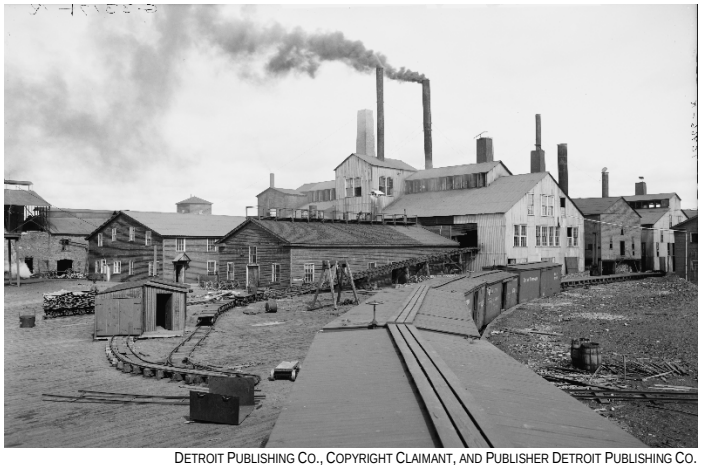
HISTORICAL DATA REVIEW AND COMPILATION TECHNICAL MEMORANDUM

ABANDONED MINING WASTES – TORCH LAKE NON-SUPERFUND SITE
QUINCY MINING COMPANY PORTAGE OPERATIONS AREA
HOUGHTON COUNTY, MICHIGAN
SITE ID# 31000098



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PREPARED FOR:
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
REMEDIATION & REDEVELOPMENT DIVISION
CALUMET FIELD OFFICE
CALUMET, MICHIGAN

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1.0 INTRODUCTION

The Mannik & Smith Group, Inc. (MSG) has prepared this *Historic Data Review and Compilation Technical Memorandum* (TM) as part of the Abandoned Mining Wastes – Torch Lake non-Superfund Site (Project) DEQ Abandoned Mining Wastes (Site ID: 31000098). This TM summarizes previous studies and investigations completed in the Quincy Mining Company Portage Operations Area (QMCP), Houghton County, Michigan. The TM findings will support the development of a Sampling and Analysis Plan (SAP) for QMCP. The TM was prepared in accordance with the *Indefinite Scope Indefinite Delivery (ISID) Discretionary Proposal for FS and Remedial Action Activities* (24 February 2016) prepared by MSG in response to a request from the Michigan Department of Environmental Quality (DEQ), Remediation and Redevelopment Division (RRD), Calumet Field Office under MSG's 2015 Environmental Services ISID Contract Number 00538 with the State of Michigan as amended by *Work Plan Augmentation No. 1* (20 November 2017).

1.1 Project Location

The Project area is located along the shoreline and in Torch Lake and Portage Canal, Houghton County, Michigan. Due to the complex nature and very large area, RRD subdivided the Project into study areas based on past use and known issues. Depicted on ***Figure 1, Project Location Map*** are the QMCP, Quincy Mining Company Mason Operations Area (QMCM), Calumet and Hecla Lake Linden Operations Area (CHLL), and Calumet and Hecla Tamarack City Operations Area (CHTC) and their respective former industrial operations.

The QMCP encompasses the former Quincy Mining Company (QMC) copper mining and processing operations along the north shoreline of the Portage Canal on the south side of M-26 from Dollar Bay, Michigan to the Portage Lake Lift Bridge in Hancock, Michigan. The QMCP consists of approximately 320 acres of land, much of which is made-lands, extending approximately 4.5 miles along the shoreline of the Portage Canal and incorporates multiple parcels and property owners. The approximate extent of the made lands is indicated by the 1865 shoreline depicted on ***Figure 2, Area Features Map.*** Residential (single-family residences)/commercial/vacant, undeveloped forested lands, industrial (capped made lands) properties, and Portage Lake border the QMCP.

1.2 Project Background

Copper mining was extensive in the Keweenaw and formed the backbone of the regional economy and society. Copper ore milling and smelting operations were conducted from the mid-1860s to the 1960s, including the importation, reprocessing, and smelting of various scrap metals in the later years of operation. Consistent with past industrial practices, Torch Lake and the Portage Canal served as dumping grounds for virtually all mining industry related wastes, including tailings, slag, and various chemicals. At least 20 percent of the Torch Lake's volume is estimated to be filled with tailings and other wastes.

The environmental legacy resulting from over 100 years of mining and reclamation led to Torch Lake and its western shoreline to be designated as a Superfund site by the United States Environmental Protection Agency (EPA) https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0503034 and a Great Lakes Area of Concern by the U.S./Canada Great Lakes Water Quality Agreement https://www.epa.gov/torch-lake-aoc. The EPA undertook cleanup activities to address some of the of the mining industry waste, while others were not addressed or left to recover through natural processes.

Review of DEQ file information for QMCP identified subareas within the footprint that have been subject to or associated with historic mining practices. Due to the varying nature of companies that operated within QMCP, the following list provides an overview of known historic operations based on available Sanborn Maps and/or other resources for each of the subareas identified on ***Figure 2, Area Features Map.***

Subareas:

Area A – Historically, the western portion of Area A was the location of the Copper Range Railroad Passenger Depot. According to the 1907 Sanborn Map, a "vacant" Lake Superior Smelting Company was located to the east. The parcel is identified as the H.S. Goodell Distributing Station for Lubricating Oils in 1917 and the H.S. Goodell and Company Bulk Oil Station in 1949. The area is currently the location of a condominium complex and the Houghton County Marina.

Area B – Review of the 1907 Sanborn Map indicates Lake Superior Iron Works operated in the southern portion of Area B. The site is identified as the Portage Lake Foundry and Machinery Company on the 1928 Sanborn Map and by 1949 was the location of the Houghton County Road Commission. The northern portion of Area B was identified as a Store House with additional dwellings in 1928 and the location of a filling station in 1949. Area B is currently the location of the Houghton County Road Commission.

Area C – QMC operated Quincy Smelting Works at the location of Area C. The EPA as part of the Torch Lake Superfund Site remedial action capped portions of the Quincy Smelting Works. Quincy Smelter Reclamation Project Torch Lake EPA Superfund Site as-built drawings (USDA NRCS, 2010) indicate that the cap was placed as part of the Torch Lake Superfund Site Quincy Smelter Reclamation Project. The Fourth Five-Year Review Report for the Torch Lake Superfund Site (USEPA, 2018) indicated that construction was completed in 2011 and that the Quincy Smelting Works was deleted from the National Priorities List (NPL) in 2013. The capped areas are subject to an on-going DEQ Operation and Maintenance (O&M) plan. Other environmental concerns, including those within the Hancock Ripley Trail corridor, have been addressed and/or mitigated through a series of interim responses undertaken by prior owners, the EPA, and the Keweenaw National Park Service Advisory Commission and further investigation as part of QMCP will not occur. The Keweenaw National Historical Park Advisory Commission currently maintains the property, where public tours of mining-era operations within the former copper smelter are provided.

Area D – Historic mining-era operations include the Portage Lake Foundry and Machinery operating within the area until at least 1949 based on review of Sanborn Maps. Julio Marine & Salvage currently operates at the location.

Area E – Historic land use and/or operations are unknown following review of available historic Sanborn Maps and other resources. The area is currently undeveloped and appears to be used for boat storage. In July 2018, a Michigan Department of Natural Resources (MDNR) surveyor observed potentially impacted soils within the ROW of the Hancock/Ripley Trail within Area E.

Area F – A manufactured gas plant was in operation at the location of Area F, south of the Hancock/Ripley trail. Environmental concerns within this area have previously been addressed and further investigation as part of QMCP will not occur. A Filling Station and Bulk Oil Station that included various gasoline, kerosene, and fuel oil tanks, along with oil and oil pump houses operated within the northwestern portion of Area F, as identified on the 1949 Sanborn Map. Keweenaw Consignment currently operates at the location north of the Hancock/Ripley trail, while a residential building and vacant lot are located to the south and east, respectively.

Area G – Standard Oil Company operated at the northwest corner of the area according to the 1917 Sanborn Map. Other historic land use and/or operations are unknown following review of available historic Sanborn Maps and other resources. The area is currently the location of Julio Contracting Company.

Area H – Historic land use and/or operations are unknown following review of available historic Sanborn Maps and other resources. The area is currently the location of Dollar Bay Motor Sports, Isle Royale Seaplanes, and Webben Construction.

Area I – Portage Boiler Works operated within Area I in 1907 according to historical Sanborn review and by 1928 Lake Superior Iron and Metal Company operated at the site. The 1949 Sanborn Map depicts Area I was used for scrap iron storage and was the location of the J.H. Green Company; however, the nature of the company is unknown. The area is currently the location of various metal scrap and machinery, but otherwise, appears to be inactive.

Area J – Area J was the location of the Houghton Lumber Yard Company and the Dollar Bay Lumber Company, according to the 1917 and 1928 Sanborn Maps, respectively. However, according to the 1949

Sanborn Map, Henry Borth Company Manufacturing R.R. Shims and UP Oil Company operated within the area. H&Y Marina currently operates at the location.

Area K – According to the 1907 Sanborn Map, Tamarack and Osceola Mining Company had mining operations at the location. By 1917, the location was the site of a Calumet and Hecla Mining Company Coal Dock. The area is currently the location of a condominium complex.

Area L – Area L was not identified on available Sanborn Maps; however, according to Monette's *Dollar Bay, Michigan, Fifty-Fourth of a Local History Series* (Monette, 2000*)*, Dollar Bay Terminal Company erected three storage tank onsite in May of 1945. It was reported the welded steel gasoline tanks each had a capacity of 840,000 gallons, with dimensions of forty feet high and sixty feet in diameter. Dikes or firewalls surrounded each tank, while lake tankers were used to transport the product from Chicago refineries. Three additional tanks were added to the site, which increased storage for kerosene, diesel fuel, and three grades of gasoline. In May 1984, the owner/operator Amoco Oil Company closed the facility, selling the property to Julio Contracting Company of Ripley. The six tanks were dismantled in October 1994 after a tug-barge was used to drain the tanks. The tug-barge has also been observed at another Julio property along the Portage Canal. Other historic land use and/or mining operations are unknown. The current usage of the area is unknown, although it appears to be inactive.

Area M – Lake Superior Smelting Company operated at the location, as identified on the 1928 Sanborn Map; however, only two ice houses remained at the site on the 1949 Sanborn Map. The EPA as part of the Torch Lake Superfund Site remedial action capped portions of Area M, N, and O. Dollar Bay Torch Lake EPA Superfund Site as-built drawings (USDA NRCS, 2004) indicate that the cap was placed as part of the Torch Lake Superfund Site Dollar Bay remedial action. The Fourth Five-Year Review Report for the Torch Lake Superfund Site (USEPA, 2018) indicated that construction was completed in 2002; however, the Dollar Bay parcel has not been deleted from the NPL. The capped areas are subject to an on-going DEQ O&M plan. The balance of the areas were not addressed as part of the Torch Lake Superfund Site remedial action. A building that houses two production wells for water supply to Dollar Bay is currently located within the area. The area appears to be undeveloped with the exception of the Dollar Bay municipal wells that are located within the area.

Area N – The parcel was identified as Tamarack and Osceola Copper Manufacturing Company on the 1907 Sanborn Map. It was the location of John A. Roebling's Sons Copper Manufacturing and Foley Copper Products Company Copper Wire Mill in 1928 and 1949, respectively. The EPA as part of the Torch Lake Superfund Site remedial action capped portions of Area M, N, and O. Dollar Bay Torch Lake EPA Superfund Site as-built drawings (USDA NRCS, 2004) indicate that the cap was placed as part of the Torch Lake Superfund Site Dollar Bay remedial action. The Fourth Five-Year Review Report for the Torch Lake Superfund Site (USEPA, 2018) indicated that construction was completed in 2002; however, the Dollar Bay parcel has not been deleted from the NPL. The capped areas are subject to an on-going DEQ O&M plan. The balance of the areas were not addressed as part of the Torch Lake Superfund Site remedial action. The area is currently the location of mining-era buildings; however, specific present day use is unknown.

Area O – According to the 1907 Sanborn Map, Area O was the location of Dollar Bay Land and Improvement Company. The parcel is identified as Dollar Bay Lumber Company in 1917 and Dollar Bay Lumber Company Saw Mill and Lumber Yard and Horner Flooring Company Wood Flooring Mill in 1949. Horner Flooring Co. Inc., a manufacturer of hardwood maple basketball flooring, currently operates at the location. The EPA as part of the Torch Lake Superfund Site remedial action capped portions of Area M, N, and O. Dollar Bay Torch Lake EPA Superfund Site as-built drawings (USDA NRCS, 2004) indicate that the cap was placed as part of the Torch Lake Superfund Site Dollar Bay remedial action. The Fourth Five-Year Review Report for the Torch Lake Superfund Site (USEPA, 2018) indicated that construction was completed in 2002; however, the Dollar Bay parcel has not been deleted from the NPL. The capped areas are subject to an on-going DEQ O&M plan. The balance of the areas were not addressed as part of the Torch Lake Superfund Site remedial action.

Area P – This area was not identified on available Sanborn Maps; however, further review of Monette's *Dollar Bay, Michigan, Fifty-Fourth of a Local History Series* (Monette, 2000*)*, indicates that the parcel was owned by

Lake Superior Smelting Company and was used as a slag dump. Present day use appears to be a scrap/recycling facility called “The People’s Store,” and includes a residential and farm area to the east.

2.0 OBJECTIVES AND SCOPE OF WORK

The objective of the Project is to address some of the remaining environmental concerns in the QMCP that were not previously addressed by the EPA. The overarching Project concerns involve groundwater, surface water, sediments, and "upland" media. Known or suspected problems which are being evaluated as part of the Project include: an unidentified, significant in-lake and/or terrestrial source of polychlorinated biphenyls (PCBs), uncharacterized waste deposits and >750 uncharacterized drums on the lake bottom, slag, landfills, industrial ruins, coal storage areas, underground storage tanks (USTs), residual process materials (RPM), asbestos containing materials (ACM), and any other waste materials identified during future investigations.

RRD conducted Site Investigation (SI) activities in the CHLL, CHTC, and QMCM areas, and confirmed the remaining concerns in the Project area involve groundwater, surface water, sediments, and "upland" media. Priority concerns which were evaluated and deemed to require interim responses (IRs) include: a significant terrestrial source of PCBs; ACM; RPM; abandoned mining-era containers; seeps; limited areas of soil in which there are Direct Contact Criteria (DCC) and Particulate Soil Inhalation Criteria (PSIC) exceedances; and, physical hazards.

In addition to the CHLL and CHTC IRs and the QMCM SI, RRD staff directed development of this document to assimilate historic information in support of a SAP for undertaking SI activities at the QMCP in 2018. The primary focus of the SAP will be to ascertain the source, nature, and extent of contaminants (including PCBs) in all affected environmental media (soil, groundwater, surface water, waste materials, and sediments) along the north shoreline of the Portage Canal from Dollar Bay to the Portage Lake Lift Bridge in Hancock, including former industrial areas within the footprint.

3.0 APPLICABLE SCREENING CRITERIA

Evaluation of potential environmental and human health risks present in the QMCP requires uniformly compared analytical results to regulatory criteria. Previous investigations had specific goals and objectives that may have placed emphasis on evaluating specific locations, environmental media, or chemical analytes, intentionally narrowing the scope of each investigation. In addition, due to the constraint of focused objectives, these investigations are also prone to common limiting factors such as funding, personnel, and equipment resources. As such, the findings of a given investigation are also limited, potentially providing a compartmentalized view of a larger, more prolific problem. Similar to limitations identified above, the findings and interpretation of each investigation were also contingent upon the selected regulatory criteria utilized in the evaluation. Over the course of time, regulatory criteria are refined and subject to change, often including criteria revisions and new rule promulgation. As a result, regulatory criteria for a specific exposure pathway and environmental medium evaluated in 2007, for example, may have been evaluated differently using the same regulatory criteria in 2013.

In support of developing a comprehensive approach for evaluating risks, the analytical results from previous investigations summarized herein were compiled and compared to the same regulatory criteria. Consistent with this approach, the same regulatory criteria will be used to evaluate the findings derived from implementation of the SAP.

The following provides a summary of the regulatory criteria utilized for evaluating analytical results from surface soil, subsurface soil, groundwater, sediment, and surface water during interpretation of the identified key documents:

- Part 201 of Michigan’s Natural Resources and Environmental Protection Act (NREPA), being PA 451 of 1994, as amended, Residential and Non-Residential Cleanup Criteria for Response Activity (December 30, 2013).
  - Surface Soil;
  - Subsurface Soil;
  - Waste Materials;

- RPM;
- Groundwater; and,
- Asbestos.

- EPA, Resource Conservation and Recovery Act (RCRA), Identification and Listing of Hazardous Waste Criteria (40 Code of Federal Regulations, Part 261, Subpart C).
  - Abandoned Containers;
  - RPM; and,
  - Waste Materials.

- EPA, National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR, Part 61, Subpart M).
  - Suspect Asbestos Containing Material (SACM).

- EPA, Region 5, RCRA, Ecological Screening Levels (ESLs) (August 2003).
  - Sediment; and,
  - Surface Water.

- DEQ – Rule 57 Water Quality Values, Surface Water Assessment Section (February 2014).
  - Surface Water.

- Sediment Quality Guidelines, Threshold Effect Concentrations (TECs) and Probable Effect Concentrations (PECs), MacDonald, et al, 2000.
  - Sediment.

Although relevant, the DEQ drinking water and groundwater/surface water interface pathways criteria exceedances for metals are excluded from the groundwater evaluation. Similarly, the metals exceedances for soil criteria protective of the DEQ drinking water and groundwater/surface water interface pathways are also excluded. The rationale for this exclusion is twofold:

- The Project investigation and anticipated response actions are being undertaken pursuant to Part 201 of Michigan's NREPA, being PA 451 of 1994, as amended. The concentrations of metals in excess of the DEQ drinking water and groundwater/surface water interface pathways criteria are ubiquitous in the study area and are predominantly the result of the presence of stamp sands. Stamp sands are not defined as a hazardous substance nor are subject to regulation under Part 201 unless the property otherwise contains hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use; and,

- The study area is part of Operable Unit (OU) 2 for which the EPA Record of Decision (ROD) remedy called for No Action. The EPA's ROD OU 2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Canal, and other area water bodies. Note that EPA's No Action determination relies on the following to mitigate the effects of stamp sand to the extent practicable:
  - The reduction of stamp sand loading to surface water bodies expected because of the remedial action taken at OU 1 and OU 3;
  - Ongoing natural sedimentation and detoxification;
  - Institutional programs and practices controlling potential future exposure to site-affected drinking water that were intended to be administered at the county and state level; and,
  - The long-term monitoring and the five-year review process monitoring requirements of the remedy selected for OU 1 and OU 3 under the 1992 ROD.

Note that metals criteria for other relevant pathways, and organic and cyanide contaminants for all pathways were included in the evaluation.

The regulatory screening criteria summarized above may be applicable to all or select study areas in the QMCP. A limiting factor in the assessment of the applicability of these criteria may include, but not be limited to, specific environmental media (as noted above), current and anticipated future land use categories, and relevant exposure pathways for human and ecological receptors. Assessment of these factors requires that the analytical results of the SI and the respective geological and hydrogeological characteristics of the Project area be evaluated to determine generally, which exposure pathways, risks, and conditions are relevant and applicable.

4.0 SAP DEVELOPMENT

Screening results and sample analytical data from previous investigations will be incorporated into the sample design. By doing so MSG will be able to identify potential data gaps, while considering the recommendations in each document and available screening and analytical results for soil, groundwater, and sediment from the investigations.

As discussed in the preceding subsection, results derived from individual investigations limit interpretation, particularly as it relates to the presence of potential source areas, localized concentrations of contaminated media, and potential exposure routes. As such, analytical and screening results compiled from the key documents summarized in this document were also integrated into the Project database. The result creates a more comprehensive look at the historical findings while also reducing the potential for redundant sampling activities. The historical analytical and screening results are depicted on multiple figures summarized as follows:

Figure 3a	Historical Sample Analytical Result Map - Soil Area A
Figure 3b	Historical Sample Analytical Result Map - Soil Area B
Figure 3c	Historical Sample Analytical Result Map - Soil Areas C-F
Figure 3d	Historical Sample Analytical Result Map - Soil Areas G-J
Figure 4a	Historical Soil Screening Result Map – XRF Areas D-J
Figure 4b	Historical Soil Screening Result Map – XRF Areas M-O
Figure 5a	Historical Sample Analytical Result Map - Groundwater – Area A
Figure 5b	Historical Sample Analytical Result Map - Groundwater – Area B
Figure 5c	Historical Sample Analytical Result Map - Groundwater – Areas G-I
Figure 5d	Historical Sample Analytical Result Map - Groundwater – Areas M-O
Figure 6	Area Assessed by Side Scan Sonar and Underwater Reconnaissance Targets

The volume of analytical data derived from the historical documents and presented on the aforementioned figures required the use of graphical and analytical details to simplify the overall presentation of the data. With the exception of soil screening results of X-ray fluorescence (XRF) data presented on Figure 4a and Figure 4b, a quadrant style graphic was used to present the analytical results for the following parameter groups:

- PCBs, located in the upper left;
- Inorganics/Cyanide, located in the upper right;
- Volatile Organic Compounds (VOCs), located in the lower left; and,
- Semi-volatile Organic Compounds (SVOCs), located in the lower right.

Sample locations are labeled with field sample locations, sample date(s) and sample intervals, if known. Detections and/or exceedances are identified by the following colors:

- Green Quadrant Fill – This quadrant coloring represents sampling or screening results below the figure criteria for the indicated parameter group. Green fill may be derived from any of the historical investigations.

- Red Quadrant Fill – This quadrant coloring represents at least one exceedance of figure criteria for the indicated parameter group. A summary is presented in the corresponding callout box that includes the analyte(s) that exceeded, the concentration(s), and a key indicating what criteria was exceeded.

- Yellow Quadrant Fill – A yellow quadrant fill indicates that a sample was analyzed for PCBs and no congeners were detected.

- Light Blue Quadrant Fill – A light blue quadrant fill means that a sample was analyzed for PCBs and at least one congener was detected. If PCBs or any other analytes exceeded criteria, they would be listed in the callout box. All PCB exceedances are highlighted with red text in the callout boxes.

- Unshaded Quadrants – Unshaded quadrants denoting sample locations mean that the indicated parameter group was not analyzed.

5.0 KEY DOCUMENT REVIEW AND INTERPRETATION

This Section provides a summary of the key documents selected for review as well as a synopsis of the investigation and conclusions relevant to the development of the SAP.

Numerous investigations have been conducted on and along the shoreline of the Portage Canal with various purposes, often specific to a particular property or investigative focus. Although often referenced in individual reports, a comprehensive approach that consolidates the findings of these investigations has not been completed. In support of the development of the SAP, the Project key deliverables associated with the QMCP were selected to assist in the identification of historic areas of contamination or data gaps requiring further assessment.

The following is a summary of the key documents reviewed along with how the findings will be incorporated into the *Draft Sampling and Analysis Plan for the Abandoned Mining Wastes, Quincy Mining Company Portage Operations Area, Torch Lake Non-Superfund Site, Houghton County, Michigan*:

- Michigan Department of Transportation M-DOT M-26, Ripley, Houghton County Hydrogeological Investigation – April 18, 1991. Prepared by M-DOT Geoenvironmental Services Unit Materials & Technology Division.

- 1st Preliminary Report Dollar Bay Wells – March 31, 1995. Prepared by Traverse Engineering Services.

- Letter of Notice Re: Complaint Inspection, Julio Construction Property Adjacent to Keweenaw Canal, Ripley, Houghton County – December 12, 1995. Prepared by Michigan Department of Environmental Quality.

- Phase II Hydrogeological Investigation Report, Houghton County Road Commission Ripley Garage – August 1998. Prepared for Houghton County Road Commission. Prepared by SCA Environmental.

- Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property – November 25, 2002. Prepared by Michigan Department of Environmental Quality.

- Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Area, Keweenaw Peninsula, Michigan – December 13, 2007. Prepared by Weston Solutions, Inc.
- Letter of Notice Re: Dollar Bay Well Field, Dollar Bay, Houghton County, Site ID: 31000089 -- August 4, 2010. Prepared by Department of Natural Resources and Environment.

- Baseline Environmental Assessment: Royce Road Marina, Royce Road, Franklin Township, Houghton County, MI 49930 – October 26, 2015. Prepared by TriMedia Environmental & Engineering (TriMedia).

- Correspondence between Horner Flooring Co. Inc. and DEQ – April 3, 1995.

- Quincy Mining Company Portage, Houghton County, Site ID #31000098, Bathymetric Investigation-Side Scan Sonar– January 9, 2018. Prepared be DEQ.

The following subsections summarize the findings of these investigations and the conclusions derived from the performance of each assessment.

Michigan Department of Transportation M-DOT M-26, Ripley, Houghton County Hydrogeological Investigation – April 18, 1991.

MDOT undertook a two phase hydrogeological investigation to study the environmental impacts associated with soil and surface water contamination discovered during construction along the south side of M-26 in Ripley. The site was formerly a bulk fuel transfer station for the Goodell Oil Company, as well as the location of a mining-era smelter. During August 1989 construction activities, a wood-braced valve pit which contained accumulated petroleum products was discovered on the site. Approximately 3,200 gallons of petroleum waste was pumped from the pit and associated underground pipelines. During this time, additional pipelines across the site were traced and removed, and contaminated soil within the pit area was excavated.

Laboratory analysis of the samples collected on August 16, 1989 during investigative activities confirmed the presence of fuel constituents, including benzene, ethylbenzene, toluene, and xylene (BTEX).

In April 1990, eleven soil borings were advanced at the site and soil samples were collected. During this time, seven (7) monitoring wells were installed and sampled. Laboratory analysis of the soil sample collected from the TH#5 location identified naphthalene in exceedance of the Groundwater Surface Water Interface Protection Criteria (GSIPC) criteria. Laboratory analysis of groundwater samples collected during this time yielded no exceedances for VOCs or SVOCs.

Three additional monitoring wells were installed and one additional test hole (TH#12) was completed to delineate the limits of the contamination in October 1990. During this time, all monitoring wells were sampled for laboratory analysis. Laboratory analysis of the soil sample collected from TH#12 showed exceedances of GSIPC for naphthalene and phenanthrene. Laboratory analysis of groundwater samples indicated from MW #6, MW #7 and MW #9 revealed detections of naphthalene, phenanthrene, benzene, ethylbenzene, and/or total xylenes in excess of one or more of the following: Residential Drinking Water Criteria (DWC), Nonresidential DWC, and/or Groundwater Surface Water Interface Criteria (GSIC). The greatest groundwater concentrations were located near where the valve pit was removed. At the time of the report, MDOT recommended semi-annual groundwater monitoring in order to determine the type of remediation required.

Coordinates associated with the site were not provided; therefore, sample locations were digitized from a georectified figure located within the report. Soil boring and monitoring locations are depicted on ***Figure 3a****, Historical Sample Analytical Results Map – Soil Area A* and ***Figure 5a****, Historical Sample Analytical Results Map – Groundwater Area A*. The analytical data generated during the investigation will be used to evaluate the potential presence of mining-era and/or other impacts that would be represented by elevated levels of petroleum related contaminants.

1st Preliminary Report Dollar Bay Wells – March 31, 1995.

During routine water sampling completed by the Michigan Department of Health, currently the Michigan Department of Health and Human Services (MDHHS), in August of 1994, laboratory analysis revealed the presence of pentachlorophenol (PCP) in production well #2 (PW #2) at a concentration of 0.55 parts per billion (ppb). Traverse Engineering Services (TES) was retained to provide an evaluation of the hydrogeological conditions in the vicinity of the Dollar Bay Well Field following the confirmation of PCP within the production wells. Repeat samples collected from the production wells also revealed PCP during sampling completed in September 1994, October 1995, and January 1996.

Three observation wells (OW #1 through OW #3) were installed in the vicinity of the production wells to determine groundwater flow direction, allow for groundwater sample collection, and determine aquifer properties. PCP was not detected in samples collected from the observation wells or from samples collected from surface water on Portage Lake.

The report stated that five (5) monitoring wells were located onsite at the nearby Horner Flooring and were part of a previous environmental investigation, although it was reported that one monitoring well had been damaged. Groundwater sampling conducted at Horner Flooring revealed PCP at a concentration of 0.04 ppb from the sample collected from monitoring well E-4. In addition to the groundwater sampling, Horner Flooring sampled a transformer pole located onsite for the presence of PCP. The utility pole, which was presumed to have been treated with PCP, was removed in March 1995.

TES recommended allowing the pumps to run for at least an hour during required quarterly groundwater sampling events in addition to long term groundwater flow determination.

Coordinates associated with the production wells were taken from the available well logs. Other sample locations were digitized from a georectified figure located within the TES report. Monitoring locations are depicted on ***Figure 5d,*** *Historical Sample Analytical Results Map – Groundwater Areas M-O*. The analytical data generated during the investigation will be used to evaluate the potential presence of mining-era and/or other impacts that would be represented by elevated levels of PCP.

Letter of Notice Re: Complaint Inspection, Julio Construction Property Adjacent to Keweenaw Canal, Ripley, Houghton County – December 12, 1995.

The DEQ outlined the inspection conducted on December 4, 1995 at the Julio Construction Company in a letter sent to Mr. Lawrence Julio. The inspection stemmed from a complaint reported to the DEQ and was performed to evaluate compliance with Part 111 of NREPA, PA 451 of 1994, as amended, and Subtitle C of RCRA. DEQ found the facility to be in violation of Part 111 due to lack of documentation as to whether or not waste streams were hazardous. While onsite, it was noted that DEQ staff had collected a sample of ash from the barrel stove at the metal scrap yard and would be forwarding results to the owner/operator. Further violations included the lack of proper documentation for the removal of appliance refrigerant, potential violations of Parts 121 and 167 of Act 451 due to lack of appropriate documentation for disposal of waste oil, and violation of Part 169 of Act 451 for scrap tires.

Additional items within the DEQ file include documentation that the Michigan Department of Natural Resources (MDNR) was notified that a fire at Julio Marine and Salvage in Ripley caused a potential release of PCBs in April 1988. Documentation revealed that a fire caused by suspected arson destroyed a storage building at Julio's on the Portage Canal. Field observations recorded by DEQ (formerly MDNR) staff during a site visit included "a large pile of transformers" located at the southeast corner of the building area with "oil on floor everywhere!" Two samples of "gunk" were collected and transported to Lansing for analysis of PCBs; however, it is unclear from where the samples were collected. Based on information from the inspection and photographic interpolation, it is suspected that the subject locations is within Area D. Analysis of the samples that were collected were non-detect for PCBs.

Coordinates associated with the samples were not provided; therefore, it is unknown from where the samples were collected. Based on the non-detect laboratory results and lack of sample locations, the results were not added to the Project database.

Phase II Hydrogeological Investigation Report, Houghton County Road Commission Ripley Garage – August 1998.

In October 1995, a *Phase I Hydrogeological Investigation* was submitted by Sundberg, Carlson and Associates, Inc. Environmental Services Division (SCA) to DEQ for review and outlined the identification of source areas and contaminates of concern at the Houghton County Road Commission (HCRC) Garage in Ripley, Michigan. SCA was

then retained to perform a *Phase II Hydrogeologic Investigation* at the HCRC Garage in which the results are summarized below.

