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October 24, 2003

VIA FEDERAL EXPRESS

John S.L. Katz, Esquire
Special Counsel
Office of the General Counsel
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Subject: Silver Lake Reservoir – P-10855

Dear Mr. Katz:

Accompanying this letter are four copies of a report entitled "Silver Lake Reservoir Fuse Plug Release, Marquette County, Michigan, May 2003: Facts, Observations and Discussion."

Kindly provide a copy to each member of the Independent Board of Review which FERC has empaneled in connection with this matter. The fourth copy is for your files. Please feel free to contact me if you have any questions.

Sincerely,

WICKWIRE GAVIN, P.C.

Robert J. Smith

Enclosures

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SILVER LAKE RESERVOIR FUSE PLUG RELEASE
Marquette County, Michigan
May 2003

FACTS, OBSERVATIONS AND DISCUSSION

Compiled and Prepared by

MWH AMERICAS, INC.

October 24, 2003

EXECUTIVE SUMMARY [1]

The Flood Was Due to UPPCO Failures

The facts related to the May 2003 Silver Lake Reservoir fuse plug release clearly show that UPPCO was responsible:

1. UPPCO allowed the reservoir to rise almost four feet above the May 1 target or maximum level specified by FERC and MDEQ. It basically ignored the requirements of two regulatory agencies in an apparent effort to maximize water storage. By so doing, it put the project and the downstream community in jeopardy because there was not enough capacity for holding runoff from the May 11-12 storm. Had UPPCO not allowed the reservoir to exceed the normal maximum operating level, the fuse plug would not have released.

2. UPPCO was well aware of the record rainfall but did nothing to: (a) check the reservoir level, or (b) release water to lower the reservoir level, in the two-day period between the rainstorm and the time that high water was reported downstream. Had UPPCO removed stop logs and opened the large low-level outlet valve on May 12, the fuse plug would not have released.

The WGI Report Criticizing the Fuse Plug Design Was Based on Incorrect Information

The recently released Washington Group International (WGI) Report was based on assumptions that were simply—and substantially—wrong. Some of the errors are summarized below:

ITEM/SUBJECT	WGI STATEMENT/ASSUMPTION	FACT
Normal Maximum operating level (NMOL), ft	1486.25	1481.5
Fuse plug elevation	Designed and constructed too low	Fuse plug was designed at the correct elevation; design was approved by FERC and UPPCO
Bay 4 stop logs	Not readily removable	Removable
Design approach	Contrary to standard concept	Consistent with standard concept and approved by FERC and UPPCO

[1] Abbreviations used in this report are defined in Subsection 1.3.

ITEM/SUBJECT	WGI STATEMENT/ASSUMPTION	FACT
Role of existing concrete overflow spillway	Would remain in use	To be abandoned because of safety concerns

The only way WGI could have taken the above positions is if they misunderstood the FERC License, the MDEQ 401 Water Quality Certification, and several FERC and UPPCO approved engineering reports.

Furthermore, the WGI Report had no discussion of (a) the high pre-Event water levels created by UPPCO and (b) the lack of UPPCO's response to the rainstorm.

Other Facts and Their Relevance Discussed in More Detail in this Report are Summarized Below

FACT	RFLFVANCF
The basis of the hydraulic design was the 2001 MWH Flood Routing Report. One of the key parameters in this report is a normal maximum operating level of 1481.5 ft, the highest of the 12 monthly target elevations in the MDEQ 401 Water Quality Certification.	This key value was known and approved by FERC and UPPCO.
FERC has broad authority to dictate the design of hydro projects.	In the exercise of this authority, FERC controls the design.
The development of the design was a collaborative effort of senior FERC engineers, UPPCO and MWH.	In the end, the design was approved by FERC, whose standard is that licensees use sound and prudent engineering practices.
UPPCO rejected engineering recommendations for adding remote data acquisition and supervisory control of Silver Lake to the fuse plug project.	If this basic equipment had been installed, UPPCO would have known the water levels were rising above the NMOL.
UPPCO assumed responsibility for removal of the Bay 4 stop logs to 1482.5 ft but failed to remove them. (MWH had initially included this requirement in the fuse plug construction contractor's scope of work).	Lowering the stop logs to 1482.5 ft and having removable stop logs was an essential element of the fuse plug project operation; failure to do this allowed UPPCO to store more water but also allowed the reservoir to rise to dangerous levels.

FACT	RELEVANCE
In May 2003, UPPCO did not achieve the May 1 target reservoir level of 1479.0 ft set forth in the License.	Had UPPCO done so, the fuse plug would not have released.
UPPCO allowed the reservoir to exceed the reservoir's Normal Maximum Operating Level (1481.5 ft) and the maximum annual target elevation (also 1481.5 ft) for 24 consecutive days prior to the Event.	This was in violation of UPPCO's FERC License and used a substantial portion of the Silver Lake reservoir emergency flood storage capability.
FERC regulations require UPPCO to use sound and prudent engineering practices in monitoring and operating the Silver Lake Reservoir (18 CFR 12.5)	Disregard of its FERC License and not checking the reservoir level following a record rainstorm are not consistent with sound and prudent engineering practices.
Four undated documents captioned "Upper Peninsula Power Co. Hydroplant Operating Procedures" submitted to FERC on June 12, 2003 were represented by UPPCO to FERC as comprising "the operating plan for Silver Lake."	Four documents dealing with a brief description of the facilities, installation of stop logs, the main valve, and instrumentation data collection and procedure do not comprise a reservoir operating plan.
UPPCO has indicated that it did not update the operating plan for the fuse plug regime.	The fuse plug regime normal maximum operating level is 4.5 feet lower than the prior operating regime.
FERC regulations require UPPCO to use sound and prudent engineering practices in preparing a reservoir operating plan for Silver Lake (18 CFR 12.5)	UPPCO's "plan" does not seem to meet this standard.
At the time of the May 11-12 storm, the low level outlet was almost closed and the Bay 4 stop logs were in place to 1486.15 ft	Only a very small amount of water was being released and the reservoir would fill until the fuse plug pilot channels started to fill (1485.5 ft).
UPPCO neither inspected the Silver Lake facilities nor initiated reservoir discharges following the May 11-12 , 2003, record rainfall	Had UPPCO acted promptly, the fuse plug would not have operated.

