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30th Anniversary

February 2, 2004

VIA E-MAIL AND OVERNIGHT MAIL

Mr. Constantine G. Tjoumas, P.E.
Director, Division of Dam Safety & Inspections
Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, N.E., Routing Code: PJ-13
Washington, DC 20426

**Subject: Silver Lake Dam (P-10855)
FERC Independent Consultants Review Panel Report
Comments of MWH Americas, Inc.**

Dear Mr. Tjoumas:

Introduction

MWH Americas, Inc. ("MWH"), which designed the facilities constructed at Silver Lake in 2002, has reviewed the Independent Consultants Review Panel Report filed with FERC on December 18, 2003 ("Panel Report"). We appreciate that the Panel had to consider a substantial amount of information in a limited time period, and we commend its efforts. However, we believe that some of the Panel's conclusions, particularly as to "root cause," do not follow from the information available to the Panel. We therefore offer the following comments on critical issues, on behalf of MWH.

The Panel Report Confirms the Adequacy of the Fuse Plug Design

At page 49, the Panel notes that the MWH design of the fuse plug embankment was "consistent with conventional practice," and that the design enhancement of including a shell zone was not a deficiency or contributing factor in the erosion of the fuse plug. Moreover, at page 50, the Panel correctly concludes that the fuse plug embankment behaved as designed. This is a critical point. By their nature, fuse plugs are

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designed to erode in conditions of extreme high water, and cannot differentiate high water that results from exceptional, short-term precipitation events from high water that results from operational errors and omissions over a three-week span, as in the May 2003 event.

The adequacy of the design is further substantiated by the extensive and continuing involvement and specific approvals by FERC's Division of Dam Safety and Inspections over the course of the project. The FERC engineering staff has tremendous experience, expertise, and objectivity. Its well-documented approvals, endorsements, and professional engineering recommendations from concept to completion confirm the soundness of the Silver Lake design.

The Panel Report Accurately Notes That, But For Critical Operational Errors and Omissions, the Fuse Plug Would Not Have Released

Both the FERC license and the MWH design are premised on the owner's active operation of the reservoir. The necessary operational tasks were simple and obvious, but the system was never intended to be entirely passive. For example, the FERC license prescribed maximum and minimum water levels and minimum flow and monitoring requirements: complying with the license would therefore entail ongoing monitoring and operational adjustments. Similarly, the new facilities were designed for the fuse plug to erode if the reservoir level exceeded the invert elevation of the pilot channel.

In addition to the clear legal obligations of its FERC license, as the owner and operator of the Silver Lake Reservoir, UPPCO had a duty to downstream riparians and the general public to operate the reservoir to avoid overfilling. To guard against overfilling, the stoplogs should have been removed – as a baseline condition – to 1482.5 feet. This point was emphasized by MWH in its 2001 and 2002 Design Reports and by FERC in a letter to UPPCO dated May 16, 2002 – a full year before the breach. Further, UPPCO was fully aware that stoplog removal to 1482.5 feet was an integral part of the construction project. *See* exhibits 1 and 2 enclosed with this letter — Construction Drawing C-1 (Exh. 1), submitted to UPPCO on May 29, 2001 (Exh. 2).

In its design review, the Panel noted:

... the new project requires the operator to fully open the bottom outlet to assure the safety of the dam in the case of an extreme event, every time the reservoir exceeds elevation 1481.5 [p. 17]

The Panel correctly concluded that even if no other operational step had been taken:

If the bottom outlet discharge had been maintained at about 20 cfs (.57 m³/s) and the stop logs were at elevation 1482.5, it is probable that the breaching of the fuse plug could have been avoided.

Panel Report, p. 49 (emphasis added).

Moreover, two other simple operational steps should have been taken, but were not. First, the stoplogs could have been removed entirely, to elevation 1480.25. This was expected in flood situations, such as that confronting UPPCO on May 12-14, 2003. Indeed, UPPCO prepared and published detailed instructions for removing stop logs at the Silver Lake Reservoir. Second, the four-foot diameter, low level outlet could easily have been opened, but was not. As the Panel emphasized:

If the bottom outlet valve were opened on April 23, when it was first noticed that the NMOL elevation had been surpassed, to discharge 280 cfs (8 m³/s), the reservoir level could have been brought to elevation 1481.5 in about 3 days. This maneuver, which is consistent with the concept of the NMOL elevation [a requirement of both the FERC License and the MDEQ "401" Certification], would have prevented the May 14 breaching accident. The storage volume in the reservoir between elevations 1481.5 and 1485.5 is about 5700 acre-ft (7.0 hm³), which would be sufficient to store any conceivable runoff from the May 10-11, 2003, rainfall. [p. 34]

* * * * *

By opening the low level outlet valve in late April, the reservoir could have been controlled at about elevation 1481.5 and the breaching of the fuse plug avoided. [p. 49]

(Emphasis added.)