The HCRC Garage property was originally the site of a copper smelter known as Lake Superior Smelting Works until 1923 when HCRC obtained the property for use as a road commission garage. Petroleum products used to fuel and lubricate road commission vehicles had routinely been stored onsite and the site included aboveground storage tanks (ASTs), USTs, and various dispensing pumps associated with the storage systems. It is reported that the historic UST and AST systems were removed during the 1960s and 1970s; however, a single UST that was abandoned in place at the time of other tank removals was removed and properly decommissioned in June 1996. It was also reported that product was released in 1965 while a railroad car was unloading gasoline to an AST. The area was excavated in the late 1970s, at which time residual free product and contaminated soils were removed from the site.

In January 1994, HCRC was requested by the DEQ to address the petroleum and salt contamination at the Ripley Garage. SCA was retained to perform the fieldwork reported in the *Phase I Hydrogeological Investigation Report* dated October 13, 1995. BTEX, PNAs, lead, and chromium were suspected to be related to the use of the former UST and AST systems onsite. Chloride contamination was thought to be related to historical road salt use and onsite storage. HCRC completed inspections to verify that the former USTs onsite had been removed. The assessment resulted in the discovery of a 500 gallon UST, which was removed in June 1996.

During the completion of the Phase II Hydrogeological Investigation, soil borings were advanced near the former UST locations (100 series), waste oil AST area (200 series), present and former salt storage area (300 series and 400 series, respectively), and near the paint shop (500 series). Soil samples collected were field screened using a photoionization detector (PID) and samples exhibiting high level responses on the PID were sent to independent laboratories for analysis. Groundwater samples were collected from most borings in which monitoring wells were not installed. A total of 28 monitoring wells were installed to monitor groundwater quality.

Laboratory analysis of the soil samples collected in July 1995 from SB-101, SB-102, SB-103, SB-104, SB-108, SB-109, SB-110, SB-111, SB-113, SB-114, and SB-201 detected one or more of the following: naphthalene, benzene, ethylbenzene, total xylenes, benzo(a)pyrene, fluoranthene, dibenzo(a,h)anthracene, phenanthrene, and fluorene in exceedance of GSIPC, Residential DWPC, Residential Soil Volatilization to Indoor Air Inhalation Criteria (SVIIC), Residential Direct Contact Criteria (DCC), Nonresidential Drinking Water Protection Criteria (DWPC), and/or Nonresidential DCC.

Laboratory analysis of the groundwater samples collected from SB-101, SB-103, SB-108, SB-109, SB-110, SB-111, SB-114, SB-201, MW-101, and MW-103 during the completion of soil boring advancement and monitoring well installation in summer 1995 detected fluoranthene, fluorene, naphthalene, phenanthrene, benzene, ethylbenzene, total xylenes, and/or anthracene exceeding Residential and Nonresidential DWC, GSIC, Water Solubility, Residential Groundwater Volatilization to Indoor Air Inhalation Criteria (GVIIC), and/or Nonresidential GVIIC.

Laboratory analysis of the groundwater samples collected during a monitoring event in October 1996 detected fluoranthene, naphthalene, phenanthrene, benzene, ethylbenzene, total xylenes, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, and/or indeno(1,2,3-cd)pyrene exceeding Residential and Nonresidential DWC, GSIC, and/or Nonresidential GVIIC.

In July 1998, a UST system that included two 10,000 gallon diesel tanks, one 10,000 gallon gasoline tank, along with the associated piping, was decommissioned. Prior to disposal, the USTs were stored onsite on the north side of the property where they were cut and cleaned. Site assessment samples that included a composite sample from the piping run (PR-1) were collected and analyzed for BTEX and PNAs. Laboratory analysis of the soil sample collected from PR-1 during the decommissioning detected 2-methylnaphthalene, phenanthrene and total xylenes in excess of the GSIPC.

Chloride was detected in the soil samples collected from MW-303 and SB-201. Lead was detected in 17 of the groundwater samples collected, while chloride was detected in 23 of the groundwater samples collected; however, criteria were not exceeded. Chromium was also detected below criteria in the soil sample collected from SB-201.

SCA concluded that the petroleum related impacts had been delineated in the area of the garages and shops, primarily in the former UST locations and that the extent of the chloride contamination appeared to have migrated to the Portage Canal.

Coordinates associated with the site were not provided; therefore, sample locations were digitized from a georectified figure located within the SCA report. Soil boring and monitoring locations are depicted on ***Figure 3b, Historical Sample Analytical Results Map – Soil Area B*** and ***Figure 5b, Historical Sample Analytical Results Map – Groundwater Area B***. The analytical data generated during the investigation will be used to evaluate the potential presence of mining-era and/or other impacts that would be represented by elevated levels of petroleum related contaminants.

Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property – November 25, 2002.

Under a cooperative agreement with the US EPA, the DEQ pre-Remedial Group conducted a Brownfield Redevelopment Assessment (BFRA) for the Hancock/Ripley Trail Property. In June 2002, DEQ conducted reconnaissance observations and collected 34 surface soil samples along a two-mile stretch of the former Hancock-Ripley Railroad Right-of-Way. Samples were submitted to the DEQ Laboratory and EPA chosen Contract Laboratory Program (CLP) laboratories for VOC, SVOC, PCB, and inorganic analysis.

Analysis of the surface soil samples detected the presence of organic and inorganic compounds. The detected arsenic concentration was reported above Residential DCC in surface soil samples collected from SS-9, SS-24, and SS-26 Cyanide was reported in SS-1, SS-32, SS-9, SS-18, SS-20, and SS-34 above GSIPC and detected results exceeded Residential DCC in the surface soil sample collected from SS-24.

Along the section of trail that traverses the Quincy Smelting Works, arsenic was detected above Residential DCC in the surface soil samples collected from SS-31, SS-11, SS-12, SS-16, while Residential DCC was exceeded at SS-10 for copper. Cyanide was reported above GSIPC at SS-33 and at least one detection of PCBs was reported in the surface soil samples collected from SS-16 and SS-33.

VOC and SVOC concentrations exceeded criteria for GSIPC, Residential DWPC, Nonresidential DWPC, and/or Residential DCC in surface soil samples collected at SS-7, SS-14, SS-27, SS-28, SS-30, and SS-35. Analytical results also indicated exceedances of Residential and/or Nonresidential DCC for SVOCs in surface soil samples collected at SS-34 and SS-24.

Due the contaminants detected, DEQ reported that the Hancock/Ripley Trail qualified as a 'facility' under Part 201 of the NREPA. It was reported that contaminants could potentially be transported to other environmental media and/or migrate down gradient. DEQ suggested restricting access to the contaminated areas, and further investigating the extent of contamination for the development of a remediation plan. Note that later, for the section of trail that traverses the Quincy Smelting Works, the Agency for Toxic Substance and Disease Registry (ATSDR) Region 5 and Michigan Department of Community Health (MDCH) (currently the MDHHS) 2006 assessment of the Hancock-Ripley Trail concluded that unrestricted use of the trail for its intended use was acceptable (USDHHS, 2006). In addition, the EPA as part of the Torch Lake Superfund Site remedial action capped portions of the Quincy Smelting Works and other environmental concerns, including those within the Hancock Ripley Trail corridor, have been addressed and/or mitigated through a series of interim responses undertaken by prior owners, the EPA, and the Keweenaw National Park Service Advisory Commission and further investigation as part of QMCP will not occur.

Coordinates associated with the sampling locations were not provided; therefore, sample locations were digitized from a georectified figure located within the BFRA report. Surface soil locations are depicted on ***Figure 3a, Historical Sample Analytical Results Map – Soil Area A,*** ***Figure 3b, Historical Sample Analytical Results Map – Soil Area B,***

Figure 3c, Historical Sample Analytical Results Map – Soil Areas C-F, and *Figure 3d, Historical Sample Analytical Results Map – Soil Areas G-J.* The analytical data generated during the investigation will be used to evaluate the potential presence of mining-era and/or other impacts that would be represented by elevated levels of organic and inorganic contaminants.

Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Area, Keweenaw Peninsula, Michigan – December 13, 2007.

In September 2007, the EPA, at the request of the DEQ, conducted assessment activities near Torch Lake and Portage Lake. The focus of the assessment was on 17 Areas of Investigation (AOI) identified jointly by the EPA and the DEQ that were impacted by historical copper mining operations in the Keweenaw Peninsula. The Torch Lake Area Assessment included portions of the Torch Lake NPL Site where stamp sands are the primary media of concern.

The primary project objectives of the Torch Lake Area Assessment were to evaluate imminent threats to human health, welfare, and the environment, including the identification of areas for additional investigation. The geographical locations specific to Torch Lake, and pathways evaluated during the assessment were:

- Direct-contact hazards associated with exposed stamp sand and the potential presence of other mining-era related waste along the western shoreline of Torch Lake. At the time of the investigation, the evaluated area included recently exposed shoreline between the edge of the EPA-installed vegetative cover and the water's edge because of the significantly lower surface-water levels in Lake Superior and its contiguous water bodies. These previously shallow water areas had not been investigated; and,
- Limited evaluation of potential environmental concerns at abandoned mining-era related industrial buildings, ruins, and land areas proximal to the western shoreline of Torch Lake and Portage Lake.

Targeted AOIs relevant to the QMCP portion of the Torch Lake NS Site included in the Torch Lake Area Assessment included:

- AOI 15 – Properties Adjacent to Quincy Smelter;
- AOI 16 – Dollar Bay Wire Mill; and,
- AOI 17 – Dollar Bay Well Field.

A comprehensive assessment of all environmental hazards known to affect historical industrial properties and structures was not within the scope of the assessment; however, the EPA's report provided specific recommendations by AOI for further investigation, maintenance, and or no further action. The following presents the general findings related to the aforementioned AOIs derived from the Torch Lake Area Assessment:

- AOI 15 – Properties Adjacent to Quincy Smelter: Fourteen properties along the Portage Waterway shoreline from the Quincy Smelting Works east to the H&Y Marina made up AOI 15. Properties included within AOI 15 that pertain to areas of interest with the QMCP footprint include: Julio Marine and Salvage, Julio Contracting, Julio Property, and the Julio Undeveloped Property. Within the limits of the scrap metal recycling yard known as the Julio Marine and Salvage property, drums with unknown contents, ASTs, USTs, compressed gas cylinders, electrical equipment, car batteries, along with large piles of stamp sand, evidence of past fires, and an oily sheen were observed. Three shoreline areas were screened with the XRF; however, no metals at concentrations above Residential DCC were detected. ASTs, USTs, automobile and marine batteries along with various piles of historic debris, stamp sand and construction debris, and equipment were observed on the Julio Contracting property. Oil-stained soil, additional ASTs, murky surface water within the creek onsite, and empty submerged drums along the shoreline were observed as well. Within the Julio property, ASTs, drums, batteries, house-hold sized propane tanks, piles of stamp sands, equipment, and historical mining-related buildings were observed, although the buildings were not open for investigation. Metal concentrations in samples screened at Julio Contracting and the Julio property were below Residential DCC. No suspicious materials were noted and XRF screening was not

performed on the undeveloped, vacant lot known as the Julio Undeveloped Property. Samples were not collected for laboratory analysis at the previously described properties within AOI 15.

- AOI 16 – Dollar Bay Wire Mill: It was noted that at the time of the report, the former use of the Dollar Bay Wire Mill property was unknown, although it was presumed that the history is related to historic mining-era operations. As part of the Torch Lake NPL remedy, a gravel cover was placed on the western portion of the property; however, access to the operating boat storage yard was denied and no further action was recommended. Additional information on remedial activities is summarized in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (US EPA, 2005).

- AOI 17 – Dollar Bay Well Field: AOI 17 included the Dollar Bay Well Field, owned by Osceola Township, along with two additional parcels of privately owned land between the Well Field and AOI 16. One of the privately owned parcels was previously capped with a vegetative cover as part of the Torch Lake NPL Site remedy. Field activities within the uncapped portions of AOI 17 included observations of foundation materials, debris, slag, and stamp sands. Four XRF locations were screened and included locations where stamp sand material was exposed along the shoreline and two slag/stamp sand piles. XRF screening indicated metal concentrations exceeding DEQ Residential DCC for arsenic, copper, and/or iron at three of the screened locations. Laboratory analytical samples were not collected.

The Torch Lake Area Assessment will be used to evaluate surface soil conditions that might be indicative of mining-era and/or other impacts. The assessment included a substantial number of surface soil screening results, recorded using an XRF hand held analyzer, within the QMCP footprint. Soil sampling and soil screening locations derived from the QMCP during implementation of the Torch Lake Area Assessment are depicted on ***Figure 4a,*** *Historical Soil Screening Results Map – XRF Areas D-J,* and ***Figure 4b,*** *Historical Soil Screening Results Map – XRF Areas M-O*. The analytical data generated during the investigation will be used to evaluate the potential presence of terrestrial mining wastes that would be represented by elevated levels of inorganic contaminants.

Letter of Notice Re: Dollar Bay Well Field, Dollar Bay, Houghton County, Site ID: 31000089 -- August 4, 2010.

The MDNR notified Mr. Steve Karpiak, Supervisor of Osceola Township of the site identified as Dollar Bay Well Field for proposed inclusion on a site list database. It was stated that locations are included on the site list when it has been determined that there has been or there is the potential for a release of a hazardous substance. Associated groundwater analytical laboratory results indicated detections of metals, VOCs, and SVOCs above laboratory reporting results; however, criteria was not exceeded.

The analytical data available within the site file will be used to evaluate the potential presence of terrestrial mining-era and/or other impacts that would be represented by elevated levels of inorganic and organic contaminants. Monitoring well locations are depicted on ***Figure 5d,*** *Historical Sample Analytical Results Map – Groundwater Areas M-O*.

Correspondence between Horner Flooring Co. Inc. and DEQ – April 3, 1995.

Following conversations with the DEQ, Horner Flooring Co. Inc. provided available information that included well logs and analytical laboratory results from groundwater samples collected from onsite monitoring wells.

Horner Flooring stated that the use of PCP was discontinued in the mid-1980s; however, the chemical was "used in suspension with mineral spirits as a carrying agent." It was also stated that if PCP contamination could be attributed to Horner's historic practice, associated mineral spirits would have also been detected in analytical results.

The analytical data available within the site file will be used to evaluate the potential presence of terrestrial mining-era and/or other impacts that would be represented by elevated levels of inorganic and organic contaminants. Monitoring well locations are depicted on ***Figure 5d,*** *Historical Sample Analytical Results Map – Groundwater Areas M-O*.

Baseline Environmental Assessment: Royce Road Marina, Royce Road, Franklin Township, Houghton County, MI 49930 – October 26, 2015.

TriMedia performed a Baseline Environmental Assessment (BEA) for a potential property transaction for the property located on Royce Road in Ripley, Michigan. The BEA summarized the data gathered during the site activities outlined in the completed 2015 Phase I Environmental Site Assessment (ESA), 2013 Limited Phase II ESA, and the Initial Groundwater Monitoring Event Summary. TriMedia identified two Recognized Environmental Conditions (RECs) associated with the property, which included the use of fill material that could potentially contain high concentrations of metals and the use of the adjacent property to the west as a recycling and scrap yard.

During the work completed and outlined in the Limited Phase II ESA, five (5) soil borings were advanced on site. Soil samples were collected based on field screening and groundwater samples were collected from temporary monitoring wells. Analytical results detected the presence of VOCs and inorganics at all five soil boring locations. Analytical results for VOC analysis of collected groundwater samples did not indicate VOCs above laboratory reporting limits. Low levels of inorganics (silver and selenium) were detected in GP-2 and GP-5, respectively. Based on the results of the Limited Phase II ESA, the subject property was classified as a "facility" as defined by Part 201 of the Michigan NREPA, Environmental Remediation, Public Act 451 of 1994, as amended.

In response to the contamination identified during the completion of the Limited Phase II ESA, three permanent groundwater monitoring wells (MW-1 through MW-3) were installed onsite in October of 2013. Groundwater samples were collected in November 2013 and analytical results detected silver in MW-1, MW-2, and MW-3, as well as mercury in MW-1.

TriMedia's conclusions were that the metals detected in soil and groundwater samples collected onsite could be attributed to the placement of stamp sand material from historic mining activities. Although MSG review of available Sanborn Maps did not indicate specific historic uses, bordering properties were the location of mining-era operations and were on made-lands per the 1865 shoreline.

Coordinates associated with the site were not provided; therefore, sample locations were digitized from a georectified figure located within the BEA report. Soil boring and monitoring locations are depicted on ***Figure 3d,*** *Historical Sample Analytical Results Map – Soil Areas G-J* and ***Figure 5c,*** *Historical Sample Analytical Results Map – Groundwater Areas G-I*. This analytical data generated during the investigation will be used to evaluate the potential presence of terrestrial mining wastes that would be represented by elevated levels of inorganic contaminants.

Quincy Mining Company Portage, Houghton County, Site ID #31000098, Bathymetric Investigation-Side Scan Sonar– January 9, 2018

The DEQ RRD Geological Services Unit (GSU) conducted a side scan sonar (SSS) survey to identify anomalies such as submerged drums, containers, and waste deposits in three areas along the shoreline of the Portage Canal in the QMCP in August 2017. GSU reviewed the SSS survey and identified potential targets along with their GPS coordinates during post processing. These observations will be incorporated into the SAP, allowing the investigation to target specific potential surface water and sediment contaminant sources along the Portage Canal shoreline.

Locations of observed underwater reconnaissance targets are depicted on ***Figure 6,*** *Area Assessed by Side Scan Sonar and Underwater Reconnaissance Targets.*

6.0 CONCLUSIONS AND RECOMMENDATIONS

The evaluation and interpretation of analytical results and findings from previous key investigations was completed to create a baseline understanding of conditions within the QMCP. The incorporation of these findings into the SAP will minimize redundancies while also creating a more comprehensive approach for assessing potential environmental impacts across the QMCP.

6.1 Conclusions

The QMCP features EPA-capped and unmitigated mining area structures and waste in a mixed residential/non-residential area along the north shoreline of the Portage Canal. The contaminants attributable to the QMCP include VOCs, SVOCs, PCBs, and inorganic contaminants. Concerns along the north shoreline of the Portage Canal and the surrounding areas, identified by the DEQ and others, include known or suspected impacts to groundwater, surface water, sediments, and upland media that were not addressed under the Superfund program. Furthermore, the analytical and screening results indicate that VOCs, SVOCs, PCBs, and inorganic contaminants are present in environmental media in excess of Part 201 of Michigan's NREPA, being PA 451 of 1994, as amended Residential and Non-Residential Cleanup Criteria for Response Activity in the QMCP.

In addition, observations of USTs, ASTs, drums with unknown contents, transformers, along with oil stained-soil, and murky surface water were noted in DEQ files and indicate the potential presence of remaining source areas.

6.2 Recommendations

It is recommended that the review and evaluation of the summarized reports, along with detailed physical inspections of the study area, be used in the preparation of a SAP that builds upon existing analytical results and focuses on potential environmental impacts, including the following:

- Unidentified, significant in-lake and/or terrestrial sources of contamination including PCBs;
- Uncharacterized waste deposits on the lake bottom;
- Bulk disposal areas, including made lands, stamp sand deposits, slag dumps, and landfills; and,
- Industrial ruins including storage areas, USTs, ASTs, RPM, SACM, and any other waste materials identified in future investigations.

REFERENCES

1. Department of Natural Resources and Environment. Letter of Notice Re: Dollar Bay Well Field, Dollar Bay, Houghton County, Site ID: 31000089. August 4, 2010
2. Michigan Department of Environmental Quality. Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property. November 25, 2002.
3. Michigan Department of Environmental Quality. Letter of Notice Re: Complaint Inspection, Julio Construction Property Adjacent to Keweenaw Canal, Ripley, Houghton County. December 12, 1995.
4. Michigan Department of Environmental Quality. Quincy Mining Company Portage, Houghton County, Site ID #31000098, Bathymetric Investigation-Side Scan Sonar. January 9, 2018.
5. Michigan Department of Transportation. Geoenvironmental Services Unit Materials & Technology Division. Michigan Department of Transportation M-DOT M-26, Ripley, Houghton County Hydrogeological Investigation. April 18, 1991.
6. Monette, Clarence J., Dollar Bay, Michigan, Fifty-Fourth of a Local History Series. Greenlee Printing Co. Of Calumet Michigan. September 20, 2000.
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11. United States Department of Agriculture Natural Resources Conservation Service. Detail Remedial Plans for Quincy Smelter Reclamation Project in Cooperation with the U.S. Environmental Protection Agency & MI Department of Environmental Quality & Franklin Township. June 2010.
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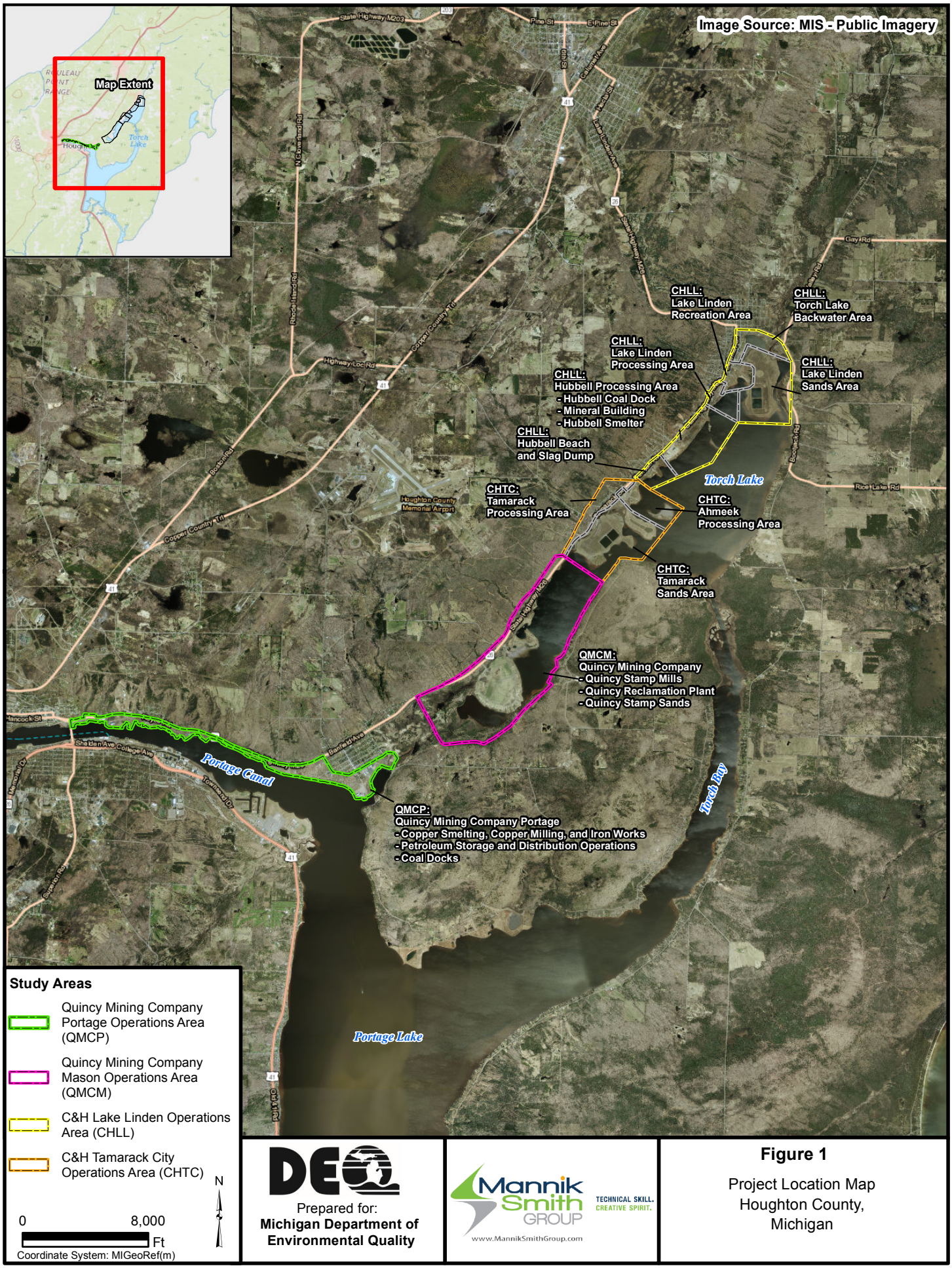
13. United States Environmental Protection Agency. Fourth Five-Year Review Report for the Torch Lake Superfund Site, Houghton County, Michigan. March 22, 2018.
14. Weston Solutions, Inc. Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Area, Keweenaw Peninsula, Michigan. December 13, 2007.

FIGURES



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Prepared for:
Michigan Department of Environmental Quality

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Figure 1

Project Location Map
Houghton County,
Michigan

Image Source: MIS - Public Imagery

1928 Store House, dwellings
1949 Filling Station
B (North)
B (South)
A
1907 Lake Superior Iron Works
1928 Portage Lake Foundry & Machinery Co.
1949 Houghton Co. Road Comission
1949 Copper Range Passenger Depot (to the west)
1907 Lake Superior Smelting Co. "vacant" (to the east)
1917 H.S. Goodell Distributing Station for Lubricating Oils
1949 H.S. Goodell & Co. Bulk Oil Station
0 700 Ft

1907 Tamarack & Osceola Mining Co.
1917 Calumet & Hecla Mining Co. Coal Dock
1917 Slag Dump, Lake Superior Smelting Co.
1907 Dollar Bay Land and Improvement Co.
1917 Dollar Bay Lumber Co.
1949 Dollar Bay Lumber Co. Saw Mill & Lumber Yard
Horner Flooring Co. Wood Flooring Mill
K
L
P
O
M
N
Bulk Oil Storage
Other historic land use
and/or operations unknown.
1928 Lake Superior Smelting Co.
1949 Ice Houses
1907 Tamarack & Osceola Copper Manufacturing Co.
1928 John A Roebling's Sons Copper Manufacturing
1949 Foley Copper Products Co. Copper Wire Mill
0 1,500 Ft

Map Extent
CHLL
CHTC
QMCM
Hancock
Houghton

RIPLEY
B (North)
A
B (South)
D
E
G
H
I
J
Portage Bridge
C - Quincy Smelting Works
F- Manufactured Gas Plant
HOUGHTON
DOLLAR BAY

1949 Portage Lake Foundry & Machinery
E
D
Historic land use and/or operations unknown.
0 800 Ft

1917 Standard Oil Co.
Other historic land use
and/or operations unknown.
1917 Houghton Lumber Yard Co.
1928 Dollar Bay Lumber Co.
1949 Henry Borth Co. Manufacturing R.R. Shims
UP Oil Company
G
H
I
J
Historic land use and/or operations unknown.
1907 Portage Boiler Works
1928 Lake Superior Iron and Metal Co.
1949 Scrap Iron Storage, J.H. Green Co.
0 800 Ft

Hancock/Ripley Trail MDNR Phase 1 ROW
1865 Shoreline
QMCP Study Area Boundary
Approximate Parcel Boundaries
Features Identified on Sanborn Maps
EPA Cap Boundary

Notes:
Historic land use and/or operations refer to noted years on available Sanborn Maps.

N
0 1,500 Ft
Coordinate System: MIGeoRef(m)

Prepared for:
Michigan Department of Environmental Quality

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Figure 2
Area Features Map
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

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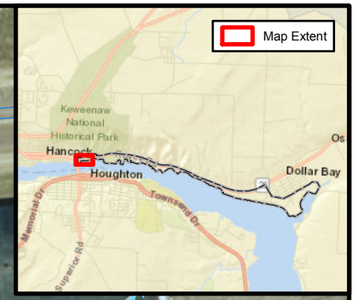
Image Source: Michigan Imagery Solution (Houghton - 2013)



Filling Station

Gas Tanks

TH #12 10/2/1990
(5.5-9.5)
NAPHTHALENE (SVOC) 1800 ug/kg [2]
PHENANTHRENE 3400 ug/kg [2]

6 Gas Tanks

Furnace

Oil Storage

Barreled Oil Warehouse

TH #4 4/17/1990

TH #1 4/17/1990

MW #10 10/2/1990

TH #3 4/17/1990

TH #2 4/17/1990

Barreled Oil Warehouse

Oil Tank on ground

Oil Pump House

Oil Tank

TH #11 4/17/1990

TH #10 4/17/1990

TH #8 4/17/1990

TH #9 4/17/1990

TH #5 4/17/1990
(unknown depth)
NAPHTHALENE (SVOC) 3700 ug/kg [2]

SS-4 6/5/2002

MW #8 10/2/1990

SS-3 6/5/2002

Oil Storage

TH #6 4/17/1990

MW #9 10/2/1990

TH #7 4/17/1990

SS-2 6/5/2002

AREA A

Open Ditch 10/2/1990

SS-1 6/5/2002
(0-1)
CYANIDE 0.15 J mg/kg [2]

PCBs
VOCs
Inorganics / Cyanide
SVOCs
At Least One Exceedance for Indicated Parameter Group
No Exceedances for Indicated Parameter Group
At Least One Detection of PCBs
PCBs Not Detected
Indicated Parameter Group Not Analyzed
Sample Results Displayed on Another Figure
1865 Shoreline
Hancock/Ripley Trail MDNR Phase 1 ROW
Feature Identified on Sanborn Maps
Approximate Parcel Boundaries
QMCP Study Area Boundary

Notes:
- *J = estimated value*
- *mg/kg = milligrams per kilogram*
- *ug/kg = micrograms per kilogram*
- ** = result is from cleanup run*

N

0 90 Ft

Coordinate System: MIGeoRef(m)

AREA A
- 1949 Copper Range Passenger Depot (to the west)
- 1907 Lake Superior Smelting Co. "vacant" (to the east)
- 1917 H.S Goodell Distributing Station for Lubricating Oils
- 1949 H.S. Goodell & Co. Bulk Oil Station

DATA SOURCES

Sample IDs	Date Range
1) **"SS-..."**	**June 2002**

-MDEQ. *Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property.* November 25, 2002.

2) **"TH#..."** **April – October 1990**

-M-DOT Geoenvironmental Services Unit Materials & Technology Division. *Michigan Department of Transportation M-DOT M-26, Ripley, Houghton County Hydrogeological Investigation.* April 18, 1991.