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1.0 INTRODUCTION

1.1 Background/Context of This Report

Following the May 2003 release of the fuse plug at Silver Lake Reservoir, Michigan, the following entities initiated investigations and performed evaluations directed at determining the cause of the Event:

- FERC's Division of Dam Safety and Inspection
- An Independent Board of Review (IBOR) established by FERC
- Washington Group International (hired by UPPCO)
- MWH

During and following May visits (post-Event) to the Silver Lake Reservoir and vicinity, MWH compiled facts and reviewed documentation potentially relevant to determining the root cause of the Event. This effort resulted in MWH making certain observations and developing preliminary conclusions which are summarized in this report. MWH has also preliminarily reviewed the WGI Report.

References cited in this report are listed in Appendix A. Exhibits are included as Appendix B.

1.2 Approach and Purpose

This report discusses the nature and extent of the involvement of UPPCO, FERC, MWH and other firms in the planning, design, and construction of the fuse plug emergency spillway. This report also identifies significant factual errors and omissions in the WGI Report.

MWH submits this report to FERC and the IBOR for two reasons:

1. To provide a broader discussion than was possible through the IBOR interview and question/answer process. MWH acknowledges that some of the issues discussed herein likely have been or are being considered by the IBOR. However, as the design engineer, MWH wants to ensure that its observations and preliminary conclusions are considered by the IBOR.

2. To set forth what it believes are significant errors and omissions in the WGI report.

1.3 Abbreviations and Terminology

CFR:	Code of Federal Regulations
Event:	The May 2003 Operation of the Fuse Plug at Silver Lake Reservoir on the Dead River, Marquette County, Michigan
FERC:	Federal Energy Regulatory Commission
FERC License:	The License Issued to UPPCO on October 4, 2002 under Part I of the Federal Power Act, 16 United States Code §§791a-825r by FERC Order of October 4, 2002 (101 FERC ¶62,013)
Harza:	Harza Engineering Co. (Acquired by Montgomery Watson to form MWH Global, Inc. in June 2001)
IBOR:	Independent Board of Review established by FERC
MDEQ:	Michigan Department of Environmental Quality
MDEQ 401 Water Quality Certification:	The February 24, 1999 Water Quality Certification issued by the Michigan Department of Environmental Quality pursuant to Section 401 of the Clean Water Act, 33 U.S.C. §1341
Mead & Hunt:	Mead & Hunt, Inc.
MWH:	MWH Americas, Inc., an operating company of MWH Global, Inc.
NRCS:	Natural Resources Conservation Service
NMOL:	Normal Maximum Operating Level
NWS:	National Weather Service
PMF:	Probable Maximum Flood
QCIP:	Quality Control and Inspection Program
Stone & Webster:	Stone & Webster Engineering Co.
UPPCO:	Upper Peninsula Power Company, a wholly-owned subsidiary of WPS Resources, Inc.[2]

[2] WPS and UPPCO are used interchangeably in this report. (Both are operating companies of WPS Resources, Inc.) This is because some correspondence to FERC and MWH came from WPS employees in Green Bay, Wisconsin, and other correspondence came from UPPCO employees in Houghton or Ishpeming, Michigan.

WGI:	Washington Group International
WGI Report:	The October 6, 2003 report entitled "Silver Lake Dam: Root Cause Report on the May 14, 2003 Operation of the Fuse Plug Spillway and Subsequent Channel Erosion Resulting in the Uncontrolled Release of Silver Lake"
WPS:	Wisconsin Public Service Corporation, a wholly-owned subsidiary of WPS Resources, Inc.[2]

2.0 ROLES AND RESPONSIBILITIES OF UPPCO, MDEQ AND FERC

2.1 Overview

The history and development of the Silver Lake Fuse Plug project was subject to the regulatory processes of FERC and the Michigan Department of Environmental Quality. These processes were lengthy and interactive. This section summarizes the roles and responsibilities of UPPCO and the regulatory agencies and explains the origin of the table of monthly operating ranges (minimum to target) in the FERC license.

2.2 UPPCO

2.2.1 Role

After purchasing the Silver Lake Reservoir and other downstream facilities (the Dead River System), UPPCO applied for a FERC license to operate the Dead River System for power generation.

2.2.2 Responsibilities

A hydro-electric project license operating a FERC-regulated hydroelectric system, such as UPPCO is obligated to comply with license conditions, FERC Regulations, and the Federal Power Act.

18 CFR 12.5 sets forth standards of performance applicable to FERC licensees:

> "A licensee or applicant must use sound and prudent engineering practices in any action relating to the design, construction, operation, maintenance, use, repair, or modification of a water power project or project works."

Section 10(a) of the Federal Power Act, 16 USC 803(a) provides, in part:

> "Each licensee hereunder shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto, constructed under the license, and in no event shall the United States be liable therefor."

Thus, under Federal law, UPPCO is responsible for all property damage claims arising out of the Event.

2.3 MDEQ 401 Water Quality Certification Requirements and Conditions

2.3.1 Role of MDEQ

As the State's water quality regulatory agency, MDEQ had the responsibility and authority to evaluate the water quality impacts of the proposed project. Specifically, Section 401 of the Clean Water Act, 33 USC §1341, required MDEQ to evaluate the water quality implications of FERC's issuance of a license to UPPCO and certify that any discharges from the project would comply with the Clean Water Act. UPPCO needed the MDEQ 401 Water Quality Certification prior to FERC taking any action on UPPCO's license application.

