: D. C. LITTEL
CHECKED:
APPROVED(DESIGN): NANCY R. GROSSO
APPROVED(CONSTRUCTION):

DuPont Environmental Remediation Services

FIGURE 5

GEOLOGIC CROSS SECTION A-A'

FORMER E.I. DuPONT BARKSDALE WORKS
BARKSDALE, WISCONSIN
SITE CONDITIONS REPORT

BARLEY MILL PLAZA, BUILDING 27
WILMINGTON, DELAWARE 19880-0027

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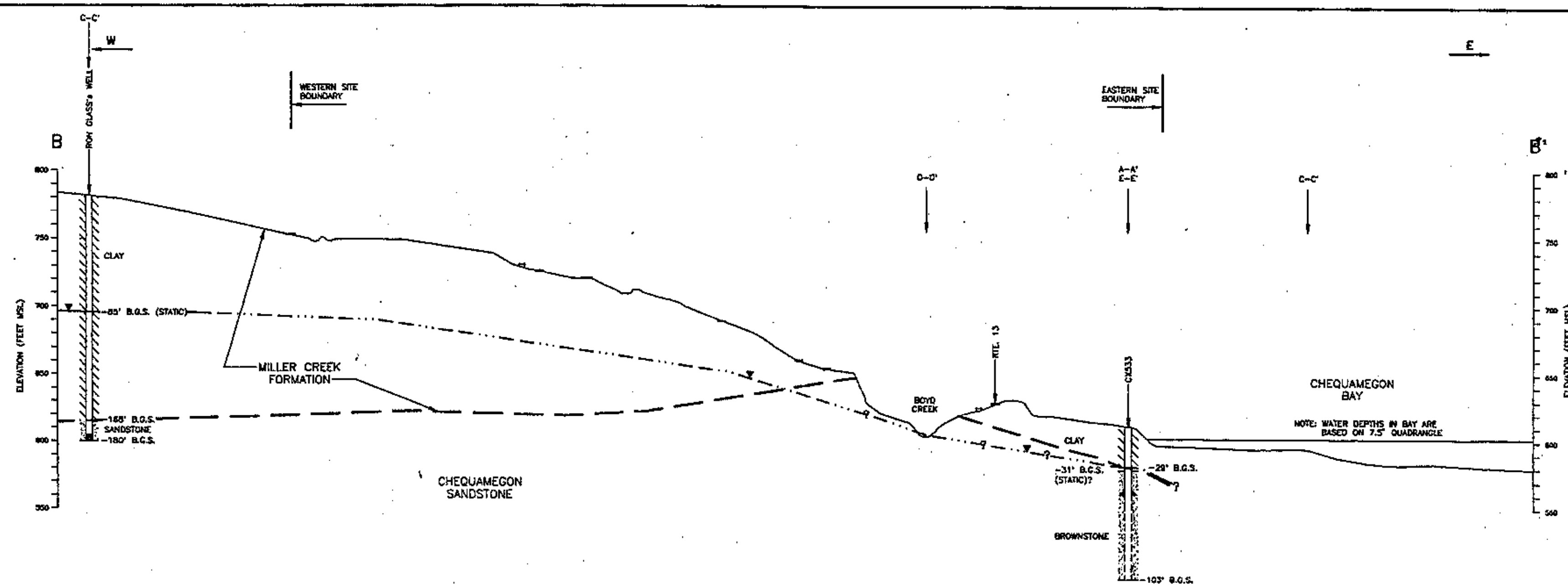

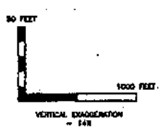

LEGEND

—	ROAD
++	RAILROAD TRACKS
– ▼ . . . –	STATIC WATER LEVEL
—— ——	LITHOLOGIC CONTACT

NOTE: WELL LOCATIONS ARE APPROXIMATE.
STATIC WATER LEVELS ARE BASED ON DRILLER's LOGS.

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE WELLS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE WELLS.

NO.	REVISIONS	BY	DATE

	INITIALS
DESIGNED K. L. DAVIS	
DRAWN D. E. LITTEL	
CHECKED	
APPROVED(DESIGN) NANCY R. CROSSO	
APPROVED(CONSTRUCTION)	

DuPont Environmental Remediation Services

FIGURE 6

GEOLOGIC CROSS SECTION B-B'

FORMER E.I. DuPONT BARKSDALE WORKS
BARKSDALE, WISCONSIN
SITE CONDITIONS REPORT

BARLEY MILL PLAZA, BUILDING 27
WILMINGTON, DELAWARE 19880-0027

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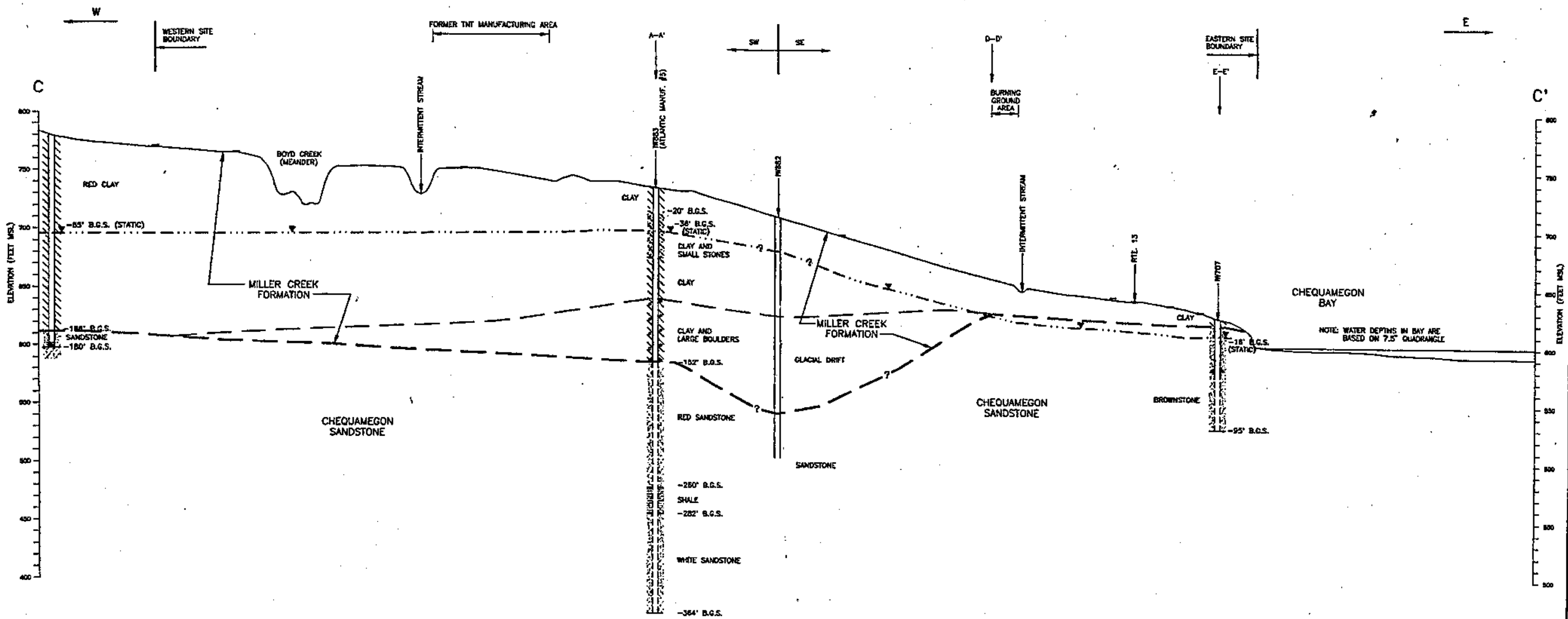

LEGEND

—	ROAD
⊤⊤	RAILROAD TRACKS
—▼— . . . —	STATIC WATER LEVEL
—— ——	LITHOLOGIC CONTACT

NOTE: WELL LOCATIONS ARE APPROXIMATE.
STATIC WATER LEVELS ARE BASED ON DRILLER's LOGS.

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE WELLS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE WELLS.

50 FEET
1000 FEET
VERTICAL EXAGGERATION ~ 14X

NO.	REVISIONS	BY	DATE

DESIGNED K. L. DAVIS
DRAWN D. E. LITTEL
CHECKED
APPROVED(DESIGN) NANCY R. GROSSO
APPROVED(CONSTRUCTION)
INITIALS

DuPont Environmental Remediation Services

FIGURE 7

GEOLOGIC CROSS SECTION C–C'

FORMER E.I. DuPONT BARKSDALE WORKS
BARKSDALE, WISCONSIN
SITE CONDITIONS REPORT

BARLEY MILL PLAZA, BUILDING 27
WILMINGTON, DELAWARE 19880-0027

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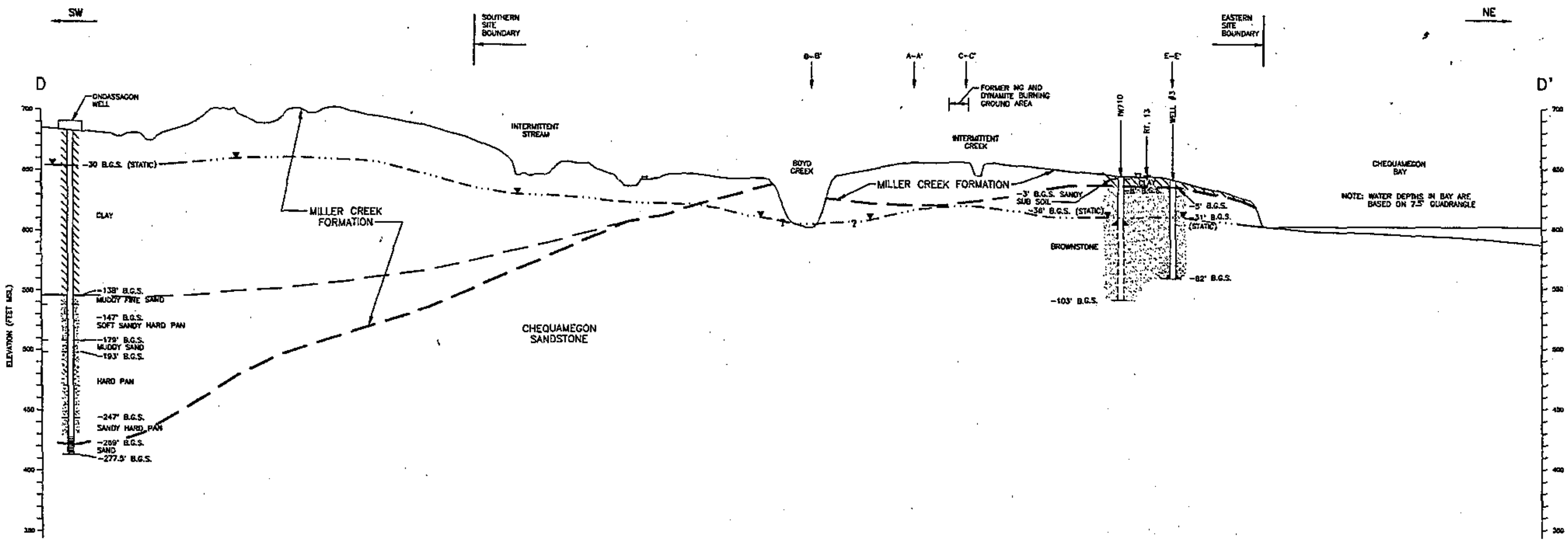
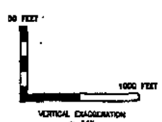


LEGEND

- ROAD
- RAILROAD TRACKS
- STATIC WATER LEVEL
- LITHOLOGIC CONTACT

NOTE: WELL LOCATIONS ARE APPROXIMATE.
STATIC WATER LEVELS ARE BASED ON DRILLER's LOGS.

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE WELLS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE WELLS.



NO.	REVISIONS	BY	DATE

DESIGNED: K. L. DAVIS
DRAWN: D. E. LITTEL
CHECKED:
APPROVED(DESIGN): NANCY R. GROSSO
APPROVED(CONSTRUCTION):

DuPont Environmental Remediation Services

FIGURE 8

GEOLOGIC CROSS SECTION D–D'

FORMER E.I. DuPONT BARKSDALE WORKS
BARKSDALE, WISCONSIN
SITE CONDITIONS REPORT

BARLEY MILL PLAZA, BUILDING 27
WILMINGTON, DELAWARE 19880-0027

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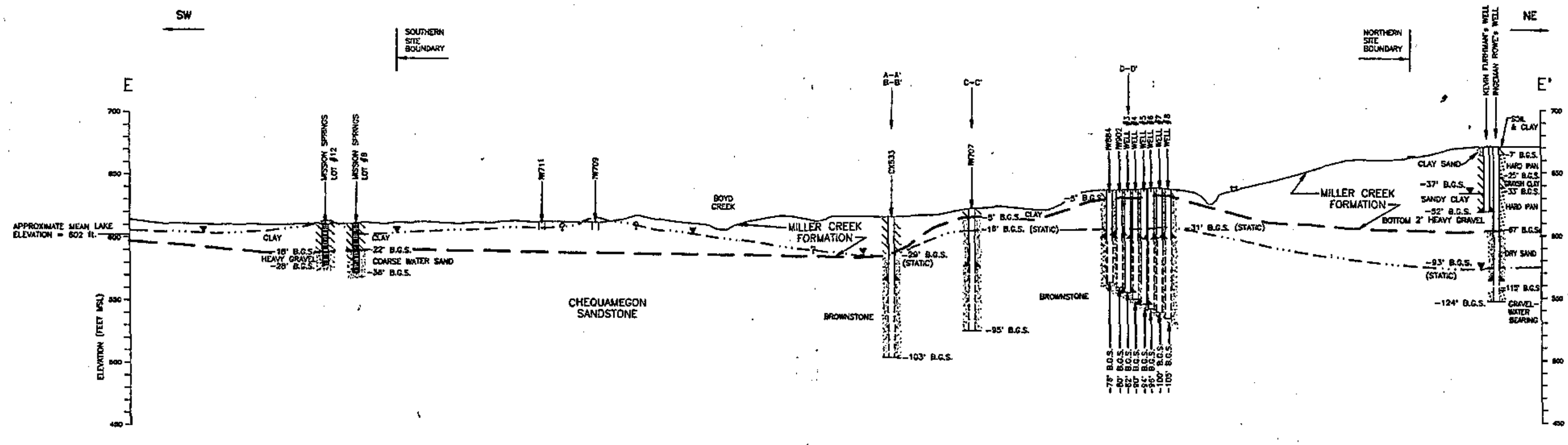
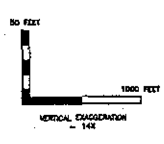


LEGEND

- ROAD
- RAILROAD TRACKS
- STATIC WATER LEVEL
- LITHOLOGIC CONTACT

NOTE: WELL LOCATIONS ARE APPROXIMATE.
STATIC WATER LEVELS ARE BASED ON DRILLER's LOGS.

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE WELLS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE WELLS.



NO.	REVISIONS	BY	DATE

DESIGNED: K. L. DAVIS
DRAWN: D. E. LITTEL
CHECKED:
APPROVED (DESIGN): NANCY R. GROSSO
APPROVED (CONSTRUCTION):

DuPont Environmental Remediation Services

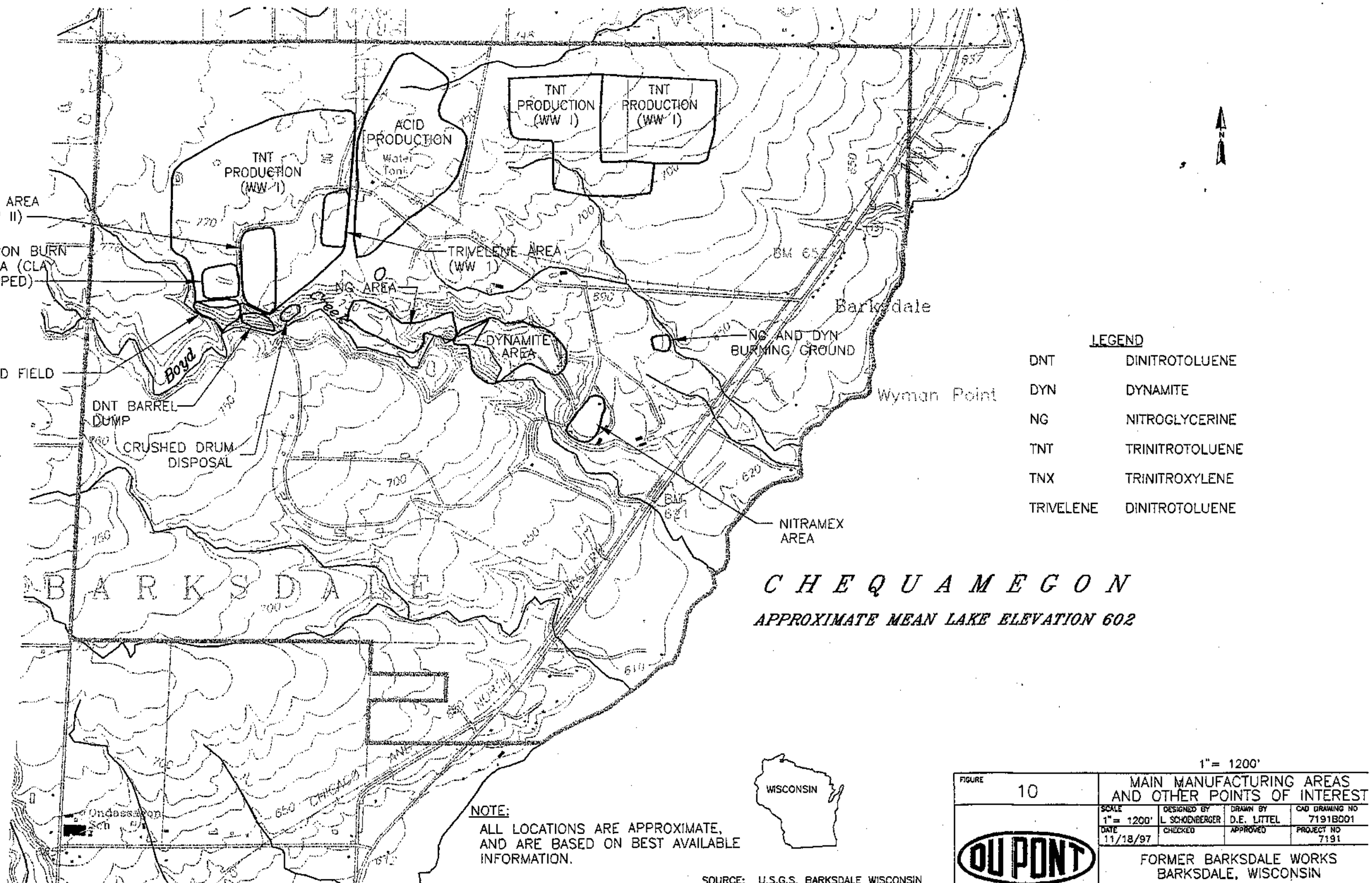
FIGURE 9

GEOLOGIC CROSS SECTION E-E'

FORMER E.I. DuPONT BARKSDALE WORKS
BARKSDALE, WISCONSIN
SITE CONDITIONS REPORT

BARLEY MILL PLAZA, BUILDING 27
WILMINGTON, DELAWARE 19880-0027

SCALE	DATE	DRAWING NO.	SHEET
AS SHOWN	12/1/97	7180005	1



NOTE:
ALL LOCATIONS ARE APPROXIMATE, AND ARE BASED ON BEST AVAILABLE INFORMATION.

SOURCE: U.S.G.S. BARKSDALE WISCONSIN QUADRANGLE 7.5 SERIES

1"= 1200'

FIGURE	MAIN MANUFACTURING AREAS AND OTHER POINTS OF INTEREST			
10	SCALE 1"= 1200'	DESIGNED BY L. SCHOENBERGER	DRAWN BY D.E. LITTEL	CAD DRAWING NO 7191B001
	DATE 11/18/97	CHECKED	APPROVED	PROJECT NO 7191
DUPONT	FORMER BARKSDALE WORKS BARKSDALE, WISCONSIN			
	DuPont Environmental Remediation Services			

TABLES

Table 1
Well Construction Summary
Former Barksdale Works
Barksdale, Wisconsin
Site Conditions Report

WDNR #	Identifier	Estimated Ground Surface Elevation (MSL)	Total Depth (ft BGS)	Lithology	Depth (ft BGS)	Casing Material	Casing Depth (ft BGS)	Casing Diameter (in)	Depth to Water (ft BGS)	Well Record Number in Appendix B	Other Information
IW709	Tim Smith Well	610	105	drift	0-105				flowing	15	Timothy and Nancy Smith
				sand	at 105						Rt 3 Box 56
											Ashland, WI 54806
IW711	Warren Smith Well	610	NA	NA	NA	NA	NA	NA		16	Warren and Edna Mae Smith
											Rt 3 Box 54
											Ashland, WI 54806
											Sampled 10/97 DuPont
CX533	Bretting Well	610	103	clay	0-29	Taiwan Pipe	+2-40	6	31	14	C/O Wayne Peterson
				sandstone	29-103	open hole	40-103	6			Rt 3 Box 158
											Ashland, WI 54806
											Sampled WDNR-6/96, DuPont 10/97
IW707	Gitchegaunee Council	627	95	clay	0-5	Std Steel Pipe	0-40	4	16	13	Sampled 10/97 DuPont
				brownstone	5-95	open hole	40-95	6			
IW884	Scott Filbert Well	649	76	clay	0-5	Std Steel Pipe	0-40	4	31	4	in Barksdale Village
	Well No. 1			brownstone	5-76	open hole	40-76	6			
IW902	Robert Carlson Well	650	80	clay	0-5	Std Steel Pipe	0-38	4	31	5	in Barksdale Village
	Well No. 2			brownstone	5-80	open hole	38-80	6			
NA	Well No. 3	650	82	clay	0-5	Std Steel Pipe	0-82	4	31	6	in Barksdale Village
				brownstone	5-82						
NA	Well No. 4	650	90	clay	0-5	Std Steel Pipe	0-40	4	31	7	in Barksdale Village
				brownstone	5-90	open hole	40-90	6			
NA	Well No. 5	650	94	clay	0-5	Std Steel Pipe	0-94	4	31	80	in Barksdale Village
				brownstone	5-94						
NA	Well No. 6	650	96	clay	0-5	Std Steel Pipe	0-41	4	31	9	in Barksdale Village
				brownstone	5-96	open hole	41-90	6			
NA	Well No. 7	649	100	clay	0-5	Std Steel Pipe	0-41	4	31	10	in Barksdale Village
				brownstone	5-100	open hole	41-100	6			Sampled 6/97 WDNR
NA	Well No. 8	649	105	clay	0-5	Std Steel Pipe	0-4	4	31	11	in Barksdale Village
				brownstone	5-105	open hole	40-105	6			Sampled 6/97 WDNR
IW710	Main Gate Well	654	103	sandy sub soil	0-3	Std Steel Pipe	0-40	4	36	12	Temporarily Abandoned 1982
				clay	3-8	open hole	40-103	6			
				brownstone	8-103						
IW882	Bretting/Maintenance	724	NA	glacial till	~0-200	NA	NA	NA	NA	3	Sampled 6/97 WDNR
	Shed			sandstone	~200-?						installed by Brettings 1986
IW883	Bretting Cow Shed/	735	NA			NA	NA	NA	NA	17	Sampled 6/97 WDNR
	former Power House well										reconditioned by Brettings in 1986
NA	Well #3, Atlantic Mfg. Co	745	290	clay	0-12	casing	0-105	6	42	2	Atlantic Mfg. Co. Well installed prior to
				hard pan	12-63	open hole	105-290	6			December, 1903; near Building 333
				sand and gravel	63-73						surface elevation 213 ft in old plant datum
				hard pan	73-96						
				red sand	96-102						
				red sandstone	102-170						
				white sandstone	170-289						
				quicksand	289-290						
NA	Well #5, Atlantic Mfg. Co	735	364	clay	0-20	casing	0-150.5	6	60	3	Atlantic Mfg. Co. Well installed prior to
				glacial drift	20-152	open hole	150.5-364	6			November, 1904; near Power House, #48
				red sandstone	152-260						surface elevation 206 ft in old plant datum
				shale	260-282						temporarily abandoned 1982
				white sandstone	282-364						
NA	DuPont Well, 1906	NA	375	clay	0-70	NA	NA	NA	NA	1	location unknown
				hard pan	70-90						
				red sandstone	90-200						
				pinkish sandstone	200-280						
				red/white sandstone	280-375						
NA	Ondassagon School	675-960	277.5	clay	0-138	Std Steel Pipe	0-211.75	8	30	18	South of Southeast corner of site
				muddy fine sand	138-147	open hole	211.75-277.	4			
				soft sandy hard pan	147-179						
				muddy sand	179-193						
				hard pan	193-247						
				gravel streaks	247-248						
				sandy hard pan	248-269.5						
				sand	269.5-270						
				fine quartz sand	270-277.5						
NA	Lot #12 Mission Springs	610	28	clay	0-18	Std Blk Pipe	0-25	4	Flowing	19	Adjacted to southwest corner of site
				heavy gravel	18-28	Screen	25-28	4			
NA	Lot #8 Mission Springs	610	36	clay	0-22	Std Blk Pipe	0-33	4	16	20	Adjacted to southwest corner of site
				coarse water sand	22-36	Screen	33-36	4			
NA	Ron Glass Well	780	180	top soil	0-2	Steel Casing	0-176	4	85	21	West of Western border of site
				red clay	2-168	Screen	176-180	2			
				water sand	168-180						
NA	Enoch Ekholm Well	820	200	red clay	0-50	Steel Pipe	0-170	4	70	22	Northwest of northwest corner of site
				sandy clay	50-92	open hole	170-200	4			
				sand and clay streaks	92-160						
				broken muddy sandstone	160-169						
				solid sandstone	169-200						
NA	Paul Kacvinsky Well	780	84	red clay	0-60	Steel Pipe	0-80	4	30	42	North of northwest corner of site
				sand and clay mixture	60-78	screen	80-84	2			
				water sand	78-84						
NA	Ingman Rowe Well	660	124	top soil and clay	0-7	Std Steel pipe	0-113	4	93	32	North of northeast corner of site
				hard pan	7-24	open hole	113-124	4			
				grayish clay	24-33						
				hard pan	33-67						
				dry sand	67-103						
				hard pan and boulders	103-107						
				quick sand	107-113						
				hard pan	113-115						
				gravel-water bearing	115-124						
NA	Kevin Fuhrman Well	660	57	dry sand	0-10	Blk Steel pipe	0-57	4	37	33	North of northeast corner of site
				sandy clay	10-55	open hole					
				heavy gravel	55-57						

APPENDICES

Appendix A

SITE INSPECTIONS AND RESULTS

SITE INSPECTIONS AND RESULTS

Limited environmental data is available for the various site media (soil, groundwater, and surface water) at the former Barksdale Works. A summary investigations is provided in Table A-1. Sample locations are shown on Figure A-1.

1943

The earliest environmental data on record consists of a surface water sample collected in 1943 from Boyd Creek which is referenced in the Wisconsin Department of Natural Resources (WDNR) report (1982). At this time, Barksdale Works was operating 24 hours a day to support the war effort. The parameters analyzed were limited to pH, nitrate, total solids, and sulfate. The results indicated surface water had a low pH and the remaining parameter concentrations were elevated. This is consistent with the use of Boyd Creek as a receiving body for red water discharge.

1974

Water quality information was collected for Boyd Creek in 1974 as part of the Lake Superior Basin Areawide Water Quality Management Plan. (Wisconsin Water Quality Program 1979). A biological investigation conducted on October 1974 indicated that the water quality of Boyd Creek had recovered very well since the discontinuance of industrial discharge from the former Barksdale Works. The chemical data collected from above and below the site showed Boyd Creek to be meeting the fish and aquatic life standards. Compared to previous sampling events, nitrate concentrations had decreased, while pH and oxygen content increased. A diversified benthic community was also found. From the data collected, it was concluded that Boyd Creek is recovering well from the former Barksdale Works discharge.

1981

An investigation was conducted in 1981 in response to a citizen complaint and to ascertain whether any significant environmental degradation had occurred or was occurring in specific locations on-site. The site was inspected jointly by WDNR and DuPont. Two rounds of sampling were collected by the WDNR in former manufacturing operation areas. Seven surficial soil samples, four surface water samples, and two groundwater samples were analyzed for a limited number of parameters including pH, chloride, nitrite plus nitrate, chemical oxygen demand (COD), and sulfate. Two soil samples were analyzed for site-related explosive compounds. Both samples had detectable concentrations of nitrobenzene, 2-nitrotoluene, 2,6-dinitrotoluene, 2,4-dinitrotoluene, 2,4,6-trinitrotoluene, and 1,3,5-trinitrobenzene.

The WDNR evaluated the results of the 1981 investigation and issued a report in January 1982 (WDNR 1982). The report concluded that generally, the results did not show any immediate environmental danger in those areas of the site sampled. However, there remain significant areas on the property which were not evaluated. It was acknowledged that having the site fenced and posted would mitigate possible environmental and human health concerns. Recommendations were provided minimize environmental degradation and aesthetically improve the site.

In response to the WDNR January 1982 report, DuPont implemented WDNR's recommendations. On September 9, 1983, the WDNR inspected the Barksdale property to verify the implementation was complete. A final property tour was conducted by the WDNR.

1982-3

In July 1982, three soil samples were collected by DuPont from the former TNX area. The laboratory results could not be located. However, it was documented that site-related constituents were not detected (DuPont 1983; see Appendix I of the main report). A composite soil sample was also collected from the TNX area in January 1983 and analyzed for 2,4-dinitrotoluene (DNT), nitrobenzene, 2-nitrotoluene, and 2,4,6-trinitrotoluene (TNT). None of these four site-related constituents were detected.

1985

One creek sample, two surface-water samples and one well sample were submitted to a laboratory by Bretting Manufacturing on October 24 , 1985. A limited number of water quality parameters and metals were analyzed. An insufficient volume of groundwater was collected, therefore all of the parameters could not be analyzed.

1986

Four soil samples were collected in December 1986 and analyzed for polychlorinated biphenyls (PCBs) by the WDNR. This was in response to the statement that the contents of transformers were disposed on the ground in 1972. This disposal was allegedly done by the contractor H&P Equipment. All four soil samples contained less than 0.05 micrograms/gram (µg/g) PCBs. The WDNR site visit report containing the data is provided in Appendix A of the main report.

1988

Bretting Manufacturing submitted a water sample from the "concrete pond" for analysis. This pond had been used during manufacturing operation for materials testing and acid resistance. The sample was analyzed for water quality parameters and metals, and the pH was measured in the field. Aerial photographs subsequent to 1988 show that the concrete pond is no longer in existence and was likely filled.

1995

On June 7, 1995, the Wisconsin Department of Public Health and the WDNR visited the former Barksdale Works and documented that there were no obvious signs of environmental damage from past activities (Wisconsin Department of Health and Social Services 1995). In December 1995, a Public Health Consultation was written by the Department of Public Health and summarized past investigations at the former Barksdale Works. The report concluded that although DuPont conducted site closure activities, no documentation that details these activities was provided. In addition, there is inadequate sampling of Boyd Creek and of groundwater beneath the site to determine if contamination exists and if groundwater is safe to drink. Recommendations were provided to address these concerns.

1996

In June 1996, groundwater or water samples were collected by Bretting Manufacturing from various locations on-site: north hayshed (standing water), south hayshed (standing water), cow pasture (standing water), cow shed (standing water), cow shed well (groundwater from IW882), and building well (groundwater from IW882). All samples were analyzed for volatile organic compounds (VOCs), dissolved metals, and general water quality parameters.

Toluene was the only VOC detected and it was only detected in the cow pasture sample at a trace concentration (3.25 µg/l). Metals analysis was limited to the dissolved concentration. All of the samples contained detectable concentrations (dissolved) of several metals including iron, barium, chromium, cadmium, and lead.

1997

In June 1997, the WDNR sampled wells at the former Barksdale Works and analyzed for explosives, inorganics, several water quality parameters, and VOCs. The wells were identified as the following:

- Hose bib (D01) [Tim Smith residence well, IW902]
- Bretting - yard hydrant (D02) [Bretting residential well, CX533]
- Hose bib (D03) [IW882]
- Cow shed - hose bib (D04) [IW883]
- Fibert 2432 HWY 13 - hose bib (D05)[IW884]

VOCs were not detected in any of the wells sampled. Several explosive constituents were detected in D02, the Bretting-yard hydrant (Bretting Residence well) at trace concentrations (less than 2.0 ug/l). Compounds detected included 2-amino-4,6-dinitrotoluene, 2,6-DNT, 1,3,5-trinitirobenzene, and 2,4-DNT. According to the WDNR, explosive constituents were not detected in any of the other groundwater samples.

The Bretting well was resampled in August 1997 to confirm the presence of explosive constituents. 2-amino-4,6-dinitrotoluene, 2,6-DNT, and 2,4-DNT were detected at similar concentrations to the June sampling results.

On October 29, 1997, a site visit was attended by the representatives of the WDNR, Bretting Manufacturing, DuPont, and a Barksdale Works retiree. The purposes of the site visit were to clarify information regarding the production areas and address WDNR questions regarding past manufacturing practices. Specific areas of the site were visited. The following conclusions were drawn from the site visit:

- A possible second well in the former power house area proved to be a 10-foot deep fire pump.
- A structure in Boyd Creek thought to be a possible deep well disposal was actually an experimental device that was designed to encourage some settling or cause flocculation of suspended particles in the red water before discharge into Boyd Creek.
- A yellow substance, in a culvert, under the road for a small stream that originates in the former acid area was seen during the 1982 WDNR visit.

During this site visit the yellow substance was determined to be an imported sand filter material used in the oil of vitriol (OV) area.

A recent sampling event was conducted by DuPont with the WDNR on October 30 and 31, 1997. Groundwater samples were collected from three residential wells. The sample collected from the Bretting well was to confirm the WDNR results. The other two wells were sampled because no analytical information existed for these wells.

References

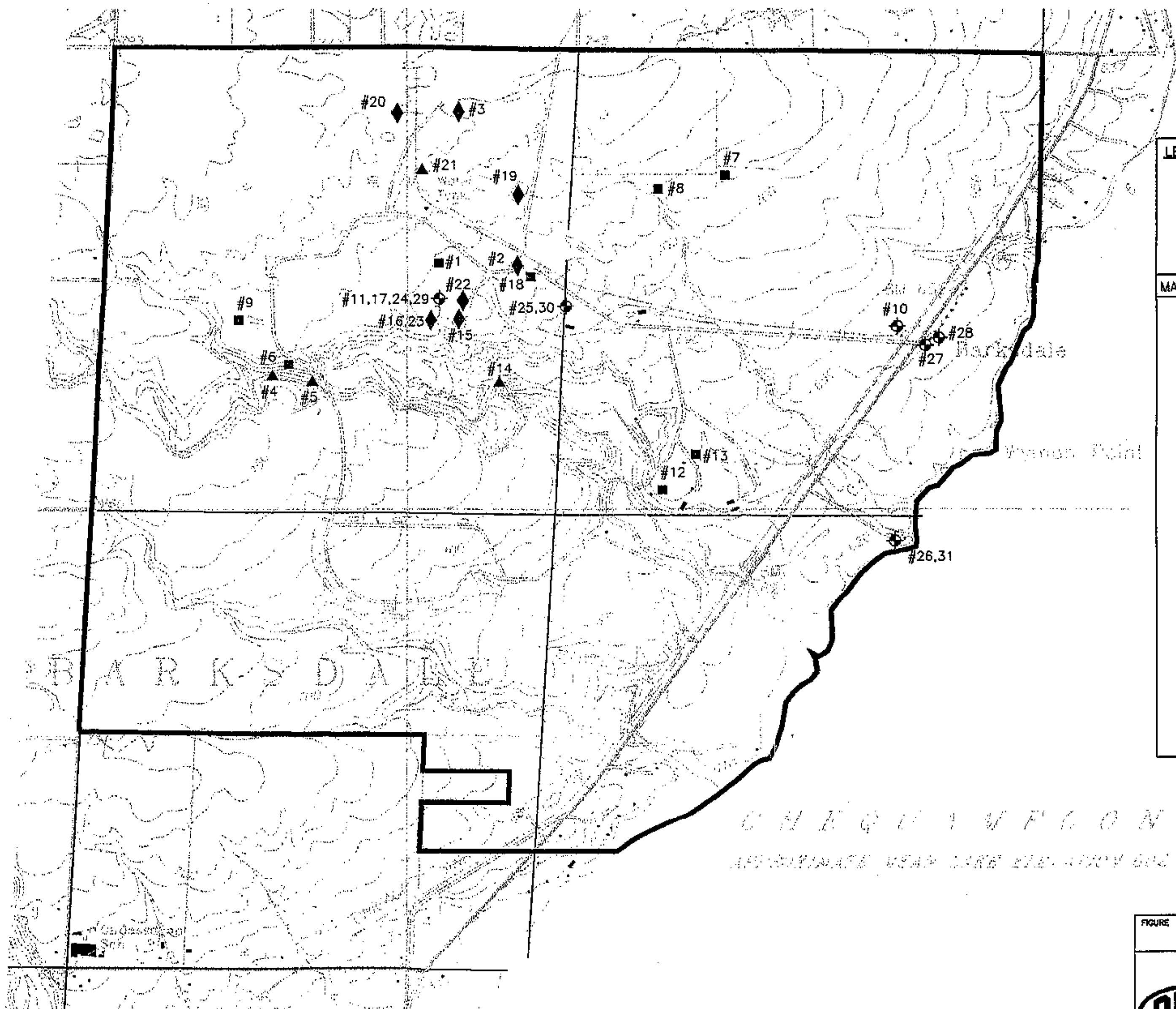
WDNR. January 1982. *Wisconsin Department of Natural Resources Report of an Investigation of the E. I. duPont de Nemours Company's Explosive Plant at Barksdale, Bayfield County, Wisconsin.*

Wisconsin Department of Public Health. December 1995. *Former DuPont Dynamite Facility*. Public Health Consultation Report.

Table A-1
Summary of Historic Environmental Sampling Events
Barksdale, Wisconsin
Site Conditions Report

Date	Requested by	Map ID # (1)	Location	Sample Matrix	Analytes
Jul-81	WDNR	1	non-vegetated area SE of water tower	soil	misc parameters
		2	pipe effluent in drainage ditch	surface water	(cond., pH, Temp.,
		3	water in ditch sulfur storage area	surface water	Cl, COD, NO2-NO3,
		4	Boyd Creek above barrel dump	surface water	NO3, SO4,)
		5	Boyd Creek below barrel dump	surface water	limited explosives
		6	base of barrel dump	soil	for 2nd berm and
		7	2nd berm on N side (TNX)	soil	ridge and furrow
		8	wetlands S of bermed area	soil	soil samples
		9	ridge and furrow area	soil	
		10	front gate well	groundwater	
		11	power plant well	groundwater	
		12	sandy soil in nitramex area	soil	
		13	old buring area	soil	
Oct-85	Bretting Manufacturing	14	creek-1 (Boyd Creek)	surface water	pH, cond., alkalinity,
		15	surface-1 (standing water near power house)	surface water	hardness, Cl, COD,
		16	surface-2 (standing water near power house)	surface water	SO4, NO3, organic
		17	well-1(cow shed/power house well/IW883)	groundwater	N, P total, mics. metals
Dec-86	WDNR	18	near old RR grade S side of main road where transformer fluid was poured	soils (4 samples)	PCB's
May-88	Bretting Manufacturing	19	concrete pond	surface water	pH, cond., alkalinity, hardness, Cl, COD, SO4, NO3, organic N, P total, mics. metals
Jun-96	Bretting Manufacturing	20	N. hayshed (standing water)	surface water	pH, cond., alkalinity,
		21	S. hayshed (standing water)	surface water	hardness, Cl, COD,
		22	cow pasture (standing water)	surface water	SO4, NO3, organic
		23	cow shed (standing water)	surface water	N, P total, dis. Fe & K
		24	cow shed well (cow shed/power house well/IW883)	groundwater	
		25	building well (maintenance shed well/IW882)	groundwater	volatiles and misc metals
Jun-97	WDNR	26	CX533 - Bretting Well	groundwater	explosives, inorganics
		27	IW884 - Filbert Well	groundwater	and VOCs
		28	IW902 - Carlson Well	groundwater	
		29	IW883 -Bretting Cow Shed/Power House Well	groundwater	
		30	IW882 -Bretting Maintenance Shed Well	groundwater	
Aug-97	WDNR	31	CX533 - Bretting Well	groundwater	explosives

(1) See Figure A-1 for approximate sample locations.
(2) See Appendix A for laboratory results.



LEGEND

⌖	GROUNDWATER SAMPLING LOCATION
▲	SURFACE WATER SAMPLING LOCATION
♦	STANDING WATER SAMPLING LOCATION
■	SOIL SAMPLING LOCATION

MAP ID#	LOCATION
1	NON-VEGETATED AREA SE OF WATER TOWER
2	PIPE EFFLUENT IN DRAINAGE DITCH
3	WATER IN DITCH SULFUR STORAGE AREA
4	BOYD CREEK ABOVE BARREL DUMP
5	BOYD CREEK BELOW BARREL DUMP
6	BASE OF BARREL DUMP
7	2ND BERM ON N SIDE (TNX)
8	WETLANDS S OF OF BERMED AREA
9	RIDGE AND FURROW AREA
10	FRONT GATE WELL (IW710)
11	POWER PLANT WELL (IW883)
12	SANDY SOIL IN NITRAMEX AREA
13	OLD BURNING AREA
14	CREEK-1 (BOYD CREEK)
15	SURFACE-1 (STANDING WATER NEAR POWER HOUSE)
16	SURFACE-2 (STANDING WATER NEAR POWER HOUSE)
17	WELL-1 (IW883)
18	NEAR OLD RR GRADE S SIDE OF MAIN ROAD WHERE TRANSFORMER FLUID WAS POURED
19	CONCRETE POND
20	N. HAYSHED (STANDING WATER)
21	S. HAYSHED (STANDING WATER)
22	COW PASTURE (STANDING WATER)
23	COW SHED (STANDING WATER)
24	COW SHED WELL (IW883)
25	BUILDING WELL (IW882)
26	CX533
27	IW884
28	IW902
29	IW883
30	IW882
31	CX533

SCALE: 1" = 1200'

FIGURE A-1	HISTORICAL AND RECENT ENVIRONMENTAL SAMPLING LOCATION MAP			
	SCALE 1" = 1200'	DESIGNED BY K.L. DAVIS	DRAWN BY D.E. LITTEL	CAD DRAWING NO FIG_5A.DWG
	DATE 11/18/97	CHECKED	APPROVED	PROJECT NO 7191

DUPONT

FORMER BARKSDALE WORKS
BARKSDALE, WISCONSIN

DuPont Environmental Remediation Services

SITE INSPECTIONS

PUBLIC HEALTH CONSULTATION

FORMER DUPONT DYNAMITE FACILITY

TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

December 15, 1995

Prepared by

Wisconsin Department of Health and Social Services
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Summary

The former duPont dynamite facility, located in the Town of Barksdale, Bayfield County, Wisconsin, was the site of explosives manufacturing activities between 1904 and 1971. These manufacturing activities resulted in environmental contamination at the site. A 1981 investigation by the State of Wisconsin found contamination at several locations around the property. While duPont cleaned up contamination identified by this investigation, the extent of the investigation was limited and did not fully examine the property. Additional information is needed to evaluate if nearby residents are exposed to contamination orginating from past actvities on the property. It is necessary to test local drinking water wells and Boyd Creek sediments in order to ensure that people are not exposed to this contamination. Additionally, the duPont de Nemours Company should be requested to provide the State of Wisconsin with all documentation regarding site closure and clean up activities.

Background

The E.I. duPont de Nemours Company opened the 1,800 acre Barksdale explosives plant in 1904 for the purpose of producing dynamite. Located in Bayfield County, south of Washburn, the plant was situated on Chequamegon Bay, Lake Superior (Figure 1), between rich iron deposits found in the Gogebic range of Michigan's Upper Peninsula and those in the Mesabi range of northern Minnesota. During World War I the Barksdale plant was the world's largest source of TNT (trinitrotoluene), producing 130 million pounds of the explosive between 1913 and 1918. At that time the Barksdale plant had a 6,000 person workforce, with 2,000 workers living in barracks on the property and 1,000 people commuting daily on a single train from nearby Washburn. Production was down scaled substantially after the war and again during the depression, but it was increased during World War II, with an estimated 226 million pounds of TNT produced for the war effort[1]. Once the war ended, the production of explosives at the Barksdale plant was decreased, once again, to meet regional mining needs. Chemical wastes generated from the production and environmental degradation of these explosives include: sulfuric acid; sulfites; nitric acid; ammonium nitrates; nitrates and nitrites; soda ash; toluene; nitroazoxytoluenes; nitroanilines; nitrobenzenes; nitrotoluene and dinitrotoluene (DNT); and TNT.

In the later years the Barksdale plant also manufactured synthetic diamonds and performed metal cladding. DuPont ceased operations at the Barksdale plant in 1971, and most existing buildings were demolished within the decade. A former employee at the Barksdale plant reported that in 1976 he personally oversaw the demolition of the buildings and incineration of soils that were suspected of being contaminated with explosives. It is not known if a report exists for these closure activities nor if there was any confirmatory sampling. The Barksdale property was sold in 1986 to Bretting Manufacturing, of Ashland, and is currently used as a private game farm.

Boyd Creek bisects the former duPont plant at Barksdale and, in the past, was greatly affected by contamination generated from manufacturing operations at the site. The creek flows from west to east and empties into Lake Superior. A report issued by the Wisconsin Department of Natural Resources (DNR) in 1970 described the creek as devoid of aquatic life and with "a deep red color caused by wastes" from the production of explosives[2]. A duPont narrative of TNT manufacturing processes at the Barksdale plant indicated that "red water" waste (from TNT production) was typically disposed into a drainage ditch on the Barksdale property[3]. During the late 1970's students from a local college analyzed surface water samples from Boyd Creek and found elevated levels of nitrates and an acidic pH. Creek sediments may continue to harbor elevated levels of explosives, their production by-products and metabolites.

In 1980, a citizen expressed concern about environmental contamination at the former Barksdale plant. These concerns were based on several observations, including reports that various areas lacked vegetation, the presence of yellow material on the ground at one barren area, disposed drums and canisters sitting in areas of oily, standing water, and a yellowish-orange effluent in a drainage pipe that ultimately emptied into Boyd Creek[4].

These citizen concerns lead the DNR to investigate the former Barksdale plant in 1981 and issue an investigative report in January 1982[5]. The DNR collected seven surface soil samples, four surface water samples, and two groundwater samples. Groundwater samples were analyzed for pH and inorganic constituents and not for organic compounds or the residues of explosives. Two surface soil samples showed elevated levels of explosive residues. Two other soil samples had acidic pH values. Two surface water samples collected effluent from a drainage ditch had elevated levels of sulfates and a pH between 3.5 and 4.3. Sediments from Boyd Creek were not sampled. The report recommended a number of remedial actions, including: the pH neutralization of areas found with acidic soils, sediments, or surface water; the removal of a drainage pipe and acidic effluent; the removal of waste materials and empty drums that were disposed along Boyd Creek; and further sampling at locations where elevated residues of explosive were detected. The E.I. du Pont de Nemours company addressed these specific recommendations in 1982 and 1983, along with the closure of two drinking water wells on the Barksdale property[6].

On June 7, 1995, a visit to the former duPont plant was made by a representative of the Wisconsin Department of Health and Social Services, along with two representatives of the Wisconsin Department of Natural Resources. Observations were made of numerous building and bunker foundations, roads, and assorted equipment and structures, clearly indicating that duPont made extensive use of the property to perform or directly support manufacturing activities. There were no obvious signs of environmental damage from past chemical manufacturing activities, with the exception of the elemental sulfur lying on bare ground at the former sulfuric acid production building. There is no indication that this elemental sulfur currently poses a human health hazard. However, at most places vegetation has grown undisturbed for several decades and obscures much of the remaining structures, growing through and around building foundations, old roads, and other infrastructure. Surface water in the creek was clear and had an approximate pH of 7.0.

Discussion

While past investigations have not identified any imminent human health or environmental hazards resulting from contamination originating from the former duPont plant, the entire Barksdale property and adjacent properties have not been fully investigated. A 1982 DNR report stated that "the results show no immediate environmental danger in those areas of the site sampled", "sampling did not reveal any significant human health hazards in these areas", and "further sampling and analysis by [DNR] does not appear to be warranted at this time." However, other parts of the report acknowledge that the DNR investigation examined only a small portion of the former Barksdale plant and that duPont conducted a variety of intensive manufacturing operations throughout the property for over 70 years. The report did conclude that the investigation was limited and "results should not be taken as representative of the remainder of the site." This DNR report recommended that if duPont should sell the Barksdale property "a thorough evaluation be completed on the entire property." There is no indication that duPont performed such an investigation when the property was sold in 1986. Given the degree of activities at the former Barksdale plant, it would be useful to obtain from duPont complete documentation of site closure and cleanup activities.

It is not known if contamination from duPont manufacturing activities currently exists in sediments of Boyd Creek. The creek was heavily impacted by wastes generated from many years of TNT manufacturing operations at the former Barksdale plant. The residues of TNT, DNT, and related compounds degrade relatively quickly in surface water and surface soils as a result of oxidation, photolysis and biotransformation processes. Additionally, these substances do not tend to concentrate in plants or animals nor are they known to substantially bioaccumulate in terrestrial or aquatic food chains. However, under certain conditions (groundwater, sub-surface soils, aerobic sediments) some of these compounds may persist in the environment[7,8]. Highly acidic conditions in sediments may inhibit the biodegradation of TNT, and related compounds, by naturally occurring aquatic microorganisms. Sediments of Boyd Creek should be tested to determine if such contamination remains. Analysis of sediment samples should also evaluate other persistent contaminants, such as heavy metals. Acidic conditions may also alter normal soil and sediment conditions, permitting the release and mobilization of metals typically held by soil particles. Sediment samples should be collected at regular intervals from Boyd Creek within the Barksdale property and downstream to its outlet on Chequamegon Bay.

There is no information indicating private wells near the former Barksdale plant have been thoroughly tested for substances that may have originated from previous manufacturing activities. Private wells in the immediate vicinity of the Barksdale property have not been tested for solvents, TNT-related compounds and metabolites, heavy metals, in order to ensure that the drinking water is safe. Though solvents and energetic compounds typically have a short half-life in surface water and surface soils, they can persist for many years in groundwater. It appears that groundwater flows from the Barksdale property toward Lake Superior. Most nearby homes are situated along Lake Superior and obtain their drinking water from private wells. On Highway 13, there are at least six homes located directly across from the main entrance to the Barksdale property. Given the long history of manufacturing operations at the former Barksdale plant, it is prudent to ensure that groundwater is not contaminated.

Conclusions

1. It was reported that duPont conducted site closure activities at the former Barksdale plant, but there is no documentation that details these activities occurred.

2. Sediments from Boyd Creek, located downstream from and within the former Barksdale plant, have not been adequately sampled to determine if contamination exists from past manufacturing activities.

3. Groundwater beneath and near the former Barksdale plant has not be adequately evaluated to determine if it is safe for drinking.

Recommendations

1. The duPont de Nemours corporate headquarters should be requested to provide all available documentation about site closure activities at the former Barksdale plant.

2. Sediments in Boyd Creek should be sampled to ensure that no residual contamination remains. Sediment samples should be collected from the creek at regular intervals within the former Barksdale plant and up to the mouth of Boyd Creek, where it empties into Chequamegon Bay. Laboratory analysis of samples should be tested for inorganics, organics, and residues of explosive.

3. Test drinking water samples from selected private wells located downgradient from the former Barksdale plant. This should be conducted to ensure drinking water supplies are safe. Samples should be analyzed for inorganics, organics, and explosive residues.

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CERTIFICATION

This public health consultation was prepared by the Wisconsin Department of Health and Social Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was begun.

Technical Project Officer, SPS, RPB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment and concurs with the findings.

for Director, DHAC, ATSDR

Selected References

1. The Daily Press. Barksdale Plant Top TNT Producer. Ashland, Wisconsin: Daily Press. March 25, 1995.

2. Wisconsin Department of Natural Resources (DNR). Surface Water Resources of Bayfield County - Lake and Stream Classification Project. Madison, Wisconsin: DNR. 1970.

3. DNR. Report of an Investigation of the E.I. duPont de Nemours Company's Explosives Plant at Barksdale, Bayfield County, Wisconsin. Appendix B: Barksdale Process Descriptions, Furnished by duPont. Prepared by Barry O'Flanagan, Hazardous Waste Specialist. Spooner, Wisconsin: DNR, January 1982.

4. DNR. Alleged Waste Disposal at duPont Barksdale Property. Hazardous Incident Report - Northwest District Office. Chronological Case History Narrative. December 1980 to June 1981.

5. DNR. Report of an Investigation of the E.I. duPont de Nemours Company's Explosives Plant at Barksdale, Bayfield County, Wisconsin. Prepared by Barry O'Flanagan, Hazardous Waste Specialist. Spooner, Wisconsin: DNR, January 1982.

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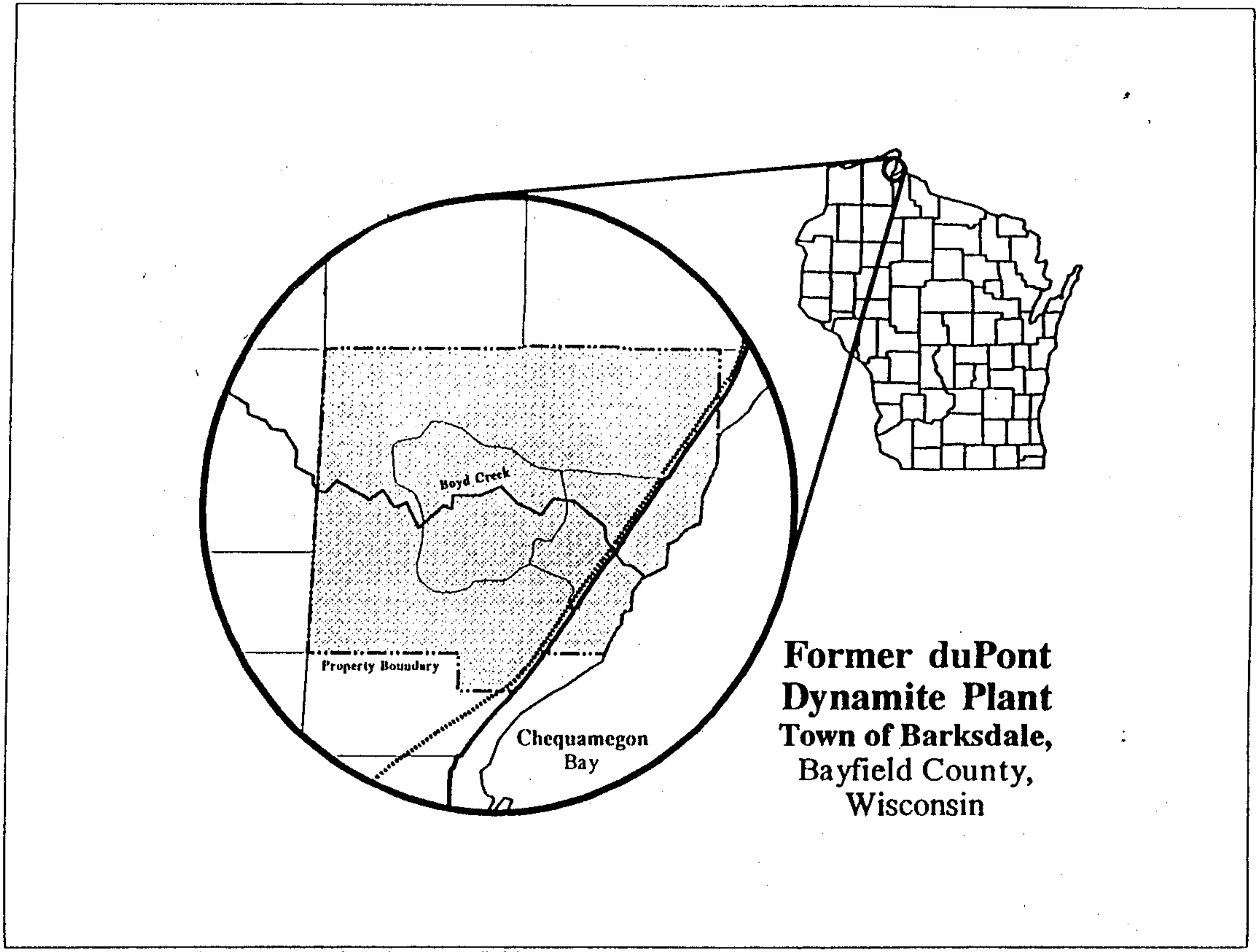

Figure 1: Former duPont Dynamite Plant, Bayfield County, Wisconsin.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REPORT OF AN INVESTIGATION OF THE
E.I. DUPONT DENEMOURS COMPANY'S EXPLOSIVES PLANT
AT BARKSDALE, BAYFIELD COUNTY, WISCONSIN

SPOONER, WISCONSIN
JANUARY 1982

By: Barry D. O'Flanagan
Hazardous Waste Specialist
Wisconsin DNR

Introduction

This report summarizes an investigation of duPont's Barksdale works by the Wisconsin Department of Natural Resources (WDNR). The investigation was initiated by the report of a Mr. James Thannum of Ashland concerning environmental degradation on the site and his expressed concern over the possibility of toxic and hazardous wastes remaining on the site. The investigation was conducted by Barry O'Flanagan, Gary LeRoy and Tom Jerow of WDNR with the cooperation of duPont, specifically with the assistance of Mr. Bruce Lawrence, Environmental Coordinator at duPont's Seneca, Illinois facility.

Objectives

The principal objective of the investigation was to respond to a citizen complaint and ascertain whether any significant environmental degradation had or was occurring in specific locations at the Barksdale site.

Background

The Barksdale works is owned and was operated by the E.I. duPont deNemours Company headquartered in Wilmington, Delaware. The property consists of approximately 1700 acres and is located along Chequamegon Bay in northeastern Bayfield County, Wisconsin (see maps and photos in Appendix A).

The site is bordered on the east by the bay and on the remaining sides by privately owned land. The private land is either wooded or in agricultural use. State Trunk Highway 13 parallels the bay and passes through the east side of the site. Most of the facility is fenced and posted and maintained by a caretaker employed by duPont.

The site is predominantly wooded although there exist many roads and openings. Surface drainage is toward the bay. Boyd Creek, a warm water stream, cuts a meandering ravine from west to east through the center of the site. The remainder of the facility is relatively level. The soils consist of fine textured materials of which red or reddish brown clay is the dominant material. The site is underlain by 50 to 100 feet of glaciolacustrine deposits consisting primarily of red clay. The direction of groundwater flow is not known for certain, but may be assumed to be toward the creek, the bay or both.

The facility operated for 72 years from 1904 through 1976. During this time many changes took place; production processes were upgraded or changed, production lines for new products were added, old lines were torn down or burned. When the facility was finally closed most of the structures were burned and/or buried. The result is that today there are a few key buildings left standing while most of the facility is leveled and growing over with vegetation. From aerial photos and visual examination, it appears that a significant portion of the 1700 acres was at one time or another utililzed in some capacity.

Presently there is no official use of the site. However, there is some indication that the site is used by local residents for hunting and other activities.

The Barksdale facility was primarily involved in the production of dynamite and trinitrotoluene (TNT). There were, however, minor products. Among others, Nitramex, Nitramon and trinitroxylene (TNX) were produced for limited periods.

Attached are two appendices which provide further information on major products and wastes at Barksdale. Appendix B is a description of the Barksdale operation put together by duPont for the Department. Waste products associated with the principal production processes are included in this narrative. Appendix C is extracted from an EPA Report (SW-118c) on industrial hazardous waste practices. Included are process descriptions and waste streams associated with TNT, dynamite and nitroglycerine (NG) production. These process descriptions indicate very little hazardous waste associated with the manufacturing processes.

Additional information on processes and particularly on waste streams has been gleaned from the files of state wastewater and sanitary engineers who visited the site.

The earliest observations are from 1943 when the facility was operating 24 hours a day. Boyd Creek was sampled at that time and analysis showed considerable pollution:

NO_3-N	38 mg/l
SO_4	784 mg/l
Total Solids	2614 mg/l
pH	2.3

At this time the "red water" waste from TNT production was channeled into the creek.

In October of 1950 the creek was observed to be "running red" and discoloring the bay out 300 feet and for 1000 feet along the shore. During that same year the state's district sanitary engineer performed an industrial process investigation. The following processes and wastes were identified:

Process	Waste
Sulfuric Acid Production (burning sulfer)	Cooling water and acid from leaks.
Nitric Acid Production (oxidize anhydrous ammonia)	Cooling water and acid from leaks.
Ammonium Nitrate Production (react HNO_3 and NH_4)	Minor spillage of solid product.
Acid Concentration (HNO_3 and H_2SO_4)	None identified.
Recovery of Waste Acids From TNT and N.G.	Small amounts of acids lost in washing.
Production of Trinitrate of Glycerol (Nitration of Glycerine by addition of HNO_3 and H_2SO_4)	Some overflow of soda ash and washings as well as nitroglycer into Boyd Creek.

TNT Production - (3 stage nitration of Toluene)

Soda ash, H_2SO_4, HNO_3, TNT isome
Na_2SO_3 was added to dissolve iso
This produced a dye red in color.
waste was channeled into Boyd Cr

Explosives production at Barksdale fluctuated widely. High production coincided closely with war-time periods. Between conflicts, production was geared more toward commercial explosives, for example, some explosives were produced for mining activities on the Iron Range.

During the final years the facility operated, some metal cladding was done and synthetic diamonds were produced. No production or process waste information has been obtained for these activities.

In December 1980, the Department received a report from James Thannum of Ashland. Mr. Thannum expressed concern over several observations he had made at the Barksdale facility:

1. Alleged sulfur and lead deposits with no plant growth evident;
2. A drainage pipe with a yellowish-orange liquid running toward Boyd Creek;
3. Downed power insulators and transformers, and;
4. An old dump with metal drums and assorted containers.

After meeting with Mr. Thannum it was decided that duPont should be contacted and an on-site investigation made. This was done and in January 1981, representatives of dupont, the DNR and Mr. Thannum toured the site. Results of that investigation are summarized in Appendix D. No immediate danger or environmental contamination was evident. It w decided to wait until spring 1981, to conduct a more thorough site investigation.

More detailed inspections were conducted on July 1, and September 3, 1981. During these inspections we again looked at the areas of concern expressed by Mr. Thannum and at other parts of the site which appeared to have been used in the past. No immediate environmental threats were observed during either site visit. The plan view in Appendix A shows the general facility layout and the areas addressed in our investigation. Soil, surface water and groundwater samples were taken. Analytical results and implications are discussed below.

Results and Discussion

On July 1, 1981, nine (9) samples were taken. This included four (4) surface water samples and five (5) soil samples.

On September 3, 1981, four (4) samples were obtained, including two groundwater samples and two soil samples.

Information about the samples and analytical results are summarized in Table 1.

Because of the size of the area, the diverse nature of the operation, and the number of sampling points, we concluded that specific analyses would be done only on a limited sample set. This set included samples 7 and 9 which were analyzed by Ral-Tech Laboratories in Madison. The analyses were limited by the standards Ral-Tech had available. Testing was done only for trinitrotoluene (TNT) and some associated breakdown products.

The remaining samples were analyzed for general indicators of soil or water quality degradation.

Water sample analysis and the heavy metals analysis of the soil was done by the Wisconsin State Laboratory of Hygiene. The remaining soils analyses were done by the University of Wisconsin Soils Laboratory.

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TABLE 1
ENVIRONMENTAL SAMPLE RESULTS FROM DUPONT'S BARDSDALE FACILITY

Sample Identification	Date	Cond. (umhos) cm	pH (su)	Temp. (°C)	CL- (mg/l) (ppm)*	COD (mg/l)	NO_2+ NO_3 (mg/l)	NO_3 (ppm)	SO_4 (mg/l)	NB**	2-NT	26-DNT	24-DNT	246-TNT	135-TNB	Comments
1)Soil sample in non-vegetated area southeast of water tower	7/1/81		3.5		8.5		5.0									This was the nitric acid production area sample taken from top 4-6" of soil.
2)Pipe effluent in drainage ditch	7/1/81	1850	3.5	15.4			.36		1100							Orange precipitate.
3)Drainage water in ditch near sulfur storage area	7/1/81		4.3	22			.02		120							H_2SO_4 production and sulfur storage areas are drained by this ditch.
4)Boyd Creek above Barrel Dump	7/1/81	110	6.7	18	2	39	.05		12							
5)Boyd Creek below Barrel Dump	7/1/81	120	7.0	18	2	41	.05		11							
6)Soil sample from base of Barrel Dump	7/1/81		7.2		1.5											Heavy metals analyses run- Pb - 10 ppm Cd - 1 ppm Cr - 5 ppm
7)Soil sample near 2nd berm on north side of the site (TNX)	7/1/81		5.6		4.0			75.5		4.64	4.72	4.80	6.60	5110	6.12***	This sample from a small bare patch in berm area. Possibly old trinitroxylene production area.
8)Soil sample from wetland south of the bermed area	7/1/81		4.1		10.0			2.5								This area appeared to be an old dump.
9)Soil sample from ridge and furrow area	7/1/81		7.0		7.0			.5		4.68	4.62	4.90	4.88	4.70	2.48	This is the ridge and furrow system used for treating the red water.
10)Well sample at front gate	9/3/81	365	6.5	9.5			.02		6							Well located at front gate-well was not bailed prior to sampling.
11)Power plant well sample	9/3/81	460	7.5				.02		2							Well is broken off improperly abandoned. Well was not bailed. Water level - 34'.
12)Soil sample from sandy soil in old nitramex area	9/3/81		5.6		.5			7.0								Sandy-gravelly area with little vegetation.
13)Soil sample from old burning area	9/3/81		6.5		.5			26.0								Burn area used for refuse and waste explosives disposal.

*ppm - parts per million from soils analysis
** Results in micrograms per gram
Definitions: NB - Nitrobenzene
NT - Nitrotoluene
DNT - Dinitrotoluene
TNT - Trinitrotoluene
TNB - Trinitrobenzene
*** TNT peak interferes with TNB peak

Samples numbered 1 through 6 were taken in areas where Mr. Thannum had expressed concern. Number 1 is a soil sample from a former nitric acid production area. There was very little vegetation growing in this area and no vegetation in the immediate area of the soil sample. The pH of this soil is 3.5. Sample 2 is from an underground pipe system. It appears this liquid is a combination of surface and groundwaters draining the nitric and sulfuric acid production areas. This liquid has a high conductivity, low pH and showed a very high sulfate (SO_4) concentration. Sample 3 was a water sample from a ditch draining the sulfur storage and sulfuric acid production areas. Relatively low pH--4.3, and a high sulfate concentration--120 mg/l were found. Samples 4, 5 and 6 are from Boyd Creek and the creek bed at the base of the Barrel Dump. Samples 4 and 5 are from Boyd Creek. Values of all parameters measured for these samples are within expected ranges. Sample 6 is a soil sample from the base of the dump. Heavy metals analysis was performed on this sample. For the analyses run, no unusual values were found.

Samples 7 through 13 were taken in areas where it appeared considerable activity had taken place or where historical records suggested a problem might exist. Sample 7 was a soil sample from outside the second berm in what was judged to be a former trinitroxylene (TNX) production area. The entire area was heavily vegetated except for the sampling location. This 2 to 4 square foot area was sampled because no vegetation existed; it is likely not typical of the general area. The results show a relatively high nitrate concentration and very high levels of 2, 4, 6 trinitrotoluene (TNT). Several breakdown products of TNT were present also. Sample 8 was a soil sample from a small wetland just south of the TNX area. This was sampled as it appeared the area had at one time been used as a dum The pH of the sample is a bit low, but apparently not low enough to have any affect on vegetative growth. Sample 9 was from the ridge and furrow area used for "treating" the TNT red water waste. TNT and breakdown products were found. However, there were no extremely high concentrations noted. Samples 10 and 11 were groundwater samples. Sample 10 was from a well near the front gate and 11 was from an old well near the power house. The wells were not bailed prior to sampling so it is not known how representative the results are of the surrounding groundwater. The conductivities were somewhat higher than those of the creek, but not excessively high. Sample 12 was from a lightly vegetated sand and gravel fill in the Nitramex area. Nothing unusual was found in this sample. Sample 13 was from the burning area. This is where plant refuse and waste explosives were burned. The area was covered with cinders. Again, nothing unusual is noted in these results.

Discussion and Recommendations

This section will focus on the samples where results indicated possible environmental problems.

The area around sample 1 (HNO_3 production) has a soil pH which very probably inhibits revegetation. It is recommended this area be treated with a neutralizing agent to raise the near-surface (3-5 inches) soil pH to approximately 7.0. This should be done such that the neutralizing agent is mixed with and incorporated into the soil. Following neutralization the area should be seeded with suitable grasses.

Sample 2 shows low pH, and high conductivity, sulfates and nitrates. The low pH enhances dissolution and probably contributes to the other parameters being high. It is recommended the pipe be removed, the ditch filled in and the area graded to prevent future erosion. This will allow for infiltration and cleansing of this drainage water.

There were no problems identified with samples 4, 5 or 6. However, the barrel dump and surrounding areas should be cleaned up. The drums and other debris lying along the stream bed must be collected and buried. All dump sites adjacent to flowing water, particularly along Boyd Creek, must be cleaned up and the material landfilled. At the dump site where samples 4, 5 and 6 were taken, the rubbish must be pulled up and away from the creek and buried. The bank should be graded, then covered and seeded to minimize soil erosion. This area should be checked periodically and maintained until it is stabilized.

Sample 7 showed some potential problems. In particular, the TNT concentratic was quite high. The uniqueness of the small area where sample 7 was taken was mentioned previously. It is possible the high values are peculiar to the small unvegetated patch. However, the possibility also exists that some other factor inhibits vegetation growth and a substantial area around the north berms is contaminated with TNT. It is recommended further sampling be done by duPont to delineate the contaminated area.

These recommendations address the concerns of Mr. Thannum and the Department only for the areas mentioned and to the extent they were investigated. It is important to point out that the Barksdale site is very large and operated for many years producing a variety of explosives products. This investigation looked at only a portion of the site and the results should not be taken as representative of the remainder of the site nor as an endorsement by the Department that the site does not pose any environmental problems.

Conclusions

This investigation was performed to address the concerns of an Ashland, Wisconsin resident, James Thannum, over environmental pollution at duPont's Barksdale facility. Generally, the results show no immediate environmental danger in those areas of the site sampled. The sampling did not reveal any significant human health hazards in these areas either. There remain significant areas on this property which have not been evaluated.

The fact that the site is fenced and posted mitigates possible environmental and human health concerns. There are, however, several areas where cleanup work will eliminate gradual environmental degradation and aesthetical improve the site. At one location follow-up sampling is recommended. Should duPont transfer ownership of this property or propose any substantial change in its use, it is strongly recommended that a thorough evaluation be completed on the entire facility.

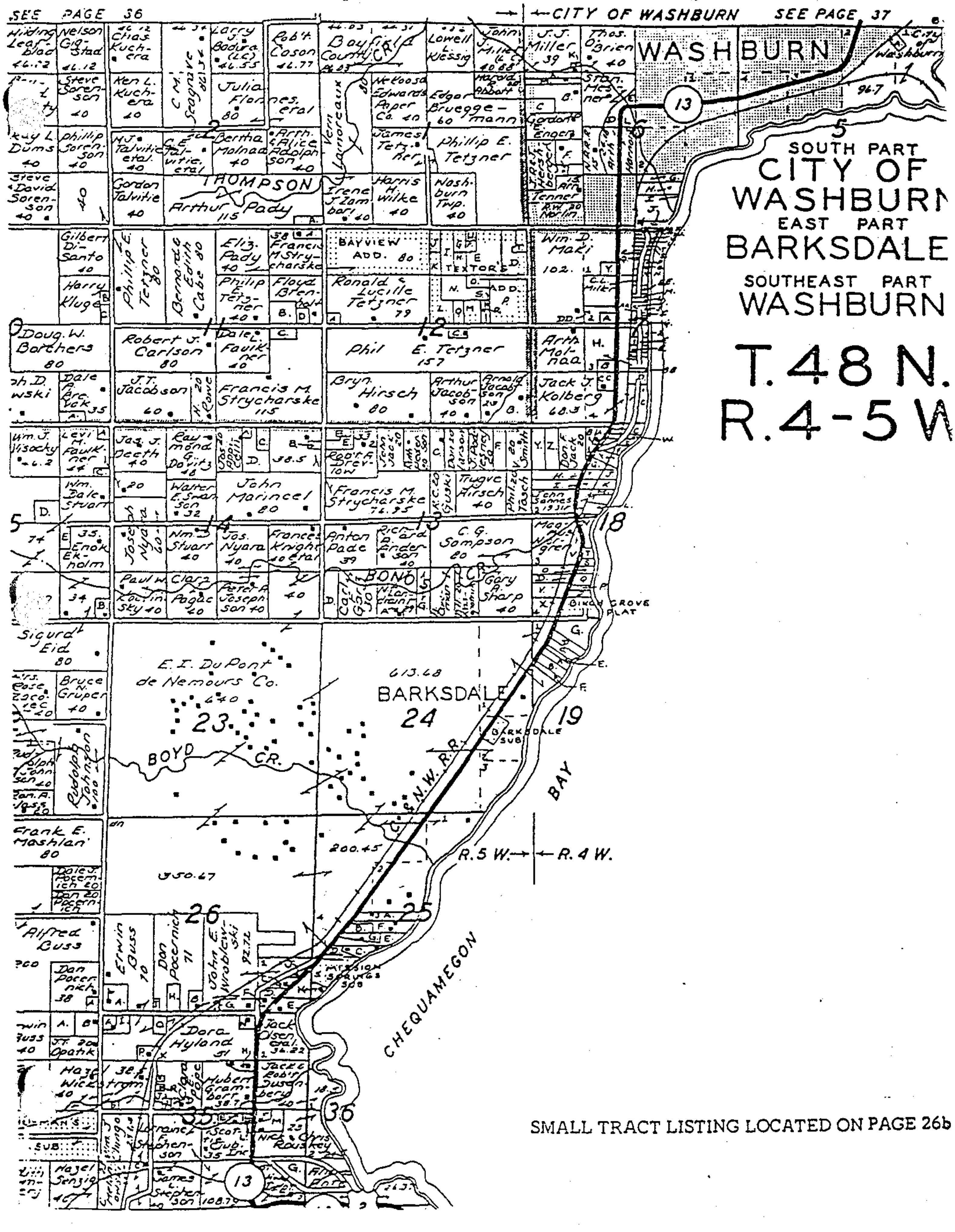
Follow-up work by the Department should document the extent the recommendatic made herein are implemented by duPont. Further sampling and analysis by the Department does not appear to be warranted at this time.