MDEQ Part 201 Cleanup Criteria for Response Action
[1]=Statewide Default Background Level
[2]*=Groundwater Surface Water Interface Protection Criteria
[3]=Soil Saturation Concentration Screening Levels
[4]*=Residential Drinking Water Protection Criteria
[5]=Residential Soil Volatilization to Indoor Air Inhalation Criteria (VSIC)
[6]=Residential Infinite Source Volatile Soil Inhalation Criteria
[7]=Residential Finite VSIC for 5 Meter Source Thickness
[8]=Residential Finite VSIC for 2 Meter Source Thickness
[9]=Residential Particulate Soil Inhalation Criteria
[10]=Residential Direct Contact Criteria
[11]*=Nonresidential Drinking Water Protection Criteria
[12]=Nonresidential Soil Volatilization to Indoor Air Inhalation
[13]=Nonresidential Infinite Source Volatile Soil Inhalation Criteria
[14]=Nonresidential Finite VSIC for 5 Meter Source Thickness
[15]=Nonresidential Finite VSIC for 2 Meter Source Thickness
[16]=Nonresidential Particulate Soil Inhalation Criteria
[17]=Nonresidential Direct Contact Criteria
* Exceedances of criteria 2, 4, and 11 shown for organics and cyanide only
Evaluation based on MDEQ Criteria at time of Project completion

Prepared for:
Michigan Department of Environmental Quality

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
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Figure 3a

Historical Sample Analytical Result Map - Soil
Area A
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMFeXX_QMCP_SOIL_all_v20180816.mxd 4:32:13 PM, 8/16/2018 amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

AREA B (North)

AREA B (South)

MW-401 7/18/1995 (chloride only)

SB-102 7/19/1995
(unknown depth)
NAPHTHALENE (SVOC)* 1600 J ug/kg [2]

SB-109 7/19/1995
(unknown depth)

NAPHTHALENE (SVOC)	1300	ug/kg [2]
BENZENE	270	ug/kg [2,4,11]
ETHYLBENZENE	3000	ug/kg [2,4,11]
XYLENE - TOTAL	17000	ug/kg [2,4,11]

SB-501 7/20/1995

Gasoline Tanks

Filling Station

SB-101 7/19/1995
(unknown depth)

NAPHTHALENE (SVOC)	12000	ug/kg [2]
NAPHTHALENE (SVOC)*	2100 J	ug/kg [2]
BENZENE	3700	ug/kg [2,4,5,11]
ETHYLBENZENE	19000	ug/kg [2,4,11]
XYLENE - TOTAL	94000	ug/kg [2,4,11]
TOLUENE	27000	ug/kg [2,4,11]

SB-104 7/19/1995
(unknown depth)

BENZO(A)PYRENE	3100	ug/kg [10]
FLUORANTHENE	6200	ug/kg [2]

PR-1 7/8/1998
(unknown depth)

2-METHYLNAPHTHALENE (SVOC)	9700	ug/kg [2]
PHENANTHRENE	2200	ug/kg [2]
XYLENE - TOTAL	950	ug/kg [2]

Barreled Oil Warehouse

SB-201 7/20/1995
(unknown depth)

NAPHTHALENE (SVOC)	15000	ug/kg [2]
NAPHTHALENE (SVOC)*	3100 J	ug/kg [2]
BENZENE	215	ug/kg [4,11]
XYLENE - TOTAL	2300	ug/kg [2]

SB-106 7/19/1995

SB-105 7/19/1995

SB-107 7/19/1995

Core Oven

Oil Tanks 10,000 Gallons Each

Coke and Sand

MW-303 7/18/1995 (chloride only)

Coal Bin

Core Oven

MW-104 7/20/1995

MW-103 7/20/1995

Barreled Oil Warehouse

Oil Tank on ground

Oil Pump House

Oil Tank

SB-108 7/19/1995
(unknown depth)
BENZO(A)PYRENE 3000 ug/kg [10]

T2-N 7/8/1998

T1-N 7/8/1998

T3-N 7/8/1998

T1-S 7/8/1998

T3-S 7/8/1998

T2-S 7/8/1998

SB-112 7/19/1995

SS-5 6/5/2002

SS-6 6/5/2002

SS-8 6/5/2002

SS-32 6/5/2002
(0-1)
CYANIDE 0.27 J mg/kg [2]

SS-9 6/5/2002
(0-1)

CYANIDE	0.57 J	mg/kg [2]
ARSENIC	9.4	mg/kg [10]

MW-302 7/18/1995 (chloride only)

Coal Dock

SB-114 7/20/1995
(unknown depth)
BENZO(A)PYRENE 2100 ug/kg [10]

SB-103 7/19/1995
(unknown depth)

NAPHTHALENE (SVOC)	3400	ug/kg [2]
BENZENE	5200	ug/kg [2,4,5,11]
ETHYLBENZENE	29000	ug/kg [2,4,11]
XYLENE - TOTAL	80000	ug/kg [2,4,11]

SB-110 7/19/1995
(unknown depth)

FLUORANTHENE	15000	ug/kg [2]
FLUORANTHENE*	6800 J	ug/kg [2]
FLUORENE	8600	ug/kg [2]
NAPHTHALENE (SVOC)	17000	ug/kg [2]
NAPHTHALENE (SVOC)*	5300 J	ug/kg [2]
PHENANTHRENE	7000	ug/kg [2]
PHENANTHRENE*	8800 J	ug/kg [2]

SB-113 7/20/1995
(unknown depth)

BENZO(A)PYRENE	14000	ug/kg [10,17]
DIBENZO(A,H)ANTHRACENE	3000	ug/kg [10]
FLUORANTHENE	6200	ug/kg [2]

SS-7 6/5/2002
(0-0.5)
XYLENE - TOTAL 1100 ug/kg [2]

SB-111 7/19/1995
(unknown depth)

NAPHTHALENE (SVOC)	28000	ug/kg [2]
NAPHTHALENE (SVOC)*	3400 J	ug/kg [2]
PHENANTHRENE	3600	ug/kg [2]

Map Extent

Keweenaw National Historical Park
Hancock
Houghton
Dollar Bay
Portage Lake
Memorial Dr
Townsend Dr
Superior Rd

DATA SOURCES

Sample IDs	Date Range
1) **"SS-..."**	**June 2002**

-MDEQ. *Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property.* November 25, 2002.

2) **"SB-/PR-/MW-/T-..."** **July 1995 – July 1998**
-SCA Environmental. *Phase II Hydrogeological Investigation Report, Houghton County Road Commission Ripley Garage.*
Prepared for Houghton County Road Commission. August 1998.

AREA B (North)
- 1928 Store House, dwellings
- 1949 Filling Station

AREA B (South)
- 1907 Lake Superior Iron Works
- 1928 Portage Lake Foundry & Machinery
- 1949 Houghton Co. Road Comission

MDEQ Part 201 Cleanup Criteria for Response Action
[1]=Statewide Default Background Level
[2]*=Groundwater Surface Water Interface Protection Criteria
[3]=Soil Saturation Concentration Screening Levels
[4]*=Residential Drinking Water Protection Criteria
[5]=Residential Soil Volatilization to Indoor Air Inhalation Criteria (VSIC)
[6]=Residential Infinite Source Volatile Soil Inhalation Criteria
[7]=Residential Finite VSIC for 5 Meter Source Thickness
[8]=Residential Finite VSIC for 2 Meter Source Thickness
[9]=Residential Particulate Soil Inhalation Criteria
[10]=Residential Direct Contact Criteria
[11]*=Nonresidential Drinking Water Protection Criteria
[12]=Nonresidential Soil Volatilization to Indoor Air Inhalation
[13]=Nonresidential Infinite Source Volatile Soil Inhalation Criteria
[14]=Nonresidential Finite VSIC for 5 Meter Source Thickness
[15]=Nonresidential Finite VSIC for 2 Meter Source Thickness
[16]=Nonresidential Particulate Soil Inhalation Criteria
[17]=Nonresidential Direct Contact Criteria
* Exceedances of criteria 2, 4, and 11 shown for organics and cyanide only
Evaluation based on MDEQ Criteria at time of Project completion

PCBs
VOCs
Inorganics / Cyanide
SVOCs

- At Least One Exceedance for Indicated Parameter Group
- No Exceedances for Indicated Parameter Group
- At Least One Detection of PCBs
- PCBs Not Detected
- Indicated Parameter Group Not Analyzed

- Sample Results Displayed on Another Figure
- 1865 Shoreline
- Hancock/Ripley Trail MDNR Phase 1 ROW
- Feature Identified on Sanborn Maps
- Approximate Parcel Boundaries
- QMCP Study Area Boundary

Notes:
- *J = estimated value*
- *mg/kg = milligrams per kilogram*
- *ug/kg = micrograms per kilogram*
- ** = result is from cleanup run*

N
0 90 Ft
Coordinate System: MIGeoRef(m)

Prepared for:
Michigan Department of Environmental Quality

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Figure 3b
Historical Sample Analytical Result Map - Soil
Area B
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMF\eXX_QMCP_SOIL_all_v20180816.mxd 4:32:31 PM, 8/16/2018 amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

SS-34 6/5/2002
(0-1)

CYANIDE	3.3 J	mg/kg [2]
ACENAPHTHYLENE	37000 J	ug/kg [4,11]
ANTHRACENE	42000 J	ug/kg [4,11]
BENZO(A)ANTHRACENE	120000 J	ug/kg [10,17]
BENZO(A)PYRENE	120000 J	ug/kg [10,17]
BENZO(B)FLUORANTHENE	110000 J	ug/kg [10,17]
DIBENZOFURAN	17000 J	ug/kg [2]
FLUORANTHENE	330000 J	ug/kg [2]
FLUORENE	30000 J	ug/kg [2]
INDENO(1,2,3-CD)PYRENE	66000 J	ug/kg [10]
NAPHTHALENE (SVOC)	21000 J	ug/kg [2]
PHENANTHRENE	270000 J	ug/kg [2,4,6,7,8,11,13,14,15]

SS-31 6/5/2002
(0-1)
ARSENIC 9.6 mg/kg [10]

SS-11 6/5/2002
(0-1)
ARSENIC 9 mg/kg [10]

SS-12 6/5/2002
(0-1)
ARSENIC 25.6 mg/kg [10]

SS-18 6/5/2002
(0-1)
CYANIDE 0.12 J mg/kg [2]

SS-20 6/5/2002
(0-1)
CYANIDE 0.11 J mg/kg [2]

SS-25 6/5/2002
(0-0.33)

1,2,4-TRIMETHYLBENZENE	920	ug/kg [2]
BENZENE	170	ug/kg [4,11]
XYLENE - TOTAL	2600	ug/kg [2]
NAPHTHALENE (VOC)	1700	ug/kg [2]

(0-1)

ARSENIC	14.9	mg/kg [10]
2-METHYLNAPHTHALENE (SVOC)	15000	ug/kg [2]
DIBENZOFURAN	4000 J	ug/kg [2]
NAPHTHALENE (SVOC)	9300 J	ug/kg [2]
PHENANTHRENE	9400 J	ug/kg [2]

SS-15 6/5/2002
SS-19 6/5/2002
SS-17 6/5/2002
SS-13 6/5/2002
SS-21 6/5/2002
SS-22 6/5/2002
SS-23 6/5/2002

APPROXIMATE LOCATION OF MDNR SURVEYOR OBSERVATIONS OF CONTAMINATED SOIL (July 2018)

Core Oven

AREA C
AREA D
AREA E
AREA F

Gasoline Tanks
Filling Station
Oil Pump House
Oil House
Gasoline, Kerosene and Fuel Oil Tanks
Foundry Warehouse
Ward Brass Foundry
Coal Pockets
Coal Shed
Tractor Sales & Service
Furnace
Oil House
Coal Dock, Coal and Coke
Warehouse
Propane Gas Tank
Coal Piles

SS-10 6/5/2002
(0-1)
COPPER 21000 mg/kg [10]

SS-16 6/5/2002
(0-1)
ARSENIC 14.4 mg/kg [10]

SS-33 6/5/2002
(0-1)
CYANIDE 0.31 J mg/kg [2]

SS-14 6/5/2002
(0-0.5)

1,2,4-TRIMETHYLBENZENE	760	ug/kg [2]
XYLENE - TOTAL	1000	ug/kg [2]

SS-35 6/5/2002
(0-0.33)

1,2,4-TRIMETHYLBENZENE	1800	ug/kg [2]
2-METHYLNAPHTHALENE (VOC)	12000	ug/kg [2]
BENZENE	1500	ug/kg [2,4,11]
ETHYLBENZENE	490	ug/kg [2]
XYLENE - TOTAL	4800	ug/kg [2]
NAPHTHALENE (VOC)	26000	ug/kg [2]

SS-24 6/5/2002
(0-0.33)

1,2,4-TRIMETHYLBENZENE	920	ug/kg [2]
BENZENE	210	ug/kg [4,11]
ETHYLBENZENE	400	ug/kg [2]
XYLENE - TOTAL	2800	ug/kg [2]
NAPHTHALENE (VOC)	2600	ug/kg [2]

(0-1)

CYANIDE	12.5 J	mg/kg [2,4,10,11]
ARSENIC	8.4	mg/kg [10]
BENZO(A)PYRENE	10000 J	ug/kg [10,17]
FLUORANTHENE	25000	ug/kg [2]
NAPHTHALENE (SVOC)	2200 J	ug/kg [2]
PHENANTHRENE	13000 J	ug/kg [2]

Mickelson-6 9/12/2007
(surface)
Arsenic 14 mg/kg [10]

Map Extent
Keweenaw National Historical Park
Hancock
Houghton
Dollar Bay

AREA C
- Quincy Smelting Works

AREA D
- 1949 Portage Lake Foundry & Machinery

AREA E
- Historic land use and/or operations unknown

AREA F
- Manufactured Gas Plant
- Filling Station

DATA SOURCES

Sample IDs	Date Range
1) **"SS-..."**	**June 2002**

-MDEQ. *Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property.* November 25, 2002.

2) **"Mickelson-..."** **September 2007**

-Weston Solutions, Inc. *Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Areas, Keweenaw Peninsula, Michigan*

PCBs
VOCs
Inorganics / Cyanide
SVOCs
At Least One Exceedance for Indicated Parameter Group
No Exceedances for Indicated Parameter Group
At Least One Detection of PCBs
PCBs Not Detected
Indicated Parameter Group Not Analyzed
1865 Shoreline
Hancock/Ripley Trail MDNR Phase 1 ROW
Feature Identified on Sanborn Maps
Approximate Parcel Boundaries
EPA Cap Boundary
QMCP Study Area Boundary

Notes:
- *J = estimated value*
- *mg/kg = milligrams per kilogram*
- *ug/kg = micrograms per kilogram*
- ** = result is from cleanup run*

N
0 200 Ft
Coordinate System: MIGeoRef(m)

MDEQ Part 201 Cleanup Criteria for Response Action
[1]=Statewide Default Background Level
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[3]=Soil Saturation Concentration Screening Levels
[4]*=Residential Drinking Water Protection Criteria
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[10]=Residential Direct Contact Criteria
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[17]=Nonresidential Direct Contact Criteria
* Exceedances of criteria 2, 4, and 11 shown for organics and cyanide only
Evaluation based on MDEQ Criteria at time of Project completion

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TM1\Fig3cXX_QMCP_SOIL_all_v20180816.mxd 4:32:52 PM 8/16/2018 amiller

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Michigan Department of Environmental Quality

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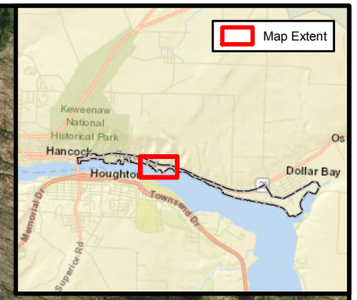
Figure 3c
Historical Sample Analytical Result Map - Soil
Areas C-F
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

Image Source: Michigan Imagery Solution (Houghton - 2013)



Standard Oil Company

SS-26 6/5/2002
(0-1)
ARSENIC 18.2 mg/kg [10]

GP-1 6/13/2012
(7)
1,2,4-TRIMETHYLBENZENE 1100 ug/kg [2]
XYLENE - TOTAL 1200 ug/kg [2]

AREA G

GP-2 6/13/2012

AREA H

SS-28 6/5/2002
(0-1)
NAPHTHALENE (SVOC) 2200 J ug/kg [2]
PHENANTHRENE 2200 J ug/kg [2]
(0-0.33)
1,2,4-TRIMETHYLBENZENE 650 ug/kg [2]
XYLENE - TOTAL 1770 ug/kg [2]
NAPHTHALENE (VOC) 1400 ug/kg [2]

GP-3 6/13/2012

GP-5 6/13/2012

GP-4 6/13/2012

SS-27 6/5/2002
(0-1)
NAPHTHALENE (SVOC) 810 J ug/kg [2]
(0-0.33)
XYLENE - TOTAL 1110 ug/kg [2]
NAPHTHALENE (VOC) 750 ug/kg [2]

AREA I

Fuel

Slag Plle 4'

Boiler House

Furnace

Slag Pile

Slag Pile 4'

H&Ymarina-19 9/12/2007
(surface)
ARESNIC 30 J mg/kg [10]
LEAD 440 J mg/kg [10]
MANGANESE 5500 mg/kg [9,16]

SS-29 6/5/2002

AREA J

Oil House

Iron Refuse Burner and Spark Arrestor

Dutch Oven

SS-30 6/5/2002
(0-0.33)
NAPHTHALENE (VOC) 820 ug/kg [2]

AREA G
- 1917 Standard Oil Co.
- Other historic land use and/or operations unknown

AREA H
- Historic land use and/or operations unknown

AREA I
- 1907 Portage Boiler Works
- 1928 Lake Superior Iron and Metal Co.
- 1949 A& Scrap Iron Storage, J.H. Green Co.

AREA J
- 1917 Houghton Lumber Yard Co
- 1928 Dollar Bay Lumber Co.
- 1928 Henry Borth Co. Manufacturing R.R. Shims
  UP Oil Company

DATA SOURCES

Sample IDs	Date Range
1) **"SS-..."**	**June 2002**

-MDEQ. *Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property.* November 25, 2002.

2) **"GP-"**	**June 2012**

-Trimedia Environmental & Engineering. *Baseline Environmental Assessment:Royce Road Marina, Royce Road, Franklin Township, Houghton County, MI 49930.* October 26, 2015.

3) **" H&Ymarina-..."**	**September 2007**

-Weston Solutions, Inc. *Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Areas, Keweenaw Peninsula, Michigan*

PCBs
VOCs
Inorganics / Cyanide
SVOCs
At Least One Exceedance for Indicated Parameter Group
No Exceedances for Indicated Parameter Group
At Least One Detection of PCBs
PCBs Not Detected
Indicated Parameter Group Not Analyzed

1865 Shoreline
Hancock/Ripley Trail MDNR Phase 1 ROW
Feature Identified on Sanborn Maps
Approximate Parcel Boundaries
QMCP Study Area Boundary

Notes:
- *J = estimated value*
- *mg/kg = milligrams per kilogram*
- *ug/kg = micrograms per kilogram*
- ** = result is from cleanup run*

N
0 200 Ft
Coordinate System: MIGeoRef(m)

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[1]=Statewide Default Background Level
[2]*=Groundwater Surface Water Interface Protection Criteria
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[7]=Residential Finite VSIC for 5 Meter Source Thickness
[8]=Residential Finite VSIC for 2 Meter Source Thickness
[9]=Residential Particulate Soil Inhalation Criteria
[10]=Residential Direct Contact Criteria
[11]*=Nonresidential Drinking Water Protection Criteria
[12]=Nonresidential Soil Volatilization to Indoor Air Inhalation
[13]=Nonresidential Infinite Source Volatile Soil Inhalation Criteria
[14]=Nonresidential Finite VSIC for 5 Meter Source Thickness
[15]=Nonresidential Finite VSIC for 2 Meter Source Thickness
[16]=Nonresidential Particulate Soil Inhalation Criteria
[17]=Nonresidential Direct Contact Criteria
* Exceedances of criteria 2, 4, and 11 shown for organics and cyanide only
Evaluation based on MDEQ Criteria at time of Project completion

Prepared for:
Michigan Department of Environmental Quality

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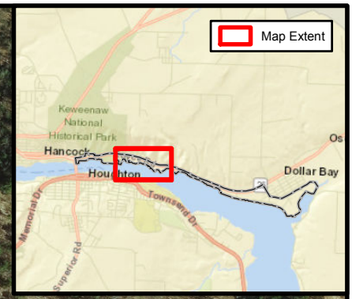
Figure 3d
Historical Sample Analytical Result Map - Soil
Areas G-J
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMIFigXX_QMCP_SOIL_all_v20180816.mxd 4:33:14 PM 8/16/2018 amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)



APPROXIMATE LOCATION OF MDNR SURVEYOR OBSERVATIONS OF CONTAMINATED SOIL (July 2018)

AREA D
AREA E
AREA F
AREA G
AREA H
AREA I
AREA J

Core Oven
Furnace
Oil House
Coal Dock, Coal and Coke
Tractor Sales & Service
Gasoline Tanks
Filling Station
Oil Pump House
Oil House
Foundry Warehouse
Ward Brass Foundry
Gasoline, Kerosene and Fuel Oil Tanks
Coal Pockets
Coal Shed
Coal Pockets
Warehouse
Propane Gas Tank
Coal Piles
Coal Shed
Standard Oil Company
Fuel
Slag Pile 4'
Slag Pile
Boiler House
Slag Pile
Slag Pile 4'
Oil House
Iron Refuse Burner and Spark Arrestor
Dutch Oven

JulioScrap-5 (9/12/2007)
JulioScrap-4 (9/12/2007)
JulioScrap-3 (9/12/2007)
Mickelson-6 (9/12/2007)
Mickelson-7 (9/12/2007)
JulioCon13 (9/12/2007)
HockingsB-20 (9/7/2007)
JulioSalvage-15 (9/12/2007)
JulioSalvage-16 (9/12/2007)
H&Ymarina-19 (9/12/2007)
H&Ymarina-18 (9/12/2007)
H&Ymarina-17 (9/12/2007)

AREA D
- 1949 Portage Lake Foundry & Machinery

AREA E
- Historic land use and/or operations unknown.

AREA F
- Manufactured Gas Plant
- Filling Station

AREA G
- Historic land use and/or operations unknown.

AREA H
- Historic land use and/or operations unknown.

AREA I
- 1907 Portage Boiler Works
- 1928 Lake Superior Iron and Metal Co.
- 1949 A& Scrap Iron Storage, J.H. Green Co. (Scrap Iro

AREA J
- 1917 Houghton Lumber Yard Co
- 1928 Dollar Bay Lumber Co.
- 1949 Henry Borth Co. Manufacturing R.R. Shims, UP Oil Company

DATA SOURCES

Sample IDs	Date Range
1) "JulioScrap-/Mickelson-/JulioCon-/HockingsB-/ JulioSalvage-/H&Ymarina-/DollarB-..."	September 2007

-Weston Solutions, Inc. *Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Areas, Keweenaw Peninsula, Michigan*

Locations Screened for Metals - At least one exceedance of:
- Residential Direct Contact Criteria
- Residential Particulate Soil Inhalation Criteria
- Non Residential Direct Contact Criteria
- Non Residential Particulate Soil Inhalation Criteria

- Screening locations with no exceedances
- 1865 Shoreline
- Hancock/Ripley Trail MDNR Phase 1 ROW
- Approximate Parcel Boundaries
- Feature Identified on Sanborn Maps
- EPA Cap Boundary

Notes:
- *Xray Fluorescence screening results are from surface soils unless otherwise specified.*

N
0 300 Ft
Coordinate System: MIGeoRef(m)

Prepared for:
Michigan Department of Environmental Quality

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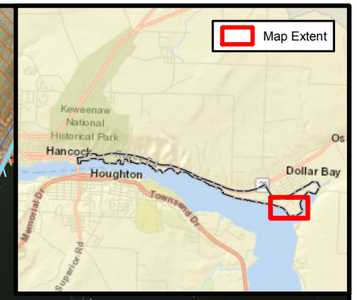
Figure 4a
Historical Soil Screening Result Map - XRF
Areas D-J
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMF\eXX_QMCP_XRF_all_v20180816.mxd 4:33:59 PM, 8/16/2018, amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)



AREA M

AREA O

AREA N

Underground Oil House

DollarB-11 (9/12/2007)

DollarB-12 (9/12/2007)

Smelter Building w/ approx. 7 furnaces

Smelter Building w/ furnaces

DollarB-18 (9/7/2007)

DollarB-19 (9/7/2007)

Waste Conveyor

Furnaces

Dust Bin

Oil House

Oil House

AREA M
- 1928 Lake Superior Smelting Co.
- 1949 Ice Houses

AREA N
- 1907 Tamarack & Osceola Copper Manufacturing Co.
- 1928 John A Roebling's Sons Copper Manufacturing
- 1949 Foley Copper Products Co. Copper Wire Mill

AREA O
- 1907 Dollar Bay Land and Improvement Co.
- 1917 Dollar Bay Lumber Company
-1928 Dollar Bay Lumber Co. Saw Mill & Lumber Yard
- 1949 Horner Flooring Co. Wood Flooring Mill

DATA SOURCES

Sample IDs	Date Range
1) "DollarB-..."	September 2007

-Weston Solutions, Inc. *Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Areas, Keweenaw Peninsula, Michigan*

Locations Screened for Metals - At least one exceedance of:
- Residential Direct Contact Criteria
- Residential Particulate Soil Inhalation Criteria
- Non Residential Direct Contact Criteria
- Non Residential Particulate Soil Inhalation Criteria

- Screening locations with no exceedances
- 1865 Shoreline
- Approximate Parcel Boundaries
- Feature Identified on Sanborn Maps
- EPA Cap Boundary

Notes:
- Xray Fluorescence screening results are from surface soils unless otherwise specified.

N

0 200 Ft

Coordinate System: MIGeoRef(m)

Prepared for:
Michigan Department of Environmental Quality

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
www.MannikSmithGroup.com

Figure 4b
Historical Soil Screening Result Map - XRF
Areas M-O
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_OMCP_TMFeXX_OMCP_XRF_all_v20180816.mxd 4:34:21 PM, 8/16/2018 amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

Filling Station

Gas Tanks

MW #6 10/3/1990
NAPHTHALENE (SVOC) 100 ug/l [3]
PHENANTHRENE 6 ug/l [3]
BENZENE 100 ug/l [1,2,3]
ETHYLBENZENE 280 ug/l [1,2,3]
XYLENE - TOTAL 2,000 ug/l [1,2,3]

6 Gas Tanks

Furnace

Oil Storage

Barreled Oil Warehouse

Barreled Oil Warehouse

MW #10 4/23/2008 10/3/1990

MW-113 3/6/1997

MW #6 4/19/1990 4/23/1990 10/3/1990

MW #7 4/19/1990 10/3/1990

MW #7 10/3/1990
PHENANTHRENE 3 ug/l [3]

AREA A

Oil Tank on ground

Oil Pump House

Oil Tank

MW #9 10/3/1990
BENZENE 6.2 ug/l [1,2]

Oil Storage

MW #4 4/19/1990 4/23/1990 10/3/1990

MW #8 4/23/2008 10/3/1990

MW #5 4/19/1990 4/23/1990 10/3/1990

MW #3 4/19/1990 10/3/1990

MW #9 4/23/2008 10/3/1990

MW #2 4/19/1990 10/3/1990

Open Ditch 10/3/1990

MW #1 4/19/1990 10/3/1990

MW-113 3/6/1997

ACENAPHTHENE	51 ug/l [3]
ANTHRACENE	7 ug/l [1,2,4,5,6]
BENZO(A)ANTHRACENE	120 ug/l [1,2,6]
BENZO(A)PYRENE	92 ug/l [1,2,6]
BENZO(B)FLUORANTHENE	180 ug/l [1,2,6]
CHRYSENE	110 ug/l [1,2,6]
FLUORANTHENE	230 ug/l [1,2,3,4,5,6]
FLUORENE	96 ug/l [3]
NAPHTHALENE (SVOC)	180 ug/l [3]
PHENANTHRENE	280 ug/l [1,2,3]
PYRENE	200 ug/l [1,2,4,5,6]

PCBs
VOCs
Inorganics / Cyanide
SVOCs

- At Least One Exceedance for Indicated Parameter Group
- No Exceedances for Indicated Parameter Group
- At Least One Detection of PCBs
- PCBs Not Detected
- Indicated Parameter Group Not Analyzed

- Sample Results Displayed on Another Figure
- 1865 Shoreline
- Hancock/Ripley Trail MDNR Phase 1 ROW
- Features Identified on Sanborn Maps
- Approximate Parcel Boundaries
- QMCP Study Area Boundary

Notes:
- *J = estimated value*
- *ug/l = micrograms per liter*

N

0 90 Ft

Coordinate System: MIGeoRef(m)

AREA A
-1949 Copper Range Passenger Depot (to the west)
-1907 Lake Superior Smelting Co. "vacant" (to the east)
-1917 H.S Goodell Distributing Station for Lubricating Oils
-1949 H.S. Goodell & Co. Bulk Oil Station

DATA SOURCES

Sample IDs	Date Range
1) **"MW #..."**	**April 1990 – October 1990**

-M-DOT Geoenvironmental Services Unit Materials & Technology Division. *Michigan Department of Transportation M-DOT M-26, Ripley, Houghton County Hydrogeological Investigation.* April 18, 1991.

2) **"MW-..."** **July 1995 – July 1998**

-SCA Environmental. *Phase II Hydrogeological Investigation Report, Houghton County Road Commission Ripley Garage.* Prepared for Houghton County Road Commission. August 1998.