2.3.2 Conditions of Certification

Tbe MDEQ 401 Water Quality Certification issued to UPPCO on February 24, 1999, established start of month target elevations and monthly minimum reservoir level requirements as set forth below. The issuance of the MDEQ 401 Water Quality Certification made it possible to begin the design process because it established the reservoir operating range for each month. Tbe MDEQ 401 Water Quality Certification reservoir elevations were used for the flood routing calculations and evaluation of alternatives and were integral to the final design concept, as discussed in Section 3.0. The MDEQ 401 Water Quality Certification also set discharge limitations with an exception for flood events and other "adverse" conditions.

The MDEQ 401 Water Quality Certification states the monthly range. It provides in pertinent part:

> "(1) The UPPCO shall maintain the Silver Lake Storage Basin at all times above the minimum elevations shown below. The UPPCO shall also strive to operate the existing facilities in such a manner as to achieve the start of month target elevations listed below.
>
> . . .

Month	Start of Month Target Elevation (ft NGVD)	Minimum Elevation (ft NGVD)
January	1479.0	1477.5
February	1477.5	1477.0
March	1477.5	1477.0
April	1477.5	1477.0
May	1479.0	1478.5
June	1481.0	1480.5
July	1481.5	1480.0
August	1480.0	1479.0
September	1479.5	1479.0
October	1479.5	1479.0

Month	Start of Month Target Elevation (ft NGVD)	Minimum Elevation (ft NGVD)
November	1479.0	1478.5
December	1479.0	1478.5

It further provides:

> "The UPPCO shall not discharge a flow from the Silver Lake Storage Basin in excess of 150 cfs when such discharges are under their control except that flow up to 200 cfs may be discharged if necessary to prevent loss of service to customers or if necessary to maintain target elevations during extreme wet weather conditions."

Thus, it is elear that the target levels are maximums. This is reinforced by a May 25, 1997, Michigan DNR letter to FERC which includes the table of minimum and target elevations for Silver Lake under the heading "Reservoir Operating Limits" (Exh. 1).

2.4 FERC

2.4.1 Role/Authority

The Federal Power Act gives FERC broad authority and responsibilities over hydroelectric facilities. These responsibilities are exercised through FERC Regulations found in Title 18 of the Code of Federal Regulations. Compliance with these regulations by licensees such as UPPCO is mandatory. In addition, a FERC operating license for a hydropower facility typically contains mandatory requirements. Non-compliance with a mandatory regulation or license requirement may result in FERC imposing sanctions. FERC's role in the design process is described in subsection 3.2.

2.4.2 FERC License Silver Lake Reservoir Level Requirements

FERC issued the License to UPPCO on October 4, 2002. The License included the MDEQ 401 Water Quality Certification as Appendix A. Article 402 of the License included the same table of target and minimum elevation requirements set forth in the MDEQ 401 Water Quality Certification, but followed a slightly different preamble:

> "The licensee [UPPCO] shall act at all times to maintain the storage basin water surface elevations, as measured immediately upstream of each project dam, as follows: (1) Maintain the Silver Lake Storage Basin (SLSB) water surface levels at all times above the minimum seasonal target elevations and strive to operate the existing project facilities to achieve the start of month target elevations listed below."

UPPCO was legally bound to comply with these requirements--non-compliance constituted a License violation. As will be discussed in detail later in this report, UPPCO was not in compliance as it operated well above the target levels in April and May, 2003

2.5 Summary

- The monthly ranges of elevations (target or maximum, and minimum) required in the MDEQ 401 Water Quality Certification, were identical to the reservoir level requirements in the License FERC issued to UPPCO.
- MWH used the MDEQ 401 Water Quality Certification target or maximum elevations as the basis for hydraulic studies and design.
- The MDEQ 401 Water Quality Certification and License reservoir level requirements for May 1 and June 1 were:

	May 1	June 1
Target (maximum):	1479.0 ft	1481.0
Minimum:	1478.5 ft	1480.5

3.0 CONCEPT THROUGH DESIGN

3.1 Overview of the Design Development Process

3.1.1 Need for the Project—Create More Freeboard in the Event of the PMF

The fuse plug project was driven by the need to provide sufficient freeboard on the dam during the PMF. This need was identified in a succession of inspections, studies and reports in the 1990s. The crest of the concrete overflow spillway is only about 5 ft below the crest of the main earth dam. This did not provide sufficient depth of flow, taking into account freeboard, to pass the PMF. Accordingly, the spillway could not be used in flood routing calculations and a different spill regime was required.

3.1.2 Flood Routing Reports

The December 1995 Stone & Webster report, "Recommended Modifications for the Dead River Hydroelectric Project," (Ref. 1) evaluated alternatives (including fuse plugs) for remedying the spillway capacity deficit at Silver Lake. It recommended various improvements which included lowering the crest of three dikes and replacing the existing spillway with a reinforced concrete labyrinth spillway. This recommendation noted that the three dikes would be overtopped during floods approaching the PMF level. The flood routings developed in this 1995 report were calculated using a 1483.5 ft starting reservoir level. (This report pre-dated the February 1999 MDEQ 401 Water Quality Certification which set the highest target level at 1481.5 ft)

Stone & Webster next submitted a letter report regarding safety improvements at Silver Lake on December 2, 1998 (Ref. 2). On June 6, 2000, FERC advised WPS that it had completed a review of the December 1998 report. FERC made detailed comments and requests, provided certain design parameters and requested that WPS initiate work on the spillway capacity and stability improvements (Exh. 2). In August, 2000, FERC advised WPS to submit a revised Silver Lake PMF study and a plan and schedule for remedial measures addressing the inadequate spillway capacity at Silver Lake (Exh. 3).