APPENDIX A

BARKSDALE MAPS AND PHOTOS

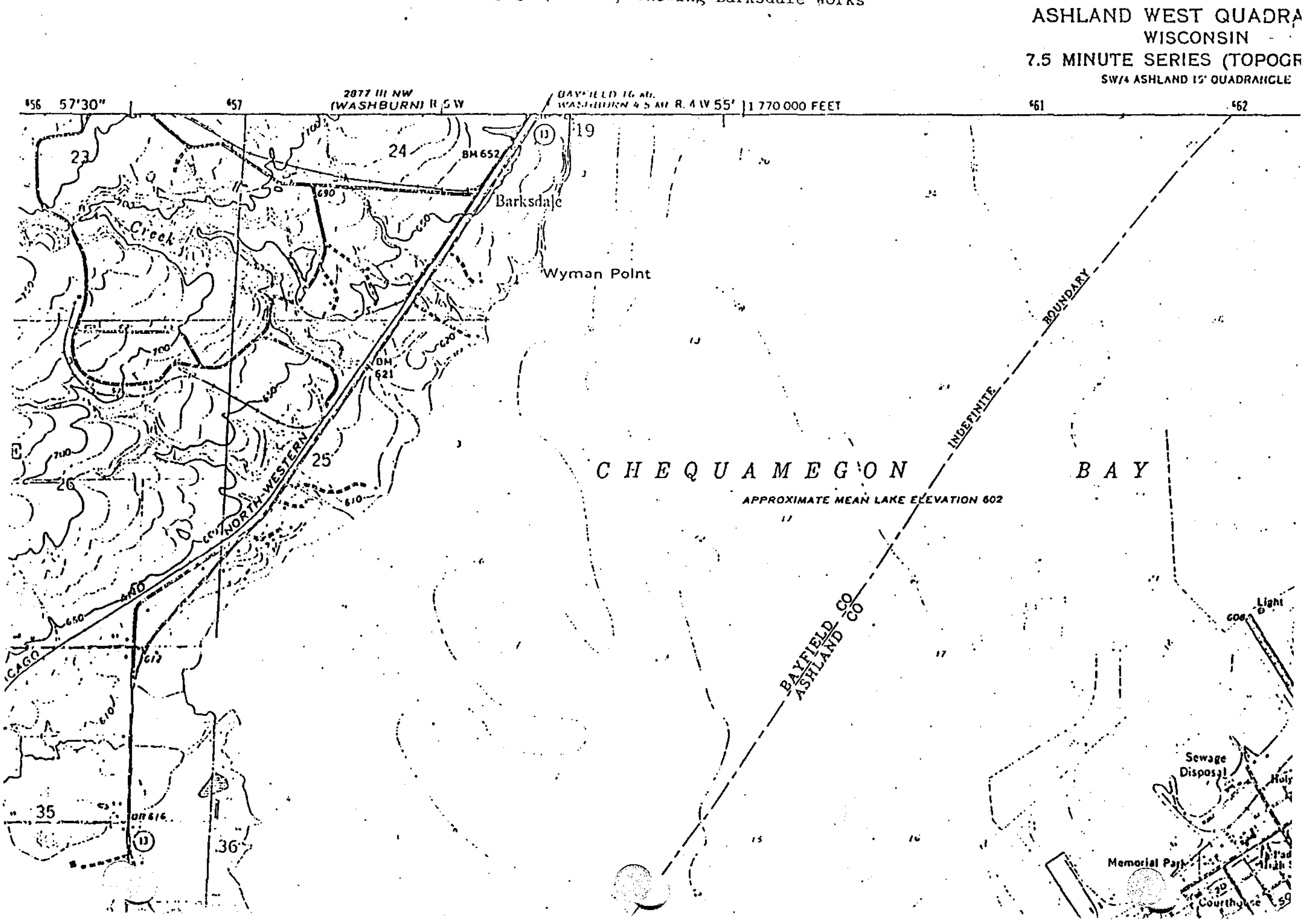
Figure A1

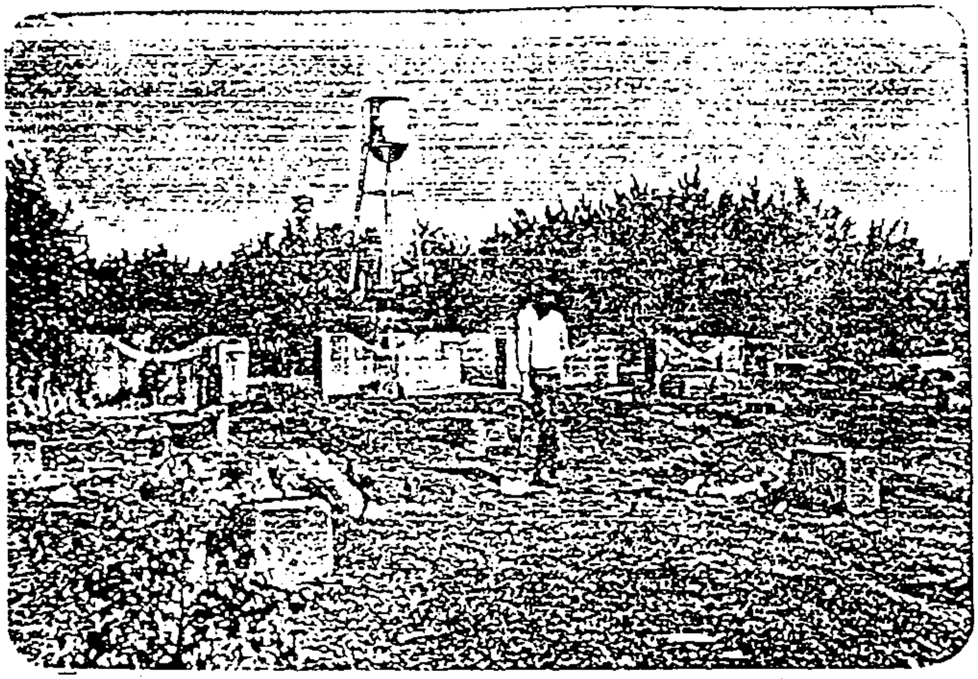
Plat Map of Barksdale Works and Surrounding Area



SMALL TRACT LISTING LOCATED ON PAGE 26b

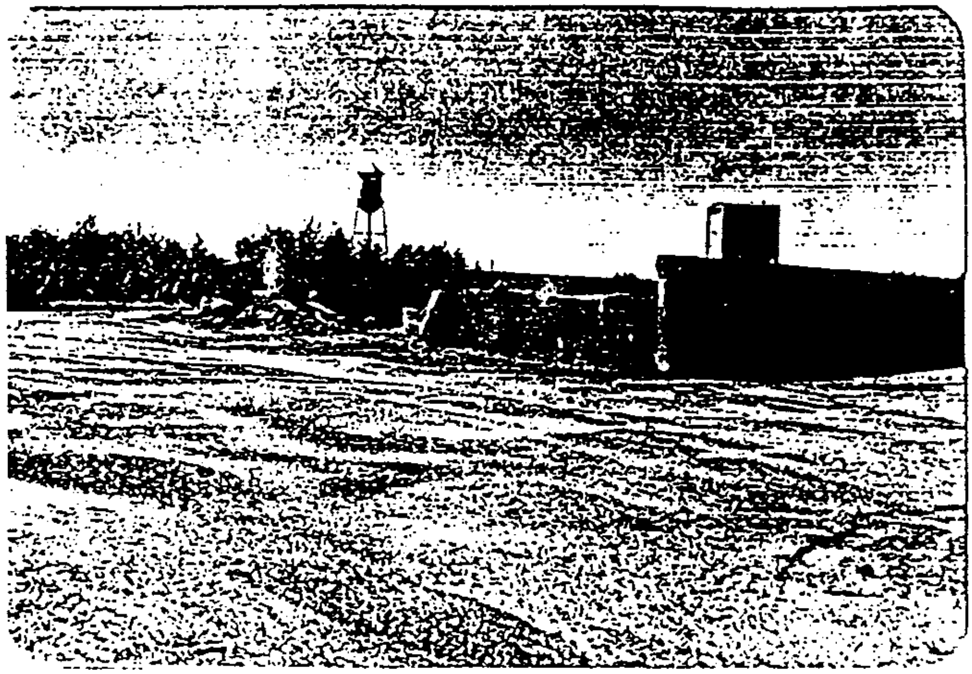
Figure 12
Topographic Map Showing Barksdale Works





Nitric Acid Production
Area - Sample
Location 1 (7/1/81)

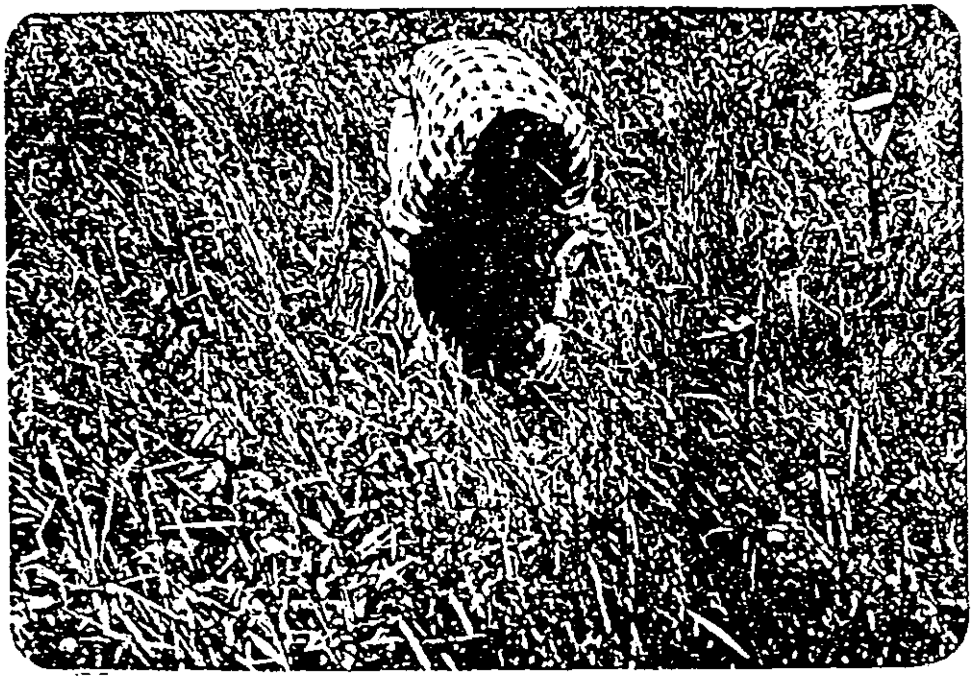
Drainage pipe with yellow precipitate
sample location 2 (7/1/81)



Sulfur Storage Bunker

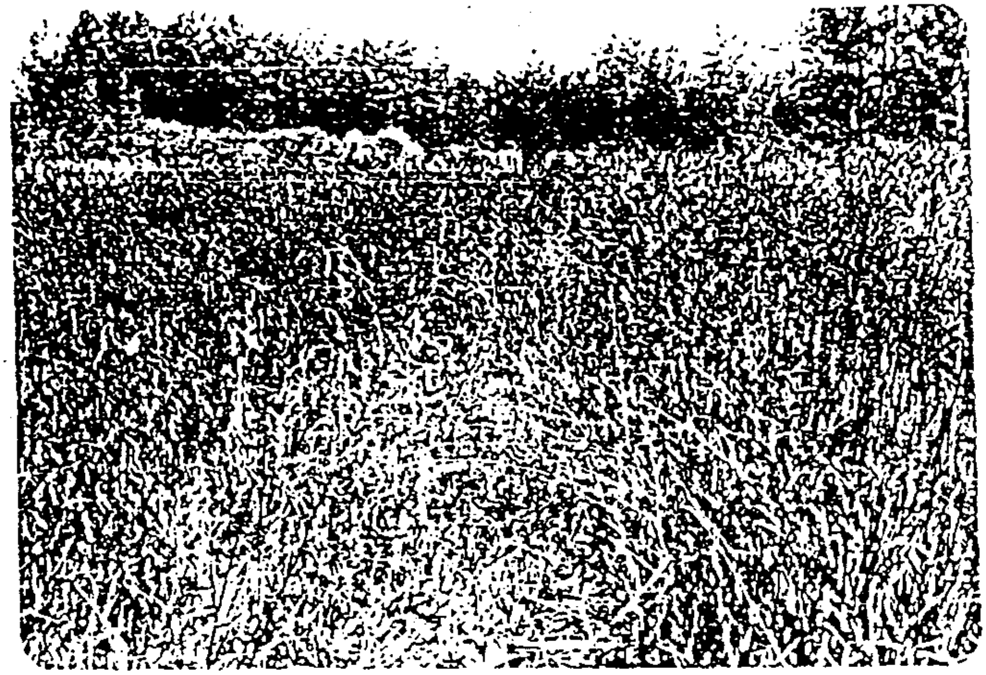
Stream draining sulfuric acid production area
Sample Location 3 (7/1/81)

Metal (barrel) dump adjacent to Boyd Creek
Sample sites 4, 5 and 6 located here (7/1/81)



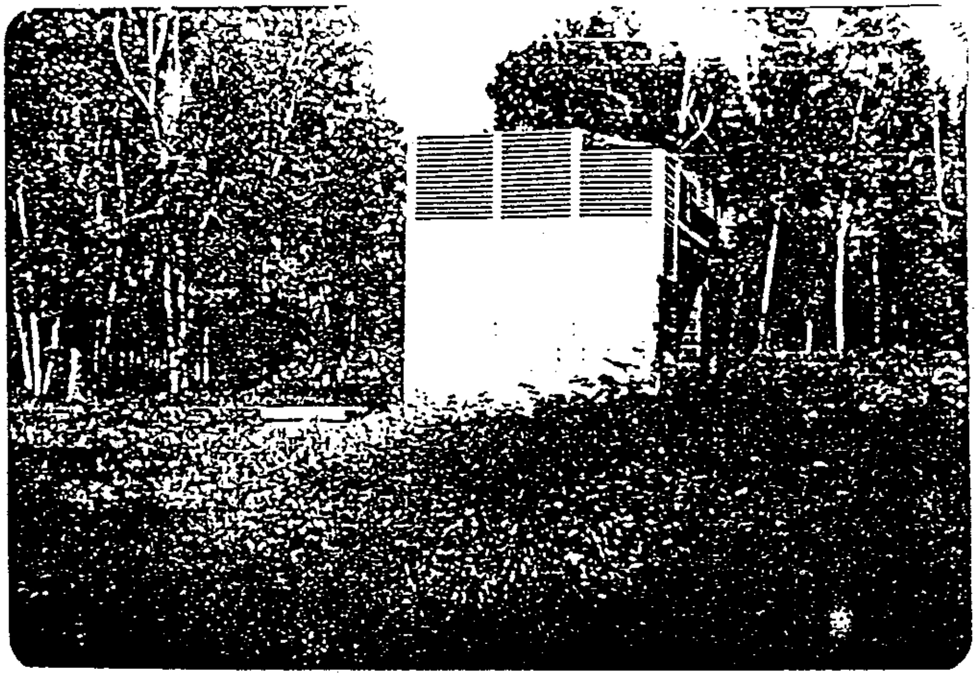
Barren soil patch in former TNX production area
Sample location 7 (7/1/81)

Marsh dump site south of TNX production area
Sample location 8 7/1/81)

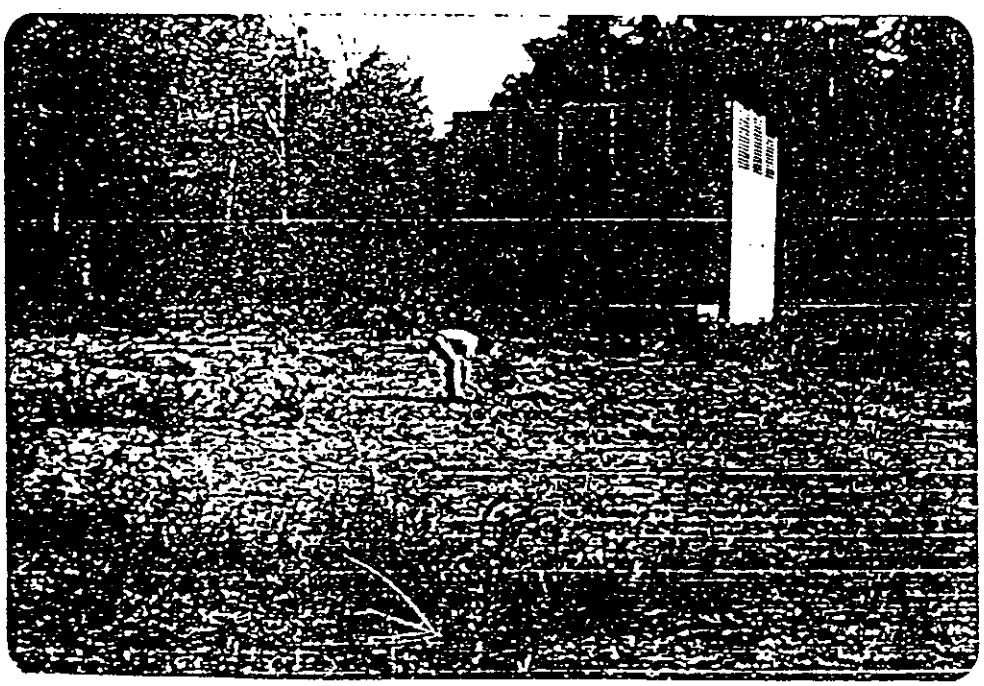


Ridge and furrows area for red water treatment
Sample location 9 (7/1/81)

Power plant well site
Sample location 11 (9/3/81)



Views of a portion of the Nitramex area
Sample Location 12 (9/3/81)



Views of burning area
Sample location 13 (9/3/81)

APPENDIX B

BARKSDALE PROCESS DESCRIPTIONS

FURNISHED BY DUPONT

Barksdale Works
General Process Descriptions

The Barksdale plant was in operation from 1905 to 1[illegible] and the major products manufactured were dynamite (thru 1961) and TNT (thru 1971). Nitric and sulfuric acid of various strengths and ammonium nitrate were manufactured for use in the production of dynamite and TNT.

Dynamite manufacturing used nitroglycerine, ammonium nitrate and sodium nitrate which were mixed with carbonaceous combustibles such as wood pulp. All solid waste from dynamite manufacturing was burned. Nitroglycerine (NG) required a soda ash washing for neutralization. An elaborate NG-wash water separation system was used to remove NG prior to discharging the wash water to the ditch. Spent acid was concentrated for reuse, and residual sulfuric acid was sold as a by-product. After production was discontinued, ditches in the NG manufacturing area were purposely "shot" with explosives.

TNT manufacturing required toluene and nitric acid for raw materials, and 109% sulfuric acid (40% oleum) was used to aid the reaction. Crude TNT was neutralized with soda ash and treatec with sellite (sodium sulfite) to remove undesirable isomers. This aqueous solution was red because of the presence of these isomers. As was standard practice, this "red water" was discharge to the ditch, although plans had been developed to incinerate the red water stream. This incinerator was never completed because TN operations were shutdown. All solid TNT waste was burned, and spent acid was concentrated for reuse. Residual sulfuric acid [illegible]as sold as a by-product.

Early processes for manufacturing nitric acid used sodium nitrate and sulfuric acid. A by-product of this reaction was sodium sulfate, which was initially kept on site and later was sold. Sodium sulfate is soluble in water, and none remains on sit to the best of our knowledge.

Beginning in 1928, nitric acid was produced by reacting ammonia and air over a platinum catalyst (AOP process). Spent catalyst was shipped off-site to be recovered for precious metals. The only discharge from the AOP process was cooling water which was used to remove the heat of reaction.

The first sulfuric acid produced at Barksdale used iron pyrite ore as a raw material to obtain sulfur. Cinders from this process were used to construct plant roadbeds. A later manufactur process for sulfuric acid production (O.V. plant, or oil of vitrio burned sulfur directly, and the SO_2 was passed through a precious metal catalyst to produce SO_3 before being absorbed in water to ma various acid strengths. Spent catalyst was refined off-site, and the only discharge from the OV plant was cooling water used to remove the heat of reaction.

As a part of the acid area shut-down, all equipment was washed and neutralized with soda ash prior to discharge. Ditches were monitored for pH to determine that neutralization was complete. Over 70 tons of soda ash were consumed in this clean-up.

Other products produced on-site were mixes of the ingredients already discussed (i.e., nitramex® was a blend of TNT, ammonium nitrate, and sodium nitrate). Any waste from these operations was burned. Typical waste would be spoiled containers, floor sweeping, and other combustible material.

APPENDIX C

EXPLOSIVES PLANT PROCESSES AND WASTE STREAM DESCRIPTIONS

FOR TNT, NG AND DYNAMITE

5.4.1 Typical Plant Process and Waste Stream Descriptions

5.4.1.1 Manufacture of Basic Explosives

TNT Production

TNT manufacture involves the nitration of toluene with a mixture of nitric acid and fuming sulfuric acid (oleum). The sulfuric acid acts as a catalyst and a dehydrating agent, absorbing and reacting with the water which is formed by the nitration reactions. The operation may be batch type ("old" technology) or continuous ("new" technology). Although in 1973 both methods were being used for TNT production, plant modernization programs planned for the Army ammunition plants (AAPs) call for replacement of all the remaining existing batch TNT lines with the new Canadian Industries Limited (CIL) continuous TNT lines.

Figure 5-29 is the schematic flow diagram for the batch TNT process and the associated satellite operations.* (The flow diagram is for the Joliet AAP which was the largest TNT producer in 1973). The nitration reactions are carried out in three consecutive batch units referred to as "mono-", "bi-", and "tri-" houses. The feed chemicals to the mono-house are toluene and the waste acid from the bi-house which is fortified with 60% HNO_3. The charge is allowed to settle, the waste acid is transferred to a storage tank (for subsequent recovery), and the partially nitrated toluene (mono oil) is pumped to the bi-house where further nitration is effected in the presence of waste acid from the tri-house fortified with 60% HNO_3. The nitrated product (bi oil) from the bi-house is pumped to the tri-house where the feed acid is a mixture of 98% nitric acid and oleum. The nitrated product from this third-stage operation is crude TNT containing α-TNT (2,4,6-trinitrotoluene) which is the desired product, and TNT isomers which are the impurities. The crude TNT is gravity fed to the wash house for purification.

The purification of crude TNT involves crystallization in water, neutralization of free acid with soda ash and solubilization and removal of undesirable nitrated products by treatment with a solution of sodium sulfite

*The satellite operations, with the exception of Red Water Disposal, will not be considered in this study. (Red Water Disposal is discussed in Section 6.4.1.)

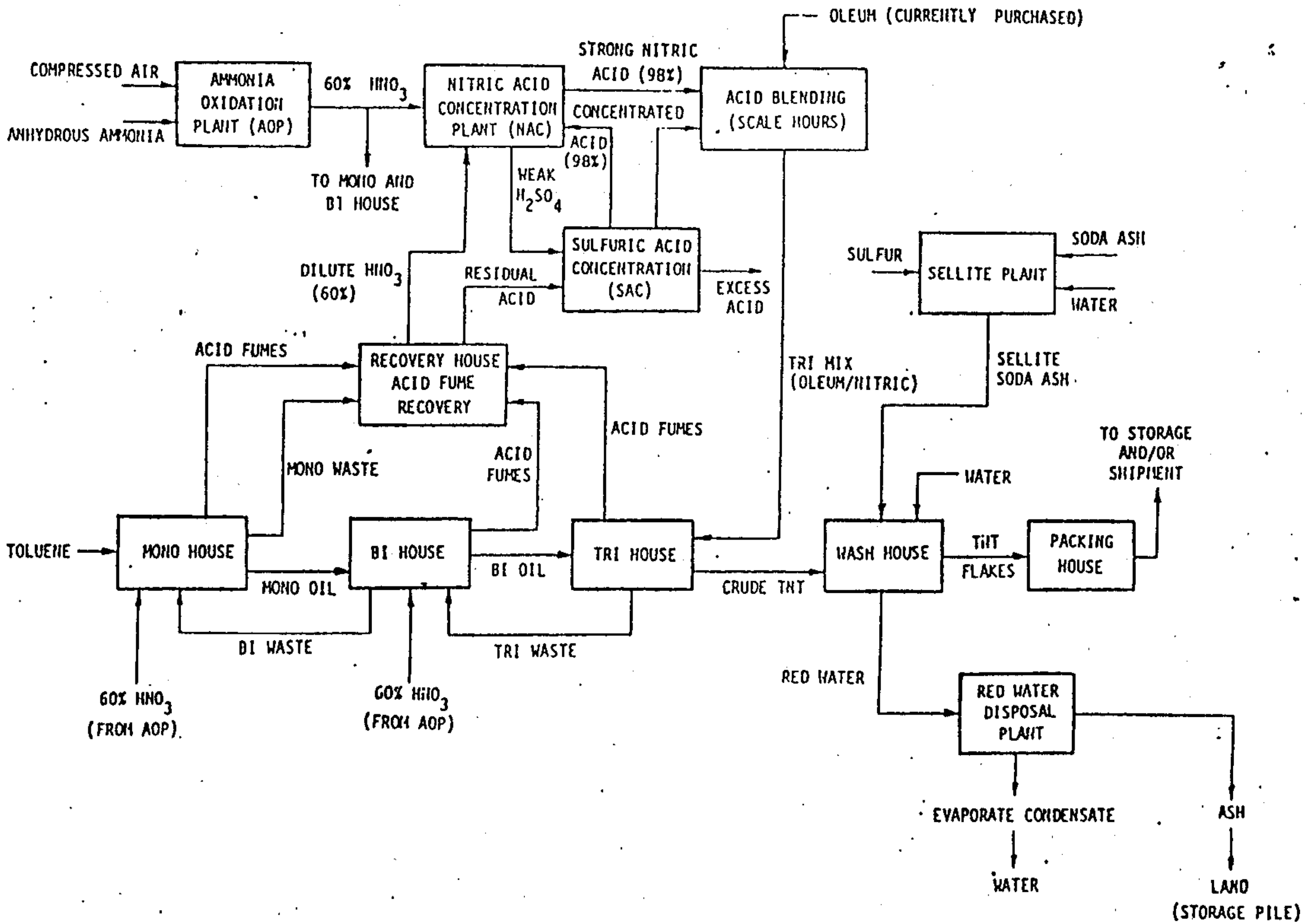


Figure 5-29. Batch Process TNT Manufacturing and Satellite Operations

(96)

(sellite). The wastewater from the sellite purification stage is the "red water" which is sent to the red water treatment plant for disposal by evaporation/concentration and concentrate incineration. The TNT slurry is transferred to a filter tank where it is washed and filtered on a screen leaving layers of TNT crystals. The crystals are reslurried with water and pumped to a melt tank where TNT is melted and most of the water is removed by evaporation. The molten product is run into hot air driers for the removal of residual water. The water-free product is solidified on a water-cooled flaker drum and the resultant film is removed in the form of small flakes by scraping with a beryllium blade scraper. The flake TNT is boxed and sent to a packing house for transfer to the magazine storage area.

Continuous TNT lines were in operation at Radford AAP (Va.) in 1973. As of September 1974, when Joliet AAP was visited, three continuous TNT lines were expected to become operational soon and three additional lines were under construction.* In the production of TNT by the continuous process, the nitration of toluene is carried out in six nitrator-separator stages with the organic phase (toluene-nitrobody mixture) flowing countercurrent to the acid phase. Nitric acid fortification is provided at intermediate points in the process. The first and third nitration stages have two nitration vessels per separator, whereas the remaining four stages have only one nitration vessel per separator. Extensive instrumentation provides for safe operation and automatic process control. If the process temperature in a nitrator vessel exceeds a pre-set level, the feed to the nitrator is automatically shut off and the contents of the nitrator and separator are automatically discharged into drowning tubs. For TNT purification, the crude TNT first passes through a mixer-settler washer where five separate countercurrent water washes remove the free acids. The acid wash is returned to the second nitrator as acid make-up. The TNT flows through two sellite washers in series where it is neutralized with soda ash and treated with sodium sulfite. Each of the sellite washers is followed by a separator which separates the aqueous phase (red water) from the purified

*Flow diagrams for TNT production by the continuous process have not been given due to time and effort constraints.

TNT phase. The dilute red water from the second separator is returned to the first separator, and the more concentrated red water from the first separator is sent to the red water treatment plant. The sellite-treated TNT receives final countercurrent water washes and is slurried and pumped to the finishing building for drying, flaking and packaging.

The major sources of aqueous wastes in TNT manufacturing are red water, spent acids, acid spills, TNT spills, cooling water, and overflows from catch basins and drowning tubs. As indicated in Figure 5-29, the red water is disposed of in the red water treatment plant and the spent acids are treated in the acid recovery facilities. The remaining wastewaters from TNT manufacturing are treated (usually in combination with other plant wastewaters) prior to final disposal. The major objectionable constituents of these wastes are TNT particles, nitrobodies, sulfate, nitrate, acidity (low pH), and color (due to the presence of nitrobodies). The gaseous wastes in the TNT manufacturing are acid fumes which evolve from the nitration and separation vessels. These fumes are withdrawn by the application of a constant suction above the tanks and sent to the fume recovery facility (see Figure 5-29) for treatment/disposal. The solid wastes associated with TNT manufacturing are scrap TNT, and settled TNT sludges collected in sumps in the TNT wash and recovery houses. As discussed in Section 6.4.1, the current disposal method for waste explosives is open-burning.

Table 5-21 presents the material balance for batch TNT production and associated satellite operations. The data are for Joliet AAP and are based on 1969 production and operating conditions. From the standpoint of pollutant discharges to the environment, somewhat lower values would be expected for the present-day operation due to improvements in process control and housekeeping and increased environmental awareness on the part of operating personnel and plant management. Material balance data for the continuous TNT lines are presented in Table 5-22. These data were obtained from Radford AAP (Radford, Va.) which in 1973 operated three CIL continuous TNT lines.

Nitrocellulose (NC) Production

Nitrocellulose is produced by nitration of cellulose (wood pulp or cotton linters). A mixture of nitric and sulfuric acids is used for nitration with the sulfuric acid acting as a catalyst and dehydrating agent. A block the future this loss of NC fines will be significantly reduced when the neutral boil wastewater is isolated and treated separately by centrifugation. Based on data for Radford AAP, for a production rate of 66,000 kg/day and with a considerable amount of water recirculation, the total volume of the final wastewater effluent from NC production is estimated at 9500 m^3 per day (2.5 million gallons per day). The major solid waste from the process is contaminated NC which is estimated at 1-2 percent of the NC production. Acid fumes are the major air pollutants from NC production.

Plant modernization program for Radford AAP calls for the replacement of the batch operation with a continuous NC production process. Table 5-23 presents mass balance data for the proposed continuous lines. The data are based on the production of 50 percent linters NC and the use of Delaval centrifuges for the removal of NC fines from wastewaters.

Nitroglycerin (NG) Production

Nitroglycerin is manufactured by a closely controlled reaction between glycerin and a mixture of nitric and sulfuric acids. The reactor is equipped with cooling coils through which a cold brine solution is circulated. Both batch and continuous (Biazzi) processes are in current use. One commercial nitroglycerin manufacturing plant uses a mixture of glycerin and ethylene glycol as the starting material; the product obtained in this plant is a mixture of nitroglycerin and ethylene glycol dinitrate.

Following nitration, the NG is separated from the spent acid by gravity separation and purified by washing with water and with a solution of sodium carbonate. Most facilities are equipped with settling pits and catch basins for the capture and return to process of most of the nitroglycerin particles entrained in the wastewaters. At Radford AAP, the spent acids are recovered and reused. Steam is used for denitrifying the spent acid at one commercial facility. At this facility, the effluent steam containing nitric acid is discharged directly to the atmosphere, and the sulfuric acid is stored in a lagoon for sale as a by-product. A block flow diagram for NG production is presented in Figure 5-31. Table 5-24 presents the material balance for NG production (based on operating conditions at Radford AAP).

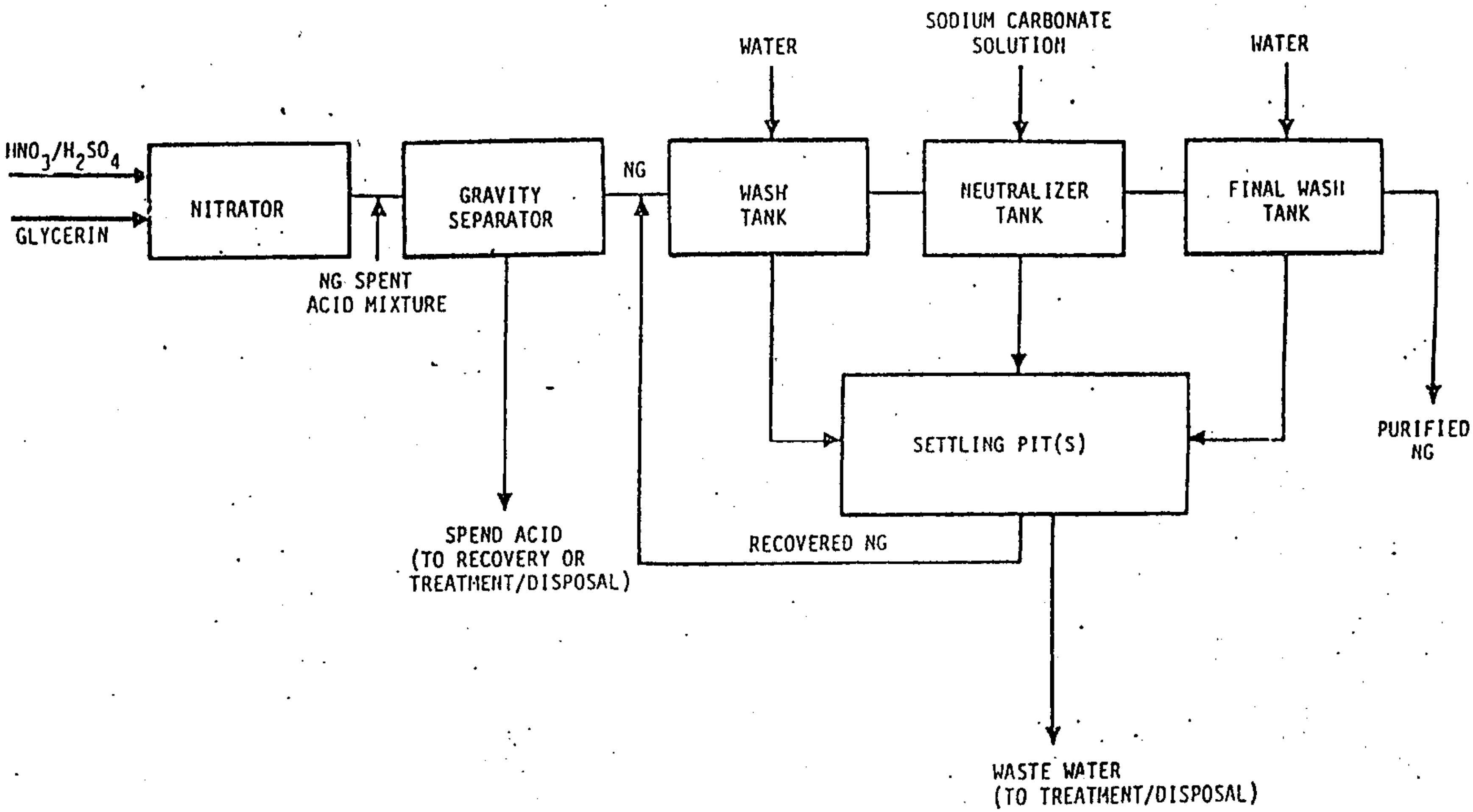


Figure 5-31. Schematic Flow Diagram for NG Production

Table 5-24. Mass Balance Data for Nitroglycerin (NG) Production (kg per kg NG Produced)

Mixed Spent Acid Input	2.13
Glycerin	0.42
Soda Ash	0.12
Spent Acid	0.15
Waste water	6.25
NG Lost to Waste water	0.006

properties and contain RDX or HMX as their prime ingredient. The production operation involves addition of RDX (or HMX) to various explosives (e.g., TNT) and nonexplosive (e.g., wax) compounds to produce a plastic bonded material or a solidified end product. The make-up of a number of major military explosive compositions are presented in Table 5-26.

Based on the weekly Burning Ground record for May 20 to July 22, 1974, and the 1973 production data,[18] the solid waste generated in the formulation of Composition B is estimated at 0.0005 kg of waste per kg of final product.

Dynamites

Although there are many different dynamite formulations, most commercial dynamites contain nitroglycerin and sodium and/or ammonium nitrate as their major ingredients. Many dynamites are formulated to the customer's specifications and some also contain a number of proprietary ingredients. The most common ingredients of dynamites are listed in Table 5-27. Typical composition for "straight" dynamite with "active" base (sodium nitrate) is presented in Table 5-28.

Dynamite formulation involves, first, mixing ammonium and/or sodium nitrate with various nonexplosive ingredients. Nitroglycerin is then added and the product is transported to a cartridge house for packaging into waxed cardboard boxes or plastic tubes for final shipment or storage in magazines.

Wastes from dynamite formulation originate from spills, off-spec products, and equipment clean-up. A waste generation factor of 0.3 percent of the production rate is estimated for the formulation of dynamite.[57]

Ammonium Nitrate-Fuel Oil Mixture (ANFO)

In 1973 ANFO compositions accounted for close to 70 percent of all commercial explosives used. ANFO is a mixture of ammonium nitrate (about 94 percent) and fuel oil (about 6 percent) to which may be added a variety of minor ingredients such as aluminum powder, ferrophosphate, coal, calcium silicate, Atticote, and mineral oils. Some ANFO compositions may contain up to 5 percent aluminum powder. ANFO formulation may be a batch or a continuous

Table 5-26. Makeup of Major Explosive Compositions

Explosive Composition	Principal Ingredients
Composition A-3	RDX (91%), Wax (9%)
Composition B	RDX (60%), TNT (39%), Wax (1%)
Composition C-4	RDX (91%), Polyisobutylene (2.1%), Motor oil (1.6%), di(2-ethylhexyl) sebacate (5.3%)
Cyclotol 70/30	RDX (70%), TNT (30%)
Octol 70/30	HMX (70%), TNT (30%)
Octol 75/25	HMX (75%), TNT (25%)

Table 5-27. Common Ingredients of Dynamites

Nitroglycerin
Ammonium Nitrate
Sodium Nitrate
Sodium Chloride
Calcium Carbonate
Sulfur
Nitrocellulose
Phenolic Resin Beads
Bagasse
Sawdust and Wood Pulp
Coal
Corn Meal and Corn Starch
Trace Inorganic Salts
Grain and Seed Hulls and Flours

APPENDIX D

SUMMARY OF JANUARY 1981 BARKSDALE SITE INSPECTION

Northwest District Headquarters
Box 309
Spooner, Wisconsin 54801

January 26, 1981 4400

Mr. Riley Williams
E. I. DuPont Company
PO Box 68
Seneca, Illinois 61360

Dear Mr. Williams:

This letter will document the tour of the E. I. DuPont facility at Barksdale, Bayfield County, Wisconsin. On January 16, 1981, Bruce Lawrence, Environmental Coordinator, and Stanley Bye, Occupational Health Coordinator, from DuPont's Seneca, Illinois facility accompanied Gary LeRoy and Barry O'Flanagan, Wisconsin Department of Natural Resources (WDNR), and James Thannum, student of Northland College, on the facility tour. The objective of the visit was to investigate concerns of environmental pollution expressed to WDNR by Mr. Thannum.

Initially, we discussed the operation of the plant as recalled by Mr. Bye. The plant was in operation from 1905 through 1976. The major products were dynamite, produced until 1961 and TNT, produced until 1971.

The processes and associated wastes we discussed are as follows:

1) Ammonium nitrate—no waste;
2) Nitric and sulfuric acids—cooling water and spilled sulfur;
3) Dynamite—neutralization wash from production of nitroglycerine and;
4) TNT—red water from washing the crude TNT.

These waste streams were, apparently, liquid and were all channeled into Boyd Creek. Mr. Bye said he did not recall any sludge-like wastes being produced.

Mr. LeRoy asked about the solid wastes that were produced on the site. Specifically, the garbage, sweepings and other refuse which presumably would be generated at a facility this size. Mr. Bye indicated there was a "burn area" on the site where material of this sort was openly burned. We did not get a chance to inspect the "burn area".

I inquired about wells on the site. Stanley Bye said there had been a number of wells, but that he did not know their location nor their present disposition. He said the drinking water was pumped from a well near the main entrance on the east side of the site. Apparently, this well is still in place as there is a wooden shelter sitting on its location.

The investigation of the site was directed toward the items Mr. Thannum had reported. Specifically we looked for:

1) Sulfur and lead deposits with no plant growth evident;

2) A "sewer" pipe with a yellowish-orange liquid running toward Boyd Creek;

3) Downed power insulators and transformers and;

4) An old dump with metal drums and assorted containers.

The sulfur deposits were located near a concrete foundation. There were a number of small sulfur "nuggets" laying on the gound in the immediate area. This was, according to Mr. Bye, a sulfur storage area. There was no vegetation growing in the immediate vicinity. Apparently, this was also heavily travelled area with some cinder roadbeds present. We found no lead deposits.

The "sewer" pipe emptied into a ditch which drained toward Boyd Creek. There was frozen liquid in the pipe and trench, but it wasn't a yellowish-orange color.

A downed power pole with several insulators was located, but no transformers were found.

Dump sites for metal containers were located along a portion of the creek bed and flood plain during the investigation. The one immediately adjacent to the creek was looked at more closely. There were many types and sizes of containers. All visible containers were rusted and appeared empty with either the containers being punctured on the top or the bung removed. Some of the containers, including barrels, had washed downstream a distance. Gary LeRoy indicated to Bruce Lawrence that it would be necessary to clean the dump site up as it was, at the least, an aesthetic nuisance. The extent of the dump sites was impossible to determine because of the snow cover and frozen ground.

Only part of the site was toured and the portion observed wasn't investigate in enough detail to substantiate or refute all the concerns of Mr. Thannum and the Department. I told Messrs. Bye and Lawrence that there appeared to be no imminent hazards on the site, consequantly, there is no need for any immediate action. However, I indicated that I believe a follow-up inspection of the entire site this spring after the vegetation is up is necessary to resolve this issue. Please do not attempt to clean up the dump sites mentioned above before we have an opportunity to more fully evaluate them this spring. The spring inspection will potentially include soils, surface water and groundwater sampling. I will contact DuPont this spring concerning this second inspection.

This is a brief summary of our discussions and facility tour. I would like to thank you for the cooperation shown in this initial contact. If you have any questions concerning this letter, please contact me at 715-635-2101.

Sincerely,

Barry D. O'Flanagan
Hazardous Waste Specialist

BDO:sw
cc: T. Jerow--Brule

JUL-81 WDNR

July 1981 WDNR

K

TABLE 1
ENVIRONMENTAL SAMPLE RESULTS FROM DUPONT'S BARKSDALE FACILITY

Sample Identification	Date	Cond. (umhos/cm)	pH (su)	Temp. (°C)	CL- (mg/l) (ppm)*	COD (mg/l)	NO_2+NO_3 (mg/l)	NO_3 (ppm)	SO_4 (mg/l)	NB**	2-NT	26-DNT	24-DNT	246-TNT	135-TNB	Comments
1)Soil sample in non-vegetated area southeast of water tower	7/1/81		3.5		8.5		5.0									This was the nitric acid production area sample taken from top 4-6" of soil.
2)Pipe effluent in drainage ditch	7/1/81	1850	3.5	15.4			.36		1100							Orange precipitate.
3)Drainage water in ditch near sulfur storage area	7/1/81		4.3	22			.02		120							H_2SO_4 production and sulfur storage areas are drained by this ditch.
4)Boyd Creek above Barrel Dump	7/1/81	110	6.7	18	2	39	.05		12							
5)Boyd Creek below Barrel Dump	7/1/81	120	7.0	18	2	41	.05		11							
6)Soil sample from base of Barrel Dump	7/1/81		7.2		1.5											Heavy metals analyses run- Pb - 10 ppm Cd - 1 ppm Cr - 5 ppm
7)Soil sample near old berm on north side of the site (TNT)	7/1/81		5.6		4.0			75.5		4.64	4.72	4.80	5.60	5110	6.12***	This sample from a small bare patch in berm area. Possibly old TNT [illegible] production area.
8)Soil sample from wetland south of the bermed area	7/1/81		4.1		10.0			2.5								This area appeared to be an old dump.
9)Soil sample from ridge and furrow area	7/1/81		7.0		7.0			.5		4.68	4.62	4.30	4.26	4.70	2.48	This is the ridge and furrow system used for treating the red water.
10)Well sample at front gate	9/3/81	365	6.5	9.5			.02		6							Well located at front gate-well was not bailed prior to sampling.
11)Power plant well sample	9/3/81	460	7.5				.02		2							Well is broken off improperly abandoned. Well was not bailed. water level - 34'.
12)Soil sample from sandy soil in old nitramex area	9/3/81		5.6		.5			7.0								Sandy-gravelly area with little vegetation.
13)Soil sample from old burning area	9/3/81		6.5		.5			26.0								Burn area used for refuse and waste explosives disposal.

*ppm - parts per million from soils analysis
** Results in micrograms per gram
Definitions: NB - Nitrobenzene
NT - Nitrotoluene
DNT - Dinitrotoluene
TNT - Trinitrotoluene
TNB - Trinitrobenzene
*** TNT peak interferes with TNB peak

Raltech
SCIENTIFIC SERVICES
P O Box 7545 • Madison Wisconsin 53707 • 608/241-4471
A Division of Ralston Purina Company

REPORT

SEP 15 1981

DAVE STENSBY
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
BOX 7921
MADISON, WI 53707

RT LAB NO. 882779

ENTERED 07/31/81

REPORTED 09/11/81

IL SAMPLE: FIELD #6

RCHASE ORDER NUMBER NFB 93483

SC. ENV. ANALYSIS

	(MCG/G)
NITROBENZENE	4.68
2-NITROTOLUENE	4.62
2,6-DINITROTOLUENE	4.90
2,4-DINITROTOLUENE	4.88
2,4,6-TRINITROTOLUENE	4.70
1,3,5-TRINITROBENZENE	2.48

METHOD: USATHAMA # ANIL-50-30

THOD REFERENCES

SC. ENV. ANALYSIS
THOD LISTED ABOVE WITH RESULTS

Raltech Scientific Services
P.O. Box 7545 • Madison, Wisconsin 53707 • 608/241 4471
A Division of Ralston Purina Company

REPORT

SEP 15 1981

DAVE STENSBY
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
BOX 7921
MADISON, WI 53707

RT LAB NO. 882778

ENTERED 07/31/81

REPORTED 09/11/81

L SAMPLE: FIELD #4

CHASE ORDER NUMBER NRR 93483

C. ENV. ANALYSIS

	(MCG/G)
NITROBENZENE	4.64
2-NITROTOLUENE	4.72
2,6-DINITROTOLUENE	4.80
2,4-DINITROTOLUENE	6.60
2,4,6-TRINITROTOLUENE	5110
3,5-TRINITROBENZENE	6.12*

E LARGE 2,4,6-TRINITROTOLUENE VALUE INTERFERES WITH THE 1,3,5-TRINITRO-
NZENE PEAK, MAKING IT APPEAR AS A SHOULDER.
METHOD: USATHAMA # ANIL-50-30

HOD REFERENCES

3C. ENV. ANALYSIS
THOD LISTED ABOVE WITH RESULTS

LOCATION	DATE	TIME	DEPTH	ACCOUNT-#	LAB-SLIP-#	END-DATE	END-TIME
66MISC	810701		F000	100010	000848		

TEST-#	STORET-#	TEST--NAME--AND--UNITS	TEST-VALUE
		EXTRA INFORMATION ABOUT SAMPLE: OFLANAGAN	
		EXTRA INFORMATION ABOUT SAMPLE: F#8	
206	61503	LEAD SLUDGE SOL MG/K	10
205	61527	CADMIUM SLUDGE SOL MG/K	<1
192	61512	CHROMIUM SLUDGE SOL MG/K	5

***** COMMENT: SOIL SAMPLE BASE OF BARREL DUMP

7-1-81

1. GATE WELL - TRY TO SAMPLE LATER
2. PUMP HOUSE WELL - MAKE ARRANGEMENTS to CUT CAP - TAKE SAMPLE AND REPLACE.
3. PIPE Sample FE PCPT.
pH. 3.0-3.5 TEMP. 15.4 COND. 1850
4. field sample # 2 - SOIL SAMPLE
NITRIC ACID CONC. AREA - South of H_2O TOWER
3) 5. Drainage Ditch near sulfur Storage
Water Sample - ± 100 yds N. of sulfur storage area T. = 22.0 pH. = 4.35 Cond. = 63

6) 2nd Bermed in area TNX area
5) 7 TNX area wetland apparent disposal of barrels

Looked at RECTANGULAR pond - decided against sampling as veget. was abundant also wildlife
#6 Ridge and furrow - SOIL sample

At Bridge near Barrel Dump
pH 6.0 - cond 120 umhos Temp 18°C

#7 Creek - Pond - above barrel dump.
#8 soil at base of barrel dump.
#9. Creek - below barrel dump.

South magazine area intersection of two rds.
looks like underground storage tank.

COOPERATIVE EXTENSION PROGRAMS
UWEX University of Wisconsin—Extension
University of Wisconsin—Madison

Soil & Plant Analysis Laboratory, 806 South Park Street, Madison, Wisconsin 53715; 608-262-4364

DEPARTMENT OF SOIL SCIENCE

INSTRUCTION EXTENSION RESEARCH
College of Agricultural and Life Sciences

August 18, 1981
Acct. 900
Lab No. 8E0020

RECEIVED
AUG 1

Northwest District
Headquarters

MEMORANDUM

TO: Barry O'Flanagan
DNR, Box 309
Spooner, WI 54801

FROM: Soil/Plant Analysis Lab

RE: Results of analyses performed on 5 soil samples submitted Aug. 3.

Sample No.	pH	Cl^-	NO_3-N
		ppm	ppm
✓ 2	3.5	8.5	5.0
✓ 4	5.6	4.0	75.5
✓ 5	4.1	10.0	2.5
✓ 6	7.0	7.0	-0.5
✓ 8	7.2	7.0	1.5

"-" values = less than.

If you have any questions concerning these analyses, please feel free to contact us.

Encl.

/sf

LOCATION	DATE	TIME	DEPTH	ACCOUNT #	LAB SLIP #	END DATE	END TIME
09MISC	810701	0001		100010	000841		

TEST #	STORET #	TEST NAME AND UNITS			TEST VALUE
		EXTRA INFORMATION ABOUT SAMPLE: OFLANAGAN			
		EXTRA INFORMATION ABOUT SAMPLE: F#9			
116	00945	SULFATE	SO4-TOT	MG/L	11
097	00403	LAB	PH	SU	7.8
085	00631	NO2&NO3	N-DISS	MG/L	0.05
035	00940	CHLORIDE	CL	MG/L	<2
114	00095	CNDUCTVY	AT 25C	MICROMHO	120
234	00340	COD	HI LEVEL	MG/L	41

***** COMMENT: BOYD CREEK BELOW BARREL DUMP

LOCATION	DATE	TIME	DEPTH	ACCOUNT #	LAB SLIP #	END DATE	END TIME
09MISC	810701			100010	000840		

TEST #	STORET #	TEST NAME AND UNITS	TEST VALUE
		EXTRA INFORMATION ABOUT SAMPLE:	OFLANAGAN
		EXTRA INFORMATION ABOUT SAMPLE:	F#7
116	00945	SULFATE SO4-TOT MG/L	12
[illegible]	[illegible]03	[illegible] SU	6.7
085	00631	NO2&NO3 N-DISS MG/L	0.05
035	00940	CHLORIDE CL MG/L	<2
114	00095	CNDUCTVY AT 25C MICROMHO	120
[illegible]	[illegible]	[illegible] LEVEL [illegible]	39

***** COMMENT: BOYD CREEK ABOVE BARREL DUMP

REC[illegible]

JUL 23 1981

DNR - WCD

LOCATION	DATE	TIME	DEPTH	ACCOUNT-#	LAB-SLIP-#	END-DATE	END-TIME
66MISC	810701	0001		100010	000839		

TEST-#	STORET-#	TEST--NAME--AND--UNITS			TEST-VALUE
		EXTRA INFORMATION ABOUT SAMPLE: OFLANAGAN			
		EXTRA INFORMATION ABOUT SAMPLE: F#3			
131	00010	WATER	TEMP	CENT	22.0
096	00400	PH		SU	4.3
116	00945	SULFATE	SO4-TOT	MG/L	120
085	00631	NO2&NO3	N-DISS	MG/L	<0.02

***** COMMENT: DRAINAGE DITCH H2SO4 AREA

LOCATION	DATE	TIME	DEPTH	ACCOUNT-#	LAB-SLIP-#	END-DATE	END-TIME
66MISC	810701			100010	000838		

TEST-#	STORET-#	TEST--NAME--AND--UNITS			TEST-VALUE
		EXTRA INFORMATION ABOUT SAMPLE: OFLANAGAN			
		EXTRA INFORMATION ABOUT SAMPLE: F#1			
131	00010	WATER	TEMP	CENT	15.4
096	00400	PH		SU	3.5
116	00945	SULFATE	SO4-TOT	MG/L	1100
097	00403	LAB	PH	SU	3.4
085	00631	NO2&NO3	N-DISS	MG/L	36

***** COMMENT: PIPE EFFLUENT

LOCATION	DATE	TIME	DEPTH	ACCOUNT-#	LAB-SLIP-#	END-DATE	END-TIME
66MISC	810903	0001		100010	020073		

TEST-#	STORET-#	TEST--NAME--AND--UNITS			TEST-VALUE
		EXTRA INFORMATION ABOUT SAMPLE: OFLANAGAN			
		EXTRA INFORMATION ABOUT SAMPLE: F#4			
116	00945	SULFATE	SO4-TOT	MG/L	2
097	00403	LAB	PH	SU	7.5
085	00631	NO2&NO3	N-DISS	MG/L	0.02
114	00095	CNDUCTVY	AT 25C	MICROMHO	460

***** COMMENT: WELL SAMPLE POWER PLANT WELL

LOCATION	DATE	TIME	DEPTH	ACCOUNT-#	LAB-SLIP-#	END-DATE	END-TIME
66MISC	810903			100010	020072		

TEST-#	STORET-#	TEST--NAME--AND--UNITS	TEST-VALUE
		EXTRA INFORMATION ABOUT SAMPLE: OFLANAGAN	
		EXTRA INFORMATION ABOUT SAMPLE: F#1	
116	00945	SULFATE SO4-TOT MG/L	6
097	00403	LAB PH SU	7.7
085	00631	NO2&NO3 N-DISS MG/L	<0.02
114	00095	CNDUCTVY AT 25C MICROMHO	210

***** COMMENT: WELL SAMPLE AT FRONT GATE

OCT-85 BRETTING MANUFACTURING

Post-it® Fax Note 7671	Date 6/6/95	# of pages ▶ 12
To Wayne Peterson	From Dennis Johnson	
Co./Dept. Bretting Mfg	Co. Ayres Associates	
Phone # 715-682-5231	Phone # 800-678 4698	
Fax # 715-682-4138	Fax # 715-831-7500	

10-0479

AYRES ASSOCIATES

November 26, 1985

1 - Creek
2 - Surface
1 - Well
for the transaction TNT area
Livestock

Mr. Wayne Peterson
C.G. Bretting Mfg. Co.
P.O. Box 113
Ashland, WI 54806

Laboratory Analysis Results

Sample Receipt Date 10-24-85

Analysis	1	2	3	4
pH (lab)	7.6	7.6	7.2	6.9
Sp. Conductance, umho's at 25° C	90	275	175	N/S
Total Alkalinity, mg/l as $CaCO_3$	40	110	65	8
Total Hardness, mg/l as $CaCO_3$	48	135	95	33
Chloride, mg/l	3	2	2	2
COD, mg/l	42	29	39	75
Sulfate, mg/l	22	28	22	
Nitrate, mg/l as N	<0.01	0.33	0.079	
Organic Nitrogen, mg/l as N	0.08	0.07	<0.010	
Total Phosphorus, mg/l	<0.01	0.33	0.095	
Potassium, mg/l	4.5	5.0	5.4	
Iron, mg/l	10	8.1	11	0.38
Arsenic, mg/l	<0.001	<0.001	<0.001	
Barium, mg/l	0.15	0.24	0.15	
Cadmium, mg/l	<0.010	<0.010	<0.010	
Chromium, mg/l	<0.010	<0.010	<0.010	
Lead, mg/l	0.030	0.064	0.044	
Mercury, mg/l	<0.001	<0.001	<0.001	
Selenium, mg/l	0.006	0.003	0.007	
Silver, mg/l	<0.010	<0.010	<0.010	

< means "less than" the detection limit.

The samples were received by Owen Ayres and Associates, Inc. on the "Sample Receipt Date." The laboratory analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, 14th Edition, or other EPA approved methodologies.

We received less than 500 ml of sample #4, so not much could run on it.

We recommend a Coliform Bacteria analysis be run on all of the sites. This is a test which requires samples to be taken in sterile bottles and analysis

Mr. Wayne Peterson
Page 2
November 26, 1985

to be done within 6-12 hours of sampling. You may want to check with your County Health Department, they may be able to perform this for you.

If you have any questions or if we can be of further service, please feel free to contact us at your convenience.

Very truly yours,

Owen Ayres & Associates, Inc.

Clarence M. Stoffel
Clarence M. Stoffel, P.E.

CMS:bmo

DEC-86 WDNR

Seneca Works
December 5, 1986

BARKSDALE SITE VISIT ON 12/3/86 - J. D. PULLER

Went to site with Wayne Peterson and Scott Bretting of C. G. Bretting Manufacturing Company.

Met Lenard Conklin and Nancy Atzen (DNR) at the site at 10:00 a.m.

Conklin stated that Du Pont had nothing to do with the spill.

Conklin stated he worked for H. and R. Equipment of Wehauken, New Jersey at the time of the spill in 1972. Du Pont had hired them to take the transformers. The transformers were all setting in the area in front of the "Workers' Changehouse" near the road. They had a flatbed truck to put the transformers on and didn't want to carry them with fluid in them so they just dumped the fluid out on the ground at that spot where the transformers were setting.

Nancy Atzen took four samples as indicated on the attached map. We split samples and corresponded numbers on our samples. She then took a couple of pictures.

She indicated that she would contact Rad Mead when she got the results. She stated it may be a month before she got the results since their lab was running behind.

I agreed with Wayne Peterson that Rad would contact him after Rad received the results.

It was SNOWING, WINDY and COLD!!

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

NANCY ATZEN
ENVIRONMENTAL SPECIALIST
SOLID WASTE

...E AREA HEADQUARTERS
...ULE WI 54820

(715) ~~[illegible]~~
635-9600

(715) 682-5831

WAYNE E. PETERSON
PLANT ENGINEER

C. G. BRETTING MANUFACTURING CO.
P.O. BOX 113
ASHLAND, WISCONSIN 54806

JDP:ard

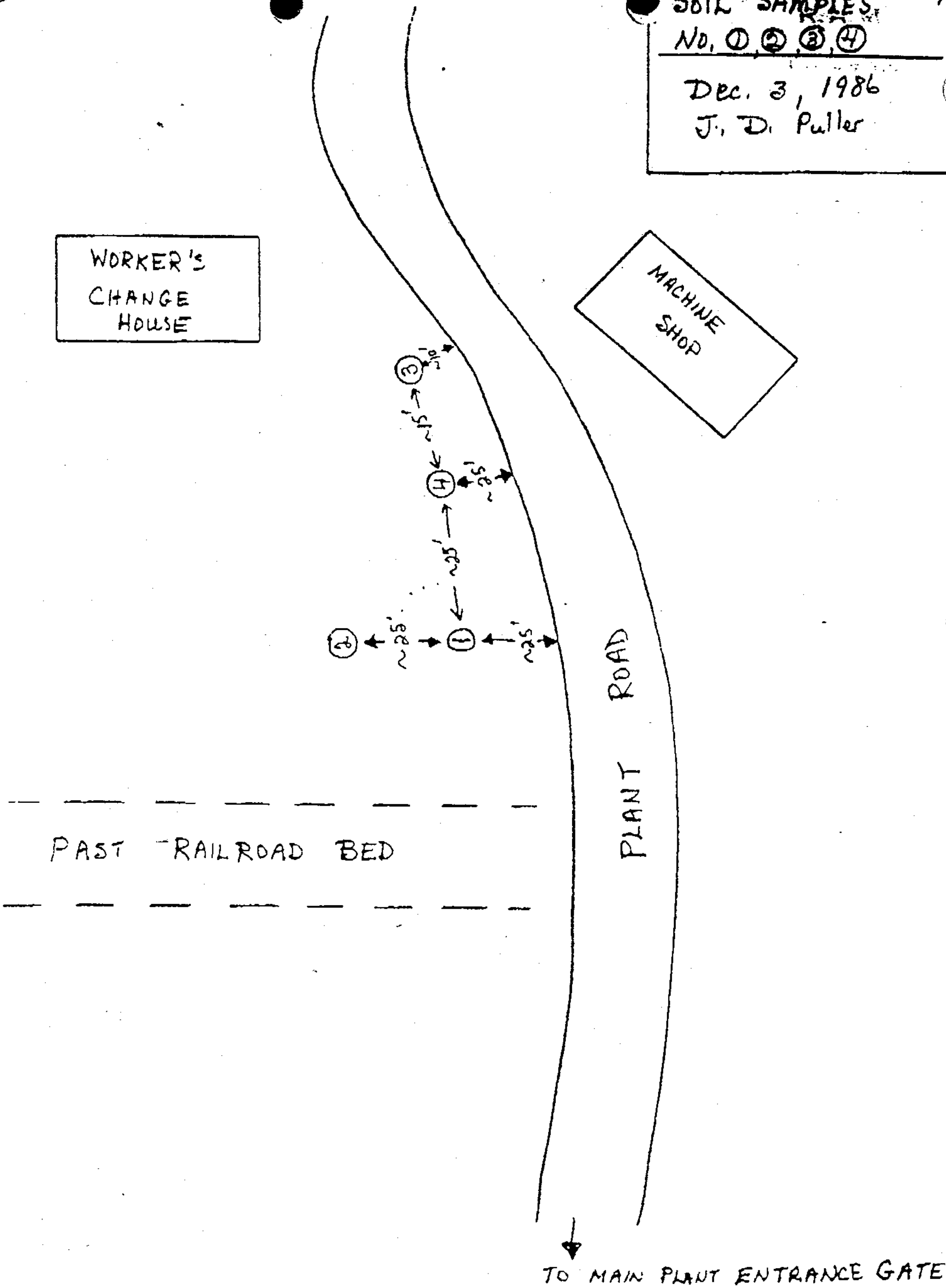
BARKSDALE

SOIL SAMPLES

No. 1, 2, 3, 4

Dec. 3, 1986

J. D. Puller



D-75)

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

Date: January 23, 1987

File Ref:

To: File

From: Nancy Atzen

Subject:

On 12/3/86 I accompanied Len Conklin (715) 373-2029, to the Barksdale Facility owned by Bretting Manufacturing of Ashland.

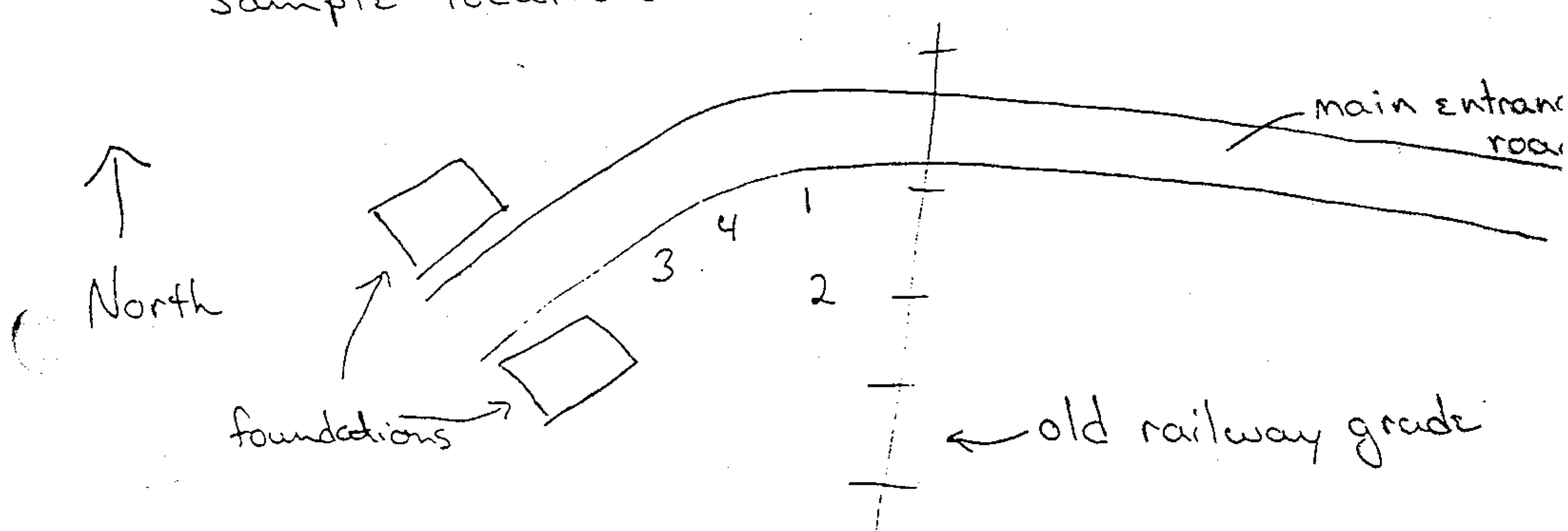
The purpose of the inspection was to attain soil samples in the area where Mr. Conklin states that the contents of 50-60 transformers were disposed of on the ground surface in 1972. This allegedly was done by the contractor H & P Equipment of Weehaken, NJ.

Four samples were taken from 4" diameter holes about 6" in depth. There was some question whether the area had subsequently been covered over with soils. Len stated that the surface was cinder at the time the disposal took place. Some cinder appeared to be in samples #1 and #4. Cinder was not found at the immediate surface of any of the 4 sample points.

Samples were split with Doug Puller of DuPont who used plastic rather than glass sample containers. Also present at the site were Wayne Peterson and ___________ Bretting, both of Bretting Manufacturing. Lab results showed less than .05 ug/gm of PCB in all four soil samples.

NA:sl

Sample location:



Department of Natural Resources

COMPLAINT OR INFORMATION RECORD

Form 4100-48 Rev. 1-83

10433

HAZARDOUS DUMP -

Date Received: 1-5-86	Time Received: 7 Am ☐ AM ☐ PM	Violation: Dumping of PCB's + transformers
Name of Caller: Lew Conklin	Return Call ☐ (✓)	Date of Violation: 1972
		Time of Violation ☐ AM ☐ PM
Street or Route: 319 W. 6		Location of Violation: Du Pont Property So. of Washburn
City, State, Zip Code: Washburn, Wi		Suspect:
Telephone Number (include area code): 715-373-2029		Suspect's Vehicle Make: Unknown
Model:	Color:	Lic. No. and State:

Who was involved / What took place / When did it happen / Where did it happen / How did it happen / Method and equipment / Disposition

Complaint relayed to me by J. Riechoff, who recieved call from Sen. Theno office in Madison. Lew says he worked for Du Pont when the plant was dismantled. they had about 350 transformers that were dumped on the grounds + then hauled away by a company from New Jersey. He will show us the location of the dumping spot. Bjork says he recalls a similar complaint several years ago that was relayed to Wash... at [illegible]

Received by	Copy 1-Action Copy	Copy 2-Informational	Copy 3-Area Warden (Warden Supervisor)	Copy 4-Preparer
D. Tnoke	BARRY O'Flanigan	C-118	C/41	D. Tnoke

ACTION COPY TO

NWD

Department of Natural Resources

ORGANIC CHEMISTRY-SOLID WASTE PROGRAM
Form 4400-85
Rev. 10-84

Bill To: ☒ Hazardous Waste ☐ Non-Hazardous Waste ☐ Spill Program

Facility Name: Barksdale

Lic No. 0

Field No. Barksdale 1

County: Bayfield

County Code: 04

DNR Point ID No.

Collection Date: 12/03/86 (MM/DD/YY)

Time (24-Hour Clock): 10:15 (HH:MM)

Sample Location: 12 feet from road, 15 feet from tracks

Sample Description: Topsoil from 0-6" in depth

Send Report To:
Name: Nancy Atzen
Address: Box 309
City, State, Zip Code: Spooner, WI 54801

Collected by: Nancy Atzen

Telephone: (715) 635-4060

Account Number: 100020 (For Lab Use Only)

☐ Monitoring Well (W) ☐ Waste (B)
☐ Surface Water (W) ☐ Oil (O)
☐ Private Well (W) ☒ Soil (S)
☐ Wastewater (E) ☐ Leachate (L)
☐ Lysimeter (W) ☐ Other

Enforcement: ☐ Yes ☒ No

Split Sample: ☒ Yes ☐ No

Received by

Lab Use	Chemical Name	Concentration
358	PCB	<0.05 ug/g

Lab Use	Chemical Name	Concentration

Comments

Date Received: ~~DEC 5 1986~~
Sample Number: 86-7- 2268

Date Reported: JAN 2 1987

DPD

R.H. Laessig, PhD., Director
Wisconsin State Laboratory of Hygiene
Madison, Wisconsin 53706

epartment of Natural Resources

ORGANIC CHEMISTRY-SOLID WASTE PROGRAM
Form 4400-85
Rev. 10-84

ill To: ☐ Hazardous Waste ☐ Non-Hazardous Waste ☐ Spill Program

acility Name: Barksdale
Lic No. 0
Field No. Barksdale 2

ounty: Bayfield
County Code 0 4
DNR Point ID No.

ollection Date: 12/03/86 (M M / D D / Y Y)
Time (24-Hour Clock): 10:15 (H H : M M)

ample Location: 25 feet from road, 15 feet from old railway

ample Description: Topsoil from 0-6" in depth

end eport o:
Name: Nancy Atzen
Address: Box 309
City, State, Zip Code: Spooner WI 54801

ollected by: Nancy Atzen
Telephone (715) 635-4060

Account Number: 100020
For Lab Use Only

☐ Monitoring Well (W)
☐ Surface Water (W)
☐ Private Well (W)
☐ Wastewater (E)
☐ Lysimeter (W)
☐ Waste (B)
☐ Oil (O)
☒ Soil (S)
☐ Leachate (L)
☐ Other

Enforcement: ☐ Yes ☒ No

Split Sample: ☒ Yes ☐ No

Received by

Lab Use	Chemical Name	Concentration
358	PCB	<0.05ug/gm

Lab Use	Chemical Name	Concentration

Comments

Date Received at: DEC 5 1986
Sample Number: 86-7- 2269

Date Reported: JAN 2 1987 DPD

R.H. Laessig, PhD., Director
Wisconsin State Laboratory of Hygiene
Madison, Wisconsin 53706

Department of Natural Resources

ORGANIC CHEMISTRY-SOLID WASTE PROGRAM
Form 4400-85
Rev. 10-84

Bill To: ☐ Hazardous Waste ☐ Non-Hazardous Waste ☐ Spill Program

Facility Name: Barksdale
Lic No. 0
Field No. Barksdale
County: Bayfield
County Code
DNR Point ID No.
Collection Date: 12/03/86 (M M / D D / Y Y)
Time (24-Hour Clock): 10:15 (H H : M M)
Sample Location: 12 feet from road, ~50 feet from old railway
Sample Description: Topsoil from 0-6" in depth

Send Report To:
Name: Nancy Atzen
Address: Box 309
City, State, Zip Code: Spooner, WI 54801

Collected by: Nancy Atzen
Telephone (715) 635-4060

100020
Account Number:
For Lab Use Only

☐ Monitoring Well (W) ☐ Waste (B)
☐ Surface Water (W) ☐ Oil (O)
☐ Private Well (W) ☒ Soil (S)
☐ Wastewater (E) ☐ Leachate (L)
☐ Lysimeter (W) ☐ Other

Enforcement: ☐ Yes ☒ No
Split Sample: ☒ Yes ☐ No

Received by

Lab Use	Chemical Name	Concentration
358	~~PCB~~ PCB	<0.05 ug/gm

Lab Use	Chemical Name	Concentration

Comments

Date Received and Sample Number: 86-7- 2270 DEC 5 1986

Date Reported: JAN 2 1987 DPD

R.H. Laessig, PhD., Director
Wisconsin State Laboratory of Hygiene
Madison, Wisconsin 53706

ment of Natural Resources

ORGANIC CHEMISTRY-SOLID WASTE PROGRAM
Form 4400-85
Rev. 10-84

☐ Hazardous Waste ☐ Non-Hazardous Waste ☐ Spill Program

Name Barksdale
Bayfield

Lic No. 0 Field No. Barksdale
County Code 04 DNR Point ID No.

on Date: 12/03/86 (M M D D Y Y)
Time (24-Hour Clock): 10/15 (H H M M)

Location 12 feet from road, 30 feet from tracks
Description Topsoil from 0-6" in depth

Name Nancy Atzen
Address Box 309
City, State, Zip Code Spooner, WI 54801

ed by Nancy Atzen
elephone (715) 635-4000

Account Number 100020
For Lab Use Only

☐ Monitoring Well (W)
☐ Surface Water (W)
☐ Private Well (W)
☐ Wastewater (E)
☐ Lysimeter (W)
☐ Waste (B)
☐ Oil (O)
☒ Soil (S)
☐ Leachate (L)
☐ Other

Enforcement ☐ Yes ☒ No
Split Sample ☒ Yes ☐ No

Received by

Chemical Name	Concentration
PCB	<0.05 ug/gm

Lab Use	Chemical Name	Concentration

Comments

Date Received and Sample Number 86-7- 2271 ~~DEC 5 1986~~

Date Reported JAN 2 1987 DPD

R.H. Laessig, PhD., Director
Wisconsin State Laboratory of Hygiene
Madison, Wisconsin 53706

MAY-88 BRETTING MANUFACTURING

AYRES
ASSOCIATES

June 28, 1988

Mr. Wayne Peterson
C.G. Bretting Mfg. Co.
P.O. Box 113
Ashland, WI 54806

Dear Mr. Peterson:

Attached is the Laboratory Analysis Results of the water sample we received 5/18/88. The laboratory analyses were performed in accordance with EPA or other approved methodologies by WI DNR certified laboratory #618013550 and/or #999447240.