Given actual conditions, it appears that UPPCO could have prevented the triggering of the fuse plug by opening the low level outlet as late as the morning of May

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14, 2003, two days after the rains had stopped and after the high water conditions. Yet, it is undisputed that UPPCO did absolutely nothing.

UPPCO Was Fully Aware of the New Operating Regime

The Panel Report states that UPPCO told the Panel that it was not aware of the new operating regime, *i.e.*, the NMOL of 1481.5. That statement is inconsistent with other available information. UPPCO has an experienced hydro operations staff. In addition, UPPCO's parent and sister companies, WPS Resources Corp. and Wisconsin Public Service Corp., respectively, employ licensed engineers with extensive hydro operating knowledge and experience.¹ Further, we understand that UPPCO/WPS engaged in extensive negotiations with the Michigan Department of Environmental Quality (MDEQ) regarding the monthly target (maximum) reservoir elevations that ultimately became a part of the FERC license.

UPPCO also was well aware of the change in NMOL down to 1481.5, which was the basis of design and incorporated into its FERC license. No fewer than three Registered Professional Engineers employed by UPPCO or Wisconsin Public Service Corp. had "hands-on" involvement with the review and approval of various studies, reports, and construction documents, which from at least March 2001 forward consistently noted a NMOL of 1481.5 and based flood routing studies on a starting elevation of 1481.5.

The In-Situ Soils are Dense, Hard, and Cemented

According to the transmittal letter, the Panel reviewed the Draft FERC Staff Report of July 24, 2003, and took its contents into account in its findings. That report notes (at p. 52) that the glacial till in the area of Silver Lake is classified as sand (SP-SM) both visually and in the laboratory. Evaluating this material in situ, however, the glacial till stands vertically as shown in numerous photographs. The Draft FERC Staff Report further suggests that this material likely contains weak carbonate cementation. Accordingly, in evaluating this material with respect to the fuse plug release, it seems most appropriate to consider its in situ properties, not its properties after it has been disturbed. The erosion resistance of the in situ till is substantially greater than that of sand. Thus, the Panel Report overstates the erodibility of the material.

¹ Collectively, Wisconsin Public Service Corp. and UPPCO operate 19 FERC-licensed hydro projects, including some with more than one dam.

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Minor Inaccuracies

Given the scope of the project – investigation, analysis, planning, licensing, design, construction, and operation spanned at least nine years – it can be understood that there are a few inaccurate details in the Panel Report. For example, the Panel Report states at section 4.4.1 (p. 43) that MWH prepared a final construction report. In fact, MWH had a limited role during construction and did not prepare any such report. However, FERC and UPPCO did prepare such reports. While this letter focuses on more fundamental concerns about the Panel Report, MWH notes that the Panel Report contains additional inaccuracies.

Conclusion

Our principal concern with the draft Panel Report is its conclusion that the design of the fuse plug was the “root cause” of the breach event on May 14, 2003. The substantive analysis of the Panel Report more accurately recognizes that there were multiple, significant operational failures, that UPPCO had knowledge of operational requirements and repeated opportunities to implement them, up to and including the day of the breach, and that implementation of some or all of those requirements would have prevented the breach. That is, the conclusory statements at the end of the Panel Report are not consistent with the more detailed analysis within the body of the Panel Report.

MWH appreciates the opportunity to comment on the Panel Report. Further, it would be pleased to answer questions or provide further information relating to its comments.

Sincerely,

WICKWIRE GAVIN, P.C.