The March 2001 MWH Flood Routing Report (Ref. 3) investigated two starting reservoir levels: 1481.5 ft and 1483.5 ft. The 1481.5 ft starting reservoir level was chosen because this was the highest of the monthly target elevations in the MDEQ 401 Water Quality Certification, which would become an integral part of a FERC License. The 1483.5 ft starting reservoir level was used to compare results to the December 1995 Stone & Webster report. This March 2001 report evaluated different fuse plug combinations. It was ultimately concluded, following detailed FERC comments and recommendations, and discussions with UPPCO, that only one fuse plug needed to be constructed, at Dike 2. The single fuse plug option was viable because of the lower starting reservoir level. FERC approved this design concept and hydraulic regime on March 23, 2001, at an UPPCO/FERC/MWH meeting in Washington, D.C.

3.1.3 Initial Design Report

MWH next prepared an initial design report entitled "Emergency Fuse Plug Spillway and Channel Design" for the Silver Lake Project (Ref. 4) and transmitted it to UPPCO on May 31, 2001. Copies of this report were forwarded to FERC. The report included a description of the principal elements of the new operating regime:

- The low-level outlet and stop logs would be used to maintain minimums and achieve target elevation (p. 6).
- Stop logs would be removed from spillway Bay 4 down to 1482.5 ft (p. 5).
- A fuse plug spillway was to be used as an emergency spillway (p. 8).
- Hydraulic analyses were conducted on the basis of the reservoir NMOL being at 1481.5 ft at the beginning of the PMF. This NMOL corresponded to the maximum target elevation in the MDEQ 401 Water Quality Certification (p. 6).

3.1.4 Final Design Report

MWH's final Design Report was issued March 20, 2002 (Ref. 5). The design described in this FERC- and UPPCO-approved report was based on a NMOL (and initial reservoir level) of 1481.5 ft, with the Bay 4 stop logs removed to 1482.5 ft. The approved report was used for preparing construction drawings and specifications, discussed in subsection 3.3 below.

3.2 FERC Responsibilities, Authority, and Involvement in Design

3.2.1 Broad FERC Authority to Dictate Design

The Federal Power Act assigns FERC various responsibilities with respect to licensees' construction projects.[3] FERC has broad supervisory authority over water power project construction and modifications (18 CFR 12.4(b)) and may actually direct design features:

[3] FERC's authority regarding the design of a water power project is dramatically different from that of other government agencies reviewing construction plans and specifications, such as state or local building code officials, or Federal funding agencies such as EPA (Wastewater Construction Grants), U.S. D.O.T. (Highway and Transit Construction Grants) and USDA (Rural Utilities Service Grants and Loans). While these agencies may require design changes that they believe are necessary for conformance with their published requirements and guidelines, unlike FERC they do not have the legal authority to direct changes in the absence of such guidelines.

- A Regional Engineer or any other authorized representative of FERC may require an applicant or a licensee to submit reports regarding the design, construction, or modification of a water power project and require an applicant to take any action that FERC deems to be necessary or desirable.

- FERC's directives must be followed and are effective immediately upon issuance unless successfully stayed or appealed (18 CFR 12.4(b)-(c)).

Thus, in the case of Silver Lake and any other FERC project, the licensee must follow FERC's directives. In the case of engineering deliverables, a copy of the directive to the licensee is typically forwarded to the licensee's consulting engineer who makes the FERC required changes in the documents.

3.2.2 Design Was a Collaborative Effort with FERC and UPPCO

The FERC Division of Dam Safety and Inspections reviews and approves all designs for dam safety modifications prepared for projects under its jurisdiction prior to construction. Licensees are required to submit plans, specifications, design analyses, and a QCIP for review and approval by FERC. In the instance of Silver Lake, FERC performed an in-depth review of MWH's deliverables. FERC requested various revisions and dictated engineering parameters and methodology. The initial review for Silver Lake was performed at the Chicago Regional Office. The FERC Headquarters Office in Washington, DC also reviewed MWH's deliverables. This review process included several face-to-face meetings, many phone conversations and numerous e-mail exchanges. The formal correspondence alone is not fully illustrative of the continuing dialog that took place between FERC, UPPCO and MWH.

Examples of FERC's directives and involvement include:

- FERC's August 1, 2000 letter to UPPCO states:

  "...we will not require any revisions to the Silver Lake PMF study due to any proposed revisions of Chapter 8 of our engineering guidelines, provided that you use the minimum permeability of the least permeable layer for each soil classification in the STATSGO database for losses as discussed in Item 1 above." (Exh. 3)

- FERC's December 15, 2000 letter to UPPCO provides results of a detailed review of the August 2000 PMF study for Silver Lake. It states:

  "As discussed with Mr. Yung Shen of your consultant's firm this week, the loss rates derived from the permeability values in STATSGO cannot be directly input into HEC-1 as weighted average. Instead, they must be used in the distributed method as described in the 1993 Chapter 8 of our engineering guidelines.... Our 1993 guidelines allowed the use of

values greater than the minimum permeability of the least permeable layer to be the loss rates for ungaged basins such as this basin. However, as discussed in our January 18, 2000 letter, this has been revised. Three copies of the revised PMF study for the Silver Lake dam should be submitted by January 16, 2001." (Exh. 4)

- FERC's June 21, 2001 letter to UPPCO provides results of a detailed review of the March 2001 PMF study and a letter concerning spillway channel velocities. The letter states:

  "since the PMF is an extreme event, we will not require the degree of erosion to be evaluated." (Exh. 5)

- FERC's June 28, 2001 letter to UPPCO provides results of a detailed review of the fuse plug design and requests revisions to closely match the fuse plug design of the USBR publication "REC-ERC-85-7." (Exh. 6)

3.3 Development of Construction Documents

3.3.1 FERC and MWH Reviewed and Commented on Drawings and Specifications

After FERC and UPPCO approved the MWH March 2002 Final Design Report, MWH finalized the drawings and the specifications for construction of the project. Interim copies of these documents were submitted to FERC and UPPCO for review and comment. FERC and UPPCO made numerous comments and requests which were addressed by MWH.