If you have any questions regarding this report or other laboratory services, please call us at your convenience.

Sincerely,

Owen Ayres & Associates, Inc.

Clarence Stoffel

Clarence M. Stoffel, P.E.
Manager, Waste Services

CMS/cal
Attachment

Owen Ayres & Associates Inc
Engineers / Architects / Planners / Surveyors
1300 W. Clairemont Ave., P.O. Box 1590, Eau Claire, WI 54702-1590, (715) 834-3161

AYRES
ASSOCIATES

June 28, 1988

Mr. Wayne Peterson
C.G. Bretting Mfg. Co.
P.O. Box 113
Ashland, WI 54806

Concrete Pond

RE: Job Order No. 411

LABORATORY ANALYSIS RESULTS

PARAMETER	AA #2343 WATER
pH	7.9
Sp. Conductance, umho's @ 25^{o}C	245
T. Alkalinity, mg/l as $CaCO_3$	36
T. Hardness, mg/l as $CaCO_3$	130
Chloride, mg/l	<1
COD, mg/l	33
Nitrate Nitrogen, mg/l	0.15
Organic Nitrogen, mg/l	0.47
T. Phosphorus, mg/l	0.03
Potassium, mg/l	1.83
Sulfate, mg/l	66
Iron, mg/l	0.79
Arsenic, ug/l	<1
Barium, ug/l	30
Cadmium, ug/l	8
Chromium, ug/l	294
Lead, ug/l	<10
Mercury, ug/l	<0.1
Selenium, ug/l	<1
Zinc, ug/l	<1

Owen Ayres & Associates Inc
Engineers / Architects / Planners / Surveyors
1300 W. Clairemont Ave., P.O. Box 1590, Eau Claire, WI 54702-1590, (715) 834-3161

JUN-96 BRETTING MANUFACTURING

ENVIROSCAN

ENVIRONMENTAL AND
ANALYTICAL SERVICES

August 16, 1996

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

Attn: Chad Underwood

Re: Analytical Results
BRETT9601.00

Please find enclosed the analytical results for the samples received August 2, 1996.

The chain of custody document is enclosed.

If you have any questions about the results, please call. Thank you for using US Filter/Enviroscan for your analytical needs.

Sincerely,

US Filter/Enviroscan

Bruce M. Schertz

Bruce M. Schertz
Inorganic Laboratory Supervisor

ANALYTICAL REPORT

ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS βrz
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	S. HAYSHED 07/31/96	Qualifiers	Date Analyzed
EPA 502.2					
1,2-Dichloroethane	µg/l	1.0	X		08/06/96
1,1-Dichloroethylene	µg/l	1.0	X		08/06/96
cis-1,2-Dichloroethylene	µg/l	2.0	X		08/06/96
trans-1,2-Dichloroethylene	µg/l	1.0	X		08/06/96
1,2-Dichloropropane	µg/l	1.0	X		08/06/96
1,3-Dichloropropane	µg/l	1.0	X		08/06/96
2,2-Dichloropropane	µg/l	2.0	X	CSL	08/06/96
1,1-Dichloropropene	µg/l	1.0	X		08/06/96
1,3-Dichloropropene	µg/l	1.0	X		08/06/96
Ethylbenzene	µg/l	1.0	X		08/06/96
Methylene Chloride	µg/l	2.0	X	CSH MB	08/06/96
Styrene	µg/l	1.0	X		08/06/96
Tetrachloroethylene	µg/l	1.0	X		08/06/96
1,1,1,2-Tetrachloroethane	µg/l	1.0	X		08/06/96
1,1,2,2-Tetrachloroethane	µg/l	1.0	X	CSL	08/06/96
Toluene	µg/l	1.0	X		08/06/96
1,2,4-Trichlorobenzene	µg/l	1.0	X		08/06/96
1,1,1-Trichloroethane	µg/l	1.0	X		08/06/96
1,1,2-Trichloroethane	µg/l	1.0	X		08/06/96
Trichloroethylene	µg/l	0.5	X		08/06/96
1,2,3-Trichloropropane	µg/l	2.0	X		08/06/96
Vinyl Chloride	µg/l	0.2	X		08/06/96
m- & p-Xylene	µg/l	1.0	X		08/06/96
o-Xylene	µg/l	1.0	X		08/06/96
Analytical No.:			73689		

X = Analyzed but not detected.

All analyses conducted in accordance with Enviroscan Quality Assurance Program.

ANALYTICAL REPORT ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

Attn: Chad Underwood

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS BMS
REVIEWED BY: JB

	Units	Reporting Limit	N. HAYSHED 07/31/96	Qualifiers	Date Analyzed
EPA 206.2					
Arsenic (GFAAS)	µg/l	2.3	X		08/15/96
EPA 213.2					
Cadmium (GFAAS)	µg/l	0.21	X		08/12/96
EPA 218.2					
Chromium (GFAAS)	µg/l	1.0	3.61	100/10	08/13/96
EPA 239.2					
Lead (GFAAS)	µg/l	1.0	2.49	15-1.5	08/14/96
EPA 245.1					
Mercury	µg/l	0.2	X		08/08/96
EPA 270.2					
Selenium (GFAAS)	µg/l	5.0	X		08/13/96
EPA 6010					
Barium	µg/l	2.	108.	2000/400	08/12/96
Silver	µg/l	15.	X	SPL DUP	08/12/96
EPA 502.2					
Benzene	µg/l	0.5	X		08/06/96
Bromobenzene	µg/l	2.0	X		08/06/96
Bromodichloromethane	µg/l	1.0	X	SPH	08/06/96
Bromoform	µg/l	1.0	X	CSL	08/06/96
Bromomethane	µg/l	2.0	X	CSL	08/06/96
Carbon Tetrachloride	µg/l	1.0	X		08/06/96
Chlorobenzene	µg/l	1.0	X		08/06/96
Chlorodibromomethane	µg/l	1.0	X	CSL	08/06/96
Chloroethane	µg/l	1.0	X	CSL	08/06/96
Chloroform	µg/l	1.0	X		08/06/96
Chloromethane	µg/l	2.0	X	CSL	08/06/96
o-Chlorotoluene	µg/l	1.0	X		08/06/96
p-Chlorotoluene	µg/l	2.0	X		08/06/96
1,2-Dibromo-3-chloropropane	µg/l	1.0	X		08/06/96
1,2-Dibromoethane	µg/l	1.0	X		08/06/96
Dibromomethane	µg/l	1.0	X		08/06/96
1,2-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,3-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,4-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,1-Dichloroethane	µg/l	1.0	X		08/06/96
Analytical No.:			73690		

X = Analyzed but not detected.

ANALYTICAL REPORT ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	N. HAYSHED 07/31/96	Qualifiers	Date Analyzed
EPA 502.2					
1,2-Dichloroethane	µg/l	1.0	X		08/06/96
1,1-Dichloroethylene	µg/l	1.0	X		08/06/96
cis-1,2-Dichloroethylene	µg/l	2.0	X		08/06/96
trans-1,2-Dichloroethylene	µg/l	1.0	X		08/06/96
1,2-Dichloropropane	µg/l	1.0	X		08/06/96
1,3-Dichloropropane	µg/l	1.0	X		08/06/96
2,2-Dichloropropane	µg/l	2.0	X	CSL	08/06/96
1,1-Dichloropropene	µg/l	1.0	X		08/06/96
1,3-Dichloropropene	µg/l	1.0	X	CSL	08/06/96
Ethylbenzene	µg/l	1.0	X		08/06/96
Methylene Chloride	µg/l	2.0	X	CSH	08/06/96
Styrene	µg/l	1.0	X		08/06/96
Tetrachloroethylene	µg/l	1.0	X		08/06/96
1,1,1,2-Tetrachloroethane	µg/l	1.0	X		08/06/96
1,1,2,2-Tetrachloroethane	µg/l	1.0	X	CSL	08/06/96
Toluene	µg/l	1.0	X		08/06/96
1,2,4-Trichlorobenzene	µg/l	1.0	X		08/06/96
1,1,1-Trichloroethane	µg/l	1.0	X		08/06/96
1,1,2-Trichloroethane	µg/l	1.0	X		08/06/96
Trichloroethylene	µg/l	0.5	X	CSH	08/06/96
1,2,3-Trichloropropane	µg/l	2.0	X		08/06/96
Vinyl Chloride	µg/l	0.2	X		08/06/96
m- & p-Xylene	µg/l	1.0	X		08/06/96
o-Xylene	µg/l	1.0	X		08/06/96
Analytical No.:			73690		

X = Analyzed but not detected.

NALYTICAL REPORT ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

Attn: Chad Underwood

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS
REVIEWED BY:

	Units	Reporting Limit	COW PASTURE 07/31/96	Qualifiers	Date Analyzed
EPA 206.2					
Arsenic (GFAAS)	µg/l	2.3	8.83	50/5	08/15/96
EPA 213.2					
Cadmium (GFAAS)	µg/l	0.21	X		08/12/96
EPA 218.2					
Chromium (GFAAS)	µg/l	1.0	1.03	100/10	08/13/96
EPA 239.2					
Lead (GFAAS)	µg/l	1.0	X		08/14/96
EPA 245.1					
Mercury	µg/l	0.2	X		08/08/96
EPA 270.2					
Selenium (GFAAS)	µg/l	5.0	X		08/13/96
EPA 6010					
Barium	µg/l	2.	16.	2000/400	08/12/96
Silver	µg/l	15.	X	SPL DUP	08/12/96
EPA 502.2					
Benzene	µg/l	0.5	X		08/06/96
Bromobenzene	µg/l	2.0	X		08/06/96
Bromodichloromethane	µg/l	1.0	X		08/06/96
Bromoform	µg/l	1.0	X	CSL	08/06/96
Bromomethane	µg/l	2.0	X	CSL DUP	08/06/96
Carbon Tetrachloride	µg/l	1.0	X		08/06/96
Chlorobenzene	µg/l	1.0	X		08/06/96
Chlorodibromomethane	µg/l	1.0	X		08/06/96
Chloroethane	µg/l	1.0	X		08/06/96
Chloroform	µg/l	1.0	X		08/06/96
Chloromethane	µg/l	2.0	X	CSL	08/06/96
o-Chlorotoluene	µg/l	1.0	X		08/06/96
p-Chlorotoluene	µg/l	2.0	X		08/06/96
1,2-Dibromo-3-chloropropane	µg/l	1.0	X		08/06/96
1,2-Dibromoethane	µg/l	1.0	X		08/06/96
Dibromomethane	µg/l	1.0	X		08/06/96
1,2-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,3-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,4-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,1-Dichloroethane	µg/l	1.0	X		08/06/96
1,2-Dichloroethane	µg/l	1.0	X		08/06/96
1,1-Dichloroethylene	µg/l	1.0	X		08/06/96
cis-1,2-Dichloroethylene	µg/l	2.0	X	CSL	08/06/96
trans-1,2-Dichloroethylene	µg/l	1.0	X		08/06/96

nalytical No.: 73691

X = Analyzed but not detected.

All analyses conducted in accordance with Enviroscan Quality Assurance Program.

ENVIROSCAN ANALYTICAL REPORT

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	COW PASTURE 07/31/96	Qualifiers	Date Analyzed
EPA 502.2					
1,2-Dichloropropane	µg/l	1.0	X		08/06/96
1,3-Dichloropropane	µg/l	1.0	X		08/06/96
2,2-Dichloropropane	µg/l	2.0	X	CSL	08/06/96
1,1-Dichloropropene	µg/l	1.0	X		08/06/96
1,3-Dichloropropene	µg/l	1.0	X		08/06/96
Ethylbenzene	µg/l	1.0	X		08/06/96
Methylene Chloride	µg/l	2.0	X	CSH MB SPL	08/06/96
Styrene	µg/l	1.0	X		08/06/96
Tetrachloroethylene	µg/l	1.0	X		08/06/96
1,1,1,2-Tetrachloroethane	µg/l	1.0	X		08/06/96
1,1,2,2-Tetrachloroethane	µg/l	1.0	X	CSL	08/06/96
Toluene	µg/l	1.0	3.25		08/06/96
1,2,4-Trichlorobenzene	µg/l	1.0	X		08/06/96
1,1,1-Trichloroethane	µg/l	1.0	X		08/06/96
1,1,2-Trichloroethane	µg/l	1.0	X		08/06/96
Trichloroethylene	µg/l	0.5	X		08/06/96
1,2,3-Trichloropropane	µg/l	2.0	X		08/06/96
Vinyl Chloride	µg/l	0.2	X		08/06/96
m- & p-Xylene	µg/l	1.0	X		08/06/96
o-Xylene	µg/l	1.0	X		08/06/96
Analytical No.:			73691		

X = Analyzed but not detected.

All analyses conducted in accordance with Enviroscan Quality Assurance Program.

ANALYTICAL REPORT ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS 6m
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	COW SHED 07/31/96	Qualifiers	Date Analyzed
EPA 206.2					
Arsenic (GFAAS)	µg/l	2.3	X		08/15/96
EPA 213.2					
Cadmium (GFAAS)	µg/l	21.	135.	5/.5	08/03/96
EPA 218.2					
Chromium (GFAAS)	µg/l	1.0	X		08/13/96
EPA 239.2					
Lead (GFAAS)	µg/l	100.	2,370.	15/1.5	08/14/96
EPA 245.1					
Mercury	µg/l	0.2	X		08/08/96
EPA 270.2					
Selenium (GFAAS)	µg/l	5.0	X		08/13/96
EPA 6010					
Barium	µg/l	2.	29.	2000/400	08/12/96
Silver	µg/l	15.	X		08/12/96
EPA 502.2					
Benzene	µg/l	0.5	X		08/06/96
Bromobenzene	µg/l	2.0	X		08/06/96
Bromodichloromethane	µg/l	1.0	X		08/06/96
Bromoform	µg/l	1.0	X	CSL	08/06/96
Bromomethane	µg/l	2.0	X	CSL DUP	08/06/96
Carbon Tetrachloride	µg/l	1.0	X		08/06/96
Chlorobenzene	µg/l	1.0	X		08/06/96
Chlorodibromomethane	µg/l	1.0	X		08/06/96
Chloroethane	µg/l	1.0	X		08/06/96
Chloroform	µg/l	1.0	X		08/06/96
Chloromethane	µg/l	2.0	X	CSL	08/06/96
o-Chlorotoluene	µg/l	1.0	X		08/06/96
p-Chlorotoluene	µg/l	2.0	X		08/06/96
1,2-Dibromo-3-chloropropane	µg/l	1.0	X		08/06/96
1,2-Dibromoethane	µg/l	1.0	X		08/06/96
Dibromomethane	µg/l	1.0	X		08/06/96
1,2-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,3-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,4-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,1-Dichloroethane	µg/l	1.0	X		08/06/96
1,2-Dichloroethane	µg/l	1.0	X		08/06/96
Analytical No.:			73692		

X = Analyzed but not detected.

ANALYTICAL REPORT ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	COW SHED 07/31/96	Qualifiers	Date Analyzed
EPA 502.2					
1,1-Dichloroethylene	µg/l	1.0	X		08/06/96
cis-1,2-Dichloroethylene	µg/l	2.0	X	CSL	08/06/96
trans-1,2-Dichloroethylene	µg/l	1.0	X		08/06/96
1,2-Dichloropropane	µg/l	1.0	X		08/06/96
1,3-Dichloropropane	µg/l	1.0	X		08/06/96
2,2-Dichloropropane	µg/l	2.0	X	CSL	08/06/96
1,1-Dichloropropene	µg/l	1.0	X		08/06/96
1,3-Dichloropropene	µg/l	1.0	X		08/06/96
Ethylbenzene	µg/l	1.0	X		08/06/96
Methylene Chloride	µg/l	2.0	X	CSH MB SPL	08/06/96
Styrene	µg/l	1.0	X		08/06/96
Tetrachloroethylene	µg/l	1.0	X		08/06/96
1,1,1,2-Tetrachloroethane	µg/l	1.0	X		08/06/96
1,1,2,2-Tetrachloroethane	µg/l	1.0	X	CSL	08/06/96
Toluene	µg/l	1.0	X		08/06/96
1,2,4-Trichlorobenzene	µg/l	1.0	X		08/06/96
1,1,1-Trichloroethane	µg/l	1.0	X		08/06/96
1,1,2-Trichloroethane	µg/l	1.0	X		08/06/96
Trichloroethylene	µg/l	0.5	X		08/06/96
1,2,3-Trichloropropane	µg/l	2.0	X		08/06/96
Vinyl Chloride	µg/l	0.2	X		08/06/96
m- & p-Xylene	µg/l	1.0	X		08/06/96
o-Xylene	µg/l	1.0	X		08/06/96
Analytical No.:			73692		

X - Analyzed but not detected.

All analyses conducted in accordance with Enviroscan Quality Assurance Program.

ANALYTICAL REPORT

ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls, WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	COW SHED WELL 07/31/96	Qualifiers	Date Analyzed
EPA 206.2					
Arsenic (GFAAS)	µg/l	2.3	X		08/15/96
EPA 213.2					
Cadmium (GFAAS)	µg/l	0.21	X		08/03/96
EPA 218.2					
Chromium (GFAAS)	µg/l	1.0	X		08/13/96
EPA 239.2					
Lead (GFAAS)	µg/l	1.0	2.95		08/14/96
EPA 245.1					
Mercury	µg/l	0.2	X		08/08/96
EPA 270.2					
Selenium (GFAAS)	µg/l	5.0	X		08/13/96
[illegible]A 6010					
[illegible]rium	µg/l	2.	20.		08/12/96
[illegible]ilver	µg/l	15.	X		08/12/96
EPA 502.2					
Benzene	µg/l	0.5	X		08/06/96
Bromobenzene	µg/l	2.0	X		08/06/96
Bromodichloromethane	µg/l	1.0	X		08/06/96
Bromoform	µg/l	1.0	X	CSL	08/06/96
Bromomethane	µg/l	2.0	X	CSL DUP	08/06/96
Carbon Tetrachloride	µg/l	1.0	X		08/06/96
Chlorobenzene	µg/l	1.0	X		08/06/96
Chlorodibromomethane	µg/l	1.0	X		08/06/96
Chloroethane	µg/l	1.0	X		08/06/96
Chloroform	µg/l	1.0	X		08/06/96
Chloromethane	µg/l	2.0	X	CSL	08/06/96
o-Chlorotoluene	µg/l	1.0	X		08/06/96
p-Chlorotoluene	µg/l	2.0	X		08/06/96
1,2-Dibromo-3-chloropropane	µg/l	1.0	X		08/06/96
1,2-Dibromoethane	µg/l	1.0	X		08/06/96
Dibromomethane	µg/l	1.0	X		08/06/96
1,2-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,3-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,4-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,1-Dichloroethane	µg/l	1.0	X		08/06/96
1,2-Dichloroethane	µg/l	1.0	X		08/06/96
Analytical No.:			73693		

X = Analyzed but not detected.

All analyses conducted in accordance with Enviroscan Quality Assurance Program.

ANALYTICAL REPORT ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMS
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	COW SHED WELL 07/31/96	Qualifiers	Date Analyzed
EPA 502.2					
1,1-Dichloroethylene	µg/l	1.0	X		08/06/96
cis-1,2-Dichloroethylene	µg/l	2.0	X	CSL	08/06/96
trans-1,2-Dichloroethylene	µg/l	1.0	X		08/06/96
1,2-Dichloropropane	µg/l	1.0	X		08/06/96
1,3-Dichloropropane	µg/l	1.0	X		08/06/96
2,2-Dichloropropane	µg/l	2.0	X	CSL	08/06/96
1,1-Dichloropropene	µg/l	1.0	X		08/06/96
1,3-Dichloropropene	µg/l	1.0	X		08/06/96
Ethylbenzene	µg/l	1.0	X		08/06/96
Methylene Chloride	µg/l	2.0	X	CSH MB SPL	08/06/96
Styrene	µg/l	1.0	X		08/06/96
Tetrachloroethylene	µg/l	1.0	X		08/06/96
1,1,1,2-Tetrachloroethane	µg/l	1.0	X		08/06/96
1,1,2,2-Tetrachloroethane	µg/l	1.0	X	CSL	08/06/96
Toluene	µg/l	1.0	X		08/06/96
1,2,4-Trichlorobenzene	µg/l	1.0	X		08/06/96
1,1,1-Trichloroethane	µg/l	1.0	X		08/06/96
1,1,2-Trichloroethane	µg/l	1.0	X		08/06/96
Trichloroethylene	µg/l	0.5	X		08/06/96
1,2,3-Trichloropropane	µg/l	2.0	X		08/06/96
Vinyl Chloride	µg/l	0.2	X		08/06/96
m- & p-Xylene	µg/l	1.0	X		08/06/96
o-Xylene	µg/l	1.0	X		08/06/96
Analytical No.:			73693		

X = Analyzed but not detected.

ANALYTICAL REPORT ENVIROSCAN

Short Elliott Hendrickson, Inc.
421 Frenette Drive
Chippewa Falls , WI 54729

CUST NUMBER: BRETT9601.0
SAMPLED BY: Client
DATE REC'D: 08/02/96
REPORT DATE: 08/16/96
PREPARED BY: BMG
REVIEWED BY:

Attn: Chad Underwood

	Units	Reporting Limit	BUILDING WELL 07/31/96	Qualifiers	Date Analyzed
EPA 206.2					
Arsenic (GFAAS)	µg/l	2.3	X		08/15/96
EPA 213.2					
Cadmium (GFAAS)	µg/l	0.21	X		08/03/96
EPA 218.2					
Chromium (GFAAS)	µg/l	1.0	X		08/13/96
EPA 239.2					
Lead (GFAAS)	µg/l	1.0	X		08/14/96
EPA 245.1					
Mercury	µg/l	0.2	X		08/08/96
EPA 270.2					
Selenium (GFAAS)	µg/l	5.0	X		08/13/96
[illegible] 6010					
[illegible]arium	µg/l	2.	22.		08/12/96
Silver	µg/l	15.	X		08/12/96
EPA 502.2					
Benzene	µg/l	0.5	X		08/06/96
Bromobenzene	µg/l	2.0	X		08/06/96
Bromodichloromethane	µg/l	1.0	X		08/06/96
Bromoform	µg/l	1.0	X	CSL	08/06/96
Bromomethane	µg/l	2.0	X	CSL DUP	08/06/96
Carbon Tetrachloride	µg/l	1.0	X		08/06/96
Chlorobenzene	µg/l	1.0	X		08/06/96
Chlorodibromomethane	µg/l	1.0	X		08/06/96
Chloroethane	µg/l	1.0	X		08/06/96
Chloroform	µg/l	1.0	X		08/06/96
Chloromethane	µg/l	2.0	X	CSL	08/06/96
o-Chlorotoluene	µg/l	1.0	X		08/06/96
p-Chlorotoluene	µg/l	2.0	X		08/06/96
1,2-Dibromo-3-chloropropane	µg/l	1.0	X		08/06/96
1,2-Dibromoethane	µg/l	1.0	X		08/06/96
Dibromomethane	µg/l	1.0	X		08/06/96
1,2-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,3-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,4-Dichlorobenzene	µg/l	1.0	X		08/06/96
1,1-Dichloroethane	µg/l	1.0	X		08/06/96
1,2-Dichloroethane	µg/l	1.0	X		08/06/96
Analytical No.:			73694		

X = Analyzed but not detected.

[illegible]ll analyses conducted in accordance with Enviroscan Quality Assurance Program.

ENVIROSCAN

REQUEST FOR SERVICES

303 W. MILITARY RD. ROTHSCHILD, WI 54474 1-800-338-SCAN

CLIENT INFORMATION

Name: Chad Underwood
Company: SEH
Address: 421 Frenette Dr.
Chippewa Falls, WI 54729
Phone: (715) 720-6200
P.O. # / Project #: BRETT9601-00
Quote / Reference #:
Note: Terms and conditions printed on back apply. Quote 4778

Turnaround Time
☑ Normal
☐ Rush
Date Needed ______
(Preapproved by Lab)

Sample Type
(Check all that apply)
☑ Groundwater
☐ Wastewater
☐ Soil
☐ Solid Waste
☐ Oil
☑ Other Surface Water

Sample Handling
☐ Nonhazardous
☐ Flammable
☐ Skin Irritant
☐ Highly Toxic
☐ Other (specify) 8-16-96
☑ Refrigerate
☐ Work in Hood
☐ Wear Gloves

ANALYTICAL REQUESTS
(use separate sheet if necessary)

LAB USE ONLY	DATE	TIME	No. of Containers COMP	No. of Containers GRAB	SAMPLE ID	3-40ml HCl DRW VOC vacuum VOC	1-1L HNO3 Metals				REMARKS
09073689	7/31/96	2:00		X	S. HAYSHED	X	X				
09073690	↓	2:15		↓	N. HAYSHED	↓	↓				(Metals → Ba, Hg,
09073691		2:30			COW PASTURE						F As, F Cd, F Ag, F Pb,
09073692		2:45			COW SHED						F Se, F Cr)
09073693		2:50			COW SHED WELL						
09073695	↓	3:00		↓	BUILDING WELL	↓	↓				
						EPA 502.2	Field Filtered				
Short											

Del'v: Hand Comm
Ship Cont. OK? Y N N/A
Rec'd Refrig.? Y N N/A
Seals OK? Y N N/A
Samples leaking? Y N N/A
Comments:

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) Chad Underwood

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Chad Underwood	8/1/96 9:00am	
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED FOR LABORATORY BY: (Signature) Sharon Y. Mateg — DATE/TIME 8-2-96 9:00

DELIVERYTRAC II SHIPPER RECEIPT
ups 1Z 584 076 05 0237 929 3
PLACE ON YOUR SHIPPING RECEIPT

ENVIROSCAN
REQUEST FOR SERVICES

303 W. MILITARY RD. ROTHSCHILD, WI 54474 1-800-338-SCAN

CLIENT INFORMATION

Name: Chad Underwood
Company: SEH
Address: 421 Frenette Dr
Chippewa Falls, WI 54729
Phone: (715) 720-6200
P.O. # / Project #: BRETT 9601-00
Quote / Reference #:
Note: Terms and conditions printed on back apply. Quote 4778

Turnaround Time
☑ Normal
☐ Rush
Date Needed ____
(Preapproved by Lab)

ANALYTICAL REQUESTS
(use separate sheet if necessary)

Sample Type
(Check all that apply)
☑ Groundwater
☐ Wastewater
☐ Soil
☐ Solid Waste
☐ Oil
☑ Other Surface Water

Sample Handling
☐ Nonhazardous ☑ Refrigerate
☐ Flammable ☐ Work In Hood
☐ Skin Irritant ☐ Wear Gloves
☐ Highly Toxic
☐ Other (specify) 8-16-96

LAB USE ONLY	DATE	TIME	No. of Containers COMP	GRAB	SAMPLE ID	3-40mL HCl DRW VOC / Vac VOC (EPA 502.2)	1-1L HNO_3 Metals (Field Filtered)					REMARKS
09073689	7/31/96	2:00		X	S. HAYSHED	X	X					
09073690	↓	2:15		↓	N. HAYSHED	↓	↓					(Metals → Ba, Hg
09073691		2:30			COW PASTURE							F As, F Cd, F Ag, F Pb
09073692		2:45			COW SHED							F Se, F Cr)
09073693		2:50			COW SHED WELL							
09073695	↓	3:00		↓	BUILDING WELL	↓	↓					

Short

CHAIN OF CUSTODY RECORD

SAMPLERS: (Signature) [signature]

RELINQUISHED BY: (Signature)	DATE/TIME		RECEIVED BY: (Signature)	DATE/TIME	
[signature]	8/1/96	9:30 a.m.			
			RECEIVED FOR LABORATORY BY: (Signature) [signature]	8-2-96	9:00

Deliv: Hand Comm
Ship. Cont. OK? Y N N/A
Rec'd Refrig.? Y N N/A
Seals OK? Y N N/A
Samples leaking? Y N N/A
Comments:

DELIVERYTRAC II SHIPPER RECEIPT
1Z 584 076 05 0237 929 3
PLACE ON YOUR SHIPPING RECORD

COMMERCIAL TESTING LABORATORY, INC.
514 Main Street, P.O. Box 526
Colfax, Wisconsin 54730
715-962-3121
800-962-5227
FAX - 715-962-4030

SHORT-ELLIOTT-HENDRICKSON

421 FRENETTE DRIVE
CHIPPEWA FALLS, WI 54729

REPORT NO.: 23867/01
REPORT DATE: 8/21/96
DATE RECEIVED: 8/01/96

WI DNR LAB CERTIF.#617013980

Project #BRETT9601, C.G. Bretting MFG.

	GW819 #1 S. Hay Shed 7-31	GW820 #2 N. Hay Shed 7-31	GW821 #3 Cow Pasture 7-31	GW822 #4Cow Shed 7-31	GW823 #5 Cow Shed Well 7-31	GW824 #6 Building Well 7-31	Date Analyzed
Alkalinity, mg/L	296	39	165	88	8	102	8-05-96
Chloride, mg/L	1	2	4	< 1	2	< 1	8-05-96
C.O.D., mg/L	64	98	93	< 5	13	11	8-05-96
Hardness, mg/L	399	57	128	63	769	105	8-14-96
Kjeldahl-Nitrogen,mg/L	1.4	1.7	2.1	< 0.5	1.6	< 0.5	8-14 & 8-16
Nitrate+Nitrite-N,mg/L	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	8-07-96
Tot.Phosphorus, mg/L	< 0.1	0.3	0.2	< 0.1	< 0.1	< 0.1	8-09-96
Sulfate,mg/L	80	49	14	< 5	781	< 5	8-08-96
Dissolved Iron, mg/L	1.11	9.49	0.169	0.006	0.168	0.008	8-15-96
Dis. Potassium, mg/L	0.91	3.53	42.9	2.34	2.96	1.90	8-13-96

Samples arrived in lab at 11:05am on 8/01 and were field filtered by SEH.
Samples are not filtered for pH or Conductivity.

< Means "LESS THAN" Detectable Level   Approved by:

CHAIN OF CUSTODY RECORD

PROJECT NO:	PROJECT NAME / CLIENT
BRETT9601	C.G Bretting Mfg.

SAMPLERS: (Signature) [signature]

SAMPLE NO.	DATE	TIME	COMP	GRAB	SAMPLE LOCATION	NO. OF CONTAINERS	1-250mL none (Alk, Cl, SO4)	1-125mL H_2SO_4 (COD, NO_2+NO_3, Tot N, P)	1-125mL HNO_3 (Hd, Fe, K)			REMARKS
1	7/31/96	2:00		X	S. HAY SHED	3	X	X	X			* All samples field filtered
2	↓	2:15		↓	N. HAYSHED	↓	↓	↓	↓			↓
3	↓	2:30		↓	COW PASTURE	↓	↓	↓	↓			↓
4	↓	2:45		↓	COW SHED	↓	↓	↓	↓			↓
5	↓	2:50		↓	COW SHED WELL	↓	↓	↓	↓			↓
6	↓	3:00		↓	BUILDING WELL	↓	↓	↓	↓			↓

RELINQUISHED BY: (Signature)	DATE/TIME		RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
[signature]	8/1/96	9:16 am				
RELINQUISHED BY: (Signature)	DATE/TIME		RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED FOR LABORATORY BY: (Signature)	DATE/TIME		REMARKS:
		Brandi DeMoe	8-1-96	11:05	Bill to SEH

SEH

JUN-97 WDNR

Wisconsin Department of Natural Resources

Drinking & Groundwater Water Section

810 West Maple Street
Spooner, WI 54801
715-635-4050
Fax: 715-635-4105

FAX TRANSMISSION COVER SHEET

Date:	October 27, 1997
To:	Nancy Grosse-Dupont
Fax:	302-892-7643
Re:	Sample Results
Sender:	John J. Prohaska

YOU SHOULD RECEIVE 1[illegible] PAGE(S), INCLUDING THIS COVER SHEET. IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL 715-635-4050.

All explosives sampling was no detect at all wells sampled except for the Dupont Residence Well. Attached is the results for the 8021 analysis and the inorganic analysis.

State Laboratory of Hygiene
University of Wisconsin Center for Health Sciences
465 Henry Mall, Madison, WI 53706
R.H. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

Environmental Science Section (608) 262-3458 DNR LAB ID 113133790
Inorganic chemistry

Id: IW902 Point/Well/..: Field #: D01 Route: WS80
Collection Date: 06/17/97 Time: 12:20 County: 04 (Bayfield)
From: DUPONT/CARLSON - HOSE BIB
To: JOHN PROHASKA - DNR Type: Miscellaneous
810 W. MAPLE STREET Source: Private
SPOONER, WI 54801
Account number: WS001 Collected by: PROHASKA
Waterbody/permit/..: D
Enforcement
Date Received: 06/18/97 Labslip #: IH028845 Reported: 07/25/97

CHLORIDE, AUTOMATED	44.9	MG/L
CONDUCTIVITY (AT 25 DEG C)	521.	UMHOS/CM
PH, LAB	7.25	SU
ALKALINITY	163.	MG/L
NITRATE PLUS NITRITE (AS N)	4.11	MG/L
SULFATE, TOTAL	*25.0	MG/L #1
TEMPERATURE	ICED	C

-- Footnotes ---
Remark #1: INSTRUMENT TROUBLE, HOLDING TIME EXCEEDED BY 1 DAY

State Laboratory of Hygiene
University of Wisconsin Center for Health Sciences
465 Henry Mall, Madison, WI 53706
. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OH003065, Field # D01

CIS-1,2-DICHLOROETHYLENE	ND (LOD=0.30 UG/L)
TRANS-1,2-DICHLOROETHYLENE	ND (LOD=0.30 UG/L)
1,2-DICHLOROPROPANE	ND (LOD=0.50 UG/L)
1,3-DICHLOROPROPANE	ND (LOD=0.50 UG/L)
2,2-DICHLOROPROPANE	ND (LOD=0.30 UG/L)
1,1-DICHLOROPROPENE	ND (LOD=0.50 UG/L)
CIS-1,3-DICHLOROPROPENE	ND (LOD=0.30 UG/L)
TRANS-1,3-DICHLOROPROPENE	ND (LOD=0.30 UG/L)
DIISOPROPYL ETHER	ND (LOD=10. UG/L)
ETHYLBENZENE	ND (LOD=0.30 UG/L)
HEXACHLOROBUTADIENE	ND (LOD=0.30 UG/L)
ISOPROPYLBENZENE	ND (LOD=0.50 UG/L)
P-ISOPROPYLTOLUENE	ND (LOD=0.50 UG/L)
METHYL ETHYL KETONE (MEK)	ND (LOD=10. UG/L)
METHYL ISOBUTYL KETONE (MIBK)	ND (LOD=10. UG/L)
METHYL-TERT-BUTYL ETHER (MTBE)	ND (LOD=1.0 UG/L)
METHYLENE CHLORIDE	ND (LOD=0.50 UG/L)
NAPHTHALENE	ND (LOD=0.30 UG/L)
N-PROPYLBENZENE	ND (LOD=0.50 UG/L)
STYRENE	ND (LOD=0.50 UG/L)
1,1,1,2-TETRACHLOROETHANE	ND (LOD=0.30 UG/L)
1,1,2,2-TETRACHLOROETHANE	ND (LOD=0.30 UG/L)
TETRACHLOROETHYLENE	ND (LOD=0.50 UG/L)
TETRAHYDROFURAN (THF)	ND (LOD=10. UG/L)
TOLUENE	ND (LOD=0.50 UG/L)
1,2,3-TRICHLOROBENZENE	ND (LOD=0.30 UG/L)
1,2,4-TRICHLOROBENZENE	ND (LOD=0.50 UG/L)
1,1,1-TRICHLOROETHANE	ND (LOD=0.50 UG/L)
1,1,2-TRICHLOROETHANE	ND (LOD=0.50 UG/L)
TRICHLOROETHYLENE	ND (LOD=0.30 UG/L)
TRICHLOROFLUOROMETHANE	ND (LOD=0.50 UG/L)
1,2,3-TRICHLOROPROPANE	ND (LOD=0.50 UG/L)
1,1,2-TRICHLOROTRIFLOUROETHANE	ND (LOD=0.50 UG/L)
1,2,4-TRIMETHYLBENZENE	ND (LOD=0.50 UG/L)
1,3,5-TRIMETHYLBENZENE	ND (LOD=0.50 UG/L)
VINYL CHLORIDE	ND (LOD=0.50 UG/L)
M/P-XYLENE	ND (LOD=1.0 UG/L)
O-XYLENE	ND (LOD=0.30 UG/L)
VOCS IN WATER BY PURGE & TRAP-PREP-EPA METHOD 8021	C

State Laboratory of Hygiene
University of Wisconsin Center for Health Sciences
465 Henry Mall, Madison, WI 53706
. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

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ironmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry

CX533 Point/Well/..: Field #: D02 Route: WS80
llection Date: 06/17/97 Time: 10:15 County: 04 (Bayfield)
om: RT 3 BOX 560
scription: YARD HYDRANT
JOHN PROHASKA - WDNR
810 W. MAPLE Source: Private
SPOONER, WI 54801
count number: DG006 Collected by: J. PROHASKA
nforcement
te Received: 06/18/97 Labslip #: OH003066 Reported: 07/18/97

-- test: TEMPERATURE - ICED - 0950

MPERATURE - ICED	ICED

-- test: VOCS IN WATER BY PURGE AND TRAP - EPA METHOD 8021

ETONE	ND (LOD=10. UG/L)
NZENE	ND (LOD=0.30 UG/L)
OMOBENZENE	ND (LOD=0.30 UG/L)
OMOCHLOROMETHANE	ND (LOD=0.50 UG/L)
OMODICHLOROMETHANE	ND (LOD=0.50 UG/L)
OFORM	ND (LOD=0.50 UG/L)
OMETHANE	ND (LOD=0.50 UG/L)
BUTYLBENZENE	ND (LOD=0.50 UG/L)
C-BUTYLBENZENE	ND (LOD=0.50 UG/L)
RT-BUTYLBENZENE	ND (LOD=0.50 UG/L)
RBON DISULFIDE	ND (LOD=10. UG/L)
RBON TETRACHLORIDE	ND (LOD=0.50 UG/L)
LOROBENZENE	ND (LOD=0.30 UG/L)
LORODIBROMOMETHANE	ND (LOD=0.50 UG/L)
LOROETHANE	ND (LOD=0.50 UG/L)
LOROFORM	ND (LOD=0.50 UG/L)
LOROMETHANE	ND (LOD=0.50 UG/L)
CHLOROTOLUENE	ND (LOD=0.50 UG/L)
CHLOROTOLUENE	ND (LOD=0.30 UG/L)
2-DIBROMO-3-CHLOROPROPANE	ND (LOD=0.50 UG/L)
2-DIBROMOETHANE (EDB)	ND (LOD=0.50 UG/L)
BROMOMETHANE	ND (LOD=0.30 UG/L)
2-DICHLOROBENZENE	ND (LOD=0.30 UG/L)
3-DICHLOROBENZENE	ND (LOD=0.30 UG/L)
4-DICHLOROBENZENE	ND (LOD=0.30 UG/L)
CHLORODIFLUOROMETHANE	ND (LOD=0.30 UG/L)
1-DICHLOROETHANE	ND (LOD=0.50 UG/L)
2-DICHLOROETHANE	ND (LOD=0.50 UG/L)
1-DICHLOROETHYLENE	ND (LOD=0.50 UG/L)

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Environmental Science Section (608) 262-3458 DNR LAB ID 113133790
Inorganic chemistry

Id: IW882 Point/Well/..: Field #: D03 Route: WS80
Collection Date: 06/17/97 Time: 10:58 County: 04 (Bayfield)
From: DUPONT - HOSE BIE
To: JOHN PROHASKA - DNR Type: Miscellaneous
810 W. MAPLE STREET Source: Private
SPOONER, WI 54801
Account number: WS001 Collected by: PROHASKA
Waterbody/permit/..: D
Enforcement
Date Received: 06/18/97 Labslip #: IH028847 Reported: 08/12/97

ANTIMONY, AA FURNACE	ND (LOD=2 UG/L)	
ARSENIC, AA FURNACE	ND (LOD=0.6 UG/L)	
CADMIUM, AA FURNACE	0.08	UG/L
CHLORIDE, AUTOMATED	0.6	MG/L
CHROMIUM, AA FURNACE	ND (LOD=0.5 UG/L)	
CONDUCTIVITY (AT 25 DEG C)	143.	UMHOS/CM
PH, LAB	7.93	SU
ALKALINITY	71.	MG/L
BARIUM, ICP	19.	UG/L
BERYLLIUM, ICP	ND (LOD=0.3 UG/L)	
CALCIUM, ICP	15.	MG/L
COPPER, ICP	ND (LOD=3. UG/L)	
IRON, ICP	1.3	MG/L
MAGNESIUM, ICP	5.0	MG/L
MANGANESE, ICP	150.	UG/L
NICKEL, ICP	ND (LOD=6. UG/L)	
SODIUM, ICP	5.1	MG/L
ZINC, ICP	180.	UG/L
HARDNESS, CALCULATION METHOD	58.	MG/L
LEAD, AA FURNACE	4.2	UG/L
NITRATE PLUS NITRITE (AS N)	ND (LOD=0.069 MG/L)	
SELENIUM, AA FURNACE	ND (LOD=1 UG/L)	
SILVER, AA FURNACE	ND (LOD=0.1 UG/L)	
SULFATE, TOTAL	*2.0	MG/L #1
THALLIUM, AA FURNACE	ND (LOD=0.6 UG/L)	
TEMPERATURE	ICED	C

--- Footnotes ---
Remark #1: INSTRUMENT TROUBLE, HOLDING TIME EXCEEDED BY 1 DAY

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OH003067, Field # D03

CIS-1,2-DICHLOROETHYLENE	ND (LOD=0.30 UG/L)
TRANS-1,2-DICHLOROETHYLENE	ND (LOD=0.30 UG/L)
1,2-DICHLOROPROPANE	ND (LOD=0.50 UG/L)
1,3-DICHLOROPROPANE	ND (LOD=0.50 UG/L)
2,2-DICHLOROPROPANE	ND (LOD=0.30 UG/L)
1,1-DICHLOROPROPENE	ND (LOD=0.50 UG/L)
CIS-1,3-DICHLOROPROPENE	ND (LOD=0.30 UG/L)
TRANS-1,3-DICHLOROPROPENE	ND (LOD=0.30 UG/L)
DIISOPROPYL ETHER	ND (LOD=10. UG/L)
ETHYLBENZENE	ND (LOD=0.30 UG/L)
HEXACHLOROBUTADIENE	ND (LOD=0.30 UG/L)
ISOPROPYLBENZENE	ND (LOD=0.50 UG/L)
P-ISOPROPYLTOLUENE	ND (LOD=0.50 UG/L)
METHYL ETHYL KETONE (MEK)	ND (LOD=10. UG/L)
METHYL ISOBUTYL KETONE (MIBK)	ND (LOD=10. UG/L)
METHYL-TERT-BUTYL ETHER (MTBE)	ND (LOD=1.0 UG/L)
METHYLENE CHLORIDE	ND (LOD=0.50 UG/L)
NAPHTHALENE	ND (LOD=0.30 UG/L)
N-PROPYLBENZENE	ND (LOD=0.50 UG/L)
STYRENE	ND (LOD=0.50 UG/L)
1,1,1,2-TETRACHLOROETHANE	ND (LOD=0.30 UG/L)
1,1,2,2-TETRACHLOROETHANE	ND (LOD=0.30 UG/L)
TETRACHLOROETHYLENE	ND (LOD=0.50 UG/L)
TETRAHYDROFURAN (THF)	ND (LOD=10. UG/L)
TOLUENE	ND (LOD=0.50 UG/L)
1,2,3-TRICHLOROBENZENE	ND (LOD=0.30 UG/L)
1,2,4-TRICHLOROBENZENE	ND (LOD=0.50 UG/L)
1,1,1-TRICHLOROETHANE	ND (LOD=0.50 UG/L)
1,1,2-TRICHLOROETHANE	ND (LOD=0.50 UG/L)
TRICHLOROETHYLENE	ND (LOD=0.30 UG/L)
TRICHLOROFLUOROMETHANE	ND (LOD=0.50 UG/L)
1,2,3-TRICHLOROPROPANE	ND (LOD=0.50 UG/L)
1,1,2-TRICHLOROTRIFLOUROETHANE	ND (LOD=0.50 UG/L)
1,2,4-TRIMETHYLBENZENE	ND (LOD=0.50 UG/L)
1,3,5-TRIMETHYLBENZENE	ND (LOD=0.50 UG/L)
VINYL CHLORIDE	ND (LOD=0.50 UG/L)
M/P-XYLENE	ND (LOD=1.0 UG/L)
O-XYLENE	ND (LOD=0.30 UG/L)
VOCS IN WATER BY PURGE & TRAP-PREP-EPA METHOD 8021	C

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Environmental Science Section   (608) 262-2797   DNR LAB ID 113133790
Organic chemistry

ID: IW823   Point Well/...   Field #: D04   Route: WS80
Collection Date: 06/17/97   Time: 11:35   County: 06 (Buffalo)
From: DUPONT/COW SHED
Description: HOSE BIB
To: WDNR - PROHASKA
810 W MAPLE ST
SPOONER, WI 54801   Source: Private
Account number: D9016   Collected by: J. PROHASKA
Enforcement
Date Received: 06/18/97   Labslip #: OH003068   Reported: 07/18/97

**** test: TEMPERATURE - ICED - 0950

TEMPERATURE - ICED	ICED

**** test: VOCS IN WATER BY PURGE AND TRAP - EPA METHOD 8021

ACETONE	ND (LOD=10. UG/L)
BENZENE	ND (LOD=0.30 UG/L)
BROMOBENZENE	ND (LOD=0.30 UG/L)
BROMOCHLOROMETHANE	ND (LOD=0.50 UG/L)
BROMODICHLOROMETHANE	ND (LOD=0.50 UG/L)
BROMOFORM	ND (LOD=0.50 UG/L)
BROMOMETHANE	ND (LOD=0.50 UG/L)
N-BUTYLBENZENE	ND (LOD=0.50 UG/L)
SEC-BUTYLBENZENE	ND (LOD=0.50 UG/L)
TERT-BUTYLBENZENE	ND (LOD=0.50 UG/L)
CARBON DISULFIDE	ND (LOD=10. UG/L)
CARBON TETRACHLORIDE	ND (LOD=0.50 UG/L)
CHLOROBENZENE	ND (LOD=0.30 UG/L)
CHLORODIBROMOMETHANE	ND (LOD=0.50 UG/L)
CHLOROETHANE	ND (LOD=0.50 UG/L)
CHLOROFORM	ND (LOD=0.50 UG/L)
CHLOROMETHANE	ND (LOD=0.50 UG/L)
2-CHLOROTOLUENE	ND (LOD=0.50 UG/L)
4-CHLOROTOLUENE	ND (LOD=0.30 UG/L)
1,2-DIBROMO-3-CHLOROPROPANE	ND (LOD=0.50 UG/L)
1,2-DIBROMOETHANE (EDB)	ND (LOD=0.50 UG/L)
DIBROMOMETHANE	ND (LOD=0.30 UG/L)
1,2-DICHLOROBENZENE	ND (LOD=0.30 UG/L)
1,3-DICHLOROBENZENE	ND (LOD=0.30 UG/L)
1,4-DICHLOROBENZENE	ND (LOD=0.30 UG/L)
DICHLORODIFLUOROMETHANE	ND (LOD=0.30 UG/L)
1,1-DICHLOROETHANE	ND (LOD=0.50 UG/L)
1,2-DICHLOROETHANE	ND (LOD=0.50 UG/L)
1,1-DICHLOROETHYLENE	ND (LOD=0.50 UG/L)

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Environmental Science Section (608) 262-3458 DNR LAB ID 113133790
Inorganic chemistry

Id: Point/Well/..: Field #: D05 Route: WS80
Collection Date: 06/17/97 Time: 12:05 County: 04 (Bayfield)
From: DUPONT/FIBERT 2432 HWY 13 - HOSE BIB
To: JOHN PROHASKA - DNR
810 W. MAPLE STREET
SPOONER, WI 54801
Source: Private
Account number: WS001
Collected by: PROHASKA
Enforcement
Date Received: 06/18/97 Labslip #: IH028849 Reported: 07/25/97

CHLORIDE, AUTOMATED	5.9	MG/L
CONDUCTIVITY (AT 25 DEG C)	260.	UMHOS/CM
PH, LAB	7.62	SU
ALKALINITY	118.	MG/L
NITRATE PLUS NITRITE (AS N)	0.55	MG/L
SULFATE, TOTAL	*9.9	MG/L #1
TEMPERATURE	ICED	C

--- Footnotes ---
Remark #1: INSTRUMENT TROUBLE, HOLDING TIME EXCEEDED BY 1 DAY

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465 Henry Mall, Madison, WI 53706
R.H. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OH003069, Field # D05

TRANS-1,2-DICHLOROETHYLENE	ND (LOD=0.30 UG/L)
1,2-DICHLOROPROPANE	ND (LOD=0.50 UG/L)
1,3-DICHLOROPROPANE	ND (LOD=0.50 UG/L)
2,2-DICHLOROPROPANE	ND (LOD=0.30 UG/L)
1,1-DICHLOROPROPENE	ND (LOD=0.50 UG/L)
CIS-1,3-DICHLOROPROPENE	ND (LOD=0.30 UG/L)
TRANS-1,3-DICHLOROPROPENE	ND (LOD=0.30 UG/L)
DIISOPROPYL ETHER	ND (LOD=10. UG/L)
ETHYLBENZENE	ND (LOD=0.30 UG/L)
HEXACHLOROBUTADIENE	ND (LOD=0.30 UG/L)
ISOPROPYLBENZENE	ND (LOD=0.50 UG/L)
P-ISOPROPYLTOLUENE	ND (LOD=0.50 UG/L)
METHYL ETHYL KETONE (MEK)	ND (LOD=10. UG/L)
METHYL ISOBUTYL KETONE (MIBK)	ND (LOD=10. UG/L)
METHYL-TERT-BUTYL ETHER (MTBE)	ND (LOD=1.0 UG/L)
METHYLENE CHLORIDE	ND (LOD=0.50 UG/L)
NAPHTHALENE	ND (LOD=0.30 UG/L)
N-PROPYLBENZENE	ND (LOD=0.50 UG/L)
STYRENE	ND (LOD=0.50 UG/L)
1,1,1,2-TETRACHLOROETHANE	ND (LOD=0.30 UG/L)
1,1,2,2-TETRACHLOROETHANE	ND (LOD=0.30 UG/L)
TETRACHLOROETHYLENE	ND (LOD=0.50 UG/L)
TETRAHYDROFURAN (THF)	ND (LOD=10. UG/L)
TOLUENE	ND (LOD=0.50 UG/L)
1,2,3-TRICHLOROBENZENE	ND (LOD=0.30 UG/L)
1,2,4-TRICHLOROBENZENE	ND (LOD=0.50 UG/L)
1,1,1-TRICHLOROETHANE	ND (LOD=0.50 UG/L)
1,1,2-TRICHLOROETHANE	ND (LOD=0.50 UG/L)
TRICHLOROETHYLENE	ND (LOD=0.30 UG/L)
TRICHLOROFLUOROMETHANE	ND (LOD=0.50 UG/L)
1,2,3-TRICHLOROPROPANE	ND (LOD=0.50 UG/L)
1,1,2-TRICHLOROTRIFLOUROETHANE	ND (LOD=0.50 UG/L)
1,2,4-TRIMETHYLBENZENE	ND (LOD=0.50 UG/L)
1,3,5-TRIMETHYLBENZENE	ND (LOD=0.50 UG/L)
VINYL CHLORIDE	ND (LOD=0.50 UG/L)
M/P-XYLENE	ND (LOD=1.0 UG/L)
O-XYLENE	ND (LOD=0.30 UG/L)
VOCS IN WATER BY PURGE & TRAP-PREP-EPA METHOD 8021	C

AUG-97 WDNR

Quanterra
Environmental Services

Explosives by HPLC - Low Level
Method 8330

CX 533

Client Name: Wisconsin Dept. of Natural Resources
Client ID: D02 Bretting Res.
Lab ID: 056460-0001-SA
Matrix: AQUEOUS
Authorized: 06 AUG 97
Sampled: 05 AUG 97
Received: 06 AUG 97
Prepared: 08 AUG 97
Analyzed: 14 AUG 97

SEH split sample

Parameter		Result	Units	Reporting Limit	
1,3,5-Trinitrobenzene		ND	ug/L	0.25	
1,3-Dinitrobenzene		ND	ug/L	0.33	
Tetryl		ND	ug/L	0.50	
2,4,6-Trinitrotoluene		ND	ug/L	0.43	
2-Amino-4,6-dinitrotoluene	1.6	0.64	ug/L	0.34	
2,6-Dinitrotoluene	ND	2.4	ug/L	0.46	
2,4-Dinitrotoluene	1.3	0.21	ug/L	0.32	J
2-Nitrotoluene		ND	ug/L	0.57	
4-Nitrotoluene		ND	ug/L	0.38	
3-Nitrotoluene		ND	ug/L	0.58	

Surrogate	Recovery		Limits
3,4-Dinitrotoluene	122	%	45-133

NOTE:
Sample was split with Short, Elliot, & Hendrixson (SEH) from Au Claire
sent to Midwest Research Kansas City, MO

Dilution factor is 1.0. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Reported By: Blake Besser

Approved By: Audrey Cornell

Appendix B

WELL CONSTRUCTION REPORTS

WELLS USED IN CROSS SECTIONS

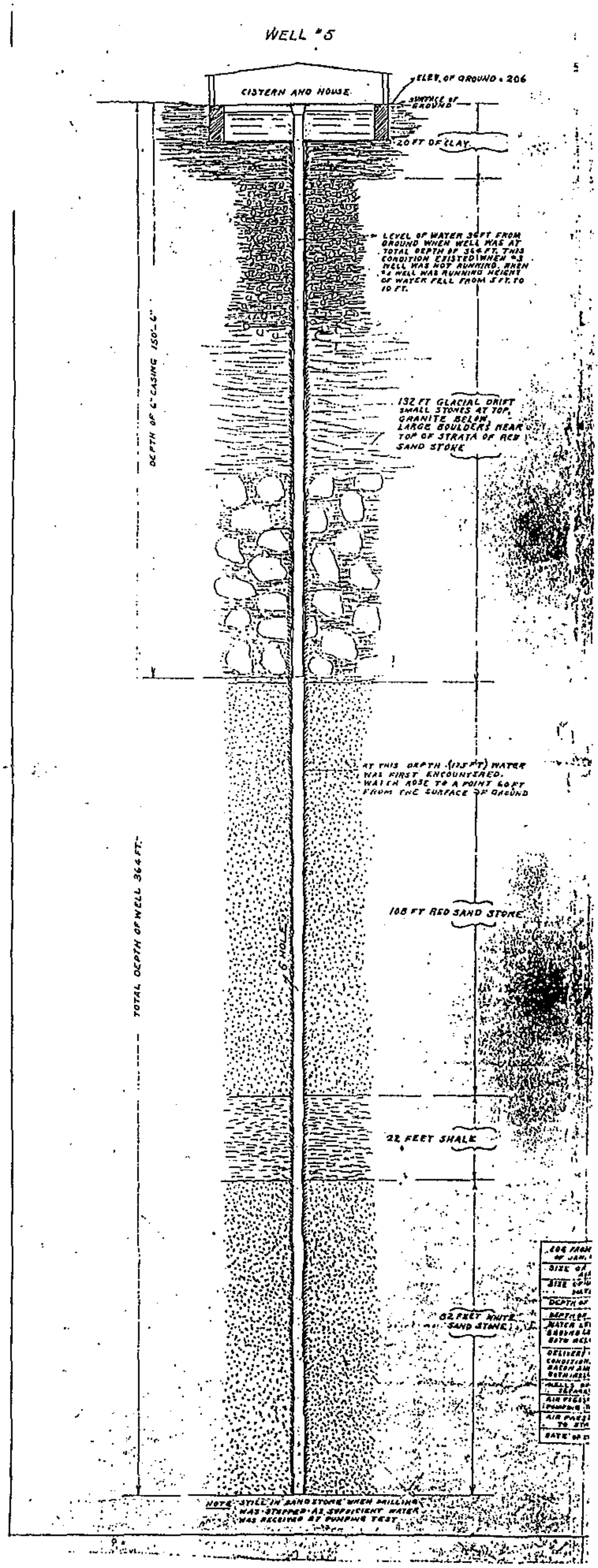
(1)

Ba - 9

Well at Barksdale, Sec. 23, T. 48, R. 5 W., Bayfield Co.
Owner: E. I. du Pont de Nemours Powder Co.
Drillers: McCullem & Cliff for G. Schwartz.
Sender: J. I. Dohm, May, 1906.
See Thwaites, F. T., Wis. Geol. & Nat. Hist. Survey,
Bull. 25, 1912, pp. 34-35. Altitude= 754' ETM

I.W.No.	Sample No.	Strata.	Depth.
16451	1	Grayish red, sandy non-calcareous clay.	0- 10 (70?)
16452	2	Very calcareous reddish gray hard pan or sandy cemented till.	(10?) 70- 90
16453	3	Chequamegon, - soft medium-grained light reddish quartz sandstone.	90-108
16454	4	Same, slightly darker and harder.	108-135
16455	5	Pinkish white, coarser and subangular grained quartz sandstone.	135-160
16456	6	Soft, finer grained reddish quartz sandstone.	160-180
16457	7	Soft, very coarse gritty or conglomeratic red sandstone mixed with some finer. sandstone.	180-200
16458	8	Soft, nearly pure quartz sandstone, grains subangular and of medium size.	200-230
	9	Sample missing. Same as last.	230-245
16459	10	Soft fine to medium grained pinkish quartz sandstone.	245-260
16460	11	Much the same as the last, but with somewhat more rounded grains.	260-280
16461	12	Nearly pure white sandstone, otherwise same as last.	280-300
	13	Soft red sandstone (no sample)	300-310
	14	Hard red sandstone (no sample).	310-315
	15	Same, (no sample).	315-345
	16	Soft white "gravel and sandstone".	345-375.

(13)



WELL #5
ELEV. OF GROUND = 206
CISTERN AND HOUSE
SURFACE OF GROUND
20 FT OF CLAY
LEVEL OF WATER 3 FT FROM GROUND WHEN WELL WAS AT TOTAL DEPTH OF 364 FT. THIS CONDITION EXISTED WHEN #3 WELL WAS NOT RUNNING. WHEN #3 WELL WAS RUNNING HEIGHT OF WATER FELL FROM 5 FT. TO 10 FT.
DEPTH OF 6" CASING 150'-6"
132 FT GLACIAL DRIFT SMALL STONES AT TOP, GRANITE BELOW, LARGE BOULDERS NEAR TOP OF STRATA OF RED SAND STONE
AT THIS DEPTH (175 FT) WATER WAS FIRST ENCOUNTERED. WATER ROSE TO A POINT 60 FT FROM THE SURFACE OF GROUND
TOTAL DEPTH OF WELL 364 FT.
6" HOLE
108 FT RED SAND STONE
22 FEET SHALE
82 FEET WHITE SAND STONE
NOTE: STILL IN SAND STONE WHEN DRILLING WAS STOPPED AS SUFFICIENT WATER WAS RECEIVED AT PUMPING TEST

Nr I well

BA-35-u

Wel. 6-80M (6-50)

4

NE, SE, Sec. 24 T43N, R5W

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH BA-35-u

See Instructions on Reverse Side

RECEIVED FEB 23 1951 BUREAU SAN. ENG.

1. County Bayfield Town ☐ Village ☐ City ☐ Barksdale Check one and give name

2. Location Well no I - Village of Barksdale, T 4
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☐ or Agent ☐ E. I. Du Pont De Nemours Co
Name of individual, partnership or firm

4. Mail Address Barksdale, Wis
Complete address required

5. From well to nearest: Building 5 ft; sewer ___ ft; drain ___ ft; septic tank ___ ft; dry well or filter bed ___ 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.)
6"	0	40			
4"	0	76			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	std steel pipe	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumite Cement	20	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
brownstone Rock	5	76

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 26 ft.

Water sample was sent to the state laboratory at: Madison (City) on Jan 25 1951

Construction of the well was completed on: Jan 22 1951

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 W. A. Gustafson — Registered Well Driller

Washburn Wis — Complete Mail Address

Please do not write in space below

Rec'd ___ No. ___

Ans'd ___

Interpretation (IV1554)

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

Examiner ___

Well 70 2

BA-55-U

Wel. 6-30M(6-50)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SE, NE, Sec. 24 T48N R5W See Instructions on Reverse Side BA-55-U

RECEIVED FEB 23 1951 BUREAU SAN. ENG.

1. County Bayfield Town ☐ Village ☒ City ☐ Barksdale (Check one and give name)

2. Location Village of Barksdale 24 48 R5 (Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☒ or Agent ☐ E. I. du Pont de Nemours Co (Name of individual, partnership or firm)

4. Mail Address Barksdale, Wis (Complete address required)

5. From well to nearest: Building 7 ft; sewer ___ ft; drain ___ ft; septic tank ___ ft; dry well or filter bed ___ 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.)
6"	0	38			
4"	0	80			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std. Steel pipe	0	38

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumite cement	18	38

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
brownstone	5	80

Construction of the well was completed on: Jan 22 1951

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 ___

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 25 ft.

Water sample was sent to the state laboratory at: Madison (City) on Jan 25 1951

Signature W. A. Gustafson (Registered Well Driller) Washburn Wis (Complete Mail Address)

Please do not write in space below

Rec'd ___ No. ___

Ans'd ___

Interpretation (EW9Ca)

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

Examiner ___

Well no III

BA-56-u

Wel. 6-80M (6-50)

6

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SE, NE, Sec. 24, T48N R5W See Instructions on Reverse Side BA-56-u

RECEIVED
1951
BUREAU SAN. ENG.

1. County Bayfield Town ☐ Village ☑ City ☐ Barksdale (Check one and give name)

2. Location Village of Barksdale T48 R5 Well No. III
(Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☑ or Agent ☐ E. I. Du Pont de Nemours Co
(Name of individual, partnership or firm)

4. Mail Address Barksdale, Wis
(Complete address required)

5. From well to nearest: Building 7 ft; sewer ___ ft; drain ___ ft; septic tank ___ ft; ___

dry well or filter bed ___ 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.)
6"	0	39			
4"	0	82			

8. **CASING AND LINER PIPE OR CURBING:**

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std Steel pipe	0	82

9. **GROUT:**

Kind	From (ft.)	To (ft.)
Lumnite Cement	19	39

10. **FORMATIONS:**

Kind	From (ft.)	To (ft.)
Clay	0	5
Brownstone	5	82

Construction of the well was completed on:

Jan 22 1951

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 ___

11. **MISCELLANEOUS DATA:**

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 25 ft.

Water sample was sent to the state laboratory at:

Madison (City) on Jan 25 1951

Signature W. A. Gustafson (Registered Well Driller) Washburn Wis (Complete Mail Address)

Please do not write in space below

Rec'd ___ No. ___

Ans'd ___

Interpretation ___

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

Examiner ___

Well no IV

BA - 57-u

Wel. 6-80M[(6-50)

(7)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SE, NE, Sec. 24 T48N R5W See Instructions on Reverse Side

BA-57-u

1. County Bayfield Town ☐ Village ☑ City ☐ Barksdale
Check one and give name

2. Location Village of Barksdale T 48 R 5 Well 4
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☐ or Agent ☐ E. I. Du Pont de Nemours
Name of individual, partnership or firm

4. Mail Address Barksdale, Wis
Complete address required

RECEIVED FEB 3 1951 BUREAU SAN. ENG.

5. From well to nearest: Building 7 ft; sewer ____ ft; drain ____ ft; septic tank ____
dry well or filter bed ____ 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.)
6"	0	40			
4"	0	90			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std Steel pipe	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumnite Cement	20	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
Brownstone	5	90

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 27 ft.

Water sample was sent to the state laboratory at:
Madison (City) on Jan 25 1951

Construction of the well was completed on:
Jan 22 1951

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 W. A. Gustafson — Registered Well Driller
Washburn Wis — Complete Mail Address

Please do not write in space below

Rec'd ____ No. ____

Ans'd ____

Interpretation ____

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

Examiner ____

Well no 5

BA-58-u

Wel. 6-30M[(6-50)

(8)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SE, NE, Sec. 24 T43N R5W See Instructions on Reverse Side

BA-58-u

1. County Bayfield — Town ☐ Village ☑ City ☐ Barksdale (Check one and give name)

2. Location Village of Barksdale T 48 R 5 Well 5 (Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☐ or Agent ☐ E. I. du Pont de Nemours (Name of individual, partnership or firm)

RECEIVED FEB 23 1951 BUREAU SAN. ENG.

4. Mail Address Barksdale, Wis (Complete address required)

5. From well to nearest: Building 7 ft; sewer ____ ft; drain ____ ft; septic tank ____

dry well or filter bed ____ ft; abandoned well ____ ft.

6. Well is intended to supply water for: ____

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6"	0	40			
4"	0	94			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std Steel pipe	0	94

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumite cement	20	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
Brownstone	5	94

Construction of the well was completed on:

Jan 22 1951

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 ____

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 27 ft.

Water sample was sent to the state laboratory at:

Madison (City) on Jan 25 1951

Signature W. A. Gustafson (Registered Well Driller) — Washburn Wis (Complete Mail Address)

Please do not write in space below

Rec'd ____ No. ____

Ans'd ____

Interpretation ____

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

Examiner ____

Well no F1

BA-59-u

Wel. 6-30M(6-50)

9

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SE, NE Sec. 24 T48N R5W See Instructions on Reverse Side

BA-59-u

1. County Bayfield — Town ☐ Village ☑ City ☐ Barksdale (Check one and give name)

2. Location Village of Barksdale T 48 R 5 Well 6 (Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☑ or Agent ☐ E. I. Du Pont de Nemours Co (Name of individual, partnership or firm)

4. Mail Address Barksdale, Wis (Complete address required)

RECEIVED FEB 23 1951 BUREAU SAN. ENG.

5. From well to nearest: Building 7 ft; sewer ____ ft; drain ____ ft; septic tank ____ ft; dry well or filter bed ____ ft; abandoned well ____ ft.

6. Well is intended to supply water for:

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6"	0	41			
4"	0	96			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std steel pipe	0	41

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumnite Cement	20	41

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
Brownstone	5	96

Construction of the well was completed on: Jan 22 1951

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 ____

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 27 ft.

Water sample was sent to the state laboratory at: Madison (City) on Jan 25 1951

Signature W. A. Gustafson (Registered Well Driller) — Washburn, Wis. (Complete Mail Address)

Please do not write in space below

Rec'd ____ No. ____

Ans'd ____

Interpretation ____

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

Examiner ____

Well no 7

BA-60-u

Wel. 6-30M (6-50)

(10)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SE, NE, Sec. 24 T48N R5W See Instructions on Reverse Side BA-60-u

RECEIVED FEB 13 1951 BUREAU SAN. ENG.

1. County Bayfield Town ☐ Village ☑ City ☐ Barksdale Check one and give name

2. Location Village of Barksdale T48 R5 ...
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☑ or Agent ☐ E. I. Du Pont de Nemours & Co
Name of individual, partnership or firm

4. Mail Address Barksdale, Wis
Complete address required

5. From well to nearest: Building 7 ft; sewer ___ ft; drain ___ ft; septic tank ___ ft; dry well or filter bed ___ ft; abandoned well ___ ft.

6. Well is intended to supply water for: ___

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6"	0	41			
4"	0	100			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std Steel pipe	0	41

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumite Cement	21	41

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
Brownstone	5	100

Construction of the well was completed on: Jan. 22 1951

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 ___

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 28 ft.

Water sample was sent to the state laboratory at: Madison (City) on Jan 25 1951

Signature W. A. Gustafson (Registered Well Driller) Washburn, Wis (Complete Mail Address)

Please do not write in space below

Rec'd ___ No. ___

Ans'd ___

Interpretation ___

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

Examiner ___

Well no 8

BA-61-U

RECEIVED MAR 2 1951 SAN. ENG.

Wel. 6-30M (6-50)

(11)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

SE, NE, Sec. 24 T48N R5W **See Instructions on Reverse Side** BA-61-U

1. County Bayfield — Town ☐ Village ☑ City ☐ Barksdale (Check one and give name)

2. Location Village of Barksdale T48 R5 ¼ Sec 8
(Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☑ or Agent ☐ E. I. Du Pont de Nemours Co.
(Name of individual, partnership or firm)

4. Mail Address Barksdale, Wis
(Complete address required)

5. From well to nearest: Building 7 ft; sewer ___ ft; drain ___ ft; septic tank ___ ft; ___ dry well or filter bed ___ ft; abandoned well ___ ft.

6. Well is intended to supply water for: ______

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6"	0	40			
4"	0	105			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std Steel pipe	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumnite Cement	20	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
Brownstone	5	105

Construction of the well was completed on: Jan 22 1951

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 ___

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 5 GPM.

Depth from surface to water-level: 31 ft.

Water-level when pumping: 29 ft.

Water sample was sent to the state laboratory at: Madison (City) on Jan 25 1951

Feb 2 - 1951 Safe

Signature W. A. Gustafson (Registered Well Driller) — Washburn Wis (Complete Mail Address)

Please do not write in space below

Rec'd ______ No. ______

Ans'd ______

Interpretation ______

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

Examiner ______

BA-32-u

Wel. 6-80M (6-50)

(12)

per USGS
NW, SE, Sec. 24 T48N R5W

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

BA-32-u

RECEIVED AUG 1952 ENVIRONMENTAL SANITATION

1. County: Bayfield — Town ☐ Village ☑ City ☐ (Check one and give name): Barksdale
2. Location: Main Gate - T-48 - R5 (Name of street and number of premise or Section, Town and Range numbers)
3. Owner ☑ or Agent ☐: E. I. Du Pont de Nemours (Name of individual, partnership or firm)
4. Mail Address: Barksdale, Wisc. (Complete address required)
5. From well to nearest: Building 30 ft; sewer ___ ft; drain ___ ft; septic tank ___ ft; dry well or filter bed ___ ft; abandoned well ___ ft.
6. Well is intended to supply water for: Guards at Gate

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	0	40			
4	40	103			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Std steel pipe	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumite Cement	28	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sandy and Soil	0	3
Clay	3	8
Brownstone	8	103

Construction of the well was completed on: July 12 1952

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 ___

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 7 GPM.

Depth from surface to water-level: 36 ft.

Water-level when pumping: 39 ft.

Water sample was sent to the state laboratory at: Madison (City) on July 15 1952

Signature: W. A. Gustafson (Registered Well Driller) — Washburn Wisc (Complete Mail Address)

Please do not write in space below

Rec'd ___ No. ___

Ans'd ___

Interpretation ___

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

Examiner ___

BA-31-U Wel. 6-80M (6-50)

(13)

per USGS
SW, SE, Sec. 24 T48N R5W

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

BA-31-U

RECEIVED
Feb 28 1951
BUREAU SAN. ENG.

1. County Bayfield — Town ☑ Village ☐ City ☐ Barksdale (Check one and give name)

2. Location S. of Village of Barksdale T 48 R5W (Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☐ or Agent ☐ Gitchegaumee Council (Name of individual, partnership or firm)

4. Mail Address Ashland, Wis (Complete address required)

5. From well to nearest: Building 7 ft; sewer ____ ft; drain ____ ft; septic tank ____ ft; dry well or filter bed ____ ft; abandoned well ____ ft.

6. Well is intended to supply water for: ____

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6"	0	40			
4"	0	95			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Std steel pipe	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Lumite Cement	20	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
Brownstone 5	5	95

Construction of the well was completed on: Jan 15 1951

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 ____

11. MISCELLANEOUS DATA:

Yield test: 12 Hrs. at 5 GPM.

Depth from surface to water-level: 16 ft.

Water-level when pumping: 16 ft.

Water sample was sent to the state laboratory at: Madison (City) on Jan 20 1951

Signature W. A. Gustafson (Registered Well Driller) — Washburn Wis (Complete Mail Address)

Please do not write in space below

Rec'd ____ No. ____

Ans'd ____

Interpretation ____

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

Examiner ____

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER CX 533

OCT 31 1991

State of Wisconsin
Department of Natural Resources
Private Water Supply — WS/2
Box 7921
Madison, WI 53707

(14)

Property Owner: Tad Bretting
Telephone Number: N/A
Mailing Address: c/o Wayne Peterson, Rt 3 Box 158
City: Ashland
State: WI
Zip Code: 54806
County of Well Location: Bayfield
County Well Location Permit No.: W
Well Completion Date: 9 9 91 (M M D D Y Y)

04

Well Constructor (Business Name): Paul Anderson Wells
Registration #: 4681
Address: Rt 4 Box 152
City: Ashland
State: WI
Zip Code: 54806

1. Location (Please type or print using a black pen.)
☒ Town ☐ City ☐ Village of Barksdale
Fire # (if available)
Grid or Street Address or Road Name and Number (if available)
Subdivision Name | Lot # | Block #
Gov't Lot # ___ or NW ¼ of NE ¼ of Section 26; T 48 N; R 5 ☐ E ☒ W

2. Mark well location in correct 40-acre parcel of section.
N / W / E / S

3. Well Type ☒ New ☐ Replacement ☐ Reconstruction
of unique well # ______ constructed in 19 ____.
Reason for new, replaced or reconstructed well? NEW HOME

4. Well serves 1 # of homes and/or ________
(ex: barn, restaurant, church, school, industry, etc.)
High Capacity Well? ☐ Yes ☒ No
High Capacity Property? ☐ Yes ☒ No
☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☒ Yes ☐ No If no, explain on back side.
Well Located in Floodplain? ☐ Yes ☒ No
Distance In Feet From Well To Nearest:

	1. Landfill		9. Downspout/Yard Hydrant		17. Wastewater Sump
70'	2. Building Overhang		10. Privy		18. Paved Animal Barn Pen
	3. Septic or Holding Tank		11. Foundation Drain to Clearwater		19. Animal Yard or Shelter
	4. Sewage Absorption Unit		12. Foundation Drain to Sewer		20. Silo — Type
	5. Nonconforming Pit		13. Building Drain ☐ Cast Iron or Plastic ☐ Other		21. Barn Gutter
	6. Buried Home Heating Oil Tank		14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other		22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
	7. Buried Petroleum Tank		15. Collector or Street Sewer		23. Other Manure Storage
300'	8. Shoreline/Swimming Pool		16. Clearwater Sump		24. Other NR 112 Waste Source: NO SEWER AT TIME

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8"	surface	40'
6"	40	103'

Method of constructing upper enlarged drillhole only.
☒ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ____ in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain ____
☐ 7. Other ____

9. Geology

DNR USE ONLY	Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
C	CLAY	surface	29'
N	SAND STONE	29	103

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
~~6.6~~ 6.625	OD 6" ID PE A53B TAIWAN PIPE	surface	42'
	ROCK	42'	103'

Dia. (in.)	screen type and material	From	To
	ROCK	40	103

8. Grout or Other Sealing Material
Method ________

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
CEMENT	surface		8

10. Static Water Level
____ ft. above ground level
71 ft. below ground surface

11. Pump Test
Pumping Level 42' ft. below surface
Pumping at 12 GPM for 24 hours

12. Well Is: 12 in. ☒ Above ☐ Below Grade
Developed? ☒ Yes ☐ No
Disinfected? ☒ Yes ☐ No
Capped? ☒ Yes ☐ No

13. Did you permanently seal all unused, noncomplying, or unsafe wells? ☐ Yes ☐ No If no, explain N/A

14. Signature of Point Driver or Registered Driller: Paul R Anderson — Date Signed: PRA 9/19/91
Signature of Drill Rig Operator: Same PRA — Date Signed

Make additional comments on reverse side about geology, etc.