MDEQ Part 201 Cleanup Criteria for Response Action
[1]*=Residential Drinking Water Criteria
[2]*=Nonresidential Drinking Water Criteria
[3]*=Groundwater Surface Water Interface Criteria
[4]=Water Solubility
[5]=Residential Groundwater Vol to Indoor Air Inhalation
[6]=Nonresidential Groundwater Vol to Indoor Air Inhalation
[7]=Flammability and Explosivity Screening Level
* Exceedances of criteria 1, 2, and 3 are shown for organics only
Evaluation based on MDEQ Criteria at time of Project completion

Prepared for:
Michigan Department of Environmental Quality

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
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Figure 5a
Historical Sample Analytical Result Map - Groundwater
Area A
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-QMDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMFigXX_QMCP_GW_all_v20180816.mxd 4:36:18 PM, 8/16/2018 amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

MW-106 10/11/1996
FLUORANTHENE 7 ug/l [3]
NAPHTHALENE (SVOC) 85 ug/l [3]
PHENANTHRENE 27 ug/l [3]
BENZENE 8 ug/l [1,2]
ETHYLBENZENE 22 ug/l [3]
XYLENE - TOTAL 500 ug/l [1,2,3]

SB-101 7/19/1995
ANTHRACENE* 82 J ug/l [1,2,4,5,6]
ANTHRACENE 91 ug/l [1,2,4,5,6]
FLUORENE 55 ug/l [3]
FLUORENE* 56 J ug/l [3]
NAPHTHALENE (SVOC) 1,100 ug/l [1,3]
NAPHTHALENE (SVOC)* 1,100 J ug/l [1,3]
PHENANTHRENE* 73 J ug/l [1,3]
ETHYLBENZENE 1,200 ug/l [1,2,3]
XYLENE - TOTAL 5,600 ug/l [1,2,3]
TOLUENE 4,800 ug/l [1,2,3]

MW-108 10/11/1996
BENZO(A)ANTHRACENE 11 ug/l [1,2,6]
BENZO(A)PYRENE 11 ug/l [1,2,6]
BENZO(B)FLUORANTHENE 10 ug/l [1,2,6]
BENZO(G,H,I)PERYLENE 8 ug/l [1,2,6]
BENZO(K)FLUORANTHENE 8 ug/l [1,2,6]
CHRYSENE 12 ug/l [1,2,6]
FLUORANTHENE 24 ug/l [3]
INDENO(1,2,3-CD)PYRENE 9 ug/l [1,2,6]
PHENANTHRENE 9 ug/l [3]

MW-105 10/29/1996
BENZENE 8 ug/l [1,2]
ETHYLBENZENE 28 ug/l [3]
XYLENE - TOTAL 72 ug/l [3]

SB-201 7/20/1995
BENZENE 35 ug/l [1,2,3]
ETHYLBENZENE 24 ug/l [3]
XYLENE - TOTAL 92 ug/l [3]

MW-103 7/25/1995
BENZENE 9 ug/l [1,2]

MW-112 10/11/1996
PHENANTHRENE 12 ug/l [3]

SB-108 7/19/1995
FLUORANTHENE 6 ug/l [3]
NAPHTHALENE (SVOC) 23 ug/l [3]

MW-110 10/11/1996
NAPHTHALENE (SVOC) 410 ug/l [3]
PHENANTHRENE 41 ug/l [3]
BENZENE 110 ug/l [1,2,3]
ETHYLBENZENE 430 ug/l [1,2,3]
XYLENE - TOTAL 1,700 ug/l [1,2,3]

MW-101 7/25/1995
ANTHRACENE 71 ug/l [1,2,4,5,6]
FLUORANTHENE 40 ug/l [3]
FLUORENE 41 ug/l [3]
NAPHTHALENE (SVOC) 280 ug/l [3]
XYLENE - TOTAL 60 ug/l [3]

SB-111 7/19/1995
NAPHTHALENE (SVOC 28 ug/l [3]

SB-109 7/19/1995
NAPHTHALENE (SVOC) 82 ug/l [3]
BENZENE 7 ug/l [1,2]
ETHYLBENZENE 71 ug/l [3]
XYLENE - TOTAL 380 ug/l [1,2,3]

SB-114 7/19/1995
BENZENE 13 ug/l [1,2,3]
XYLENE - TOTAL 42 ug/l [3]

SB-110 7/19/1995
NAPHTHALENE (SVOC) 50 ug/l [3]

SB-103 7/19/1995
NAPHTHALENE (SVOC) 37 ug/l [3]
BENZENE 53 ug/l [1,2,3]
ETHYLBENZENE 94 ug/l [1,2,3]
XYLENE - TOTAL 260 ug/l [3]

MW-109 10/11/1996
BENZO(A)ANTHRACENE 24 ug/l [1,2,6]
BENZO(A)PYRENE 22 ug/l [1,2,6]
BENZO(B)FLUORANTHENE 24 ug/l [1,2,6]
BENZO(G,H,I)PERYLENE 13 ug/l [1,2,6]
BENZO(K)FLUORANTHENE 18 ug/l [1,2,6]
CHRYSENE 25 ug/l [1,2,6]
FLUORANTHENE 56 ug/l [3]
INDENO(1,2,3-CD)PYRENE 15 ug/l [1,2,6]
NAPHTHALENE (SVOC) 18 ug/l [3]
PHENANTHRENE 36 ug/l [3]
BENZENE 30 ug/l [1,2,3]

MW-403 7/25/1995 (chloride only)
MW-404 10/11/1996
MW-402 7/25/1995 (chloride only)
MW-401 7/25/1995 (chloride)
MW-405 10/11/1996
MW-406 3/6/1997
SB-501 7/20/1995
Gasoline Tanks
Filling Station
MW-305 10/11/1996
Barreled Oil Warehouse
SB-102 7/19/1995
SB-104 7/19/1995
SB-105 7/19/1995
SB-107 7/19/1995
SB-106 7/19/1995
Core Oven
Oil Tanks 10,000 Gallons Each
Coke and Sand
MW-303 7/25/1995 10/11/1996
Coal Bin
Core Oven
MW-306 10/23/1997
Barreled Oil Warehouse
MW-104 7/25/1995
Oil Tank on ground
MW-102 7/25/1995
Oil Pump House
Oil Tank
MW-501 10/11/1996
MW-502 10/11/1996
MW-503 10/11/1996
MW-504 10/11/1996
SB-112 7/19/1995
MW-505 10/11/1996
AREA B (North)
AREA B (South)
MW-301 7/25/1995 (chloride only)
MW-302 7/25/1995 (chloride only)
Coal Dock

Map Extent
Keweenaw National Historical Park
Hancock
Houghton
Dollar Bay
Dodgeville
Townsend Dr
Superior Rd

DATA SOURCES

Sample IDs	Date Range
1) **"MW-/SB-…"**	**July 1995 – July 1998**

-SCA Environmental. *Phase II Hydrogeological Investigation Report, Houghton County Road Commission Ripley Garage.* Prepared for Houghton County Road Commission. August 1998.

AREA B (North)
- 1928 Store House, dwellings
- 1949 Filling Station

AREA B (South)
- 1907 Lake Superior Iron Works
- 1928 Portage Lake Foundry & Machinery Co.
- 1949 Houghton Co. Road Comission

MDEQ Part 201 Cleanup Criteria for Response Action
[1]*=Residential Drinking Water Criteria
[2]*=Nonresidential Drinking Water Criteria
[3]*=Groundwater Surface Water Interface Criteria
[4]=Water Solubility
[5]=Residential Groundwater Vol to Indoor Air Inhalation
[6]=Nonresidential Groundwater Vol to Indoor Air Inhalation
[7]=Flammability and Explosivity Screening Level
* Exceedances of criteria 1, 2, and 3 are shown for organics only
Evaluation based on MDEQ Criteria at time of Project completion

PCBs
VOCs
Inorganics / Cyanide
SVOCs
At Least One Exceedance for Indicated Parameter Group
No Exceedances for Indicated Parameter Group
At Least One Detection of PCBs
PCBs Not Detected
Indicated Parameter Group Not Analyzed
Sample Results Displayed on Another Figure
1865 Shoreline
Hancock/Ripley Trail MDNR Phase 1 ROW
Features Identified on Sanborn Maps
Approximate Parcel Boundaries
QMCP Study Area Boundary

Notes:
- J = estimated value
- ug/l = micrograms per liter

N
0 90 Ft
Coordinate System: MIGeoRef(m)

Prepared for:
Michigan Department of Environmental Quality

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
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Figure 5b
Historical Sample Analytical Result Map - Groundwater
Area B
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMI\FigXX_QMCP_GW_all_v20180816.mxd 4:36:33 PM, 8/16/2018 amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

AREA G

AREA H

AREA I

GP-1 6/13/2012
MW-1 11/7/2013
GP-2 6/13/2012
MW-3 11/7/2013
GP-3 6/13/2012
GP-5 6/13/2012
MW-2 11/7/2013
GP-4 6/13/2012

Fuel
Slag PIle 4'
Boiler House
Furnace
Slag Pile

AREA G
- 1917 Standard Oil Co.
- Other historic land use and/or operations unknown.

AREA H
- Historic land use and/or operations unknown

AREA I
- 1907 Portage Boiler Works
- 1928 Lake Superior Iron and Metal Co.
- 1949 A& Scrap Iron Storage, J.H. Green Co.

DATA SOURCES

Sample IDs	Date Range
1) **"GP-/MW-"**	**June 2012 – November 2013**

- Trimedia Environmental & Engineering. *Baseline Environmental Assessment: Royce Road Marina, Royce Road, Franklin Township, Houghton County, MI 49930.* October 26, 2015.

PCBs
VOCs
Inorganics / Cyanide
SVOCs
At Least One Exceedance for Indicated Parameter Group
No Exceedances for Indicated Parameter Group
At Least One Detection of PCBs
PCBs Not Detected
Indicated Parameter Group Not Analyzed

Sample Results Displayed on Another Figure
1865 Shoreline
Hancock/Ripley Trail MDNR Phase 1 ROW
Features Identified on Sanborn Maps
Approximate Parcel Boundaries
QMCP Study Area Boundary

Notes:
- *J = estimated value*
- *ug/l = micrograms per liter*

N
0 100 Ft
Coordinate System: MIGeoRef(m)

MDEQ Part 201 Cleanup Criteria for Response Action
[1]*=Residential Drinking Water Criteria
[2]*=Nonresidential Drinking Water Criteria
[3]*=Groundwater Surface Water Interface Criteria
[4]=Water Solubility
[5]=Residential Groundwater Vol to Indoor Air Inhalation
[6]=Nonresidential Groundwater Vol to Indoor Air Inhalation
[7]=Flammability and Explosivity Screening Level
* Exceedances of criteria 1, 2, and 3 are shown for organics only
Evaluation based on MDEQ Criteria at time of Project completion

Prepared for:
Michigan Department of Environmental Quality

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TECHNICAL SKILL. CREATIVE SPIRIT.
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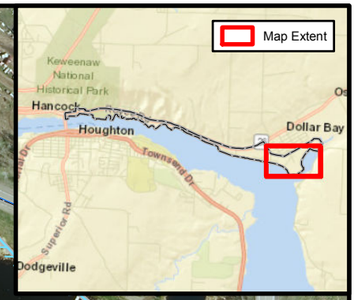
Figure 5c
Historical Sample Analytical Result Map - Groundwater
Areas G-I
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TM1FigXX_QMCP_GW_all_v20180816.mxd 4:36:50 PM, 8/16/2018 amiller

Image Source: Michigan Imagery Solution (Houghton - 2013)



E-1 9/21/1994
E-2 9/21/1994
E-4 9/21/1994
E-5 9/21/1994
Lake 9/21/1994

AREA M
AREA N
AREA O

PW #2 8/28/1994 1/5/1995 6/7/1995 9/11/1995 1/16/1996 3/19/1996 6/25/1996 5/20/2010
OW #1 12/14/1994
PW #3 9/12/1994 10/18/1994 4/15/1997 5/20/2010

Smelter Building w/ approx. 7 furnaces
Underground Oil House
Smelter Building w/ furnaces
Waste Conveyor
Furnaces
Dust Bin
Oil House
Oil House

AREA M
-1928 Lake Superior Smelting Co.
-1949 Ice Houses

AREA N
- 1907 Tamarack & Osceola Copper Manufacturing Co.
- 1928 John A Roebling's Sons Copper Manufacturing
- 1949 Foley Copper Products Co. Copper Wire Mill

AREA O
- 1907 Dollar Bay Land and Improvement Co.
- 1917 Dollar Bay Lumber Company
- 1949 Dollar Bay Lumber Co. Saw Mill & Lumber Yard
- 1949 Horner Flooring Co. Wood Flooring Mill

DATA SOURCES

Sample IDs	Date Range
1) **"PW#/OW#..."**	**August 1994 – January 1995**

-Traverse Engineering Services. *1st Preliminary Report Dollar Bay Wells.* March 31, 1995.

2) **"PW#/OW#..."**	**January 1996 – May 2010**

-Michigan Department of Public Health. *Select results from periodic sampling.*

3) **"E-.../Lake"**	**September 1994**

-Correspondence with Horner Flooring

PCBs
VOCs
Inorganics / Cyanide
SVOCs
At Least One Exceedance for Indicated Parameter Group
No Exceedances for Indicated Parameter Group
At Least One Detection of PCBs
PCBs Not Detected
Indicated Parameter Group Not Analyzed
Sample Results Displayed on Another Figure
1865 Shoreline
Features Identified on Sanborn Maps
Approximate Parcel Boundaries
EPA Cap Boundary
QMCP Study Area Boundary

Notes:
- *J = estimated value*
- *ug/l = micrograms per liter*

N
0 280 Ft
Coordinate System: MIGeoRef(m)

MDEQ Part 201 Cleanup Criteria for Response Action
[1]*=Residential Drinking Water Criteria
[2]*=Nonresidential Drinking Water Criteria
[3]*=Groundwater Surface Water Interface Criteria
[4]=Water Solubility
[5]=Residential Groundwater Vol to Indoor Air Inhalation
[6]=Nonresidential Groundwater Vol to Indoor Air Inhalation
[7]=Flammability and Explosivity Screening Level
* Exceedances of criteria 1, 2, and 3 are shown for organics only
Evaluation based on MDEQ Criteria at time of Project completion

Prepared for:
Michigan Department of Environmental Quality

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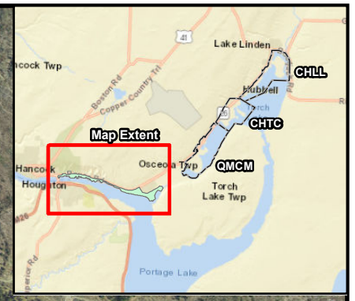
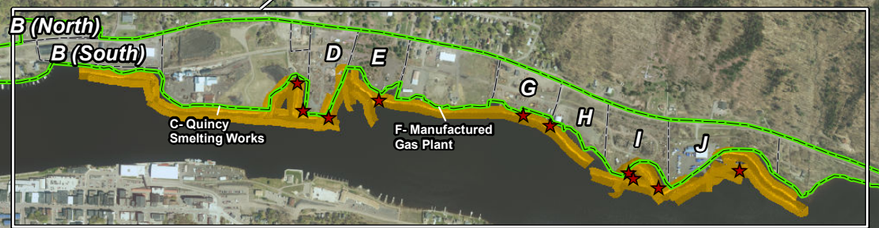
Figure 5d
Historical Sample Analytical Result Map - Groundwater
Areas M-O
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ00076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMIFcXX_QMCP_GW_all_v20180816.mxd 4:37:12 PM, 8/16/2018 amiller

Image Source: MIS - Public Imagery



RIPLEY



Portage Bridge

HOUGHTON

DOLLAR BAY

★ Underwater Reconnaissance Target

MDEQ Sidescan Sonar Tracks

QMCP Study Area Boundary

Approximate Parcel Boundaries

Notes:
- RP = Ripley
- CD = Coal Dock
- DB = Dollar Bay

N
0 1,500 Ft
Coordinate System: MIGeoRef(m)

Prepared for:
Michigan Department of Environmental Quality

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Figure 6
Area Assessed by Side Scan Sonar and Underwater Reconnaissance Targets
Quincy Mining Company Portage Operations Area
Houghton County, Michigan

FILE: \\MSGFILESRV\MSGData\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20180423_QMCP_TMFigXX_QMCP_SidescanSonar_v20180816.mxd 4:36:35 PM, 8/16/2018, amiller

AREA	Year	Historical Operations
A	1907, 1917, 1928, 1949	Copper Range Passenger Depot (to the west)
	1907	Lake Superior Smelting Co. "vacant" (to the east)
	1917	H.S. Goodell Distributing Station for Lubricating Oils
	1928, 1949	H.S. Goodell & Co. Bulk Oil Station
B (South)	1907	Lake Superior Iron Works
	1917, 1928	Portage Lake Foundry & Machinery Co.
	1949	Houghton Co. Road Comission
B (North)	1907, 1917, 1928	Store House, dwellings
	1949	Filling Station
C	1907, 1917, 1928, 1949	QSW
D	1907, 1917, 1928, 1949	Portage Lake Foundry & Machinery
E		Historic land use and/or operations unknown.
F	1907, 1917	Houghton Co. Gas & Coke Co. (to the west)
		Portage Coal & Dock Co. (to the east)
		Ward & Williams Brass Furnace (to the north)
	1928	Michigan Gas & Electric Co. Gas Plant (to the west)
		Portage Coal & Dock Co. (to the east)
		Ward & Williams Brass Furnace (to the north)
	1949	Michigan Gas & Electric Co. Gas Plant (to the west)
		Superior Bottled Gas Co. (to the east)
		Ward Brass Furnace (to the north)
		Standard Oil CO. (to the northeast)
		Filling Station and Bulk Oil Station (to the northwest)
G	1917	Standard Oil Company
		Other historic land use and/or operations unknown.
H		Historic land use and/or operations unknown
I	1907	Portage Boiler Works
	1917, 1928	Lake Superior Iron and Metal Co.
	1949	Scrap Iron Storage, J.H. Green Co. (Scrap Iron Yard)
J	1907, 1917	Houghton Lumber Yard Co
	1928	Dollar Bay Lumber Co.
	1949	Henry Borth Co. Manufacturing R.R. Shims, UP Oil Company
K	1907	Tamarack & Osceola Mining Co.
	1917	Calumet & Hecla Mining Co. Coal Dock
	1928, 1949	not found
L		Bulk Oil Storage
		Other historic land use and/or operations unknown.
M	1907, 1917, 1928	Lake Superior Smelting Co.
	1949	Ice Houses
N	1907	Tamarack & Osceola Copper Manufacturing Co.
	1917, 1928	John A Roebling's Sons Copper Manufacturing
	1949	Foley Copper Products Co. Copper Wire Mill
O	1907	Dollar Bay Land and Improvement Co.
	1917	Dollar Bay Lumber Company
	1928, 1949	Dollar Bay Lumber Co. Saw Mill & Lumber Yard
	1949	Horner Flooring Co. Wood Flooring Mill
P	1917	Slag Dump, Lake Superior Melting Co.

- Historic land use and/or operations identified on Sanborn Maps for assosicated years.

Prepared for:
Michigan Department of Environmental Quality

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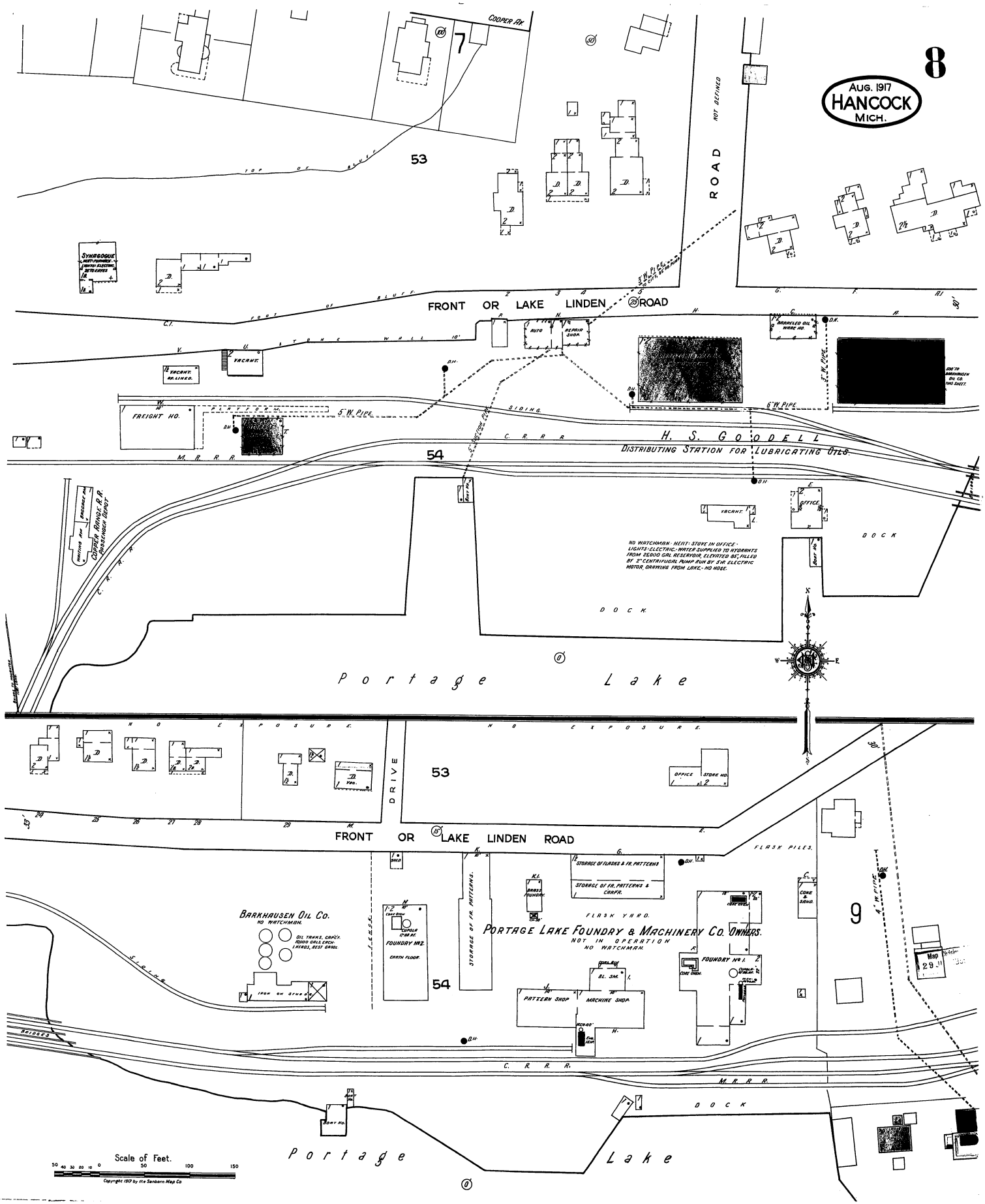
Area Assessed by Side Scan Sonar
and Underwater Reconnaissance Targets

APPENDIX A

SANBORN MAPS


8
AUG. 1917
HANCOCK
MICH.
COOPER AV.
7
53
ROAD NOT DEFINED
TOP OF BLUFF
SYNAGOGUE
FRONT OR LAKE LINDEN ROAD
FOOT OF BLUFF
STONE WALL 10'
VACANT.
AUTO REPAIR SHOP
BARRELED OIL WARE HO.
5" W. PIPE
6" W. PIPE
FREIGHT HO.
SIDING.
C. R. R. R.
M. R. R.
54
H. S. GOODELL
DISTRIBUTING STATION FOR LUBRICATING OILS.
COPPER RANGE R.R. PASSENGER DEPOT
OFFICE
DOCK
NO WATCHMAN. HEAT: STOVE IN OFFICE. LIGHTS: ELECTRIC. WATER SUPPLIED TO HYDRANTS FROM ZERO CAL. RESERVOIR, ELEVATED 85', FILLED BY 2" CENTRIFUGAL PUMP RUN BY 5HP. ELECTRIC MOTOR, DRAWING FROM LAKE. NO HOSE.
Portage Lake
NO EXPOSURE.
DRIVE
53
OFFICE
STORE HO.
FRONT OR LAKE LINDEN ROAD
FLASK PILES.
STORAGE OF FLASKS & FR. PATTERNS
STORAGE OF FR. PATTERNS & CARPR.
FLASK YARD.
BARKHAUSEN OIL CO.
NO WATCHMAN.
OIL TANKS, CAPCY. 10000 GALS. EACH. 1 HYDG., REST GRAVL.
IRON ON STUDS
FOUNDRY NO 2.
EARTH FLOOR.
STORAGE OF FR. PATTERNS.
PORTAGE LAKE FOUNDRY & MACHINERY CO. OWNERS.
NOT IN OPERATION
NO WATCHMAN.
FOUNDRY NO 1.
PATTERN SHOP
MACHINE SHOP.
9
Map Portage 29-11
BRIDGES
C. R. R. R.
M. R. R.
DOCK
BOAT HO.
Portage Lake
Scale of Feet.
50 40 30 20 10 0 50 100 150
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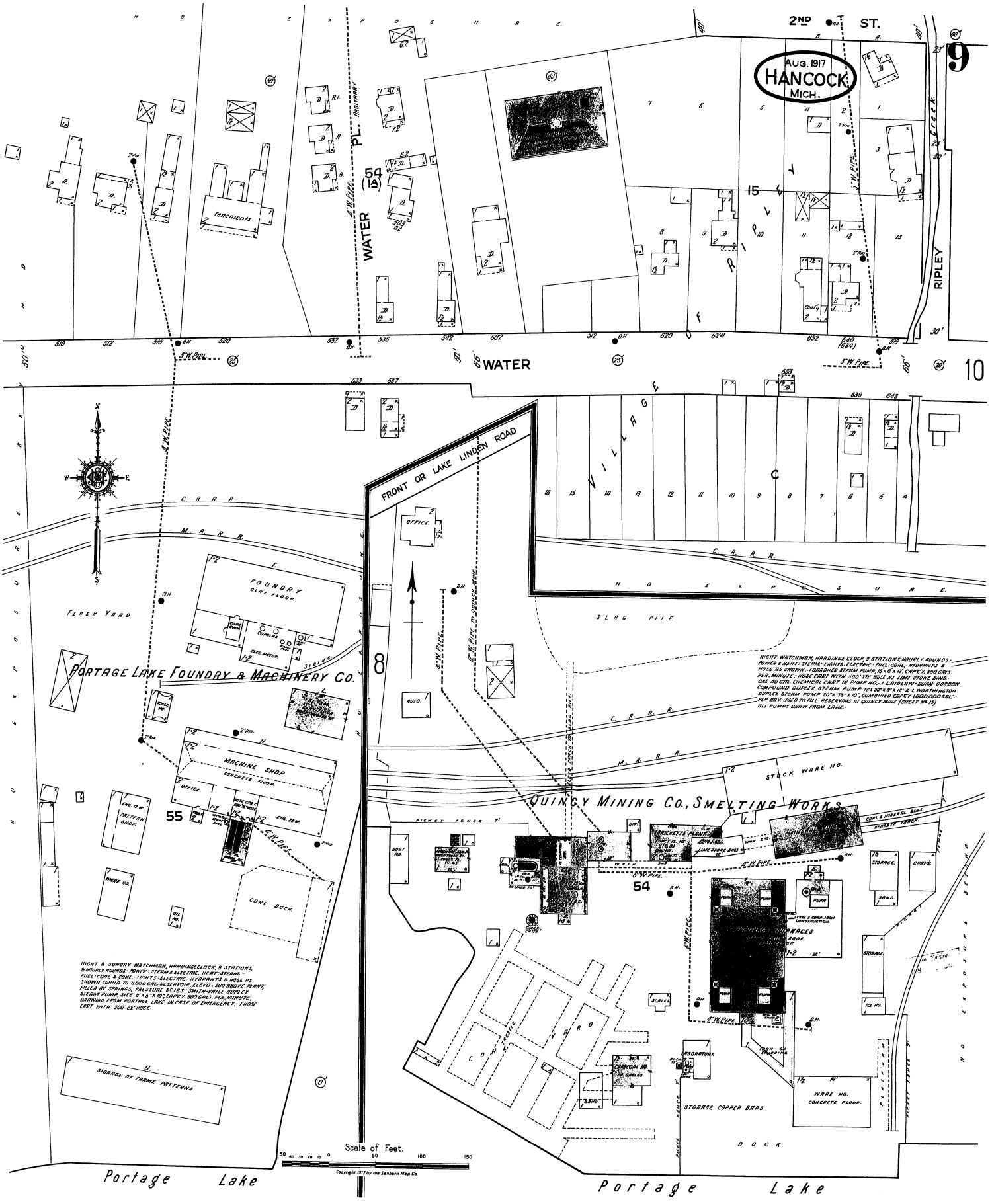
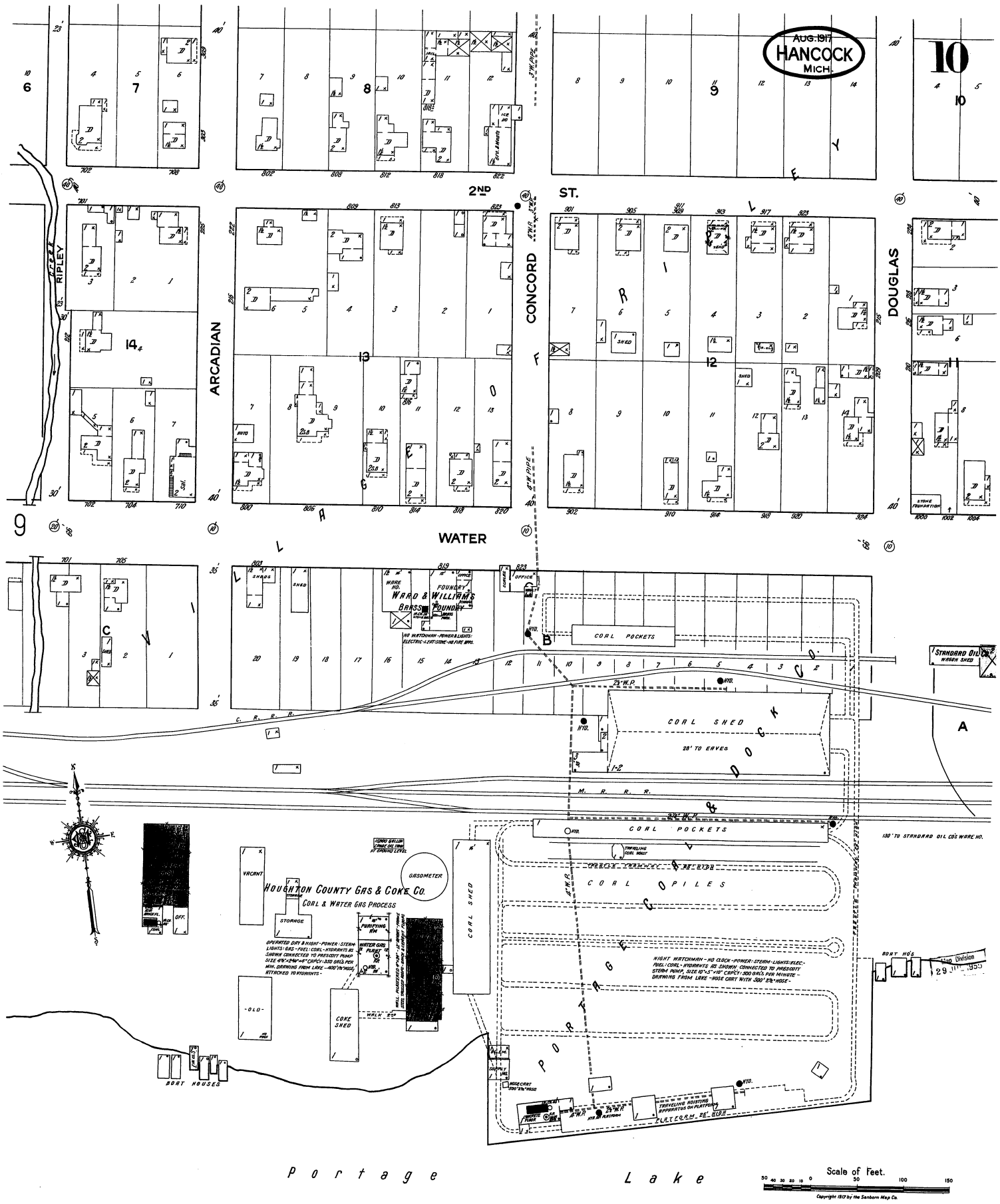
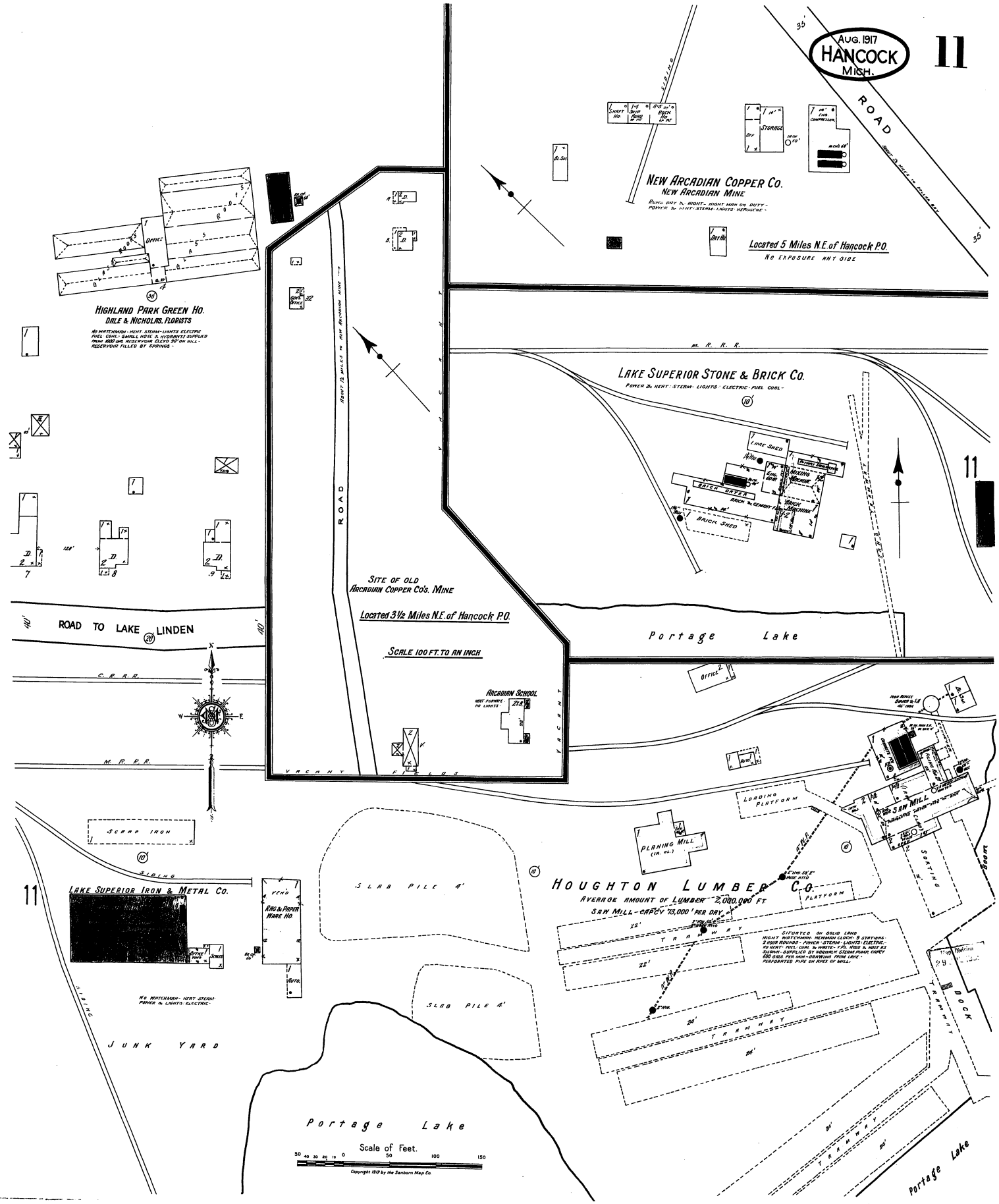


NIGHT WATCHMAN, HARDINGE CLOCK, 9 STATIONS, 19 HOURLY ROUNDS.- POWER - STEAM & ELECTRIC.- HEAT - STEAM.- FUEL: COAL & COKE.- LIGHTS - ELECTRIC.- HYDRANTS & HOSE AS SHOWN. CUMB. TO 9,000 GAL. RESERVOIR, ELEVD. 200 ABOVE PLANT, FILLED BY SPRINGS, PRESSURE 85 LBS.- SMITH-VAILE DUPLEX STEAM PUMP, SIZE 6" x 3" x 10"; CAP'Y 600 GALS. PER MINUTE.- DRAWING FROM PORTAGE LAKE IN CASE OF EMERGENCY.- 1 HOSE CART WITH 300' 2½" HOSE.