Robert J. Smith
Carl A. Sinderbrand

Enclosures

May 29, 2001

Mr. Benjamin Trotter
Project Coordinator
Wisconsin Public Service Corporation - UPPCO
600 Adams Street
Green Bay, WI 54301

Subject: Silver Lake Basin
Drawings for Fuse Plug Spillway Design

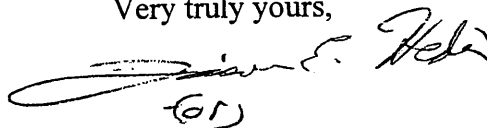
Dear Mr. Trotter:

Enclosed for your review are copies of the latest drawings for the Silver Lake Basin Fuseplug Spillway Project. These include the following:

18305G-01 Area Map, Site Location Map, and Site Plan
18305G-02 Fuse Plug and Spillway Channel, Plan and Profile
18305G-03 Profile and Cross-Sections, Fuse Plug

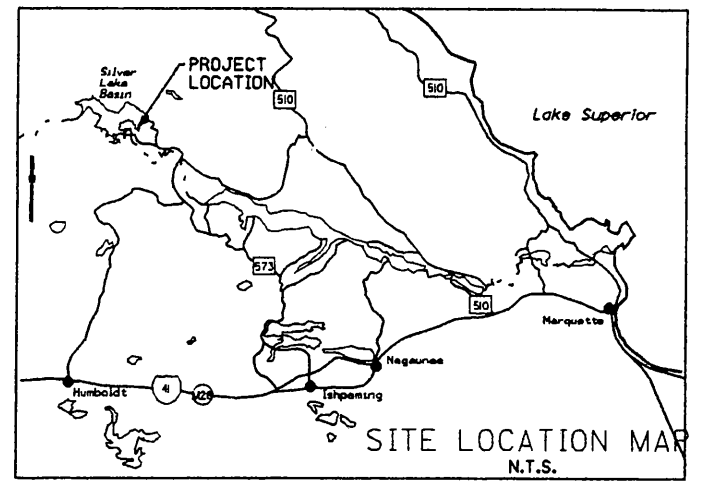
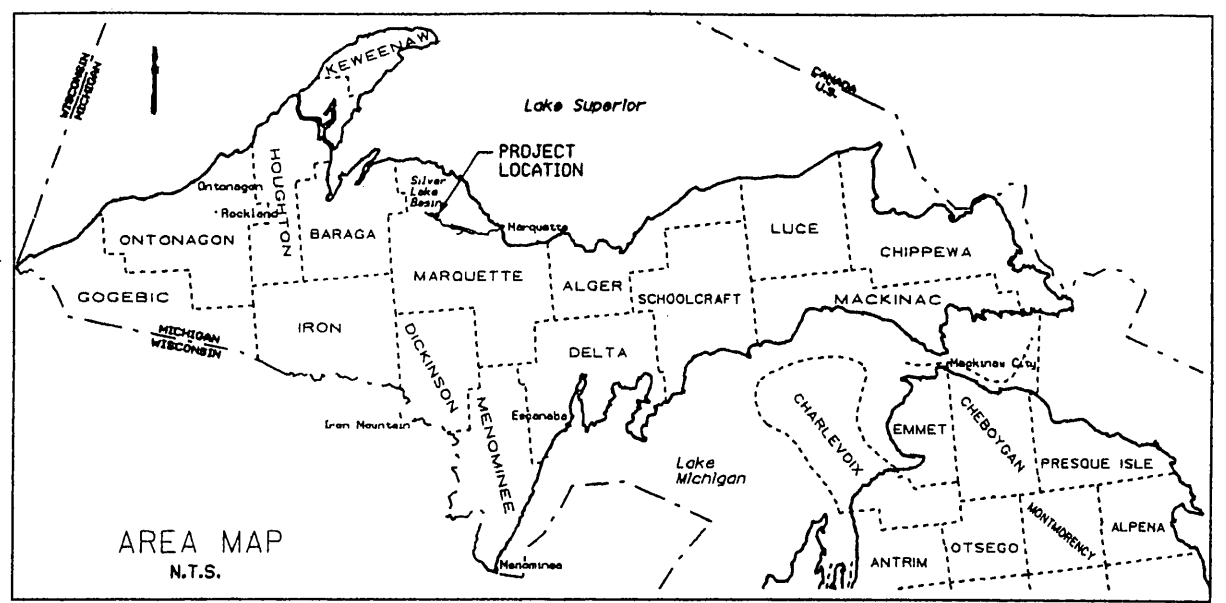
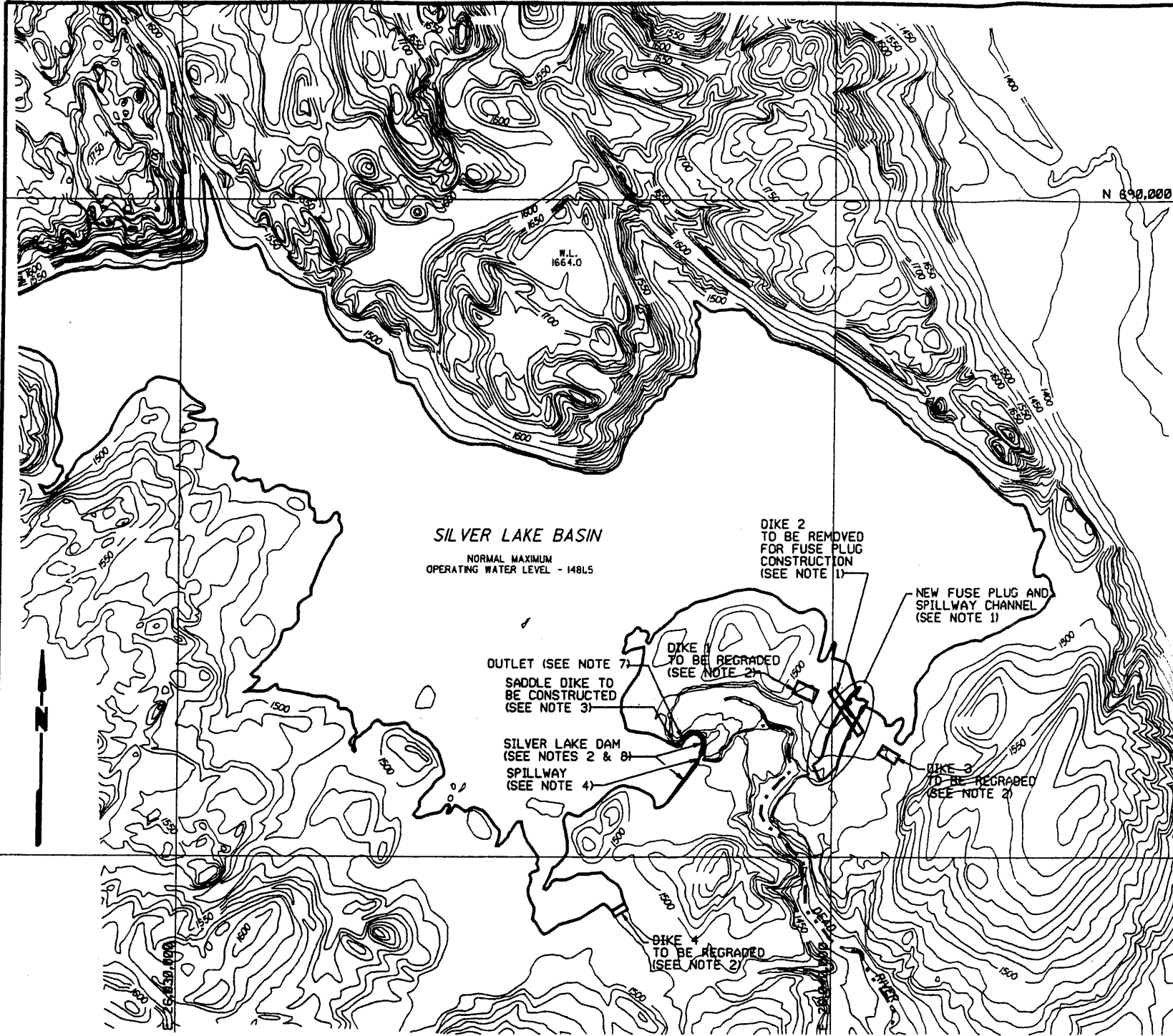
Please do not hesitate to call me at (720) 932-7741 if you have any questions.