DNR

WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 9-88

134

WGNHS ORIGINAL

BAYFIELD COUNTY BA-117-U

T48N R5W SW¼, Section 25

OWNER = Harris

WATER LEVEL = Flowing

FORMATIONS =	Drift	0-105
	Sand	AT 105

IW711

Warren Smith Well

no info available

IW 882

Bretting Manufacturing
Maintenance Shed Well

~200 ft. glacial till
on sandstone (Prohaska)

no info. available

40
U61J7

Wel. 6

(18)

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

1. County Bayfield Town ☑ Village ☐ City ☐ Barksdale
Check one and give name

2. Location T48N R5W SW, SW, SW, Sec. 26
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☐ or Agent ☐ Ondossagon School Dist-
Name of individual, partnership or firm

4. Mail Address Ashland, Wis - R.2.
Complete address required

5. From well to nearest: Building 10 ft; sewer ___ ft; drain ___ ft; septic tank ___ ft;
dry well or filter bed ___ ft; abandoned well ___ ft.

RECEIVED
DEC 7 1955
ENVIRONMENTAL SANITATION

6. Well is intended to supply water for: School

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	0	211'9"			
4	211'9'	277'6"			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6"	Std Steel pipe	0	211'9"
4"	" " "	153'5'	259'6"
	Sandpacker-		

9. GROUT:

Kind	From (ft.)	To (ft.)
18 ft. Johnson Everdur	4"	
Screen installed		

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	138
Muddy fine Sand	138	147
Soft Sandy Hard pan	147	179
Muddy Sand	179	193
Hard pan	193	247
gravel streak	247	248
Sandy Hard pan	248	269½
sand	269½	270
Fine quartz Sand	270	277'6"

11. MISCELLANEOUS DATA:

Yield test: 20 Hrs. at 50 GPM.

Depth from surface to water-level: 30 ft.

Water-level when pumping: 40 ft.

Water sample was sent to the state laboratory at:
Madison on Oct 4 1956
City

Construction of the well was completed on:
Oct 1 1956

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 W. A. Gustafson Washburn Wis
Registered Well Driller Complete Mail Address

Please do not write in space below

Rec'd ___ No. ___

Ans'd ___

Interpretation ___

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

Examiner ___

'18 (19)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

RECEIVED JUN 16 1954 SANITARY ENGINEERING

1. County BAYFIELD — Town ☒ Village ☐ City ☐ (Check one and give name) BARKS DALE

2. Location LOT 12 MISSION SPRINGS PLOT SEC. 25 T48 (Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☒ or Agent ☐ AL GADDA (Name of individual, partnership or firm)

4. Mail Address R 3 ASHLAND, WISC (Complete address required)

5. From well to nearest: Building 20 ft; sewer — ft; drain — ft; septic tank — ft;

dry well or filter bed — ft; abandoned well — ft.

6. Well is intended to supply water for: SUMMER HOME

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	20				
4	20	28			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	STD BLK PIPE	0	25
	Screen- Johnson, #25 slot,		
	3' long, std fitting, everdur metal		

9. GROUT:

Kind	From (ft.)	To (ft.)
MUD	0	20

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
CLAY	0	18
HEAVY GRAVEL	18	28

Construction of the well was completed on: JUNE 4 1964

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

11. MISCELLANEOUS DATA:

Yield test: CONTINUOUS Hrs. at 6 GPM.

Depth from surface to water-level: 2 FT. ABOVE ft.

Water-level when pumping: 1-FOOT ABOVE GRADE ft.

Water sample was sent to the state laboratory at: MADISON (City) on JUNE 9 1964

Signature Richard W. Squires (Registered Well Driller) — Mason, Wisc. (Complete Mail Address)

Please do not write in space below

Rec'd JUN 10 1964 No. 23288

Ans'd

Interpretation

SAFE—BACTERIOLOGICALLY

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli	0	0	0	0	0

Examiner

INSTRUCTIONS

ALL INFORMATION INDICATED ON THE FACE OF THIS FORM MUST BE GIVEN

PLEASE BE GUIDED BY THE FOLLOWING:

Numbers below correspond to numbers of items of the form on the opposite side.

1. Name of the County and the name of the Town, Village or City. Indicate which is given.
2. If Rural: Number and the 1/4 of the Section, the number of the Town North, and the number of the Range East or West.
   If Urban: Name of the Street and the number of the Premise.
3. Name of the Owner. If the name of the owner cannot be given, give instead the name of the Agent. Indicate which is given.
4. Name of the Street and the number of the Premise or the number of the Mail Route, the name of the Post Office and the name of the State.
5. Distance, in feet, from the well to the nearest building and to each source of pollution shown.
6. Indicate: Home, farm, school, tavern, creamery, community, industry, etc.
7. Show the diameter and depth of the initial drillhole or excavation and each reduction in size to bottom. If well was reconstructed, show diameter and depth of original well on first line.
8. Show diameter and kind of casing pipe, liner pipe or curbing and actual position in the well, measured from the surface.
9. Show kind of material (mud or cement) used in sealing the annular space, from and to what depths from the surface. If neither was used indicate "none".
10. Show thickness of each formation and the total depth at the base thereof.
11. Provide the data indicated.

Note: The Well Construction Report (Well Log) may be forwarded with the water sample from a newly constructed or reconstructed well, instead of the report requested by the State Laboratory of Hygiene, on the form which accompanies the sample bottle.

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., may be given here:

WELL IS COMPLETED WITH A JOHNSON
WELL SCREEN 3 FEET LONG - #25 SLOT
EVERDUR METAL - STD FITTINGS

DO NOT FILM

If more space is needed another sheet may be attached.

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH RECEIVED (20)
See Instructions on Reverse Side

1. County BAYFIELD — Town ☒ Village ☐ City ☐ BARKSDALE (Check one and give name) JUN 16 1964
2. Location LOT 8 MISSION SPRINGS PLOT SEC. 25 T 48N R 5W (Name of street and number of premise or Section, Town and Range numbers) SANITARY ENGINEERING
3. Owner ☒ or Agent ☐ AL GADDA (Name of individual, partnership or firm)
4. Mail Address R3. ASHLAND, WISC. (Complete address required)
5. From well to nearest: Building NONE ft; sewer — ft; drain — ft; septic tank — ft; dry well or filter bed — ft; abandoned well — ft.
6. Well is intended to supply water for: SUMMER HOME

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	0	20			
4	20	36			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	STD. BLK. PIPE	0	33
	well point - #172-60		

9. GROUT:

Kind	From (ft.)	To (ft.)
MUD	0	20

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
CLAY	0	22
COARSE WATER SAND	22	36

Construction of the well was completed on: JUNE 1 1964

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

Was the well disinfected upon completion? Yes X No

Was the well sealed watertight upon completion? Yes X No

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 15 GPM.

Depth from surface to water-level: 16 ft.

Water-level when pumping: 18 ft.

Water sample was sent to the state laboratory at: MADISON (City) on JUNE 9 1964

Signature Richard W. Squires (Registered Well Driller) — Mason, Wisc. (Complete Mail Address)

Please do not write in space below

Rec'd JUN 10 1964 No. 23295

Ans'd

Interpretation SAFE—BACTERIOLOGICALLY

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli	0	0	0	0	0

Examiner

INSTRUCTIONS

ALL INFORMATION INDICATED ON THE FACE OF THIS FORM MUST BE GIVEN

PLEASE BE GUIDED BY THE FOLLOWING:

Numbers below correspond to numbers of items of the form on the opposite side.

1. Name of the County and the name of the Town, Village or City. Indicate which is given.
2. If Rural: Number and the $\frac{1}{4}$ of the Section, the number of the Town North, and the number of the Range East or West.
   If Urban: Name of the Street and the number of the Premise.
3. Name of the Owner. If the name of the owner cannot be given, give instead the name of the Agent. Indicate which is given.
4. Name of the Street and the number of the Premise or the number of the Mail Route, the name of the Post Office and the name of the State.
5. Distance, in feet, from the well to the nearest building and to each source of pollution shown.
6. Indicate: Home, farm, school, tavern, creamery, community, industry, etc.
7. Show the diameter and depth of the initial drillhole or excavation and each reduction in size to bottom. If well was reconstructed, show diameter and depth of original well on first line.
8. Show diameter and kind of casing pipe, liner pipe or curbing and actual position in the well, measured from the surface.
9. Show kind of material (mud or cement) used in sealing the annular space, from and to what depths from the surface. If neither was used indicate "none".
10. Show thickness of each formation and the total depth at the base thereof.
11. Provide the data indicated.

Note: The Well Construction Report (Well Log) may be forwarded with the water sample from a newly constructed or reconstructed well, instead of the report requested by the State Laboratory of Hygiene, on the form which accompanies the sample bottle.

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., may be given here:

WELL IS COMPLETED WITH A # 172-60 WELL POINT.

If more space is needed another sheet may be attached.

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 12-76

(21)

FEB 5 1985

1. COUNTY	CHECK (✓) ONE:			Name
BAYFIELD	☑ Town	☐ Village	☐ City	BARKS DALE

2. LOCATION	¼ Section	Section	Township	Range
	SW-SE	S22	T.48N	R-5W

OR – Grid or Street No. Street Name

AND – If available subdivision name, lot & block No.

3. NAME ☑ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE
RON GLASS
ADDRESS
R-3
POST OFFICE
ASHLAND - WIS

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
15			25		25		NONE		NONE	

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Clearwater Dr.	Sewage Sump	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit / Seepage Bed / Seepage Trench
NONE		NONE				NONE					75	NONE	Seepage Bed 100

Privy	Pet Waste Pit	Pit: Nonconforming Existing (Well / Pump / Tank)	Subsurface Pumproom 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
NONE										

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: HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
~~8~~ 6	Surface	20	4	20	180

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
4	11 LBS PER FT.	Surface	176
	T & C ASTM-A-120		
	USS STEEL CASING		
2	JOHNSON SS 10 SLOT		
	SCREEN	176	180

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
CLAY SLURRY FROM	Surface	20
DRILL HOLE		

9. FORMATIONS

Kind	From (ft.)	To (ft.)
TOP SOIL	Surface	2
RED CLAY	2	168
WATER SAND	168	180

See 3-85 letter in W.D. file

10. TYPE OF DRILLING MACHINE USED

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

Well construction completed on 6-25-73 19 ~~73~~ 79 D.T.

Well is terminated 12 inches ☑ above ☐ below final grade

Well disinfected upon completion ☑ Yes ☐ No

Well sealed watertight upon completion ☑ Yes ☐ No

11. MISCELLANEOUS DATA

Yield Test: 10 Hrs. at 5 GPM

Depth from surface to normal water level 85 Ft.

Depth of water level when pumping 90 Ft. Stabilized ☑ 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, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: Robert T. Melin Registered Well Driller

Complete Mail Address: 1318 Mac Arthur Ave - Ashland-Wis

SEP 10 1974

22

WELL CONSTRUCTOR'S REPORT
FORM 3300–15

FEB 12 1975

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 BAYFIELD
CHECK ONE: [X] Town [ ] Village [ ] City — NAME BARKSDALE

2. LOCATION – ¼ Section NE-SE, Section 15, Township 48N, Range 5W
OR – Grid or street no. / Street name
AND – If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING ENOCH EKHOLM
ADDRESS RR
POST OFFICE WASHBURN

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

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

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		60		80					

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

5. Well is intended to supply water for: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	169			
4	169	200			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½"	O.D. BLK ELECTRIC	Surface	
	WELD 11# PER FT.		
	T.&C. .237 WALL		
4"	F.D. STEEL PIPE		170

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED ROTARY DRILL CUTTINGS	Surface	169

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	50
SANDY CLAY	50	92
SAND & CLAY STREAKS	92	160
BROKEN MUDDY SANDSTONE	160	169
SOLID SANDSTONE	169	200

10. TYPE OF DRILLING MACHINE USED
[ ] Cable Tool [X] Direct Rotary [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 7-15 1974
Well is terminated 12 inches [X] above [ ] below final grade
Well disinfected upon completion [X] Yes [ ] No
Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield test: 2 Hrs. at 10 GPM
Depth from surface to normal water level 70 ft.
Depth to water level when pumping 90 ft.
Water sample sent to MADISON laboratory on: JULY 15 1974

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 Richard W. Squires Registered Well Driller
COMPLETE MAIL ADDRESS R1 MASON, WI.

Please do not write in space below

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

REV. 3–71

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL DRILLING DIVISION

SEP 7 1939 (32)

Note: Section 32 of the Wisconsin Well Drilling Sanitary 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 Jngeman Rowe — Driller Melin Well Drilling Co Theodore Melin

Street or RFD Route I — Post Office Ashland Wis

Post Office Washburn Wis. — Date Sept 5-39 — Permit No. 027

LOCATION OF PREMISES

Bayfield County — Barksdale Town

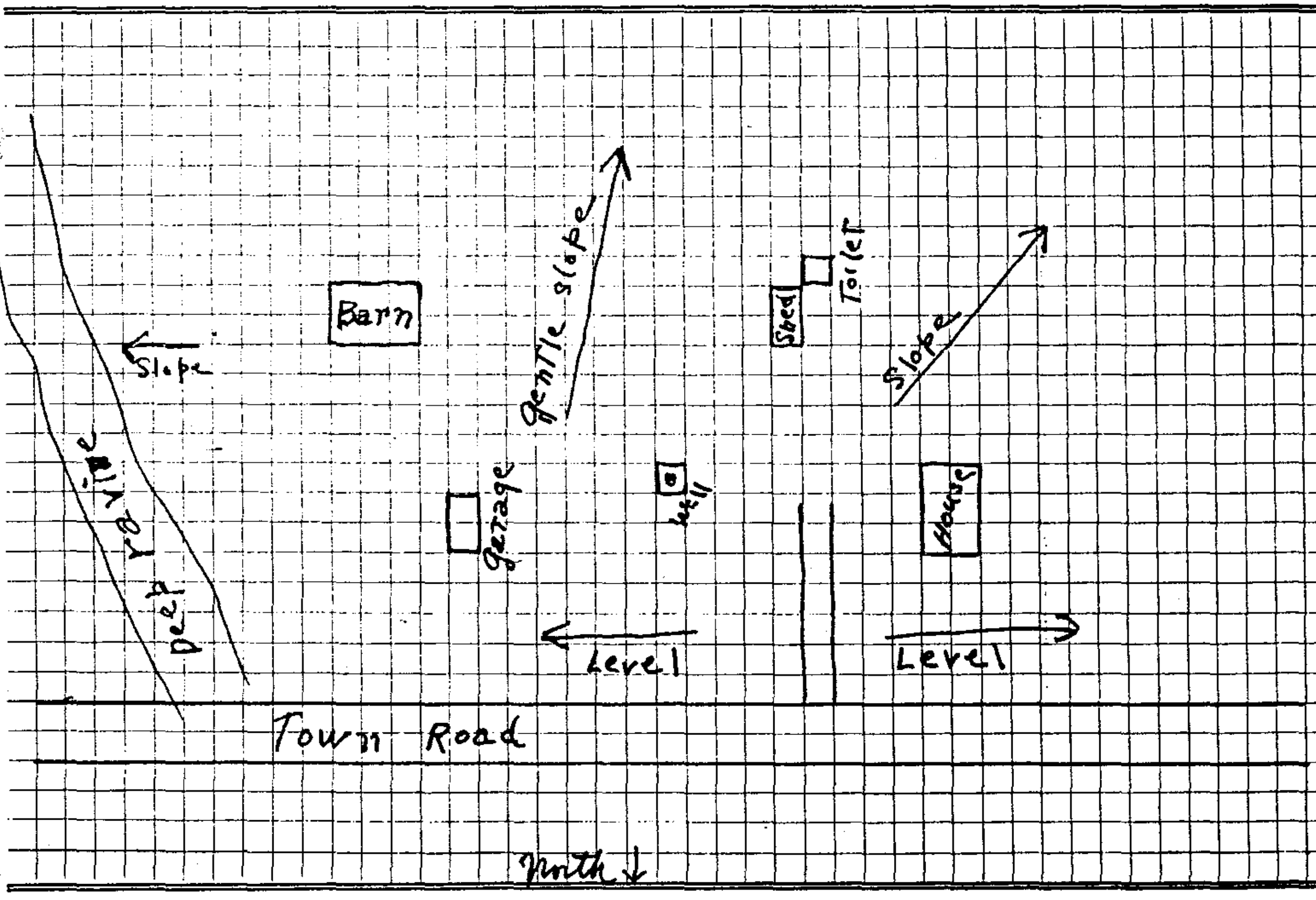
NW¼ of NW¼ of Section 13 - Township 48 - Range 5
Describe further by subdivision, plat, district, lake, lot,
U.S. 13 - Nearest highway
block, nearest principal highway, etc., whichever apply.

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

Sec. 13
Twp. 48
Range 5 {E W

DIAGRAM OF PREMISES

See discussion and illustration in Part III Well Drilling Code. In making the diagram in the space below consider 10 ft. as the distance between lines. Be sure to indicate NORTH.



Additional copies of this form may be obtained in lots of 12 for 25¢. Send remittance with order to State Board of Health, Well Drilling Division, Madison, Wis.

WELL LOG *and* REPORT

In this column indicate the kind of casing, liner, shoe and other accessories used.

Std. WT. wrot steel pipe

Drillers Special

Forged steel drive shoes

Key:

| = casing pipe

{ = Mud grout

WELL DIAGRAM
Use a red line to show casing or liner pipe. Use black for drill or borehole.

Inches Diameter
2 3 4 5 6 8 10 12 14 16 18

113'

Draw the diagram to show the right half only

In this column state the kind of formations penetrated, their thickness in feet and if water bearing.

Depth		
7	Top soil & clay	7'
24	Hard pan	17'
25		
27		
33	grayish clay	9'
50		
67	Hard pan	34'
75		
100	Dry sand	36'
103		
107	Hard Pan & bowlders	4'
113	Quick sand	6'
115	Hard Pan	2'
124	Gravel - Waterbearing	9'
150		
200		
400		
800		
1200		

Record of FINAL Pumping test

Duration of test
Hours 8

Pumping rate
G.P.M. 6

Depth of pump in well. Ft. 114

Standing water-level (from surface)
Ft. 93

Water-level when pumping Ft. 97

Water. End of test.
Clear ✓
Cloudy
Turbid

Was the well sterilized?
Yes ✓ No

To which laboratory was sample sent?
Superior Wis.
Date June 28 - 39

Was the well sealed on completion?
Yes ✓ No

How high did you leave the casing-pipe above grade?
14"

Well was completed
Date July 27 - 39

Well Driller Theodore Melin
Signature

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 12-76

(33)

NOV 26 1980

1. COUNTY BAYFIELD
CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name BARKSDALE

2. LOCATION ¼ Section NE-SE Section 13 Township 48N Range 5W
OR – Grid or Street No. Street Name
AND – If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
KEVIN FUHRMAN
ADDRESS RR
POST OFFICE WASHBURN, WIS.

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
30										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Clearwater Dr.	Sewage Sump	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Seepage Pit	Seepage Bed	Seepage Trench
											80			100	

Privy	Pet Waste Pit	Pit: Nonconforming Existing (Well / Pump / Tank)	Subsurface Pumproom 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

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:
TRAILER HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	Surface	55			
4	55	57			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
4½" O.D.	T&C. ASTM 589	Surface	
11#	0.237 WALL - 4" I.D.		
	BLK. STEEL PIPE		57

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	55

9. FORMATIONS

Kind	From (ft.)	To (ft.)
DRY SAND	Surface	10
SANDY CLAY	10	55
HEAVY GRAVEL	55	57

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool 55-57
[ ] Rotary-air w/drilling mud
[X] Rotary-w/drilling mud 0-55
[ ] Rotary-hammer w/drilling mud & air
[ ] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with [ ] Air [ ] Water

Well construction completed on 7-29 1980

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 10 Hrs. at 15 GPM
Depth from surface to normal water level 37 Ft.
Depth of water level when pumping 38 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on 7-29 1980

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 Richard W. Squire Registered Well Driller

Complete Mail Address R1 MASON, WIS. 54856

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300–15 Rev. 2-79

812

OCT 14 1982

1. COUNTY BAYFIELD
CHECK (✓) ONE: ☒ Town ☐ Village ☐ City — Name BARKSDALE

2. LOCATION — ¼ Section or Gov't. Lot: SW-SW | Section: 14 | Township: 49N | Range: 5W
OR – Grid or Street No. | Street or Road Name
AND – If available subdivision name, lot & block No.

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE
PAUL KACVINSKY
ADDRESS R1
POST OFFICE WASHBURN, WIS. ZIP CODE 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
10										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to Sewer	Foundation Drain Connected to Clearwater Dr.	Foundation Drain Connected to Sewage Sump	Foundation Drain Connected to Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit	Seepage Bed	Seepage Trench	Manure Hopper or Retention or Pnuematic Tank
											100			120		

Privy	Pet Waste Pit	Pit: Nonconforming Existing — Well / Pump / Tank	Subsurface Pumproom 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	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: FARM & HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	65			
4	65	84			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½"	O.D. T.&C. ASTM A-589	Surface	
11#	0.237 WALL 4" I.D.		
BLK.	STEEL PIPE		80
2"	STAINLESS ST. SCREEN	80	
#10 SLOT	W/4½ K PACKER		84

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	65

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	60
SAND & CLAY MIXTURE	68	78
WATER SAND	78	84

10. TYPE OF DRILLING MACHINE USED
☒ Cable Tool ☐ Rotary-air w/drilling mud ☐ Rotary-w/drilling mud ☐ Rotary-hammer w/drilling mud & air ☐ Rotary-hammer & air ☐ Reverse Rotary ☐ Jetting with ☐ Air ☐ Water

Well construction completed on 12-8 1981

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield Test: 5 Hrs. at 5 GPM
Depth from surface to normal water level 30 Ft.
Depth of water level when pumping 70 Ft. Stabilized ☒ Yes ☐ No

Water sample sent to MADISON laboratory on DEC. 8 1981

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 Richard W. Squires Registered Well Driller

Business Name and Complete Mailing Address
DICK SQUIRES WELLDRILLING CO.
R1 BOX 77, MASON, WIS. 54856

WELLS NOT USED IN CROSS SECTIONS

County Bayfield Twp. Barksdale Sec. 12
(Office Record—Do not fill in)

(23)

TO THE WISCONSIN STATE BOARD OF HEALTH, WELL DRILLING DIVISION, MADISON, WIS.

WELL LOG, PREMISES DIAGRAM, and REPORT

For Official Record of the Board.
(TO BE USED FOR THAT PURPOSE ONLY)

Owner Leander Johnson
(If a joint ownership give name of responsible official. Also name of each individual holding an interest. Use a separate sheet and attach hereto.)

Driller Melin Well Drilling Co

Address 620-19one W.
Ashland Wis

Address Washburn Wis. Bayfield
(City, village, township, county)

Date of Report Apr 7 — 1938

Registration No. 027

Give below the location of the property on which well is drilled.

If incorporated village or city:	Name	Lot	Blk.	Street and No.
If unincorporated hamlet	Name	County	Twp.	Highway
If Lake Shore Plat	Name of Plat	Lake	Lot	Blk. / Street
If Farm	Bayfield (County)	48 (Twp.)	12 (Sec.)	Dogo Road off US.13. (Highway)
If School	County	Twp.	Sec.	District
If other public building	Kind	County	Twp.	Sec.
Miscellaneous	Kind	County	Twp.	Sec.

WELL LOG and REPORT

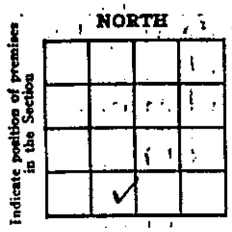
Screens, Seals Grouts, etc.	Well Diagram (Each vertical line equals 1")	Kind of Casing, liner, shoe, etc. (Each horizontal line equals 5')	Formations State if dry or water bearing	Record of FINAL Pumping Test
105' 4" Standard drillers pipe	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 300, 350, 400, 500, 600, 700	0-25' sand dry 25'-75' gravel dry 75'-105' Hard pan 105'-141' sandstone water		Duration of test. Hours 4 Pumping Rate. G. P. M. 6 Depth of pump in well. Ft. 126 Standing water-level (from surface.) Ft. ~~[illegible]~~ 60 ft Water level when pumping Ft. 65 ft Water. End of test. Check: Clear ✓ Cloudy Turbid Was well sterilized before test? Yes ✓ No Date June 21-1937 To which Laboratory was sample sent? Superior Wis Date Apr 7-1938 Was the well sealed on completion? Yes ✓ No How high did you leave casing above grade? 18" Well was completed June 21 1937 Well Driller: Theodore Melin Signature. (Be sure to complete the report on the reverse side)

PREMISES DIAGRAM

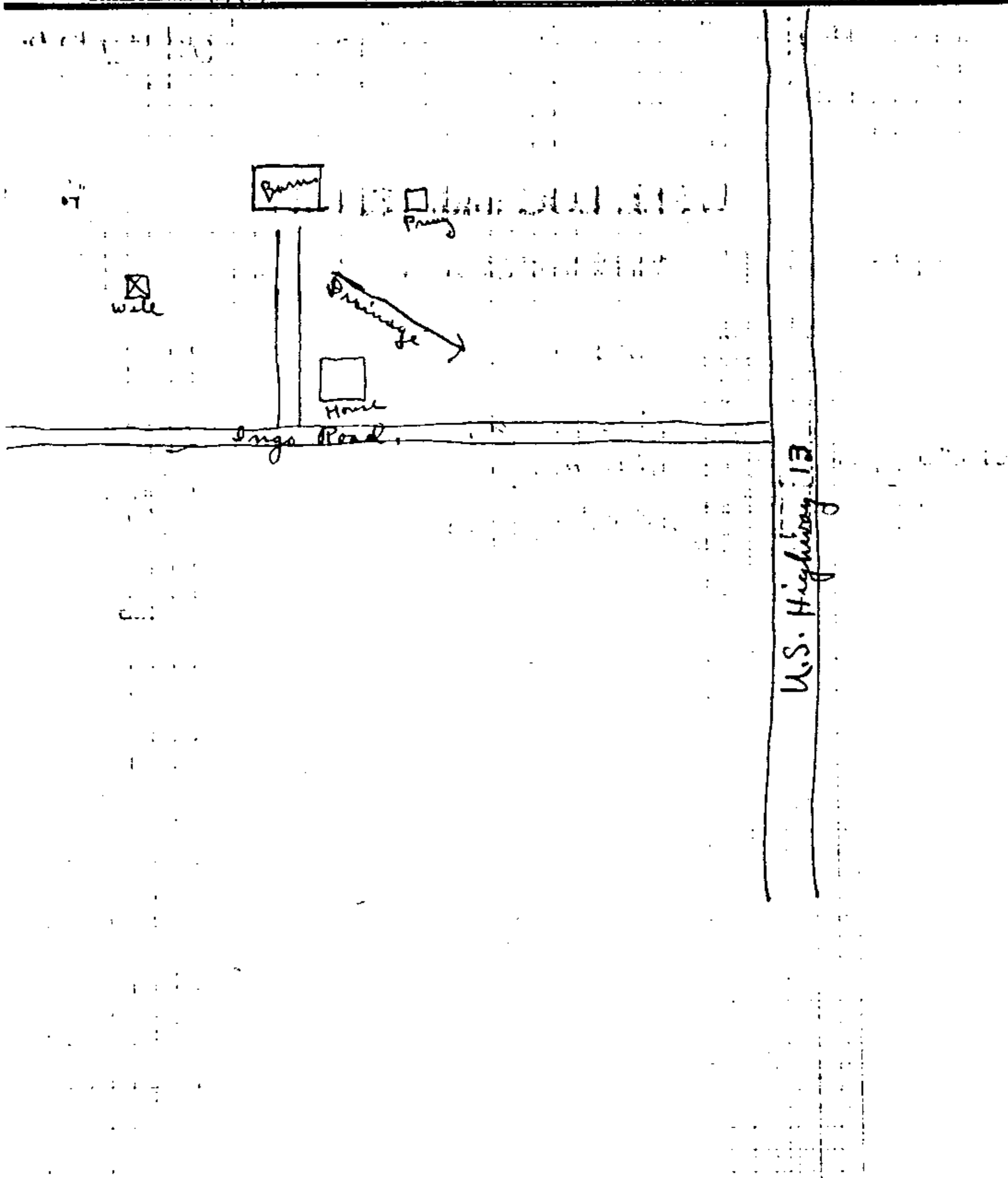
(See Rules)

Draw a representative sketch of the premises on which this well is located, showing the location of the well with reference to buildings and possible sources of pollution. Indicate the condition of the surroundings by printing descriptive words like high, low, level, slope, lake, river, swamp, forest meadow, barnyard, cesspool, privy, sewer, etc., at their respective locations and show distance from the well on the sketch. Also show direction of the compass. See Part III for specimen Diagram.

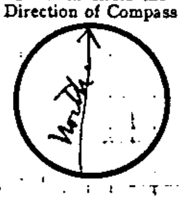
REMARKS:



Sec [illegible] T 41 R 5 (E) (W) (Each division equals 10') (If more or less indicate: ______)



Show in circle the Direction of Compass



Note: Additional copies of this form may be obtained at 5c per copy in lots of 10 or more. Send remittance with order to State Board of Health, Well Drilling Division, Madison.

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL CONSTRUCTION DIVISION

FEB -6 1941 ✓ (24)

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 BRYNJOLF HIRSCH Driller W. A. GUSTAFSON

Street or RFD NO. 1 Post Office WASHBURN

Post Office WASHBURN Date JAN. 1 - 1941 Permit No. 124

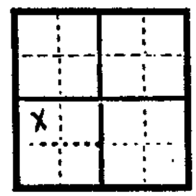
LOCATION OF PREMISES

BAYFIELD (County) Washburn (Town)

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

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

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



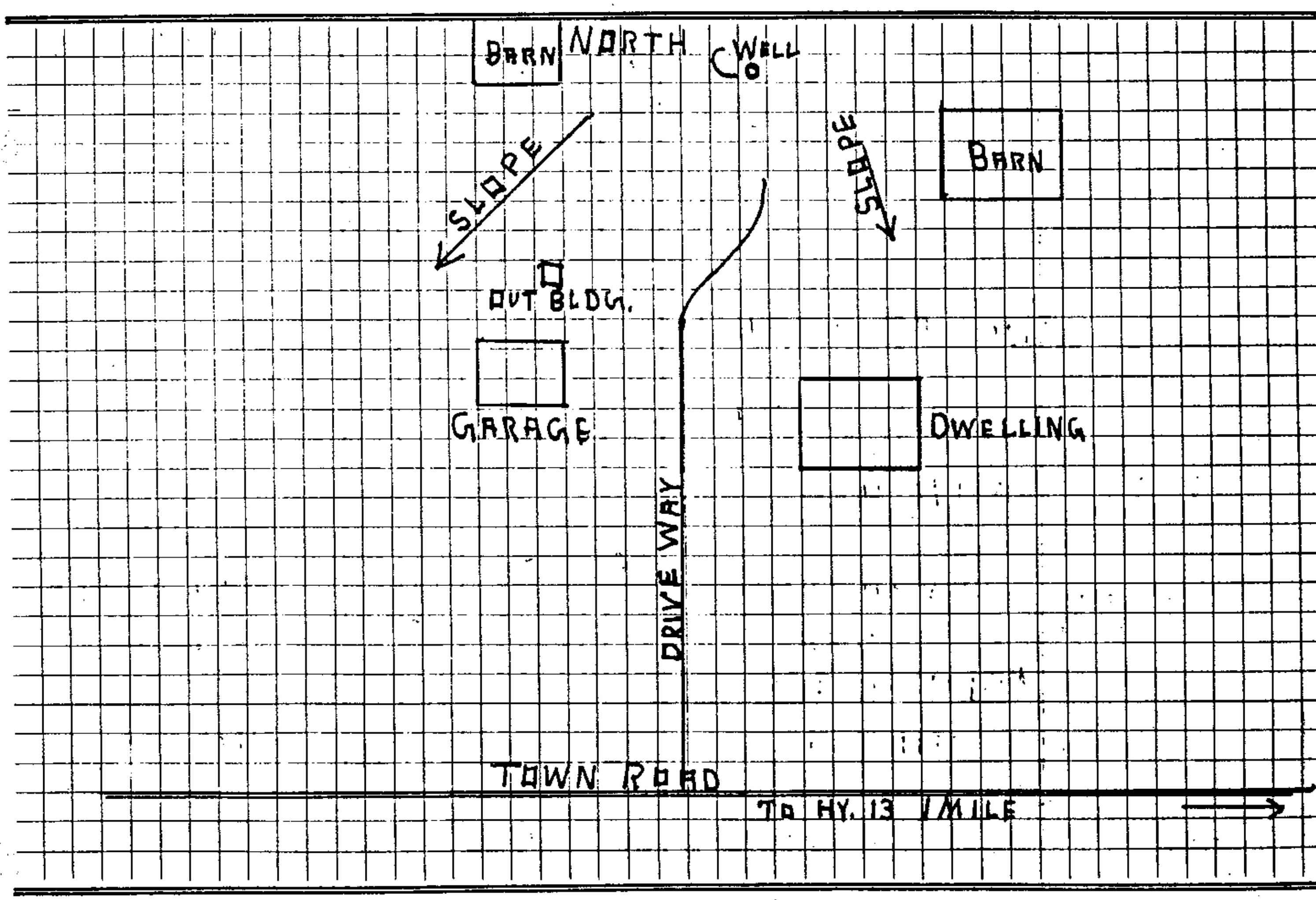
Sec. No. 12

Twp. No. 48

Range 5 { E W

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.



Additional copies of this form may be obtained in lots of 12 for 25¢. Send remittance with order to State Board of Health, Well Drilling Division, Madison, Wis.

WELL LOG *and* REPORT

For method of making report, refer to bulletin entitled "Well Construction Report," 7-5-1939.

In this column indicate the kind of casing, liner, shoe and other accessories used.	WELL DIAGRAM Use a red line to show casing or liner pipe. Use black for drill or borehole. Inches Diameter 2 3 4 5 6 8 10 12 14 16 18 — Depth	In this column state the kind of formations penetrated, their thickness in feet and if water bearing.	Record of FINAL Pumping test
4" STd. WT. STEEL PIPE WITH STEEL DRIVE SHOE 145!	25 30	TOP SOIL SANDY HARD PAN AND BOULDERS	Duration of test Hours 5 Pumping rate G.P.M. 8
	50 75 100 123	RED HARD PAN WITH LARGE BOULDERS	Depth of pump in well. Ft. 153 Standing water-level (from surface) Ft. 129 Water-level when pumping Ft. 129 Water. End of test. Clear ✓ Cloudy Turbid
3" STD. WT. STEEL PIPE WITH STEEL DRIVE SHOE 81!	133 135	WATER BEARING SAND	
	145 150 190	RED HARD PAN	Was the well sterilized? Yes ✓ No To which laboratory was sample sent? SUPERIOR Date JAN. 1 - 1941
	200 204	SOFT BROWN STONE	
	235	HARD BROWN STONE (WATER BEARING)	Was the well sealed on completion? Yes ✓ No
	400 800 1200		How high did you leave the casing-pipe above grade? 12" Well was completed Date JAN. 1 - 1941 Well Driller W. A. Gustafson Signature
	Draw the diagram to show the right half only		

Well Construction Report For
WISCONSIN UNIQUE WELL NUMBER **CZ 222**

State of Wisconsin
Department of Natural Resources
Private Water Supply — WS/2
Box 7921
Madison, WI 53707

JUL 13 1990

Property Owner: Letzner
Telephone Number: NA NA
Mailing Address: Rt 1
City: Washburn | State: Wi | Zip Code: 54891
County of Well Location: Bayfield 04 | County Well Location Permit No. W | Well Completion Date: 6 20 90 (MM DD YY)

Well Constructor (Business Name): Paul Anderson Wells | Registration #: 4681
Address: Rt 4 Box 152
City: Ashland | State: Wi | Zip Code: 54806

1. Location (Please type or print using a black pen.)
☒ Town ☐ City ☐ Village of WASHBURN
Fire # (if available)
Grid or Street Address or Road Name and Number (if available)
Subdivision Name | Lot # | Block #
Gov't Lot # ____ or NW ¼ of SE ¼ of Section 12; T 48 N; R 5 ☐ E ☒ W

2. Mark well location in correct 40-acre parcel of section.
N / W / E / S

3. Well Type ☒ New ☐ Replacement ☐ Reconstruction
of unique well # ______ constructed in 19____
Reason for new, replaced or reconstructed well?
MIRR HMER

☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other

4. Well serves 1 # of homes and/or FARM
(ex: barn, restaurant, church, school, industry, etc.)
High Capacity Well? ☐ Yes ☒ No
High Capacity Property? ☐ Yes ☒ No

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☒ Yes ☐ No If no, explain on back side.
Well Located in Floodplain? ☐ Yes ☒ No
Distance In Feet From Well To Nearest:

	1. Landfill		9. Downspout/Yard Hydrant		17. Wastewater Sump
6'	2. Building Overhang		10. Privy		18. Paved Animal Barn Pen
100'	3. Septic or Holding Tank		11. Foundation Drain to Clearwater	150'	19. Animal Yard or Shelter
100'	4. Sewage Absorption Unit		12. Foundation Drain to Sewer		20. Silo — Type
	5. Nonconforming Pit		13. Building Drain ☐ Cast Iron or Plastic ☐ Other	120'	21. Barn Gutter
	6. Buried Home Heating Oil Tank		14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other		22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
	7. Buried Petroleum Tank		15. Collector or Street Sewer	300'	23. Other Manure Storage PIT
	8. Shoreline/Swimming Pool		16. Clearwater Sump		Other NR 112 Waste Source 24.

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8"	surface	164'
6"	164	181

Method of constructing upper enlarged drillhole only.
☒ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ____ in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain
☐ 7. Other

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
6.625 / 6.00	6" ID ASTM A53 P.E. 18.97# TAIWAN PIPE	surface	164

Dia. (in.)	Screen type and material	From	To
	SANDSTONE ROCK	164	181

8. Grout or Other Sealing Material
Method

Kind of Sealing Material	From (ft.)	To (ft.)	Sacks Cement
PUDDLED CLAY	surface	164	

9. Geology

DNR USE ONLY	Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
-C-	CLAY	surface	4'
-CS	SANDY CLAY	4	12'
-C-	CLAY	12	48
-S-	SAND	48	120
-C-	CLAY	120	164
-N-	SAND STONE	164	181

10. Static Water Level
____ ft. above ground level
151 ft. below ground surface

11. Pump Test
Pumping Level 180 ft. below surface
Pumping at 10 GPM for 12 hours

12. Well Is: 24 in. ☒ Above ☐ Below Grade
Developed? ☒ Yes ☐ No
Disinfected? ☒ Yes ☐ No
Capped? ☒ Yes ☐ No

13. Did you permanently seal all unused, noncomplying, or unsafe wells?
☐ Yes ☐ No If no, explain N/A

14. Signature of Point Driver or Registered Driller: Paul R Anderson PRA | Date Signed 6 21 90
Signature of Drill Rig Operator: [signature] PRA | Date Signed

Make additional comments on reverse side about geology, etc.

DNR

WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 9-88

80

WGNHS ORIGINAL

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

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

JAN 2 1 1980

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 12-76

26

1. COUNTY: Bayfield
CHECK (✓) ONE: ☒ Town ☐ Village ☐ City — Name: Washburn

2. LOCATION: ¼ Section: SE NW | Section: 12 | Township: 49 | Range: 5 W
OR – Grid or Street No. — | Street Name: 48 5
AND – If available subdivision name, lot & block No. —

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE
Harris H. Wilke
ADDRESS: Rt 1 Washburn
POST OFFICE: Washburn, Wis.

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

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

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

Privy	Pet Waste Pit	Pit: Nonconforming Existing (Well / Pump / Tank)	Subsurface Pumproom 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
—	—	—	—	—	—	—	—	—	—	—

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)
—	—	—	—	—	None At Time of Drilling

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6¼	Surface	350			~~350~~

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
4	New Seamless Steel Pipe Plain end Astm 53 Well Thick .237	Surface	348

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
drill Cuttings	Surface	348
Caving form.	348	350

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Clay	Surface	180
Hard Pan	180	259
Clay & Hard Pan	259	340
Gravel	340	348

10. TYPE OF DRILLING MACHINE USED
☐ Cable Tool ☒ Rotary-air w/drilling mud ☐ Rotary-w/drilling mud ☐ Rotary-hammer w/drilling mud & air ☐ Rotary-hammer & air ☐ Reverse Rotary ☐ Jetting with ☐ Air ☐ Water

Well construction completed on 4-12 1978

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield Test: 4 Hrs. at 10 GPM
Depth from surface to normal water level 260 Ft.
Depth of water level when pumping 269 Ft. Stabilized ☒ Yes ☐ No

Water sample sent to Madison laboratory on 4-12 1978

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: Larry [signature] Registered Well Driller
Complete Mail Address: Maple Wis.

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 5-85

AUG 14 1987

1. COUNTY: BAYFIELD
CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name: WASHBURN

2. LOCATION — ¼ Section or Gov't. Lot: SW-NE | Section: 12 | Township: 49N | Range: 5W
OR - Grid or Street No. | Street or Road Name
AND - If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE: JOE GROSHEK
ADDRESS: RR.
POST OFFICE: WASHBURN, WIS. ZIP CODE: 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
20										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer / Clearwater Dr. / Sewage Sump / Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit / Seepage Bed / Seepage Trench	Manure Hopper or Retention or Pnuematic Tank
								100 #		Seepage Bed 120	

Privy	Pet Waste Pit	Pit: Nonconforming Existing (Well / Pump / Tank)	Subsurface Pumproom 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	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: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	143			
6	143	213			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
6⅝" O.D.	P.E. A-53	Surface	
6" I.D.	18.97# - BLACK		
NEWPORT STEEL CORP.			
	STEEL PIPE		143

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	143

9. FORMATIONS

Kind	From (ft.)	To (ft.)
DRY SAND	Surface	10
RED CLAY	10	68
CLAY-HARDPAN-BOULDERS	68	135
BROKEN SANDSTONE	135	142
SOLID RED SANDSTONE	142	213

10. TYPE OF DRILLING MACHINE USED
[ ] Cable Tool [ ] Rotary-air w/drilling mud [X] Rotary-w/drilling mud [ ] Rotary-hammer w/drilling mud & air [ ] Rotary-hammer & air [ ] Reverse Rotary [ ] Jetting with [ ] Air [ ] Water

Well construction completed on JULY 29 1987
Well is terminated 12 inches [X] above [ ] below final grade
Well disinfected upon completion [X] Yes [ ] No
Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 10 Hrs. at 10 GPM
Depth from surface to normal water level 142 Ft.
Depth of water level when pumping 155 Ft. Stabilized [X] Yes [ ] No
Water sample sent to MADISON laboratory on JULY 29 1987

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: Richard W. Squires — Registered Well Driller
Business Name and Complete Mailing Address: DICK SQUIRES WELL DRILLING CO. R1 BOX 77 MASON, WIS. 54856

JAN 1 0 1972

WELL CONSTRUCTOR'S REPORT
FORM 3300–15

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

28

1. COUNTY: BAYFIELD
CHECK ONE: [X] Town [ ] Village [ ] City
NAME: WASHBURN

2. LOCATION – ¼ Section: SW-NE | Section: 12 | Township: 48N | Range: 5W
OR – Grid or street no. | Street name
AND – If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING: DON SNIPPEN
ADDRESS: RR
POST OFFICE: WASHBURN, WISC

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
8								

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		60		80					

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

5. Well is intended to supply water for: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	220			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½"	O.D. BLK. ELECTRIC WELDED - 11# PER FOOT .237 WALL THICKNESS 4" I.D. THREADED + COUPLED - STEEL PIPE	Surface	120

9. FORMATIONS

Kind	From (ft.)	To (ft.)
SAND+CLAY MIXTURE SOME BOULDERS	Surface	73
RED CLAY	73	114
BROKEN SANDSTONE	114	118
SOLID SANDSTONE	118	220

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool [ ] Direct Rotary [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 9-13 1971

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield test: 24 Hrs. at 8 GPM

Depth from surface to normal water level 151 ft.

Depth to water level when pumping 160 ft.

Water sample sent to MADISON laboratory on: 12-2 1971

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: Richard W. Squires — Registered Well Driller
COMPLETE MAIL ADDRESS: R1 MASON, WISC. 54856

Please do not write in space below

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

REV. 3–71

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-79

JUN 19 1986

(89)

1. COUNTY: BAYFIELD

CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name: WASHBURN

2. LOCATION — ¼ Section or Gov't. Lot: SE-NE — Section: 12 — Township: 49N — Range: 5W

OR – Grid or Street No. — Street or Road Name

AND – If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE

HELEN TETZNER

ADDRESS: RR

POST OFFICE: WASHBURN, WIS. — ZIP CODE: 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
20										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Clearwater Dr.	Sewage Sump	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit	Manure Hopper or Retention or Pnuematic Tank
											40		Seepage Bed 60	

Sewage Absorption Unit: Seepage Pit / Seepage Bed 60 / Seepage Trench

Privy	Pet Waste Pit	Pit: Nonconforming Existing (Well / Pump / Tank)	Subsurface Pumproom 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	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: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	85			
6	85	120			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.) Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
6 5/8" O.D. P.E. 6" I.D 18.97# A-53 BLK. STEEL PIPE NEWPORT STEEL CORP	Surface	85

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	85

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	82
MUDDY GRAVEL BROKEN	-	
SANDSTONE	82	84
SOLID RED+WHITE SANDSTONE	84	120

10. TYPE OF DRILLING MACHINE USED

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

Well construction completed on JUNE 12 1986

Well is terminated 14 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA

Yield Test: 10 Hrs. at 10 GPM

Depth from surface to normal water level 59 Ft.

Depth of water level when pumping 65 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on JUNE 12 1986

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: Richard W. Squires — Registered Well Driller

Business Name and Complete Mailing Address: DICK SQUIRES WELL DRILLING CO R1 BOX 77 MASON, WIS. 54856

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUC[illegible]
Form 3300-15 Rev. 2-79

30

APR 1 1985

1. COUNTY: BAYFIELD

CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name: BARKSDALE

2. LOCATION

¼ Section or Gov't. Lot	Section	Township	Range
NW-NE	12	48N	5W

OR – Grid or Street No. / Street or Road Name

AND – If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE

GARIT TEN PAS

ADDRESS: RR,

POST OFFICE: WASHBURN, WIS. ZIP CODE: 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
40										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Clearwater Dr.	Sewage Sump	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit	Seepage Bed	Seepage Trench	Manure Hopper or Retention or Pnuematic Tank
											100			125		

Privy	Pet Waste Pit	Pit: Nonconforming Existing (Well / Pump / Tank)	Subsurface Pumproom 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	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: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	133			
6	133	230			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.) Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
6⅝" O.D. T.+C. A-120 .280 WALL 19.45# 6" I.D UNION PIPE Co.	Surface	134

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	133

9. FORMATIONS

Kind	From (ft.)	To (ft.)
SAND & CLAY MIXTURE	Surface	10
CLAY - HARDPAN - BOULDERS	10	125
FRACTURED SANDSTONE & SAND	125	132
SOLID SANDSTONE	132	230

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
[X] Rotary-w/drilling mud [ ] Reverse Rotary

Well construction completed on MARCH. 11 1985

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA

Yield Test: 10 Hrs. at 15 GPM

Depth from surface to normal water level 146 Ft.

Depth of water level when pumping 155 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on MARCH 11 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: Richard W. Squires Registered Well Driller

Business Name and Complete Mailing Address: DICK SQUIRES WELL DRILLING CO R1 BOX 77 MASON, WIS. 54856

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTION REPORT
Form 3300–15 Rev. 2-79

FEB 10 1983

31

1. COUNTY BAYFIELD
CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name WASHBURN

2. LOCATION — ¼ Section or Gov't. Lot: NE-NE; Section: 12; Township: 48N; Range: 5W
OR – Grid or Street No. / Street or Road Name
AND – If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
JERRY SUKALA
ADDRESS RR
POST OFFICE WASHBURN, WIS ZIP CODE 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
20										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to Sewer	Foundation Drain Connected to Clearwater Dr.	Foundation Drain Connected to Sewage Sump	Foundation Drain Connected to Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit	Seepage Bed	Seepage Trench	Manure Hopper or Retention or Pnuematic Tank
											60			80		

Privy	Pet Waste Pit	Pit: Nonconforming Existing Well	Pump	Tank	Subsurface Pumproom 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	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: RURAL HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	210			
4	210	215			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½"	O.D. T.&C. ASTM-A589	Surface	
	11# PER FT. 0.237 WALL		
	4" ID BLK. STEEL PIPE		215

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	210

9. FORMATIONS

Kind	From (ft.)	To (ft.)
DRY SAND	Surface	10
RED CLAY	10	210
HEAVY GRAVEL	210	215

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool 210'-215'
[ ] Rotary-air w/drilling mud
[X] Rotary-w/drilling mud 0-210'
[ ] Rotary-hammer w/drilling mud & air
[ ] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with [ ] Air [ ] Water

Well construction completed on DEC. 27 1982

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 3 Hrs. at 10 GPM
Depth from surface to normal water level 158 Ft.
Depth of water level when pumping 190 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on DEC. 27 1982

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 Richard W. Squires Registered Well Driller

Business Name and Complete Mailing Address: DICK SQUIRES WELL DRILLING CO R1 BOX 77 MASON, WIS. 54856

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL DRILLING DIVISION

JUL 30 1940 (34)

Note: Section 32 of the Wisconsin Well Drilling Sanitary 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 Clarence Ness — Driller Melin Well Drilling Co

Street or RFD R.F.D. Route I — Post Office Ashland Wis

Post Office Washburn Wis — Date July 29-40 — Permit No. 27

LOCATION OF PREMISES

Bayfield (County) — Barksdale (Town)

NE¼ of SE¼ of S 13-T 48-R 5 W

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

U.S. Highway 13 - Nearest principal highway

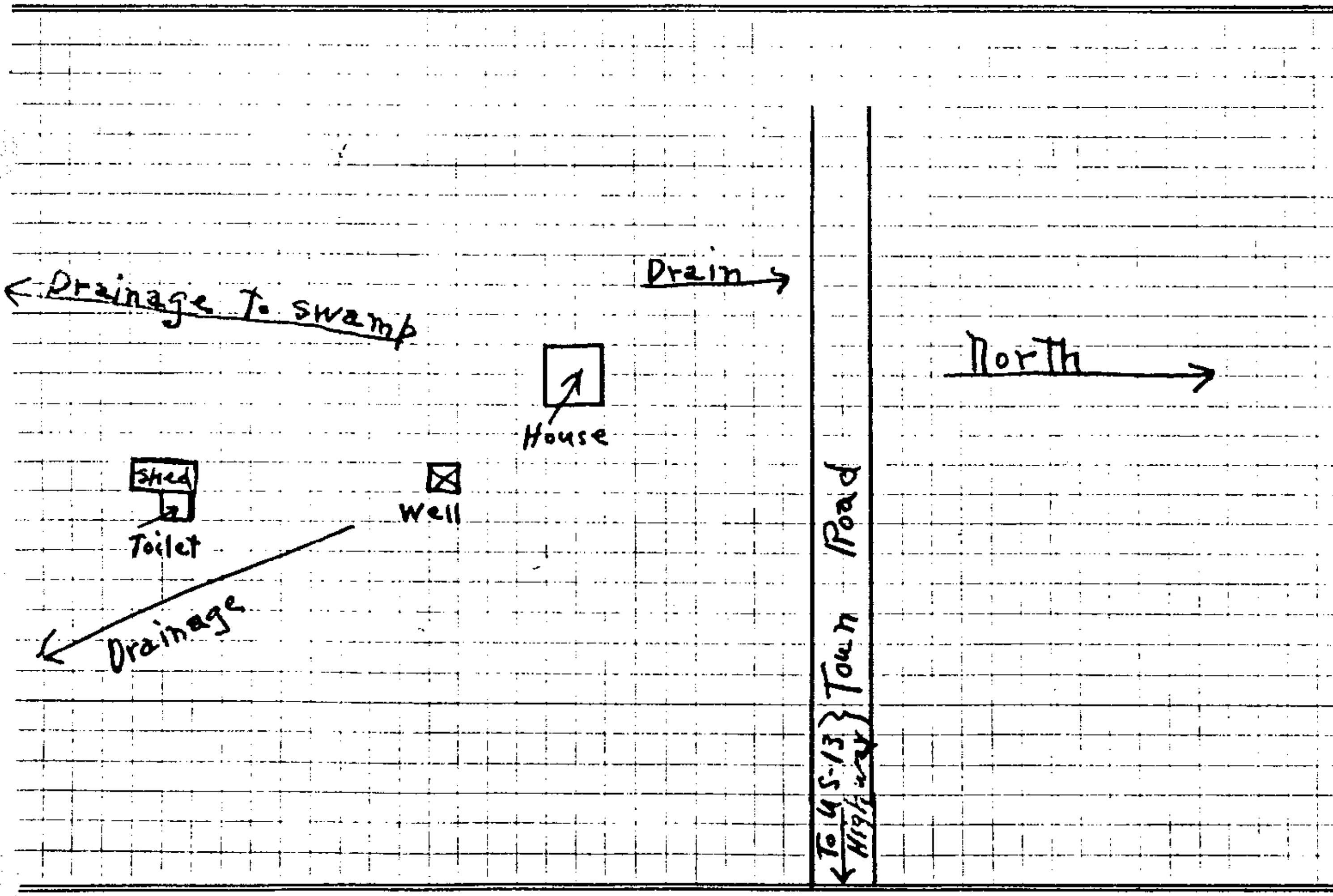
block, nearest principal highway, etc., whichever apply.

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

Sec. 13
Twp. 48
Range 5 {E / W}

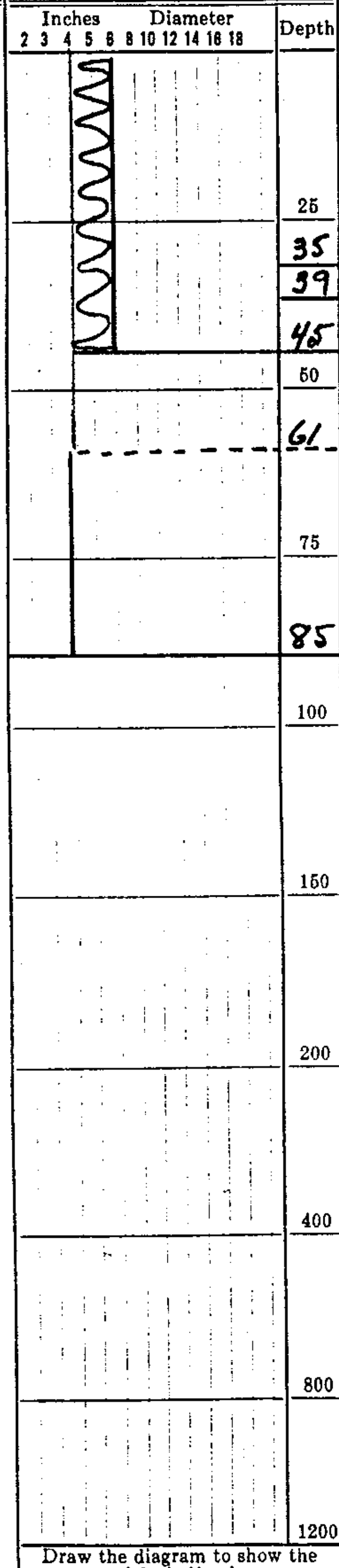
DIAGRAM OF PREMISES

See discussion and illustration in Part III Well Drilling Code. In making the diagram in the space below consider 10 ft. as the distance between lines. Be sure to indicate NORTH.



Additional copies of this form may be obtained in lots of 12 for 25¢. Send remittance with order to State Board of Health, Well Drilling Division, Madison, Wis.

WELL LOG *and* REPORT

In this column indicate the kind of casing, liner, shoe and other accessories used.	WELL DIAGRAM Use a red line to show casing or liner pipe. Use black for drill or borehole.	In this column state the kind of formations penetrated, their thickness in feet and if water bearing.	Record of FINAL Pumping test
Std. WT. Wrot steel pipe Drillers special" Steel drive shoe		Top soil & Red clay 35' Hard Pan 4' Sand Rock 46' Water bearing	Duration of test Hours 3 Pumping rate G.P.M. 6 Depth of pump in well. Ft. 30 Standing water-level (from surface) Ft. 20 Water-level when pumping Ft. 25

Draw the diagram to show the right half only

Key:

| = Casing Pipe

| = Drill hole

= Mud grout

Water. End of test.
Clear ✓
Cloudy
Turbid

Was the well sterilized?
Yes ✓ No

To which laboratory was sample sent? Superior
Date July 29-40

Was the well sealed on completion?
Yes ✓ No

How high did you leave the casing-pipe above grade? 12 inches

Well was completed
Date July 29-40

Well Driller
Theodore Melin
Signature

SEP 10 1974

35

WELL CONSTRUCTOR'S REPORT
FORM 3300–15

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 BAYFIELD — CHECK ONE: [X] Town [ ] Village [ ] City — NAME BARKSDALE

2. LOCATION – ¼ Section NW-NE | Section 13 | Township 48N | Range 5W

3. OWNER AT TIME OF DRILLING CLYDE R. HANSON

OR – Grid or street no. | Street name

ADDRESS RR

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

POST OFFICE WASHBURN, WI.

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
10								

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		40		60					

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

5. Well is intended to supply water for: RURAL TRAILER HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	98			
4	98	165			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½" O.D. BLK. ELECT.		Surface	
	WELD 11# PER FT. T&C		
	.237 WALL 4" I.D.		
	STEEL PIPE		99

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED ROTARY	Surface	
DRILL CUTTINGS		98

9. FORMATIONS

Kind	From (ft.)	To (ft.)
SANDY CLAY-SOME BOULDERS	Surface	36
CLAY	36	92
CLAY-BROKEN SANDSTONE	92	98
SOLID-SANDSTONE	98	165

10. TYPE OF DRILLING MACHINE USED

[ ] Cable Tool [X] Direct Rotary [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 7– 1974

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA

Yield test: 2 Hrs. at 10 GPM

Depth from surface to normal water level 71 ft.

Depth to water level when pumping 85 ft.

Water sample sent to MADISON laboratory on: 7-8 1974

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 Richard W. Squires Registered Well Driller

COMPLETE MAIL ADDRESS R1 MASON, WI 54856

Please do not write in space below

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

REV. 3–71

MAY 2 4 1979 JUN 28 1979 (36)

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

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 BAYFIELD | CHECK ONE [X] Town [ ] Village [ ] City | NAME BARKSDALE

2. LOCATION - ¼ Section SE SW Section 13 Township 48N Range 5W

OR - Grid or street no. Street name

AND If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING MIKE BARK

ADDRESS RR

POST OFFICE WASHBURN, WI.

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN 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.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		40			60				

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

5. Well is intended to supply water for: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
12	Surface	56			
6	20	122			

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	56
SOLID SANDSTONE	56	122

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6 5/8" O.D. BLK. P.E. SEAMLESS 19.45 lb/ft .280 WALL 6" I.D. STEEL PIPE		Surface	57

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	56

10. TYPE OF DRILLING MACHINE USED

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

11. MISCELLANEOUS DATA

Yield test: 12 Hrs. at 12 GPM

Depth from surface to normal water level 46 ft.

Depth to water level when pumping 80 ft.

Well construction completed on 6-3 1976

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

Water sample sent to MADISON laboratory on: 6-3 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 pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE Richard J. W. Squires Registered Well Driller

COMPLETE MAIL ADDRESS R1 MASON, WI. 54856

Please do not write in space below

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

REV. 3-71

Rec'd 7/13/69

(37)

WELL CONSTRUCTOR'S REPORT

Wel-6

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: BAYFIELD — CHECK ONE: [X] Town [ ] Village [ ] City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.): SW-SE SEC. 13 T48N. R5W

3. OWNER AT TIME OF DRILLING: FRITZ ICEBERG

4. OWNER'S COMPLETE MAIL ADDRESS: RR ASHLAND WISC.

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

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
15	—	—	—	—	—	—	—	—

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
—	—	NONE	60'	NONE	—	—	—	—	—

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

6. Well is intended to supply water for: RURAL RESIDENCE

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	114			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½"	OD. SEAMLESS	Surface	
	~~[illegible]~~ THREADED		
	& COUPLED. 11# PER		
	FOOT. .237 WALL		
	4" I.D. BLACK STEEL PIPE		78

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

10. FORMATIONS

Kind	From (ft.)	To (ft.)
CLAY	Surface	6
HARDPAN-BOULDERS		
SAND GRAVEL	6	30
CLAY	30	58
SAND-SANDSTONE		
PIECES	58	78
SOLID WATERBEARING		
SANDSTONE	78	114

Well construction completed on 6-4 1969

11. MISCELLANEOUS DATA

Yield test: 24 Hrs. at 12 GPM

Depth from surface to normal water level 34 ft.

Depth to water level when pumping 54 ft.

Well is terminated 10 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

Water sample sent to MADISON laboratory on: 6-4 1969

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: Richard W. Squires Registered Well Driller — COMPLETE MAIL ADDRESS: R1 MASON, WISC.

Please do not write in space below

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

REV. 11-68

FEB 1 5 1974

(38)

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

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: BAYFIELD
CHECK ONE: [X] Town [ ] Village [ ] City — NAME: BARKSDALE

2. LOCATION – ¼ Section: SE-SE | Section: 13 | Township: 48N | Range: 4W (5W)
OR – Grid or street no. | Street name
AND – If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING: GARY SHARP
ADDRESS: RR
POST OFFICE: WASHBURN, WISC

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
15	60							

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		75			100				

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

5. Well is intended to supply water for: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	75			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½ OD	BLK. ELECT. WELD	Surface	
	11# PER FOOT - T.&C.		
	.237 WALL 4" I.D		
	STEEL PIPE		40

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

9. FORMATIONS

Kind	From (ft.)	To (ft.)
CLAY	Surface	8
DRY SAND	8	12
CLAY & SAND MIXTURE	12	28
BROKEN SANDSTONE	28	
& CLAY MIXTURE		38
SOLID RED SANDSTONE	38	75

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool [ ] Direct Rotary [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 1-8 1974

Well is terminated 10 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield test: 24 Hrs. at 8 GPM
Depth from surface to normal water level 26 ft.
Depth to water level when pumping 30 ft.

Water sample sent to MADISON laboratory on: 1-8 1974

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: Richard W. [illegible] Registered Well Driller
COMPLETE MAIL ADDRESS: R1 MASON, WISC. 54856

Please do not write in space below

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

REV. 3-71

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

FEB - 9 1976

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

39

1. COUNTY: BAYFIELD
CHECK ONE: [X] Town [ ] Village [ ] City
NAME: BARKSDALE

2. LOCATION – ¼ Section: SE-NE | Section: 13 | Township: 45N | Range: ~~4~~ 5W?
OR – Grid or street no. | Street name
AND – If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING: PHIL TESCH
ADDRESS: RR
POST OFFICE: WASHBURN

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
30								

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		40		80					

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

5. Well is intended to supply water for: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	48			
4	48	85			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½" O.D. 570 BLK. PIPE		Surface	
T.&C. -237 WALL-11#			
PERF. 4" I.D. STEEL PIPE			49

9. FORMATIONS

Kind	From (ft.)	To (ft.)
DRY SAND	Surface	5
RED CLAY	5	39
RED CLAY & SANDSTONE ROCKS	39	48
SOLID SANDSTONE	48	55

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
MUDDY ROTARY DRILL CUTTINGS	Surface	48

10. TYPE OF DRILLING MACHINE USED
[ ] Cable Tool [X] Direct Rotary [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 11-7 1974

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield test: 12 Hrs. at 5 GPM
Depth from surface to normal water level 27 ft.
Depth to water level when pumping 45 ft.
Water sample sent to MADISON laboratory on: 11-19 1974

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: Richard W. Squires Registered Well Driller
COMPLETE MAIL ADDRESS: R1 MASON, WI. 54856

Please do not write in space below

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

REV. 3-71

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL CONSTRUCTION DIVISION

DEC 1 1943

(40)

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 Anton Pade — Driller T. A. Melin

Street or RFD — Post Office Ashland Wis.

Post Office Washburn Wis — Date Dec 13 - 43 — Permit No. 10

LOCATION OF PREMISES

Bayfield County — Barksdale Town

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

			X

Sec. No. 13

Twp. No. 48

Range 4 E/W (5W)

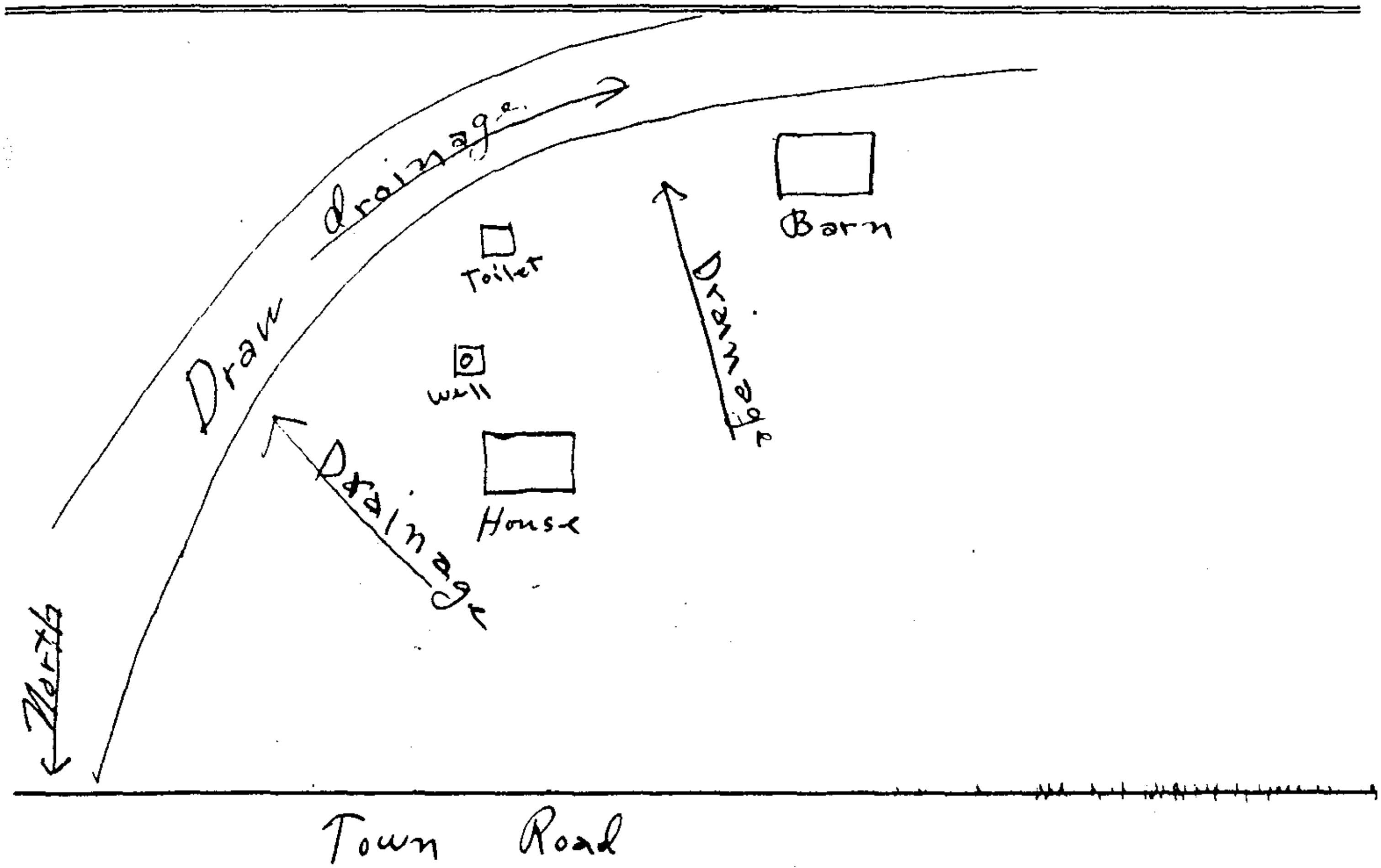
Describe further by subdivision, plat, district, lake, lot.

S.H. 13 - Nearest principal highway

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.



Additional copies of this form may be obtained in lots of 12 for 25c. Send remittance with order to State Board of Health, Well Construction Division, Madison, Wis.

WELL LOG *and* REPORT

For method of making report, refer to bulletin entitled "Well Construction Report," 7-5-39.

In this column indicate the kind of casing, liner, shoe and other accessories used.

Std. WT. wroT Steel Pipe

Drillers Special

Steel drive shoe

Key:

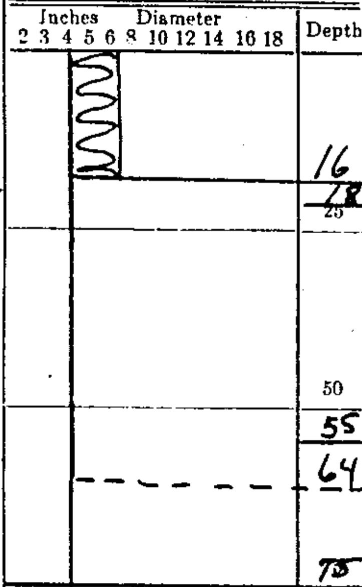
| = Casing Pipe

| = Drill hole

§ = Mud Grout

WELL DIAGRAM
Use a red line to show casing or liner pipe. Use black for drill or borehole.

Inches Diameter 2 3 4 5 6 8 10 12 14 16 18 | Depth



Draw the diagram to show the right half only

In this column state the kind of formations penetrated, their thickness in feet and if water bearing.

Top soil & Red Clay	18'
Hard-Pan	37'
Sand Stone	20'

Record of FINAL Pumping test

Duration of test
Hours 5

Pumping rate
G.P.M. 5

Depth of pump in well. Ft. 60

Standing water-level (from surface)
Ft. 40

Water-level when pumping Ft. 45

Water. End of test.
Clear ✓
Cloudy
Turbid

Was the well sterilized?
Yes ✓ No

To which laboratory was sample sent? Superior Wis
Date Dec 15-43

Was the well sealed on completion?
Yes ✓ No

How high did you leave the casing-pipe above grade?
12"

Well was completed
Date Dec 10-43

Well Constructor T.A. Melin
Signature

AUG 11 1988

First Water Quality Test For
WISCONSIN UNIQUE WELL NUMBER AZ 927

State of Wisconsin
Department of Natural Resources
Private Water Supply — WS/2
Box 7921
Madison, WI 53707

OCT 6 1988

(41)

Property Owner: RANDY DAIGLE | Telephone Number: N.A.

Mailing Address: RT 1 BX 77A

City: WASHBURN | State: WIS | Zip Code: 54891

County: BAYFIELD 04 | County Well Location Permit No. W | Well Completion Date (MM DD YY): 7 29 88

Well Constructor (Business Name): PAUL R ANDERSON | Registration #: 4681

Address: RT 4 BOX 152

City: ASHLAND | State: WIS | Zip Code: 54806

2. Mark well location in correct 40-acre parcel of section. (N, W, E, S)

1. Location (Please type or print using a black pen)

☒ Town ☐ City ☐ Village of BARKSDALE | Fire # (if available)

Grid or Street Address or Road Name and Number (if available)

Subdivision Name | Lot # | Block #

Gov't Lot # ____ or NE ¼ of SE ¼ of NW, SE, of Section 14; T 48 N; R 5 ☐ E ☒ W

3. Well Type ☒ New ☐ Replacement ☐ Reconstruction/Rehabilitation of well constructed in 19 ____.

Reason for new, reconstructed, replaced, or rehabilitated well? NEW HOME

☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other ____

4. Well serves 1 # of homes and/or ____ (ex: barn, restaurant, church, school, industry, etc.)

High Capacity Well? ☐ Yes ☒ No
High Capacity Property? ☐ Yes ☒ No

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☒ Yes ☐ No

Well Located in Floodplain? ☐ Yes ☒ No

Distance In Feet From Well To Nearest:

___ 1. Landfill	___ 9. Downspout/Yard Hydrant	___ 17. Wastewater Sump
6' 2. Building Overhang	___ 10. Privy	___ 18. Paved Animal Barn Pen
3. Septic or Holding Tank } +	___ 11. Foundation Drain to Clearwater	___ 19. Animal Yard or Shelter
4. Sewage Absorption Unit } 24	___ 12. Foundation Drain to Sewer	___ 20. Silo — Type ____
___ 5. Nonconforming Pit	___ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other	___ 21. Barn Gutter
___ 6. Buried Home Heating Oil Tank	___ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other	___ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
___ 7. Buried Petroleum Tank	___ 15. Collector Sewer	___ 23. Other Manure Storage ____
___ 8. Shoreline/Swimming Pool	___ 16. Clearwater Sump	Other NR 112 Waste Source 24. NONE AT TIME OF DRILLING

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8"	surface	50
4	50	52'

Method of constructing upper enlarged drillhole. (If applicable ✓ more than one.)