3.3.2 Requirement for Stop Log Removal by Contractor Deleted by UPPCO

The MWH March 2002 Design Report, which was based in part on the 2001 flood routing, established that the stop logs in Bay 4 were to be permanently lowered to 1482.5 ft, or 1 ft above NMOL. (Before and during the design phase, the stop logs were observed to be at approximately 1486.5 ft, a foot higher than the pilot channels of the proposed fuse plug.) Accordingly, the construction drawings and specifications initially submitted by MWH for UPPCO review included statements requiring removal of the stop logs (Harza June 29, 2001 letter to UPPCO, Exh. 7):

- Specification Section 103.1
  - *"The scope of work required under this contract is generally described as...removal of wooden stop logs in the existing concrete spillway deep bay..."*

- Specification Section 300.1
  - *"...The work shall also include...removal of the wooden stop logs from the existing concrete spillway."*

- Specification Section 301.1
  - *"The Work required to be performed by the Contractor generally consists of...removal of wooden stop logs in the existing concrete spillway..."*

- Specification Section 306. Removal of Stop Logs at Spillway Bay:
  - 306.1.1 *"The Work to be performed under this Section consists of the removal of the existing wooden stop logs in the fourth bay from the left of the existing concrete spillway."*
  - 306.3.1 *"...The Contractor shall remove the stop logs in the existing concrete spillway deep bay (fourth from the left as seen with the direction of the flow downstream) to Elevation 1482.5."*

- Note 3 on drawing 18305G-01-Area Map, Site Location Map, and Site Plan:
  - *"Contractor shall remove wooden stop logs from fourth spillway bay from the left to elevation 1482.5. Stop logs are currently in place to elevation 1486.5...."*

During its review of the proposed construction drawings and specifications, UPPCO directed that the requirements for removal of the stop logs from Bay 4 to 1482.5 ft be deleted from those documents. UPPCO informed MWH that it would remove the stop logs with its own personnel rather than pay the contractor to do so. (Telephone conversation of February 2002 between Ben Trotter of UPPCO and Craig Harris of MWH.) Accordingly, the applicable drawing notes and specification requirements were deleted. Based on this representation, MWH relied on UPPCO to remove the stop logs with its own forces as UPPCO committed to do.

3.3.3 MWH Monitoring and Control Recommendations

During the design process, MWH and UPPCO discussed a 1995 Stone & Webster recommendation that UPPCO include water level sensing and telemetry equipment in the project to enable continuous remote monitoring of the reservoir level. UPPCO had such instrumentation at the Hoist and McClure reservoirs. MWH also suggested that UPPCO automate the low level outlet gate operator so that its position could be monitored and changed from a remote location. These enhancements were not implemented by UPPCO because of capital cost considerations. Implementing either recommendation would have required an electrical power source at the site. If the remote water level monitoring equipment had been installed and used in May 2003, UPPCO would have known that the reservoir level was rising.

3.3.4 FERC Approval

The construction drawings and specifications were checked for adequacy and quality by MWH, FERC, and UPPCO/WPS before advertisement for bidding. The three parties were in agreement that the fuse plug design was not only sound but would be operationally simple and effective. Following its review and approval, FERC authorized construction to proceed by its letter of May 16, 2002. (Exh. 8)

FERC regulations (18 CFR 12.5) require a licensee to:

> "...use sound and prudent engineering practices in any action relating to design...of a water power project or project works."

FERC's approval of MWH's deliverables after iterative reviews constituted a finding that MWH's design met that standard.

3.4 Summary

- The basis of the hydraulic design was the 2001 MWH Flood Routing Report which was based on an initial reservoir elevation of 1481.5 ft, the highest of the 12 monthly target elevations in the MDEQ 401 Water Quality Certification
- The development of the design was a collaborative effort of senior FERC engineers, UPPCO and MWH
- FERC and UPPCO approved the design and the construction drawings and specifications
- FERC's approvals established that MWH used sound and prudent engineering practices
- UPPCO rejected recommendations for remote data acquisition and supervisory control of Silver Lake levels
- MWH had included responsibility for removal of the Bay 4 stop logs in the fuse plug construction contractor's scope of work, but prior to bidding UPPCO assumed this responsibility

4.0 CONSTRUCTION

4.1 Roles and Responsibilities of UPPCO and MWH—Planned vs. Actual

4.1.1 QCIP Contemplated Substantial MWH Construction Phase Involvement

A precondition to obtaining FERC's authorization to proceed with construction was the preparation, submission and FERC approval of a Quality Control and Inspection Plan (QCIP). (Ref. 7) MWH prepared a QCIP and submitted it to UPPCO in August 2001. FERC approved the QCIP in its letter dated August 30, 2001 (Exh. 9). The QCIP, as submitted, stated that MWH would provide project oversight of the contractor's work for conformance with the specifications and would perform the quality assurance inspections and reviews during construction. It was predicated on UPPCO's engagement of MWH to provide construction management, technical assistance, and monitoring of contractor compliance with quality objectives, the contract documents, and the intent of the design. The QCIP further stated that management of engineering and construction activities for the project would be assigned to Ben Trotter of WPS and Craig Harris of MWH.[4] The QCIP also provided that a MWH geotechnical engineer would make "periodic" trips to the site and be the on-site Quality Assurance Engineer and interface with site construction personnel.