Very truly yours,

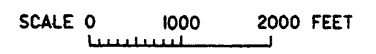


Norman A. Bishop, Jr., P.E., M.B.A.
Partner

NAB/jeh
Enc: as noted



REFERENCE DRAWINGS:
 WORK THIS DRAWING WITH 20895-C2, C3, C4, C5, C6, C7,
 AND 1992 COLEMAN ENGINEERING DRAWINGS 1, 2, 3, 4, 5,
 6 AND 7 OF 11.



INDEX OF DRAWINGS	
NUMBER	TITLE
20895-C1	AREA MAP, SITE LOCATION MAP AND SITE PLAN
20895-C2	MAIN DAM PLAN
20895-C3	MAIN DAM AND SPILLWAY SECTIONS AND DETAILS
20895-C4	CONCRETE OUTLET STRUCTURE SECTIONS AND DETAILS
20895-C5	SADDLE DIKE PLAN AND CROSS SECTION
20895-C6	FUSE PLUG AND SPILLWAY CHANNEL PLAN AND PROFILE
20895-C7	FUSE PLUG PROFILE AND CROSS SECTIONS

NOTES:

1. DETAILS OF WORK TO BE PERFORMED BY CONTRACTOR FOR CONSTRUCTION OF NEW FUSE PLUG AND SPILLWAY CHANNEL AND REMOVAL OF DIKE 2 ARE SHOWN ON DRAWINGS 18305G-02 AND 18305G-03.
2. CONTRACTOR SHALL REGRADE CREST OF EXISTING DAM AND DIKES 1, 3 AND 4 TO EL. 1491.5 USING SUITABLE MATERIAL RECOVERED DURING REMOVAL OF DIKE 2 IN ACCORDANCE WITH THE SPECIFICATIONS.
3. CONTRACTOR SHALL CONSTRUCT SADDLE DIKE USING SUITABLE MATERIAL IN ACCORDANCE WITH THE SPECIFICATIONS. DETAILS OF WORK TO BE PERFORMED ARE SHOWN ON DRAWING 20895-C5.
4. CONTRACTOR SHALL REMOVE WOODEN STOPLOGS FROM FIFTH SPILLWAY BAY FROM THE LEFT IN ACCORDANCE WITH THE SPECIFICATIONS. STOPLOGS ARE CURRENTLY IN PLACE AT EL. 1486.5 AND SHALL BE REMOVED TO EL. 1482.5. CONTRACTOR SHALL ALSO INSTALL ANCHORS IN CENTER OF EACH SPILLWAY BAY IN ACCORDANCE WITH THE SPECIFICATIONS. DETAILS OF WORK TO BE PERFORMED ARE SHOWN ON DRAWING 20895-C3.
5. HORIZONTAL PROJECT DATUM IS MICHIGAN STATE PLANE COORDINATE SYSTEM, NAD 83/86, NORTH ZONE. VERTICAL PROJECT DATUM IS NGVD 1929.
6. THE COMPANY WILL PROVIDE STOCKPILE AND DISPOSAL AREAS.
7. CONTRACTOR SHALL REPAIR AREAS OF DAMAGED CONCRETE ON OUTLET STRUCTURE IN ACCORDANCE WITH THE SPECIFICATIONS. DETAILS OF WORK TO BE PERFORMED ARE SHOWN ON DRAWINGS 20895-C2 AND 20895-C4.
8. CONTRACTOR SHALL REGRADE OVERSTEEPENED DOWNSTREAM SLOPE OF MAIN DAM NEAR OUTLET STRUCTURE IN ACCORDANCE WITH THE SPECIFICATIONS. CONTRACTOR SHALL INSTALL TOE DRAIN ALONG DOWNSTREAM TOE OF MAIN DAM IN ACCORDANCE WITH SPECIFICATIONS. DETAILS OF WORK TO BE PERFORMED ARE SHOWN ON DRAWINGS 20895-C2 AND 20895-C3.