NIGHT WATCHMAN, HARDINGE CLOCK, 9 STATIONS, HOURLY ROUNDS.- POWER & HEAT - STEAM - ELECTRIC - FUEL: COAL.- HYDRANTS & HOSE AS SHOWN.- 1 GARDNER STEAM PUMP, 15 x 8½ x 12", CAP'C'Y, 800 GALS. PER MINUTE.- HOSE CART WITH 300' 2½" HOSE AT LIME STONE BINS.- ONE 40 GAL. CHEMICAL CART IN PUMP HO.- 1 LAIDLAW-DUNN-GORDON COMPOUND DUPLEX STEAM PUMP 12"x 20" x 8" x 18" x 1. NORTHINGTON DUPLEX STEAM PUMP 20"x 7½" x 10", COMBINED CAP'CY 1,000,000 GAL. PER 24 HRS. USED TO FILL RESERVOIRS AT QUINCY MINE (SHEET No. 13) ALL PUMPS DRAW FROM LAKE.




AUG. 1917
HANCOCK
MICH.
11
NEW ARCADIAN COPPER CO.
NEW ARCADIAN MINE
Located 5 Miles N.E. of Hancock P.O.
No Exposure Any Side
ROAD
HIGHLAND PARK GREEN HO.
DALE & NICHOLAS, FLORISTS
LAKE SUPERIOR STONE & BRICK CO.
M. R. R.
SITE OF OLD ARCADIAN COPPER CO'S. MINE
Located 3½ Miles N.E. of Hancock P.O.
SCALE 100 FT. TO AN INCH
ROAD TO LAKE LINDEN
ARCADIAN SCHOOL
VACANT
C. R. R.
SCRAP IRON
SIDING
LAKE SUPERIOR IRON & METAL CO.
RAG & PAPER WARE HO.
JUNK YARD
SLAB PILE 4'
HOUGHTON LUMBER CO.
AVERAGE AMOUNT OF LUMBER 2,000,000 FT.
SAW MILL - CAPCITY 75,000 ' PER DAY
PLANING MILL
LOADING PLATFORM
SOAKING
TRAMWAY
DOCK
Portage Lake
Scale of Feet.
50 40 30 20 10 0 50 100 150
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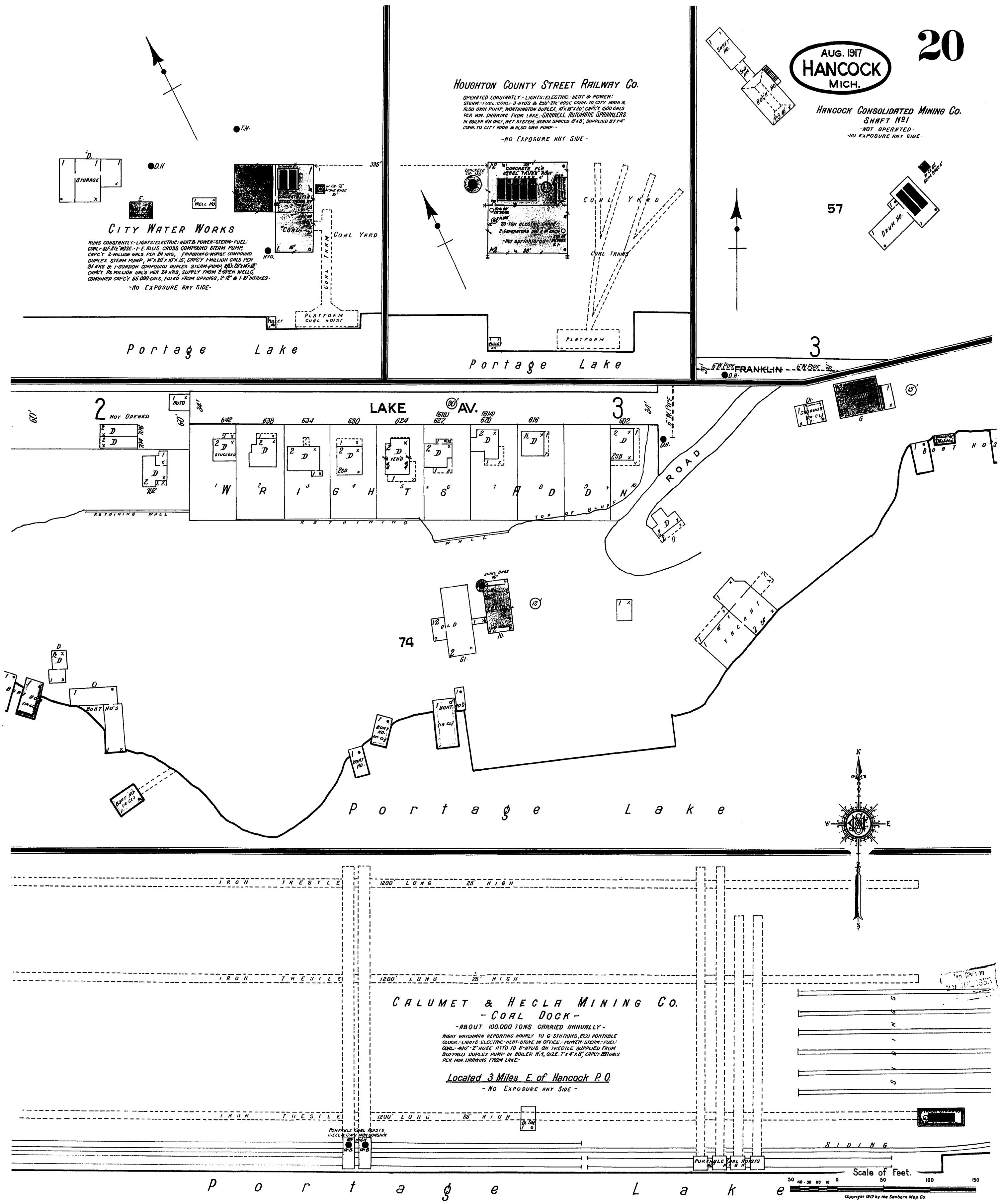
AUG. 1917
HANCOCK
MICH.
HANCOCK CONSOLIDATED MINING CO.
SHAFT Nº1
·NOT OPERATED·
·NO EXPOSURE ANY SIDE·
SHAFT HO.
SKIP R'M
ROCK HO.
DRUM HO.
57
CITY WATER WORKS
RUNS CONSTANTLY.- LIGHTS: ELECTRIC.- HEAT & POWER: STEAM- FUEL:
COAL.- 50'-2½" HOSE.- 1- E. ALLIS CROSS COMPOUND STEAM PUMP,
CAP'CY 2-MILLION GALS. PER 24 HRS, FAIRBANKS-MORSE COMPOUND
DUPLEX STEAM PUMP, 14"x20"x10"x15", CAP'CY 1-MILLION GALS PER
24 HRS & 1-GORDON COMPOUND DUPLEX STEAM PUMP,
CAP'CY 1½ MILLION GALS PER 24 HRS, SUPPLY FROM 2-OPEN WELLS,
COMBINED CAP'CY 55.000 GALS, FILLED FROM SPRINGS, 2-12" & 1-10" INTAKES-
-NO EXPOSURE ANY SIDE-
STORAGE
D.H.
T.H.
WELL HO.
COAL
HYD.
COAL YARD
COAL TRAM
PLATFORM COAL HOIST
PULLEY HO.
395'
Portage Lake
HOUGHTON COUNTY STREET RAILWAY CO.
OPERATED CONSTANTLY.- LIGHTS: ELECTRIC.- HEAT & POWER:
STEAM.- FUEL: COAL.- 3-HYD'S & 250'-2½" HOSE CONN. TO CITY MAIN &
ALSO OWN PUMP, WORTHINGTON DUPLEX, 10"x18"x20", CAP'CY 1500 GALS
PER MIN. DRAWING FROM LAKE.- GRINNELL AUTOMATIC SPRINKLERS
IN BOILER R'M ONLY, WET SYSTEM, HEADS SPACED 8'x8', SUPPLIED BY 1-4"
CONN. TO CITY MAIN & ALSO OWN PUMP.-
-NO EXPOSURE ANY SIDE-
CONCRETE CH. 125'
CONCRETE FLR
STEEL TRUSS ROOF
COAL YARD
COAL TRAMS
PLATFORM
PULLEY HO.
Portage Lake
FRANKLIN
6"W. PIPE
LAKE AV.
NOT OPENED
ROAD
WRIGHTS ADDN
RETAINING WALL
TOP OF BLUFF
STORAGE
BOAT HO'S
OLD
VACANT
74
Portage Lake
IRON TRESTLE 1200' LONG 25' HIGH
IRON TRESTLE 1200' LONG 25' HIGH
CALUMET & HECLA MINING CO.
-COAL DOCK-
-ABOUT 100.000 TONS CARRIED ANNUALLY-
NIGHT WATCHMAN REPORTING HOURLY TO 6-STATIONS, ECO PORTABLE
CLOCK.- LIGHTS: ELECTRIC- HEAT: STOVE IN OFFICE.- POWER: STEAM.- FUEL:
COAL.- 400'-2" HOSE ATT'D TO 5-HYDS. ON TRESTLE SUPPLIED FROM
BUFFALO DUPLEX PUMP IN BOILER R'M, SIZE 7"x4"x8", CAP'CY 250 GALS
PER MIN. DRAWING FROM LAKE.-
Located 3 Miles E. of Hancock P.O.
- NO EXPOSURE ANY SIDE -
IRON TRESTLE 1200' LONG 25' HIGH
PORTABLE COAL HOISTS
SIDING
Portage Lake
Scale of Feet.
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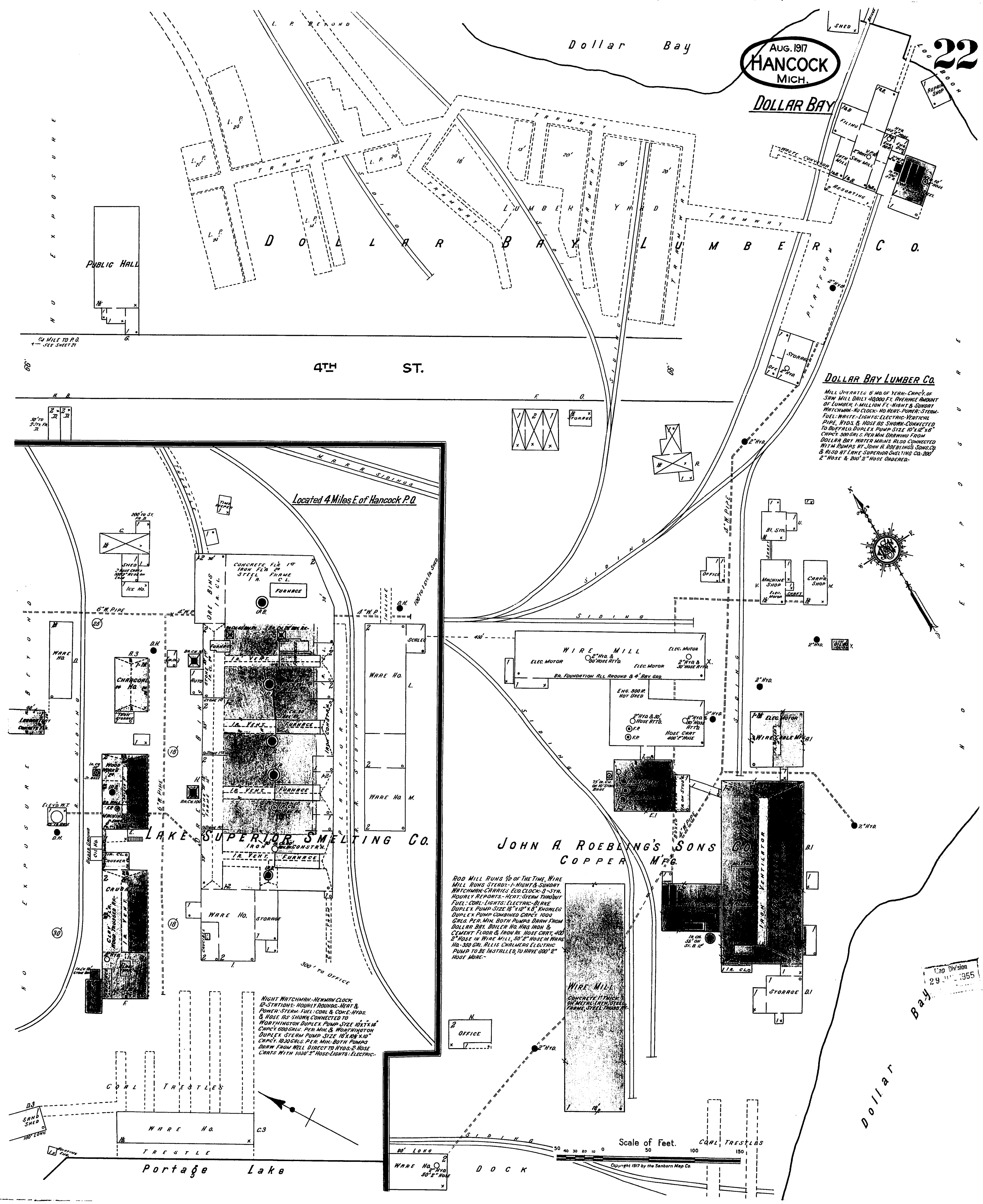
22
Aug. 1917
Hancock
Mich.
Dollar Bay
Dollar Bay
Dollar Bay Lumber Co.
Lumber Yard
Tramway
Siding
Platform
Public Hall
1/4 Mile to P.O. See Sheet 21
4th St.
Storage
Repair Shop
Log Boom
Filing
Saw Mill
Assorting
Office
Dollar Bay Lumber Co.
Mill Operates 6 Mo. of Year.-Capcy. of Saw Mill Daily 40,000 Ft. Average Amount of Lumber, 1-Million Ft.-Night & Sunday Watchman.-No Clock:-No Heat.-Power: Steam.-Fuel: Waste.-Lights: Electric.-Vertical Pipe, Hyds. & Hose as Shown.-Connected to Buffalo Duplex Pump Size 10"x12"x6" Capcy. 500 Gals. Per Min. Drawing from Dollar Bay Water Mains Also Connected with Pumps at John A. Roebling's Sons Co. & Also at Lake Superior Smelting Co.-200' 2" Hose & 200' 2" Hose Ordered.-
Located 4 Miles E. of Hancock P.O.
M. R. R. Sidings
Lake Superior Smelting Co.
Ore Bins
Furnace
Ware Ho.
Charcoal Ho.
Ice Ho.
Shed
Crusher
Office
300' to Office
Night Watchman.-Newman Clock 12-Stations:-Hourly Rounds.-Heat & Power: Steam.-Fuel: Coal & Coke:-Hyds. & Hose as Shown Connected to Worthington Duplex Pump Size 10"x7"x14" Capcy. 600 Gals. Per Min. & Worthington Duplex Steam Pump Size 16"x10"x10" Capcy. 1000 Gals. Per Min.-Both Pumps Draw from Well Direct to Hyds.:-2-Hose Carts with 1000' 2" Hose-Lights: Electric.-
Coal Trestles
Ware Ho.
Trestle
Sand Shed
Portage Lake
Dock
John A. Roebling's Sons Co.
Copper M'f'g.
Wire Mill
Elec. Motor
Machine Shop
Carp'r Shop
Wire Cable Mill
Iron Ventilator
Storage
Rod Mill Runs 1/2 of the Time, Wire Mill Runs Steady.-1-Night & Sunday Watchman-Carries Eco. Clock.-8-Sta. Hourly Reports.-Heat: Steam Thro'out Fuel: Coal.-Lights: Electric.-Blake Duplex Pump Size 16"x12"x8", Knowles Duplex Pump Combined Capcy. 1000 Gals. Per. Min. Both Pumps Draw from Dollar Bay. Boiler Ho. Has Iron & Cement Floor & Iron Rf. Hose Cart, 400' 2" Hose in Wire Mill, 50' 2" Hose in Ware Ho.-350 Gal. Allis Chalmers Electric Pump to Be Installed, to Have 600' 2" Hose More.-
Office
Scale of Feet.
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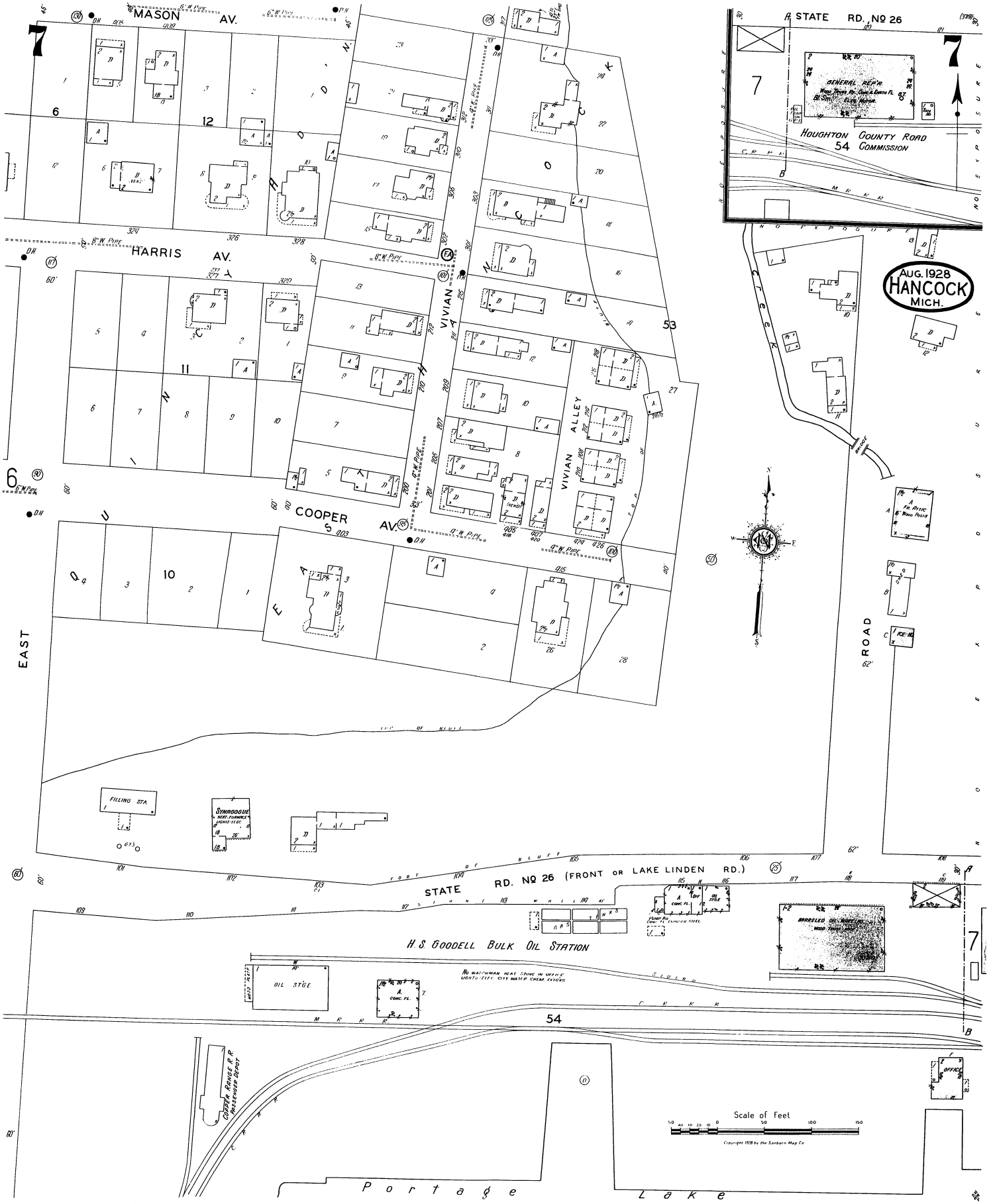
Map Division 29 JUL 1955


MASON AV.
HARRIS AV.
COOPER AV.
VIVIAN
ALLEY
EAST
ROAD
STATE RD. Nº 26 (FRONT OR LAKE LINDEN RD.)
STATE RD. Nº 26
HOUGHTON COUNTY ROAD COMMISSION
AUG. 1928
HANCOCK
MICH.
H.S. GOODELL BULK OIL STATION
FILLING STA.
SYNAGOGUE
OIL STGE.
OFFICE
CREEK
Portage Lake
Scale of Feet
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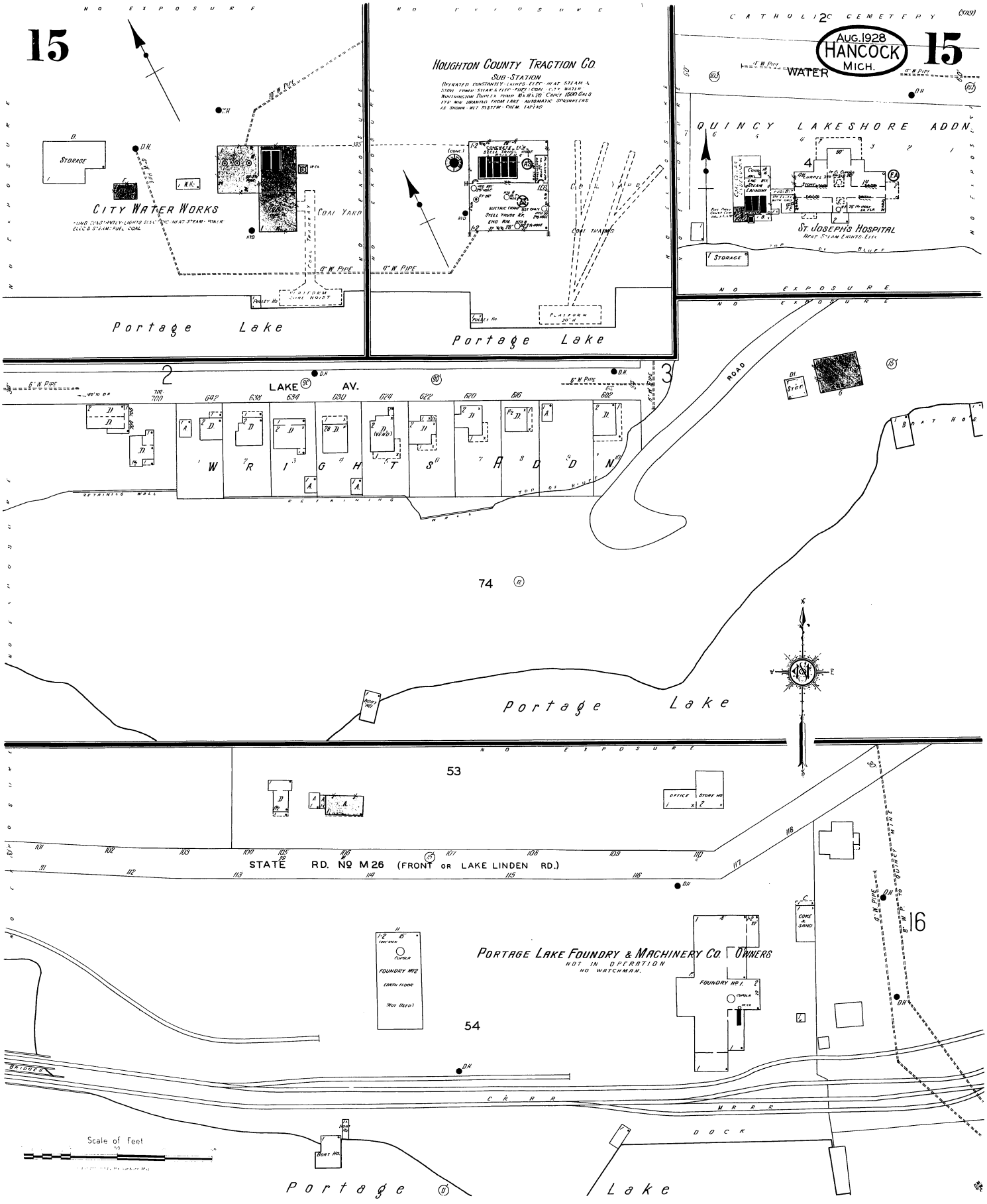
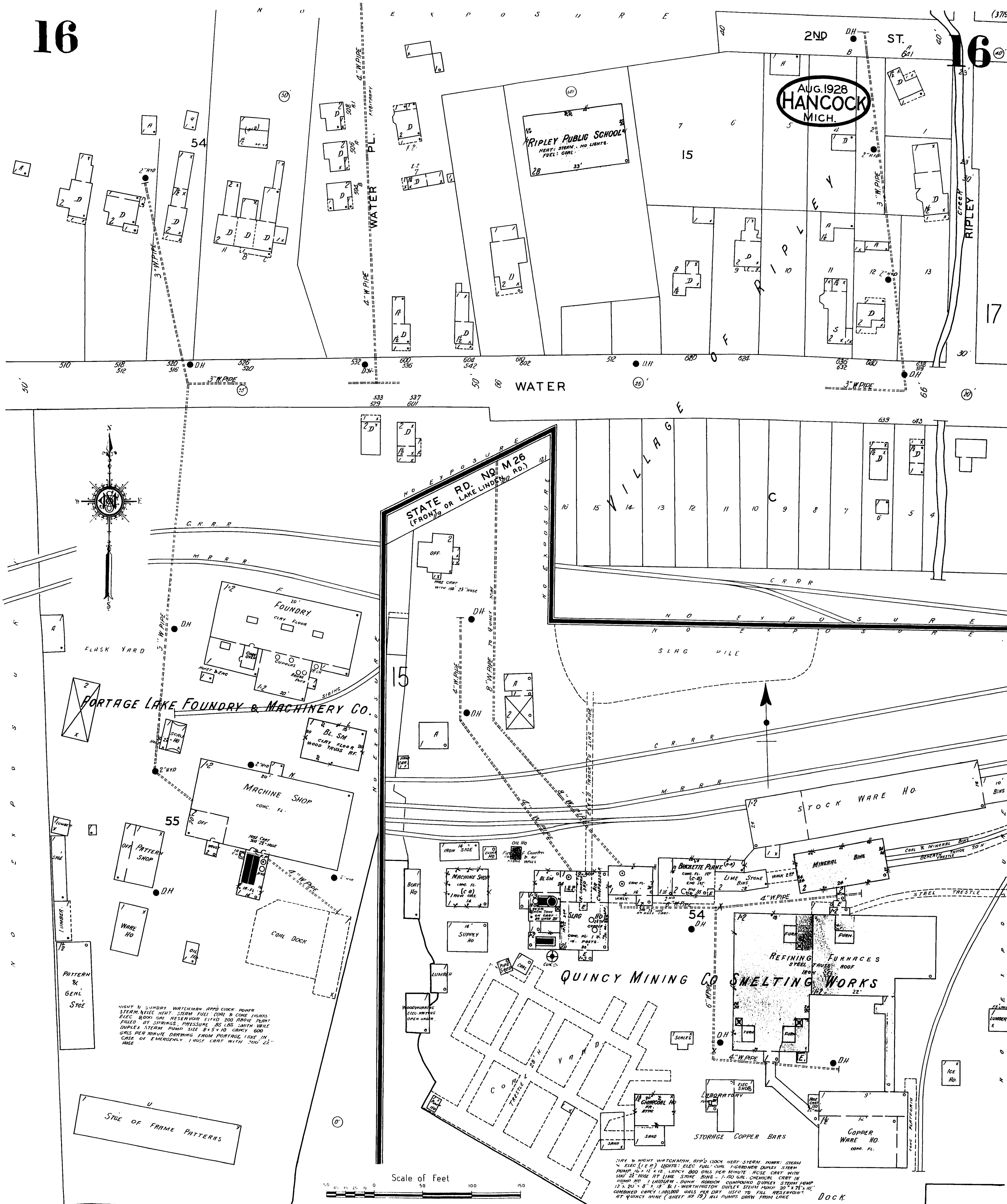
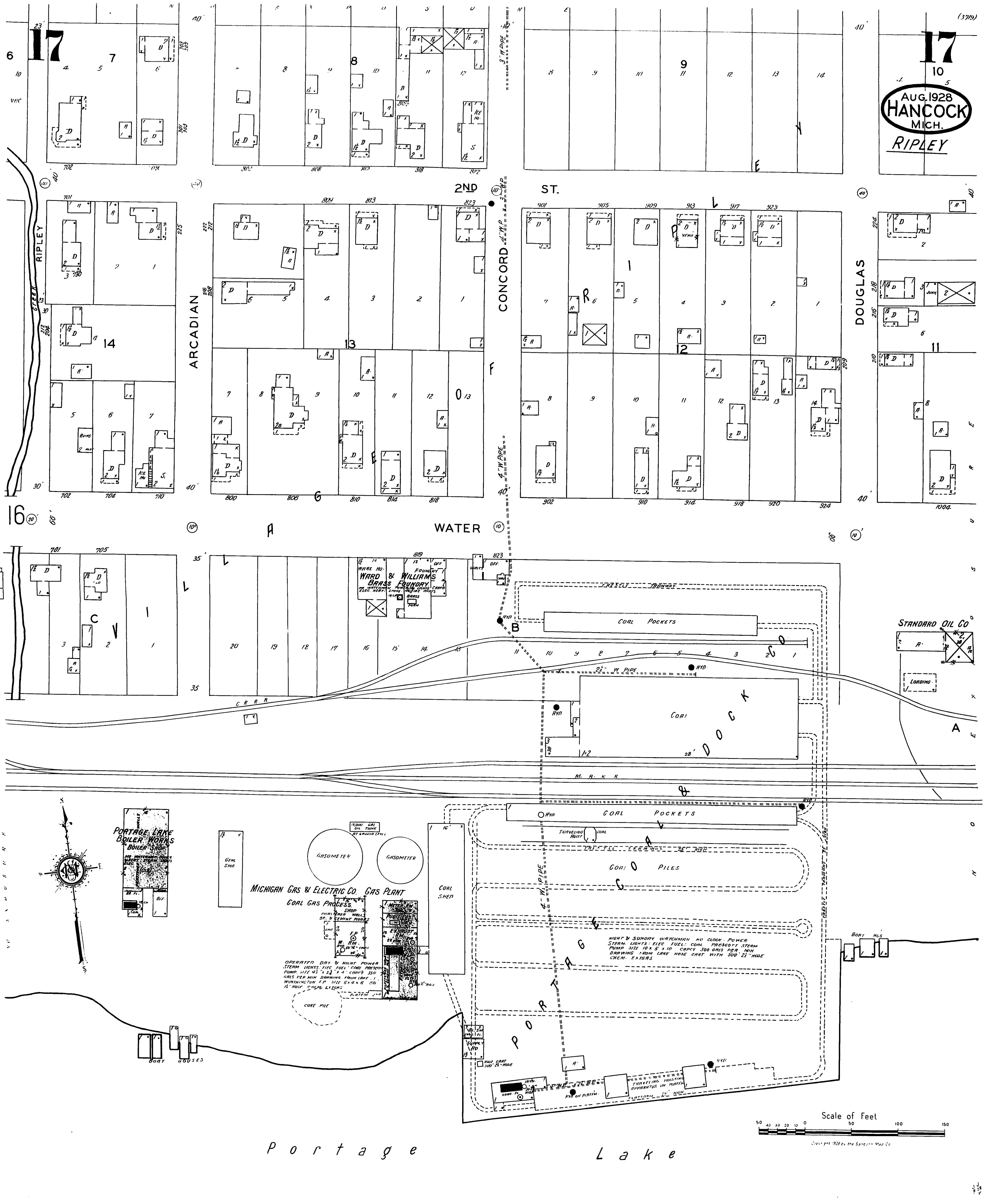