4.1.2 UPPCO Significantly Modified the QCIP by Greatly Reducing MWH's Role

UPPCO verbally directed MWH to change the final version of the QCIP. The principal change was that many of the functions and responsibilities of the Quality Assurance Engineer could be performed by either the MWH geotechnical engineer or the WPS/UPPCO Construction Manager (Ben Trotter), at UPPCO's option. As a result, MWH's role during construction was greatly reduced. In addition, MWH's "periodic" site visits were reduced to "as-requested" site visits. UPPCO contractually limited MWH to two visits to the site during the construction phase.

The QCIP stated the following regarding Mr. Trotter's role and responsibilities:

> *"Mr. Benedict Trotter will have overall responsibility to WPS-UPPCO management for the project. He will interface with the Federal Energy Regulatory Commission, WPS-UPPCO's Environmental Compliance Officer, and MWH's Project Manager. He will review all field reports,*

[4] MWH's understanding of Mr. Trotter's qualifications is as follows: He has an Associate Degree in Mechanical Design/Pre-Engineering from Bay de Noc Community College, Escanaba, MI, 1982. He is neither degreed nor licensed as an engineer. Based on MWH's interaction with him, he had limited familiarity with earthwork QC tests and the construction means and methods specified for the fuse plug project.

correspondence and actions and will have final authority with respect to WPS-UPPCO's responsibilities under the Contract. He will have the authority to stop work.

Mr. Trotter will also serve as the Construction Manager. In this role, he will be responsible for oversight of construction activities and coordination with each of the contractors. He will be responsible for coordinating contractor activities as well for the execution of this QCIP. He will visit the site periodically during the work to observe performance of the work, review inspection and test reports, approve non-conformance reports (see Appendix J-5 for example), and prepare field directives and clarifications. He will discuss with MWH's Project Manager any situation where the plans and specifications need to be revised to reflect the field conditions encountered, document field changes, and maintain a record drawing file of changes or revisions made during construction.

As Construction Manager, Mr. Trotter has the responsibility and authority to approve or reject work performed by the contractor. Additionally, he may stop the work being performed, if in his opinion, the work is not in accordance with the Contract Documents. The Construction Manager will also review change order requests, scheduling of construction, and claims prepared by the Contractor. He will attend meetings at the site with the contractors during construction and prepare and issue minutes of these meetings. In addition, he will prepare monthly construction reports for submittal to the FERC. The Construction Manager will make a final inspection of the Work and recommend certification of completion to the Site Construction Clerk."

The following portion of the QCIP was modified at UPPCO's direction (additions are underlined)

"The Quality Assurance Engineer <u>or the Construction Manager</u> will be onsite to observe the following construction activities:

- *Inspection of field conditions and channel geometry following clearing and grading of spillway channel*
- *Preparation of subgrade after removal of Dike 2 for construction of fuse plug dike*
- *Stockpile of fuse plug dike material prior to placement*
- *Compaction and gradation of fuse plug dike materials*
- *Excavation of rock trench, placement of geotextile, and placement of rockfill*
- *Construction of toe drain berm*

- *Excavation and construction of toe drain"*

4.2 Contract Completion, Punchlist, and Initial Use

It is MWH's understanding that:

- In late fall of 2002, the contractor advised UPPCO that it had achieved substantial completion, but not final completion. (Conversation between Norm Bishop and Ben Trotter, May 17, 2003.)

- In January, 2003, UPPCO reprcsented to FERC that the project was complete on October 15, 2002. (Exh. 10)

- Some of the items on an UPPCO-prepared punch list were not completed as of the May 14, 2003 event. UPPCO paid the Contractor for all work except items on the punch list. (Conversation between Norm Bishop and Ben Trotter, May 17, 2003). As of the date of this report, MWH has not seen the punch list.

- UPPCO put the fuse plug into service altbough the project had not been accepted by FERC and a "sufficient stand of vegetation" (grass lining) was not in place upstream or downstream, as required by the specifications. (This statcmcnt is based on reported water levels.)

It is not known if UPPCO prepared a reservoir filling plan. It did not request MWH to prepare one. If UPPCO had consulted with MWH regarding the filling of the reservoir, and requested a final site inspection, then MWH would have pointed out the need for all construction requirements to be satisfactorily completed pursuant to the FERC-approvcd construction drawings and specifications prior to filling the reservoir. MWH would also have reminded UPPCO of their obligation to remove the Bay 4 stop logs to 1482.5 ft.

4.3 Summary

- UPPCO greatly reduced MWH's construction phase engineering role from that included in the FERC-approved Quality Control and Inspection Plan

- UPPCO assigned a non-engincer overall rcsponsibility for the project and onsitc execution of the QCIP, sitc inspections, review of field reports, observation of work and quality control tcsts, and supervision of the independent testing laboratory

- UPPCO put the project into service beforc it was complete

5.0 UPPCO SILVER LAKE RESERVOIR OPERATIONS - - REQUIREMENTS VS. ACTUAL; UPPCO RESPONSE TO STORM

5.1 Generally

5.1.1 Prescribed Monthly Reservoir Level Operating Ranges

The October 4, 2002 FERC License established monthly reservoir level operating ranges. (See subsections 2.3.2 and 2.4.2 above). The range for the month of May is from 1478.5 ft minimum to 1479.0 (on May 1) and 1481.0 ft (on June 1). The License also required UPPCO to submit operating procedures for Silver Lake since there was a new NMOL and a new hydraulic regime.

5.1.2 Water Level Management

UPPCO has the following means to monitor and control Silver Lake reservoir levels and discharges: a staff gage, a 48-in diameter low-level outlet (sluice), and removable stop logs in spillway Bay 4.