new detail dwg

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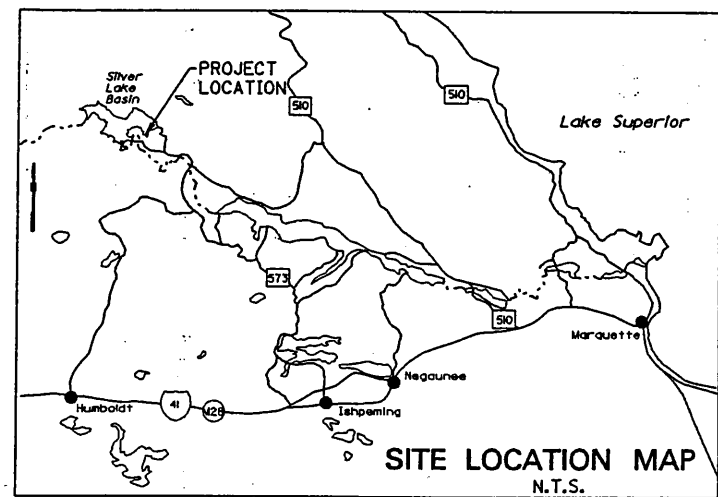
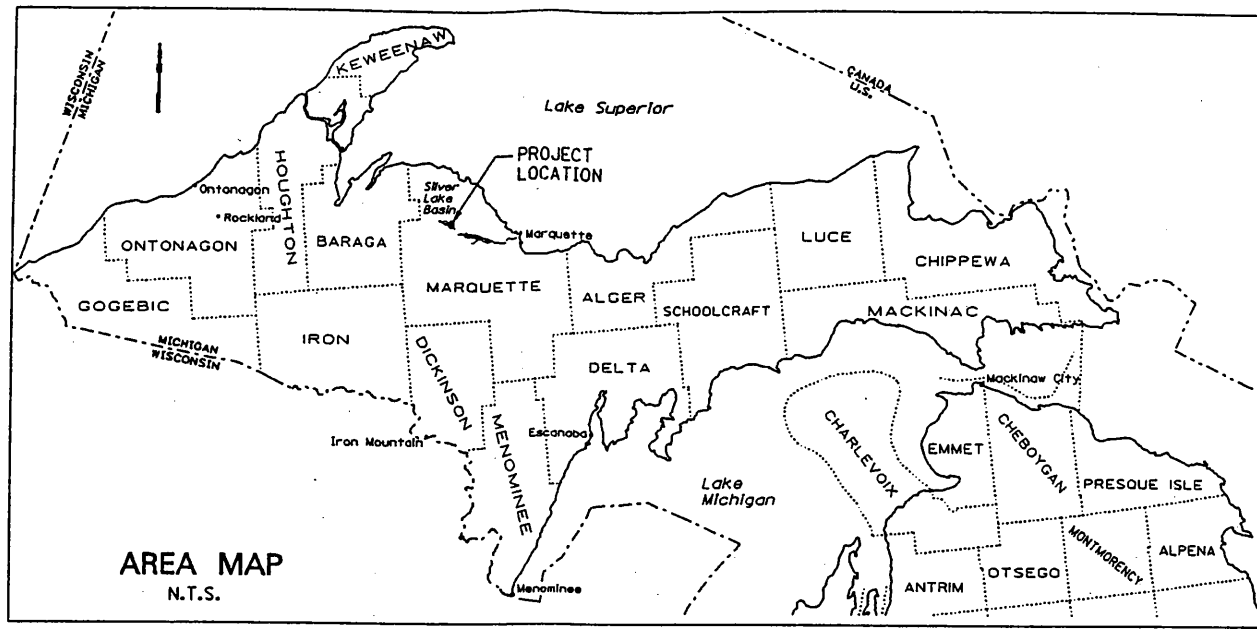
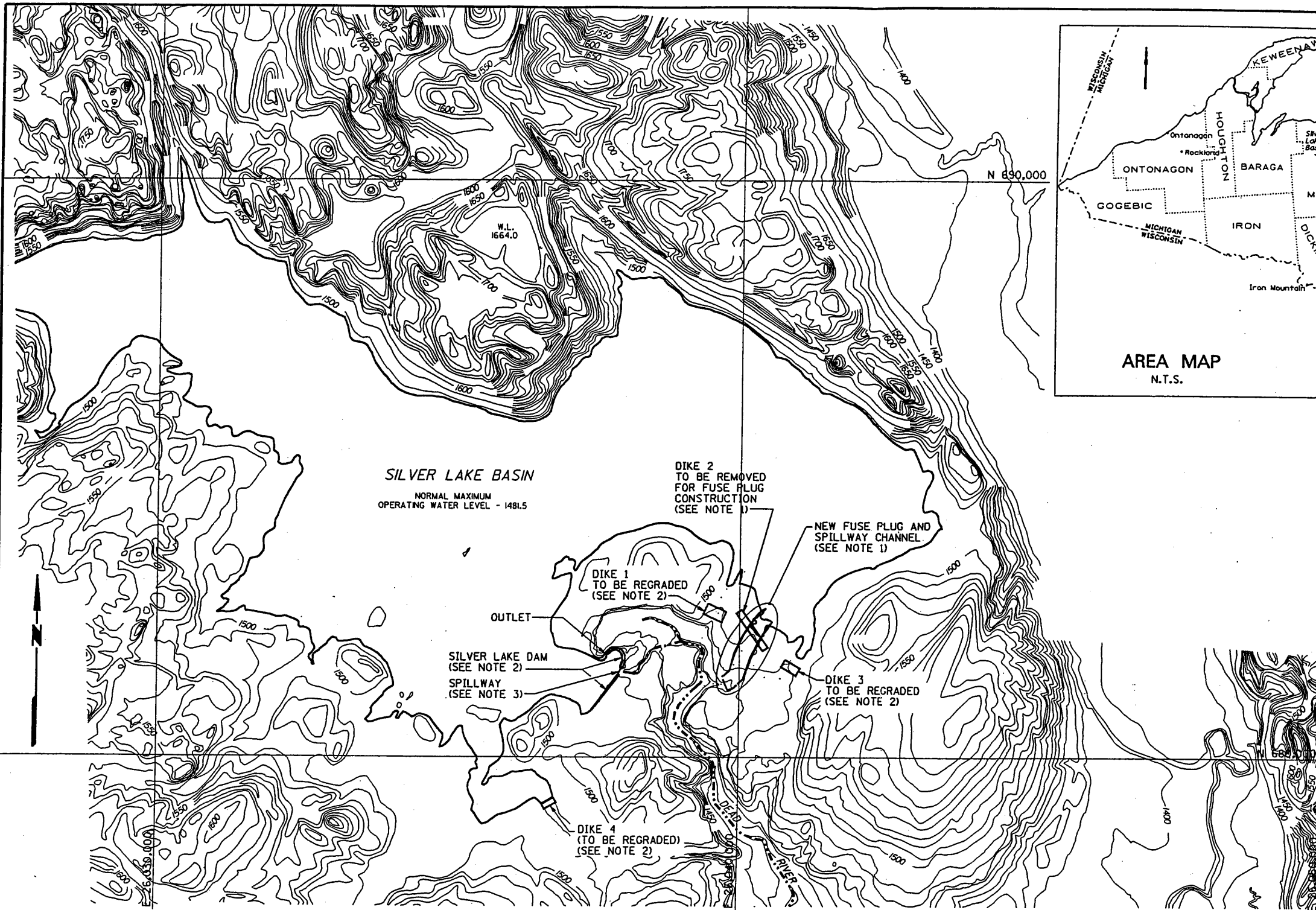
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REV.	DATE	NATURE OF REVISION	BY	CHKD.	APPR.	OWNER