15
NO EXPOSURE
HOUGHTON COUNTY TRACTION CO.
SUB-STATION
CITY WATER WORKS
COAL YARD
STORAGE
Portage Lake
CATHOLIC CEMETERY
AUG. 1928
HANCOCK
MICH.
WATER
15
QUINCY LAKESHORE ADDN.
ST. JOSEPH'S HOSPITAL
LAKE AV.
WRIGHTS ADDN.
ROAD
BOAT HOUSE
74
53
STATE RD. NO M 26 (FRONT OR LAKE LINDEN RD.)
PORTAGE LAKE FOUNDRY & MACHINERY CO. OWNERS
NOT IN OPERATION
NO WATCHMAN.
FOUNDRY NO 2
FOUNDRY NO 1
54
16
C R R R
DOCK
Scale of Feet



16
(3719)
Aug. 1928
HANCOCK
MICH.
NO EXPOSURE
2ND ST.
RIPLEY PUBLIC SCHOOL
HEAT: STEAM · NO LIGHTS
FUEL: COAL
15
WATER PL.
4" W. PIPE
3" W. PIPE
2" HYD
54
VILLAGE OF RIPLEY
RIPLEY
CREEK
17
WATER
DH
C
STATE RD. NO. M 26
(FRONT OR LAKE LINDEN RD.)
C.R.R.
M.R.R.
FOUNDRY
CLAY FLOOR
CUPOLAS
FLASK YARD
PORTAGE LAKE FOUNDRY & MACHINERY CO.
BL. SM.
CLAY FLOOR
WOOD TRUSS RF.
MACHINE SHOP
CONC. FL.
55
OFF
PATTERN SHOP
WARE HO
LUMBER
STGE
PATTERN & GEN'L STGE
COAL DOCK
OIL
STGE OF FRAME PATTERNS
SLAG PILE
STOCK WARE HO.
BINS
MINERAL BINS
COAL & MINERAL BINS
STEEL TRESTLE
BRICKETTE PLANT
LIME STONE BINS
IRON STGE
MACHINE SHOP
SUPPLY HO
BOAT HO
LUMBER
WOODWORKING
SLAG
OIL HO
REFINING FURNACES
STEEL TRUSS ROOF
QUINCY MINING CO SMELTING WORKS
COAL YARD
TRESTLE
SCALES
LABORATORY
ELEC. SHOP
CHARCOAL HO
SAND
STORAGE COPPER BARS
COPPER WARE HO.
CONC. FL.
ICE HO.
DOCK
Scale of Feet
0 50 100 150
Copyright 1928, the Sanborn Map Co.
Portage Lake


17
17
Aug. 1928
HANCOCK
MICH.
RIPLEY
2ND ST.
CONCORD
ARCADIAN
DOUGLAS
RIPLEY
WATER
Creek
16
Ward & Williams Brass Foundry
Standard Oil Co
Coal Pockets
Coal
C. R. R.
M. R. K. R.
Portage Coal & Dock Co
Portage Lake Boiler Works
Boiler Shop
Gasometer
Gasometer
Michigan Gas & Electric Co. Gas Plant
Coal Gas Process
Coal Shed
Coal Piles
Coke Pile
Boat Houses
Boat Hos
Portage Lake
Scale of Feet
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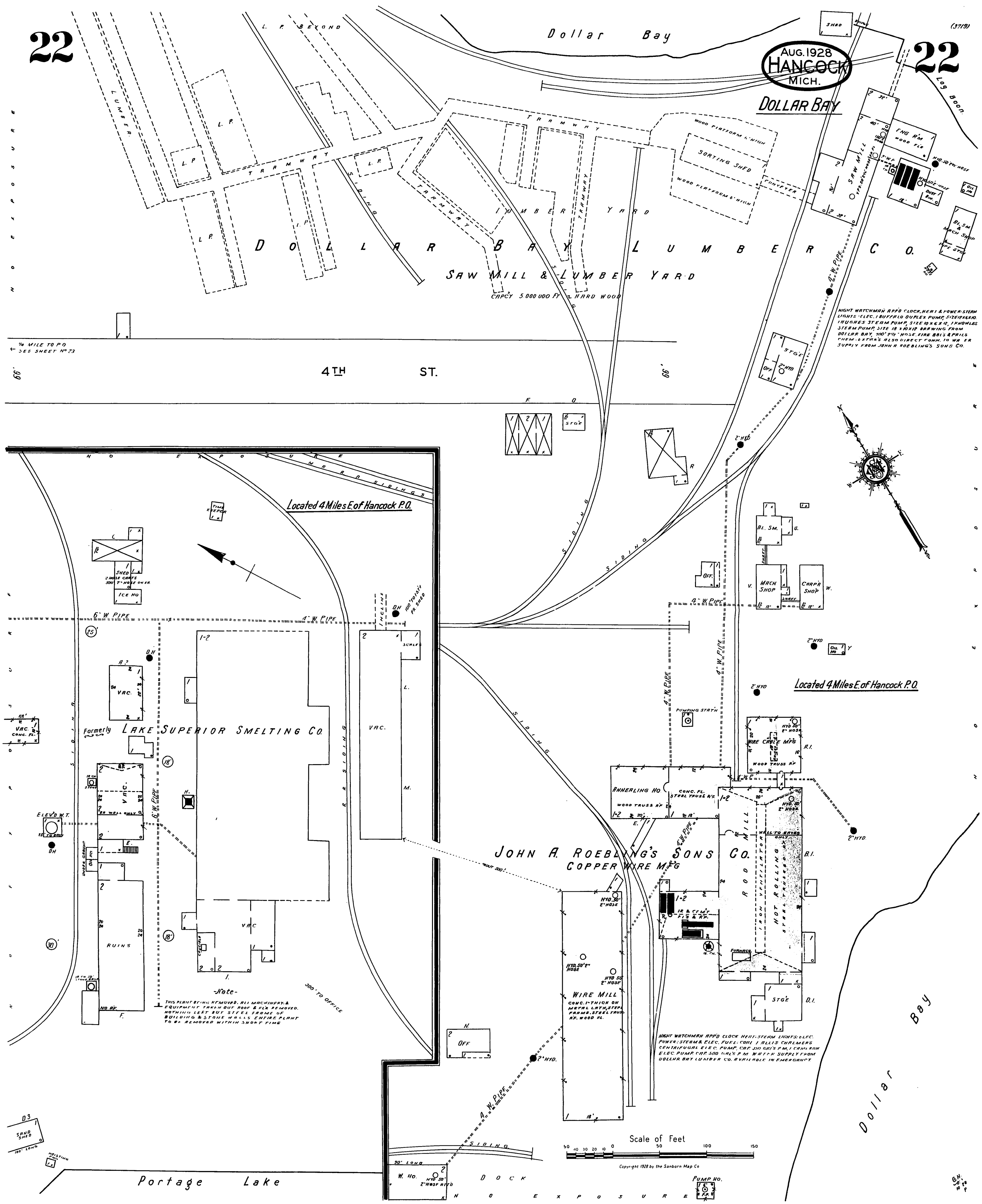
22
AUG. 1928
HANCOCK
MICH.
DOLLAR BAY
(3719)
Dollar Bay
DOLLAR BAY LUMBER CO.
SAW MILL & LUMBER YARD
CAPC'Y 5 000 000 FT HARD WOOD
LUMBER YARD
TRAMWAY
SORTING SHED
SAW MILL
NIGHT WATCHMAN APP'D CLOCK. HEAT & POWER: STEAM LIGHTS: ELEC. 1 BUFFALO DUPLEX PUMP, SIZE 12 X 6 X 10. 1 HUGHES STEAM PUMP, SIZE 10 X 6 X 12, 1 KNOWLES STEAM PUMP, SIZE 18 X 10 X 12 DRAWING FROM DOLLAR BAY, 700' 2½" HOSE. FIRE BBLS & PAILS CHEM. EXTGR'S ALSO DIRECT CONN. TO WATER SUPPLY FROM JOHN A. ROEBLING'S SONS CO.
¼ MILE TO P.O. SEE SHEET No 23
4TH ST.
66'
Located 4 Miles E. of Hancock P.O.
Formerly LAKE SUPERIOR SMELTING CO.
-Note-
THIS PLANT BEING REMOVED. ALL MACHINERY & EQUIPMENT TAKEN OUT ROOF & FL'R REMOVED. NOTHING LEFT BUT STEEL FRAME OF BUILDING & STONE WALLS ENTIRE PLANT TO BE REMOVED WITHIN SHORT TIME
300' TO OFFICE
JOHN A. ROEBLING'S SONS CO.
COPPER WIRE M'F'G
ROD MILL
HOT ROLLING
ANNEALING HO.
WIRE MILL
WIRE CABLE M'F'G
MACH SHOP
CARP'R SHOP
BL. SM.
PUMPING STA'TN
NIGHT WATCHMAN APP'D CLOCK HEAT: STEAM LIGHTS: ELEC. POWER: STEAM & ELEC. FUEL: COAL 1 ALLIS CHALMERS CENTRIFUGAL ELEC. PUMP, CAP. 350 GAL'S P.M., 1 CAMERON ELEC. PUMP CAP. 500 GAL'S P.M. WATER SUPPLY FROM DOLLAR BAY LUMBER CO. AVAILABLE IN EMERGANCY.
Dollar Bay
Portage Lake
DOCK
NO EXPOSURE
PUMP HO.
Scale of Feet
50 40 30 20 10 0 50 100 150
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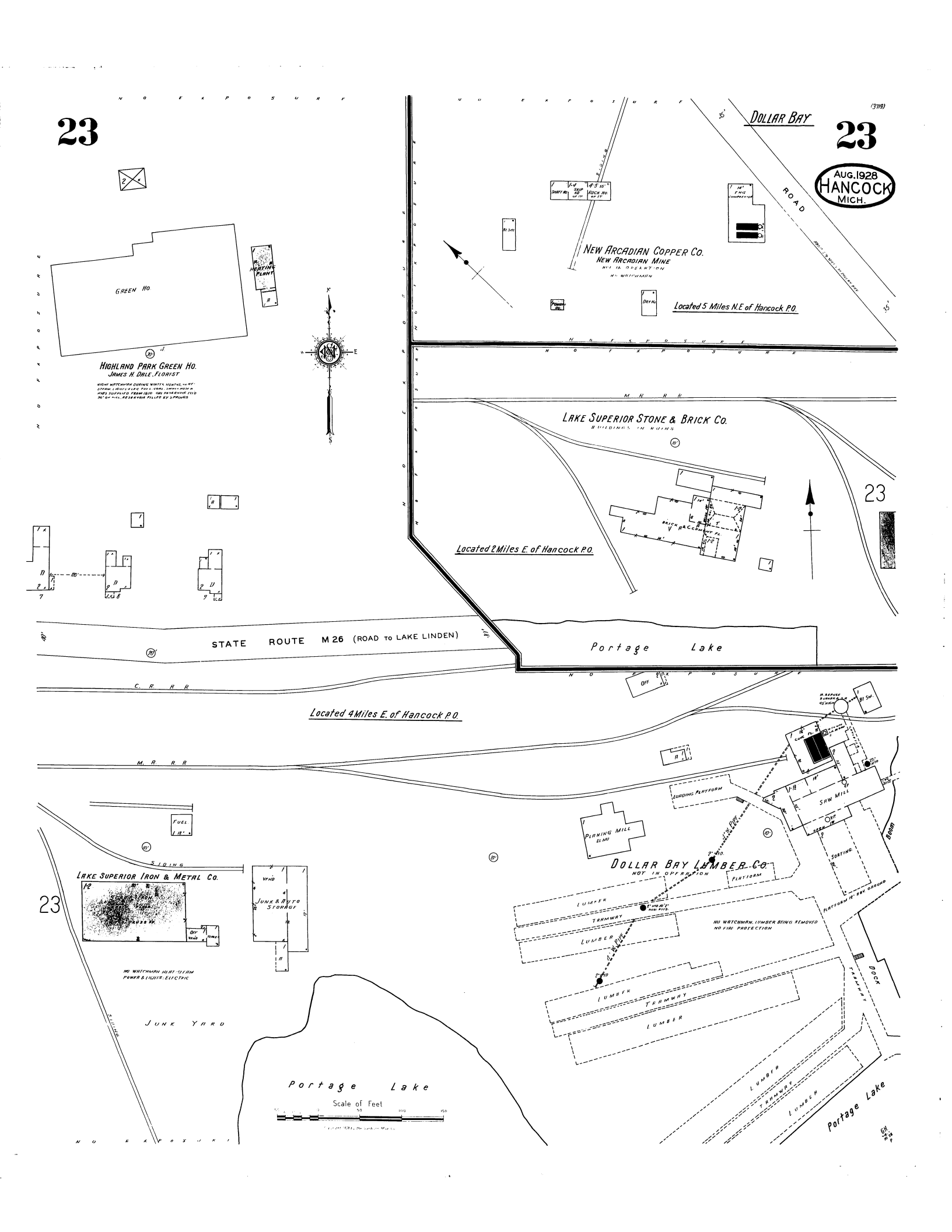
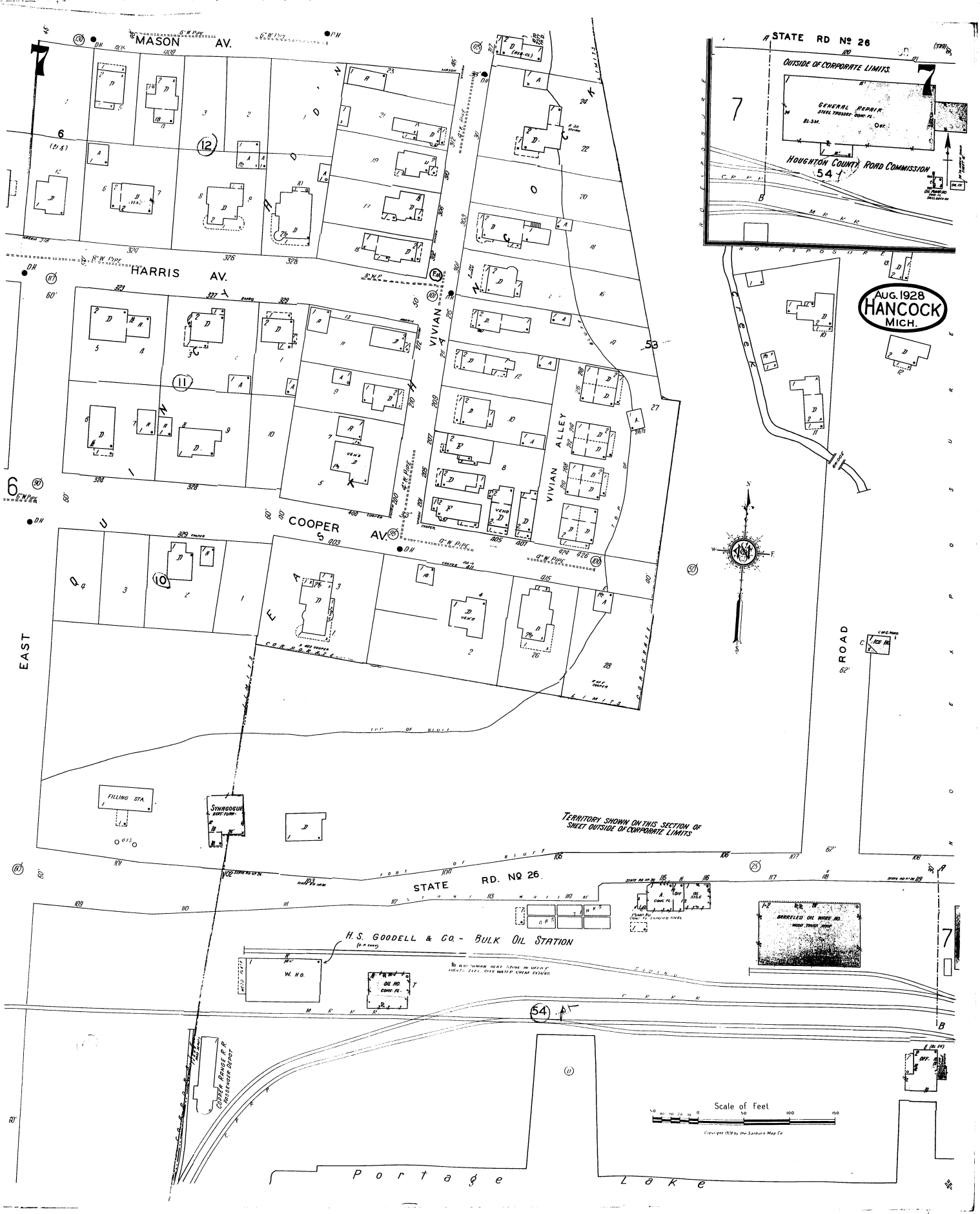
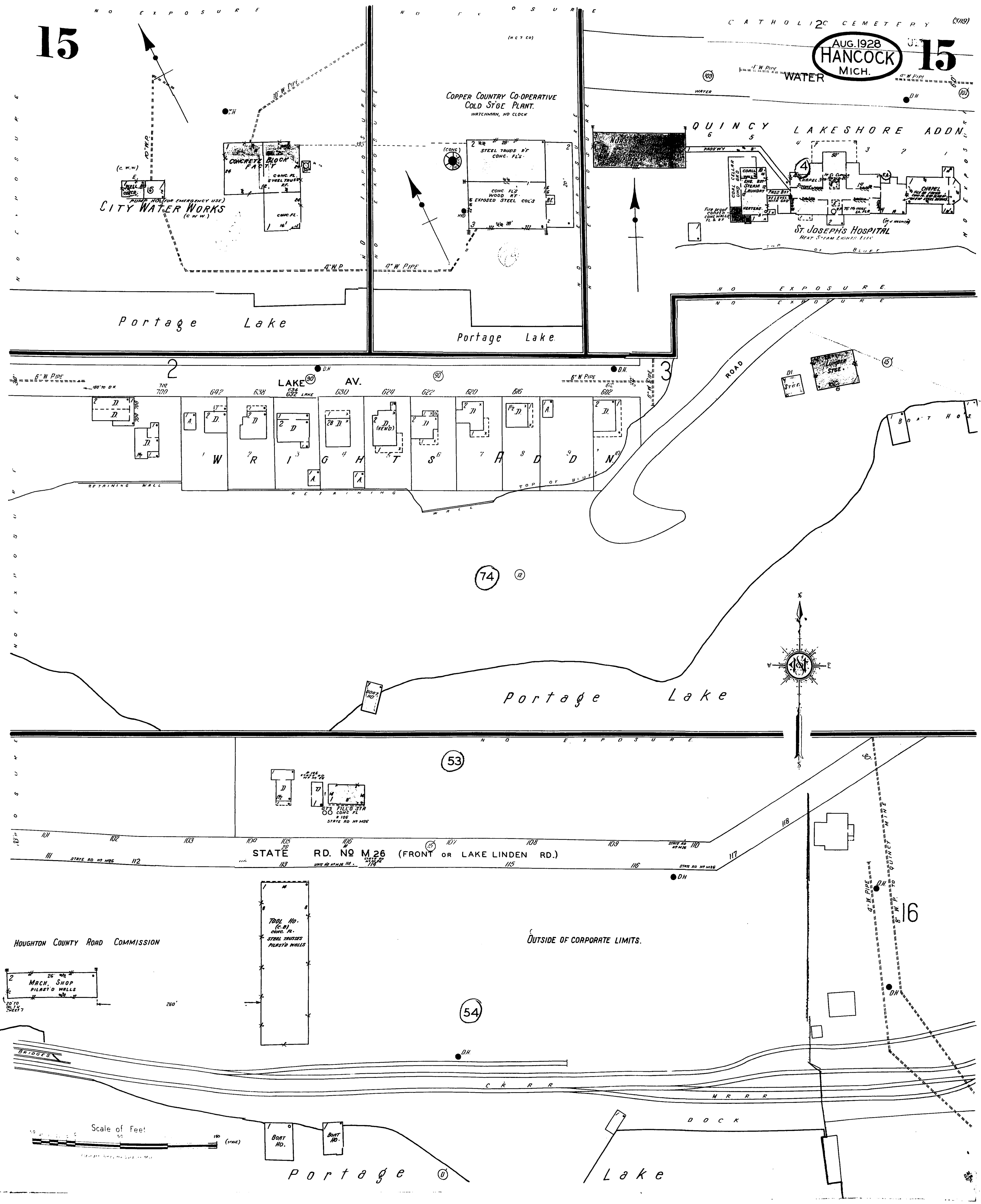
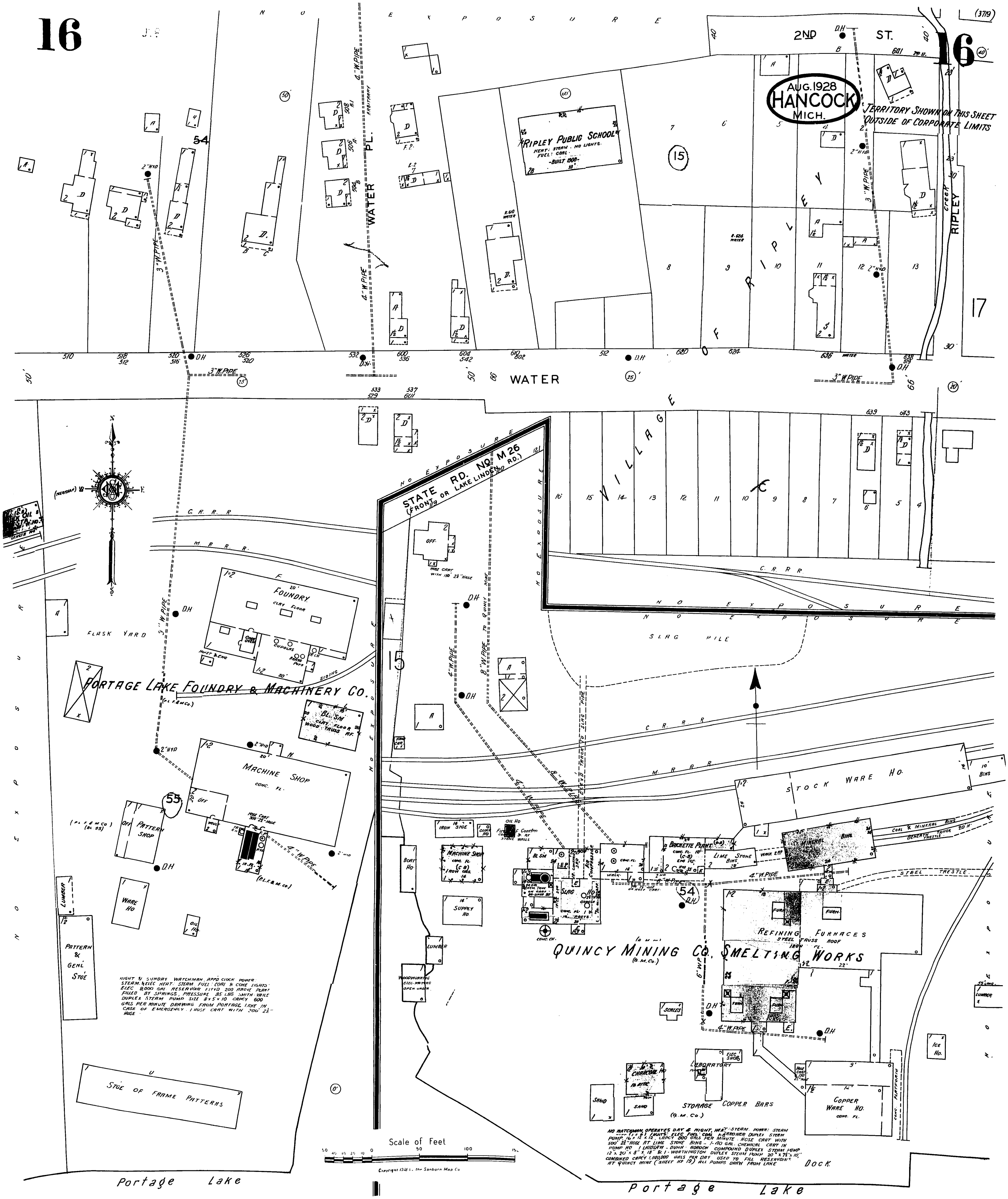
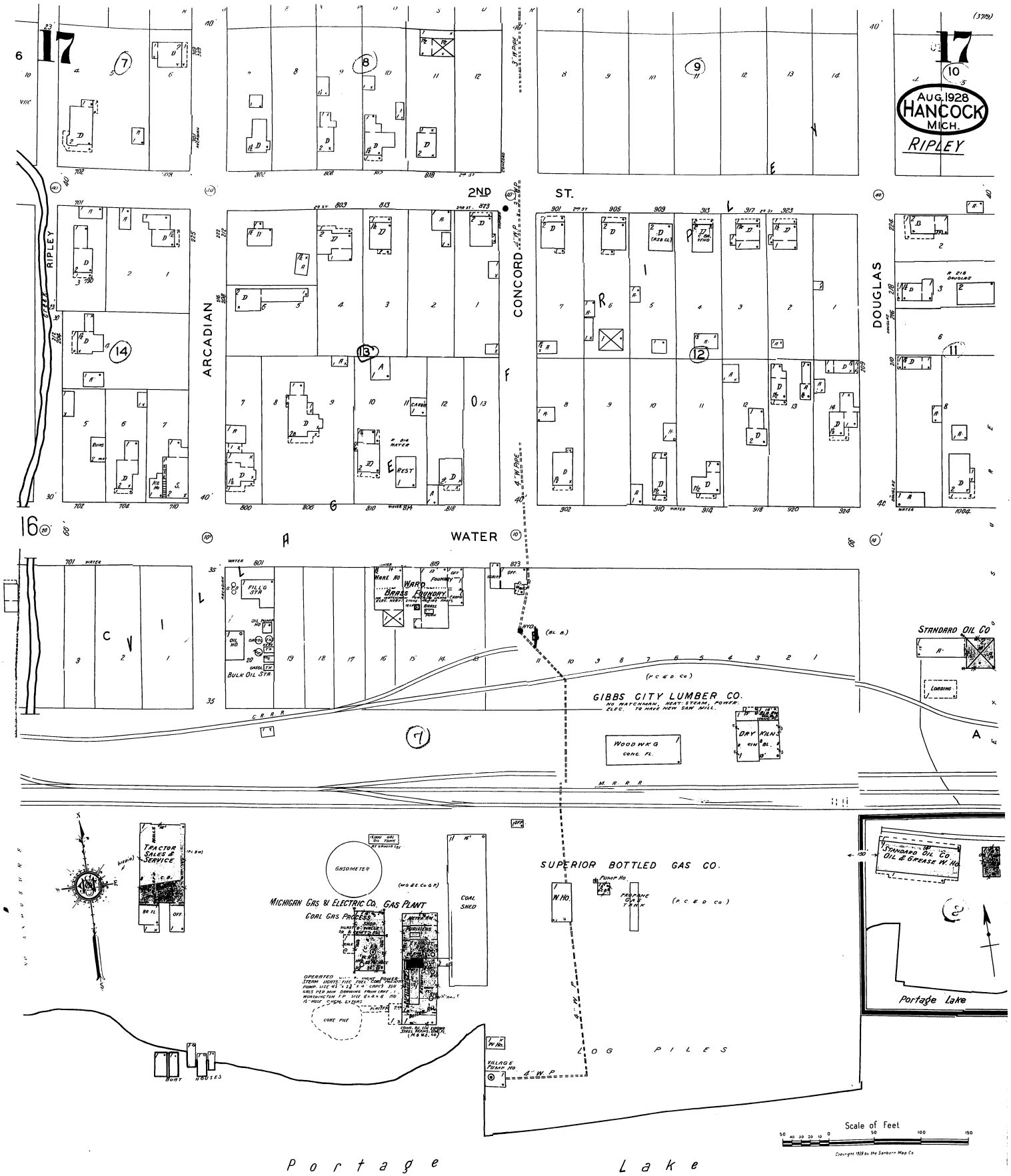
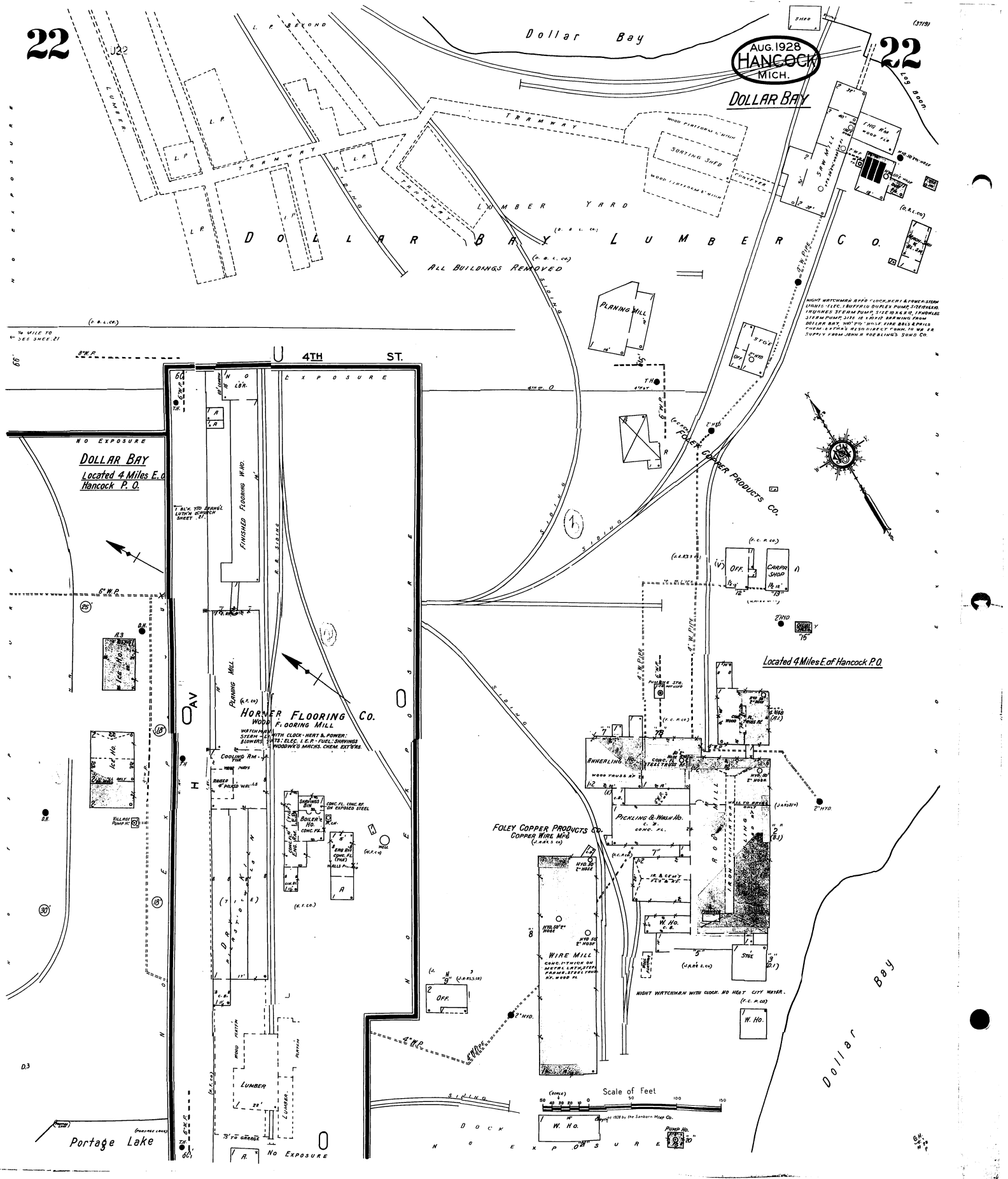