The normal operation of the Silver Lake reservoir following fuse plug construction was established through discussions with UPPCO and FERC between March 2001 and March 2002. Use of the low level outlet and the stoplogs was explained in the MWH March 2002 Design Report that was reviewed and approved by both UPPCO and FERC. The MWH March 2002 Design Report in Section 4.7, Operation, states

> "...Releases at Silver Lake are made through tbe outlet structure and the spillway. These releases are controlled hy a manually operated gate valve at the outlet structure and by wooden stop logs at the spillway. The wooden stop logs at the fourth bay in the spillway from the left are removed during periods of high water or when large flows are expected."

5.1.3 Normal Maximum Operating Level (NMOL) and Actual Level

The highest of the 12 monthly Silver Lake target elevations from the MDEQ 401 Water Quality Certification and October 4, 2002 FERC License was 1481.5 ft. As noted above, this NMOL was the starting reservoir level for PMF and flood routing calculations--a very important parameter. This elevation was agreed upon by FERC, UPPCO, and MWH at a March 23, 2001 meeting at FERC Headquarters in Washington, DC. This NMOL value was consistently and repeatedly emphasized in several meetings, repeatedly referenced in MWH reports (including the MWH March 2002 Design Report) and shown on the construction drawings.

Both the MWH March 2002 Design Report and the construction specifications and drawings were based on the ground level immediately upstream of the fuse plug being at 1481.0 ft or 0.5 ft below the NMOL of 1481.5 ft. Thus, when the reservoir was at the May 1 target elevation of 1479 ft, water

would not have been on the upstream face of the fuse plug and all of the constructed channel upstream of the fuse plug would have been dry as well.[5]

5.1.4 Operating Procedures Prepared by UPPCO: Incomplete and Not Updated

In a June 12, 2003 response to FERC's request for "Operating Procedures for Silver Lake," UPPCO provided the following documents (Exh. 11):

- Upper Peninsula Power Company Hydro Plant Operating Procedure
  - Section – Operating
  - Subject – Silver Lake project description

- Upper Peninsula Power Company Hydro Plant Operating Procedure
  - Section – Operating
  - Subject – Installation of the Stop Logs

- Upper Peninsula Power Company Hydro Plant Operating Procedure
  - Section – Operating
  - Subject – Silver Lake Main Valve

- Upper Peninsula Power Company Hydro Plant Operating Procedure
  - Section – Operating
  - Subject – Instrumentation Data Collection and Evaluation Procedure

None of the documents are numbered, nor do any of the documents bear an issue date. The first document listed – "Silver Lake project description," states:

> *Purpose and Scope*
>
> *This procedure provides information and quidance [sic] to plant personnel for the correct and safe operation of Silver Lake.*

However, this document is essentially a description of the facilities prior to construction of tbe fuse plug. It describes dike 2, not the fuse plug. It does not address "the correct and safe operation of Silver Lake." The other three documents cover specific tasks – (1) installation/removal of stop logs (how, not when), (2) main valve operation, (how, not when), and (3) instrumentation data collection and evaluation (relating to piezometers).

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[5] Information provided to FERC by UPPCO on June 12, 2003 states that the May 7, 2003 Silver Lake Reservoir elevation was 1483.35 ft, so the reservoir level would have been 2.35 ft up the upstream face of the fuse plug. To the date of this report, MWH has not seen any documents indicating what efforts, if any, were made by UPPCO to comply with the License and bring the Silver Lake reservoir levels into the May operating range of 1478.5 ft (minimum) to 1479 ft (May 1 target) required by the October 4, 2002 FERC License.

The Operating Procedures in UPPCO's June 12, 2003, submittal to FERC do not address reservoir levels--they simply provide general instructions for mechanical tasks to be performed by operators. MWH has not found any statement in which UPPCO advised its operators that the Silver Lake Reservoir NMOL was 1481.5 ft or told them of the operation described in tbe Design Report. The Operating Procedures do not reference the monthly minimums and target level requirements in the License. Neither did these documents include any instructions or guidance regarding what an operator needs to do when the NMOL is reached or exceeded, e.g., "remove stop logs from Spillway Bay No. 4" or "open the low-level outlet to [a certain position]."

It appears that the apparently incomplete submission may be the reason that by letter of August 1, 2003, FERC instructed UPPCO "The reservoir operation plan for operating the reservoir after the completion of the construction of the fuse plug spillway should be provided." UPPCO responded to FERC's request on August 11, 2003 (Exh. 12), confirming that the four procedures listed above constituted its response by stating "WPS previously provided a copy of tbe operation plan for the Silver Lake reservoir on June 12, 2003."

Thus, MWH is not aware of any documentation indicating that as of May 2003 UPPCO had prepared a reservoir operation plan which incorporated the emergency fuse plug spillway. Indeed, a handwritten note in the margin on page 2 of FERC's August 1, 2003, letter used words to the effect that no new operation plan had been prepared. (This letter is CEII and cannot be copied).

5.1.5 FERC Standard of Performance for Licensees' Operations

FERC regulations (18 CFR §12.5) require a licensee to

> "..use sound and prudent engineering practices in any action relating to the...operation...of a water power project or project works."

Yet, UPPCO did nothing to update or prepare a reservoir operating plan despite a 4.75 ft decrease in normal operating level and a 3.5 ft decrease in the top of the Bay 4 stop logs.

5.2 UPPCO Operations – May 2003

5.2.1 May 7 Reservoir Level

UPPCO's June 12, 2003 submission to FERC stated that the reservoir level was 1483.35 ft on May 7, 2003 (about 4.35 ft higher than the May 1 target level, 2.35 ft up on the 5.5 ft high fuse plug, and 1.85 ft above the NMOL of 1481.5 ft). Thus, UPPCO was not operating in compliance with the License or the MDEQ 401 Water Quality Certification. Figure 5-1 illustrates reported reservoir levels for the period November 1, 2002, to May 15, 2003. The WGI report suggests that UPPCO never intended to meet target elevations or keep the reservoir at or below the NMOL of 1481.5 ft: "The past operational practice of Silver Lake has been to allow the lake to fill to the crest of the concrete ogee service spillway, El. 1486.25 ft. This has occurred every spring since 1996 . . ." (WGI Report, p II-3).