☒ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☒ 5. Cable-tool Bit 4" in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain ____
☐ 7. Other ____

9. Geology

	Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
C	Clay	surface	20
GG	ROCKS AND GRAVEL	20	52'

7. Casing, Liner, Screen

Dia. (in.) 45	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4"	004"10 T.C ASTM A589	surface	
	11# BLK STEEL 0.237		
	SAW MILL PIPE		52'

Dia. (in.)	screen type and material	From	To
	OPEN BOTTOM		

10. Static Water Level
____ ft. above ground level
32 ft. below ground surface

11. Pump Test
Pumping Level 42 ft. below surface
Pumping at 10 GPM for 10 hours

12. Well Is: 24 in. ☒ Above ☐ Below Grade
Developed? ☒ Yes ☐ No
Disinfected? ☒ Yes ☐ No
Capped? ☒ Yes ☐ No

8. Grout or Other Sealing Material

Method ____

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
CLAY SLURRY	surface	50	

13. Were all unused, noncomplying, or unsafe wells properly filled with sealant? ☐ Yes ☐ No If no, explain ____

14. Signature of Well Constructor: Paul R Anderson PRA | Date Signed: 7 29 88

Signature of Drill Rig Operator: Same PRA | Date Signed

Make additional comments on reverse side about geology, etc.

DNR WGNHS ORIGINAL WELL CONSTRUCTION REPORT
Form 3300-77A Rev. 1-88

SEP 21 [illegible]

(43)

State of Wisconsin
Private Water Supply - WS/2
Department of Natural Resources
Box 7921
Madison, WI 53707 (Please type or print using a black pen.)

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER HP 524

Property Owner: Allen Huber
Telephone Number ( )
Mailing Address: Rt 1 Box 77B
City: Washburn State: Wi Zip Code: 54891
County of Well Location: Bayfield
Co. Well Permit No. W
Well Completion Date (mm-dd-yy): 8-24-94

04 Well Constructor (Business Name): Larry Lind well
License #: 432
Address: 10976 E. US. Hy 2
City: Maple State: Wi Zip Code: 54854

2. Mark well location with a dot in correct 40-acre parcel of section. N W E S

1. Well Location — Please use decimals instead of fractions.
[X] Town [ ] City [ ] Village of Barksdale
Fire # (If avail.)
Grid or Street Address or Road Name and Number (If avail.)
Subdivision Name Lot # Block #
Gov't Lot # NW¼ of NW 1/4 of SE 1/4 of
Section 14, T 48 N; R 5 [ ] E [X] W
R5W

3. Well Type [X] New [ ] Replacement [ ] Reconstruction
of previous unique well # ______ constructed in 19 ____
Reason for new, replaced or reconstructed well? New home
[X] Drilled [ ] Driven Point [ ] Jetted [ ] Other

4. Well serves 1 # of homes and or home
(Ex: barn, restaurant, church, school, industry, etc.)

High Capacity:
Well? [ ] Yes [X] No
Property? [ ] Yes [X] No

5. Well located on highest point of property, consistent with the general layout and surroundings? [X] Yes [ ] No If no, explain on back side.

Well located in floodplain? [ ] Yes [X] No
Distance in Feet From Well To Nearest:

— 1. Landfill
— 2. Building Overhang
— 3. Septic or Holding Tank (circle one)
— 4. Sewage Absorption Unit
— 5. Nonconforming Pit
— 6. Buried Home Heating Oil Tank
— 7. Buried Petroleum Tank
— 8. Shoreline/Swimming Pool
— 9. Downspout/Yard Hydrant
— 10. Privy
— 11. Foundation Drain to Clearwater
— 12. Foundation Drain to Sewer
— 13. Building Drain [ ] Cast Iron or Plastic [ ] Other
— 14. Building Sewer [ ] Gravity [ ] Pressure [ ] Cast Iron or Plastic [ ] Other
— 15. Collector or Street Sewer
— 16. Clearwater Sump
— 17. Wastewater Sump
— 18. Paved Animal Barn Pen
— 19. Animal Yard or Shelter
— 20. Silo - Type
— 21. Barn Gutter
— 22. Manure Pipe [ ] Gravity [ ] Pressure [ ] Cast Iron or Plastic [ ] Other
— 23. Other Manure Storage
Other NR 112 Waste Source
— 24.

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
9	surface	65

Method of constructing upper enlarged drillhole only.
[X] 1. Rotary - Mud Circulation
[ ] 2. Rotary - Air
[ ] 3. Rotary - Foam
[ ] 4. Reverse Rotary
[ ] 5. Cable-tool Bit ______ in. dia.
[ ] 6. Temp. Outer Casing ______ in. dia. Removed? [ ] Yes [ ] No If no, explain ______
[ ] 7. Other

9. Geology

DNR USE ONLY	Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
-C-	Clay	Surface	20
-P-	Hard Pan	20	55
-Y-	Sand + Gravel	55	65

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification, Manufacturer & Method of Assembly	From (ft.)	To (ft.)
5	PVC SDR-21	surface	61
	ASTM F-480		
	NSF-WC		
	Cresline		

Dia. (in.)	screen type, material & slot size	From	To
2	Stainless 12 slot	61	65

8. Grout or Other Sealing Material
Method: Pumping

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
Cuttings & Bentonite	surface	61	
Caving form	61	65	

10. Static Water Level
____ ft. above ground surface
15 ft. below ground surface

11. Pump Test
Pumping Level 50 ft. below surface
Pumping at 8 GPM for 2 hours

12. Well Is: 12 in. [X] Above [ ] Below Grade
Developed? [X] Yes [ ] No
Disinfected? [X] Yes [ ] No
Capped? [X] Yes [ ] No

13. Did you permanently seal all unused, noncomplying, or unsafe wells? [ ] Yes [ ] No If no, explain N/A

14. Signature of Point Driver or Licensed Supervisory Driller: Larry Lind LLL Date Signed 8-24-94
Signature of Drill Rig Operator (Mandatory unless same as above): Larry Lind LLL Date Signed 8-24-94

Make additional comments on reverse side about geology, additional screens, water quality, etc.
Comments on reverse side ____ (Check √, if yes)

DNR

WELL CONSTRUCTION REPORT Form 3300-77A Rev. 7-93 281

WGNHS ORIGINAL

(44)

AUG 1 1 1988

State of Wisconsin
Department of Natural Resources
Private Water Supply — WS/2
Box 7921
Madison, WI 53707 OCT 6 1988

First Water Quality Test For WISCONSIN UNIQUE WELL NUMBER AZ 926

Property Owner HOWARD BUCKMAN Telephone Number ( ) NA

Mailing Address 3600 Second STEET EAST

City ASHLAND State WIS Zip Code 54806

County ~~ASHLAND 02~~ County Well Location Permit No. W Well Completion Date 7 21 88 (M M D D Y Y)

BAYFIELD COUNTY 04

Well Constructor (Business Name) PAUL R ANDERSON Registration # 4691

Address Rt 4 BOX 152

City ASHLAND State WIS Zip Code 54806

2. Mark well location in correct 40-acre parcel of section. N S E W

1. Location (Please type or print using a black pen.)
☒ Town ☐ City ☐ Village of BARKSDALE Fire # (if available)
Grid or Street Address or Road Name and Number (if available)
Subdivision Name Lot # Block #
Gov't Lot # ____ or NE ¼ of SE ¼ of Section 14 ; T 48 N; R 5 ☐ E ☒ W

3. Well Type ☒ New ☐ Replacement ☐ Reconstruction/Rehabilitation of well constructed in 19 ____.
Reason for new, reconstructed, replaced, or rehabilitated well? NEW HOME
☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other ____

4. Well serves 1 # of homes and/or ____ (ex: barn, restaurant, church, school, industry, etc.)
High Capacity Well? ☐ Yes ☒ No
High Capacity Property? ☐ Yes ☒ No

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☒ Yes ☐ No
Well Located in Floodplain? ☐ Yes ☒ No
Distance In Feet From Well To Nearest:

- ____ 1. Landfill
- 15' 2. Building Overhang
- ____ 3. Septic or Holding Tank } # 24
- ____ 4. Sewage Absorption Unit }
- ____ 5. Nonconforming Pit
- ____ 6. Buried Home Heating Oil Tank
- ____ 7. Buried Petroleum Tank
- ____ 8. Shoreline/Swimming Pool
- ____ 9. Downspout/Yard Hydrant
- ____ 10. Privy
- ____ 11. Foundation Drain to Clearwater
- ____ 12. Foundation Drain to Sewer
- ____ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other
- ____ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
- ____ 15. Collector Sewer
- ____ 16. Clearwater Sump
- ____ 17. Wastewater Sump
- ____ 18. Paved Animal Barn Pen
- ____ 19. Animal Yard or Shelter
- ____ 20. Silo — Type ____
- ____ 21. Barn Gutter
- ____ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
- ____ 23. Other Manure Storage ____
- Other NR 112 Waste Source ____ 24. NONE AT TIME OF DRILLING

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8	surface	50
4	50	52'

Method of constructing upper enlarged drillhole. (If applicable ✓ more than one.)
☒ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☒ 5. Cable-tool Bit 4" in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain ____
☐ 7. Other ____

9. Geology

	Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
-C-	CLAY	surface	28'
-GG	ROCKS AND GRAVEL	28	52

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4.5 OD	4" ID ASTM A589	surface	
	H# 0.237 WALL BLK STEEL		
	SAW HILL PIPE		52

Dia. (in.)	screen type and material	From	To
	OPEN BOTTOM		52'

8. Grout or Other Sealing Material
Method ____

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
PUDDLED CLAY	surface	50	

10. Static Water Level
____ ft. above ground level
24 ft. below ground surface

11. Pump Test
Pumping Level 40 ft. below surface
Pumping at 8 GPM for 8 hours

12. Well Is: 20 in. ☒ Above ☐ Below Grade
Developed? ☒ Yes ☒ No
Disinfected? ☒ Yes ☐ No
Capped? ☒ Yes ☐ No

13. Were all unused, noncomplying, or unsafe wells properly filled with sealant? ☐ Yes ☐ No If no, explain ____

14. Signature of Well Constructor Paul R Anderson PRA Date Signed 7 22 88
Signature of Drill Rig Operator Same PRA Date Signed

Make additional comments on reverse side about geology, etc.

DNR WGNHS ORIGINAL WELL CONSTRUCTION REPORT Form 3300-77A Rev. 1-88

MAR 9 1971

WELL CONSTRUCTOR'S REPORT

Wel-6

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

4

1. COUNTY: BAYFIELD

CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SE 1/4 NW 1/4 S. 14 T. 48 N R. 5 W

3. OWNER AT TIME OF DRILLING
WALTER SWANSON

4. OWNER'S COMPLETE MAIL ADDRESS
R-1 WASHBURN - WIS

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

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
20	35		38		20		35	

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
35		75	NONE	NONE	90	120	NONE	NONE [redacted]	NONE

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

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	25	4	25	170

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	NEW, BLACK STEEL T.C. 10.89 LBS PER FT.	Surface	123

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
CLAY SLURRY	Surface	25

10. FORMATIONS

Kind	From (ft.)	To (ft.)
TOP SOIL	Surface	1
CLAY	1	30
GRAVEL + SAND	30	55
HARD PAN	55	71
SAND STONE	71	170

Well construction completed on [redacted] MARCH 4 1971

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield test: 12 Hrs. at 5 GPM

Depth from surface to normal water level 60 ft.

Depth to water level when pumping 80 ft.

Water sample sent to MADISON laboratory on: [redacted] March 8 1971

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: Robert T. Melin Registered Well Driller

COMPLETE MAIL ADDRESS: 1318 McArthur Ave, Ashland

Please do not write in space below

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

REV. 11-68

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-74

JAN 2 1987

46

1. COUNTY BAYFIELD
CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name BARKSDALE

2. LOCATION — ¼ Section or Gov't. Lot ✓ NW-NW; Section 14; Township 48N; Range 5W
OR - Grid or Street No. / Street or Road Name
AND - If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
DAN THORESON
ADDRESS P.O. BOX 564
POST OFFICE WASHBURN, WIS. ZIP CODE 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
50										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Sewage Sump	Clearwater Dr.	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit / Seepage Bed / Seepage Trench	Manure Hopper or Retention or Pneumatic Tank
												60		

Privy | Pet Waste Pit | Pit: Nonconforming Existing — Well / Pump / Tank | Subsurface Pumproom 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 | 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:
RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	128			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½" O.D	T.&C. ASTM A-589	Surface	
4" I.D	11# 0.237 WALL		
SAWHILL	BLK. ST. PIPE		125
2" #12	SLOT JOHNSON	125	
ST. STEEL	SCR. W/4x2 K PACKER		128

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

LIMIT PUMPAGE LETTER IN WD. FILE

9. FORMATIONS

Kind	From (ft.)	To (ft.)
CLAY & BOULDERS	Surface	30
DRY SAND	30	48
RED CLAY	48	124
SAND & GRAVEL	124	128
SAND STONE AT	128	

10. TYPE OF DRILLING MACHINE USED
[X] 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 DEC. 4 1986

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 2 Hrs. at 4 GPM
Depth from surface to normal water level 98 Ft.
Depth of water level when pumping 119 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on DEC. 4 1986

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. OVER

Signature Richard W. Squires Registered Well Driller

Business Name and Complete Mailing Address
DICK SQUIRES WELL DRILLING CO
R1 BOX 77 MASON, WIS 54856

I did not wish to go into the sandstone in this area because of brackish water in the rock. Better 4 gallons per minute of good water than 10 GPM ~~that~~ has to be conditioned.

Richard W. Squires

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-79

JAN 9 1985

47

1. COUNTY BAYFIELD — CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name BARKSDALE

2. LOCATION — ¼ Section or Gov't. Lot NW-NW — Section 14 — Township, Range 48 5W
OR – Grid or Street No. Street or Road Name
AND – If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
PAUL BEEKSMA
ADDRESS RR
POST OFFICE WASHBURN, WIS. ZIP CODE 54891

4. Distance in feet from well to nearest: (Record answer in appropriate block)
Building 10
Septic Tank 70
Sewage Absorption Unit — Seepage Bed 90

5. Well is intended to supply water for:
RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	107			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½"	O.D.-T+C. ASTM A-589	Surface	
11#	0.237 WALL 4" I.D.		
SAWHILL BLK. ST. PIPE			103
2" #10	SLOT-H.SMITH-STAIN.	103	
SCR. W/	K. PACKER		107

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	16
SILTY SAND	16	28
DRY SAND	28	89
WATER SAND	89	107

10. TYPE OF DRILLING MACHINE USED
[X] 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 Dec 12 1984

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 10 Hrs. at 10 GPM
Depth from surface to normal water level 89 Ft.
Depth of water level when pumping 94 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on DEC. 12 1984

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 Richard W. Squires Registered Well Driller

Business Name and Complete Mailing Address
DICK SQUIRES WELLDRILLING CO
R1 BOX 77 MASON, WIS. 54856

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL DRILLING DIVISION

OCT -8 1940

48

Note: Section 32 of the Wisconsin Well Drilling Sanitary 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 Edward Peterson Driller Melin Well Drilling Co

Street or RFD Rout I Post Office Ashland Wis.

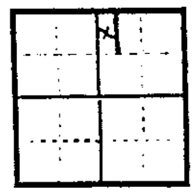
Post Office Washburn Wis. Date Oct 7 - 40 Permit No. 27

LOCATION OF PREMISES

Bayfield (County) Barksdale (Town)

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

N W ½ of N W ¼ of NE ¼ of S14 - T 48 - R5W.
Describe further by subdivision, plat, district, lake, lot,
State highway 13 - nearest
block, nearest principal highway, etc., whichever apply.
princepal highway



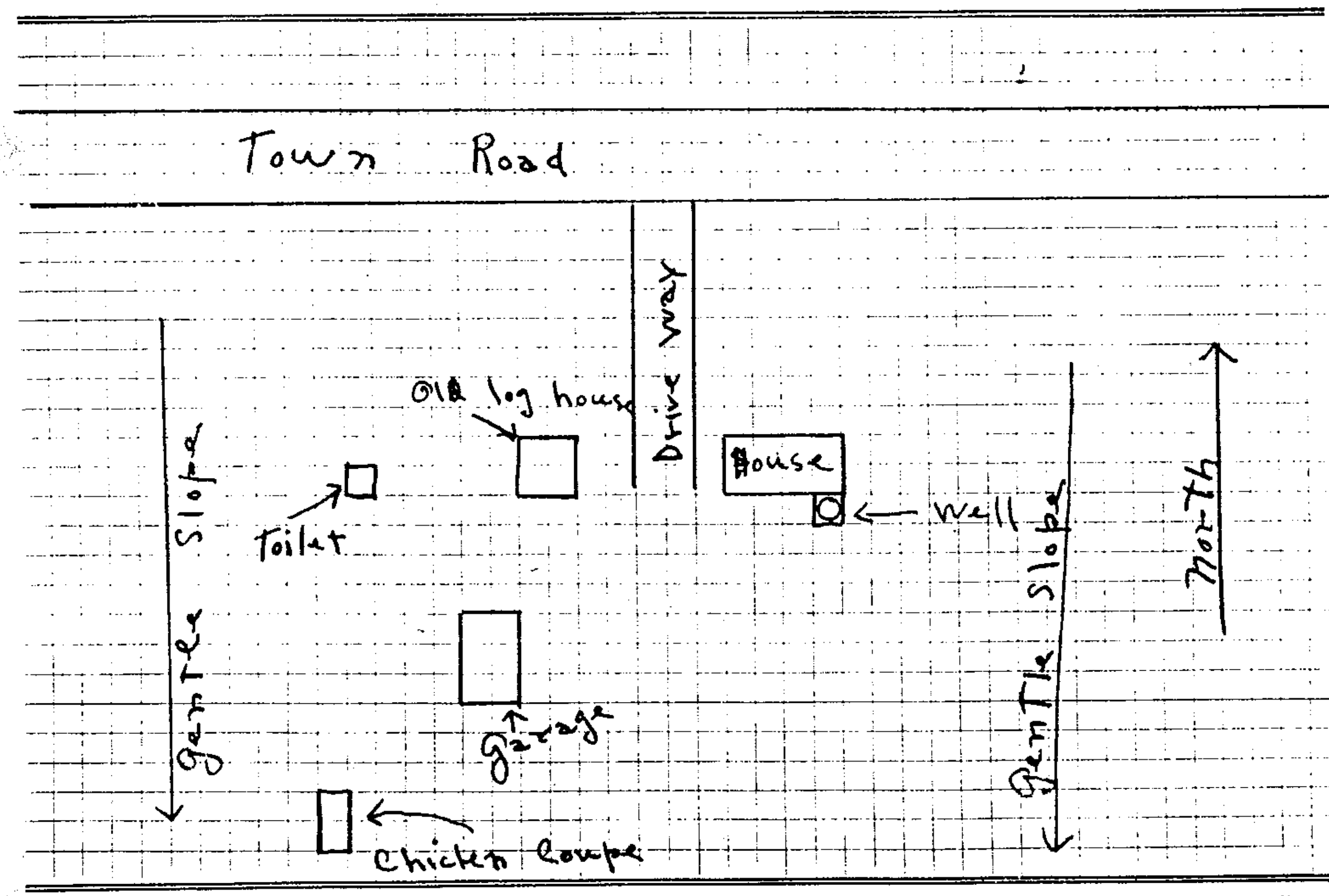
Sec. 14

Twp. 48

Range 5 { E W ✓

DIAGRAM OF PREMISES

See discussion and illustration in Part III Well Drilling Code. In making the diagram in the space below consider 10 ft. as the distance between lines. Be sure to indicate NORTH.



Additional copies of this form may be obtained in lots of 12 for 25¢. Send remittance with order to State Board of Health, Well Drilling Division, Madison, Wis.

Lo

WELL LOG *and* REPORT

In this column indicate the kind of casing, liner, shoe and other accessories used.

Std. wt. wrot Steelpipe

"Drillers Special"

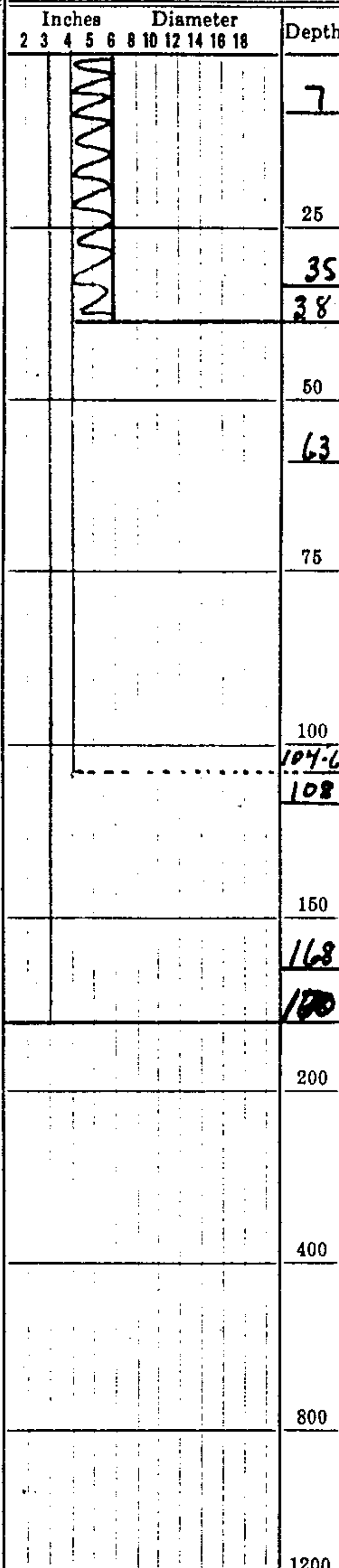
Forged steel drive shoes

Key:

= Mud grout

| = Casing pipe

WELL DIAGRAM
Use a red line to show casing or liner pipe. Use black for drill or borehole.



Draw the diagram to show the right half only

In this column state the kind of formations penetrated, their thickness in feet and if water bearing.

Top soil & sandy loam	7'
Red Clay	28'
Hard pan	28'
Dry sand & gravel	45'
Hard pan	60'
Water bearing gravel	2'

Record of FINAL Pumping test

Duration of test
Hours 20

Pumping rate
G.P.M. 3

Depth of pump in well. Ft. 126

Standing water-level (from surface)
Ft. 85

Water-level when pumping Ft. 110

Water. End of test.
Clear ✓
Cloudy
Turbid

Was the well sterilized?
Yes ✓ No

To which laboratory was sample sent?
Superior Wis
Date Sept 9-40

Was the well sealed on completion?
Yes ✓ No

How high did you leave the casing-pipe above grade?
12"

Well was completed
Date Oct 7-40

Well Driller
Theodore Melvin
Signature

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-79

49

JUN 11 1985

1. COUNTY Bayfield — CHECK (✓) ONE: ☑ Town ☐ Village ☐ City — Name Barksdale

2. LOCATION — ¼ Section or Gov't. Lot: NW-NE — Section: 14 — Township, Range: 48N 5W
OR – Grid or Street No. — Street or Road Name
AND – If available subdivision name, lot & block No.

3. NAME ☑ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE
Russ Dennis
ADDRESS Rt 1
POST OFFICE Washburn WI — ZIP CODE 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
45	—	—	—	—	—	—	—	—	—	—

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Clearwater Dr.	Sewage Sump	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit	Seepage Bed	Seepage Trench	Manure Hopper or Retention or Pnuematic Tank
—	—	—	—	—	—	—	—	—	—	—	150	—	—	175	—	—

Privy	Pet Waste Pit	Pit: Nonconforming Existing Well	Pump	Tank	Subsurface Pumproom 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	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)
—	—	—	—	—	—	—	—	NONE at time of Drilling

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8 3/4	Surface	320			
6	321	330			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
6	New steel Pipe plain end Astm 53 Wall thick 280	Surface	320

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
drill cuttings	Surface	320

9. FORMATIONS

Kind	From (ft.)	To (ft.)
SAND	Surface	20
HARD PAN	21	290
CLAY + Boulders	291	319
SANDSTONE	320	330

10. TYPE OF DRILLING MACHINE USED
☐ Cable Tool ☐ Rotary-air w/drilling mud ☑ Rotary-w/drilling mud ☐ Rotary-hammer w/drilling mud & air ☐ Rotary-hammer & air ☐ Reverse Rotary ☐ Jetting with ☐ Air ☐ Water

Well construction completed on 4-20 19 85

Well is terminated 18 inches ☑ above ☐ below final grade

Well disinfected upon completion ☑ Yes ☐ No

Well sealed watertight upon completion ☑ Yes ☐ No

11. MISCELLANEOUS DATA
Yield Test: 2 Hrs. at 12 GPM
Depth from surface to normal water level 140 Ft.
Depth of water level when pumping 145 Ft. Stabilized ☑ Yes ☐ No

Water sample sent to Wis State LAB. MADISON, WI laboratory on 6-5 19 85

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 Gary Lind — Registered Well Driller

Business Name and Complete Mailing Address: Gary Lind Well Drilling Box 73 Iron River, WI

FEB 20 1974

WELL CONSTRUCTOR'S REPORT

Wel-6

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

5C

1. COUNTY: BAYFIELD
CHECK ONE: ☒ Town ☐ Village ☐ City
NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
NW ¼ NE ¼ S. 14 T. 48 N R-6 W

3. OWNER AT TIME OF DRILLING
JOHN MARINCEL

4. OWNER'S COMPLETE MAIL ADDRESS
R-1 WASHBURN

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

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
20	40		35			20	35	

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
35		100	—	—	120	—	—	—	—

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

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20	4	20	134

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	NEW-BLACK STEEL - 10.00 LBS PER FT. T+C.	Surface	129
4	10 SLOT-S.S. SCREEN	129	134

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
CLAY SLURRY	Surface	20

10. FORMATIONS

Kind	From (ft.)	To (ft.)
CLAY	Surface	5
SAND	5	10
CLAY	10	45
GRAVEL	45	90
HARD PAN	90	128
WATER SAND	128	134

Well construction completed on 2-16 1974

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield test: 5 Hrs. at 5 GPM

Depth from surface to normal water level 100 ft.

Depth to water level when pumping 105 ft.

Water sample sent to MADISON laboratory on: 2-19 1974

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: Robert T. Melin Registered Well Driller
COMPLETE MAIL ADDRESS: 1318 MacArthur Ave - Ashland Wis

Please do not write in space below

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

REV. 11-68

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 12-76

51

1. COUNTY BAYFIELD
CHECK (✓) ONE: [X] Town [ ] Village [ ] City
Name BARKSDALE

2. LOCATION
¼ Section NE-NE | Section 14 | Township 48N | Range 5W
OR – Grid or Street No. Street Name
AND – If available subdivision name, lot & block No.

3. NAME [ ] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
MARY ANN HIRSCH
ADDRESS RR
POST OFFICE WASHBURN, WIS.

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
15										

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Clearwater Dr.	Sewage Sump	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Seepage Pit	Seepage Bed	Seepage Trench
											60		80		

Privy	Pet Waste Pit	Pit: Nonconforming Existing Well	Pump	Tank	Subsurface Pumproom 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

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:
RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	140			
4	140	162			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
4½" O.D.	T.&C. .237 WALL	Surface	
ASTM	A589 11# 4" I.D.		
BLK	STEEL PIPE		158
#948	STAIN. STEEL #10 SLOT	158	
2"	SCREEN W/ 4X2 K PACKER		162

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	140

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	140
HARD PAN	140	154
CLEAN WATER SAND	154	162

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool 140-162
[ ] Rotary-air w/drilling mud
[X] Rotary-w/drilling mud 0-140'
[ ] Rotary-hammer w/drilling mud & air
[ ] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with [ ] Air [ ] Water

Well construction completed on 3-10 1977
Well is terminated 12 inches [X] above [ ] below final grade
Well disinfected upon completion [X] Yes [ ] No
Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 4 Hrs. at 10 GPM
Depth from surface to normal water level 100' Ft.
Depth of water level when pumping 110 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on 3-10 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 Richard W. Squires Registered Well Driller
Complete Mail Address R1 MASON, WIS. 54856

SEP 10 1974

FEB 12 1975

52

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

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 BAYFIELD — CHECK ONE: [X] Town [ ] Village [ ] City — NAME WASHBURN

2. LOCATION – ¼ Section SE-NE | Section 15 | Township 48N | Range 5W

OR – Grid or street no. | Street name

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

3. OWNER AT TIME OF DRILLING DALE STUART
ADDRESS RR
POST OFFICE WASHBURN, WISC.

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
10								

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		100		125					

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

5. Well is intended to supply water for: FARM & HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	Surface	130			
4	130	195			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½" O.D. BLK. ELECT. WLD		Surface	
11# PER FT. T.&C.			
.237 WALL THICKNESS			
4" I.D. STEEL PIPE			131

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED ROTARY DRILL CUTTINGS	Surface	130

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	70
CLAY & SAND MIXED	70	122
BROKEN MUDDY SAND STONE	122	130
SOLID RED SANDSTONE	130	195

10. TYPE OF DRILLING MACHINE USED

[ ] Cable Tool [ ] Direct Rotary [ ] Reverse Rotary
[X] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 7-8 1974

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA

Yield test: 4 Hrs. at 10 GPM

Depth from surface to normal water level 66 ft.

Depth to water level when pumping 88 ft.

Water sample sent to MADISON laboratory on: 7-8 1974

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 Richard W. Sprenis — Registered Well Driller

COMPLETE MAIL ADDRESS R1 MASON, WI. 54856

Please do not write in space below

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

REV. 3-71

MAR 5 1975

WELL CONSTRUCTOR'S REPORT

Wel-6

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

5

1. COUNTY: BAYFIELD — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
NE 1/4 SE 1/4 S-15 T.48N R.5W

3. OWNER AT TIME OF DRILLING
LARRY EKHOLM

4. OWNER'S COMPLETE MAIL ADDRESS
R-1 WASHBURN

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

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
35	50		40		[illegible]	35	40	

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
40		70	—	—	100	—	—	—	—

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

6. Well is intended to supply water for:
NEW HOME

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	25	4	25	175

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	NEW-BLACK-T+C	Surface	130
	11:00-LBS-PER-FT.		

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
CLAY SLURRY	Surface	25

10. FORMATIONS

Kind	From (ft.)	To (ft.)
TOP SOIL	Surface	2
CLAY + SAND MIXED	2	45
ROCKS + BOULDERS	45	50
HARD PAN	50	90
SAND + HARDPAN	90	100
SAND STONE	100	175

Well construction completed on JAN 20 1975

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA

Yield test: 30 Hrs. at 6 GPM

Depth from surface to normal water level 65 ft.

Depth to water level when pumping 85 ft.

Water sample sent to MADISON laboratory on: JAN 21 1975

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: Robert T. Melin Registered Well Driller

COMPLETE MAIL ADDRESS: 1318 MacArthur Ave - Ashland Wis

Please do not write in space below

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

REV. 11-68

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-79

54

1. COUNTY BAYFIELD — CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name BARKSDALE

2. LOCATION — Section or Gov't. Lot: SW-NW — Section: 15 — Township: 48N — Range: 5W
OR – Grid or Street No. | Street or Road Name
AND – If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
JAMES KAUGE
ADDRESS R1
POST OFFICE WASHBURN, WIS. — ZIP CODE 54891

4. Distance in feet from well to nearest: (Record answer in appropriate block)
Building: 8
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 (San., Storm); Other Sewers (C.I., Other); Foundation Drain Connected to (Sewer, Clearwater Dr., Sewage Sump, Clearwater Sump); Sewage Sump (C.I., Other); Clearwater Sump; Septic Tank; Holding Tank; Sewage Absorption Unit (Seepage Pit, Seepage Bed, Seepage Trench); Manure Hopper or Retention or Pnuematic Tank
NO SEWER AT TIME OF DRILLING
Privy; Pet Waste Pit; Pit: Nonconforming Existing (Well, Pump, Tank); Subsurface Pumproom 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; 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: RURAL RESIDENCE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	130'			
4	130	145			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½" O.D.	T.&C. ASTM	Surface	
A 589	11# 0.237 WALL		
4" I.D.	BLK. STEEL PIPE		141
#944	STAINLESS 2" SCR.	141	
#10 SLOT	W/4x2 K PACKER		145

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	130

9. FORMATIONS

Kind	From (ft.)	To (ft.)
SAND & CLAY MIXTURE	Surface	30
DRY SAND	30	128
WATER SAND	128	145

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool 130'-145'
[ ] Rotary-air w/drilling mud
[X] Rotary-w/drilling mud 0-130
[ ] Rotary-hammer w/drilling mud & air
[ ] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with [ ] Air [ ] Water

Well construction completed on SEPT 14 1982

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 2 Hrs. at 10 GPM
Depth from surface to normal water level 128 Ft.
Depth of water level when pumping 132 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on SEPT. 14 1982

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 Richard W. Squires — Registered Well Driller

Business Name and Complete Mailing Address
DICK SQUIRES WELL DRILLING Co.
R1 BOX 77 MASON, WIS. 54856

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 5-85

(55)

AUG 14 1987

1. COUNTY BAYFIELD — CHECK (✓) ONE: ☒ Town ☐ Village ☐ City — Name BARKSDALE

2. LOCATION — ¼ Section or Gov't. Lot NW-NE ✓ — Section 15 — Township 49N — Range 5W
OR – Grid or Street No. — Street or Road Name — T48N
AND – If available subdivision name, lot & block No.

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE
LARRY CHASE
ADDRESS RR
POST OFFICE WASHBURN, WIS. — ZIP CODE 54891

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

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
100										

Street Sewer (San., Storm) — Other Sewers (C.I., Other) — Foundation Drain Connected to (Sewer, Clearwater Dr., Sewage Sump, Clearwater Sump) — Sewage Sump (C.I., Other) — Clearwater Sump — Septic Tank — Holding Tank — Sewage Absorption Unit (Seepage Pit, Seepage Bed, Seepage Trench) — Manure Hopper or Retention or Pnuematic Tank

NO SEWER AT TIME OF DRILLING

Privy — Pet Waste Pit — Pit: Nonconforming Existing (Well, Pump, Tank) — Subsurface Pumproom 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 — 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:
FUTURE HOME SITE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	187			
4	187	191			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.) Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½" O.D. T.&C. ASTM	Surface	
A589 4" I.D. 0.237		
WALL SAWHILL-BLK		
STEEL PIPE		191

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	187

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	65
SILTY CLAY	65	173
SILTY SAND	173	187
HEAVY WATER BEARING GRAVEL	187	191

10. TYPE OF DRILLING MACHINE USED
☒ Cable Tool 185-191
☐ Rotary-hammer w/drilling mud & air
☐ Jetting with ☐ Air ☐ Water
☐ Rotary-air w/drilling mud
☐ Rotary-hammer & air
☒ Rotary-w/drilling mud 0-185
☐ Reverse Rotary

Well construction completed on JULY 6 1987

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield Test: 10 Hrs. at 15 GPM
Depth from surface to normal water level 119 Ft.
Depth of water level when pumping 130 Ft. Stabilized ☒ Yes ☐ No

Water sample sent to MADISON laboratory on JULY 6 1987

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 Richard Squires Registered Well Driller

Business Name and Complete Mailing Address
DICK SQUIRES WELLDRILLING CO
R1 BOX 77 MASON, WIS. 54856

(1) (30)

WELL CONSTRUCTOR'S REPORT
Wel-6

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

APR 10 1979

1. COUNTY: BAYFIELD — CHECK ONE: [X] Town [ ] Village [ ] City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
NW 1/4 NE 1/4 S 15 T 48 N R 5W

3. OWNER AT TIME OF DRILLING
JOHN PODLESNY

4. OWNER'S COMPLETE MAIL ADDRESS
507 14TH AVE E ASHLAND - WIS 54806

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

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
12	40		40		~~12~~	12	40	

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
40		60	NONE	NONE	100	NONE	NONE	NONE	NONE

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

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
9	Surface	25	6 1/4	25	58
4	58	150			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	STD WEIGHT T+C PIPE	Surface	58

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
CLAY SLURRY	Surface	25

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Top Soil	Surface	2
CLAY	2	10
SAND + GRAVEL	10	55
SAND STONE	55	150

Well construction completed on 7-1 1973

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield test: 8 Hrs. at 6 GPM

Depth from surface to normal water level 34 ft.

Depth to water level when pumping 40 ft.

Water sample sent to MADISON laboratory on: 7-9-73 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: [illegible] Registered Well Driller — COMPLETE MAIL ADDRESS: 1518 [illegible]

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS
				[illegible]

REV. 11-68

57

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

JAN 30 1946

1. County Bayfield — Town ~~Village~~ ~~City~~ Barksdale
2. Location N.E. of N.E. ¼ of Sec. ~~11~~ 15, T. 48N., R. ~~4W~~ 5W
3. Owner or Agent George Sampson
4. Address Route I. Washburn, Wisconsin
5. From well to nearest: Building 4 ft; sewer 25 ft; drain 25 ft; septic tank 60 ft; dry well or filter bed none ft; abandoned well none ft.
6. Well is intended to supply water for: Home and Tavern

7. DRILLHOLE OR EXCAVATION:

Dia. (in.)	From (ft.)	To (ft.)
6	0	35
4	35	I41

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind	From (ft.)	To (ft.)
4	Standard Weight		
	Steel Pipe	0	I41
	screen - 2 x 55 inch, gauge brass		
	well point w/ gaskets		

9. GROUT:

Kind	From (ft.)	To (ft.)
Puddled Clay	0	35

10. FORMATIONS:

Kind	Thickness (ft.)	Total Depth (ft.)
Red Clay	48	48
Dry Sand	8	56
Dry Gravel & Sand	65	I2I
Hard Pan	8	I29
Water Bearing Sand & Gravel	I5	I44

11. MISCELLANEOUS DATA:

Yield test: 4 Hrs. at 6 GPM.

Depth from surface to water: I25 ft.

Water-level when pumping: I30 ft.

Water sample sent to laboratory at Superior Wis. on Dec. I0 19 45

Construction of the well was completed on December 8 1945

The well is terminated I2 inches (above) ~~(below)~~ the permanent grade.

Was the well disinfected upon completion? Yes x No

Was the well sealed watertight upon completion? Yes x No

Signature T.A. Melin
Registered Well Driller
Theodore Melin

I104. Front Str. W.
Ashland Wisconsin
Complete Mail Address

INSTRUCTIONS

ALL INFORMATION INDICATED ON THE FACE OF THIS FORM MUST BE GIVEN

PLEASE BE GUIDED BY THE FOLLOWING:

Numbers below correspond to numbers of items of the form on the opposite side.

1. Name of the County and the name of the Town, Village or City. Indicate which is given.
2. If Rural: Number and the ¼ of the Section, the number of the Town North, and the number of the Range East or West.
   If Urban: Name of the Street and the number of the Premise.
3. Name of the Owner. If the name of the owner cannot be given, give instead the name of the Agent. Indicate which is given.
4. Name of the Street and the number of the Premise or the number of the Mail Route, the name of the Post Office and the name of the State.
5. Distance, in feet, from the well to the nearest building and to each source of pollution shown.
6. Indicate: Home, farm, school, tavern, creamery, community, industry, etc.
7. Show the diameter and depth of the initial drillhole or excavation and each reduction in size to bottom. If well was reconstructed, show diameter and depth of original well on first line.
8. Show diameter and kind of casing pipe, liner pipe or curbing and actual position in the well, measured from the surface.
9. Show kind of material (mud or cement) used in sealing the annular space, from and to what depths from the surface. If neither was used indicate "none".
10. Show thickness of each formation and the total depth at the base thereof.
11. Provide the data indicated.

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, connecting pits, etc., may be given here:

2 X 55 inch 60 gauge brass well point with gaskets used for screen.

DO NOT FILM

If more space is needed another sheet may be attached.

Rec'd 6/15/67

Wel. 6-30M(6-60)

58

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

1. County BAYFIELD — Town ☑ Village ☐ City ☐ BARKSDALE (Check one and give name)
2. Location NE 1/4 NE 1/4 S-15 T-48 N R-5 W (Name of street and number of premise or Section, Town and Range numbers)
3. Owner ☑ or Agent ☐ ALBERT BREVAK (Name of individual, partnership or firm)
4. Mail Address R-1 WASHBURN WIS (Complete address required)
5. From well to nearest: Building 10 ft; sewer 25 ft; drain 25 ft; septic tank 75 ft; dry well or filter bed 100 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.)
6	0	20	4	20	170

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	STANDARD WEIGHT	0	110

9. GROUT:

Kind	From (ft.)	To (ft.)
CLAY SLURRY	0	20

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
CLAY	0	25
SAND & GRAVEL	25	68
HARD PAN	68	86
GRAVEL	86	90
SANDSTONE	90	170

Construction of the well was completed on: OCTOBER 23 1965

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 ____

11. MISCELLANEOUS DATA:

Yield test: 12 Hrs. at 5 GPM.

Depth from surface to water-level: 80 ft.

Water-level when pumping: 95 ft.

Water sample was sent to the state laboratory at: ____ (City) on ____ 19__

Signature Theodore Melin (Registered Well Driller) — 1104-Front St. W. Ashland Wis (Complete Mail Address)

Please do not write in space below

Rec'd ____ No. ____

Ans'd ____

Interpretation ____

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

Examiner ____

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300 NOV 26 1986 Rev.

(59)

1. COUNTY BAYFIELD — CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name BARKS DALE

2. LOCATION — Section or Gov't. Lot ✓ SE-SW — Section 22 — Township 49N — Range 5W
OR — Grid or Street No. — Street or Road Name
AND — If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
RON HEGLUND
ADDRESS RR ~~ASHLAN~~
POST OFFICE ASHLAND, WIS. — ZIP CODE 54806

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

Building | 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 (San., Storm) | Other Sewers (C.I., Other) | Foundation Drain Connected to (Sewer, Clearwater Dr., Sewage Sump, Clearwater Sump) | Sewage Sump (C.I., Other) | Clearwater Sump | Septic Tank | Holding Tank | Sewage Absorption Unit (Seepage Pit, Seepage Bed, Seepage Trench) | Manure Hopper or Retention or Pneumatic Tank

Privy | Pet Waste Pit | Pit: Nonconforming Existing (Well, Pump, Tank) | Subsurface Pumproom 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 | 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:
FUTURE BUILDING SITE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	120			
4	120	129			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
$4\frac{1}{2}$" O.D.	T. & C. ASTM A-589	Surface	
4" I.D.	11# 0.237 WALL		
	SAWHILL BLK. ST. PIPE		125
3"	#12 SLOT JOHNSON STAINL.	125	
	ST. ~~SCR~~ SCREEN W/4X3 K PACKER		129

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	120

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	10
DRY SAND	10	68
SILTY CLAY	68	120
CLEAN, COARSE WATER BEARING SAND	120	129

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool 120-129
[ ] Rotary-air w/drilling mud
[X] Rotary-w/drilling mud 0-120
[ ] Rotary-hammer w/drilling mud & air
[ ] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with [ ] Air [ ] Water

Well construction completed on OCT 30 1986

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 2 Hrs. at 8 GPM
Depth from surface to normal water level 88 Ft.
Depth of water level when pumping 115 Ft. Stabilized [X] Yes [ ] No
Water sample sent to MADISON laboratory on OCT 30 1986

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 Richard W. Squires Registered Well Driller

Business Name and Complete Mailing Address
DICK SQUIRES WELLDRILLING CO
R1 BOX77 MASON, WIS. 54856

(60)

WELL CONSTRUCTOR'S REPORT
Wel-6

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: BAYFIELD — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available): SE-SW SEC. 26 T48N. R5W

3. OWNER AT TIME OF DRILLING: DON POCERNICH

4. OWNER'S COMPLETE MAIL ADDRESS: R3 ASHLAND, WISC.

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
30	35							

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		50			100				

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

6. Well is intended to supply water for: RURAL RESIDENCE

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	Surface	20			
4	20	50			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½"	O.D. BLK. THREADED & COUPLED-ELECTRIC WELDED 11# PER FOOT .237 WALL THICKNESS	Surface	
	4" I.D. STEEL PIPE		47
4"	TELESCOPE SIZE STD. FITTED STAINLESS STEEL METAL-JOHNSON WELL SCREEN #15 SLOT	47	50

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

10. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	38
SOFT SILTY CLAY	38	44
CLEAN WATER SAND	44	50

Well construction completed on 12-21 1970

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA

Yield test: 24 Hrs. at 10 GPM

Depth from surface to normal water level 24 ft.

Depth to water level when pumping 30 ft.

Water sample sent to MADISON laboratory on: 12-21 1970

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: Richard W. Squires — Registered Well Driller

COMPLETE MAIL ADDRESS: R1 MASON, WISC. 54856

Please do not write in space below

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

REV. 11-68

61

BAYFIELD COUNTY BA-118-U

T48N R5W S½, SE¼, Section 26

ELEVATION = 630

WATER LEVEL = Weak flow

FORMATION =	Clay & sand	0-95
	Gravel	AT 95

Rec'd 7/15/69 (62

WELL CONSTRUCTOR'S REPORT
Wel-6

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: BAYFIELD — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SE-SW SEC. 26 T48N. R5W

3. OWNER AT TIME OF DRILLING
WILLIAM HEGLUND

4. OWNER'S COMPLETE MAIL ADDRESS
R3 ASHLAND

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

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
6	12	–	–	–	–	–	–	–

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
–	–	150	–	200	–	–	–	–	–

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

6. Well is intended to supply water for: RURAL RESIDENCE

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	43			

10. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	32
WATER SAND	32	43

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½"	O.D. BLK. THREADED & COUPLED - SEAMLESS 11# PER FOOT .237 WALL THICKNESS - 4" I.D STEEL PIPE	Surface	40
4"	TELESCOPE SIZE JOHNSON WELL SCREEN - STD FITTED STAINLESS STEEL METAL # 12 SLOT	40	43

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

Well construction completed on 2-24 19 69

11. MISCELLANEOUS DATA
Yield test: 10 Hrs. at 15 GPM

Well is terminated 10 inches ☒ above ☐ below final grade

Depth from surface to normal water level 3 ft.

Well disinfected upon completion ☒ Yes ☐ No

Depth to water level when pumping 10 ft.

Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to MADISON laboratory on: 2-24 19 69

M 17 TON

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: Richard W. Squires Registered Well Driller — COMPLETE MAIL ADDRESS: R 1 MASON, WISC.

Please do not write in space below

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

REV. 11-68

WELL CONSTRUCTOR'S REPORT
Wel-6

JUL 28 1970

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

63

1. COUNTY: BAYFIELD — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: BARKSDALE

LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SW-SE SEC. 26 T48N, R5W

3. OWNER AT TIME OF DRILLING: JOHN WROBLESKI

4. OWNER'S COMPLETE MAIL ADDRESS: WASHBURN, WISC

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

BUILDING	SANITARY SEWER C.I.	SANITARY SEWER TILE	FLOOR DRAIN C.I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C.I.	WASTE WATER DRAIN TILE
4	20							

CLEAR WATER DRAIN C.I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		40			75				

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

6. Well is intended to supply water for: RURAL RESIDENCE

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	128			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½"	O.D. BLK. THREADED + COUPLED - ELECTRIC WELDED - 11# PERFOC, .237 WALL THICKNESS 4" I.D. PIPE	Surface	125
4"	TELESCOPE SIZE JOHNSON WELL SCREEN STD. FITTED - STAINLESS STEEL METAL #10 SLOT	125	128

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	

10. FORMATIONS

Kind	From (ft.)	To (ft.)
REDCLAY	Surface	90
ROCKS-GRAYISH CLAY	90	108
SILTY SAND	108	123
CLEAN WATER SAND	123	128

Well construction completed on 6-30 1970

11. MISCELLANEOUS DATA
Yield test: CONTINUOUS Hrs. at 30 GPM

Depth from surface to normal water level 20' ABOVE GROUND ft.

Depth to water level when pumping 2' ABOVE GROUND ft.

Well is terminated 12 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: 6-30 1970

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: Richard W. Squires — Registered Well Driller

COMPLETE MAIL ADDRESS: R1 MASON, WISC.

Please do not write in space below

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

REV. 11-68

APR 10 1973

WELL CONSTRUCTOR'S REPORT

Wel-6

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

(64)

1. COUNTY: BAYFIELD — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SE 1/4 SE 1/4 S. 26 T. 48 N R- 5W

3. OWNER AT TIME OF DRILLING
CURTIS MALMBERG

4. OWNER'S COMPLETE MAIL ADDRESS
R-3 ASHLAND - WIS

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
12	25		30		~~12~~	12	25	

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
25		100	NONE	NONE	110	NONE	NONE	NONE	NONE

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

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20	4	20	65

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	STD. NEW BLACK STEEL PIPE 10.89 LBS PER FT.	Surface	61
2	60 GAUGE SS. SCREEN	61	65

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
CLAY SLURRY	Surface	20

10. FORMATIONS

Kind	From (ft.)	To (ft.)
TOP SOIL	Surface	2
CLAY	2	51
SAND + GRAVEL	51	55
FINE SAND	55	60
COURSE SAND	60	65

Well construction completed on APRIL 2 1973

Well is terminated 12 Inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield test: FLOWING 16PM Hrs. at 1 GPM

Depth from surface to normal water level FLOWING ft.

STATIC WATER PRESSURE -0- LBS PSI

Depth to water level when pumping FLOWING ft.

Water sample sent to MADISON laboratory on: APRIL 4 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: Robert T. Melin — Registered Well Driller

COMPLETE MAIL ADDRESS: 1318 McArthur Ave - Ashland

Please do not write in space below

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

REV. 11-68

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

FEB - 9 1976

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

65

COUNTY BAYFIELD | CHECK ONE [X] Town [ ] Village [ ] City | NAME BARKS DALE

2. LOCATION – ¼ Section NE¼SE | Section 27 | Township 48N | Range 5W

3. OWNER AT TIME OF DRILLING A. BUSS

OR – Grid or street no. | Street name

ADDRESS R3

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

POST OFFICE ASHLAND, WI. 54806

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
8								

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		60		80					

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

5. Well is intended to supply water for: FARM + HOME

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	110			
4	110	118			

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	110
WATER SAND	110	118

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½" OD	TAC BLK. ELECTRIC	Surface	
	WELD SEAM, .237 WALL 11#		
	PER FOOT - 4" I.D. STEEL PIPE		114
	#948 STAINLESS WELL SCREEN	114	
	W/ 4x7 PACKER #10 SLOT		118

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
ROTARY DRILL CUTTINGS	Surface	110

10. TYPE OF DRILLING MACHINE USED

[X] Cable Tool 110-118' | [X] Direct Rotary To 110' | [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud | [ ] Rotary – hammer with drilling mud & air | [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 5-19 1975

Well is terminated 10 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA

Yield test: 10 Hrs. at 8 GPM

Depth from surface to normal water level 62 ft.

Depth to water level when pumping 80 ft.

Water sample sent to MADISON laboratory on: 5-19 1975

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 Richard W. Squires Registered Well Driller

COMPLETE MAIL ADDRESS R1 MASON, WI. 54856

Please do not write in space below

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

REV. 3-71

WELL CONSTRUCTOR'S REPORT
Wel-6

JAN 13 1971

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

66

1. COUNTY: BAYFIELD
CHECK ONE: ☒ Town ☐ Village ☐ City
NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SW-NW SEC. 27 T48N R5W

3. OWNER AT TIME OF DRILLING: MIKE FREDERICKS

4. OWNER'S COMPLETE MAIL ADDRESS: R3 ASHLAND, WISC

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
15	60							

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		50			100				

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

6. Well is intended to supply water for: RURAL RESIDENCE

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	228			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4½"	O.D. BLK. THREADED & COUPLED-ELECTRIC WELDED 11# PER FOOT .237 WALL THICKNESS	Surface	
	4" I.D. STEEL PIPE		225
4"	TELESCOPE SIZE - STD. FITTED STAINLESS STEEL METAL JOHNSON WELL SCREEN #10 SLOT	225	228

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

10. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	40
SAND-CLAY MIXTURE	40	220
WATER SAND	220	228

Well construction completed on 7-27 1970

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield test: 4 Hrs. at 10 GPM

Depth from surface to normal water level 108 ft.

Depth to water level when pumping 120 ft.

Water sample sent to MADISON laboratory on: 7-27 1970

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: Richard W. Squire — Registered Well Driller
COMPLETE MAIL ADDRESS: R1 MASON, WISC.

Please do not write in space below

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

REV. 11-68

Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-79

(67)

OCT 13 1986

1. COUNTY: BAYFIELD
CHECK (✓) ONE: [X] Town [ ] Village [ ] City
Name: BARKSDALE

2. LOCATION
¼ Section or Gov't Lot: ~~SE-SW~~ NE-SW | Section: 34 | Township Range: 48N 5W
OR – Grid or Street No. | Street or Road Name
AND – If available subdivision name, lot & block No.

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
REGAN TRINKO
ADDRESS: R3
POST OFFICE: ASHLAND, WIS. ZIP CODE: 54806

4. Distance in feet from well to nearest: (Record answer in appropriate block)
Building: 6
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 (San., Storm) | Other Sewers (C.I., Other) | Foundation Drain Connected to (Sewer, Clearwater Dr., Sewage Sump, Clearwater Sump) | Sewage Sump (C.I., Other) | Clearwater Sump | Septic Tank: 40 | Holding Tank | Sewage Absorption Unit (Seepage Pit, Seepage Bed, Seepage Trench: 60) | Manure Hopper or Retention or Pneumatic Tank
Privy | Pet Waste Pit | Pit: Nonconforming Existing (Well, Pump, Tank) | Subsurface Pumproom 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 | 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:
SAUSAGE COMPANY

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	130			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½" O.D.	T.&C. ASTM A-589	Surface	
4" I.D.	11# 0.237 WALL		
SAWHILL	BLK. ST. PIPE		126
3" #10	SLOT JOHNSON ST. STEEL	126	
SCR.	W/4X3 K PACKER		130

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

9. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	18
SILTY SAND	18	24
SOFT CLAY	24	105
HARD PAN	105	120
FINE SAND	120	124
COARSE WATER SAND	124	130

10. TYPE OF DRILLING MACHINE USED
[X] 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 SEPT. 15 1986

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 2 Hrs. at 15 GPM
Depth from surface to normal water level 19 Ft.
Depth of water level when pumping 26 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on SEPT 15 1986

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: Richard W. Squires — Registered Well Driller

Business Name and Complete Mailing Address:
DICK SQUIRES WELLDRILLING
R1 BOX 77 MASON, WIS. 54856

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL CONSTRUCTION DIVISION

(68)

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 David Bergdahl — Driller T.A. Melin

Street or RFD Route 3 — Post Office Ashland Wis

Post Office Ashland Wis — Date May 10 – 41 — Permit No. 27

LOCATION OF PREMISES

Bayfield (County) — Barksdale (Town)

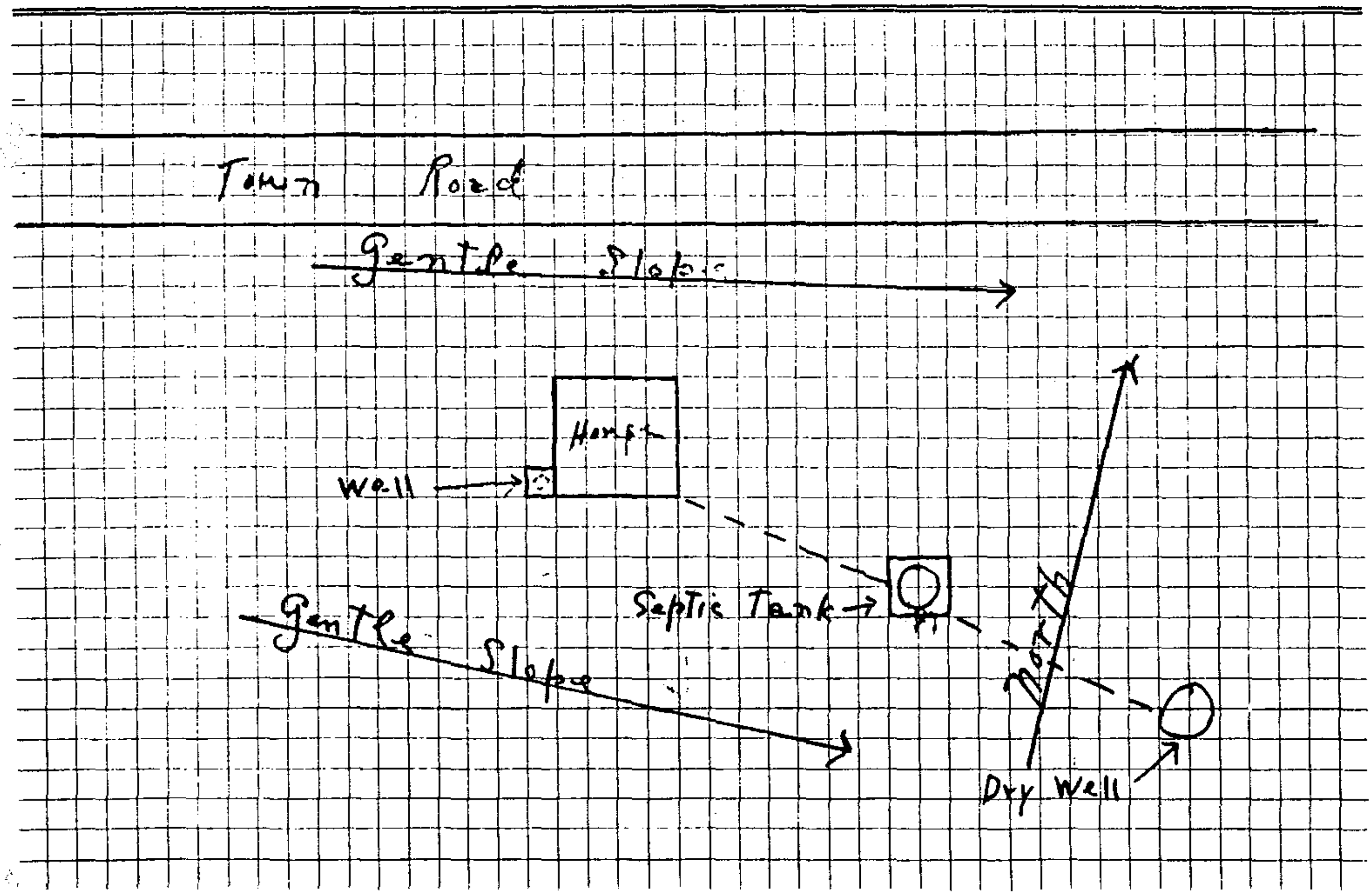
U.S. 2 and S.H. 13, nearest principal highways
Describe further by subdivision, plat, district, lake, lot, block, nearest principal highway, etc., whichever apply.

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

Sec. No. 34
Twp. No. 48
Range 5 E / W

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.



Additional copies of this form may be obtained in lots of 12 for 25¢. Send remittance with order to State Board of Health, Well Drilling Division, Madison, Wis.

WELL LOG *and* REPORT

For method of making report, refer to bulletin entitled "Well Construction Report," 7-5-1939.

In this column indicate the kind of casing, liner, shoe and other accessories used.

ST. wt. wroT steel pipe Drillers Special"

Steel drive Shoe

2" well point 60 gauge 74" Long

Key:

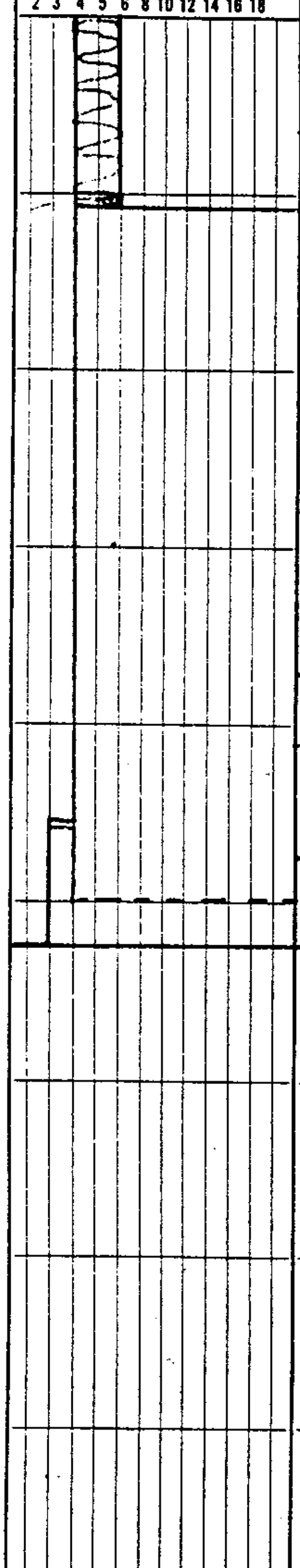
| = Casing pipe

F = Well point

≷ = Mud grout

WELL DIAGRAM Use a red line to show casing or liner pipe. Use black for drill or borehole.

Inches Diameter 2 3 4 5 6 8 10 12 14 16 18



Draw the diagram to show the right half only

In this column state the kind of formations penetrated, their thickness in feet and if water bearing.

Depth		
8	Top soil & clay	8'
15	Quick sand	7'
22	Hard Pan	7'
25		
27		
50		
75		
93	Dry sand	71'
100		
102	Hard Pan	9'
141	Quick Sand	39'
150		
153	Water Bearing sand	12'
200		
400		
800		
1200		

Record of FINAL Pumping test

Duration of test
Hours Flowing well

Pumping rate
G.P.M. 4 gal.

Depth of pump in well. Ft. no pump

Standing water-level (from surface)
Ft. 2 ft. over ground level

Water-level when pumping Ft. ——

Water. End of test.
Clear ✓
Cloudy
Turbid

Was the well sterilized?
Yes ______ No ✓

To which laboratory was sample sent?
Superior Wis
Date April 10-41

Was the well sealed on completion?
Yes ✓ No ______

How high did you leave the casing-pipe above grade?
6"

Well was completed
Date April 12-41

Well Driller
Theodore Melin
Signature

Wel 6

69

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County BAYFIELD — Town ☒ Village ☐ City ☐ BARKSDALE (Check one and give name)

2. Location NW-SE Sec 34 T-48N R 5-W (Name of street and number of premise or Section, Town and Range numbers)

3. Owner ☒ or Agent ☐ Victor TRINKO (Name of individual, partnership or firm)

4. Mail Address ASHLAND, Wisc R-3 (Complete address required)

RECEIVED MAR 7 1961 SANITARY ENGINEERING

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

6. Well is intended to supply water for: RURAL RESIDENCE

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	20			
4	20	124			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	St. Blk Pipe	0	121
	Well point - #172-60		

9. GROUT:

Kind	From (ft.)	To (ft.)
Mud	0	20

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	26
Soft Clay Some Sand Streaks	26	105
Fine Sand	105	118
Coarse Sand	118	124

Construction of the well was completed on: Feb 27 1961

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

Was the well disinfected upon completion? Yes X No

Was the well sealed watertight upon completion? Yes X No

11. MISCELLANEOUS DATA:

Yield test: 2 Hrs. at 15 GPM.

Depth from surface to water-level: 11 ft.

Water-level when pumping: 16 ft.

Water sample was sent to the state laboratory at: MADISON (City) on FEB 28 1961

Signature Richard W. Squires (Registered Well Driller) Mason, Wisc (Complete Mail Address)

Please do not write in space below

Rec'd MAR - 1 1961 No. 6131

Ans'd

Interpretation SAFE—BACTERIOLOGICALLY

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli	0				

Examiner Ls

INSTRUCTIONS

ALL INFORMATION INDICATED ON THE FACE OF THIS FORM MUST BE GIVEN

PLEASE BE GUIDED BY THE FOLLOWING:

Numbers below correspond to numbers of items of the form on the opposite side.

1. Name of the County and the name of the Town, Village or City. Indicate which is given.
2. If Rural: Number and the ¼ of the Section, the number of the Town North, and the number of the Range East or West.
   If Urban: Name of the Street and the number of the Premise.
3. Name of the Owner. If the name of the owner cannot be given, give instead the name of the Agent. Indicate which is given.
4. Name of the Street and the number of the Premise or the number of the Mail Route, the name of the Post Office and the name of the State.
5. Distance, in feet, from the well to the nearest building and to each source of pollution shown.
6. Indicate: Home, farm, school, tavern, creamery, community, industry, etc.
7. Show the diameter and depth of the initial drillhole or excavation and each reduction in size to bottom. If well was reconstructed, show diameter and depth of original well on first line.
8. Show diameter and kind of casing pipe, liner pipe or curbing and actual position in the well, measured from the surface.
9. Show kind of material (mud or cement) used in sealing the annular space, from and to what depths from the surface. If neither was used indicate "none".
10. Show thickness of each formation and the total depth at the base thereof.
11. Provide the data indicated.

Note: The Well Construction Report (Well Log) may be forwarded with the water sample from a newly constructed or reconstructed well, instead of the report requested by the State Laboratory of Hygiene, on the form which accompanies the sample bottle.

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., may be given here:

Well completed with a #172-60 Well Point

DO NOT FILM

If more space is needed another sheet may be attached.

Rec'd 7/21/67 (70)

WELL CONSTRUCTOR'S REPORT — WISCONSIN STATE BOARD OF HEALTH — Wel 6

1. COUNTY: BAYFIELD — CHECK ONE: [X] Town [ ] Village [ ] City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SW-NW SEC. 34 T 48N R 5W

3. OWNER AT TIME OF DRILLING: GEORGE VERNON

4. OWNER'S COMPLETE MAIL ADDRESS: R3 ASHLAND, WISC.

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
15	30							

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		60			125				

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

6. Well is intended to supply water for: RURAL RESIDENCE

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	73			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4" I.D.	NEW - 4½" O.D. BLACK-SEAMLESS STEEL 11# PER FOOT	Surface	70
4"	TELESCOPE-SIZE JOHNSON		
	S. STEEL WELLSCREEN - #		
-	12 SLOT	70	73

PIPE IS NEW-STEEL THREADED & COUPLED

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

10. FORMATIONS

Kind	From (ft.)	To (ft.)
RED CLAY	Surface	38
FINE WATER SAND	38	66
COARSE WATER SAND	66	73

Well construction completed on MAY 1 1967

11. MISCELLANEOUS DATA
Yield test: 10 Hrs. at 15 GPM

Well is terminated 12 inches [X] above [ ] below final grade

Depth from surface to normal water level 36 ft.

Well disinfected upon completion [X] Yes [ ] No

Depth to water level when pumping 40 ft.

Well sealed watertight upon completion [X] Yes [ ] No

Water sample sent to MADISON laboratory on: MAY 1 1967

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: Richard W. Squires Registered Well Driller — COMPLETE MAIL ADDRESS: Mason, Wisc.

Please do not write in space below

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

Wel. 6-30M (6-50)

(71)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County Bayfield — Town ☑ Village ☐ City ☐ Barksdale (Check one and give name)

2. Location 1/4 S.E. - N.W. Sec 34 Twn 48 - R. 5 (Name of street and number of premise or Section, Town and Range numbers)

RECEIVED

DEC 13 1957

ENVIRONMENTAL SANITATION

3. Owner ☑ or Agent ☐ Rachel - Bob Frinko (Name of individual, partnership or firm)

4. Mail Address R3 - Ashland Wisc (Complete address required)

5. From well to nearest: Building 4 ft; sewer ____ ft; drain ____ ft; septic tank 100 ft; dry well or filter bed ____ 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	179			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Std. Steel pipe	0	179

9. GROUT:

Kind	From (ft.)	To (ft.)

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	3
Sand	3	35
Hard pan	35	76
Muddy Sand	76	86
Sand with Some gravel	86	88
Clay - Hardpan	88	95
Sand - Clay Streaks	95	175
Sand -	175	179

Construction of the well was completed on: Aug 15 1957

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 ____

11. MISCELLANEOUS DATA:

Yield test: 20 Hrs. at 7 GPM.

Depth from surface to water-level: 28 ft.

Water-level when pumping: 38 ft.

Water sample was sent to the state laboratory at: Madison (City) on Oct 29 1957

Signature W. A. Gustafson (Registered Well Driller) — Washburn, Wis (Complete Mail Address)

Please do not write in space below

Rec'd ________ No. ________

Ans'd ________

Interpretation ________

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

Examiner ________

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

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

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 2-79
NOV 21 1983

72

1. COUNTY: BAYFIELD — CHECK (✓) ONE: [X] Town [ ] Village [ ] City — Name: BARKSDALE

2. LOCATION — ¼ Section or Gov't. Lot: NE-NW — Section: 34 — Township: 48N — Range: 5W
OR – Grid or Street No. / Street or Road Name:
AND – If available subdivision name, lot & block No.:

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
JAMES LUMBERG
ADDRESS: R3
POST OFFICE: ASHLAND, WIS. — ZIP CODE: 54806

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

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

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Sewage Sump	Clearwater Dr.	Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit / Seepage Bed / Seepage Trench	Manure Hopper or Retention or Pnuematic Tank

Privy	Pet Waste Pit	Pit: Nonconforming Existing — Well / Pump / Tank	Subsurface Pumproom 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	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: FUTURE HOME SITE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	65			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4½"	O.D.-T.&C. ASTM Union	Surface	
A-120	11# 0.237 WALL		
4" I.D.	BLK. STEEL PIPE		61
2"	STAINLESS ST. #10 SLOT	61	
H. SMITH	W/4X2 K PACKER		65

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
PUDDLED CLAY	Surface	20

9. FORMATIONS

Kind	From (ft.)	To (ft.)
DRY SAND	Surface	34
SOFT CLAY	34	58
CLEAN COARSE WATER SAND	58	65

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool
[ ] Rotary-air w/drilling mud
[ ] Rotary-w/drilling mud
[ ] Rotary-hammer w/drilling mud & air
[ ] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with [ ] Air [ ] Water

Well construction completed on OCT. 4 1983

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA
Yield Test: 2 Hrs. at 10 GPM
Depth from surface to normal water level 37 Ft.
Depth of water level when pumping 42 Ft. Stabilized [X] Yes [ ] No

Water sample sent to MADISON laboratory on OCT. 4 1983

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: Richard W. Squires — Registered Well Driller

Business Name and Complete Mailing Address:
DICK SQUIRES WELLDRILLING CO
R1 BOX 77 MASON, WIS. 54856

Wel 6

73

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County BAYFIELD — Town ☒ Village ☐ City ☐ BARKSDALE (Check one and give name)
2. Location NE NW Sec 34 - Twn 45N - R5W (Name of street and number of premise or Section, Town and Range numbers)
3. Owner ☒ or Agent ☐ Robert W Trinks (Name of individual, partnership or firm)
4. Mail Address R3 ASHLAND (Complete address required)

RECEIVED
FEB 28 1961
SANITARY ENGINEERING

5. From well to nearest: Building 4 ft; sewer — ft; drain — ft; septic tank 50 ft; dry well or filter bed 80 ft; abandoned well ___ ft.
6. Well is intended to supply water for: Trailer Court

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
9	0	20			
3½"	20	123			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Standard Blk Pipe	0	119
	Screen - Johnson,	4' - 4"	telescope
	std fitted, everdur metal		#10 slot

9. GROUT:

Kind	From (ft.)	To (ft.)
Mud	0	20

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	24
Dirty Sand	24	47
Soft Clay	47	112
Dirty Sand	112	118
Clean Coarse Sand	118	123

11. MISCELLANEOUS DATA:

Yield test: 2 Hrs. at 18 GPM.

Depth from surface to water-level: 14 ft.

Water-level when pumping: 30 ft.

Water sample was sent to the state laboratory at: Madison (City) on Feb 15 1961

Construction of the well was completed on: Feb 15 1961

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

Was the well disinfected upon completion? Yes X No ___

Was the well sealed watertight upon completion? Yes X No ___

Signature Richard W. Squires (Registered Well Driller) — Mason, Wis. (Complete Mail Address)

Please do not write in space below

Rec'd FEB 16 1961 No. 4953

Ans'd ___

Interpretation SAFE—BACTERIOLOGICALLY

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli	0				

Examiner ___

INSTRUCTIONS

ALL INFORMATION INDICATED ON THE FACE OF THIS FORM MUST BE GIVEN

PLEASE BE GUIDED BY THE FOLLOWING:

Numbers below correspond to numbers of items of the form on the opposite side.

1. Name of the County and the name of the Town, Village or City. Indicate which is given.
2. If Rural: Number and the ¼ of the Section, the number of the Town North, and the number of the Range East or West.
   If Urban: Name of the Street and the number of the Premise.
3. Name of the Owner. If the name of the owner cannot be given, give instead the name of the Agent. Indicate which is given.
4. Name of the Street and the number of the Premise or the number of the Mail Route, the name of the Post Office and the name of the State.
5. Distance, in feet, from the well to the nearest building and to each source of pollution shown.
6. Indicate: Home, farm, school, tavern, creamery, community, industry, etc.
7. Show the diameter and depth of the initial drillhole or excavation and each reduction in size to bottom. If well was reconstructed, show diameter and depth of original well on first line.
8. Show diameter and kind of casing pipe, liner pipe or curbing and actual position in the well, measured from the surface.
9. Show kind of material (mud or cement) used in sealing the annular space, from and to what depths from the surface. If neither was used indicate "none".
10. Show thickness of each formation and the total depth at the base thereof.
11. Provide the data indicated.

Note: The Well Construction Report (Well Log) may be forwarded with the water sample from a newly constructed or reconstructed well, instead of the report requested by the State Laboratory of Hygiene, on the form which accompanies the sample bottle.

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., may be given here:

Well Completed with a 4' - 4" Telescope
Size Johnson Standard Tilled Well Screen
Everdur Metal - #10 Slot

If more space is needed another sheet may be attached.

BA-161-4

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

RECEIVED

See Instructions on Reverse Side

(74)

1. County BAYFIELD — Town ☒ Village ☐ City ☐ BARKSDALE (Check one and give name)

2. Location SE-SE SEC 35 T 48 N R 5 W (Name of street and number of premise or Section, Town and Range numbers)

SEC. ... ENGINEERING

3. Owner ☒ or Agent ☐ JOE BERWEGER (Name of individual, partnership or firm)

4. Mail Address R1 MASON, WISC. (Complete address required)

5. From well to nearest: Building NONE 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: FUTURE DEVELOPMENT

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	45			
4	45	398			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	STD. BLK. PIPE	0	392
	Screen-Johnson, #12 slot,		
	6' long, everdur metal, jetting bottom		

fitting, 10' 2" pipe extension on top

9. GROUT:

Kind	From (ft.)	To (ft.)
MUD	0	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
FILL, SAND	0	6
SOFT SILTY CLAY	6	40
SOLID RED CLAY	40	352
SILT	352	388
COARSE WATER SAND	388	398

Construction of the well was completed on: Dec 9 1964

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

Was the well disinfected upon completion? Yes X No

Was the well sealed watertight upon completion? Yes X No

11. MISCELLANEOUS DATA:

Yield test: CONTINUOUS Hrs. at 45 GPM.

Depth from surface to water-level: 30' ABOVE GRADE ft.

Water-level when pumping: 2 FT ABOVE ft.

Water sample was sent to the state laboratory at: MADISON (City) on DEC. 9 1964

Signature Richard W. Squires (Registered Well Driller) Mason, Wisc. (Complete Mail Address)

Please do not write in space below

Rec'd DEC 10 1964 No. 57163

Ans'd DEC 14 1964

Interpretation SAFE BACTERIOLOGICALLY

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli	0	0	0	0	0

Examiner

INSTRUCTIONS

ALL INFORMATION INDICATED ON THE FACE OF THIS FORM MUST BE GIVEN

PLEASE BE GUIDED BY THE FOLLOWING:

Numbers below correspond to numbers of items of the form on the opposite side.