23
DOLLAR BAY
23
(3719)
AUG. 1928
HANCOCK
MICH.
ROAD
NEW ARCADIAN COPPER CO.
NEW ARCADIAN MINE
Located 5 Miles N.E of Hancock P.O.
GREEN HO.
HEATING PLANT
HIGHLAND PARK GREEN HO.
JAMES H. DALE, FLORIST
LAKE SUPERIOR STONE & BRICK CO.
BUILDINGS IN RUINS
Located 2 Miles E. of Hancock P.O.
STATE ROUTE M 26 (ROAD TO LAKE LINDEN)
Portage Lake
C. R. R. R.
Located 4 Miles E. of Hancock P.O.
M. R. R. R.
LAKE SUPERIOR IRON & METAL CO.
JUNK & AUTO STORAGE
JUNK YARD
SIDING
FUEL
PLANING MILL
LOADING PLATFORM
SAW MILL
SORTING
DOLLAR BAY LUMBER CO.
NOT IN OPERATION
PLATFORM
LUMBER TRAMWAY
NO WATCHMAN, LUMBER BEING REMOVED
NO FIRE PROTECTION
DOCK
PLATFORM AT R.R. GROUND
Portage Lake
Scale of Feet
NO EXPOSURE


MASON AV.
HARRIS AV.
COOPER AV.
VIVIAN
ALLEY
EAST
ROAD
STATE RD No 26
OUTSIDE OF CORPORATE LIMITS.
GENERAL REPAIR
HOUGHTON COUNTY ROAD COMMISSION
AUG. 1928
HANCOCK
MICH.
FILLING STA.
SYNAGOGUE
TERRITORY SHOWN ON THIS SECTION OF SHEET OUTSIDE OF CORPORATE LIMITS
STATE RD. No 26.
H. S. GOODELL & CO. - BULK OIL STATION
W. HO.
OIL HO.
BARRELED OIL WHSE. NO.
COPPER RANGE R. R. PASSENGER DEPOT
Scale of Feet
Portage Lake


15
AUG. 1928
HANCOCK
MICH.
15
NO EXPOSURE
CATHOLIC CEMETERY
WATER
QUINCY LAKESHORE ADDN.
ST. JOSEPH'S HOSPITAL
HEAT STEAM LIGHTS ELEC.
COPPER COUNTRY CO-OPERATIVE
COLD ST'GE PLANT.
WATCHMAN, NO CLOCK
STEEL TRUSS R'F
CONC. FL'S.
CONC. FL'S
WOOD RF.
EXPOSED STEEL COL'S
CONCRETE BLOCK FACT'Y
CONC. FL.
STEEL TRUSS RF.
CITY WATER WORKS
(C.W.W.)
PUMP HO. (FOR EMERGENCY USE)
10" W. PIPE
4" W. P.
4" W. PIPE
Portage Lake
Portage Lake
LAKE AV.
6" W. PIPE
6" W. PIPE
702
700
642
638
634
632 LAKE
630
624
622
620
616
612
602
WRIGHTS ADD'N
RETAINING WALL
TOP OF BLUFF
ROAD
LINDEN STGE.
BOAT HOS.
74
BOAT HO.
Portage Lake
NO EXPOSURE
53
GTS. FILL'G STN
CONC. FL
STATE RD. No M26
101
102
103
104
105
107
108
109
110
111
112
113
114
115
116
117
118
STATE RD. No M 26 (FRONT OR LAKE LINDEN RD.)
TOOL HO.
(C.B.)
CONC. FL.
STEEL TRUSSES
PILAST'D WALLS
OUTSIDE OF CORPORATE LIMITS.
HOUGHTON COUNTY ROAD COMMISSION
MACH. SHOP
PILAST'D WALLS
260'
54
4" W. PIPE
8" W. P. TO QUINCY MINE
16
C.R.R.
M.R.R.
DOCK
BRIDGES
Scale of Feet
50
150
BOAT HO.
BOAT HO.
Portage Lake
Lake


Aug. 1928
HANCOCK
MICH.
TERRITORY SHOWN ON THIS SHEET OUTSIDE OF CORPORATE LIMITS
2ND ST.
RIPLEY PUBLIC SCHOOL
HEAT: STEAM. NO LIGHTS. FUEL: COAL
BUILT 1900
WATER PL.
WATER
RIPLEY
CREEK
VILLAGE OF RIPLEY
STATE RD. NO. M 26 (FRONT OR LAKE LINDEN RD.)
C.R.R.R.
M.R.R.R.
FOUNDRY
FLASK YARD
PORTAGE LAKE FOUNDRY & MACHINERY CO.
MACHINE SHOP
PATTERN SHOP
WARE HO
OIL HO.
PATTERN & GEN'L STGE
STGE OF FRAME PATTERNS
NIGHT & SUNDAY WATCHMAN, APPD CLOCK. POWER: STEAM & ELEC. HEAT: STEAM. FUEL: COAL & COKE. LIGHTS: ELEC. 8,000 GAL. RESERVOIR ELEVD 200 ABOVE PLANT FILLED BY SPRINGS, PRESSURE 85 LBS. SMITH-VAILE DUPLEX STEAM PUMP SIZE 8 x 5 x 10 CAPCY 600 GALS PER MINUTE DRAWING FROM PORTAGE LAKE IN CASE OF EMERGENCY. 1 HOSE CART WITH 300' 2½" HOSE.
SLAG PILE
STOCK WARE HO.
BRIQUETTE PLANT
LIME STONE BINS
MINERAL BINS
COAL & MINERAL BINS
STEEL TRESTLE
REFINING FURNACES
QUINCY MINING CO. SMELTING WORKS
LABORATORY
ELEC SHOP
CHARCOAL HO
SAND
STORAGE COPPER BARS (Q.M.Co.)
COPPER WARE HO.
NO WATCHMAN, OPERATES DAY & NIGHT. HEAT: STEAM. POWER: STEAM & ELEC. LIGHTS: ELEC. FUEL: COAL. 1 GARDNER DUPLEX STEAM PUMP 16 x 12 x 12, CAPCY 800 GALS PER MINUTE. HOSE CART WITH 500' 2½" HOSE AT LIME STONE BINS. 1-40 GAL. CHEMICAL CART IN PUMP HO. 1 LAIDLAW-DUNN-GORDON COMPOUND DUPLEX STEAM PUMP 12" x 20" x 8" x 18" & 1-WORTHINGTON DUPLEX STEAM PUMP 20" x 7½" x 10", COMBINED CAPCY 1,000,000 GALS PER DAY USED TO FILL RESERVOIRS AT QUINCY MINE (SHEET No. 19) ALL PUMPS DRAW FROM LAKE
Scale of Feet
DOCK
Portage Lake


AUG. 1928
HANCOCK
MICH.
RIPLEY
2ND ST.
RIPLEY
ARCADIAN
CONCORD
DOUGLAS
WATER
WARD BRASS FOUNDRY
FILLG STA
BULK OIL STA
GIBBS CITY LUMBER CO.
NO WATCHMAN, HEAT: STEAM, POWER: ELEC. TO HAVE NEW SAW MILL.
WOODWKG
DRY KILNS
STANDARD OIL CO
LOADING
C R R
M R R R
TRACTOR SALES & SERVICE
GASOMETER
MICHIGAN GAS & ELECTRIC CO. GAS PLANT
COAL GAS PROCESS
COAL SHED
SUPERIOR BOTTLED GAS CO.
PROPANE GAS TANK
STANDARD OIL CO OIL & GREASE W. HO.
Portage Lake
LOG PILES
BOAT HOUSES
Scale of Feet
Portage Lake


22
22
Dollar Bay
AUG. 1928
HANCOCK
MICH.
DOLLAR BAY
DOLLAR BAY LUMBER CO.
LUMBER YARD
SORTING SHED
SAW MILL
TRAMWAY
ALL BUILDINGS REMOVED
PLANING MILL
4TH ST.
NO EXPOSURE
DOLLAR BAY
Located 4 Miles E. of Hancock P. O.
FINISHED FLOORING W. HO.
HORNER FLOORING CO.
WOOD FLOORING MILL
COOLING RM.
SHAVINGS BIN
BOILER HO.
ENG. RM.
LUMBER
FOLEY COPPER PRODUCTS CO.
COPPER WIRE MFG
ANNEALING HO.
PICKLING & WASH HO.
WIRE MILL
W. HO.
OFF.
CARPR. SHOP
NIGHT WATCHMAN WITH CLOCK. NO HEAT. CITY WATER.
Portage Lake
Dollar Bay
DOCK
NO EXPOSURE
Scale of Feet
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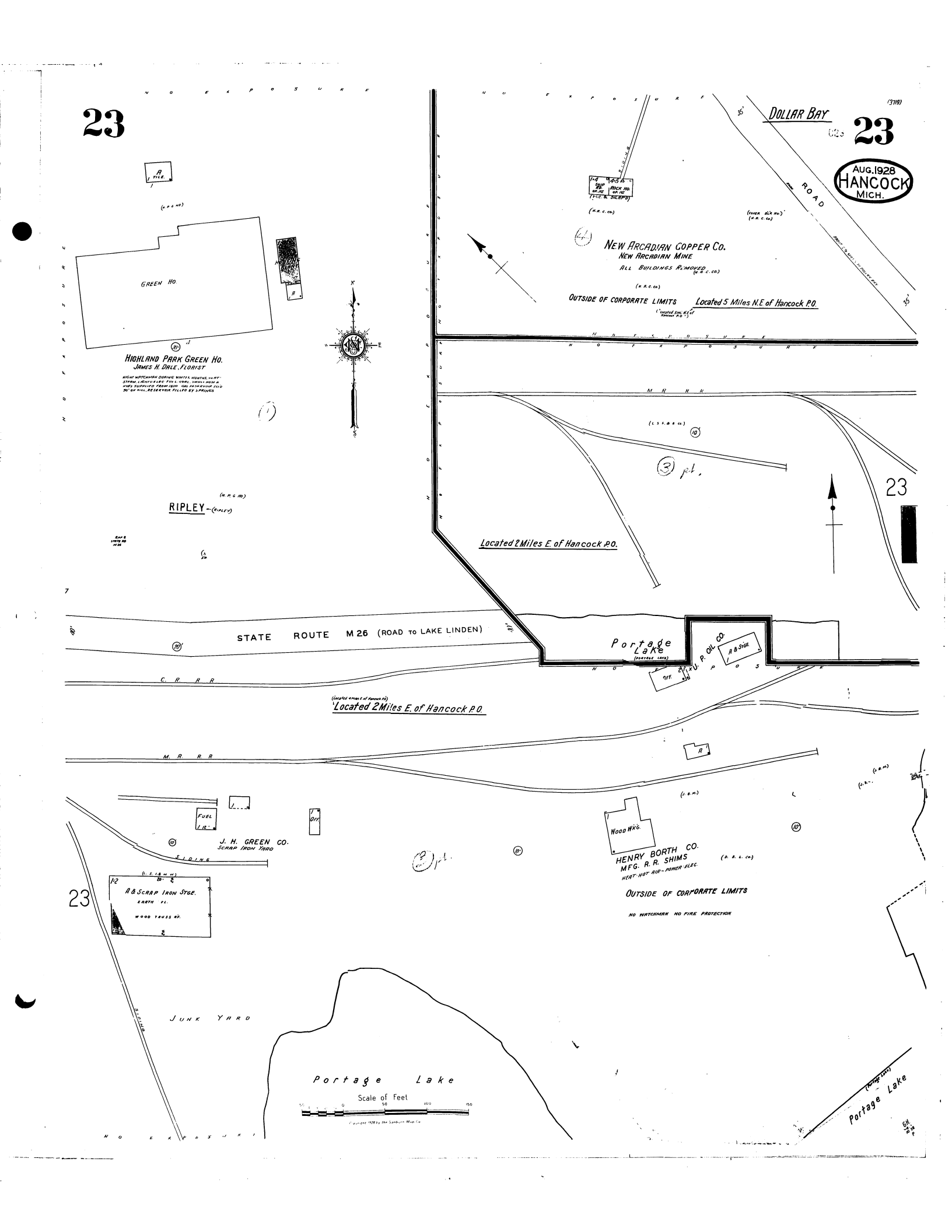
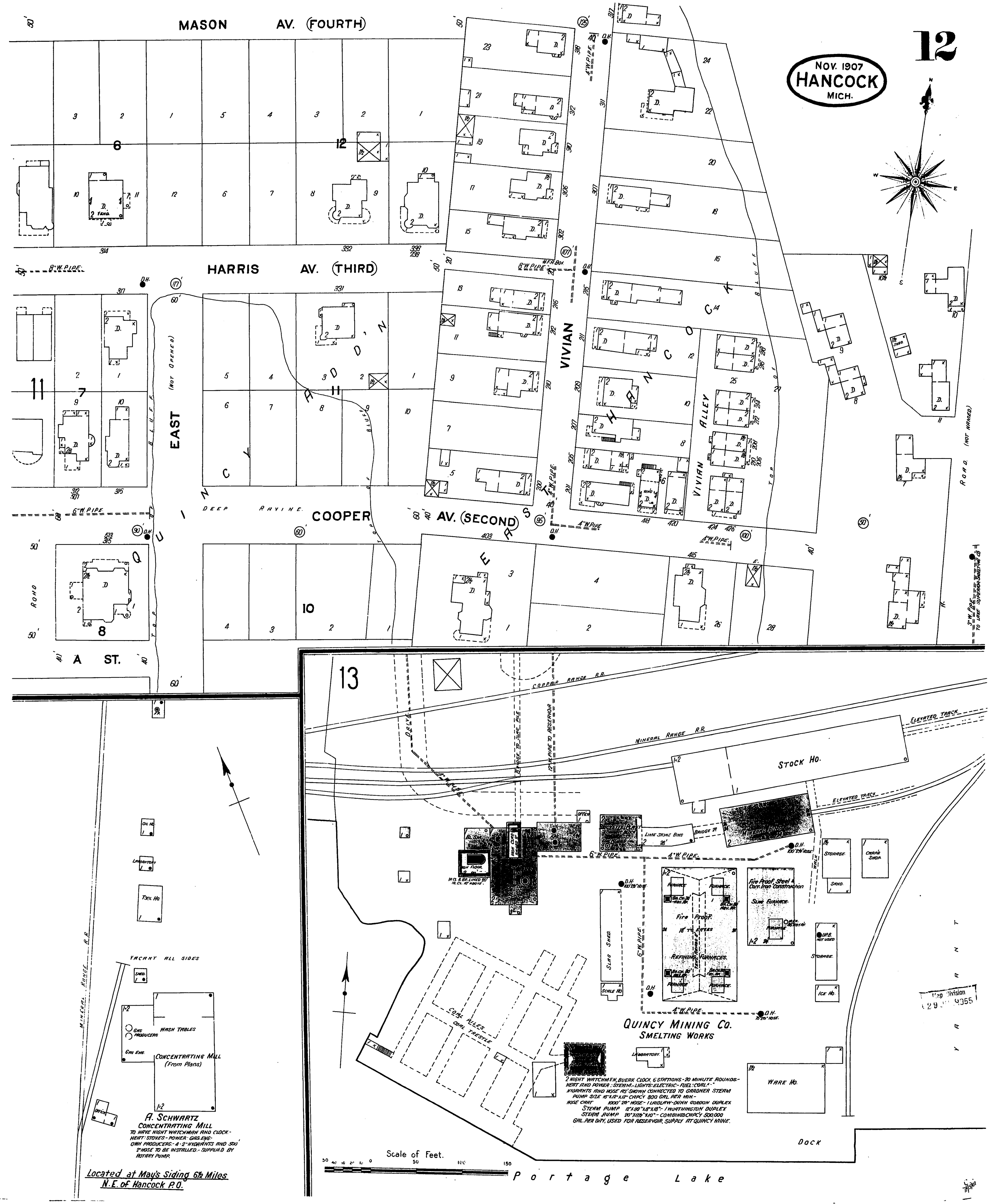
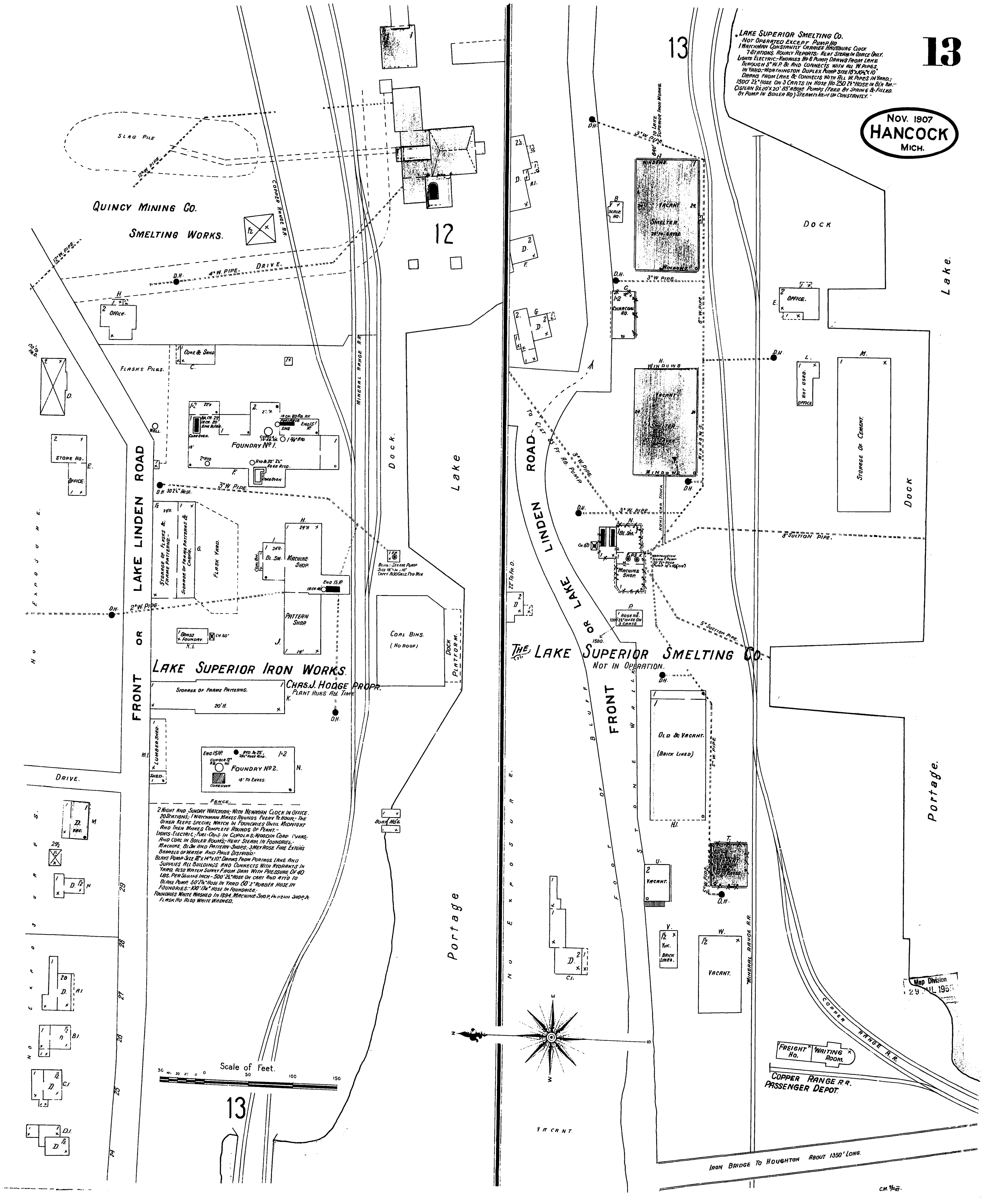
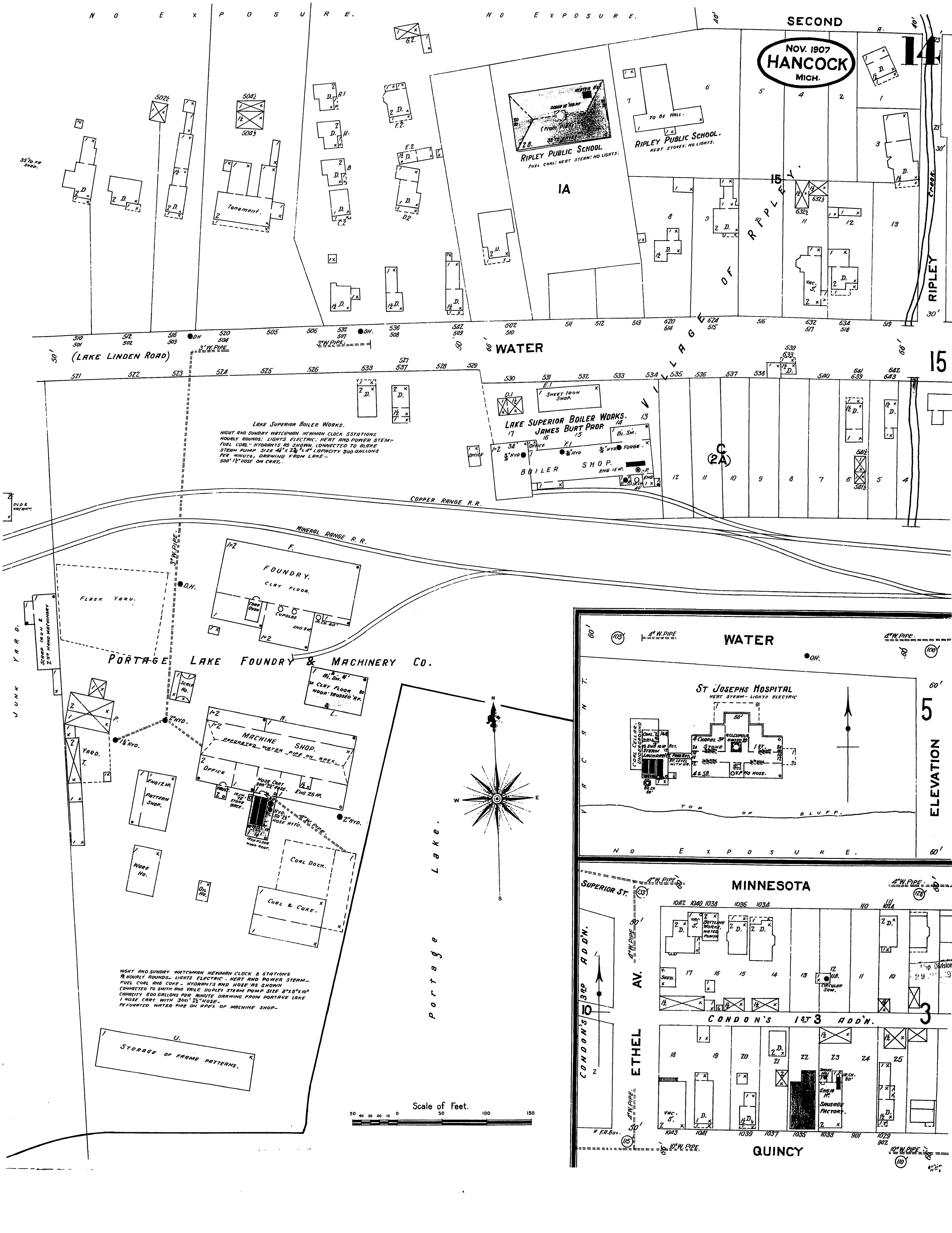
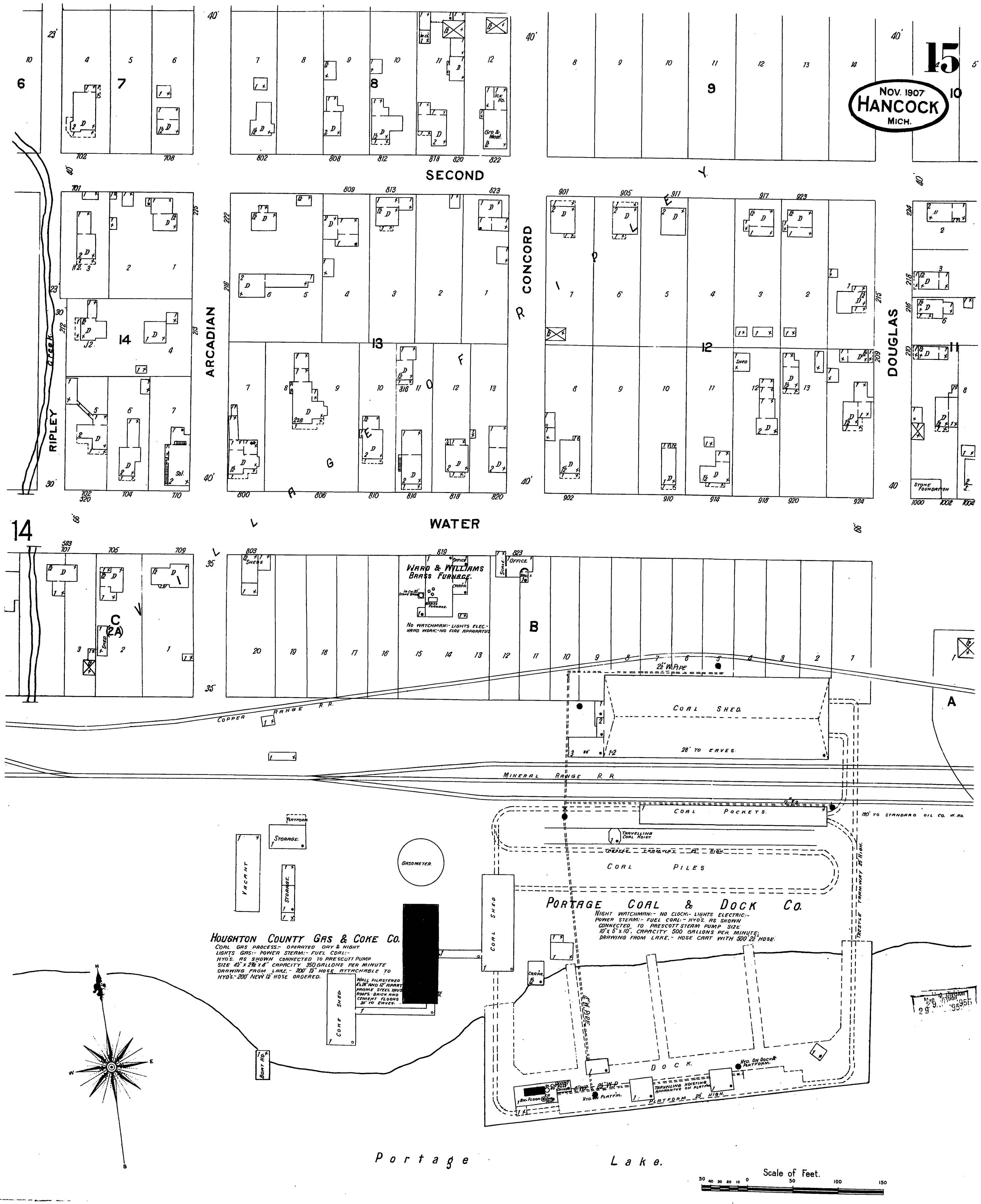

23
(3719)
DOLLAR BAY
23
AUG. 1928
HANCOCK
MICH.
ROAD
NEW ARCADIAN COPPER CO.
NEW ARCADIAN MINE
ALL BUILDINGS REMOVED
OUTSIDE OF CORPORATE LIMITS
Located 5 Miles N.E of Hancock P.O.
HIGHLAND PARK GREEN HO.
JAMES H. DALE, FLORIST
GREEN HO.
RIPLEY
Located 2 Miles E. of Hancock P.O.
STATE ROUTE M 26 (ROAD TO LAKE LINDEN)
C. R. R. R.
M. R. R. R.
Portage Lake
(PORTAGE LAKE)
U. P. OIL CO.
A & STGE.
OFF.
FUEL
J. H. GREEN CO.
SCRAP IRON YARD
SIDING
A & SCRAP IRON STGE.
EARTH FL.
WOOD TRUSS RF.
JUNK YARD
HOOD WKG.
HENRY BORTH CO.
MFG. R. R. SHIMS
HEAT-HOT AIR-POWER-ELEC.
OUTSIDE OF CORPORATE LIMITS
NO WATCHMAN NO FIRE PROTECTION
Portage Lake
Scale of Feet
0 50 100 150
Copyright 1928 by the Sanborn Map Co.
Portage Lake
NO EXPOSURE