UPPER PENINSULA POWER COMPANY
 "A SUBSIDIARY OF WPS RESOURCES"
SILVER LAKE BASIN PROJECT
FUSE PLUG SPILLWAY & DAM MODIFICATIONS
 AREA MAP, SITE LOCATION MAP AND SITE PLAN

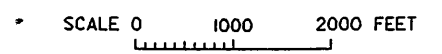
MWH
 MONTGOMERY WATSON HARZA

CHICAGO, ILLINOIS DATE DWG. NO. 20895-C1



REFERENCE DRAWINGS:
 WORK THIS DRAWING WITH 1830G-02 AND 18305G-03

- NOTES:
1. DETAILS OF REMOVAL OF DIKE 2 AND WORK TO BE PERFORMED BY CONTRACTOR FOR CONSTRUCTION OF NEW FUSE PLUG AND SPILLWAY CHANNEL ARE SHOWN ON DRAWINGS 18305G-02 AND 18305G-03.
 2. CONTRACTOR SHALL REGRADE EXISTING DAM AND DIKE FILLS TO EL. 1491.5 USING SUITABLE MATERIAL RECOVERED DURING REMOVAL OF DIKE 2 IN ACCORDANCE WITH THE SPECIFICATIONS.
 3. CONTRACTOR SHALL REMOVE WOODEN STOPLOGS FROM FOURTH SPILLWAY BAY FROM THE LEFT TO ELEVATION 1482.5. STOPLOGS ARE CURRENTLY IN PLACE TO ELEVATION 1486.5 IN ACCORDANCE WITH THE SPECIFICATIONS.
 4. HORIZONTAL PROJECT DATUM IS MICHIGAN STATE PLANE COORDINATE SYSTEM, NAD 83/86, NORTH ZONE. VERTICAL PROJECT DATUM IS NGVD 1929.



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DESIGN	
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UPPER PENINSULA POWER COMPANY
 "A SUBSIDIARY OF WPS RESOURCES"

**SILVER LAKE BASIN PROJECT
 FUSE PLUG SPILLWAY**

**AREA MAP, SITE LOCATION MAP
 AND SITE PLAN**

HARZA ENGINEERING COMPANY

APPROVED _____

CHICAGO, ILLINOIS	DATE	DWG. NO. 18305G-01
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