1. Name of the County and the name of the Town, Village or City. Indicate which is given.
2. If Rural: Number and the 1/4 of the Section, the number of the Town North, and the number of the Range East or West.
   If Urban: Name of the Street and the number of the Premise.
3. Name of the Owner. If the name of the owner cannot be given, give instead the name of the Agent. Indicate which is given.
4. Name of the Street and the number of the Premise or the number of the Mail Route, the name of the Post Office and the name of the State.
5. Distance, in feet, from the well to the nearest building and to each source of pollution shown.
6. Indicate: Home, farm, school, tavern, creamery, community, industry, etc.
7. Show the diameter and depth of the initial drillhole or excavation and each reduction in size to bottom. If well was reconstructed, show diameter and depth of original well on first line.
8. Show diameter and kind of casing pipe, liner pipe or curbing and actual position in the well, measured from the surface.
9. Show kind of material (mud or cement) used in sealing the annular space, from and to what depths from the surface. If neither was used indicate "none".
10. Show thickness of each formation and the total depth at the base thereof.
11. Provide the data indicated.

Note: The Well Construction Report (Well Log) may be forwarded with the water sample from a newly constructed or reconstructed well, instead of the report requested by the State Laboratory of Hygiene, on the form which accompanies the sample bottle.

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., may be given here:

WELL IS COMPLETED WITH A JOHNSON WELL SCREEN - 6 FT LONG EVERDUR METAL #12 SLOT - JETTING BOTTOM FITTING 10 FOOT 2" PIPE EXTENSION ON TOP.

DO NOT FILM

If more space is needed another sheet may be attached.

75

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

1. County Bayfield — Town ☑ Village ☐ City ☐ Barksdale
Check one and give name

2. Location NW ¼ of SE ¼ - Section 35 - T ~~47~~N - R ~~7~~W (T48N R5W)
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☑ or Agent ☐ ~~[illegible]~~ Rolland De Mint
Name of individual, partnership or firm

4. Mail Address Route 3 - Ashland Wis
Complete address required

5. From well to nearest: Building 125 ft; sewer 52 ft; drain 52 ft; septic tank 115 ft;
dry well or filter bed none ft; abandoned well 225 ft.

6. Well is intended to supply water for: Tavern + Restaurant and Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	22			
4	22	272			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4"	Standard well		
	pipe	0	272

9. GROUT:

Kind	From (ft.)	To (ft.)
Clay Slurry	0	22

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Top soil + Sandy clay	0	16
Red Clay	16	55
Clay mixed with gravel	55	58
Red clay - soft	58	218
Hard Pan	218	252
Muddy sand	252	261
Sand + Gravel - water	261	269
Course sand + gravel	269	272

Construction of the well was completed on:
Sept. 26 - 5 1959

The well is terminated 36 inches
☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion?
Yes ✓ No

Was the well sealed watertight upon completion?
Yes ✓ No

11. MISCELLANEOUS DATA:

Yield test: Flows Hrs. at 52 GPM.

Depth from surface to water-level: Flowing ft.

Water-level when pumping: No Pump ft.

Water sample was sent to the state laboratory at:
~~[illegible]~~ Madison Wis (City) on Oct 1 1959

Signature Theodore Melin — 1104 - Front St. W. Ashland Wis
Registered Well Driller — Complete Mail Address

Please do not write in space below

Rec'd OCT - 2 1959 No. 34903

Ans'd

Interpretation SAFE

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

Examiner

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL CONSTRUCTION DIVISION

DEC 2 1941

76

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 Joe Scholl | Driller T.A. Melin
Street or RFD | Post Office Ashland Wis.
Post Office Washburn Wis. | Date Nov 27-41 Permit No. 27

LOCATION OF PREMISES

Bayfield County | Bayview Town

NE-SE - S35-T48-R5W

Describe further by subdivision, plat, district, lake, lot, block, nearest principal highway, etc., whichever apply.

County Trunk - C - nearest principal highway

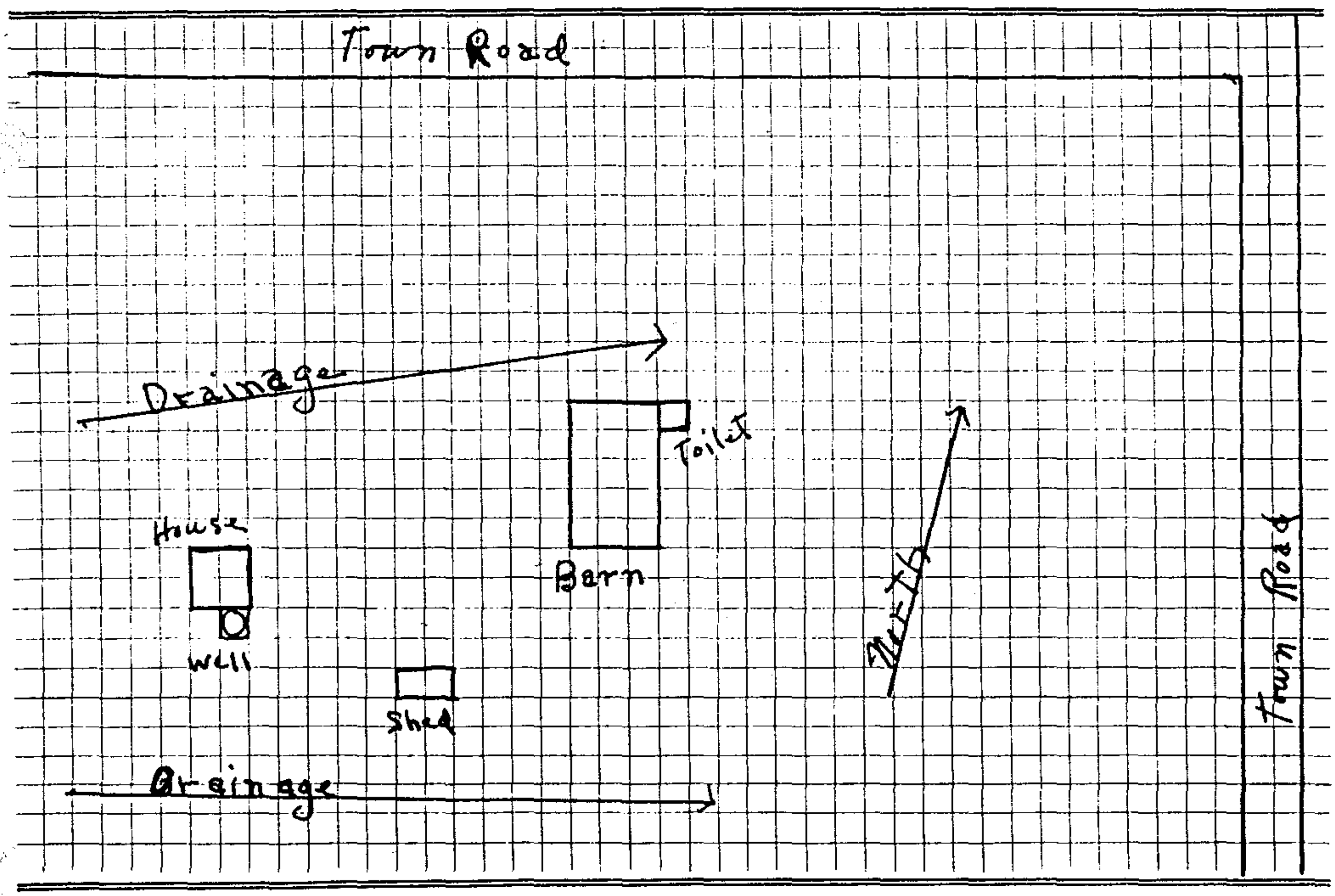
The square below represents a section of land divided into 40 acre tracts. Mark the position of the premises in the section.

Sec. No. 35
Twp. No. 48
Range 5 { E W

wrong loc?

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.



Additional copies of this form may be obtained in lots of 12 for 25¢. Send remittance with order to State Board of Health, Well Drilling Division, Madison, Wis.

WELL LOG *and* REPORT

For method of making report, refer to bulletin entitled "Well Construction Report," 7-5-1939.

In this column indicate the kind of casing, liner, shoe and other accessories used.

STd. WT. WroT steel pipe

Drillers Special"

Forged steel drive shoe

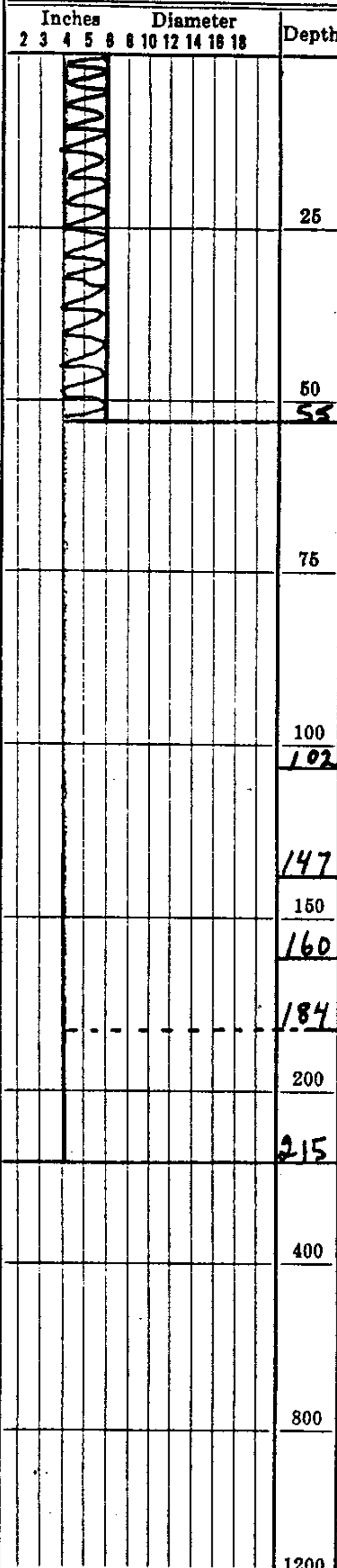
Key:

| = Casing pipe

| = Drill hole

§ = Mud Grout

WELL DIAGRAM
Use a red line to show casing or liner pipe. Use black for drill or borehole.



Draw the diagram to show the right half only

In this column state the kind of formations penetrated, their thickness in feet and if water bearing.

Red Clay	102'
Dry sand	45'
Hard Pan	13'
Sand stone	55'

Record of FINAL Pumping test

Duration of test
Hours 24

Pumping rate
G.P.M. 6

Depth of pump in well. Ft. 180

Standing water-level (from surface)
Ft. 150

Water-level when pumping Ft. 160

Water. End of test.
Clear ✓
Cloudy
Turbid

Was the well sterilized?
Yes ✓ No

To which laboratory was sample sent?
Superior Wis
Date Nov 26 - 41

Was the well sealed on completion?
Yes ✓ No

How high did you leave the casing-pipe above grade?
12"

Well was completed
Date Oct 28 - 41

Well Driller
Theodore Melin
Signature

WELL CONSTRUCTOR'S REPORT — WISCONSIN STATE BOARD OF HEALTH — Wel 6

RECEIVED DEC 31 1965 SANITARY ENGINEERING (77)

1. COUNTY: BAYFIELD — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: BARKSDALE

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.) NW-NW SEC. 35 T 48N R 5W

OWNER AT TIME OF DRILLING: TOWN OF BARKSDALE

4. OWNER'S COMPLETE MAIL ADDRESS: R3 ASHLAND - GEO. SAMPSON, CHAIRMAN

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

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
30								

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		30			75				

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

6. Well is intended to supply water for: TOWN HALL & GARAGE

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	20			
5	20	95			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
5"	STD. BLK. PIPE	Surface	92
5"	STD. FITTED TELE-		
	SCOPE SIZE JOHN		
	SON WELL SCREEN		
	S. STEEL #20 SLOT	92	95

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
MUD	Surface	20

10. FORMATIONS

Kind	From (ft.)	To (ft.)
SOFT CLAY	Surface	86
DIRTY WATER SAND	86	90
CLEAN COARSE WATER SAND	90	95

Well construction completed on NOV. 15 1965

Well is terminated inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA

Yield test: 10 Hrs. at 15 GPM

Depth from surface to normal water level 20 ft.

Depth to water level when pumping 24 ft.

Water sample sent to MADISON - STATE laboratory on: NOV. 15 1965

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: Richard W. Squires — Registered Well Driller

COMPLETE MAIL ADDRESS: Mason, Wis.

Please do not write in space below

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

WELL CONSTRUCTION REPORT
WISCONSIN STATE BOARD OF HEALTH
WELL CONSTRUCTION DIVISION

MAR 27 1945 ✓ (78)

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 S. W. Martin

Driller W. A. Gustafson

Street or RFD 1

Post Office Washburn, Wis.

Post Office Ashland, Wisc.

Date JAN. 15 - 1945 Permit No. 124

LOCATION OF PREMISES

Bayfield (County) Barksdale (Town)

Parcel of Land lying in N. E. Corner
Describe further by subdivision, plat, district, lake, lot.

of S. W. one quarter of N. E. 1/4
block, nearest principal highway, etc., whichever apply.

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

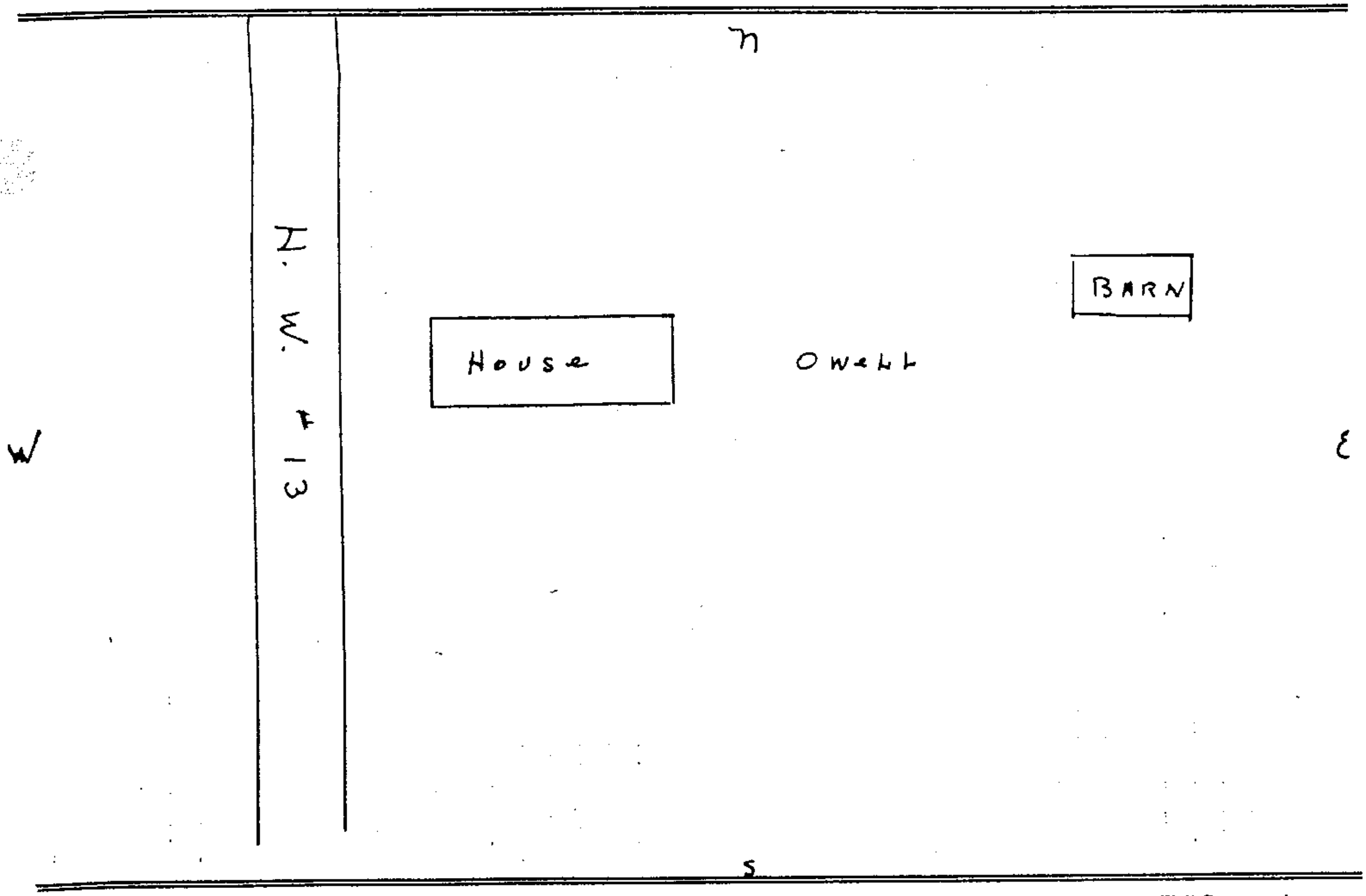
Sec. No. 35

Twp. No. 48

Range 5 ~~E~~ W

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.



Additional copies of this form may be obtained in lots of 12 for 25c. Send remittance with order to State Board of Health, Well Construction Division, Madison, Wis.

WELL LOG *and* REPORT

For method of making report, refer to bulletin entitled "Well Construction Report," 7-5-39.

In this column indicate the kind of casing, liner, shoe and other accessories used.	WELL DIAGRAM Use a red line to show casing or liner pipe. Use black for drill or borehole. Inches Diameter 2 3 4 5 6 8 10 12 14 16 18	Depth	In this column state the kind of formations penetrated, their thickness in feet and if water bearing.	Record of FINAL Pumping test
4" Std. BLK. pipe. Steel Drive Shoe				Duration of test Hours 8
		25		Pumping rate G.P.M.
				Depth of pump in well. Ft.
		50		Standing water-level (from surface) Ft. Flowing
		75		Water-level when pumping Ft.
		97' 100		Water. End of test. Clear ✓ Cloudy Turbid
		104		
		150		Was the well sterilized? Yes ✓ No
		200		To which laboratory was sample sent? Madison Date Nov. 27-1944
		400		Was the well sealed on completion? Yes ✓ No
		800		How high did you leave the casing-pipe above grade? 2 ft.
		1200		Well was completed Date Nov. 27-1944
	Draw the diagram to show the right half only			Well Constructor W.A. Gustafson Signature

Appendix C

ESTIMATED HYDRAULIC CONDUCTIVITIES FOR WELLS IN THE VICINITY

ESTIMATED HYDRAULIC CONDUCTIVITIES FOR WELLS IN THE VICINITY

Well Constructor's Reports to the Wisconsin State Board of Health, provided by the Wisconsin Geological and Natural History Survey (WGNHS) indicate that there were 74 wells recorded in areas surrounding the former Barksdale Works. Appendix D of the main report includes the quarter sections for which well construction reports were available. Using the yield test data from these reports (excluding the flowing wells and other questionable data), specific yields were calculated. From the specific yield calculations, transmissivity values were estimated using the following empirical equation for a confined aquifer (Driscoll 1986):

$$Q / s = T / 2000$$

where

Q = yield of the well in gallons/minute
s = drawdown in the well in feet
T = transmissivity of a well in gpd / ft

Then, using the thickness of the Chequamegon sandstone that is penetrated by screen or open hole, hydraulic conductivities were estimated. Using this method, maximum calculated hydraulic conductivities result since there is actually upward flow into the well from below. This additional volume is not accounted for in this estimate. The hydraulic conductivity values were then averaged. This data is presented in Table C-1.

References

Driscoll, F.G. 1986. *Groundwater and Wells.* 2nd Edition. Johnson Division, Minnesota. 1089 p.

Table C-1
Estimated Hydraulic Conductivity for Wells in the Area of the Former Barksdale Works
Barksdale, Wisconsin
Site Conditions Report

Well Record Number (1)	Well Names/Owner	Static Water Level	Test (Hrs.)	Pump Rate (GPM)	Drawdown (ft)	Penetrated Thickness (ft)	Specific Capacity (gpm/ft)	Transmissivity(2) (gpd/ft)	Estimated Hydraulic Conductivity(3) (gpd/ft^2)	Estimated Hydraulic Conductivity(3) (ft/day)
4	IW884	26	10	5	5	36	1.0	2000.0	55.6	7.4
5	IW902	25	10	5	6	42	0.8	1666.7	39.7	5.3
6	Well #3	25	10	5	6	43	0.8	1666.7	38.8	5.2
7	Well #4	27	10	5	4	50	1.3	2500.0	50.0	6.7
8	Well #5	27	10	5	4	54	1.3	2500.0	46.3	6.2
9	Well #6	27	10	5	4	55	1.3	2500.0	45.5	6.1
10	Well #7	28	10	5	3	59	1.7	3333.3	56.5	7.6
11	Well #8	29	10	5	2	65	2.5	5000.0	76.9	10.3
12	IW710	36	10	7	3	63	2.3	4666.7	74.1	9.9
14	CX533	42	24	12	11	61	1.1	2181.8	35.8	4.8
18	Ondassagon School	30	20	50	10	18	5.0	10000.0	555.6	74.4
20	Lot #8 Mission Springs	16	10	15	2	3	7.5	15000.0	5000.0	670.0
21	Ron Glass	85	10	5	5	4	1.0	2000.0	500.0	67.0
22	Enoch Ekholm	70	2	10	20	30	0.5	1000.0	33.3	4.5
23	Leander Johnson	60	4	6	5	36	1.2	2400.0	66.7	8.9
25	Tetzner	151	12	10	19	17	0.5	1052.6	61.9	8.3
27	Joe Groshek	142	10	10	13	70	0.8	1538.5	22.0	2.9
28	Don Snippen	151	24	8	9	100	0.9	1777.8	17.8	2.4
29	Helen Tetzner	59	10	10	6	35	1.7	3333.3	95.2	12.8
30	Garit Tenpas	146	10	15	9	96	1.7	3333.3	34.7	4.7
32	Ingeman Rowe	93	8	6	4	11	1.5	3000.0	272.7	36.5
34	Clarence Ness	20	3	6	5	24	1.2	2400.0	100.0	13.4
35	Clyde Hanson	71	2	10	14	66	0.7	1428.6	21.6	2.9
36	Mike Bark	48	12	12	32	65	0.4	750.0	11.5	1.5
37	Fritz Iceburg	34	24	12	20	39	0.6	1200.0	30.8	4.1
38	Gary Sharp	26	24	8	4	35	2.0	4000.0	114.3	15.3
39	Phil Tosch	27	12	8	18	36	0.4	888.9	24.7	3.3
40	Anton Pade	40	5	5	5	11	1.0	2000.0	181.8	24.4
42	Paul Kacvinsky	30	5	5	40	4	0.1	250.0	62.5	8.4
43	Allen Huber	15	2	8	35	4	0.2	457.1	114.3	15.3
45	Walter Swanson	60	12	5	20	47	0.3	500.0	10.6	1.4
46	Dan Thoreson	98	2	4	21	3	0.2	381.0	127.0	17.0
47	Paul Becksma	89	10	10	5	4	2.0	4000.0	1000.0	134.0
48	Edward Peterson	85	20	3	25	65.5	0.1	240.0	3.7	0.5
49	Russ Dennis	140	3	12	5	10	2.4	4800.0	480.0	64.3
50	John Marincel	100	5	5	5	5	1.0	2000.0	400.0	53.6
51	Mary Ann Hirsch	100	4	10	10	4	1.0	2000.0	500.0	67.0
52	Dale Stuart	68	4	10	20	64	0.5	1000.0	15.6	2.1
53	Larry Ekholm	65	30	6	20	45	0.3	600.0	13.3	1.8
54	James Kluge	128	2	10	4	4	2.5	5000.0	1250.0	167.5
56	John Podlesky	34	8	6	6	92	1.0	2000.0	21.7	2.9
57	George Sampson	125	4	6	5	3	1.2	2400.0	800.0	107.2
58	Albert Brevak	80	12	5	5	60	1.0	2000.0	33.3	4.5
59	Ron Helgund	88	2	8	27	4	0.3	592.6	148.1	19.9
60	Don Pocernich	24	24	10	6	3	1.7	3333.3	1111.1	148.9
62	William Heglund	3	10	15	7	3	2.1	4285.7	1428.6	191.4
65	A. Buss	62	10	8	18	4	0.4	888.9	222.2	29.8
66	Mike Fredericks	108	4	10	12	3	0.8	1666.7	555.6	74.4
67	Regan Trinko	19	2	15	7	4	2.1	4285.7	1071.4	143.6
69	Victor Trinko	11	2	15	5	3	3.0	6000.0	2000.0	268.0
70	George Vernon	36	10	15	4	3	3.8	7500.0	2500.0	335.0
72	James Lumberg	37	2	10	6	4	1.7	3333.3	833.3	111.7
73	Robin Trinko	14	2	18	16	4	1.1	2250.0	562.5	75.4
76	Joe Scholl	150	24	6	10	36	0.6	1200.0	33.3	4.5
77	Town of Barksdale	20	10	15	4	3	3.8	7500.0	2500.0	335.0
							Log Average	2005.7	122.9	16.5

(1) Well Record Numbers are correlated with Appendix B
(2) Emperical equation for transmissivity for confined aquifer from Driscoll (1986) p. 1021 (Q/s=T/2000).
(3) calculated using actual penetrated thickness of Chequamegon Sandstone

Appendix D

WELL SEARCH RESULTS

WELL SEARCH RESULTS

A well search through the WGNHS indicated that there were 62 wells recorded in the area surrounding the former Barksdale Works. All wells are reported as being water production wells. Well constructor's reports show that there were 13 wells installed within the property boundaries of the former Barksdale Works. Well construction records maintained at the WGNHS and wells known to exist on the site are not consistent. Included in the discussion below is an attempt to resolve some of these discrepancies.

DuPont records indicate the existence of other wells, Well Nos. 3 and 5. Bretting Manufacturing recently installed one well, IW882, the Bretting maintenance shed well. Figure 4 of the main report shows the location of wells discussed below and presented on the cross sections (see Figures 5 through 9 of the main report). Well construction reports are included in Appendix B of the main report and are keyed to Figure D-1.

Available data for 17 on-site wells is provided below and is summarized in Table 1 of the main report. In general, well construction consists of a 4-inch steel casing extending a few feet below the contact between the Pleistocene sediments and the Precambrian sandstone. The remainder of the boring is open hole, approximately 6 inches in diameter.

Atlantic Manufacturing constructed production wells on the site. Their first two attempts at well construction, Well Nos. 1 and 2, were abandoned at 150 feet below ground surface (BGS) due to difficulties drilling thorough the glacial drift. Well No. 3 was successfully completed to a depth of 290 feet BGS. This well no longer exists at the site, and abandonment forms are unavailable.

Well No. 4 was also abandoned during drilling because the drill stem was stuck at approximately 131 feet BGS. Well No. 5 was successfully completed to a depth of 364 feet BGS. No information is available on how Wells Nos. 1, 2, and 4 were abandoned. Coordinates were given for the locations of Wells Nos. 3 and 5; therefore, approximate locations are known. The location of Well No. 5 coincides closely with the location of the powerhouse/cow shed well (IW883), a well renovated by Bretting manufacturing shortly after their purchase of the property, and may be the same well. During a site visit by DuPont, WDNR and Bretting Manufacturing representatives in October 1997, only one well was found at this location.

One of the well constructor's reports to the Wisconsin Board of Health provided by the Wisconsin Geological and Natural History Survey (WGNHS) is of a boring log generated in May 1906. No well construction data is included in the description. Thwaites (1912) refers to this boring and indicates that the descriptive log was from a well. No location information more specific than the section number (section 23, northwest section of the site) is given, and no information was found for this well in the DuPont historical files. The log is described to a depth of 375 feet BGS.

In January 1951, eight wells were drilled to provide domestic water for the homes in the Barksdale Village, located adjacent to the main gate of the site. These wells ranged in depth from 76 feet BGS for the northernmost well to 105 feet BGS for the southernmost well. These wells are referred to (from the north heading south) as Wells Nos. 1 through No. 6, IW902, and IW884.

A well (IW707) was drilled in January 1951 slightly south of Barksdale Village and north of the current Bretting residence. The well was completed at a depth of 95 feet BGS. During the October 1997 sampling event, a second well was noted in this vicinity. No records of well installation or construction have been obtained for this second well.

In July 1952, a well (IW710) was installed at the main gate to provide water to the guardhouse. This well is completed to a depth of 103 feet BGS, is located across Route 13 from the southernmost Barksdale Village residence, and has been temporarily abandoned.

After Bretting Manufacturing purchased the former Barksdale Works in 1986, they installed a new well (IW882) near the old machine shop. The log for this well is unavailable. In addition, Bretting Manufacturing reconditioned an older well with a bent casing (IW883), found near the powerhouse. It is likely that IW883 is actually well No. 5, installed by Atlantic Manufacturing in 1904. The Bretting Manufacturing Company also installed a well at the Bretting residence, CX533, located south of the Boy Scout camp, and completed to a depth of 103 feet BGS.

Located along the southern border of the former Barksdale Works are two residential wells, IW709 and IW711. Little information is available for either of these wells. Only one well construction record was located (IW709), and the data is incomplete. According to the owner, the well (IW709) is a flowing well.

Located approximately one mile southwest of the Bretting residence (side gradient of the former manufacturing area) is Ondassagon School, which has one well providing water to the facility.

References

Thwaites, F.T. 1912. *Sandstones of the Wisconsin Coast of Lake Superior*. Wisconsin Geological and Natural History Survey. Bulletin 25.

SCALE: 1"= 2400'

LEGEND

16 WELL LOCATION (KNOWN POSITION)

78 WELL LOCATION (APPROXIMATE POSITION)

NOTE:
NUMBERS REFER TO WELL CONSTRUCTION REPORTS IN APPENDIX B

FIGURE D-1	QUARTER SECTION WELL LOCATION MAP		
SCALE 1"= 2400'	DESIGNED BY K.L. DAVIS	DRAWN BY DEL	CAD DRAWING NO FIG_K10.DWG
DATE 11/18/97	CHECKED	APPROVED	PROJECT NO 7191

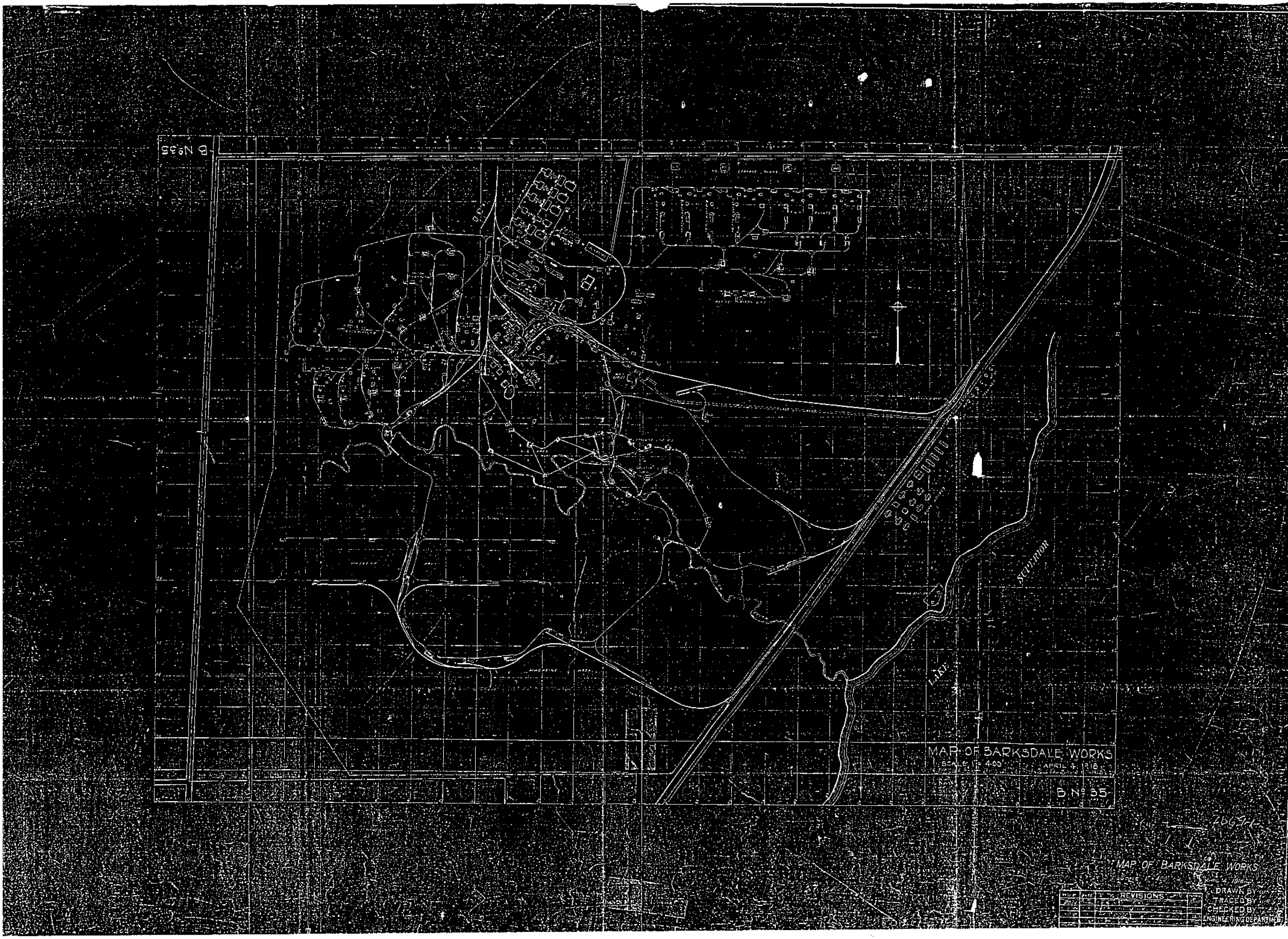
DUPONT

FORMER E.I. DuPont BARKSDALE WORKS
BARKSDALE, WISCONSIN
SITE CONDITIONS REPORT

DuPont Environmental Remediation Services

Appendix E

SITE PLAN MAP, 1918


B No 35
LAKE
SUPERIOR
MAP OF BARKSDALE WORKS
SCALE 1" = 400'
APRIL 4, 1918
B No 35
MAP OF BARKSDALE WORKS
REVISIONS
DRAWN BY
TRACED BY
CHECKED BY
ENGINEERING DEPARTMENT

Appendix F

PRODUCTION HISTORY AT THE FORMER BARKSDALE WORKS

PROCESSES AND PRODUCTION HISTORY AT THE FORMER BARKSDALE WORKS

The manufacturing activities described in this section are based on a site reconnaissance conducted October 30, 1997, descriptions provided by former DuPont employees: Mr. Glen "Bud" Holman, Mr. Robert Mace, Mr. Robert Lindsey, Mr. James Hill, and on July 1940 notes from Mr. Philip J. Kimball. General information on manufacturing processes were also obtained from *The First 50 Years of Barksdale Works, 1904-1954* (Klassen 1954; see Appendix H of the main report) and *Manufacture of Nitroglycerin (NG) by the Biazzi Continuous Process* (Humphrys 1953). Aerial photos from 1938, 1953, 1963, 1966, 1975, 1978, and 1990 were also reviewed as well as copies of historic site plans from DuPont archives. Notes on the interviews with Mr. Holman, Mr. Mace, Mr. Lindsey, and Mr. Hill are provided in Appendix G of the main report. Below are details of the production for the different products and raw materials manufactured at the former Barksdale Works.

Acid Production Areas

Sulfuric Acid

The first sulfuric acid (H_2SO_4) produced at the Barksdale Works used iron pyrite as the sulfur source. The iron pyrite was roasted in the acid area, and sulfur gas was driven off of the ore. The sulfur gas was then converted into H_2SO_4. The iron residue was used as fill on-site along the narrow gauge track beds and in the roads. The sulfur source was later replaced with elemental sulfur (99.7 percent pure sulfur).

Concentrated (fuming) H_2SO_4, also known as oil of vitriol (OV), was produced at the Barksdale Works. (The acid production area is shown on Figure 10 of the main report. A flow diagram of the manufacturing process is provided in Figure F-1) To produce weak H_2SO_4, the first stage in the production of concentrated H_2SO_4, elemental sulfur was purchased and burned in the burning house in the acid area. The resultant combustion gases contained sulfur dioxide (SO_2). After the combustion gases passed through the combustion chamber (a secondary combustion unit) they were passed to the purification house. Additional purification of the SO_2 occurred in the purification house via the addition of concentrated H_2SO_4. The H_2SO_4 acted as a desiccant to the combustion gases. Additional desiccation of the gases was achieved in the spray catcher and the coke filter. Excess water was drawn from each of these units. The SO_2 gas was further cleansed of particulate matter by passing it through a sand filter.

The blow house followed the sand filter. The blow house contained the fans that established the draft throughout the combustion and purification processes. Immediately following the blow house was the converter house, where the SO_2 gas was converted to sulfur trioxide (SO_3) gas. The SO_3 gas was then converted to H_2SO_4 in the absorber via the addition of water and H_2SO_4. The weak H_2SO_4 was stored on-site.

Concentrated H_2SO_4 was produced from the above H_2SO_4. This acid was preheated and then introduced into a vacuum chamber where water and some acid gases were drawn off. The acid was then passed into a separator. Vapors from the separator were drawn off into the barometric condenser where they were condensed and fed back into the vacuum chamber. Insoluble solids settled in the separator. (The disposition of these solids is not described in the available information.) The acid was then pumped through a distributor into a series of falling film tubes. Noncontact steam flowed through the tubes and heated the H_2SO_4. Acid vapors from these tubes were drawn into the barometric condenser. The concentrated H_2SO_4 was pumped into the cooling kegs where it was cooled with noncontact cooling water. After the acid passed through the cooling kegs, it accumulated in the collecting tank. The final concentrated H_2SO_4 product was stored in the splash tanks cooler and storage area.

Process wastes from the H_2SO_4 production area may have included wastewater from the purification house, spray catcher and coke filter; waste coke filter media; insoluble solids from the concentrated H_2SO_4 separator; noncontact cooling water from the cooling kegs, and absorber; and noncontact steam from the falling film tubes.

Nitric Acid

Nitric acid (HNO_3) was produced at the plant in the southern part of the acid area. (see Figure 10 of the main report) Initially, weak HNO_3 was used to make ammonia liquor at the ammonia neutralizer. The ammonia neutralizer was an in-ground brick lined pit. The original process was soon replaced with an Ammonia Oxidation Plant (AOP). A diagram of the HNO_3 production process is provided in Figure F-2.

Anhydrous ammonia (NH_3) was purchased from the DuPont Belle, West Virginia, facility and stored in storage tanks on-site. At the converter house, the NH_3 was pumped through a vaporizer, mixed with hot air, and passed into the converter, where it was converted to nitrogen dioxide (NO_2) in the presence of a platinum/rhodinium/iridium catalyst. The NO_2 was passed through a heat exchanger and into a condenser. The hot NO_2 gases were cooled in the condenser with noncontact cooling water. The cooled NO_2 gases were converted to weak HNO_3 in the absorption tower. Excess NO_2 gas was drawn off into the bleaching tower where it was reintroduced into the production process, along with NO_2 gases from elsewhere in the HNO_3 production process, via the oxidation tank.

The weak HNO_3 was concentrated in the HNO_3 concentrator by mixing the HNO_3 with strong H_2SO_4 (from the H_2SO_4 concentrator) in the dehydration tower. Excess H_2SO_4 and water were drawn from the bottom of the tower, while concentrated HNO_3 vapors were drawn from the top of the tower into the strong nitric bleacher where it was further concentrated. Then, the HNO_3 vapors were drawn into the strong nitric condensers and cooled with noncontact cooling water. The concentrated HNO_3 was cooled further in the cooler prior to being sent to the concentrated HNO_3 storage unit.

The only known process waste from the HNO_3 plant is noncontact cooling water.

Monowaste Acid Recovery

Optimal pH conditions are essential for the production of explosives. Spend acid was conserved and then concentrated for reuse. In the TNT production line, the flow of acid was countercurrent to the production line (see Figure F-2 for a description of the manufacturing process). Mixed acid was added in the trihouse, transferred after each use up to the bihouse, and eventually to the monohouse. Mixed acid consisted of 39 to 41.5 percent H_2SO_4, 57 percent HNO_3, and less than 2 percent water.

The waste acid from the monohouse was sent to the monowaste acid recovery area. Because the monowaste acid contained TNT, dinitrotoluene (DNT), mononitrotoluene (MNT), and toluene, it was first discharged into an accumulation tank where the monooil could settle. Periodically, the monooil was pumped out of this tank and sent to the monohouse. The monowaste acid then passed through a monooil filter, where more monooil was removed. The spent filter material was washed and reused. Then, the monowaste acid was introduced into the denitrification tower where steam was used to vaporize the HNO_3 present in the acid.

The H_2SO_4 discharged from the denitrification tower was cooled in a cooling bath and stored in a H_2SO_4 storage tank. This H_2SO_4 was eventually reused. The HNO_3 vapor was pumped into the bleacher where it was further concentrated and drawn into a condenser where it was cooled with noncontact cooling water. The NO_2 from the condenser was further adsorbed into water in the adsorption towers. The resultant acid (approximately 61 percent HNO_3) was placed in HNO_3 cars and transferred to the HNO_3 storage tanks.

The only known process waste from the monoacid recovery system is the wash water from the filter media.

Sellite Manufacturing

Sellite was a $NaSO_4$ solution that was used in the TNT production line to wash and neutralize the final TNT product. To produce sellite, soda ash and hot water were mixed together with SO_2 gas in the absorber house. The chemical reaction between the SO_2 gas and soda ash solution resulted in the production of a $NaSO_4$ solution. The reaction was driven further toward completion in the tower, where additional SO_2 gas was mixed with the solution. The resultant sellite solution was stored in tanks awaiting use at the TNT line.

There is no record of any process wastes from the sellite manufacturing process.

Powder Production (Dynamite and Gelatin)

Nitroglycerin

NG is the primary explosive ingredient in both dynamite and gelatin. Other explosive or flammable ingredients, as well as inert ingredients, were mixed with the dynamite depending upon the type of dynamite or gelatin that was being produced. These additives were referred to as dope. The type of dope used in a product was dictated by the product (grade of dynamite or gelex) that was being produced on any given day. A typical composition of dynamite is provided in Figure F-4.

Up until the 1950s, NG was manufactured using only the batch process method (see Figure F-3 for a description of the manufacturing process). Mixed acid, glycerin, and glycol were all mixed together in the nitrator building. A noncontact cooling brine was circulated around the nitrator to help cool the heat from the reaction of the glycerin and glycol with the acids. An NG solution was generated from this process.

The NG solution was gravity fed to a separator where the acid was separated from the NG. Then, the NG was gravity fed to the prewash tank where it was mixed with NG recovered from the freezing house. From the prewash tank, the NG was gravity fed to the neutralizing house, where the NG was neutralized with soda water (15 percent soda ash) in the neutralizer tub. NG fumes were drawn off of the tub and exhausted to the atmosphere. NG was drawn off from the bottom of the tub and NG/water was drawn off from the top of the tub. The NG drawn from the bottom of the tub was placed into a buggy and transported to the talley mix area.

In the talley mix area, the dope was mixed with the NG to manufacture the desired explosive. If gelex was the desired product, gun cotton (also known as nitrocellulose) from the DuPont Parlin plant (New Jersey) was mixed with the NG in the talley mix. The resultant mixture of NG and dope (except for the gelex) was often referred to as powder. The powder was placed into buggies and transported to the packing house where it was packaged and packed in boxes that were determined by the grade of explosive and customer needs.

Waste acid from the separator that followed the nitrator was gravity fed into blow cases. These blow cases were then pressurized and the waste acid was blown to the freezing house. In the freezing house, the temperature of the waste acid was reduced, and NG came out of solution. Then, the NG was gravity fed to the prewash tank where it was mixed with the NG from the separator. The remaining waste acid was collected and sent to the acid area for reclamation.

The NG/water mixture from the tub in the neutralizing house was discharged to a boat where the NG was separated from the water, and the wastewater was discharged to a ditch that eventually flowed into Boyd Creek. The NG was gravity fed to the slum house where it was accumulated and periodically sent through a filter back to the neutralizer tub. The waste filters from this operation were sent to the burning ground for destruction.

The nitrator had a drowning tub full of water beneath it, which was used in cases of emergency to receive the solution in the nitrator if the reaction forming the NG became unstable. If the load was not consumed by a runaway reaction, it could be reclaimed from the drowning tub and used.

During most of the manufacturing years of the Barksdale Works, NG was manufactured using the above batch process. After World War II, a Biazzi plant was built at the Barksdale Works to manufacture NG. The Biazzi plant was a continuous process manufacturing facility. Although the equipment involved in the Biazzi plant was different from the batch process, the general function of the equipment and flow of materials was essentially the same. The primary engineering difference is that each of the processes (e.g., nitration, separation, washing) used equipment that was designed to accept and deliver a continuous flow of raw materials and products.

Process wastes generated in the dynamite and gelex manufacturing processes included wastewater from the neutralizer boat that were discharged to the wastewater ditch. This wastewater was likely to have contained some NG. Noncontact cooling brine may also have been generated. Management practices for this waste are unknown. Waste filter media from the neutralizer area was sent to the open burning ground. Off-specification dynamite and gelex that could not be fed back into the production process were burned at the open burning ground.

Open burning at the NG and dynamite waste burning ground (see Figure 10 of the main report for the location) is believed to have occurred during the entire life of the facility. There are no records of the operation in this area during the early years at the plant, however it is likely to have been very much the same as it was in later years. Waste explosive material was placed on top of a pile of dunnage (i.e., waste paper, wood, and card board), dowsed with several gallons of kerosene, and lit on fire. An observer watched the fire from a safe vantage point. The burning occurred on racks to ensure a good draught and usually occurred on Friday afternoons. As many as 15 open burning fires were lit at any one time in the open burning ground.

Dynamite and Gelex Dopes

Dope (generally a carbonaceous combustible material) is the term used to describe the relatively inert, or at least less explosive materials that NG was mixed with to produce dynamite or gelex. As noted above, gun cotton from DuPont's Parlin plant was mixed with NG for the production of gelex.

Packing House

After NG was mixed with the dope in the talley mix area, it was ready for packing in the packing houses. The size, shape, and contents of each explosive product were dependent upon the grade of explosive. Waste powder from the packing area was returned to the tally mix area and blended into a new batch of explosives.

Boxes for packing the explosive cartridges were cut and assembled in the box factory. Wood shooks were received from various sources and then planed to size, glued, and nailed at the box factory. After the boxes were assembled, they were marked and labeled according to the type of explosive they were expected to receive.

Trinitrotoluene Production

The following description of TNT production (also referred to as triton at several plant locations) is based on the July 1940 description of the Number 2 TNT production line at the Barksdale Works. The ingredients required to manufacture TNT were concentrated H_2SO_4, toluene, and concentrated HNO_3. TNT manufacturing areas operating during World Wars I and II are shown on Figure 10 of the main report. A schematic flow diagram of TNT production is provided in Figure F-2.

As noted above, the flow of acid through the production line was countercurrent to the flow of the TNT production line (see Figure F-2). Virgin toluene (usually distilled from coal tar generated by cooking ovens at a steel mill) was introduced to the monohouse along with fortified bihouse waste acid. The bihouse waste acid was fortified by adding the appropriate amount of new HNO_3 to the waste acid from the bihouse. The same fortifier tank facility was used by both the bi- and trihouses. Once the toluene had been converted to MNT (referred to as monooil by the plant), it was discharged into a blow case where it was pressurized and blown to the bihouse. The monohouse waste acid was collected and sent via travelers (small tank cars) to the waste acid recovery area.

At the bihouse, monooil and trihouse waste acid, which had been fortified in the same manner as the bihouse waste acid, were mixed in the bihouse nitrator. After the monooil had been converted to DNT (referred to as bioil by the plant), it was allowed to flow via gravity to the trihouse. Bihouse waste acid was pumped to the fortifier for fortification and transferred to the monohouse. Bioil, mixed acid, and OV acid were mixed together in the trihouse for the final nitration step. The mixed acid and OV came from the acid production area. Molten TNT was drawn off of the trihouse nitrator and allowed to flow via gravity to the wash house. Trihouse waste acid was sent to the fortifier where it was fortified and sent to the bihouse. (Note: for the Number 2 line, the bihouse and trihouse were both located in the same building.)

The molten TNT was washed in the wash house with a sellite solution to remove any undesirable isomers that were present in the molten TNT. The wash house also had the facilities for drying, flaking, palletizing, and packing the TNT products. The wash water from the wash house was discharged to a series of catch tanks or "catch boxes" that discharged to a ravine eventually leading to Boyd Creek. This discharge was red water. Various methods were used, some experimental, to reduce the volume of red water discharged to Boyd Creek. In later years, the red water was discharged to a reed field (1963 aerial photograph) where much of the red water was taken up by the plants, and some of the NO_3 materials were removed prior to discharging into Boyd Creek. TNT would accumulate in the catch boxes and was periodically recovered from the catch boxes and either fed into the product stream at the wash house or sent to the burning ground for treatment.

The fortifier, mono-, bi-, and trihouses had a fume collection system to collect the air emissions in these areas. The fumes were passed to the tower house where distilled water was sprayed into the fumes to remove the acid gases. The resultant acid solution was collected and transferred to the HNO_3 recovery facilities.

A drowning tank was located outside of the mono-, bi-, and trihouses to dowse a charge of mono-, bi- or trioil that was beginning to overreact. Oils that were discharged into this area were reclaimed if the reaction did not consume them.

Toluene was stored in the toluene storage area in the northern part of the plant and in tank cars that were spotted on a spur in the TNT area. OV and mixed acids were stored in separate tanks outside of the bi- and trihouses. Strong HNO_3 was stored in a tank outside of the fortifier house. Travelers were used to bring OV and HNO_3 from the acid area to the TNT area.

Process wastes from the TNT production line include red water that was discharged to a ditch (and later a reed field) that eventually flowed to Boyd Creek and TNT solids that settled from the red water in the catch boxes that could not be reclaimed and were subsequently sent to the open burning ground for treatment.

Miscellaneous Operations

During Barksdale Works manufacturing history, several manufacturing activities occurred for a brief time, including smokeless powder reprocessing and the production of TNX, trivelene, and nitramex. All available information about these operations is described below.

Smokeless Powder Reprocessing

At the end of World War I, the Barksdale Works reprocessed excess smokeless powder (also known as gun cotton and nitrocellulose) from the military. The smokeless powder was wetted, ground, dried, and sold to farmers as agritol, sodatol, and pyrotol.

Trinitroxylene

During World War I, the plant constructed five TNX production lines. There is no detailed information on this production process. (The site plan from 1918 shows the specific production lines for TNX). The only available description states that TNX was made in the same manner as TNT, with the exception of xylene, which was substituted for toluene in the production process. The TNX production facilities were located east of the acid area (see Appendix E of the main report).

Trivelene

During World War I, the plant manufactured trivelene (a form of DNT). There is no detailed information on this production process. The type of isomers produced is also unknown. The location of the trivelene plant No. 2 is shown on the map of Barksdale Works dated April 4, 1918 (see Appendix E of the main report). Records show that there were two production lines constructed for this product during World War I (Klassen 1954).

Soda Amatol, Nitramon, Nitramex and other Ammonium Nitrate Explosives

Beginning in the 1950s, the Barksdale Works produced soda amatol, nitramon, and nitramex. There is no information on the manufacturing processes at Barksdale Works for these products. According to Mr. Holman, these products were all ammonium nitrate and TNT-based explosives.

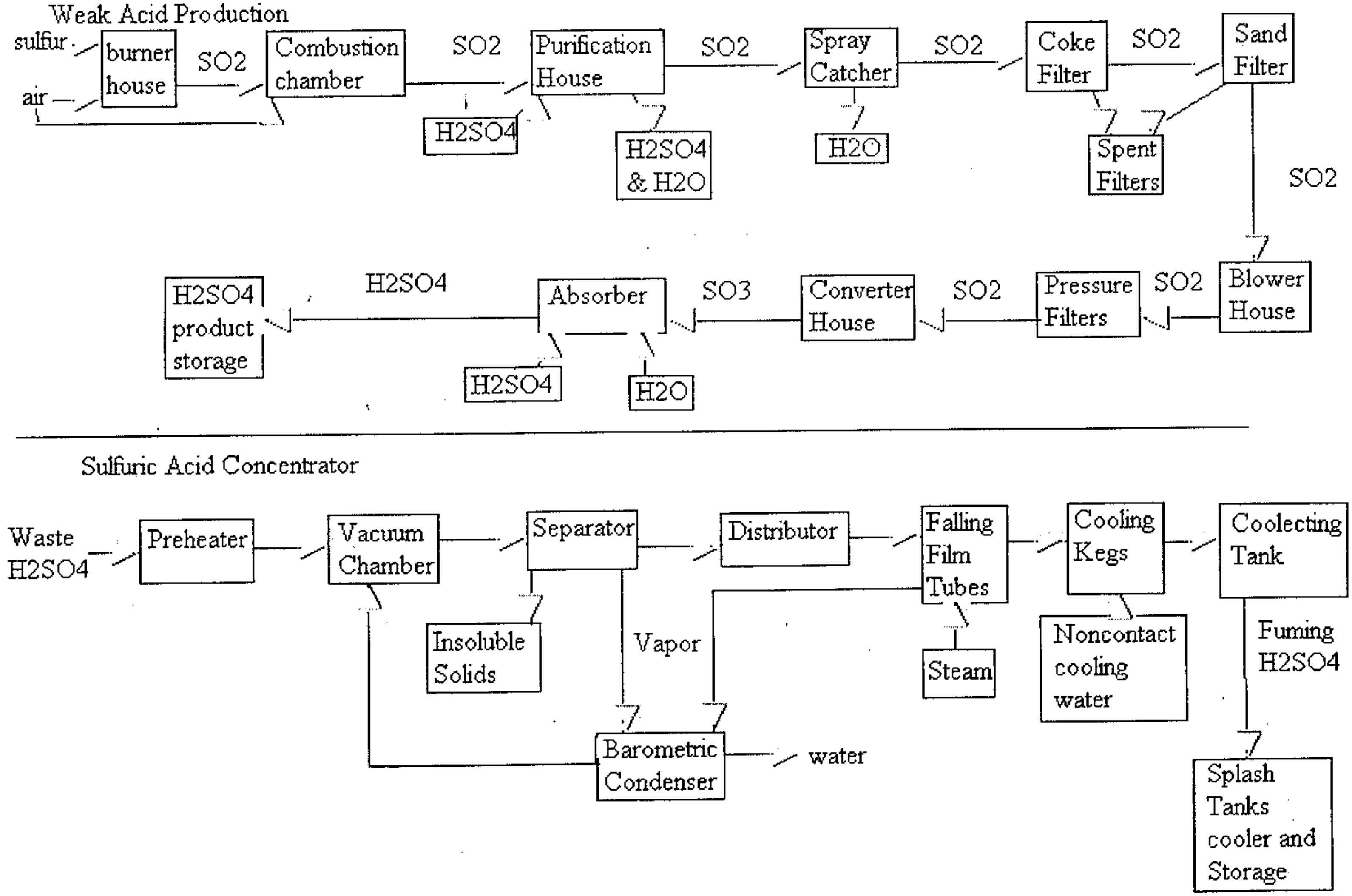


Figure F-1: Schematic Flow Diagram for Sulfuric Acid Production

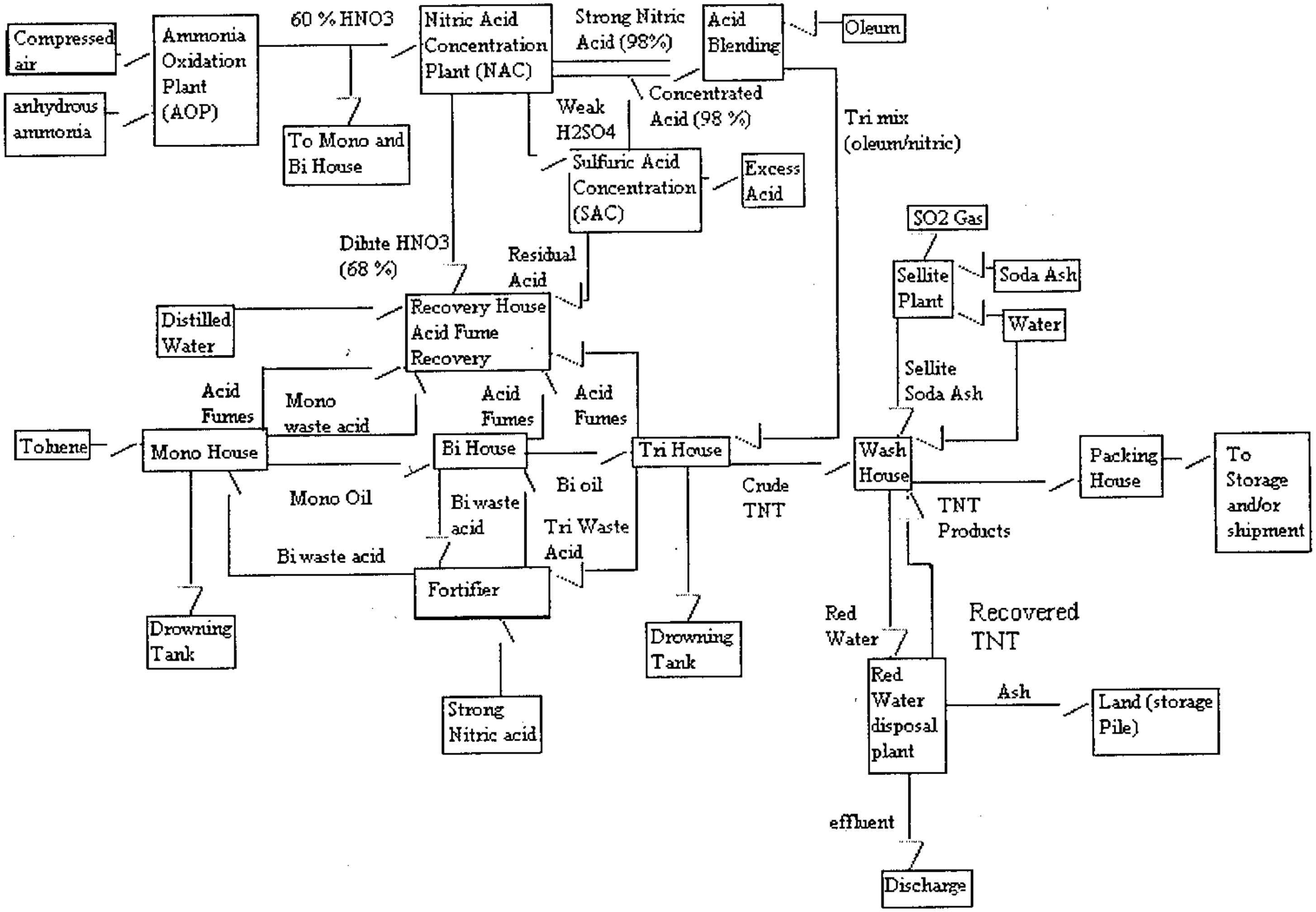


Figure F-2: Batch Process TNT Manufacturing and Satellite Operations

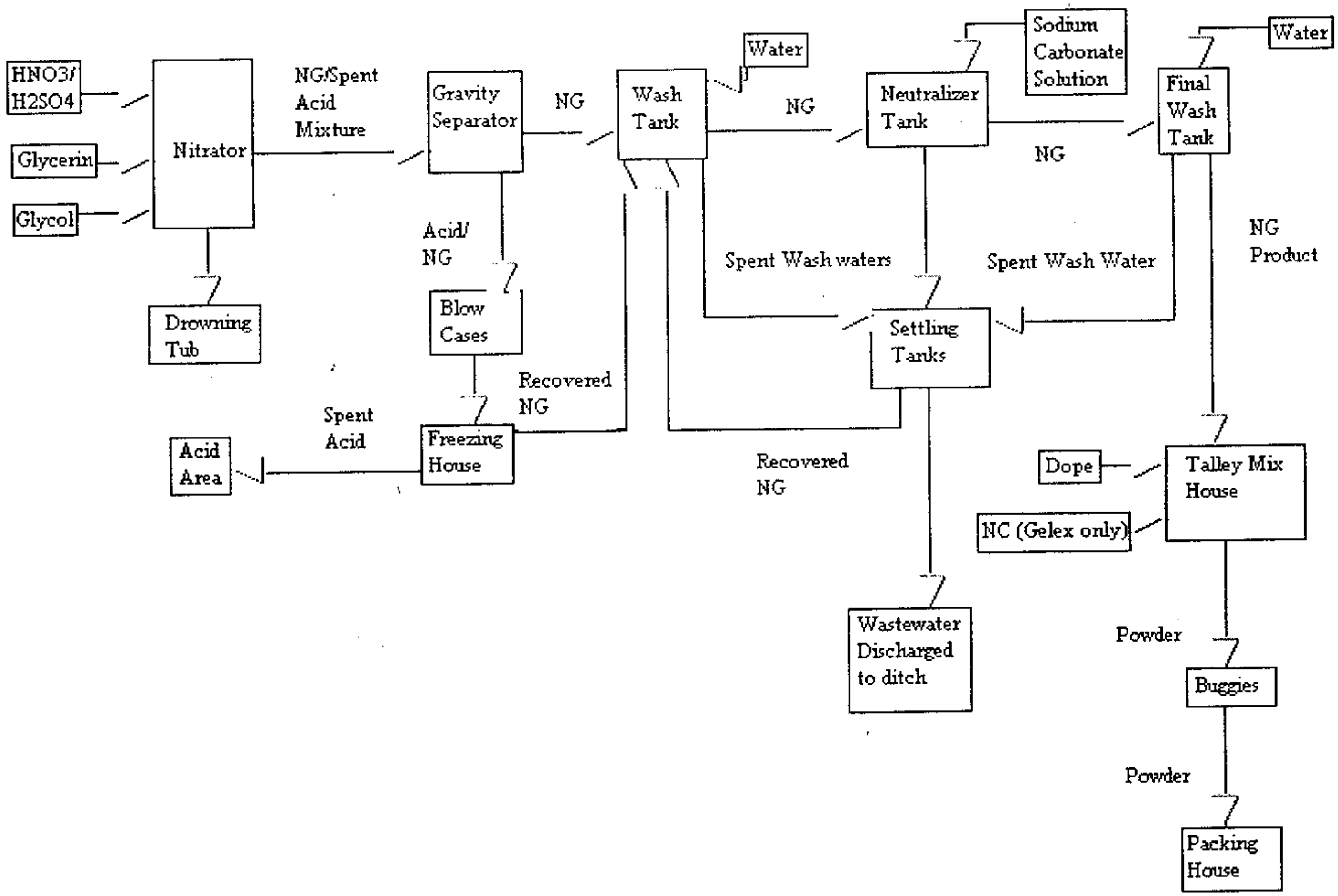


Figure F-3: Schematic Flow Diagram for Dynamite Production

Nitroglycerin
Ammonium Nitrate
Sodium Nitrate
Sodium Chloride
Calcium Carbonate
Sulfur
Nitrocellulose
Phenolic Resin Beads
Bagasse
Sawdust and Wood Pulp
Coal
Corn Meal and Corn Starch
Trace Inorganic Salts
Grain and Seed Hulls and Flours

FIGURE F-4	TYPICAL DYNAMITE COMPOSITION			
	SCALE NO SCALE	DESIGNED BY K.L. DAVIS	DRAWN BY DEL	CAD DRAWING NO ASIZE.DWG
	DATE 12/11/97	CHECKED	APPROVED	PROJECT NO 7191
DUPONT	FORMER E.I. DuPont BARKSDALE WORKS BARKSDALE, WISCONSIN SITE CONDITIONS REPORT			
	DuPont Environmental Remediation Services			

TABLE F-1

BARKSDALE WORKS
SUMMARY OF PRODUCTION HISTORY

Manufacturing Years	Manufacturing History	Amount of Production	Raw Materials	Intermediates	Waste Streams or by-products	Waste Disposal Practices	Comments
TNT 1912-1971	1913-1918 ("Triton") 1920-1931 1934 - 1941 (No. 1 line) 1941-1945 (No. 1 and No. 2 line) 1945-1950 1951	130,000,000 pounds intermittent production (No. 1 line) 60,000 lb./day 100,000 lb./day Total production during W.W.II 208,000,000 lb. of bulk and 18,000,000 lb. of TNT block No production "Pelletol No. 1"	toluene, nitric acid, and 109% sulfuric acid (40% oleum) was used to aid the reaction	mononitrotoluene dinitrotoluene	Red water (Waste water containing H_2SO_4, HNO_3 unwanted TNT isomers), overflows from catch basins and drowning tubs Solid waste associated with TNT were commonly burned Waste acid sent to spent acid recovery	Waste water was channeled into Boyd Creek	Maximum 10 lines during W.W.I Production between wars mainly for ore mining industry
Nitroglycerin 1905-1961	1906 (NG No. 2 line)		mixed acid (nitric and sulfuric), glycerin and glycol together, soda ash	None	Waste water (Waste acid were sent to the acid house for reclamation)	Waste water was channeled into Boyd Creek	

TABLE F-1

BARKSDALE WORKS
SUMMARY OF PRODUCTION HISTORY

Manufacturing Years	Manufacturing History	Amount of Production	Raw Materials	Intermediates	Waste Streams or by-products	Waste Disposal Practices	Comments
Dynamite 1905-1961	1927 - High production year 1933 - Low production year	27,151,550 pounds 4,475,000 pounds	*Common Ingredients*: Nitroglycerin ammonium nitrate, sodium nitrate, sodium chloride, calcium carbonate, sulfur, Nitrocellulose, chalk, starch, flour, wood pulp and sawdust		Wastewater discharged to catch boxes and eventually to Boyds Creek. Wastewater sludge's were burned at the Burning Ground		1905 production 2.9 MM pounds 90,000,000 lbs. of commercial explosives W.W.I 102,000,000 lbs. of commercial explosives W.W.II
Nitric Acid 1905 -1971	1905		Anhydrous Ammonium sodium nitrate		Cooling water nitre or salt cake (until 1928)	Nitre cake sold to fertilizer companies	
Sulfuric Acid 1905 - 1971			pyrite elemental sulfur	SO_2 gas	Cooling waters, spent sand filter material, insoluble solids	Spent sand filter material washed down for recycling	pyrite was replaced by elemental sulfur as a sulfur source.
Trinitroxylene 1917 - 1918	World War 1	5 TNX units were built at Barksdale	mixed acids xylene				Manufacturing process was the same as in TNT except that Xylene replaced Toluene
"Trivelene" (DNT) 1912-1918	World War 1	2 DNT lines (One double and one single unit)					Supposed to be a lubricating explosive to help shoot charges from gun

TABLE F-1

BARKSDALE WORKS
SUMMARY OF PRODUCTION HISTORY

Manufacturing Years	Manufacturing History	Amount of Production	Raw Materials	Intermediates	Waste Streams or by-products	Waste Disposal Practices	Comments
"Nitramex" 1950-1971	1950 - started blasting agent 1953 - New plant built	Three buildings and change house	Ammonium Nitrate (80%) TNT (20%)			Waste was burned	Nitramex plant destroyed completely in 1952 from and explosion. Nitramex was a blend of TNT, ammonium nitrate, and sodium nitrate "Nitramon" also produced
Lydol	World War 1	Only one unit was built					Used in making Dynamite
Sellite 1912 - 1971							A sodium sulfate solution used in the TNT production line to wash (and neutralize) the final TNT product.
Smokeless Powder (reprocessed)	1922 -1928	Reprocessed	smokeless powder (nitrocellulose) "other ingredients"	None	None		At the end of W.W.I, government excess smokeless powder was shipped to Barksdale and reprocessed. Smokeless powder was wetted, ground, mixed, dried and then sold to farmers as "Agritol", "sodatol", and "Pyrotol"

Appendix G

SUMMARY OF INTERVIEWS WITH FORMER BARKSDALE EMPLOYEES

SUMMARY OF INTERVIEWS WITH FORMER BARKSDALE EMPLOYEES

Interview With Mr. Glenn Holman

On October 13, 1997, Mr. Lewis Schoenberger of DuPont Environmental Remediation Services (DERS) interviewed Mr. Glenn "Bud" Holman, a former DuPont employee of the Barksdale Works, via telephone. A summary of the conversation is below.

- There may be a well buried beneath the debris where the office next to magazine 3 was located. This was debris from the plant demolition.
- The ditches leading from the manufacturing facilities down to Boyd Creek were shot at the time of the plant demolition.
- The dynamite line was located on the north side of Boyd Creek and the gelatin line was on the south side of Boyd Creek. The gelatin line was destroyed in a flood one year, but was rebuilt on the north side of Boyd Creek.
- The smokeless powder reclamation facilities were located along Boyd Creek upstream of the dynamite facilities. There were four grinders on the south side of the creek.
- The ditches were not "shot" while manufacturing activities were occurring at Barksdale Works.
- Mr. Holman recalls two spills of nitroglycerin (NG) while he worked at the site. Both of these spills were cleaned up at the time with "NG Neutralizer." After the plant was shut down, these areas were shot in an attempt to sympathetically detonate any residual NG that may have been present in the soil.
- During the early 1980s Mr. Holman and Mr. Robert Lindsey performed additional decontamination of the Barksdale Works, focusing on locating the "catch boxes" in the trinitrotoluene (TNT) area. These boxes were used to separate explosives from the wastewater that was discharged to the ditches. Potential explosives areas were investigated by looking for a barricade and then additional construction. The catch boxes were excavated and their contents and the soil around them were burned. The drain lines from the catch boxes were also excavated and burned. Mr. Holman made maps of the excavated areas.
- According to Mr. Holman, there were 11 TNT production lines at the site during World War I. These lines ran basically north to south from the northwestern part of the site to Boyd Creek. In addition, there were three additional TNT lines mixed in with the eight or nine trinitroxylene (TNX) production facilities east of the acid area. Nine sulfuric acid plants existed at the site in the acid area. There is sulfur visible on the ground in this area. The

ammonia crystalizer area was near the main gate. This area is also identified as the ammonia oxidation plant (AOP).

- Three nitric acid plants existed at Barksdale Works and were located near the laboratory on the main road just before the soda store building. Spray ponds for condensing acid gases were located nearby.

- In Mr. Holman's opinion, there are miles of abandoned underground water supply pipes on-site. The acid, steam, and air pipelines were all overhead lines. None of these were buried.

- NG manufacturing activities occurred in several areas. NG was made in one of the nitrating buildings (there were two nitrators) and then tracked to the neutralizer/store houses (there were two of these as well). NG was transferred between buildings using a tramway. Dynamite mixing occurred in the mix house. The dope came from one of the dope houses. The dope typically contained meal, ammonia, and other additives. Some of the dopes contained nitrocellulose, dinitrotoluene, and similar materials. The mixed dynamite was either transferred to the punching house (where the Hall machine was located) or the gelatin machine for packaging. From there it went to the packing house for packing out, which was done by hand. There was also a "Kimber" machine building for making big shells. There was a hand pack building for loading by hand. The hand pack would ship broken containers to the mixing building. All NG building floors were swept every day.

- In the NG area, the drain lines went to Boyd Creek via a long ditch that led from the "freezing buildings."

- The monohouse was the beginning of the TNT manufacturing line. All of the TNT production lines run roughly north to south. The bihouse was the second facility in the production line. The trihouse and wash house followed. The TNT was washed and packaged in the wash house. The TNT line had a number of catch boxes in the water line downstream of where sellite was added. The catch boxes were baffled and would capture powder that was eventually reclaimed. The catch boxes discharged into Boyd Creek. In the 1950s or 1960s, a several acre drain field (via ponds) was installed near the last wash house. Later, a reed pond was installed, which eventually discharged to Boyd Creek. Ashes from the burning of TNT during decontamination were buried in the area of the reed field.

- Mr. Holman was familiar with several dump sites on the plant. One was on north of the acid plant. To the east of the sulfuric acid plant was a nitromex product dump. Mr. Holman spent three months excavating and burning the material in the nitromex dump.

- On the road to the north gate, west of the TNX plant, there was a dump that had old machinery parts. North of the machine shop was an area with old tanks.

- The barrel dump, which was located along Boyd Creek, west of the tramway trestle, had numerous barrels. Mr. Holman thinks there may be more barrels and may be present all the way to the #1 packhouse.

- The burning ground was cleaned out in the 1980s, after the plant was shut down.

Interview with Mr. Robert Mace

On October 21, 1997, Mr. Lewis R. Schoenberger DERS interviewed Mr. Robert "Bob" Mace, a former DuPont employee who worked at the Barksdale Works. A summary of the conversation is below.

- Mr. Mace worked at the Barksdale Works for four years, from 1966 until 1970. He was a senior supervisor in the TNT area and the acid area. Mr. Mace was not involved in plant decontamination activities; however, he does remember seeing TNT on the ground. Mr. Mace said that one could see a layer of TNT in the soil in the production area. There were also spills of toluene, but Mr. Mace does not recall the locations.
- During World War I, 10 TNT production lines were in operation, including a block press for TNT. During World War II, only two TNT production lines were needed. During the Korean and Vietnam wars, only the #2 TNT production line was used. The plant shut down in 1971.
- The plant had a dynamite production line and also produced nitramon primers, sulfuric and nitric acids, and ammonium nitrate.
- The NG line had a batch nitrator and a Biazzi continuous NG nitrator was purchased in 1957 or 1958. Mr. Mace believes that the NG was transported via gutter trough or water jet emulsion transfer for transport from the nitrator to the neutralizer building. Soda ash was used to neutralize the NG. Mr. Mace is not aware of any NG spills. Although Mr. Mace was aware of the open burning ground, he was not aware of any dump sites on the property.
- TNT production started with the mononitration of toluene. The monooil was then transferred to the bihouse via pumps and pipes. A blow case with pressurized air tanks was used to transfer bioil to the trihouse. Residual sulfuric acid was gravity-transferred countercurrent upstream. Trinitration occurred in the trihouse. Catch boxes were used to separate wastewater and TNT at the wash house and were cleaned out during every shutdown (approximately once per month). The accumulated powder in these boxes was either reworked into the manufacturing process or treated via open burning.
- Starting in either 1964 or 1965, the Barksdale Works began to use orthonitrotoluene produced by Chambers Works as a feed stock to the bihouse, replacing approximately 60% of the toluene feed source. The orthonitrotoluene was shipped to the Barksdale Works via rail car.
- According to Mr. Mace, there were releases of sodium sulfite at the wash house that did reach the ditch that flows to Boyd Creek. (This ditch runs south west from the wash house to Boyd Creek.)