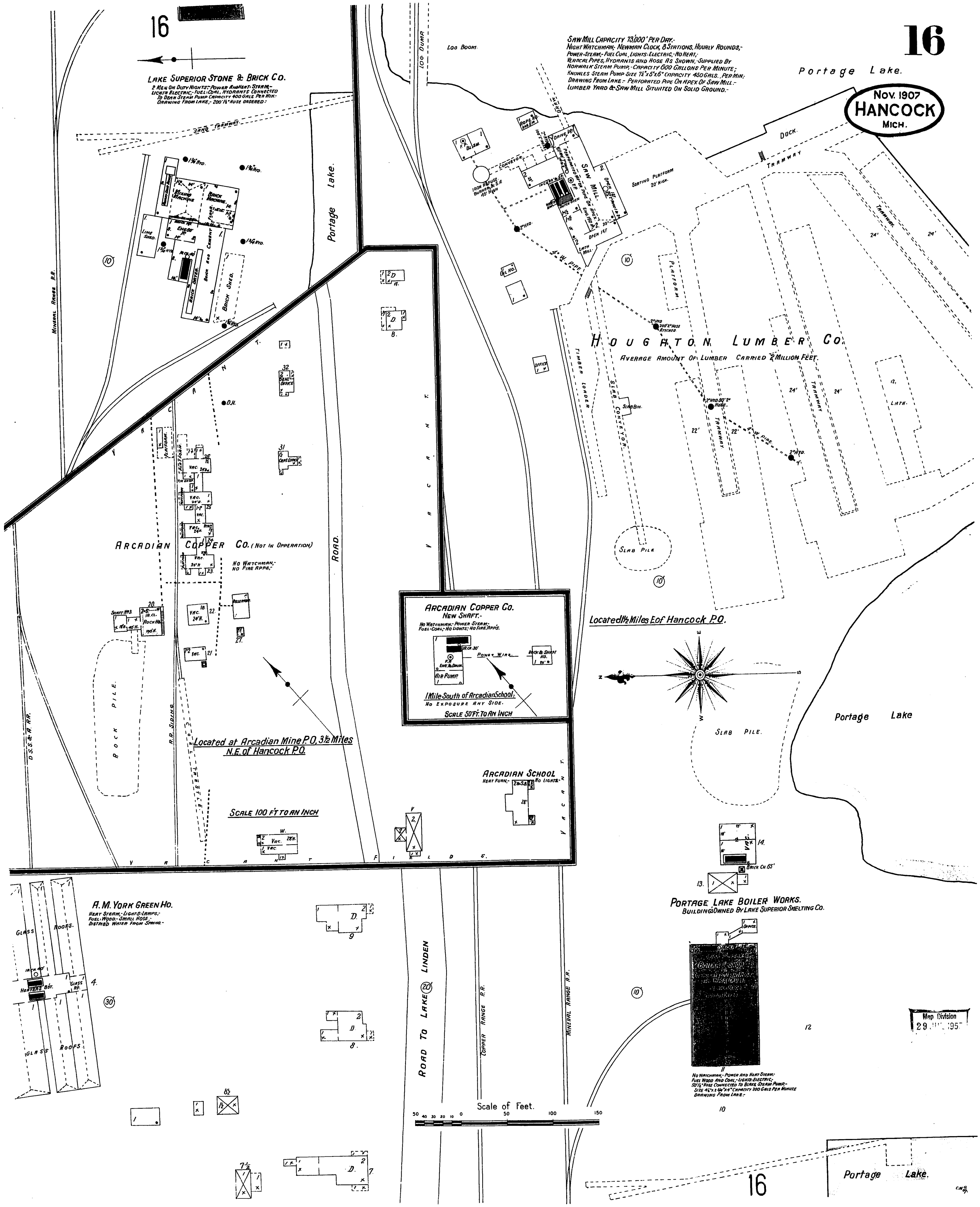

12
NOV. 1907
HANCOCK
MICH.
MASON AV. (FOURTH)
HARRIS AV. (THIRD)
COOPER AV. (SECOND)
A ST.
EAST
VIVIAN
VIVIAN ALLEY
QUINCY ADDN. 11
EAST HANCOCK
DEEP RAVINE
MINERAL RANGE R.R.
COPPER RANGE R.R.
ELEVATED TRACK
STOCK HO.
LIME STONE BINS
SLAG SHED
SCALE HO
STORAGE
LABORATORY.
WARE HO.
DOCK
ICE HO.
QUINCY MINING CO.
SMELTING WORKS
2 NIGHT WATCHMEN, BUERK CLOCK, 6 STATIONS.-20 MINUTE ROUNDS.-
HEAT AND POWER: STEAM.-LIGHTS: ELECTRIC.-FUEL: COAL.
HYDRANTS AND HOSE AS SHOWN CONNECTED TO GARDNER STEAM
PUMP SIZE 16"X12"X12" CAPCY 800 GAL. PER MIN.-
HOSE CART 1000' 2½" HOSE:- 1 LAIDLAW-DUNN GORDON DUPLEX
STEAM PUMP 12"X20"X8"X18":- 1 WORTHINGTON DUPLEX
STEAM PUMP 20"X17½"X10":- COMBINED CAPCY 500,000
GAL. PER DAY, USED FOR RESERVOIR, SUPPLY AT QUINCY MINE.
Scale of Feet.
Portage Lake
VACANT ALL SIDES
WASH TABLES
GAS PRODUCERS
GAS ENG.
CONCENTRATING MILL
(From Plans)
Office
A. SCHWARTZ
CONCENTRATING MILL
TO HAVE NIGHT WATCHMAN AND CLOCK.-
HEAT: STOVES.-POWER: GAS ENG.-
OWN PRODUCERS.- 4-2" HYDRANTS AND 500'
2" HOSE TO BE INSTALLED.- SUPPLIED BY
ROTARY PUMP.
Located at May's Siding 6½ Miles
N.E. of Hancock P.O.
13

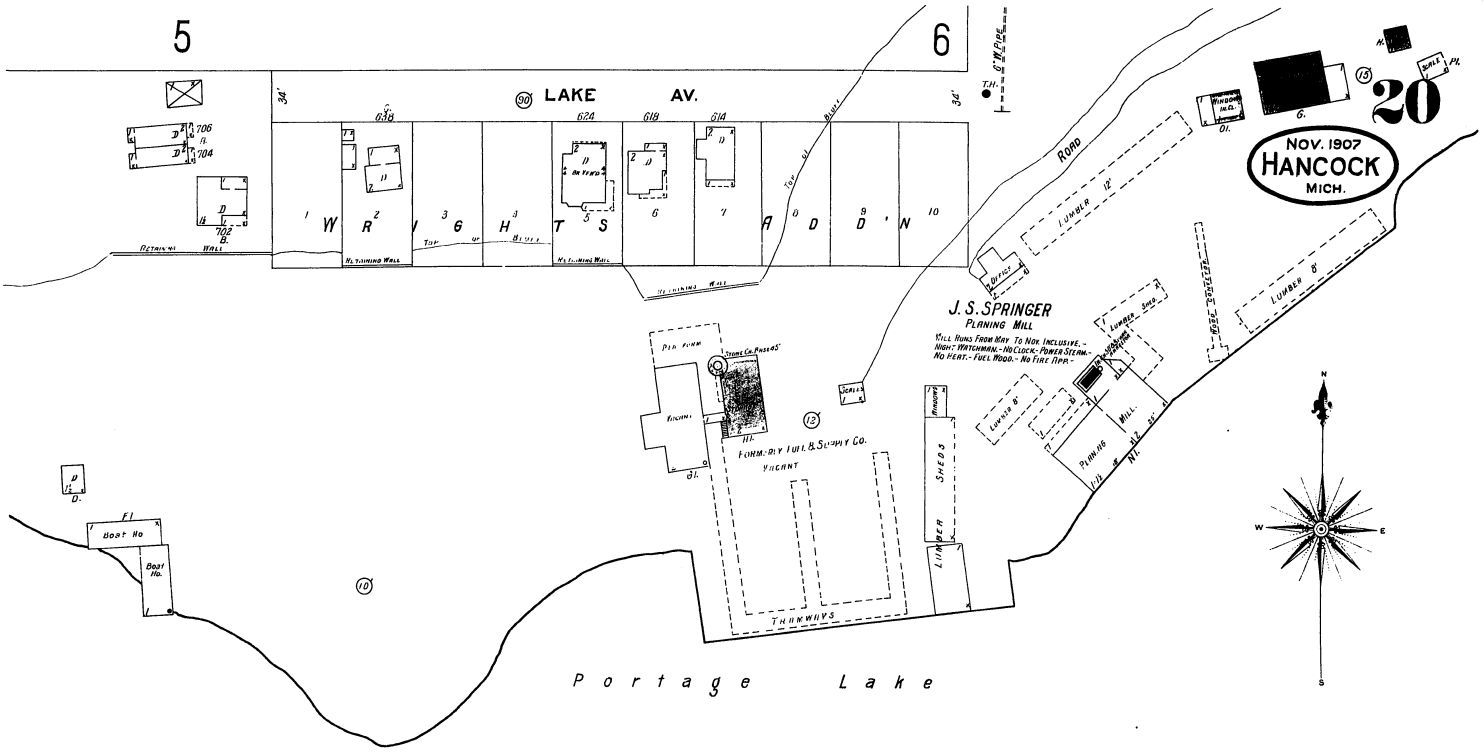

13
Nov. 1907
HANCOCK
MICH.
LAKE SUPERIOR SMELTING CO.
NOT OPERATED EXCEPT PUMP HO
1 WATCHMAN CONSTANTLY CARRIES HAUSBURG CLOCK
7 STATIONS. HOURLY REPORTS.- HEAT STEAM IN OFFICE ONLY.
LIGHTS ELECTRIC.-KNOWLES Nº 8 PUMP, DRAWS FROM LAKE
THROUGH 5" W.P. & AND CONNECTS WITH ALL W. PIPES.
IN YARD.-WORTHINGTON DUPLEX PUMP SIZE 18"X10½"X10"
DRAWS FROM LAKE & CONNECTS WITH ALL W. PIPES IN YARD.-
1500' 2½" HOSE ON 3 CARTS IN HOSE HO. 250 2½" HOSE IN BLR RM.-
CISTERN 9'X20'X20' 85' ABOVE PUMPS (FEED BY SPRING & FILLED.
BY PUMP IN BOILER HO) STEAM IS KEPT UP CONSTANTLY.
QUINCY MINING CO.
SMELTING WORKS.
SLAG PILE
DRIVE.
OFFICE
FOUNDRY Nº 1.
MACHINE SHOP.
PATTERN SHOP
FLASK YARD.
BRASS FOUNDRY.
LAKE SUPERIOR IRON WORKS.
CHAS. J. HODGE PROPR.
PLANT RUNS ALL TIME.
STORAGE OF FRAME PATTERNS.
FOUNDRY Nº 2.
18' TO EAVES.
FENCE.
2 NIGHT AND SUNDAY WATCHMAN;- WITH NEWMAN CLOCK IN OFFICE.
20 STATIONS;- 1 WATCHMAN MAKES ROUNDS EVERY ½ HOUR,- THE
OTHER KEEPS SPECIAL WATCH IN FOUNDRIES UNTIL MIDNIGHT
AND THEN MAKES COMPLETE ROUNDS OF PLANT.-
LIGHTS-ELECTRIC.; FUEL-COKE IN CUPOLAS; WOOD IN CORE OVENS;
AND COAL IN BOILER ROOMS;- HEAT STEAM IN FOUNDRIES,-
MACHINE, BL. SM. AND PATTERN-SHOPS;- 3 MEYROSE FIRE EXTGR'S
BARRELS OF WATER AND PAILS DISTRIB'D.-
BLAKE PUMP SIZE 18"X14"X10". DRAWS FROM PORTAGE LAKE AND
SUPPLIES ALL BUILDINGS AND CONNECTS WITH HYDRANTS IN
YARD, ALSO WATER SUPPLY FROM DAM WITH PRESSURE OF 40
LBS. PER SQUARE INCH.- 500' 2½" HOSE ON CART AND ATT'D TO
BLAKE PUMP. 50' 2½" HOSE IN YARD 60' 2" RUBBER HOSE IN
FOUNDRIES.- 100' 1¼" HOSE IN FOUNDRIES.-
FOUNDRIES WHITE WASHED IN 1894. MACHINE SHOP, PATTERN SHOP, &
FLASK HO ALSO WHITE WASHED.
FRONT OR LAKE LINDEN ROAD
COPPER RANGE R.R.
MINERAL RANGE R.R.
DOCK
COAL BINS. (NO ROOF)
Lake
Portage
12
13
Scale of Feet.
THE LAKE SUPERIOR SMELTING CO.
NOT IN OPERATION.
SMELTER
CHARCOAL HO.
MACHINE SHOP.
OFFICE
STORAGE OF CEMENT.
OLD & VACANT. (BRICK LINED)
VACANT.
FREIGHT HO.
WAITING ROOM.
COPPER RANGE R.R. PASSENGER DEPOT.
IRON BRIDGE TO HOUGHTON ABOUT 1350' LONG.
BLUFF OF FOOT STONE WALL
NO EXPOSURE
Map Division
29 JUL 1957

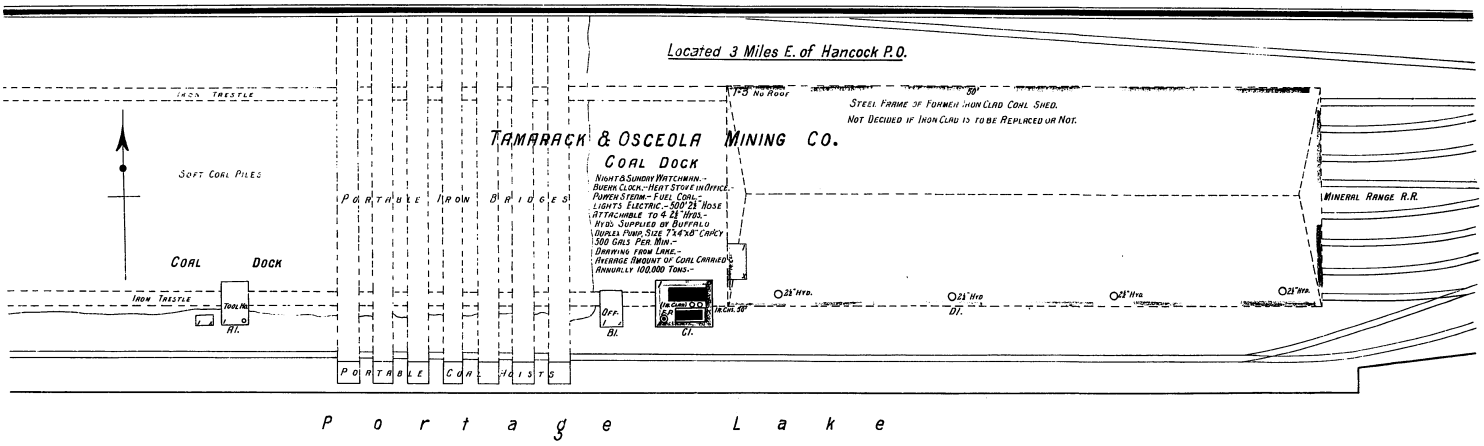


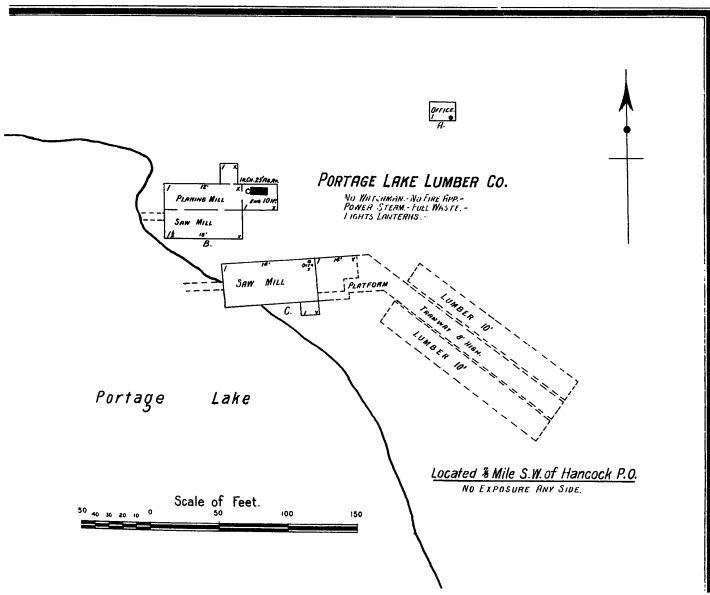
NOV. 1907
HANCOCK
MICH.
14
SECOND
NO EXPOSURE.
NO EXPOSURE.
RIPLEY PUBLIC SCHOOL
FUEL COAL: HEAT STEAM: NO LIGHTS.
RIPLEY PUBLIC SCHOOL.
HEAT STOVES: NO LIGHTS.
TO BE HALL.
1A
Tenement.
VILLAGE OF RIPLEY
RIPLEY
Creek
WATER
(LAKE LINDEN ROAD)
3"W.PIPE
15
LAKE SUPERIOR BOILER WORKS.
NIGHT AND SUNDAY WATCHMAN NEWMAN CLOCK 5 STATIONS HOURLY ROUNDS: LIGHTS ELECTRIC: HEAT AND POWER STEAM: FUEL COAL: HYDRANTS AS SHOWN, CONNECTED TO BLAKE STEAM PUMP SIZE 4½" x 2¾" x 4" CAPACITY 300 GALLONS PER MINUTE, DRAWING FROM LAKE: 500' 1½" HOSE ON CART.
LAKE SUPERIOR BOILER WORKS.
JAMES BURT PROP.
SHEET IRON SHOP.
BOILER SHOP.
FORGE
OFFICE
C
(2A)
COPPER RANGE R.R.
MINERAL RANGE R.R.
FOUNDRY.
CLAY FLOOR.
CUPOLAS
FLASK YARD.
JUNK YARD.
SCRAP IRON & 2ND HAND MACHINERY
PORTAGE LAKE FOUNDRY & MACHINERY CO.
CLAY FLOOR WOOD TRUSSED RF.
SCALE HO.
MACHINE SHOP.
PERFORATED WATER PIPE ON APEX.
Office
ENG 25 HP.
PATTERN SHOP.
ENG 12 HP.
WARE HO.
OIL HO.
COAL DOCK.
COAL & COKE.
NIGHT AND SUNDAY WATCHMAN NEWMAN CLOCK 8 STATIONS ½ HOURLY ROUNDS: LIGHTS ELECTRIC: HEAT AND POWER STEAM: FUEL COAL AND COKE: HYDRANTS AND HOSE AS SHOWN CONNECTED TO SMITH AND VAILE DUPLEX STEAM PUMP SIZE 8"x5"x10" CAPACITY 600 GALLONS PER MINUTE DRAWING FROM PORTAGE LAKE 1 HOSE CART WITH 300' 2½" HOSE: PERFORATED WATER PIPE ON APEX OF MACHINE SHOP.
STORAGE OF FRAME PATTERNS.
Portage Lake.
Scale of Feet.
50 40 30 20 10 0 50 100 150
WATER
4"W.PIPE
ST JOSEPHS HOSPITAL
HEAT STEAM: LIGHTS ELECTRIC
COAL CELLAR UNDERGROUND
STEAM LAUNDRY
TOP OF BLUFF.
NO EXPOSURE.
5
ELEVATION
VACANT
MINNESOTA
SUPERIOR ST.
BOTTLING WORKS
CIRCULAR SAW
CONDON'S 1ST 3 ADD'N.
CONDON'S 3RD ADD'N.
ETHEL AV.
10
3
SAUSAGE FACTORY.
QUINCY
10"W.PIPE

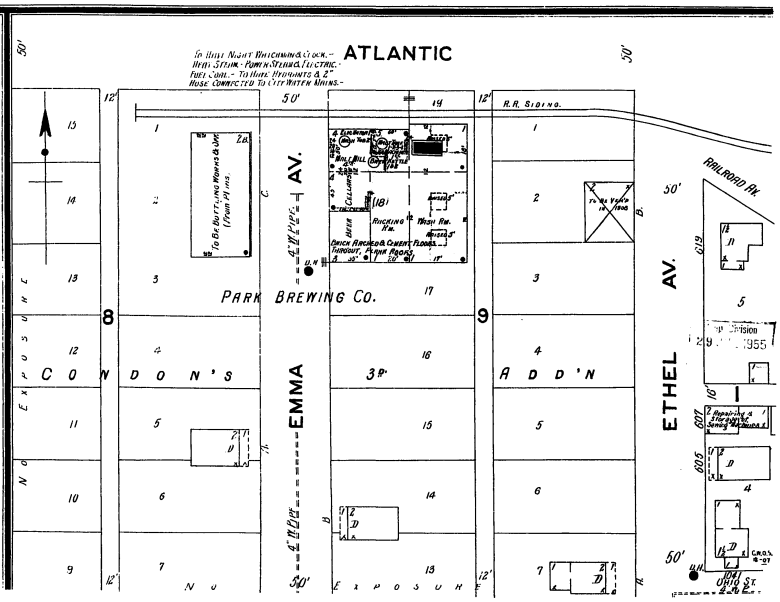

15
Nov. 1907
Hancock
Mich.
Second
Water
Concord
Arcadian
Douglas
Ripley
Creek
Ward & Williams
Brass Furnace
No watchman:- lights elec.- hand work - no fire apparatus
Copper Range R.R.
Mineral Range R.R.
Coal Shed
28' to eaves
Coal Pockets
Travelling Coal Hoist
Coal Piles
Gasometer
Vacant
Storage
Platform
Portage Coal & Dock Co.
Night watchman:- no clock - lights electric:- power steam:- fuel coal:- hyd's. as shown connected to Prescott steam pump size 10" x 5" x 10". Capacity 500 gallons per minute; drawing from lake.- hose cart with 500' 2½" hose.
Houghton County Gas & Coke Co.
Coal gas process:- operated day & night. Lights gas:- power steam:- fuel coal:- hyd's. as shown connected to Prescott pump size 4½" x 2¾" x 4" capacity 350 gallons per minute drawing from lake.- 200' 1½" hose attachable to hyd's.- 200' new 1½" hose ordered.
Coke Shed
Boat Ho.
Dock
Platform 24' high
Stone Foundation
Portage Lake.
Scale of Feet.

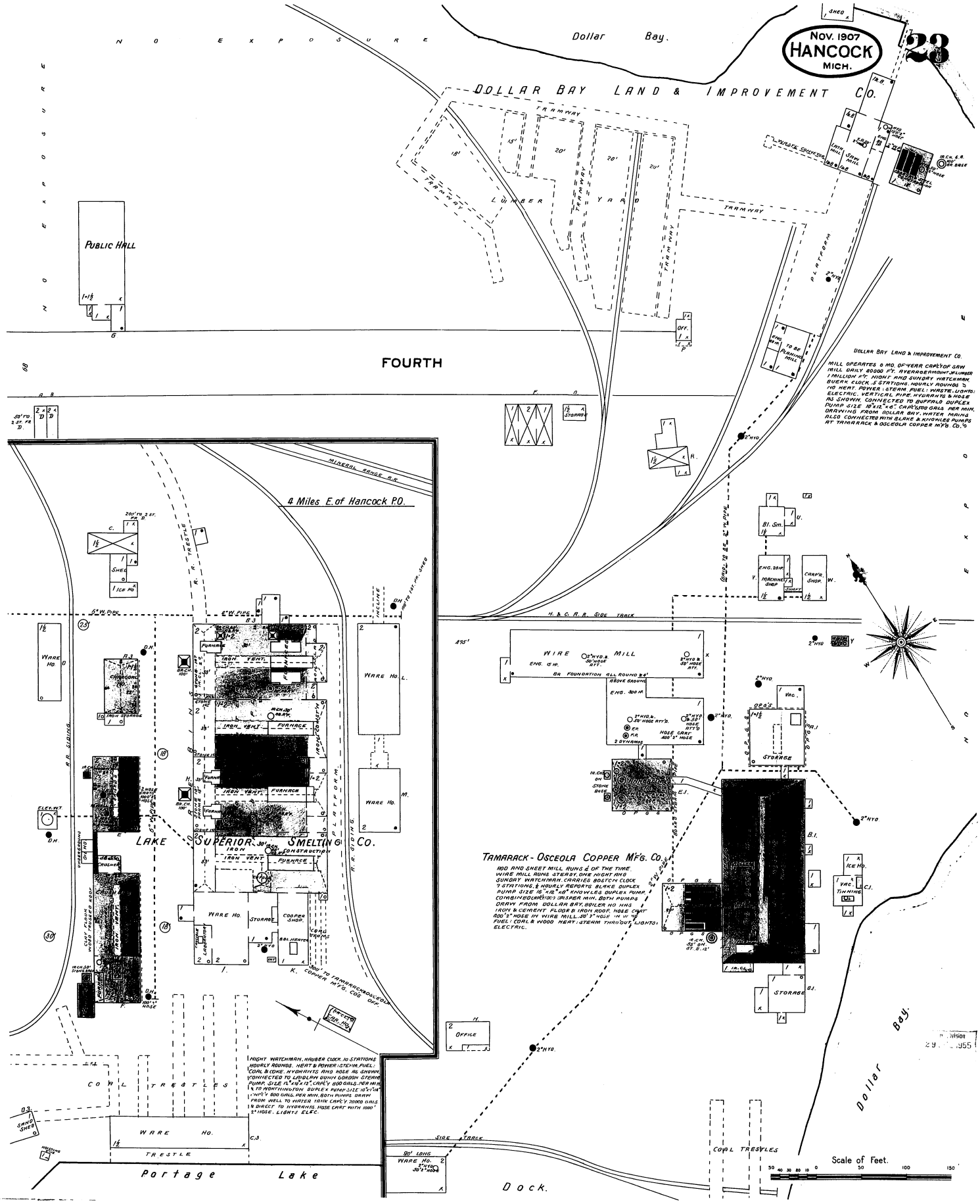

16
Nov. 1907
HANCOCK
MICH.
Portage Lake.
Saw Mill Capacity 73,000' Per Day.-
Night Watchman; Newman Clock, 8 Stations, Hourly Rounds,-
Power-Steam,- Fuel Coal, Lights: Electric,- No Heat,-
Vertical Pipes, Hydrants and Hose As Shown,- Supplied By
Norwalk Steam Pump,- Capacity 600 Gallons Per Minute;-
Knowles Steam Pump Size 7½"x5"x6" Capacity 450 Gals. Per Min;
Drawing From Lake.- Perforated Pipe On Apex Of Saw Mill.-
Lumber Yard & Saw Mill Situated On Solid Ground.-
Log Boom.
Log Dump
Lake Superior Stone & Brick Co.
Sand Tramway
Portage Lake.
Mineral Range R.R.
Lime Shed.
Brick Machine
Brick Dryer
Brick Shed.
Saw Mill
Sorting Platform 20' High.
Dock.
Tramway
Platform
Houghton Lumber Co.
Average Amount Of Lumber Carried 2 Million Feet.
Timber Loader
Slab Conveyor
Slab Bin.
Slab Pile
Lath.
Office
Arcadian Copper Co. (Not In Opperation)
No Watchman,-
No Fire Apps.-
Road.
Vacant
Arcadian Copper Co.
New Shaft.-
No Watchman;- Power Steam;-
Fuel-Coal;- No Lights; No Fire Apps.
Air Pump
Power Wire.
1 Mile South of Arcadian School.-
No Exposure Any Side.
Scale 50 Ft. To An Inch
Located 1½ Miles E. of Hancock P.O.
Portage Lake
Slab Pile.
Rock Pile.
D.S.S.&A. RR.
R.R. Siding
Located at Arcadian Mine P.O. 3½ Miles
N.E. of Hancock P.O.
Scale 100 Ft. To An Inch
Arcadian School
Heat Furn.- No Lights.-
Vacant Fields.
A. M. York Green Ho.
Heat Steam;- Lights Lamps;-
Fuel Wood.- Small Hose.-
Distrib'd Water From Spring.-
Glass Roofs.
Heaters Bst.
Road To Lake Linden
Copper Range R.R.
Mineral Range R.R.
Portage Lake Boiler Works.
Buildings Owned By Lake Superior Smelting Co.
Office.
Brick Ch. 65'
No Watchman;- Power And Heat Steam;-
Fuel Wood And Coal;- Lights Electric;
Scale of Feet.
Map Division
Portage Lake.
16


5
6
LAKE AV.
WRIGHTS ADD'N
J. S. SPRINGER
PLANING MILL
Portage Lake
20
NOV. 1907
HANCOCK
MICH.


Located 3 Miles E. of Hancock P.O.
TAMARACK & OSCEOLA MINING CO.
COAL DOCK
Portage Lake


PORTAGE LAKE LUMBER CO.
Portage Lake
Located ¾ Mile S.W. of Hancock P.O.
NO EXPOSURE ANY SIDE.
Scale of Feet.


ATLANTIC
PARK BREWING CO.
EMMA AV.
ETHEL AV.
RAILROAD AV.
R.R. SIDING.


NOV. 1907
HANCOCK
MICH.
23
NO EXPOSURE
Dollar Bay.
DOLLAR BAY LAND & IMPROVEMENT CO.
TRAMWAY
LUMBER YARD
PUBLIC HALL
FOURTH
4 Miles E. of Hancock P.O.
MINERAL RANGE R.R.
H. & C. R.R. SIDE TRACK
WIRE MILL
ROD AND SHEET MILL RUNS 1/2 OF THE TIME.
WIRE MILL RUNS STEADY, ONE NIGHT AND SUNDAY WATCHMAN. CARRIES BOSTON CLOCK 7 STATIONS, 8 HOURLY REPORTS. BLAKE DUPLEX PUMP SIZE 16"x8"x8" AND W.L.E.S. DUPLEX PUMP COMBINED CAP'Y 1200 GRISSER MIN. BOTH PUMPS DRAW FROM DOLLAR BAY, BOILER NO. HAS IRON & CEMENT FLOOR & IRON ROOF. HOSE CART 600 2" HOSE IN WIRE MILL...30 2" HOSE IN W. HO. FUEL: COAL & WOOD. HEAT: STEAM THROUT. LIGHTS: ELECTRIC.
DOLLAR BAY LAND & IMPROVEMENT CO.
MILL OPERATES 6 MO. OF YEAR CAP'Y OF SAW MILL DAILY 80000 FT. AVERAGE AMOUNT OF LUMBER 1 MILLION FT. NIGHT AND SUNDAY WATCHMAN BUERK CLOCK 5 STATIONS. HOURLY ROUNDS. NO HEAT. POWER: STEAM. FUEL: WASTE. LIGHTS: ELECTRIC. VERTICAL PIPE. HYDRANTS & HOSE AS SHOWN. CONNECTED TO BUFFALO DUPLEX PUMP SIZE 18"x12"x6". CAP'Y 3500 GALS PER MIN. DRAWING FROM DOLLAR BAY. WATER MAINS ALSO CONNECTED WITH BLAKE & KNOWLES PUMPS AT TAMARACK & OSCEOLA COPPER MF'G. CO.'S
TAMARACK - OSCEOLA COPPER MF'G. CO.
LAKE SUPERIOR SMELTING CO.
NIGHT WATCHMAN, HAUBER CLOCK, 10 STATIONS HOURLY ROUNDS. HEAT & POWER: STEAM. FUEL: COAL & COKE. HYDRANTS AND HOSE AS SHOWN. CONNECTED TO LAIDLAW DUNN GORDON STEAM PUMP, SIZE 15"x8"x12" CAP'Y 400 GALS. PER MIN. & TO MONTINGTON DUPLEX PUMP SIZE 10"x11"x8" SUPPLY 600 GALS. PER MIN. BOTH PUMPS DRAW FROM WELL TO WATER TANK CAP'Y 30000 GALS. & DIRECT TO HYDRANTS. HOSE CART WITH 1000' 2" HOSE. LIGHTS ELEC.
COAL TRESTLES
Portage Lake
Dock.
Dollar Bay.
Scale of Feet.
0 50 40 30 20 10 0 50 100 150