Interview With Mr. Robert Lindsey

On October 24, 1997, and November 12, 1997, Mr. Lewis R. Schoenberger of DERS interviewed Mr. Robert Lindsey, a former employee of the DuPont Barksdale Works. A summary of the conversation is below.

- Mr. Lindsey worked at the Barksdale Works from approximately 1937 until 1964. His job titles were apprentice, mechanic, general foreman, and supervisor of maintenance. All of his employment history with the Barksdale Works was in the Maintenance Department.
- According to Mr. Lindsey, the manufacturing facilities at Barksdale Works were spread out over a large area. Any questionable material found in the vicinity of the operating areas was removed and burned in the open burning ground.
- Mr. Lindsey, along with Mr. Holman, was involved in the decontamination of Barksdale Works. Both men walked the entire plant and removed and burned questionable areas. They also scrapped the acid-contaminated soil in the acid area, resodded, and planted grass. They did not find any TNT in the acid area. Mr. Lindsey said that reports were prepared documenting the daily (or weekly) decontamination activities and were sent to Wilmington, Delaware. Mr. Lindsey believes that Mr. Hill may have copies of these reports. During the decommissioning of the plant, Mr. Lindsey and Mr. Holman performed decontamination blasting in the dynamite areas. Mr. Lindsey does not recall any "sympathetic" detonations from spilled or leaked material. In addition to blasting the ditches, they also blasted some of the building foundations at the Barksdale Works. However, they did not perform decontamination blasting in Boyd Creek or along the shore of Lake Superior. Mr. Lindsey and Mr. Holman inspected the lake shore and did not observe any visible explosives deposits. Mr. Lindsey said that he and Mr. Holman spent two summers (approximately six months) decontaminating the site.
- The only spills Mr. Lindsey recalled were acid spills in the acid area, which were immediately covered with soda ash to neutralize the acid.
- The burning ground was used to treat explosives and explosive-contaminated material removed during decontamination activities. Material containing explosives was placed on a pile of dunnage, dowsed with several gallons of kerosene, and lit on fire. The dunnage typically consisted of paper, cardboard, and scrap wood.

Interview with Mr. James Hill

On November 12, 1997, Mr. Lewis R. Schoenberger of DERS interviewed Mr. James Hill, a former DuPont Barksdale Works employee. A summary of the conversation is below.

- Mr. Hill worked at the Barksdale Works from 1942 until 1952. His last position at the plant was as a supervisor in the dynamite manufacturing facility. Mr. Hill also assisted with the decontamination of the plant.
- Mr. Hill did not recall whether he had any reports documenting the remediation activities. If he did find any documents, he would contact Mr. Schoenberger.
- Mr. Hill knew that spills of NG had occurred during operation of the plant, but all spills were remediated at the time of the spill.
- Mr. Hill was not aware of any specific dumps at the Barksdale Works. However, he believes that at the end of World War I, there was a large quantity of explosives and explosives intermediates that were dumped on the ground. Mr. Hill believed that the World War I plants were shut down quickly and that the material that was in the process lines was dumped.

Appendix H

"THE FIRST 50 YEARS OF BARKSDALE WORKS, 1904-1954"

Du Pont - Explosives Dept.
(8)

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AEH
~~FCM~~
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JEH
~~COD~~
~~GPS~~
~~ABP~~
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GAH
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THE FIRST

1904 50 1954

YEARS OF

BARKSDALE WORKS

WISCONSIN'S PIONEER EXPLOSIVES PLANT

E. I. du Pont de Nemours & Co.

Acc. 1081 #4

HAG0024511

FOREWARD

Our pride in offering this brief history of the Barksdale Works is tempered with regret that due, to necessary space limitations, it cannot be a more complete and detailed account. While we have tried to include as many facts and names as possible, a volume many times as large as this would be required to mention even briefly the thousands of persons and incidents that are part of the Barksdale story. Our apologies are offered for the many unintentional errors of omission that will be noted by readers.

We acknowledge with special thanks the co-operation of the following in helping us collect and present the material used in this historical sketch: R. E. Lunn, production manager; George H. Miller, service manager; M. C. Knake, F. T. Beers, C. L. Johnson, Cy McManus, Carl Christofferson, Jack Murphy, Paul Paulson, Al Garberg, Joe Johnson, Axel Lund, Hi Hansen, Jim Morris, Mose Wegsteen, Doc Olsen, Les Lindblad, Tom Peterson, Martin Thompson, Percy Williamson, Joe Kasmarek, J. H. Hanson, George Mager, Sr., Ray Cudmore, Dr. Harold Guzzo, Chet Sanger, Arty Anderson, Oscar Bartness, Paul Robinson of The Washburn Times, William Tomlinson of F. Tomlinson Co., Register of Deeds Earl Pedersen, County Clerk Ludwig Tranmal, Charles M. Sheridan, and many others not mentioned here.

ERNEST H. HOLMAN

DEDICATION

To all the men and women who have worked at the Barksdale Works in the past half-century, who have contributed so much to the success and progress of this industrial enterprise by their outstanding ability, conscientious service and unwavering loyalty, this brief history of the plant's first fifty years is dedicated with sincere respect and affection.

THE STORY OF THE BARKSDALE WORKS

SELECTING THE SITE

As part of a program of expansion at the opening of the 20th century, a decision to establish a dynamite factory in the Lake Superior region was made by the DuPont organization, which had entered the dynamite business in 1880 with construction of the Repauno plant at Gibbstown, N. J. Establishment of a plant in this area was a logical move, as great quantities of explosives were needed for the iron mines of northern Minnesota, the iron and copper mines of upper Michigan, the great metal mines and stone quarries of the West, and the clearing of the cut-over lands of the Lake States.

No information as to the exact reasons for selecting a site on the shore of Chequamegon bay between Ashland and Washburn, Wis., are available, but some of the factors favoring this choice were plain: location between the iron ranges and not too far from the copper mines; access to both railroad and lake shipping facilities; an excellent water supply; isolation from large centers of population; and an adequate reservoir of intelligent, dependable labor.

ACQUISITION OF LAND

In 1902 "the mysterious man with the red top boots" as he later was referred to in a Washburn weekly, arrived in the area and began buying parcels of land in the area north of Nash, across the end of Chequamegon bay from Ashland. This man was Major William G. Ramsay, who had earned his title in the Spanish-American War and had become head of the DuPont engineering division when the companies were consolidated. Assisting Major Ramsay in acquiring this property was D. M. Maxcy, Washburn banker and realtor. By the end of 1902, a block of about 1400 acres had been acquired in the name of Ramsey and his wife Caroline J.

In 1903 the title was transferred to the Atlantic Manufacturing Company. This company purchased the lake front property, including the site of Barksdale village, from the Bay City Land Company in 1904. Later the Atlantic Manufacturing Company transferred the land to the Eastern Dynamite Company, which operated the Repauno Works, and the latter, in turn, transferred it to the DuPont Company, the parent organization.

NAMING THE PLANT

One Jacob Bjork, who sold land to Major Ramsay, modestly suggested the plant be called "Bjorkland". The company had a better idea, naming it Barksdale in honor of Hamilton M. Barksdale, vice-president of the DuPont Company, head of the high explosives operating department, recognized by his contemporaries as the leading dynamite executive in America. "H.M.", as he was called, was the son of an illustrious Virginia family, a University of Virginia graduate, and an engineer and executive of great ability, held in high regard by his associates. He and Harry G. Haskell, for whom the Haskell Club in Washburn was named later, are credited with originating the idea of research in the chemical field, culminating in the establishment of the DuPont Company's Eastern Laboratory.

PLANS ARE ANNOUNCED

Projected construction of a dynamite plant nearby did not create the excitement or enthusiasm in Washburn that might have been expected, considering the vital role that the plant was to play in the destiny of the community in the next half-century. At that time Washburn was a booming town of 5,000, with four sawmills, a box factory, a grain elevator, merchandise dock and coal dock. The coming demise of the lumber industry was not forseen generally and relatively little attention was given to the new and different industrial enterprise. Most townsfolk were indifferent and some were incredulous and critical, but the News and Itemizer gave support and coverage to the new venture and it is from articles in that paper that most of the following information concerning construction has been obtained.

In February 1903 the News and Itemizer welcomed the plant and predicted that "Washburn ought to become the home of at least two thirds of the men employed there!" Later Major Ramsay informed the paper that "The Atlantic Dynamite Company of Wilmington, Delaware, will erect the largest plant of its kind in the country. One of dozen plants operated by this company—this is to be the largest. Only dynamite will be manufactured at this plant. Buildings will be built so that everything that goes into dynamite can and will be made here—including a large acid plant"

SURVEYING AND LAND CLEARING

In the spring of 1903 Walter Page, superintendent of construction at the start of the project, hired County Surveyor Glover and George Berge to do the necessary surveying. It was reported that 100 men would be employed on construction and that masons were being contacted for work on the power house chimney, which was to be 120-125 feet high. The company asked for prices on materials, wages for masons and laborers, and hours worked per day. Cost of the electric power plant was estimated at $40,000. The contract was let to a Michigan firm of which George Irving of Washburn was superintendent. The brick and stone building would be 87 x 98 feet. By September 1903 a telephone line to the plant was installed.

Clearing the plant site of stumps and second growth trees was a primary step. This area had been logged by the Shores Lumber Company of Ashland and the camp buildings had been left when logging was completed. Located northeast of the present "Dope Dry" warehouses, these structures were used during construction and early operation to board and bunk the workers, who went home to Washburn only on week-ends.

FIRST FATAL MISHAPS

Three deaths occurred on the plant during the land-clearing phase. The body of O. Anderson, a member of one of the crews, was found and the paper reported that Judge A. M. Warden, acting coroner, and Sheriff Simpson held an inquest. No explanation of the cause of death was printed. Judge Warden was the father of Max Warden now President of Remington Arms Company.

The other two victims were Nels Peterson and Halvor Gilbertson, who received fatal injuries in January 1904 from an explosion of dynamite they were thawing out for blowing stumps. Dr. T. R. Spears and Dr. Hicks came from Washburn to treat the injured men but their efforts were in vain.

CONSTRUCTION GOES FORWARD

By March 1904 W. B. Chamberlain, then in charge of construction, was able to report that the Atlantic Manufacturing Company was "rapidly taking on the appearance of a finished affair." About 200 acres had been cleared, 53 buildings had been erected, and 27 more were to be put up. Thirty-five men were employed but work was held up by severe winter weather. By spring, 200 men would be employed. It was estimated that the plant would start operations in eight months.

"The three boilers in the power house have mechanical starters and are supplied with water from a well 247 feet deep," said the News and Itemizer. "Steam will be furnished for the two 125 H. P. engines and a 100 H. P. engine - - - It will require 2000 incandescent and 23 arc lights to supply the grounds and buildings. The machine shop is nearly completed and a 5 H. P. motor will furnish power.

"An 'Oil of Vitriol' plant is also being constructed, with six buildings for this one operation. Fifty-four buildings are located in a ravine (Boyd's Creek) for the manufacturing of dynamite, the buildings being placed here as a safety measure . . . Precautions are taken by surrounding these buildings with earthworks."

To celebrate progress, the construction department held a "Leap Year Party" at the plant, making the trip from Hotel Washburn in Cal Willey's Livery carry-all. A banquet and dance were enjoyed. W. B. Chamberlain, engineer, and Jack Dohme, first power house foreman, were the reception committee. Roy Hull, as M. C., called on Messrs. Stevens, Oscar, Dohme and Chamberlain.

Many of the first buildings on the plant were built by A. Donald and Company, Ashland contractors, with whom Frank Tomlinson, still alive at 92, was associated. His son, William, now head of the Tomlinson Company, used to bicycle from Ashland to Barksdale to deliver messages. Sandstone used in construction came from the quarries at Houghton near Washburn and brick came from Menomonie. Construction costs of the first buildings erected by A. Donald and Company totaled $611,032.58. The houses in the Village of Barksdale were built at the same time, excepting the two largest, now occupied by M. O. Thompson and Magnus Norgren. The Omaha station was not built until the World War I boom and was razed between the wars.

The main office was completed and ready for use in February, 1905. While it was being built, the clerical staff worked in the present spare electric motor storage, the small building near the carpenter shop.

EARLY TRANSPORTATION

For transporting raw materials and finished products, narrow-gauge railroad tracks totaling 11 miles were laid throughout the plant. The job was done by Sol Wilkinson, Ashland contractor.

Transportation of workers between Barksdale and Washburn was a problem from the start. Construction of electric car lines from both Washburn and Ashland was proposed but never materialized. In October, 1904, I. L. Pierce, first plant superintendent, accompanied by Mayor W. H. Irish and M. H. Sprague, Washburn banker, went to St. Paul and arranged with Omaha railway officials for a work train between Barksdale and Washburn. The first train ran in early November, with 75 workers in two coaches: The road bed on the plant had been built by John Friberg, Washburn contractor.

CONSTRUCTION PERSONNEL

While the plant was being built, the construction department was headed by Walter Page, superintendent, and W. B. Chamberlain, engineer. Under them were several local men in charge of various phases of the work. Jack Ward had charge of labor along with Bill Fenton, who later handled the "bull gang" as the labor crew was called. Construction carpenters were under John Nolánder, assisted by Anton Wedal.

CREATION OF TOWN OF BARKSDALE

When the plant was started, it was in the Town of Washburn, which then included the present City of Washburn, the present Towns of Washburn and Barksdale and other territory. It was known as the largest unincorporated town in the U. S. In April 1904 the City of Washburn was incorporated and set off from the town. The Town of Barksdale, which now embraces the plant, was created March 27, 1907.

OPERATIONS ARE STARTED

By the spring of 1905 the plant was ready for operation. Before dynamite could be made, sulphuric and nitric acid had to be manufactured Experienced men from the Repauno plant were brought in to start up the acid lines. Some of them were: Carl Havens, Nelson Jorgenson, David Carson and Winn Allen.

Joe Failing was general acid foreman. When the first fire was built in No. 1 burner on April 29, 1905, George Lee and Louis Duffy were operators. Others there then or shortly after were Charlie "O. V." Anderson, John Carlson and Otto Anderson, who continued as operators until pensioned many years later.

Other Repauno men were brought in to start up the powder line. Mike (or Cal) Connelly and Jim Reilly came to nitrate the first charge of nitroglycerin. Assisting them with the first charge on May 24, 1905 were Mike Aspel, William Arntsen, and Oscar Wegsteen. Bert Davis was in the "Dope House". Waiting for the powder at No. 1 Hall was William (Bill) Mitchell, who punched the first sticks made at Barksdale. Later he made an individual world record when he punched 54,000 1½-inch sticks and 45,000 1¼-inch sticks, each in one eight-hour day.

On June 14, 1905, the construction department officially turned the plant over to the operating department under Ira L. Pierce as plant superintendent, who had arrived January 21, 1905. The first shipment of three carloads was made in June. The new plant was a model dynamite factory, the first of about a dozen such plants erected by the DuPont Company at strategic locations throughout the U. S.

Production of acid and powder was entirely new and strange work to local men, most of whom had worked only in lumber camps and sawmills, but they learned swiftly under the tutelage of the trained Repauno workers. In a letter to H. G. Haskell before the plant started operating in 1905, Supt. I. L. Pierce wrote "We have at Barksdale a number of intelligent men who are usually very steady, and in a short time, probably four months, would be capable of taking charge of the different processes. Take it as a whole, I believe the general workmen at

Barksdale are superior in habits and intelligence to the average."

This confidence was justified. In the first year of production the men of Barksdale turned out 2,907,475 lbs. of dynamite under the supervision of G. B. Lang, powder superintendent. With only two years experience they smashed the world's production record by turning out 74,400 pounds of dynamite in eight hours.

EARLY PROCESSES, PRACTICES AND PERSONNEL

Production of sulphuric acid differed somewhat from today's process. Iron pyrites, an ore containing sulphur and about 40% iron, was roasted in big burners to extract the sulphur gas, which was used to produce acid in a complicated operation. The iron residue was used as a filler on the narrow-guage track beds and spread on the roads, including the dirt road from Washburn, resulting in rust-splattered cars.

The iron pyrites came from Spain to the Northwestern Fuel Company dock in Washburn via Newfoundland, where it was transferred from ocean ships to lake boats. The first shipment, 2,861 tons worth $14,000, arrived October 21, 1904, and was transported by rail to the pyrites storehouse at Barksdale.

Later, when sulphur was available in its true form, it still came by boat to the Washburn dock. Changes in the "O.V." plant resulted from use of raw sulphur instead of iron pyrites.

Sodium nitrate, basic compound used in the manufacture of nitric acid, also came by water from Chile, South America. In addition to being used for nitric acid, sodium nitrate was dried and ground for use in dynamite manufacture. The burlap soda bags were washed to recover soda, dried, baled and returned for salvage.

The first nitric acid made was "weak" acid used to make ammonia liquor at the ammonia neutralizer, a brick-lined pit in the ground covered only by planking. Two men with "carrying sticks" carried the acid to the pit in large carboys. For protection from acid fumes, they used woolen nose rags, dampened with water if the fumes were "bad".

Nearby was the ammonia crystallizer where ammonium nitrate was made. In early days it was shoveled out of the kettles.

For protection, operators wore woolen clothing, which is not affected as much by acid as cotton or other fabrics. Because of their "holey" appearance after working with acid for some time, they were called "acid rats".

Machinery in the acid area was steam-driven. Powder buildings were heated by separate heating houses with hand-fired

steam boilers. Among early heater-house men, who also acted as powder line watchmen, were George Cooklar, August Bluhm, Phil Neuhart, and Ole Warden.

Powder buildings were not ventilated and headaches were in order for all who entered. Modern ventilating systems were installed in all powder buildings in the 1930's. The men worked bare-handed and wore their own clothes but a special powder shoe or "sneaker" was worn by those working in explosives buildings.

During the first year of operation, all powder made was referred to as "straight dynamite". At the "Case and Dip House" it was put in wire cages and dipped in paraffin by hand. Powder "buggies" did not have wheels but were carried from the building to the push truck with "carrying sticks".

"Dopes" used in dynamite making include pulp, starch, chalk, flour and meals which had to be dried before using. The first operator was Ole Westerlund. He was the father of John Westerlund, who was the "Alexander Graham Bell' of the plant telephone system for years.

Flat cars pulled by mules were used to haul soda, ammonium nitrate and dopes in barrels to the powder line dope house. Among early mule drivers were Al Vieno, Hans Johnson, George Ogren, Vic Bergquist, Joe Pallage and Ben White.

Mule and horse drawn cars were also used to transport the finished product from the box packing house to the magazines. Frank Bennett and Paul Martin were two of these drivers.

Gas locomotives followed mules and horses and preceded electric locomotives. "Old No. 4", used until the late 1920's was not as fast and strong as the electrics, Nos. 5, 6, 7 and 8, and was nicknamed "Spark Plug" after the slow steed in the "Barney Google" comic strip. Christ Aune and Fred Tapely were early drivers or conductors on the first locomotives. George Glazier, famous log roller, kept them in running order.

The 11 miles of narrow gauge track were kept in good condition by Section Boss Andy Ranahan, colorful old Irishman about whom many amusing incidents still are recalled. One of the early "gandy-dancers" on Andy's section crew was John Renstrom.

Refuse from the nitric acid plant, where sodium nitrate was treated with sulphuric acid in hand-fired coal-burning stills, was called "salt cake" or "nitre cake". At first there was no sale for this and it was used to fill up small ravines. Later, it was sold to fertilizer companies. The back-breaking job of breaking up the rock-like substance for shipment was done first by Joe Sirois and later by Ed DeMars and Ed Gagne.

During construction, William (Bill) Mitchell and Paul Paulson were sworn in as deputies to protect the property and equipment. There were no regular watchmen on the plant, aside from the powder line heating house firemen, after operations started. Visitors, even women and small boys, were not barred. Few restrictions were necessary until World War I, when the fence was built and a police force was organized.

In early days, the machine shop had the job of shoeing the horses and mules along with its other work. Harry Fahrig was the first machine shop foreman, advancing from that to other positions in the maintenance department, and eventually being transferred to the Joplin, Missouri plant as maintenance department head. One of the early machinists was Charles Taberman. Harry was succeeded by Carl Christofferson, first apprentice on the plant, who learned the trade in four years and was advanced to first class mechanic. Carl stayed as machine shop foreman until retiring February 1, 1953. In 1918 he had as many as 80 men in the shop. In 1932, employment was so low he handled the work alone.

The first blacksmith was Fred Christianson, with son Louis as helper. Fred was the only man who could put shoes on the mean gray mule. Louis eventually became the blacksmith and held the job until pensioned in August, 1932.

Ed Moore was the first pipe shop foreman, followed by Amos Nelson. Al Garberg gave up his job as tram horse driver and became an apprentice pipefitter, later advancing to foreman and holding that post for many years until retiring in January 1954. Among early pipefitters were Louis Nelson and Albert Grehn, a helper.

Henry Oscar ran the electric shop, assisted by Arty J. Anderson. Elam Johnson, brother of Chief Clerk C. Leon Johnson, was an apprentice and Guy Warden also worked there for a time.

The electricians also had the responsibility of being plant firemen but fire fighting facilities were scanty until the water line from the bay was built in 1915. Fire alarms were installed on light poles throughout the plant and a steam fire siren was installed at the power house. Ken (Old Mac) MacDonald, retired Duluth fireman, became fire chief, living upstairs in the main office.

The first tinsmith and leadburner was Andrew Young, who became the first Barksdale employee to be pensioned, because of his service at Repauno dating back to 1901. His son was the first child born in the new Town of Barksdale after it was created in 1907 and was named Barksdale Young. The late Art Nelson, who ran the lead shop for many years, was recognized throughout the company for his ability and was often called to other

plants for special jobs. Clarence "Sparky" Nelson now has charge of the lead shop.

Dynamite boxes were not assembled on the plant at first but were shipped in, completely made up, from Milwaukee. The present box factory was a banding house, where all filled boxes were fastened securely with metal bands. Equipment to assemble boxes was installed in World War I. Early men in charge were Christ Albrechtson, John Upham and Joe Johnson. In 1917 Art Fossum took over and served 24 years, until May 1, 1941.

The first magazines were the two brick buildings near the box factory. More magazines were erected and barricaded in their present location about 1915. Oscar Palm did the brick and concrete work. The first magazine keeper was Albert Beausoliel. Others who held this post were Axel Axelberg, Jack Murphy and Jens Albrechtson. Since 1917 Magnus Norgren has been in charge.

Water for operations was supplied by several deep wells until the water line from Chequamegon bay was laid in 1915. Only one of these wells located outside the power house, is still usable. When the bay water is too "thick" for drinking, water from this well is distributed to plant personnel.

Some of the early workers, in addition to those mentioned elswhere, were:

Case and Dip House — Bob Tarbox, George Bean, Art Anderson, Bill Urquhart, Hugh Ross, Charles Gierczic, Frank Komborski and George Staples from Repauno.

Hand Packing House — Paul Paulson, Otto Pallage, Sig Anderson, Bill Burns.

Kimber House — Joe Johnson, Ed White.

Figure Eight Machine — Charlie Anderson, Olaf Anderson.

No. 2 Hall Machine — Bill Dayton, Paul Paulson.

N. G. Neutralizer — "Windy" Wallace, George Woodisse.

Atlas Mix House — Hi Hanson, Charles B. Olson.

Shell House — Frank Stone, from Repauno; Jared Welton, John Sampson, Frank Parker, Homer Brisson and Mike Cassidy, repairman.

Acid Area — Jim Monahan, Pete Flones, Bob Anderson, Julius Hustland.

Soda Dry House — Dave McCarthy, Jim Murphy, John Larson.

Ammonia Neutralizer — Herman Kluge.

Nitric Acid Concentrator or "Pan House" — Jim Williamson, Bob Urquhart.

Ammonia Crystallizer — John Erickson, John Cease, Ernie Fahrig.

Acid Recovery — Fred LaFlamme.

Soda Bag Refinery or "Bag Wash" — Joe Tracy, laundryman, Oscar Bartness, helper. Later school boys worked in the "bag wash" during summer vacations.

N. G. Waste Acid House — Adolph Kinney.

During construction of the power house, live steam was supplied by a portable boiler. The first fireman was Carl "Charlie" Ekholm, later a pipefitter for many years.

Jack Dohme was the first power house foreman and his men included Bill Fenton, Joe Arseneau, Walter Wick, Carl Gasman, Charlie Downey and Curly Ellison.

The first foreman of the operating department carpenter shop was John Bergquist. He was followed by Jacob Jackson, with Christ Albechtson as assistant. Carl Kinney was perhaps the first carpenter hired at Barksdale. Others were George Lamere and Ole Hoel. During World War I and later the carpenter shop was called "Norway House". Hagbart Pedersen was in charge. Although Lauren Porter and Leo King were not Scandinavians they sometimes received their instructions in Norske as well as English.

Fred Tanneberg was the paint foreman for many years and was succeeded by Ole Larson. His son, Arnold, has held the same job since 1950. The third generation of this family is represented at Barksdale by Arnold's daughter, Betty Ann, a stenographer.

Charles Hare was one of the first operators in the neutralizer on No. 2 N. G. line after it was built early in 1906. He had the distinction of operating the cleanest and neatest N. G. neutralizer in any Company plant. At a meeting of plant managers here, it was the showplace of the plant and all managers inspected it. Until his death Mr. Hare served as postmaster in the village of Barksdale, a position now held by his daughter, Agnes. His son, Clarence, who began at Barksdale in 1911 as a laboratory boy, is now employed at the Louviers, Colorado, plant.

The first stenographer was Miss Cedar Noyes, who was succeeded by C. Leon Johnon. He remained until 1915, when he went to Repauno as chief clerk. Later he returned to Barksdale and is chief clerk at this writing.

EARLY ACCIDENTS

The first classified major injuries after operations began were suffered by Dolph Tateroe and Anton Wedal. Tateroe broke a leg and Wedal broke two ribs while measuring a belt on a running pulley.

Although Barksdale was a modern plant and all possible precautions were taken, a terrific explosion occurred at No. 1 N. G. Neutralizer on July 16, 1906, killing three men; I. L. Pierce, plant superintendent; George Woodisse, line foreman; "Windy" Wallace, operator.

Willis "Buck" Harrington served as temporary superintendent until arrival of Charles A. Patterson. Pete Wishert was assistant superintendent. Production was not disrupted, as the No. 2 N. G. line had been completed and was ready for operation. It was at this time that production of gelatin dynamite was started.

In September, 1907, a second serious explosion, in the No. 1 N. G. storehouse, resulted in three more fatalities; Ole Wick, Arnold Hustland and Hans Wick. The two Wicks were not brothers but may have been related.

F. T. Beers succeeded C. A. Patterson as superintendent in 1908 and during his first year was injured in a third explosion. The N. G. neutralizer blew up, killing the operator, "Strawberry" Weber. Mr. Beers had just left the building when the blast occurred and was struck by debris.

Causes of these accidents could not be determined but every possible effort was made to reduce risks. Lead tubs replaced wood tubs in the N. G. neutralizer and storehouse and other changes were made. There were no more fatal blasts from 1908 until 1916, during the World War I rush, although there were minor mishaps and fires.

START OF A SAFETY PROGRAM

The DuPont Company's responsibility for the safety of employees was recognized by the founder when the first powder plant was built in 1802. Safety practices and precautions were encouraged in all plants, including Barksdale, from the start. About 1912 this policy was given strength here by the hiring of a man trained in safety work to promote safety education and reduce accidents. The first safety supervisor was John Upham.

The employee safety committee originated at Barksdale, it is believed. These were groups of three members — foremen and working leaders — the personnel changing every three months. Harry Fahrig, Charles Hare and George Lee were one of the first safety committees to inspect the plant.

To reach foreign-born workers, safety lectures were printed in four or five languages. Safety rallies for employees and their families were entertaining as well as educational, proving popular and effective. The first was held in Washburn in 1913.

Partly as a result of these efforts, Barksdale won many of the "A" awards in the yearly competition between plants. "B" awards were made in monthly competition between departments, stimulating interest among workers. A "Prize Court" of plant managers and company executives made the awards. Supt. Beers was one of the members of the "Prize Court."

TNT PRODUCTION STARTS

It was in 1912 that production of trinitrotoluene, or TNT, the explosive that was to give the Barksdale plant world-wide fame, was started here.

TNT had been made on an experimental scale at Eastern Laboratory as early as 1909 but did not become well-known until World War I. When production of TNT was launched at Barksdale, it was for use in making dynamite.

The first TNT plant was built under the supervision of Henry Christofferson, brother of Carl. Paul Kaiser came here to be the first TNT superintendent. Among the first local men to work on the new line were: George and Bob Williamson, "Toots" Kearns, Chester Kinney, Harold Moore, Lambert Bourgo, "Bricky" Bolin, Art Anderson, George Mager, Joe and Ted Durocher, "Klondike" Chesney and Henry Charbonneau.

With the outbreak of World War I, the DuPont Company was called on to produce military explosives for the Allies and TNT production at Barksdale was expanded greatly. Three more TNT plants were built at first, with about 600 men employed on construction. Eventually ten units were built and operated. When they were running at full capacity, the Barksdale plant was the largest producer of TNT in the world. From 1913 through 1918, production totaled 130,000,000 pounds of TNT, the peak being reached in 1918. Barksdale also turned out 90,000,000 lbs. of commercial explosives during World War I.

Most TNT was packed in 100 lb. boxes banded with metal straps. Some, in a molten state, was poured into contact depth bombs, each holding about 250 lbs. TNT also was pressed into blocks and electro-plated with copper for protection. Later the uncoated blocks were packed in tin cans, called bombs. The TNT block operation was done mostly by physically-handicapped employees, as the work was light.

In 1918 a ten-unit TNT plant was started at Racine and several Barksdale men, including Al Garberg, Henry Christofferson, Enoch Ekholm, Amos Nelson and George Potts, went there to supervise construction but work stopped when the war ended.

THE HASKELL CLUB

In 1909 Supt. Beers helped organize a club to provide housing and improve social conditions for unmarried chemists and supervisors. It was named the "Haskell Club" in honor of H. G. Haskell, who had worked with H. M. Barksdale in organizing the Company's explosives operating department and later became general manager of the high explosives department.

This club, one of the first of its kind sponsored by the Company, had its original quarters on the sceond and third floors of the Bayfield County Bank building. Expenses were divided among 10 to 13 members. The Company also provided a lunch room at the plant for the Haskell Club boys and staff members. Breakfast, lunch and supper were available at 25c per meal. Some of the supervisors lived upstairs in the plant office.

During World War I the club moved to the upper floor of the F. T. Beers club. In the latter part of the war the building now occupied by the Washburn hospital was erected for the Haskell club. After the war the club, considerably reduced in numbers, moved to the duplex on East Third street. The club finally came to an end in June, 1946, when Frank Wuest, lone survivor of the "Benedicts", moved out and the house was sold. The club building built during the war was taken over by Dr. Albert A. Axley and opened as the Washburn hospital in 1922.

THE BARKSDALE BENEFIT ASSOCIATION

Commonly called the B. B. A., the Barksdale Benefit Association was organized in July 1912 at the suggestion of Supt. Beers. It was then and still is the only organization of its kind in the Company. In describing its advantages at a meeting of the Company's superintendents, Supt. Beers said: "Besides providing means for sustaining life during time of sickness and keeping members out of the hands of loan sharks, it should aid in inducing employees to remain in the employ of the Company instead of migrating from one employment to another with consequent loss of wages."

Still operating, the B. B. A. is in good financial condition, having survived three wars, two depressions and one epidemic.

First officers were: Harry Fahrig, president; Charles "O. V." Anderson, vice-president; C. W. Hare, secretary-treasurer. Jack Murphy was secretary-treasurer from 1917 to 1952, except for one year. Present officers are Earl Ross, Harvey Rowe and Ernest H. Holman.

Alvin N. Swanson and Lawrence Daigle are on the sick committee.

THE BARKSDALE PLANT FARM

To utilize idle acres and provide feed for the horses and mules, farming was tried on the plant during the years prior to World War I. G. A. "Cy" Allan was the farm superintendent and George Donley the barn boss. Sheep and goats were put on the land north of the road between main gate and office to clean up grass, weeds and brush. Logs and stumps were blasted and piled for burning. Wheat, hay, oats, peas and potatoes were tried. Yields were fair but land clearing costs were high and money was lost in 1911, 1912, and 1913. A dairy herd was contemplated but the idea was dropped with the coming of World War I.

The farm residence and barn remained for many years. In the early twenties, Carl R. Thoreson lived there and cut the hay. Later the office force ate noon lunch there, prepared by "Ma" Donley.

For several years the noon lunch was served by Mrs. William Mitchell at her home in Barksdale. Then a lunch room was set up in part of the store office and Mrs. Edna Peterson cooked and served the noon meal for many years until 1950, when the practice was discontinned.

THE PLANT DEER HERD

Deer roamed the wooded areas of the plant from the start and increased greatly after erection of the guard fence in World War I, as the enclosed area offered some protection as well as natural food. The danger to the plant of stray bullets from the high-powered rifles of poachers was recognized by Sup. Beers and he hired special deputies, paying them regular wages plus $5.00 for each man they arrested. One year they arrested five or six and the effect was salutary.

It was fortunate that Supt. Beers did not know that certain employees occasionally shot rabbits and partridge in the ravine back of the N. G. line, with which Fred Chritianson would make stew on his forge. Percy Williamson remembers eating some on a visit to the plant as a boy.

While M. C. Knake was plant manager the deer herd increased to 300 to 400 head. Natural feed was exhausted and feeding did not offer a satisfactory solution, so the herd has been reduced by periodic trapping by the Wisconsin Conservation department. It now probably numbers less than 50 head.

THE F. T. BEERS CLUB

Recognizing the need of a recreational center for employees in World War I, the Company purchased the Sheridan Block

in 1914 located where the DuPont Club now stands. The building was remodeled, bowling alleys were installed and lunch and lounging rooms furnished.

Named the "F. T. Beers Club" in honor of Supt. Beers, who was president ex officio, the club opened October 29, 1915. Hi Hanson was the first president and Charles Frost the first secretary. H. H. Higbee managed the store and looked after the club rooms. By 1916 there were 500 members. On paydays, the club was used as a pay station.

Bowling was popular and departmental teams were formed. A baseball team was sponsored, managed by Mr. Pratt. Homer Posey and Art Peterson were the only local players. Chin Swanson and John Daly were mascots.

In 1917 the F. T. Beers Club burned down and the present DuPont Club, first called the DuPont Y. M. C. A. was erected in 1918.

WOMEN EMPLOYEES AT BARKSDALE

The first woman employee was Cedar Noyes, who was hired as a stenographer about 1906. Minnie Anderson came later and Mabel Kinney started in 1909. During World War I there were several, including Mabel Holman, Adelaide Wussow, Tilda Moland, Gertrude Kane, Hilda Moland, Marie Larson, Sal Lindgren, and Nora Olson.

About 1912, women were hired for "picking shells" at the shell house. The first girls were Frances Dibbell, Mary Callahan, Blanche Lamoreaux, Myrtle Ramstead, Minnie Cousineau, Hilma Sampson, and Martha Pallage. Others were hired during World War I, and many worked as kitchen help at the barracks.

Early in 1944, because of the World War II shortage of manpower, it became necessary to employ many women and the total reached 90. They worked in the block line, in the TNT wash house, as clerks, stenographers and chemists, and, in the latter part of the war, in some of the dynamite buildings. Special facilities were provided for their safety and comfort and some of the work was rearranged. They proved to be competent and willing "soldiers of production."

EMPLOYEE TRANSPORTATION IN WORLD WAR I

The great increase in employment resulted in a rapidly growing work train running between Washburn and Barksdale. By July 1915 there were 12 coaches accomodating 700 men. By August, 18 coaches made up one train. Twenty coaches were too many for "Old No. 99" to pull, so they were divided between two trains. Eventually one train had 14 coaches and one 12. A count on one train revealed 1,181 men riding it. Jadie Manning and Charlie Wolfe were conductors and Bert Harrington was one of the engineers.

Efforts to put on a work train from Ashland, so that more employees could live there, were unsuccessful, but eventually a one coach work train came from across the bay. Some employees living in Ashland rode bicycles to work and in winter some even skated across the bay.

ACCIDENTS DURING WORLD WAR I

Thousands were employed around the clock, production was tremendous and operations were new and unfamiliar to most workers, but few serious accidents occurred during the war.

The first major mishap since 1908 resulted when the DNT nitrator exploded in 1916. David Michand and Henry Ebner, operators, were killed.

In 1918, two men, strangers to this area, were killed when a flat car loaded with rock, pushed by a gas engine, jumped the track and tipped over.

The worst accident up to that time happened August 2, 1918, when a TNT fortifier blew up, killing the operator, his helper and five laborers working outside the building, including two local men, Andrew Johnson, father of Joe Johnson, and Andrew Borgren.

WORLD WAR I POLICE SYSTEM

For the first time since establishment of the plant, security became a necessity in World War I and the free and easy ways of the past were discarded. This was largely because of the fear of pro-German espionage and sabotage and the hundreds of plant workers of unknown origin and character. A guard fence eight feet high and six or seven miles long was erected around the major portion of the plant property. Search-lights in watch towers swept the cleared area along the fences and scanned the night skies. Every employee wore a watch fob with his picture and payroll number. Men were searched on the work train before entering the plant and matches, guns, cameras, etc., were banned. Other precautions were taken and there were many wild rumors of German bomb plots and even air raids that never materialized.

The plant police force was composed of six mounted and 34 walking policemen. Chief of the Barksdale police force was Mr. Johnson and the assistant chief, Jim French. Men from this area on the force included: Gideon Chauvin and Oliver Wescott, who had been Washburn police chiefs, Harvey Irish, Clarence Wright, Ole Holm, Rude Dahl, Pete Kjarvick, Harry Wieman,

Paddy Wilson, Jack Moon, Andrew Nelson, Ed Gruber, Jac mons, Hjalmar Frostman, Earl Carnick, Harvey and Ra Hudson.

OTHER WORLD WAR I PRODUCTS

To ease the raw material problem, trinitroxylene or TN introduced. It closely resembled TNT, with xylene re the toluene as the basic ingredient. Five TNX units we in the area east of the north gate. Only small amount made, in trial runs, and one carload of TNX was shipped Barksdale, according to Joe Johnson, who made the boxes Some of the men who worked on the TNX operation wer drew Mesner, Henry Charbonneau, Albert Meloche and Peck. One mishap is remembered. A muffled explosio the nitrator half-way through a brick wall, but no one jured.

Another World War I product was trivilene or DNT, su to be a lubricating explosive to help shoot charges from There were two DNT lines in operation, one double an single unit. Among the DNT workers were Helmer Moe 'es Rogahn, Homer Posey, Leonard Hanson, Ernald Berna Lindblad, Andrew Arntsen, Alf Wedin, Carl Lindstrom a Blexrude. Trivilene workers developed orange-yellow ha reddish hair. After the War DNT was shipped to the ville plant near Milwaukee and used in producing dyes.

Lydol, used in making dynamite, was also made during War I. Only one unit was built. Fred Rhody was in and Newell Leighton and Red Sykes also worked there.

THE WORLD WAR I "BOOM"

The influx of several thousand workers for the Barksdal launched a hectic boom in Washburn. At the peak of const and operations close to 6000 were employed at the plant. burn's population climbed to 8000 to 10,000.

All vacant business and residential buildings were soo pied. Many were turned into boarding and rooming house businesses of various kinds were started. New dv sprang up on vacant lots.

To provide homes for officials, the Company erected dwellings along East Third Street. The Superintendent's and others in that block were put up in 1916 by Charles Ashland contractor.

Late in the war, many homes were erected by the C between Bayfield and Fourth Streets, from Fifth avenu to Superior avenue. After the war, these were sold to M Wells Company and moved to Duluth in sections.

The Loveland Company erected many dwellings in the "DuPont Park" addition on the northeast edge of the city and the Washburn Dwellings Company put up several houses on scattered vacant lots.

As Washburn was unable to take care of the entire influx, barracks were erected at Barksdale and over 2000 employees were housed and fed there during the latter part of the war.

Many workers had families and Washburn's school population swelled to 1600 in 1915 and more later. All schools were jammed full and a temporary two-room schoolhouse was erected.

WORLD WAR I MISCELLANY

In August 1915 the plant went on the 8-hour day. Prior to this some of the operations had worked two shifts, one of 10 hours and one of 14. During the war wages climbed to 65c per hour for some of the higher paying jobs. In the early years the scale was 17½c per hour for labor and 27½c for operators and experienced craftsmen.

Plant expansion required more water than the wells could supply, so digging of a water line from the bay was started in April, 1915. About 200 additional men were employed. The line was about three-quarters of a mile long and the tank 110 feet high, with a total elevation of 250 to 300 feet above the lake.

Washburn voted to go "dry" in 1914, but Ashland remained "wet". This may have been one of the reasons management seemed to encourage expansion of Washburn more than Ashland.

When the Omaha station was built, the employment office was moved to the main gate nearby. Phil Axelberg and Bill Hamilton did some of the hiring. After the U. S. entered the war in 1917, the slogan was "Work or fight!" and thousands thronged here from all parts of the country.

As Barksdale was making explosives for the Allies, military officers from England, China, Italy, France and Russia appeared to inspect the plant and especially the TNT department. M. C. Knake, then general superintendent under Supt. Beers, showed them around. During the boom period, Supt. Beers had both an assistant superintendent and a general superintendent to help him.

Barksdale employees formed the DuPont Patriotic Association in World War I to contribute to various war causes. Each member donated two hours wages per month as dues and wore a small oval brass lapel pin bearing the letters D.P.A. When the war ended funds remained in the treasury and were used to acquire the land for Memorial Park, named to honor the men

who served in the armed forces. The plaque on the boulder at the park entrance was made by Carl Christofferson from the brass DPA pins turned in by employees. The park has been the scene of many plant picnics and has been a great source of comfort and pleasure to the community.

MEDICAL PROBLEMS AND PROGRAMS

In Barksdale's early days, physical examinations were unheard of and first-aid for minor injuries usually was administered by chemists at the laboratory, as there was no company doctor, part-time or full-time. All plants had Dr. W. G. Hudson's first-aid handbook, and first-aid kits were placed in the many change houses on the plant.

Sanitary drinking fountains appeared in 1913. The war brought on more stringent health rules. "No Spitting on the Floor" signs were placed in the work train coaches. Inoculations against many diseases became compulsory.

In 1914 the Company purchased a baggage and mail coach for $800 and converted it into a hospital, stationed on a siding west of the soda storehouse. The purpose of the mobile hospital was to carry seriously injured men by rail to Ashland or Washburn hospitals. It was used only once for this purpose, following an explosion at one of the TNT buildings. In the early 1920's a small hospital was set up in the employment office. After remaining idle for many years, the hospital car was removed from the plant in 1935.

Dr. P. J. Frey was the first doctor to be employed at the plant on a part-time basis, starting in 1916. He was succeeded by Dr. W. G. Lampson, who served until 1919. During the flu epidemic, which affected many plant men and their families, these two doctors worked together to combat the disease. A "pest house" was set up at Barksdale and those suspected of being ill were isolated for observation. Washburn had no hospital, so the Garfield school was used to isolate and care for the most severe cases. Most flu victims were cared for at home.

Dr. Albert A. Axley followed Dr. Lampson as Company doctor in 1919. Later he acquired the Haskell Club building and opened the Washburn hospital there in 1922.

THE DU PONT CLUB

Erected after the burning of the F. T. Beers Club in 1917, the DuPont Club building was operated as the Dupont Y.M.C.A. for several years. J. C. Manville was the manager and Hobe Bondi the athletic director. Harold Picklesimer succeeded Mr. Manville.

After the "DuPont Club of Barksdale" was organized and took over the building, early managers were Jens and Enard Albrechtson.

For three and one-half decades, this building has been the recreational and social center of Washburn, serving not only DuPont employees and their families but the entire population. The original two bowling alleys were so popular that an addition housing two more was built in 1940. The gym has been the home floor of many Washburn high school, Boy Scout and DuPont Club basketball teams and has also been used for dances, card parties, bingo games, "mixers", banquets and other gatherings. In the 1920's it was used regularly as a movie theater.

Always used for many Washburn high school activities, the club was pressed into service as an emergency high school building following the destruction of the Walker high school by fire February 5, 1947. Temporary partitions were edected in the main floor lounge and the second-floor auditorium to make classrooms. The club served as high school, rent free, until completion of the new high school building in the spring of 1950.

The Company contributed $35,000 toward construction of the new high school. In 1942 the Company made a contribution of $30,000 for the elementary school built that year.

In the middle 1920's, when the City of Washburn was in dire financial straits, the Company had displayed a generous spirit of cooperation by voluntarily accepting a double assessment of all its residential property and the DuPont club. This double assessment continued for many years and effected a substantial contribution to the city's financial welfare.

POST-WAR RECESSION

Armistice Day, November 11, 1918, brought a sudden end to war production. Military explosives were no longer needed and government contracts were cancelled. Men were discharged almost as fast as they had been hired at the beginning of the war.

Once again dynamite was the only product in demand and the many buildings used for production of war materials were required no more. The TNX buildings, most of the TNT units and all but one O. V. unit were dismantled by the Bremmer Company and the Bosley Wrecking Company. Many local men worked on the razing job after leaving the DuPont payroll. The original TNT plant was left as a stand-by. A huge, unfinished concrete coal crusher was left as a "monument" to World War I and is still standing.

In the post-war period, the plant reached what was probably the lowest level of its history, operating only 12 hours per week, with few employees.

"AGRITOL", "SODATOL", AND "PYROTOL"

Large government stocks of smokeless powder were left after the war and it was decided to convert it into commercial explosives at Barksdale for sale to farmers at cost for land clearing. A plant to grind and dry the powder was built in 1922 and started operating that fall.

As the powder was shipped here in zinc-lined boxes, which had to be opened in a separate building, one unit of the "smokeless line" was called the "can opener house." Other units were: a "grinder" building where the powder was ground in water, a screening house, four dry houses and a store house.

The smokeless was mixed with other ingredients, packed in shells and sold as "Agritol". At the same time, the powder line was making "Sodatol", packed in shells, and "Pyrotol", packed in tin cans, 50 lbs. to the can, also for sale at cost to farmers. No new buildings were erected for "Sodatol" and "Pyrotol". The "Atlas Mixing" house and "Figure 8" machine were used. In 1927 the "Figure 8" machine was replaced by the "Tally Mixer No. 1".

The "Smokeless Line" worked three shifts at times, from 1922 to the spring of 1928, when the government stocks were depleted. Fred Rhody was the first foreman and Tom Peterson, Joe Johnson, Chester Wolfe, Nels Swanson, Henry Larson and Art Day were some of the first workers. Martin Anderson, Hannum Holman, Tuffy Lizotte and Ernie Holman were laboratory boys. Richard Hanson was the government inspector.

The dry smokeless powder was highly inflammable and, although every possible precaution was taken, an explosion occurred in February 1925. Severe burns were suffered by George Murray, who died, and Carl Malcheski, who survived.

In 1927 Barksdale made a high production record, turning out 27,151,550 lbs. of dynamite, 4,000,000 lbs, of "Sodatol" and 6,000,000 lbs. of "Pyrotol".

The smokeless plant was dismantled partially after it was shut down but one drier and the storehouse were used for other purposes for many years. The drier was converted into a TNT block press house. Around 1930 J. B. Castner, explosives expert, experimented with pressing "Nitramon", then a new explosive, into blocks. Men who worked in the press house were Fred Cudmore, Les Lindblad, William Gilstead, Lawrence Miller, Ed Tourville, Art Score, and Ernie Flodeen.

THE "PRESIDENT'S PRIZE"

In 1922 the Barksdale plant established a no-accident record of 1,059,415 exposure hours, the first such record over one million hours in the Company's history. Approximately 200 employees worked 28 months or 851 calendar days without a major injury.

This safety record was so outstanding that Irenee du Pont, then President of the Company, offered to recognize an unusual no-accident record at any plant, by personally contributing a suitable award. This became known as the "President's Prize" and is still in existence.

The record was made under the supervision of F. T. Beers, plant superintendent, and G. L. Knotts, safety supervisor.

THE BLIZZARD OF 1922

Remembered as the most severe winter storm that ever struck this region, the Washington's Birthday blizzard of 1922 piled up snowdrifts 10 to 15 feet high, isolated the Barksdale plant for several days, and tied up operations for about a week.

A. G. Ward was the power engineer and his crew, J. H. Hanson, George Welty, Jim Fisk, August Lindquist, Louis Malinoski, Eben Burdick, John Goszewski, Mike Oberts and John Niemczyk, stayed at the power house for 72 hours without relief.

Before the snow became too deep, the work train made a final trip to the plant, bringing food, tobacco and snuff. Smoking was permitted in the power house during the time it was isolated.

Joe Kasmarek, Hagbart Pedersen, Jens Langerude and Carl Christofferson slept and ate in the girls' rest room near the main office. Mrs. William Mitchell made soup and lunches at her home in the village and Fire Chief MacDonald delivered the food on skis. Hagbart and Jens made skis and skied to Washburn.

Al Garberg, Al Swanson and Henry Stuhlman came out from Washburn in a sleigh from Bergquist's Livery, with two teams of horses to break through the drifts. To save coal, they drained steam lines to some of the buildings.

When the coal supply was getting low, Bert Harrington, engineer on the "Scoot" locomotive, broke through from Bayfield, where he had been stranded by the storm. Aided by another engine, he moved cars of coal to the power house.

CHANGES IN MANAGEMENT

In the fall of 1923, F. T. Beers was transferred to the Du Pont, Washington, plant after 15 years of management at Barksdale. He had seen the plant grow from 200 to 300 employees in 1908

up to almost 6,000 in 1918 and return to a normal level after the war.

Mr. Beers was succeeded as manager by R. T. Cann, who stayed five years at Barksdale and was transferred in the fall of 1928 to a plant at Buffalo, N. Y.

Succeeding Manager Cann was M. C. Knake, who already was known at Barksdale, having been here previously as acid superintendent and as general superintendent under Supt. Beers in World War 1. He had taken several Barksdale employees with him to Ramsay, Montana, when the plant was started there in 1914.

NEW UNITS CONSTRUCTED

A new process of making nitric acid, called the ammonia oxidation process, had been developed in 1920 at the Eastern Laboratory. In 1928 an A. O. P. plant was constructed at Barksdale at a cost of $425,000. To provide more power, additions to the power plant, including the "spray pond" were made at the same time.

The A. O. P. plant elminated the old nitric stills, "monkey house" and the by-product, nitre cake.

First A. O. P. operators were Jack Beaulieu, Jack Lamoreaux, Ben Rude and Earl Ross.

A nitric acid recovery was built in 1930 and a sulphuric acid concentrator later to provide for expected expansion and to eliminate out-dated processes in use since the first TNT plant was built.

First N. A. C. and Recovery operators were Bob Urquhart, Jack Beaulieu, Jack Lamoreaux and Ed Joanis. First S. A. C. operators were Ben Rude, Bill Anderson, Herb Swanson, George Frechette and Ernest Holman.

TRANSPORTATION IN THE 1920's

In the early 1920's, midnight shift workers rode to the plant in winter in a horse-drawn carry-all from Bergquist's Livery and the 4 p. m. shift men came back to Washburn on the carry-all's return trip. The 4 p. m. men went out on the afternoon work train and the midnight men returned on the morning work train. In severely cold weather, the carry-all riders would get out and run to keep warm.

Later, Oscar Plumpton, who ran the Bayview Hotel, transported the shift workers in his taxi, a 1920 model Chevrolet touring car.

In the latter 1920's, shift men were transported in a Company

G. M. C. truck with a canvas-covered truck box and benches. George Mager was the first driver, followed by Ole Olson and "Sparky" Nelson. They were machine shop men who drove the truck on extra time.

As more and more men drove their own cars to work, the number of work train passengers decreased until in 1928 the service was suspended.

MISCELLANY OF THE 1920's

Many Barksdale employees lost savings when both Washburn banks closed in 1924.

The first of a series of annual picnics was held Aug. 16, 1925 at Memorial Park.

Nitrate of soda for Barksdale was brought to the Washburn dock by two Norwegian ships, stirring up local interest in the possibility of the St. Lawrence Seaway.

In June, 1928, 7,000 cases of dynamite were shipped to Calcite, Michigan, on a barge towed by a tug. This was the first shipment of Barksdale products by water.

The second serious accident of the 1920's occurred August 24, 1928, when Gelatin Punching House No. 1 exploded, killing Conrad Holman, father of Glenn, and Albin Renstrom, brother of John. This was to be the last life-taking explosion until October 15, 1952.

An overdose of fumes resulted in the death of Anton Mager only a day before the gelatin punching house blast.

DEPRESSION OF THE 1930's

Business was good in 1928 and 1929 but the country-wide depression began to be felt in 1930. Employment decreased until by August of 1932 only 50 men were employed. For a time they worked only six hours per day. Numbers of men in the various departments were: power—8; maintenance—12; service—7; acid—6; powder—17.

Men who formerly had supervisory jobs were working part-time or full-time in their areas. Harry Robinson was a carpenter with Hagbart Pedersen. The acid supervisor, Henry Howell, and chemist, Alvin Johnson, did the laboratory work and operated the electric locomotive when acid cars were moved.

In 1933 the low point in dynamite production was reached—a total of only 4,473,425 lbs. for the year. Business began to improve in 1934.

WORKS COUNCIL AND B. W. P. A.

To promote harmony between management and labor, the Company established a Works Council about 1935. Labor representatives were elected by fellow workers in each department. They would meet with management's representatives to consider employees' grievances, wage problems and other matters. This council was dissolved in 1937, as it was considered a "company-dominated" union under the Wagner Act.

In 1938 the employes organized their own independent union, the Barksdale Workmen's Protective Association, and 85 percent of the workers voted to have it act as their sole bargaining agent. Some of the first officers and representatives were C. A. Nelson, Earl Ross, Stanoe Stefinske, Ed Laurion, Enoch Eckholm and Ernest Holman.

The B. W. P. A. died around the start of World War II as there was no real need for a bargaining agent at Barksdale. No serious labor problems ever arose here, as there is more harmony and co-operation between labor and management at Barksdale than usually exists in a plant this size. This happy situation reflects great credit on both parties.

MCK'S BEACH CLUBHOUSE

"To provide recreational facilities of a social nature for Barksdale employees", a clubhouse was built on the shore of Chequamegon bay near the village of Barksdale in 1936. The Company furnished the material and employees donated the labor. Prime movers of the project were Oscar E. Olsen, Andy Johnson and Harry Robinson. Lauren Porter supervised construction of the large field stone fireplace.

The committee headed by Oscar E. Olsen named the clubhouse "MCK'S Beach", pronounced "Mack's Beach", in honor of Manager M. C. Knake.

The clubhouse has been used for Twenty Year Club meetings, annual meetings of the B. B. A. departmental parties, safety rallies, farewell parties, wedding parties and family picnics and reunions. The governing board is composed of the chairmen of the Twenty Year club, the B. B. A. and the DuPont Club and the service supervisor.

MODERN HOSPITAL FACILITIES

After January 1, 1929, physical examinations were available for those who desired them and E. V. Albrechtson urged department heads to encourage their men to take them. Annual physical exams became required a little later.

Dr. Albert A. Axley, Company doctor since 1919, died in 1935 and was succeeded by Dr. A. C. Taylor.

Modern hospital facilities were installed in the main office building for examinations and treatment of employees. Chest x-rays at two-year intervals became part of the health program.

In 1939, because of TNT expansion, a hospital attendant was needed and Bud Bodin was employed in that capacity.

Dr. John H. Juhl succeeded Dr. Taylor in 1941, becoming the first full-time plant doctor.

VARIOUS EVENTS OF THE 1930'S

In January 1934 a major injury occurred at Barksdale when Ben Page received a fatal dose of nitrous fumes.

On April 28, 1935, Charles "Finney" Christiansen died from a heart attack in his car after passing through the main gate on his way to work.

Air conditioning equipment was installed in all powder buildings in 1937 for the purpose of eliminating fumes which caused headaches. A new change house with modern toilet facilities was erected in 1937 for all powder line men except box factory and shell house workers. Formerly, the powder area was dotted with small, stuffy change houses and "Chic Sale" facilities rather close to the powder buildings. Only three of the primitive reminders of yesteryear now remain on the plant.

In June, 1937, the Company's disability wage plan became effective, offering full wages for 13 weeks after a two-day waiting period.

No. 2 Talley Mixing House was erected in 1937 to replace the old "Atlas Mix" house, completely modernizing the mixing of dynamite.

The powder line went all through the 1930's without a major mishap and by 1940 had established a no-accident record of 12 years, the best record made by any powder department in the Company. Bill Garwood was powder superintendent at that time.

At the same time the service department boasted of 14 years without a major injury.

APPRENTICESHIPS OFFERED

In 1937, apprenticeships were offered to men unler 30 years old, for the first time since before World War I. Eight men completed courses: Robert R. Lindsey, carpenter, who became carpenter foreman and is now assistant general maintenance foreman; Harold W. Carlson, electrician, who is now the electric shop foreman; Leonard Peterson and Harvey Rowe, machinists, now in the machine shop; William Lund, pipefitter, now in the

pipe shop; Phil Lindsey, Glenn Holman and George Schultz, who completed their courses after World War II and are now employed as electrician, mechanic and carpenter, respectively.

Several other young men started courses but were called into service and did not return to Barksdale.

Present apprentices are Ed Ludack, power; L. Art Cuty, machinist; Elliott Peterson and Melvin Moe, pipefitters; Robert Smolen, carpenter; Robert Carlson and Roy Ledin, general mechanics; Arne Piirtola, electrician; Leo Justice, machine and lead; and George "Red" Barr, engineering draftsman. "Red" was one of the Doolittle fliers who bombed Tokyo and survived imprisonment in Japan in World War II.

Joseph Sinclair was the first apprentice instructor and others were Dick Fahrig, Dan Knake, Don Pedersen, Ken Brown, Don Stitzer, Jim Sherman, Roger Steele and Bard Quillman, who has the job at present.

TNT PRODUCTION 1934-1945

Barksdale's No. 1 TNT line, which was the only commercial TNT plant in operation in the U. S. between World War I and II, had operated off and on from 1920 to 1931. In 1934 it began producing again for the U. S. government and operated continuously until the end of World War II.

TNT "slabs" had been made in the No. 1 Graining House and later in the old chloride refined TNT finishing house. Melted TNT was poured into flat shallow pans and removed after it cooled off or "froze" Joe Cotty, Harry Newman and Andy Chapman were workers on the first TNT slabs.

In 1939 a second TNT plant was built to speed up production for the pre-war defense program. Embodying all improvements in TNT production developed since World War I, it became the proving ground for still more improvements.

Sarting in 1940 with a daily capacity of 33,000 lbs., it was turning out 100,000 lbs. per day by 1941. The No. 1 line was boosted from 20,000 lbs. a day to 60,000 lbs. All production quotas requested by the Armed Forces were met or exceeded.

To balance the TNT lines, additions to the acid area and power house were built. A TNT "block" line, with a capacity of 18,000 one-half pound blocks per day, was also added. Bulk TNT was pressed into rectangular blocks under 22,000 lbs. pressure. Improvements increased capacity to 40,000 blocks per day.

Employment rapidly expanded from 350 to 600 men and women, from all parts of this area.

Total production in World War II included 208,000,000 pounds of bulk TNT plus 18,000,000 lbs. of TNT blocks, almost twice as much as the 130,000,000 lbs. turned out in World War I. The production peak was reached in 1944 when 44,223,566 lbs. were produced by the two units.

At the same time, Barksdale produced 102,000,000 lbs. of commercial explosives, substantially more than the 90,000,000 lbs. of World War I. Barksdale dynamite played a vital part in the war effort, some of it being used in construction of the Mac Arthur locks and the deepening of St. Mary's river at the Sault.

THE "UNIVERSITY OF BARKSDALE"

Because the Barksdale plant was the only operating TNT plant in the nation when World War II broke out and because our men had a vast fund of TNT "know-how", this was selected as the site for a TNT training school, which became known as the "University of Barksdale". W. T. Cloud was the first school manager.

Over 300 men, from superintendents to operators, came here from all over the U. S. and Canada to learn the art and science of TNT manufacture. These men became the nucleus of the large force of workers who operated the huge TNT plants erected in various parts of the continent.

CONTRIBUTORS TO TNT PROGRAM

Many men of Barksdale contributed substantially to TNT production before and during World War II but probably the outstanding contribution was made by the late Oscar E. Olsen, concerning whom the following statement was made by Manager M. C. Knake after the war ended:

"Because of the high regard in which O. E. Olsen was held by all, Management saw fit to single him out after his untimely death, at the height of his career, to pay tribute to him for what he had contributed towards the development of the art of TNT manufacture. His broad experience in the practical phase of TNT manufacture had gained him the position as the outstanding man in the TNT industry. His advice and counsel was frequently in demand and he always pleasantly responded."

Another Barksdale man who made a valuable contribution to the national TNT program was Harry L. Robinson. After serving as construction engineer on the No 2 TNT line here in 1939, he was transferred to Kankakee, Illinois, to help build the huge plant there. While stationed there he was called to Memphis, Tennessee, in an emergency and made a record by putting up a TNT "Tri-house" in only 38 hours.

Because of their TNT knowledge and ability, many other men of Barksdale, too numerous to mention here, were also called to other plants from time to time.

BARKSDALE WINS "E" AWARD

In recognition of exceptional performance, in production of war materials, the Army-Navy "E" was awarded to the Barksdale Works October 31, 1942. An impressive and memorable presentation ceremony was held December 1 at Dodd gymnasium in Ashland, with employees, their families and guests, numbering about 1300, attending. The "emcee" was Cedric Adams, Minneapolis radio commentator and newspaper columnist. F. R. Wilson, DuPont director of production, delivered congratulations from the management in Wilmington. The Army-Navy "E" pennant was presented to Manager Knake by Col. C. K. Harding. The Navy was represented by Commander B. W. Hunter, who presented Army-Navy "E" lapel buttons to representatives of the Barksdale employes as a token of presentation to all the men and women of Barksdale. Selected by the Labor-Management Committee, these representatives were: A. S. Torkelson, who gave the acceptance speech for the employees, Joe Cotty, Elmer Anderson, Joe DeMars, Rod Bourgo, Len Pallage, Myron Barry, Ernest Bellile and Mrs. "Sal" Lindgren.

After the initial "E" award, the Barksdale plant received a first star award in July 1943, a second in February 1944, a third in October, 1944, a fourth in May 1945 and a fifth in June 1945.

Congratulations for the outstanding job done at Barksdale were received from: General Dwight Eisenhower; W. S. Carpenter, president of the DuPont Company; E. B. Yancey, general manager; U. S. Senators Wiley and LaFollette; Gov. Julius P. Heil; P. J. Kimball, manager of the explosives division; Sam Baker, director of sales; F. T. Beers, J. W. Kitts, P. C. Kaiser, F. E. Jacquot, George Leith, and Larry Meyers.

GUARD FORCE OF WORLD WAR II

To insure security, members of a guard force were trained by Army personnel and sworn in as Auxiliary Military Police. Clarence Overdahl, former Ashland chief of police, became chief of the force. M. O. Thompson, Lyle Freeman, Herb Justice and Chester Wroblewski were sergeants

Some regular plant employees were transferred to the guard force, including: Ted Smolen, Al Lowe, Elmer Dagsgard, Herb Justice, M. O. Thompson, Joe Beaulieu, Olaf Dagsgard, Levi Anderson, John Handberg, Ted Martinson, Clarence Carlson, John Wroblewski, Art Smith, Ed Laurion, Albert Cousineau, Frank Brown, Sig Anderson and John Gust Wickstrom.

Many new men were also hired as guards and before the war ended the force was made up of 107 guards, 9 sergeants, 4 lieutenants and the chief. Wearing khaki uniforms, they patrolled the entire plant day and night and kept close watch from guard houses and observation towers at strategic locations. "How much sabotage this group prevented will never be known," stated Manager Knake.

A large change house and office for the force was built near the machine shop, with adjoining fence-enclosed parking lot. Cars entered through the north gate and reached the parking lot by a road that was also enclosed. No cars were allowed in the plant proper

Each employee wore an identification card with picture, pinned to coat or hat. Every card had an identifying color to indicate the employee's department and no one was permitted to roam in any area but his own without written permission.

The pumphouse and power house were guarded with special care. A military fence enclosed the power house and grounds.

At the end of the war the guard stations and additional fences were removed. Security restrictions were relaxed and the guard force was reduced to the normal peacetime number of watchmen. At present they are Oscar Bartness, Ed "Speed" Laurion, Art Day, Carl Palm and John Handberg as a relief man.

SAFETY AND CONSERVATION

A Labor-Management Transportation committee was formed to promote maximum, "Production With Safety", to stimulate suggestions for improvement, and to arrange for "car pools" and other transportation to conserve gasoline and rubber.

The first committee members, named in April 1942, were: Joe Dallas, chm., O. E. Olsen, Robert Williams, Stance Stefinske, Tom McManus, Al Garberg, C. A. Nelson and Ernie Holman, secretary. Others who served later were Harold Carlson, C. M. Hare, C. L. Johnson, A. Mellott, E. E. Stewart and John James.

Conservation of gas and rubber was given a big boost when DeMars Chevrolet Company, under Harvey DeMars, began transporting workers to and from the plant in three large busses, carrying 40 passengers each. Drivers were Jack Joanis, Carl Brenholt and Cy Kurschner. Hub Nichols and Web Beaulieu had diven busses for DeMars earlier.

TNT workers rode from the parking lot to their area in a converted narrow guage box car, with canvas top, pulled by one of the two new gas locomotives.

Conserving water and salvaging scrap were also vitally important. Dick Hedreen had charge of water conservation. Andy Johnson and Jack Murphy were in charge of salvage and the rule was, for a time, that if anything could not be used within a certain time, it was to be scrapped.

The cause of safety was promoted by a huge safety rally in 1943 at the DuPont Club, the outstanding event of the year.

Accidents were held to a minimum during the war, in spite of inexperienced men and new processes. This situation, said Manager Knake, "placed a tremendous responsibility on the older employees, but the group responded splendidly and, through their efforts, injuries and accidents were kept down."

Dr. John H. Juhl organized a first aid group composed of Carl Christofferson, Bud Bodin, Tom McManus, Ray Joanis, Ernie Holman, Enoch Ekholm and Elmer Dagsgard.

A fire brigade was organized with J. Herman Hanson as chief and Art Nelson as assistant. Members were: Lawrence Miller, Peter Johnson, George Mager, Harold Carlson, Dolph Swanson, Al Garberg, Bud Shaylor, Joe Kasmarek, "Bozo" Anderson, Pete Hanson, "Sparky" Nelson, Jack Beaulieu, Albin Carlson and Ray Cudmore.

THE BARKSDALE NEWS

In 1940 Manager Knake authorized publication of a monthly paper, the "Barksdale News" to succeed a mimeographed publication edited by George C. Watters, containing safety articles, jokes and other items of interest. Printed by the Ashland Press, the first edition appeared in July 1940 and made an immediate hit.

Hobey Chase was the editor and Eddie Anderson his assistant. First reporters were Joe Vizanko, Al Dervais, Oscar Olsen, Theron Robinson, Frank Kenton, Leonard Peterson and Ernest Holman.

The "Barksdale News" told the story of the works for almost ten years and copies followed Barksdale men in the armed forces all over the world. When it was discontinued in May 1950 news of its demise was received with genuine regret.

BARKSDALE MEN IN SERVICE

Selective Service for the Armed Forces steadily cut into Barksdale's personnel and before the war ended 153 employees entered the service. There were 97 in the Army, 40 in the Navy, 12 in the Air Force, and 4 in the Marine Corps.

Five men made the supreme sacrifice for their country; Robert McDonald, Lloyd R. Olson, John P. Swanson, Henry Harvey and Dan Welty.

Barksdale employees backed up their men in service by subscribing heavily to Defense and War Bonds. The plant received a flag for War Bond sales when 95 per cent of the employees were subscribing.

The Barksdale workers and the Company also donated generously to the Red Cross, USO and other worthy causes. Money was collected to purchase cigarettes for the boys in service overseas.

VICTORY IS CELEBRATED

When official news of the Jap surrender came through on August 14, 1945, a two-day holiday was declared for the plant to permit employees to blow off steam in a jubilant victory celebration. They had played a vital role in winning the victory and Manager Knake paid a glowing tribute to the wonderful spirit with which they had accepted unfamiliar assignments, responded to breakdowns, worked long hours and six-day weeks with low absenteeism, turned in many valuable suggestions and shared cars to save gas and rubber.

Plans for shutting down the TNT plants were put into effect immediately. Cancellation of contracts made personnel cutbacks imperative and many good workers were affected.

Normal production of dynamite continued after the end of the war. A record for production was set in the first year of peace and sales were the highest in the Company's history.

In February of 1946, however, the plant was shut down temporarily because of lack of orders for dynamite during the steel strike.

DR. JUHL, DR. KAMM, DR. GUZZO

Dr. John H. Juhl, who had succeeded Dr. A. C. Taylor in 1941, was commissioned in the U. S. Navy in 1943. He was succeeded by Dr. A. X. Kamm of Ashland, who remained at Barksdale until his death from a heart attack in 1947. Immunization for influenza was started under Dr. Kamm and Miss Emma Larson became the first full-time nurse.

In April 1947 Dr. Harold Guzzo began serving as plant doctor on a half-day basis and took over as superintendent of the Washburn hospital, which had been reopened after being closed when Dr. Juhl entered the Navy.

Blood typing was repeated and the RH factor of every employee determined. Monthly blood counts were taken on TNT and Nitramex workers. A resuscitator, audiometer and E. K. G. instrument were replaced by modern equipment. A new diathermy machine was added.

Mrs. Emma Larson Pearson resigned as nurse in February 1954 and was succeeded by Mrs. Grace Manning Nordin.

DAMAGE FROM STORMS

A terrific rain storm on August 30, 1941, caused heavy damage in the plant, the heaviest damage being in the vicinity of the dope house and the powder area. The powder line was isolated from the magazines and explosives were transferred through the safety area. Flood waters rose to within 18 feet of the top of the large fill in the TNT area but the fill held. Highway bridges on Boyd's Creek and Fish Creek and railroad bridges between Washburn and Ashland were washed out.

A worse natural disaster occurred in July, 1946 when a rainfall of 6¼ inches caused a severe flood on Boyd's Creek. The huge dirt fill across the upper end of the ravine in the TNT area was washed out and two small powder buildings were swept away. Tracks and walkways were washed out in the south side of the powder area. Small landslides covered tracks and building entrances. Bridges and service lines across Boyd's Creek were washed away. Buildings on the south side of the powder line were not used again and eventually were wrecked or burned down.

HIGHLIGHTS 1946-1954

After World War II, employees who had 15 years or more of continuous service were offered an annual vacation of three weeks. First to take advantage of it, in 1946, was Joe Cotty, veteran "acid rat" with 28 years of service.

The first annual dinner party for foremen and supervisors was held October 22, 1947, at the Menard hotel. Asst. Mgr. D. E. Montgomery as M. C. called on Manager M. C. Knake for introductory remarks. Guest speakers were Production Manager Tom R. Carlson, who had been assistant manager at Barksdale in 1940 and Service Manager George H. Miller, who had been service supervisor here from 1922 to 1926.

In 1948, Barksdale completed its first year without a major injury since 1941. To celebrate, a safety dinner was held for all employees and their wives at the Elk's clubhouse in Ashland, with 468 attending.

Pictures of Barksdale employees on a trolling trip among the Apostle Islands, which appeared later in "Better Living" the DuPont Magazine, were taken in August 1948 by Jack Alexander, staff photographer.

Another big safety party was held in 1949 to celebrate completion of two years without a major injury. This record won the National Safety Council Award for the second consecutive year.

The dinner for foremen and supervisors in 1949 also celebrated the safety record. The guest speaker was Harold Brayman, director of public relations.

In November 1949, 106 out of a possible 119 pensioners and 25 year men attended the Thanksgiving dinner for old-timers.

"More than $772,000 was put into this area during 1949 by the Barksdale explosives plant," reported Manager F. N. Hendon. "Salaries, wages and benefits earned by 176 employees totaled more than $700,000. The plant spends $72,000 in the area for services, supplies, dealing directly with 124 local concerns and individuals."

Production of "Seismograph" powder for use in drilling oil wells was started in 1951.

In 1951 the last remnants of World War I expansion were burned. These were the old nitric acid recovery, the balance of the buildings on the chloride refined TNT line, and the remaining buildings on the original TNT line.

On February 26, 1952, a fire destroyed practically everything but the kettles in the Ammonia Crystallizer. In less than five days the carpenters, millwrights, pipefitters and mechanics had the place in operation again. The maintenance department was praised highly by Manager Semb and the Wilmington office gave special recognition for the speed and safety displayed.

Completion of a five-year safety record on May 13, 1952, gave added zest to the celebration of the DuPont Company's 150th birthday at a big picnic at Memorial Park July 18, 1952. A committee headed by Bob Lindsey, chairman, Manager B. A. Semb and Assistant Manager C. D. Pitts planned and staged the most elaborate picnic ever held here.

The 150th birthday celebration at the site of the first DuPont powder plant on Brandywine Creek, broadcast throughout the nation, was attended by George Mager, Sr. and Martin Thompson as official representatives of the Barksdale plant.

In 1953 another holiday with pay was added when the Company declared Good Friday a holiday for DuPont employees.

On June 18, 1954, a count revealed a total of 142 cars carrying 350 or more workers, leaving the plant at the end of the day.

SODA AMATOL, "NITRAMON" AND "NITRAMEX"

As the result of improvements in the manufacture of Soda Amatol, "Nitramon", and "Nitromex" and expansion in that

field, it was decided to build a new plant at Barksdale. In February 1950 work was started on revamping the old No. 2 Packing House, and the "Nitramex" plant, as it is called, was ready to start in June 1950.

"Nitramex" is a blasting agent which has found wide acceptance throughout the U. S. in recent years and is now being used in place of other explosives for mining high grade iron ore on the range as well as the newly developed taconite process and seismic prospecting for oil in North Dakota and Montana.

Reconditioning of the remaining TNT line, which had not been producing since September 1945, was started early in 1950 and production was underway by May. Manufacture of Pelletol No. 1 was started in 1951.

TNT "old-timers" were called to produce the famous explosive again. Elmer "Doc" Olsen, a TNT pioneer from World War I, was put in charge, along with Helmer Moe, who has also spent most of his years at Barksdale working with TNT or acid. John Burlager was there for a time but is now back at the box factory. Cy Sirois, Sid Scott, Elmer Jacobson, John Rodkewich and Bill Rave round out the old-timers' crew making TNT for commercial use.

Soda Amatol, "Nitramon" and "Nitramex" had been produced at the Repauno plant for some time, but were to be discontinued for the most part because of transportation difficulties in the heavily-populated area around Repauno. Explosives for the eastern seaboard area are now being produced at the new Potomac River plant located at Martinsburg, W. Va.

Lawrence Geisert, Les Lindblad and Ernie Holman were sent to Repauno to learn production of the new blasting agent and returned here to become shift foremen in the "Nitramex" plant. Frank Fenton, a Repauno supervisor, was transferred here to take charge.

Among the first operators were Wally Moe, who later took over at the shell house, Elmer Dagsgard, now a foreman, and Ellsworth Embertson. Henry Bomey and Herb Westen became operators shortly after the plant started.

DISASTROUS NITRAMEX EXPLOSION

Barksdale had achieved a safety record of over five years and five months when the "Nitramex" plant was destroyed instantly and completely by an explosion of unknown origin in the early morning of October 15, 1952. This was the worst blast in Barksdale's history.

Eight lives were lost, including Henry Bomey, acting foreman; Carlton Moe, operator; Leo Swanson, Carl Moe, Thomas

Ferguson and Emil Haviar, all "Nitramex" men; and Eddie Cudmore and George Hoerich of the transportation crew.

John Rodkewich had a narrow escape, having left the "Nitramex" plant for lunch shortly before the explosion occurred.

Rebuilding of the "Nitramex" plant was started in a short time and it was ready to operate in the spring of 1953. The "S"-Primer operation continued to operate after the blast, as it was located in the rear of the No. 1 Packing House. Soda Amatol, used to pack "S"-Primers, was shipped here from Repauno by rail.

The new "Nitramex" plant consists of three buildings and a modern change house. Soda Amatol is now made in a separate building from "Nitramon" and "Nitramex".

Jim Reilly was supervisor until entering the Armed Forces in 1954, having succeeded Wm. Todd. William Hague succeeded Reilly August 1, 1954. Foremen are Spot Geisert, Les Lindblad, Ernie Holman, Elmer Dagsgard and Herb Westen. Relief foremen are John Day and Ed Foltz.

New and improved transportation has been put in effect since the start of the new "Nitramex" plant. Roads have been built so that trucks, jeeps and trailers are replacing electric locomotives and cars on the narrow gauge system.

CHANGES IN MANAGERS

M. C. Knake, who had entered the DuPont organization as a laboratory boy May 16, 1898, and who had been manager at Barksdale since 1928, retired August 1, 1949, with a record of over 51 years of Company service.

His 21 years as manager here made the longest tenure of any Barksdale manager and his retirement was the first retirement of a manager while stationed here. The entire plant personnel attended a farewell party in his honor at MCK'S Beach.

Succeeding Mr. Knake as manager at Barksdale was Fred N. Hendon, who arrived from the Repauno plant, where he had been assistant manager. After 19 months at Barksdale, Mr. Hendon was transferred March 1, 1952 to the Birmingham, Alabama, plant.

Balwen A. Semb succeed Mr. Hendon coming from Pompton Lakes, N. J. where he had been assistant manager of the only Blasting Supplies Plant operated by the DuPont Co. Mr. Semb is the manager as Barksdale celebrates its Golden Jubilee.

PENSIONS AND PENSIONERS

Andrew Young was the first Barksdale employee to accept a

pension. He had been employed at Repauno before coming to Barksdale.

On February 1, 1922, Wm. Fenton retired as the first pensioner who had worked entirely at Barksdale. On March 1, 1922 Charles Taberman accepted a pension because of ill health. His health improved in retirement and he is still alive and active in 1954, at 88 years of age.

Homer Brisson was the first Barksdale employee to attain 25 years of service, receiving his pin Nov. 4, 1928. He was considered the plant's oldest employee in point of service, having started to work here Nov. 4, 1903. He retired June 5, 1930 and has died since.

In 1941 the Company pension and retirement plan was revised, making retirement compulsory at age 65.

Two father and son teams have retired at Barksdale: Ole Westerlund in 1925 and John Westerlund in 1945; Charles Anderson in 1928 and Sigurd Anderson in 1950.

Selma B. "Sal" Lindgren became the first and only woman thus far, to complete 25 years of service at Barksdale, winning her 25 year pin March 4, 1945. She retired March 31, 1954, at age 65, with a record of 34 years and was honored at a farewell dinner at the Menard hotel.

Edna Peterson, wife of Odeen Peterson, was the first woman to be pensioned at Barksdale, retiring in 1950.

In the middle 1940's the custom of presenting each pensioned employee with a gift contributed by his fellow workers was started. This has been the source of much mutual goodwill.

In May 1954 a revised and liberalized pension plan became effective, providing a generous company pension which was exclusive of Social Security benefits.

After World War II, employees were permitted to accept pensions after 30 years of continuous service, if they had reached 60 years of age.

The annual Thanksgiving banquet for pensioners and 25 year men has become a popular and well-attended event. At the 1953 dinner on November 19th, there were 44 pensioners and 61 25-year men in attendance.

As the Barksdale Works celebrates its 50th birthday, the list of pensioners includes the names of 55 living and 31 who have died. There are 62 25-year men at Barksdale at present.

LIST OF ASSISTANT MANAGERS

"You've never worked for DuPont unless you've been at

Barksdale!" is a statement credited to some of the Company's officials who have served here at various times. Many one-time Barksdale men have gone on to high positions in the Company and it is safe to say that the experience they gained here were helpful to them in their rise in the industry.

While lack of space does not permit listing all the supervisors and department heads who have worked here in the past half-century, it seems proper to mention those who served as assistant superintendents or, as they were designated later assistant managers. The following list, compiled from the memories of old-timers, is not necessarily in correct chronological order:

Pete Wishert, W. F. Harrington, George Staples, W. G. Chamberlain, D. S. Robinson, W. W. Witmer, P. C. Kaiser, Jack Wellford, J. P. Huger, M. C. Knake, E. R. Wright, F. C. Evans. A. W. Skerry, F. E. Jacquot, L. E. Meyers, H. F. Brown, J. W. Kitts, Tom Carlson, D. E. Montgomery, and C. D. Pitts.

GOLDEN JUBILEE PICNIC

The 50th anniversary of the Barksdale plant will be celebrated at a huge picnic at Memorial Park in Washburn on Saturday, August 14, 1954. Plans and preparations for one of the biggest and best events of this kind ever held here are being made. It is the sincere hope of all these committees that every one of the 55 living pensioners, all the employees, and all their families will be in attendance to help make it an occasion that will be recalled with pleasure for years to come.

AT CONCLUSION OF 50 YEARS

Plant Manager B. A. Semb known as "Baldie" to both employes and other friends sums up the past and expresses hope for the future as follows:

"As the Barksdale Works celebrates its 50th birthday, both employees and management can view the accomplishments of the past with justifiable pride and face the future with confidence and optimism.

"At present Barksdale has the highest peacetime employment on record. Dynamite, TNT, Nitramex Products and Acid operations are progressing at a near record level.

"In the true DuPont tradition, the Company is offering its employees the highest wages and the most liberal group of industrial relations plan and practices in DuPont history. These include: paid vacations of two, three and four weeks, depending on length of service; disability wages; group accident and health insurance; hospital surgical coverage; non-contributory and contributory group life insurance; salary allotment insurance; special benefits for injuries; generous pensions at age 60 or 65;

continuity of service rules; lay-off notice plan; pay allowances to employees entering the Armed Forces; gold and diamond service pins; progressive safety and health practices.

"As a result of this generous and farsighted policy, employee morale is high and there is a warm feeling of mutual esteem and cooperation between labor and management that is valued highly by both. The Company is keenly aware of the intelligence, competence, dependability and loyalty of its Barksdale workers and will continue in the future to show its sincere appreciation of their sterling qualities in every possible way."

BARKSDALE MANAGERS

I. L. Pierce	1904—1906
W. F. Harrington	1906 (Acting)
C. A. Patterson	1906—1908
F. T. Beers	1908—1923
R. T. Cann	1923—1928
M. C. Knake	1928—1949
F. N. Hendon	1949—1952
B. A. Semb	1952—

BARKSDALE - - 1954

Wilmington Explosives Department Management	
General Manager	H. F. Brown
Assistant General Manager	P. J. Kimball
Director of Manufacture	F. R. Wilson
Production Manager	R. E. Lunn
Plant Staff	
Manager	B. A. Semb
Assistant Manager	C. D. Pitts
Acid & T.N.T. Superintendent	K. C. Eckmann
Powder & "Nitramex" Superintendent	L. Pesce
Power & Maintenance Superintendent	J. H. Hanson
Chief Clerk	C. L. Johnson
Service Superintendent	R. C. Eley, Jr.
Plant Physician	H. Guzzo, M. D.

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BARKSDALE - - 1954

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Chief Clerk	C. L. Johnson
Service Superintendent	R. C. Eley, Jr.
Plant Physician	H. Guzzo, M. D.

ACID-TNT DEPARTMENT

Amich, Roy P.
Baker, Jerry R.
Bartness, Eldor L.
Bednarski, Frank
Bowers, Patrick
Brown, Edwin E.
Brown, Howard G.
Cliff, Ernest
Cudmore, Ray
Cuty, Louis
Frechette, George N.
Frechette, Henry F.
Gazdik, Thomas J.
Hagen, James H.
Holman, Clarence T.
Hudson, Charles A.
Jacobson, Elmer E.
Jaynes, Edward B.
Joanis, Edmund
Johnson, Carl R.
Kitchak, Sam J.
Lamoreaux, John B.
Lamoreaux, Vern L.
Lowe, Alvin
Mager, George R.
McDonald, Earl F.
Meyers, Ray E.
Miller, Jerold T.
Moe, Helmer A.
Nelson, Albert
Neuman, Louis W.
Newhouse, Percy E.
Newman, Lester R.
Niemi, Oscar W.
Olsen, C. Elmer
Pallage, Leonard
Peterson, Thomas P.
Rave, William E.
Rodkewich, John J.
Ross, Earl
Roberts, Roy C.
Saari, Carl E.
Sanger, Arthur H.
Schaller, Eugene H.
Scott, Sidney
Simoneau, Edward M.
Sirois, Edward L.
Sirois, William
Skaug, Carl E.
Sorenson, Steve D.
Stauffer, Eugene D.
Stock, Edward L.
Stone, Allan P.
Swanson, Herbert C.
Swanson, Kenneth O.
Tetzner, Willis R.
Thoreson, Carl R.
Todd, William E.
Vizanko, Joseph G.
Welton, Jack J.
Wroblewski, John

CLERICAL DEPARTMENT

Barry, Janice L.
Barry, Myron D.
Borowick, Ardath R.
Dittbrenner, Eitel
Franklin, Eugene T.
Holman, Richard L.
Howard, Lois L.
Jardine, Kenneth H.
Larson, Betty A.
MacDonald, Donald
McManus, C. J.
McManus, J. Edward
Newhouse, Patricia A.
Patzer, Eugene C.
Ross, JoAnne C.
Runkel, Carl E.
Scamfer, Engval C.
Stock, Ethelyn F.
Summerfield, Ruth E.
Taylor, Lacy
Westen, LaVerne A.
Wick, Lawrence E.

POWDER & NITRAMEX DEPARTMENT

Amrein, George J.
Anderson, Albert R.
Anderson, Levi
Anderson, William H.
Annala, Oscar A.
Annala, Reino W.

Arntsen, Robert G.
Augustine, Stanley T.
Bailey, Allen W.
Baker, Frank Jr.
Baker, Murray E.
Barningham, Frank L.
Begin, Robert D.
Berg, Stanley C.
Bodin, Glenn E.
Bolin, Clarence H.
Burke, George
Burlager, John
Carlson, Clarence A.
Carlson, Darrel F.
Carlson, Glenn P.
Carlson, Kermit G.
Colgrove, Glenn E.
Dagsgard, Elmer O.
Dagsgard, Olaf
Daigle, Lawrence J.
Dandeneau, Eugene D.
Day, John W.
Deragon, Joseph E.
Dibbell, Amos B.
Doane, Harold R.
Eisenhauer, Paul A.
Eliason, Clarence E.
Embertson, Norval C.
Eno, Robert H.
Fisk, James S.
Flonnes, Oscar
Foltz, Edwin J.
Forsberg, Raymond W.
Fredrikson, Arne E.
Gagne, Leo A.
Gazdik, Carl J.
Geisert, Lawrence
Gierczic, James T.
Gierzak, Walter A. Jr.
Girga, Lawrence L.
Goszewski, Joseph D.
Guski, John
Guski, Lawrence V.
Gustafson, Laurel F.
Gustfason, Marvin E.
Hagstrom, Bernard
Hague, Harry W.
Heinonen, Evald S.
Hewitt, Donald J.
Hill, Theodore J.
Holman, Ernest H.
Hudson, Glenn R.
Johnson, Andy K.
Johnson, Carl L.
Johnson, Robert L.
Johnson, Robert S.
Jokinen, Eugene O.
Kacvinsky, Joe J.
Klock, Andrew
Koval, James R.
Lajcak, Andrew T.
Landraint, Neal
Larson, Herman E.
Larson, Walter G.
Leask, Hind A.
Ledin, James M.
Leutwiler, Walter A.
Lindahl, Garfield B.
Lindblad, Lester
Lindgren, Philip H.
Lindsey, Theodore F.
Lowe, George R.
Lukasiewicz, Tom J.
Malcheski, Edmund D.
Martinson, Theodore W.
Mattson, Robert C.
Merila, Toivo J.
Mick, Walter R.
Mihalek, Joseph J.
Moe, Walter M.
Molnaa, Arthur P.
Morrison, Eskil H.
Naselius, E. Birger B.
Nelson, Arthur
Nelson, Elmer
Nelson, Norman
Nelson, Russell R.
Neuman, Lawrence E.
Niemisto, Vernie E.
Niska, William J.
Norgren, Magnus E.
Olson, Juel R.
Olson, Richard W.
Olson, Thomas F.
Olson, Thomas R.
Olson, Donald E.
Pagac, James T.
Pearson, Gustaf R.
Peltonen, Harold E.
Perkovich, Joseph C.
Peterson, Perley
Pocernich, Joseph M.

Pristash, William M.
Reilly, James I.
Renstrom, John
Rogers, Kenneth E.
Rokser, John F.
Roy, Albert J.
Sampson, Henry F.
Sanger, Chester R.
Scholl, Joseph F.
Schutte, Walter E.
Sirois, Earl H.
Smith, Marlan E.
Smith, Richard E.
Smolen, Edward M.
Smolen, Theodore M.
Somppi, Kenneth R.
Sorenson, Philip H.
Spesak, Mike J.
Susienka, Mike L.
Tenner, Arnold C.
Tetzner, Philip E.
Torkko, Edward E.
Tutor, Robert R.
Wegsteen, Morris
Westen, Herbert D.
Westling, Alvin F.
Wiberg, Robert E.
Williamson, Alvin L.
Woiak, Larry F.

POWER & MAINTENANCE DEPARTMENT

Anderson, Dell V.
Anderson, Elmer
Anderson, Elmer O.
Anderson, George H.
Barr, George
Barry, Alvin L.
Bellile, Ernest C.
Bergman, Bertil M.
Bergman, Ronald E.
Bluhm, Wilbur J.
Bratley, Harvey A.
Bratley, Henry T.
Carlson, Albin
Carlson, Harold W.
Carlson, Robert O.
Cinker, George W.
Clark, Arnold R.
Cook, Theron G.
Corrier, Albert
Corrier, Arthur
Cousineau, Albert
Cudmore, George F.
Cuty, Louis A.
Day, Barton E.
Day, Morris H.
Eid, Harold H.
Ekholm, Enok S.
Erickson, Gustav
Erickson, Oliver
Faulk, Walter
Fick, Fredrick J.
Flaherty, William J.
Flones, Harold
Fuskerud, Albert
Gadda, Arne A.
Garland, Joseph P.
Gass, Urban M.
Gatts, Lewis A.
Geisert, Leslie E.
Grage, Arnold E.
Green, Philip H.
Hackbarth, Arthur E.
Hagstrom, Oscar C.
Halverson, Robert R.
Handberg, John B.
Handberg, Arthur M.
Hanson, Peter H.
Hoffhines, Murray A
Holman, Glenn O.
Hove, Alvin B.
Jacka, William G.
Jacobson, Earl J.
Jarecki, John A.
Joanis, Albert
Johnson, Edwin A.
Justice, Herbert A.
Justice, Leo R.
Kacvinsky, Paul W.
Kalinowski, Walter
Kasmarek, Joseph A.
Kupczyk, Peter J.
Landry, Joseph P.
Larson, Arnold
Larson, Henry
Larson, John A.
Larson, Leonard A.

Laurion, Raymond T.
Ledin, Raymond R.
Lindsey, Phillip L.
Lindsey, Robert R.
Lizotte, Henry J.
Ludack, Edward G.
Lukasiewicz, Frank A.
Lund, Axel
Lund, Howard E.
Lund, William E.
Lundquist, Louis J.
Mager, George
Majewski, Louis S.
Mason, Thomas F.
Merila, John O.
Moe, Melvin H.
Moore, Merlin R.
Nelson, Clarence A.
Nelson, Edward B.
Nelson, Edwin C.
Nohl, James A.
Nozal, Aken
Olson, Dale E.
Oberts, Sigmund J.
Olson, Tharlie E.
Olson, William O.
Pade, Anton
Pearson, Edwin W.
Pedersen, Arthur E.
Peterson, Albert E.
Peterson, Elliott O.
Peterson, Leonard E.
Phillips, Raymond A.
Piirtola, Arnold W.
Pocernich, Dan S.
Provost, Fabian L.
Puig, Edward F. Jr.
Quillman, Bard
Raarup, Jerold W.
Raarup, Paul J.
Ropiak, Joseph L.
Ross, Claude A.
Rowe, Harvey J.
Rude, Bennie R.
Ruha, Arthur W.
Sampson, Carl G.
Schultz, Clarence T.
Schultz, George A.
Schultz, Raymond A.
Schwenzfeier, Calvin C.
Shaylor, Jerome H.
Simonson, Gust M.
Smith, Arthur A.
Smith, Cecil M.
Smith, John O.
Smith, William C.
Smolen, Robert R.
Stefinske, Stanley A.
Swanson, Alvin N.
Swanson, Nels P.
Swiston, Joseph L.
Thomas, Theodore C.
Thoreson, Robert C.
Tidstrom, Fred L.
Truchon, Arthur F.
Tutor, Carl A.
Tutor, Vernon E.
Utegaard, Arthur A.
Welton, Irvin M.
Westman, Robert E.
Wick, Donald F.
Williamson, Percy J.
Wolf, Ronald A.
Wroblewski, Julian P.
Wroblewski, Stance J.
Yuhas, Michael

SERVICE & MEDICAL DEPARTMENT

Bartness, Oscar E.
Day, Arthur
Laurion, Edward J.
Nordin, Grace M.
Palm, Carl E.
Peterson, John W.
Thompson, Martin O.

TWENTY-FIVE YEAR MEN

Anderson, Elmer O.
Anderson, Levi
Bartness, Oscar C.
Bergman, Bertil M.
Berry, Alvin L.
Burlager, John
Carlson, Albin
Cudmore, George F.
Cudmore, Ray
Day, Arthur
Day, Barton E.
Ekholm, Enok
Faulk, Walter
Frechette, George
Fuskerud, Albert
Geisert, Lawrence
Handberg, John B.
Hanson, J. Herman
Hanson, Peter
Holman, Ernest H.
Joanis, Albert
Joanis, Edmund
Johnson, C. L.
Justice, Herbert A.
Kasmarek, Joseph A.
Lamoreaux, John B.
Larson, Walter G.
Laurion, Edward J.
Leutwiler, Walter A.
Lindblad, Lester
Lund, Axel
Lizotte, Henry J.
Mager, George, Sr.
McManus, Cyril J.
McManus, J. Edward
Moe, Helmer
Molnaa, Arthur P.
Naselius, E. Birger B.
Nelson, Albert
Nelson, Clarence
Neuman, Louis W.
Norgren, Magnus E.
Olsen, C. Elmer
Pallage, Leonard
Pearson, Gustaf
Peterson, Perley
Peterson, Thomas P.
Pitts, Cornelius D.
Renstrom, John
Ross, Earl
Rude, Bennie R.
Sampson, Carl G.
Semb, B. A.
Sirois, William
Smith, Arthur A.
Stefinske, Stanley A.
Taylor, Lacy T.
Thompson, Martin O.
Thoreson, Carl R.
Vizanko, Joseph
Wegsteen, Morris
Wroblewski, John

*Sigurd Anderson	Box Packer
*Albert N. Anderson	TNT Operator
*Charles Anderson	Make Weight Man-Gun Cotton Screening
*Charles Alfred Anderson	O.V. Foreman
*Otto Anderson	O.V. Foreman
*Joseph Bourgo	Watchman
*Homer Brisson	Shell House
Frank Brown	Guard
M. Ebin Burdick	Power House Meterman
Tim Burke	Labor Sub-Foreman
Joseph T. D. Cantin	Acid Operator
*Andy Chapman	Carpenter
Carl Christiansen	Amm. Nit. Oper.
*Louis Christianson	Blacksmith
Carl Christofferson	Foreman-Machinist
*George Cooklar	Pipefitter
George W. Coulthurst	Truck Driver
*John Carlson	O.V. Foreman
John D. Durkin	Loco. Engineer
Frank Faulkner	Loco. Conductor
*William Felix	Watchman
*William Fenton	Labor Foreman
*James B. Fisk	Power House Engineer
Arthur H. Fossum	Box-Factory Foreman
Henry L. Frechette	Acid Area Operator
Albert Garberg	Pipe-Shop Foreman
Charles Gierczic	Box Packer
John Goski	Power House Fireman
*Charles W. Hare	Nitroglycerin
Oscar Holman	Carpenter
*Jacob Jackson	Carpenter
Martin Jacobsen	Machinist
Andrew Johnson	Storekeeper
*Andrew P. Johnson	Mixed Acid Operator
Carl O. Johnson	Powder Dept.
Carl V. Johnson	Powder Dept.
*Carl Kinney	Carpenter
Max C. Knake	Plant Manager
*Frank Komborski	Shell Feeder
*Jens Langerude	Carpenter
*Ole Larson	Painter Foreman
Selma B. Lindgren	Clerk
*John Larson	Soda Dry Operator
*George H. Lee	O. V. Foreman
*Louis Malinoski	Power Hse. Repairman
*David McCarthy	Soda Dry
Thomas J. McManus	Foreman-Labor Dept.
Victor Merila	Labor Sub-Foreman

Allen Morris	Pipe Coverer
*William Mitchell	Hall Machine Operator
James J. Murphy	Loco. Conductor
James A. Murray	Shell House
Albert R. Nelson	Carpenter
John Nelson	Carpenter
Peter Ness	Lead Burner
*Philip Neuharth	Box Packer
*Eugene Newhouse	Nitric Acid Operator
Harry A. Newman	TNT Operator
John Niemczyk	Power House Fireman
Michael J. Oberts	Power House Fireman
John P. Oie	Acid Operator
Paul Paulson	Carpenter
Hagbart Pedersen	Carpenter and Millwright foreman
James Pellizzi	Powder Dept.
Edar C. Peterson	Machinist
Edna V. Peterson	Mess Attendant
Odeen Peterson	Carpenter
Lauren W. Porter	Carpenter
August F. Rave	Shell House Foreman
Fred W. Rhody	Safety & Fire Inspector
Leo Roy	Carpenter
John Sampson	Shell Trucker
*Arthur E. Score	TNT Operator
Lars Simonson	Carpenter
*Albert Smolen	Blacksmith
Michael Stapleton	Laundry Operator
*Edward E. Stouffer	Recovery Operator
Albert E. Swanson	Pipefitter
Charles Taberman	Machinist
Adolph S. Torkelson	Powder Dept.
Robert Urquhart	Recovery Operator
Albert Vieno	Dope House
Matt View	TNT Operator
Matt Wahamaki	Pipefitter
*Jared Welton	Shell House Foreman
George S. Welty	Power House Engineer
John Westerlund	Electrician
*Ole Westerlund	Pulp Dry Operator
*John A. Wickstrom	Nitroglycerin
*James Williamson	Dope & Soda Dry Operator
Chester A. Wolf	Pipe Coverer
*Andrew Young	Lead Burner

**Duncan Arseneau
**Axel Axelberg
**Hiram Hansen
**C. J. Lamere

(*) Deceased
(**) Pensioners of other plants residing in this area.

Appendix I

DOCUMENTS RELATING TO SITE DECOMMISSIONING AND DECONTAMINATION

DOCUMENTS RELATING TO SITE DECOMMISSIONING AND DECONTAMINATION

Hill, J.P. September 12, 1978. *Clean Up—Barksdale Site*. Memo to B.F. Kennedy.

Kennedy, B.F. August 23, 1979. *Barksdale Deontamination*. Memo to G.L. Moore, DuPont Real Estate.

Koochak, J.L. June 26, 1980. *Barksdale, Wisconsin, Shutdown File 036*. Memo to J.C. Purcell.

Lawrence, B.M. August 16, 1982. *Barksdale Works, Site Preparation Summary*. Memo to R.F. Williams.

Lawrence, B.M. October 18, 1982. *Trip Report, Barksdale Plant Inspection*. Memo to R.F. Williams.

Lawrence, B.M. November 22, 1982. *Barksdale Cleanup Progress, TNX Area*. Memo to R.F. Williams.

Lawrence, B.M. August 4, 1983. *Barksdale Works*. Letter to B.D. O'Flanagan, WDNR.

Lawrence, B.M. March 27, 1984. *Barksdale Property, Final Condition Report*. Memo to R.F. Williams.

Lindsey, R.R. August 17, 1979. *Barksdale Decontamination*. Memo.

Lindsey, R.R. October 25, 1979. *Barksdale Decontamination—10/79*. Memo to J.A. Robbe and J.L. Hamilton.

CC: R. E. Lunn
R. R. Lindsey
Potomac River Works

DU PONT

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE

PETROCHEMICALS DEPARTMENT

September 12, 1978

D - 2076
4 00 pm

TO: B. F. KENNEDY

FROM: J. P. HILL

CLEAN-UP - BARKSDALE SITE

Ref: My memorandum of 7/11/78.

During the month of July, 1978, several excavations were made in areas of suspected contamination. One area was adjacent to a ravine in the World War I TNT area. This ravine had been completely excavated along one bank and considerable TNT located and destroyed. In July, the other side of the ravine was excavated to a depth of about 2 ft. and no explosives found.

However, a 6 in. rain fall on August 22 washed away the fresh dirt and revealed additional TNT. Approximately 2200 lbs. were dug up and burned (see attached pictures). It appears that this contamination may have come when the building was burned and molten TNT ran into the ravine. It had obviously been deliberately covered by 3 - 6 ft. of dirt.

The ravine was excavated further and no more TNT was found.

Recovery of this TNT emphasizes our previous report that there is no way to guarantee that additional concentrations may not be on the site. As a result of the excavations and core drillings we have made, we consider this very unlikely unless some concentrations were deliberately buried in some non-operating areas of the plant.

We do recommend that additional, careful inspections be made in late October and again after the spring thaw and rains in late May, 1979.

As far as disposition of the site is concerned, my opinion remains that it can be sold. However, this course entails some risk, and buyers should be cautioned against drilling and blasting in some areas of the site.

PD-2

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE

PETROCHEMICALS DEPARTMENT

CC: W. R. Davidson
R. R. Lindsey
Potomac River Works

August 23, 1979

D E Johnson
We best set up some arrangement
with Holman on compensation.
Jio.

G. L. MOORE
REAL ESTATE DIVISION

BARKSDALE DECONTAMINATION

Attached is a report from R. R. Lindsey summarizing the Barksdale, WI site.

With your concurrence, we plan to level the clay banks around the ravine in the northwest area of the site in October. In the Spring of 1980, we will reinspect the site, and we anticipate satisfaction with the state of decontamination. In the meantime, we consider the 200 acres in the northwest corner of the fenced area suspect. The remainder of the site is decontaminated.

Glenn Holman, retired, continues to serve as an unofficial caretaker of the Barksdale site. He has been compensated adequately for his activities in conjunction with decontamination. Lindsey feels that he is due some modest compensation for his caretaker activities which include escorting prospective buyers through the site. I presume that the Real Estate Division will provide appropriate compensation for these activities.

Please advise if you have any questions or disagreement with our plans.

EXPLOSIVES PRODUCTS DIVISION

BFK

B. F. KENNEDY
DIRECTOR OF MANUFACTURING

BFK:ajm
Attachment

An alternative would be to sell as much as safely possible of the 1700 acres and retain the rest ad infinitum. All of the area outside the fence should be safe (approximately 500 acres). The dynamite line has been completely decontaminated (about 100 acres). The office and acid areas should be okay (approximately 300 acres). All the rest of the property could have some explosives. However, the area which is most suspect and which was the main TNT operating area in World War I consists of 80 acres in the northwest corner of the plant, and this could be easily segregated leaving 1600 acres for sale.

The existing plant fence has been temporarily repaired but hunters, snowmobilers, etc. breach the fence regularly, and the site is not secure from trespassers. Several of the existing buildings inside the fence have been vandalized. The area along the lake is not fenced, and the buildings (the lake pump house and McK's beach club house) are vandalized regularly.

JPH:ajm
Attachments

DU PONT

ESTABLISHED 1802

J PONT DE NEMOURS & COMPANY

INCORPORATED

OLYMER INTERMEDIATES DEPARTMENT

August 20, 1979

B. F. KENNEDY
DIRECTOR OF MANUFACTURING
EXPLOSIVES PRODUCTS DIVISION
PETROCHEMICALS DEPARTMENT
N-6447

Attached is Bob Lindsey's report on the decontamination effort at the Barksdale site. This report will probably be of interest to George Moore.

If you have any questions, please give us a call.

J L Hamilton

J. L. HAMILTON, MANAGER
POTOMAC RIVER WORKS

JLH/jgg

Attachment

August 17, 1979

BARKSDALE DECONTAMINATION - 1979

Miscellaneous information, comments and suggestions for future and necessary decontamination at the Barksdale Works plant site, Barksdale, Wisconsin:

In 1978, I supervised the effort made to decontaminate the entire plant. We shot the NG lines and ditches, cleaned up and re-burned the NX and primer area buildings and completed dismantling the NG walkways and troughs, re-leveled many hazardous buildings and barricades left by former contract work.

There were about twenty five or more assorted TNT lines each containing 8-12 buildings in areas known as WWI & WWII, Trivolene, T&X, Lydol, Pelletol, and others. Each area needed some clean up and re-burning.

Throughout the summer we burned over 200 fires each containing at least 100 lbs. of TNT type explosives. The bulk of this 10 tons was found in one ravine near the west fence and spaced out along 6-700 yards along a small creek. The ravine had contained many buildings each of them having catch boxes and troughs, ditches and even wood barrels full of TNT and other explosives products including WWI pellets. (According to the old prints there were many TNT pellitizer houses and graining houses.)

When WWI was over it looked like they just quickly shut down operations and left everything go. We found TNT in solid "veins" reaching back into the banks of the stream over 30 feet and slabs of material 2-3 feet thick and weighing several hundred pounds. When the buildings were dismantled or burned the TNT melted and ran into all the low pockets. Throughout the next 75 years the stream washed out pieces and we could always find chunks about football size along the banks of this creek. Very little effort ~~was~~ had been made to recover this material and in places up to 6 or 8 feet of red clay ~~was~~ had been pushed in to cover the areas.

When we rediscovered this mess in 1977 and 1978 we brought in bulldozers, back hoes and trucks and equipment to clean it up. During this operation the weather was very wet and rainy and everything was covered with a layer of red Wisconsin clay. The clay made the pieces of TNT almost impossible to identify. During the remainder of the year, the snow, rain, wind and sun exposed the yellow and brown TNT pieces, plus the fact that the small stream dried up and left many small pieces of TNT dry and exposed in the creek bottom. This is the reason for the recent work and for ~~sure~~ some future work.

Early in July, 1979 I returned to the plant. I picked up hundreds of small pieces of TNT and put it in plastic bags ready to burn. Most of the material was along the banks of the WWI TNT ravine described earlier.

On the 5th of August I returned from Denver and Colorado Springs to Barksdale. I proceeded to contact Biwabik and to gather tools and supplies to finish the job, as requested by Mr. Hamilton. I was able to get the Washburn Fire Department to supply a truck, tools and two men. Luckily the two men were former Barksdale employees so their assistance was valuable and time saving. We picked up and burned every little piece of TNT we could find in the mud banks and creek bottom. The total amount was about 5-600 pounds. We again had very successful burns with no incidents.

We returned the borrowed equipment, cleaned up the burning area and left the plant on Friday, August 10, 1979.

I am sure that the weather will expose more small pieces in the future. I would suggest leveling the mud piles either this fall or next spring and then let the rain and sun work on it for a few months and go in and clean it up again.

There were no new "veins" or deposits discovered this time so I feel we are doing a lot of good.

I would recommend leaving the 200 acres, in the northwest corner of the fenced area, on a hold basis until we make another couple surveys and burns.

I took the time to look over all of the explosive areas and did not find any amount worth mentioning. A few very small pieces were noted in the old trivolene area near the new TNT lab foundation. (We had dug up 2200 lbs. in one ditch in 1978 in this spot.)

During the past winter some one had broken into the N-X change house building by kicking in the door panels. We nailed it shut again. Also a large hole was cut in the west fence. We repaired the hole with a section of burning ground fence.

The hasps were cut off the main gate and there was an indication of an attempt to cut off the pad locks. We purchased some heavy chain and relocked the gate.

The roads are very overgrown with tall grass and brush. It would be a lot easier for the area to be shown to some one if you could drive around. We should get a farmer in to brush hog the roads about the middle of next summer. X

The doors on the M.C.K.'s beach house are kicked in again and the building is leaking in the back part of the kitchen roof.

The boy scout camp has been rebuilt (it partially burned down in 1978) and it is being used regularly.

The lake pump building doors are kicked in again; the building seems sturdy yet.

The burning ground areas are grown over with grass and brush again and should be scarified if we use them again. (We cleaned off several areas by hand this year to prevent fire spreading.)

I was satisfied with all the clean up areas except the ravine in the WWI areas. There is a possibility that the heavy equipment contractor could be brought in late this fall and level the clay banks so the elements could work on it during the winter and spring months.

I beleive that we can complete this job and turn it all over to real estate for sale with some more work.

While I was there a real estate broker from Iron River, Wisconsin called and wanted to see the area. I escorted him over the entire plant and lake shore. He wants to bring a prospect in. His name is Orlin Johnson, of Up North Real Estate Co., Iron River Wisconsin, phone 1-715-372-8884. I told him to get Bud Holman to let him look at it again if he wanted to.

Mr. Glen (Bud) Holman should be paid some way for his time spent on several ocassions in assisting real estate people and other services preformed at the old plant. He is the unofficial contact if needed by anyone.

The people at Biwabik were very cooperative again this year in advice and assistance with the job.

I took several polaroid pictures of the area but the hot sun caused the film to stick together and only a few were worth sending.

Pictures #1 shows a piece of TNT on the left and a blackened sandstone rock on the right. These stones are blackened by years of exposure to "red water" and are found mostly in the water and along the edges of the stream. There were a lot of them this year due to the unusual dried up stream. The pieces in picture #1 were about the size of a softball.

TNT SANDSTONE ROCK 1979

Pictures #2, 3, and 4 are piles of TNT ready for burning. Most pieces were small. We had already broken up the remainder into 1" size for safer combustion. (See page 5.)

R. R. LINDSEY
POTOMAC RIVER WORKS

TNT
1979

LBS
TNT
1979

CC: D. F. Kennedy
Director of Manufacturing
6447

George L. Moore, Jr.
Real Estate Division
D-2076

D. E. Johnson

October 25, 1979

TO: J. A. ROBBE - PRW
J. L. HAMILTON - PRW

FROM: R. R. LINDSEY - R. R. Lindsey

BARKSDALE DECONTAMINATION - OCT., 1979

During the week of October 15, 1979 through the 19th, I again spent time at the Barksdale Plant continuing the decontamination work as follows:

1. We hired a bulldozer to level the piles of clay which were previously accumulated during the digging out of old catch boxes, troughs and ditches. We leveled all piles and back graded the edges of the small creek and ravine in the northwest area of the WWI - TNT plants.

   Following and during the leveling, we inspected the area thoroughly and picked up about 200 pounds of small mud covered pieces of a substance resembling TNT, this material was destroyed by the usual burning method with no incident. (The ashes later confirmed that the material was about half mud.) The majority of this work was along the one ravine in the northwest section of the plant.

2. We had to grade the burning ground area because of the high, dry grass. We also scarified the fire break and the entrance road to the burning ground because of fire hazards.

3. We used the usual contractors (A. H. Roffers and the Washburn City Fire Department) and they did a very good job. The three men involved were all former DuPont employees.

4. A walk through survey was made of all the other TNT areas where suspected material was formerly located. These areas were clean on the surface.

5. After we were reasonably sure the areas were clean, we pushed in some sod grass and top soil and broadcasted some small amounts of winter wheat and grass seed. This should make these areas normal looking again by next spring.

6. A quick survey of the buildings revealed more vandalism. The door on the NX changehouse was kicked in. We nailed a piece of plywood over it to keep out the snow. Several windows were broken by small arms gun fire. Many 22 cal. shells were lying on the floor inside the building.

7. The beach clubhouse door was broken in again. We nailed a piece of plywood over it. All the furniture is now missing except the furnace and a piano.

8. The blacktop roads are still passable but the dirt and non-paved roads are covered with long grass, weeds, and brush. This creates a problem when prospective buyers request a tour of the plant.

9. We should be prepared for a "final" inspection early next summer. We should also be prepared to again dispose of some small pieces that will be exposed by the winter elements. I believe we can make the final inspection, and at this time, classify the area for the future.

   The local people continue to keep asking about any prospective buyers or sales. Another man wanted to show a client through the property. His name is John E. Anderson, I called Real Estate (George Moore's office) and reported this.

RRL/llh

PD-2

DU PONT

ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE

PETROCHEMICALS DEPARTMENT

RECEIVED
PETCHEM OPERATIONS
JUN 27 1980
AC VLR LKB
JPP JLS GVC
EMS JB
FILE

RECEIVED
JUL 01 1980
REAL ESTATE DIVISION

June 26, 1980

J. C. PURCELL

BARKSDALE, WISCONSIN
SHUTDOWN FILE 036

Ref 1: Your letter of June 13 to W. A. Shearer, Jr.
Ref 2: B. F. Kennedy's letter of November 9, 1978.
Ref 3: J. P. Hill's letter of November 7, 1978.
Ref 4: R. R. Lindsey's memorandum of October 25, 1979.

Attached reference letters 2, 3, and 4 supplied our inspection assessment and recommendations on the Barksdale site as of October, 1979.

Another inspection visit is scheduled for July, 1980. A report will be forwarded to you as soon as it is available.

J. L. Kvochak

J. L. KVOCHAK
MANUFACTURING MANAGER

JLK:eak

Attachments

July 2, 1980

MEMORANDUM FOR FILE

BARKSDALE, WI - FORMER PLANT SITE DECONTAMINATION CHRONOLOGY

The site was declared decontaminated and transferred to GSD by Polymer Intermediates Department in September, 1976.

In the Spring of 1977, following heavy winter rains and severe erosion, TNT was exposed in the old World War I TNT area. The site was retransferred to Petrochemicals Department for decontamination. The exposed TNT was destroyed during the summer.

Additional TNT was exposed in the Spring of 1978. In July 1978, the ravine along the World War I manufacturing area was bulldozed on both sides and large quantities of TNT were uncovered and burned. The site was declared decontaminated and transferred to GSD on August 16, 1978. On August 22, 1978, following a 6-inch rainfall, another cache of TNT (totaling approximately 220 lbs.) was discovered and destroyed. The site was then declared decontaminated.

D. E. Johnson and G. L. Moore, Jr. visited the site in June 1979 with Glenn O. Holman (who acts as part time caretaker for GSD). An inspection of the ravine adjacent to the WWI manufacturing area revealed cork-like material in the stream bed which Holman identified as TNT particles. We requested further decontamination by Petrochemicals.

In August 1979, R. R. Lindsey, Petchem Research, Potomac River, and Glenn Holman assisted by the Washburn Fire Department again investigated the WWI area. No new "veins" or deposits were discovered although they gathered and burned 5-600 lbs. of very small pieces which were found in the old TNT area. They declared the site clear except for 200 acres in the northeast corner of the fenced area which was to be rechecked during the summer of 1980.

R. R. Lindsey is currently at the site. B. F. Kennedy, Director of Manufacturing, will join Lindsey for an inspection on July 17th. Kennedy advises they expect to find little more than small scattered gravel-like deposits in the stream and that, unless a large deposit or vein is found, they will declare the site fully decontaminated. When the Petchem report and position is in hand, we will finalize our plan for disposition of the site.

D. E. Johnson

:24 REV. 7-75

DU PONT

ESTABLISHED 1802

...U PONT DE NEMOURS & COMPANY

INCORPORATED

...NERAL SERVICES DEPARTMENT
...AL ESTATE DIVISION

cc: C. I Suplee, Jr.
Real Estate Division

D. E. Johnson
Real Estate Division

Jack Bund.

Fruit!

June 13, 1980

W. A. SHEARER, JR.
PETROCHEMICALS DEPT.

BARKSDALE, WISCONSIN

The Barksdale plant site is currently on General Services Department's books.

Real Estate Division is currently updating its records and evaluating the marketability of Barksdale and other General Services Department properties. Accordingly, please provide me with any available information regarding past disposal of material on the Barksdale site as well as the decontamination of that site.

Please call me at X48370 if you have any questions.

Jack Purcell
JACK PURCELL
INDUSTRIAL PROPERTIES SECTION

JCP/sdb

RECEIVED
JUN 1 6 1980

J FONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE

TROCHEMICALS DEPARTMENT

CC: (. R. Davidson
J. P. Hill

November 9, 1978

G. L. MOORE
REAL ESTATE DIVISION

BARKSDALE SITE

This letter is to supply our current assessment of the state of decontamination of the Barksdale site. On October 17, J. P. Hill, R. R. Lindsey and I inspected the site thoroughly. I concur with Hill's assessment and recommendation as presented in his letter of November 7 (attached).

EXPLOSIVES PRODUCTS DIVISION

B. F. Kennedy

B. F. KENNEDY
DIRECTOR OF MANUFACTURING

BFK:ajm
Attachment

. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE

TROCHEMICALS DEPARTMENT

CC: . E. Lunn
... R. Lindsey
Potomac River Works

November 7, 1978

TO: B. F. KENNEDY

FROM: J. P. HILL

BARKSDALE SITE - DECONTAMINATION

Ref: My memos of July 7, September 12, and October 20, 1978.

An additional examination of the Barksdale site was made on October 17, 1978. No significant amounts of TNT were found.

Since start of work in the Fall of 1977, all manufacturing areas of the plant have been carefully examined. All ditches which might have contained nitroglycerin have been shot. All deposits of TNT have been destroyed (about 10 tons). All surface concentrations of TNT and DNT have been burned. All areas where TNT might be logically found have been core drilled.

Thus, the site decontamination is as good as we know how, and no further work is recommended.

With all this it is, of course, impossible to guarantee that some TNT deposits do not still exist. The only hazard of this might be with blasting or high speed drilling. Whereas we consider this hazard to be minimal, it may be advisable to caution buyers about drilling or blasting in the 198 acres in the northwest corner of the plant (2400 ft. east from the west fence and 3600 ft. south from the north fence).

It is recommended that the site be sold.

JPH:ajm

~~cc~~ D. F. Kennedy
Director of Manufacturing
N 447

George L. Moore, Jr.
Real Estate Division
D-2076

① ~~WEB~~ } init
~~②~~
③ dum file

October 25, 1979

TO: J. A. ROBBE - PRW
J. L. HAMILTON - PRW

FROM: R. R. LINDSEY - R. R. Lindsey

BARKSDALE DECONTAMINATION - OCT., 1979

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8. The blacktop roads are still passable but the dirt and non-paved roads are covered with long grass, weeds, and brush. This creates a problem when prospective buyers request a tour of the plant.

9. We should be prepared for a "final" inspection early next summer. We should also be prepared to again dispose of some small pieces that will be exposed by the winter elements. I believe we can make the final inspection, and at this time, classify the area for the future.

The local people continue to keep asking about any prospective buyers or sales. Another man wanted to show a client through the property. His name is John E. Anderson, I called Real Estate (George Moore's office) and reported this.

RRL/llh

CC: S. L. Griffith/R. W. Kuhn
T. L. Johnson - N-9498

August 16, 1982

RECEIVED
AUG 18 1982
ENVIRONMENTAL AFFAIRS
PETROCHEMICALS DEPT.

TO: R. F. Williams

FROM: B. M. Lawrence

BARKSDALE WORKS
SITE PREPARATION SUMMARY

This letter is a summary of our site preparation work at Barksdale. The goal of the preparation work was to locate and correct any conditions which could create either a long term or short term hazard.

The cleanup program was begun in 1977, when a detailed inspection of the site was done. The major work was done in 1978, at which time layout drawings of the site were used to locate old TNT manufacturing building foundations and catch boxes. As foundations were located, they were marked with a numbered stake, which was then indicated on the master map. In this way, all potential problem areas were systematically located and examined. All catch boxes were excavated, and any material was removed and burned. Soil borings were taken next to each foundation, and questionable areas were excavated. Soil around the excavated catch boxes were saturated with oil and burned. Grass seed was planted to hold banks and prevent erosion.

Also in 1978, the ditches in the nitroglycerine manufacturing area were shot with Water Gel charges as a precaution. There was no evidence of nitroglycerine remaining.

In 1979, the old TNT area was again policed for foreign material which might have worked its way to the surface. Only a small amount was found. One additional catch box was excavated.

In 1980, only minor work was done, such as the collection of boards used for contractor barricades at the time of plant shutdown. Many of these boards were found to have protruding nails.

In 1981 a final cleanup program was defined, and work was split over a 2 year period. The empty barrel dump was cleaned up, and crushed drums were landfilled on site. The culvert and ditch in the acid area were excavated and neutralized, and the area was regraded and seeded. A part of the acid area was found to have lower than normal pH, and this area was neutralized and seeded so that vegetation would grow. The old TNT area was again examined, and additional catch box material was picked up.

The final segment of work, which is now being completed, involves removal of all empty drums from Boyd Creek and also a surface excavation of the old TNT area for catch box material removal. At the request of Wisconsin DNR, we will cap the two wells (gate well and powerhouse well) and submit well abandonment reports. Wisconsin DNR has requested a final inspection of the property this year, which is planned for the first part of September.

BML:smm

CC: S. L. Griffith/R. W. Kuhn
~~D. S. Olson -- N9498~~

October 18, 1982

TO: R. F. Williams

FROM: B. M. Lawrence BML

Trip Report
Barksdale Plant Inspection

The writer inspected Barksdale Works on October 8 with R. R. Lindsey and R. F. Williams. The purpose of the inspection was to examine 1982 clean-up progress and to decide which areas required further work.

1982 Progress

- Old TNT manufacturing area was stripped down to virgin soil along the ditch. A large catch box was excavated and material removed and burned. Banks were sloped toward the ditch. A second catch box was located but not excavated.

- Surface of old OV area was examined for bare spots and material was excavated and burned. Resin-coated prills had been dumped in this area and had not dissolved.

- Two wells were capped.

- Loose asbestos was bagged and taken to a local landfill.

- Two buildings in the TNX area were excavated to audit the cleanliness of drain systems.

- Empty drums were removed from the flood plain of Boyd Creek and were landfilled after being crushed.

- Earth removed from the old TNT area was spread out in several 6" layers, and catch box waste was manually removed from the earth. A clay cap at least 1' thick was placed on these layers.

Work to be completed

The finds of 1982 indicate that previous core sampling did not locate all abandoned material, and that total excavation of old foundations was required to insure cleanliness. A final excavation of all building foundation could not be performed in 1982 because of RCRA limitations on waste disposal. However, as of this writing, five buildings in the old TNX area were still to be excavated in 1982 because of newly discovered contamination. These TNX excavations are not in a "special property" designation at this time.

The following work remains to be completed:

- o Five building foundations and 2 large catch boxes in the old TNT area need to be excavated.
- o Three building foundations in the "chloride refine" area need to be excavated.
- o The foundation of the TNT graining house needs to be excavated.
- o Old OV area needs to be policed for additional surface contamination.
- o Old TNT manufacturing ditch and ditch banks need to be policed for surface contamination.

Projected Costs

It is feasible that this additional work could be done in one summer if an additional large backhoe is available in the area. The local construction company used this year has only one large backhoe. Additional manpower would also be required to remove debris from the soil as it is being spread. Order of magnitude estimate for this work is $40M to $60M, depending on the amount of contaminated material which is found.

Program

- o Obtain construction bids from local construction company for the work outlined above. Request the use of a second backhoe. This estimate should be completed by March 1, 1983.
- o Line up pensioner R. R. Lindsey as work supervisor, and obtain one additional man to act as relief supervisor. Hire two additional men to assist in removing contaminated material which is unearthed. To be completed by April 1, 1983.
- o Begin work by May 1, 1983, and plan on completing work by July 1.

BML:smm

O50 REV 4 82

DU PONT
ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
MORRIS, ILLINOIS 60450

BCC: S. L. Griffith/R. W. Kuhn/
R. F. Williams
D. S. Olson-N9498
~~H. Smithies~~-N6447
Tech File E-114

PETROCHEMICALS DEPARTMENT
SENECA WORKS
7700 WEST DU PONT ROAD

Copied to: D. E. Johnson
GS - Barley Mill Plaza, Phips Bldg.

August 4, 1983

Mr. Barry D. O'Flanagan
Wisconsin Department of Natural Resources
Northwest District Headquarters
Box 309
Spooner, Wisconsin 51801

Barksdale Works

This letter documents the action taken by Du Pont at its Barksdale Wisconsin site. Although we have been actively engaged in thorough property examination since 1977, the items listed in this letter involve the work done in 1981 and 1982 subsequent to Wisconsin DNR's site inspection of January 1981. Items are in the same order as the recommendations you proposed on February 16, 1982.

- In September 1981, sodium carbonate was spread over the nitric acid production area and seeded with grass.

- In August 1981, a culvert pipe east of the nitric acid production area was removed and the ditch was regraded to form a swale. This area was neutralized with sodium carbonate and grass seed was planted.

- In August and September 1981, empty barrels were removed from the edge of Boyd's Creek and were crushed and buried at a suitable spot east of the old barrel dump. The creek bank was regraded and planted with grass seed. Grass cover had stabilized erosion by 1982.

- In July 1982, Boyd Creek was policed for empty barrels and other debris which had been washed out of the barrel dump by flood waters. These drums were crushed and taken to the new drum landfill. Approximately 1 foot of clay was compacted over the crushed barrels and the area was planted with grass seed.

- In July 1982, three soil samples were taken in the TNX area in a triangular pattern around sample point #7 (as referenced in your letter of February 16, 1982). These three samples were composited, and the results of this analysis are attached. No contamination of this area was detected.

o In August 1982, metal caps were sealed onto the casings of the wells at the main gate and the powerhouse. As we discussed by telephone, future use of these wells is possible, so permanent abandonment was not deemed necessary. A well abandonment report is attached to this letter for documentation purposes, although we have very little data available on well dimensions.

Please be assured that Du Pont has not released any section of property prior to thorough environmental examination. We are concluding a complete property examination this summer and are prepared to conduct an inspection with you to verify the results of our efforts. I trust that this letter addresses all recommendations made by Wisconsin DNR in previous correspondence about Barksdale, and I appreciate your willingness to work with us in resolving DNR's inquiry. Please give me a call on 815-357-8711, extension 214 if there are any questions.

Very truly yours,

R. F. WILLIAMS, MANAGER

BMLawrence

B. M. Lawrence

BML:smm
Att.

BOX 7921
MADISON, WISCONSIN 53707

Form 3300-5
Rev. 6-76

Property Owner: E. I. du Pont de Nemours & Co.

P.O. Address: Barksdale, Wisconsin (Route 13 North of Ashland)

Well Location: Section 24, T48N, R5W (Powerhouse well)
Street and Number or Fractional Section, Town and Range

Type of Well: N/A Drilled; N/A Driven; N/A Dug; N/A Bored

Total Depth of Well: N/A Feet; Diameter: 6 Inches; Depth of Casing: N/A Feet

Depth to Rock: 50 to 100 Feet; Depth to Water: ~150 Feet; Limestone Formation: N/A Yes or No

Material Overlying Rock: X Clay; ___ Sand or Gravel; ___ Mixed

Material and yardage used for fill or seal in rock section of well:

Formation*	Sealing Material Used	Cubic Yardage
	None	

*In mixed formations, list formations (if known) and sealing material according to Section NR 112.21 as indicated the back of this page.

Material and yardage used for sealing above rock:

Formation	Sealing Material Used	Cubic Yardage
Sand or sand & gravel	Metal cap placed on casing.	
Clay		
Till		

To permit adequate grouting, the casing should remain in place but ungrouted liner pipes or any other obstruc need to be removed.

Was casing left in place? Yes

Were liners and other obstructions removed? No

Name of Person or Firm doing Sealing Work: Bruce M. Lawrence

Signature of Person doing the Work: Bruce M Lawrence

Address: 7700 West Du Pont Road, Morris, Illinois 60450

BOX 7921
ADISON, WISCONSIN 53707

Form 3300-5
Rev. 6-76

operty Owner: E. I. du Pont de Nemours & Co.

O. Address: Barksdale, Wisconsin (Route 13 North of Ashland)

ell Location: Section 24, T48N, R5W (Main Gate Well)
Street and Number or Fractional Section, Town and Range

ype of Well: N/A Drilled; N/A Driven; N/A Dug; N/A Bored

otal Depth of Well: N/A Feet; Diameter: 6 Inches; Depth of Casing: N/A Feet

epth to Rock: 50 to 100 Feet; Depth to Water: ~150 Feet; Limestone Formation: N/A Yes or No

aterial Overlying Rock: X Clay; Sand or Gravel; Mixed

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Formation*	Sealing Material Used	Cubic Yardage
	None	

*In mixed formations, list formations (if known) and sealing material according to Section NR 112.21 as indicated the back of this page.

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Till		

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Was casing left in place? Yes

Were liners and other obstructions removed? No

ame of Person or Firm doing Sealing Work: Bruce M. Lawrence

Signature of Person doing the Work: Bruce M. Lawrence

Address: 7700 West Du Pont Road, Morris, Illinois 60450

February 2, 1983

TECHNICAL REPORT

for

E. I. DuPont
Seneca Works
7700 W. DuPont Rd.
Morris, IL 60450

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
B7466	EI DuPont	SENECA WKS	BARKSDALE TNX			

ENVIRONMENTAL TESTING and CERTIFICATION CORPORATION

Denis C. K. Lin, Ph.D.
Vice President
Research and Operations

ETC ENVIRONMENTAL TESTING and CERTIFICATION

February 2, 1983

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Base/Neutral Compounds – GC/MS Analysis Data (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
B7466	EI DuPont	SENECA WKS BARKSDALE TNX				

		Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
DES mber	Compound	Sample Concen. ug/kg	MDL ug/kg*	First ug/kg	Second ug/kg	Blank Data ug/ml	Concen. Added ug/ml	** % Recov	Unspiked Extract ug/ml	Concen. Added ug/ml	% Recov
B	Acenaphthene	-	-	-	-	-	-	-	-	-	-
B	Acenaphthylene	-	-	-	-	-	-	-	-	-	-
B	Anthracene	-	-	-	-	-	-	-	-	-	-
B	Benzidine	-	-	-	-	-	-	-	-	-	-
B	Benzo(a)anthracene	-	-	-	-	-	-	-	-	-	-
B	Benzo(a)pyrene	-	-	-	-	-	-	-	-	-	-
B	Benzo(b)fluoranthene	-	-	-	-	-	-	-	-	-	-
B	Benzo(ghi)perylene	-	-	-	-	-	-	-	-	-	-
B	Benzo(k)fluoranthene	-	-	-	-	-	-	-	-	-	-
B	bis(2-Chloroethoxy)methane	-	-	-	-	-	-	-	-	-	-
B	bis(2-Chloroethyl) ether	-	-	-	-	-	-	-	-	-	-
B	bis(2-Chloroisopropyl)ether	-	-	-	-	-	-	-	-	-	-
B	bis(2-Ethylhexyl)phthalate	-	-	-	-	-	-	-	-	-	-
B	4-Bromophenyl phenyl ether	-	-	-	-	-	-	-	-	-	-
B	Butyl benzyl phthalate	-	-	-	-	-	-	-	-	-	-
B	2-Chloronaphthalene	-	-	-	-	-	-	-	-	-	-
B	4-Chlorophenyl phenyl ether	-	-	-	-	-	-	-	-	-	
B	Chrysene	-	-	-	-	-	-	-	-	-	
B	Dibenzo(a,h)anthracene	-	-	-	-	-	-	-	-	-	-
B	1,2-Dichlorobenzene	-	-	-	-	-	-	-	-	-	-
B	1,3-Dichlorobenzene	-	-	-	-	-	-	-	-	-	-
B	1,4-Dichlorobenzene	-	-	-	-	-	-	-	-	-	-
B	3,3'-Dichlorobenzidine	-	-	-	-	-	-	-	-	-	-
B	Diethyl phthalate	-	-	-	-	-	-	-	-	-	-
B	Dimethyl phthalate	-	-	-	-	-	-	-	-	-	-
B	Di-n-butyl phthalate	-	-	-	-	-	-	-	-	-	-
B	2,4-Dinitrotoluene	ND	3330	ND	ND	ND	0	-	ND	100	51
B	2,6-Dinitrotoluene	-	-	-	-	-	-	-	-	-	-
B	Di-n-octyl phthalate	-	-	-	-	-	-	-	-	-	-
B	1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-
B	Fluoranthene	-	-	-	-	-	-	-	-	-	-

* ETC established Method Detection Limit for this particular sample.

** Reagent Blank. Spiked Blank cannot be performed for this sample.

CC: S. L. Griffith
D. S. Olson-Corpus Christi
D. T. Modi-D7082

November 22, 1982

TO: R. F. Williams

FROM: B. M. Lawrence

Barksdale Clean-up Progress
TNX Area

A thorough excavation of the TNX area was finished 11/12/82. I recommend that this section of property be released for sale, and I recommend against holding this section for further examination. The procedures used to reach this conclusion are listed below:

- Every building foundation associated with Powder Manufacture was excavated (38 total). Contamination was found near eleven foundations, primarily in catch boxes, and was removed and burned. Three additional building foundations (two acid storage and one toluene storage) were also examined and were cleaned.

- Floor drains, roof gutters, and catch boxes were excavated until the drains ended at an open ditch. Contamination was found in three of the five lines in the eastern manufacturing area, and the material was removed and burned.

- Sections of open ditches which received discharge from a pipe were excavated to check for contaminants. Some contamination was found, and the material was removed and burned.

- Open ditches remote from building pipe discharges were hand dug to check for contamination. None was found.

- Two floor slabs were removed to spot check for contamination under the concrete. None was found.

- The source buildings for two contaminated wooden wash troughs was traced. Similar manufacturing buildings were examined to assure that other troughs did not exist.

A sketch of the building foundations is attached. It appears that three separate areas were constructed (east, west, and south). The west section (4 lines) contained no evidence of contamination, and may not have operated. The east section (5 lines) contained some contamination of a small particle grain powder, which was mixed with sand and gravel in the catch boxes and drain pipes. Three of the five lines apparently operated. The south section may have been a rework area, and contamination here was in slab form, indicating that molten material may have been discharged thru drain pipes when the building was burned.

This will conclude the excavation work for this year. The WWI TNT area and the chloride refine area will be excavated next year with the same building-to-building examination and decontamination. This procedure represents our best efforts to find and remove undesirable material, and we are reasonably confident that an area will be clean after such an excavation search is concluded. It would be necessary to strip the entire manufacturing area to guarantee 100% cleanliness, and this extreme thoroughness is not recommended.

BML:smm
Att.

CC: G. J. Hollod-N9498
J. R. Cooper-N9498
V. C. Minardi
Tech File E-114

March 27, 1984

TO: R. F. Williams

FROM: B. M. Lawrence

Barksdale Property
Revised Final Report

Attached is a revised report. Please destroy the report issued on March 26, 1984, which inaccurately labeled test results as "grams" instead of "micrograms".

BML:smm
Att.

CC: G. J. Hollod-N9498
J. R. Cooper-N9498
V. C. Minardi
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March 27, 1984

TO: R. F. Williams

FROM: B. M. Lawrence BML

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CC: G. J. Hollod-N9498
J. R. Cooper-N9498
V. C. Minardi
Tech File E-114

March 27, 1984

TO: R. F. Williams

FROM: B. M. Lawrence

Barksdale Property
Final Condition Report

Efforts to examine, clean up, and sample the inactive Barksdale, Wisconsin site have been concluded. This report summarizes current property conditions and itemizes clean up efforts.

Property Condition

- No hazards from cap-sensitive materials exist on the site. Future activities involving blasting (i.e., tree clearing, ditching, road cutting) would not initiate a secondary blast within surrounding soil.

- No hazards from acidic soil exist on the site.

- No hazards from chemical toxicity exist on the site.

- Low level soil concentrations of TNT and DNT exist within the DNT and TNT manufacturing areas of the site. Levels are not considered toxic, but red standing water will be present within the affected areas. 500 acres of the total 1800 acre site are involved. (See attached map)

- None of the former TNT manufacturing areas have been 100% stripped of catch box material (1/2" diameter and smaller). An estimated 400,000 cubic yards of soil were excavated and spread during a 1 year examination period, but this procedure intentionally did not include soil screening for 100% removal because of cost factors.

- Sampling results from plant areas are attached.

BML:smm

Clean-up Summary

1977	Building foundations were staked out and auger cored (200). TNT surface material was collected and burned. Wooden NG and dynamite equipment was burned.
1978	NG ditches and drains were shot. WWI TNT ravine was examined and material was burned.
1979	Further examination of WWI TNT ravine. Suspicious areas were excavated, and material was burned.
1980	A site inspection was conducted by B. F. Kennedy and R. F. Williams. Additional surface material was located in WWI TNT area. Material tested as cap sensitive.
1981	The site was inspected jointly by Wisconsin DNR and Du Pont. The empty barrel dump was cleaned up; nitric acid area culverts were removed, covered and neutralized. WWI TNT area was examined, and debris burned.
1982	The TNX area was examined and entire TNX-triton drainage collection system was excavated. Detailed examination of entire WWI TNT area was agreed to, and work was begun. A large catch box was destroyed and burned. Surface dump areas in old OV plant were excavated and burned. Excavated soil was transported to TNT and spread in 6" layers for removal of TNT lumps. A property "hold" was placed on the WWI area pending further investigation. Asbestos insulation was bagged, marked, and transported to a local approved landfill.
1983	WWI TNT area excavation was completed. All drains, catch boxes, and foundations were unearthed and material was burned. Similar procedures were conducted for Chloride Refine, Lydol, and Trivilene areas. Dirt was spread in 6" layers to examine and remove contaminated material, then a clay cap was placed over the entire examination area. Old OV dump areas were re-examined for cleanliness. Iron piping was removed from the lab basement and the excavation filled with clean dirt. Many surface drainage ditches in the TNX and TNT areas were regraded to avoid stagnant water pools. Five small transformers were disposed of as PCB equipment, and were shipped to Emille, Alabama for destruction. A final property tour was conducted by Wisconsin DNR.
1984	No further clean-up work proposed.

Barksdale Soil & Water Sampling
Results Summary

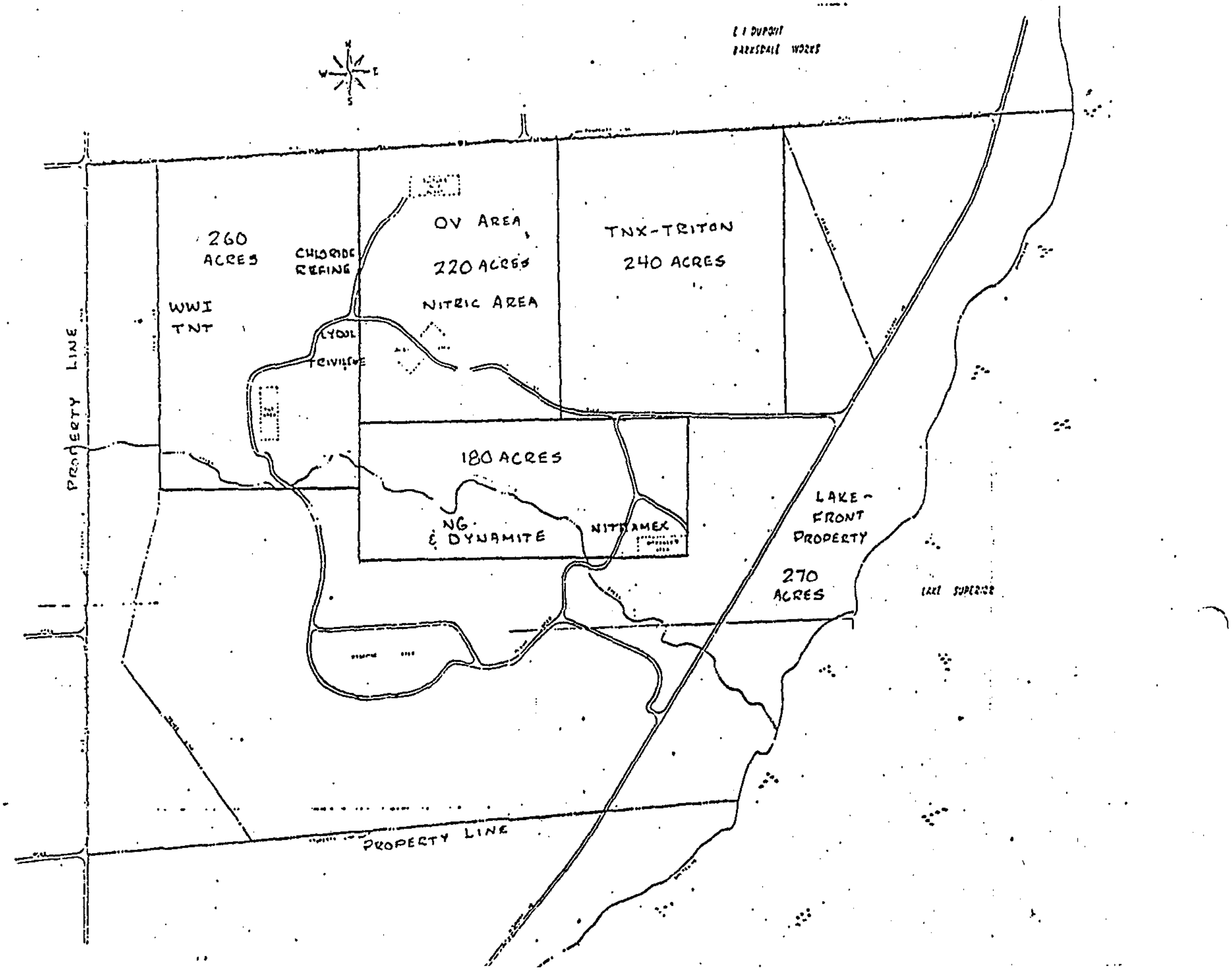
Date	Type of Sample	Results
7/01/81	Soil (misc.)	See attached sheet
7/01/81	Surface water (misc.)	See attached sheet
9/03/81	Soil (misc.)	See attached sheet
9/03/81	Ground water (2 wells)	See attached sheet
1/10/83	Soil (TNX)	No contamination detected
10/27/83	Soil (chloride refine)	2,4 DNT: 108μg/g max. 2,6 DNT: 0.743μg/g max. 2,4,6 TNT: 107μg/g max.
11/22/83	Surface water (red standing H_2O)	2,4,6 TNT: 27μg/l other TNT isomers: BMDL* DNT isomers: BMDL*

*BMDL: Below method detection limit of 10 g/l

TABLE 3
ENVIRONMENTAL SAMPLE RESULTS FROM DUPONT'S BARKSDALE FACILITY

...ication	Date	Cond. (umhos/cm)	pH (su)	Temp. (°C)	CL- (mg/l) (ppm)*	COD (mg/l)	NO_2+ NO_3 (mg/l)	NO_3 (ppm)	SO_4 (mg/l)	NB**	2-NT	26-DNT	24-DNT	246-TNT	135-TNB	Comments
sample in ...etated area ...st of water	7/1/81		3.5		8.5		5.0									This was the nitric acid production area sample taken from top 4-6" of soil.
effluent in ...e ditch	7/1/81	1850	3.5	15.4			36		1100							Orange precipitate.
...age water in ...ear sulfur ... area	7/1/81		4.3	22			.02		120							H_2SO_4 production and sulfur storage areas are drained by this ditch.
Creek above Dump	7/1/81	110	6.7	18	2	39	.05		12							
Creek below Dump	7/1/81	120	7.0	18	2	41	.05		11							
sample from ...f Barrel Dump	7/1/81		7.2		1.5											Heavy metals analyses run- Pb - 10 ppm Cd - 1 ppm Cr - 5 ppm
sample near ...m on north ...f the site	7/1/81		5.6		4.0			75.5		4.64	4.72	4.80	6.60	5110	6.12***	This sample from a small bare patch in berm area. Possibly old trinitroxylene production area.
sample from ...d south of ...med area	7/1/81		4.1		10.0			2.5								This area appeared to be an old dump.
sample from ...rrow	7/1/81		7.0		7.0			.5		4.68	4.62	4.90	4.88	4.70	2.48	This is the ridge and furrow system used for treating the red water.
...l sample at ...gate	9/3/81	365	6.5	9.5			.02		6							Well located at front gate-well was not bailed prior to sampling.
...er plant well	9/3/81	460	7.5				.02		2							Well is broken off improperly abandoned. Well was not bailed. Water level - 34'.
...l sample from ...soil in old ...ex area	9/3/81		5.6		.5			7.0								Sandy-gravelly area with little vegetation.
...l sample from ...rning area	9/3/81		6.5		.5			26.0								Burn area used for refuse and waste explosives disposal.

\- parts per million from soils analysis
...sults in micrograms per gram
...Definitions: NB - Nitrobenzene
NT - Nitrotoluene
DNT - Dinitrotoluene
TNT - Trinitrotoluene
TNB - Trinitrobenzene
...T peak interferes with TNB peak



N
W
E
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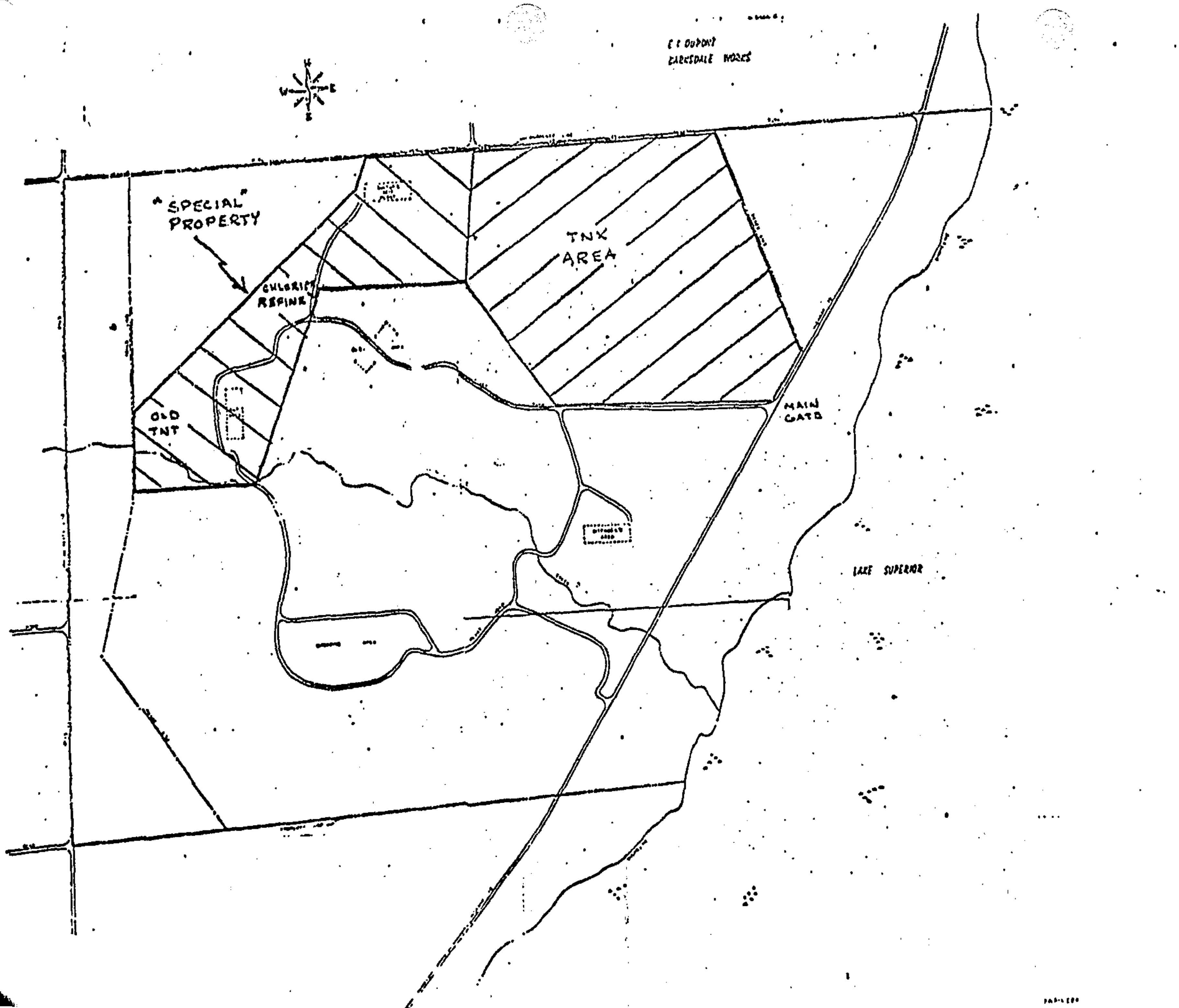
BARKSDALE WORKS
260
ACRES
WWI
TNT
CHLORIDE
REFINE
LYDOL
OV AREA
220 ACRES
NITRIC AREA
TNX-TRITON
240 ACRES
180 ACRES
NG
& DYNAMITE
NITRAMEX
LAKE-
FRONT
PROPERTY
270
ACRES
LAKE SUPERIOR
PROPERTY LINE
PROPERTY LINE


E I DUPONT
BARKSDALE WORKS
"SPECIAL" PROPERTY
TNX AREA
REFINE
OLD TNT
MAIN GATE
LAKE SUPERIOR

BARKSDALE WORKS

TNX-TRITON CLEAN-UP DETAILS

REV 11/9/82
REV 11/5/82
10/29/82