Figure 5-1

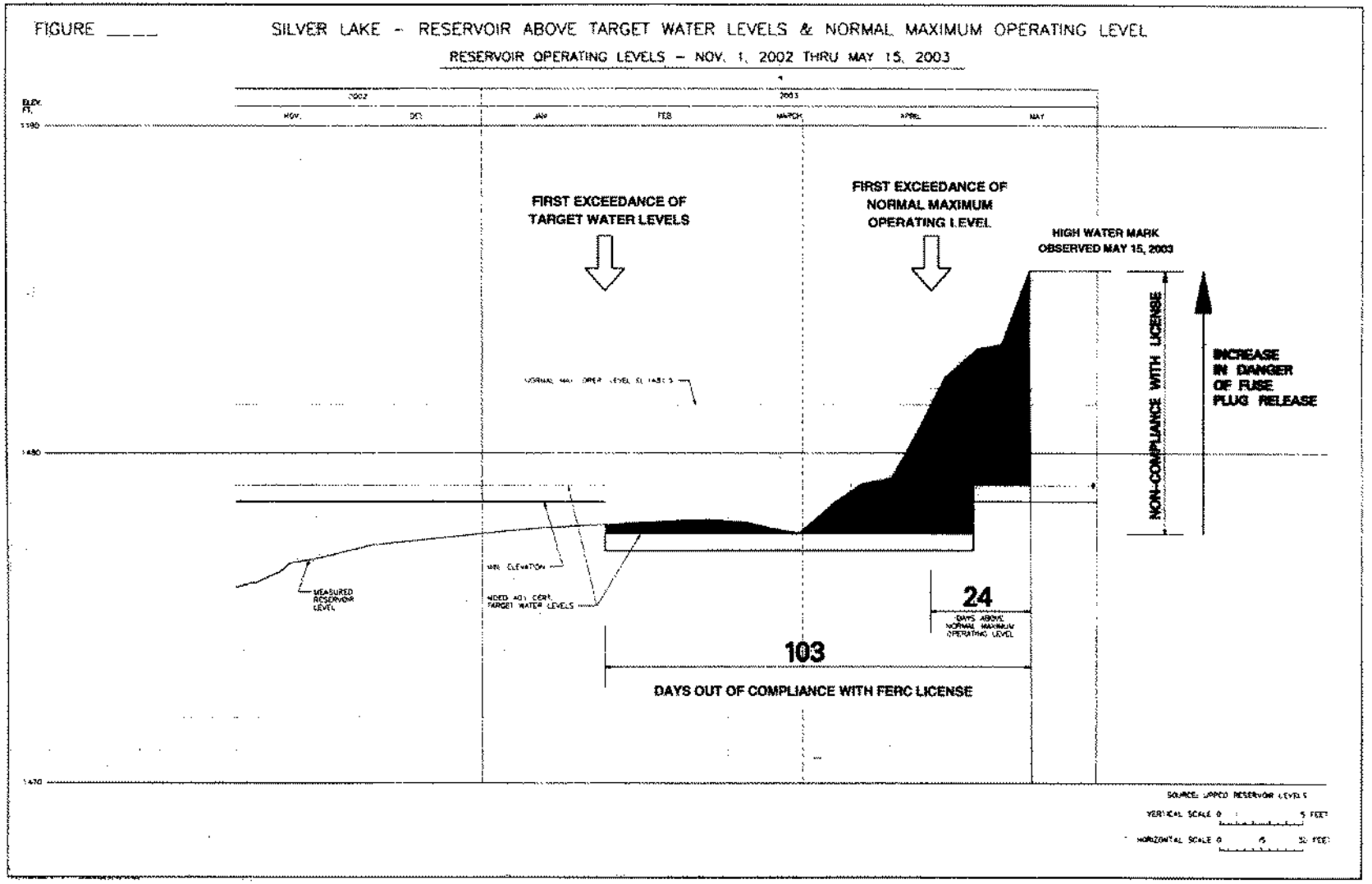


FIGURE ____
SILVER LAKE - RESERVOIR ABOVE TARGET WATER LEVELS & NORMAL MAXIMUM OPERATING LEVEL
RESERVOIR OPERATING LEVELS - NOV. 1, 2002 THRU MAY 15, 2003
2002
2003
NOV.
DEC.
JAN
FEB
MARCH
APRIL
MAY
FIRST EXCEEDANCE OF TARGET WATER LEVELS
FIRST EXCEEDANCE OF NORMAL MAXIMUM OPERATING LEVEL
HIGH WATER MARK OBSERVED MAY 15, 2003
NON-COMPLIANCE WITH LICENSE
INCREASE IN DANGER OF FUSE PLUG RELEASE
MEASURED RESERVOIR LEVEL
24
DAYS ABOVE NORMAL MAXIMUM OPERATING LEVEL
103
DAYS OUT OF COMPLIANCE WITH FERC LICENSE

5.2.2 May 9-15, 2003 Weather

5.2.2.1 NWS Data

Table 5-1 is NWS Marquette Station (actually located in Negaunee Township) precipitation, wind speed, direction, and other weather information for May 9-15, 2003.

Table 5-1—NWS Marquette Weather Data[6]

	Precipitation (inches)	Weather	Wind Peak Speed	Wind Direction
May 9	0.32	Thunder	31	90
May 10	0.03	Fog	18	90
May 11	2.32	Fog, Thunder	44	360
May 12	1.27	N	50	360
May 13	0.00	N	23	45
May 14	0.00	N	18	90
May 15	0.00	N	20	135

5.2.2.2 Widespread Knowledge of Impact of Rainstorm

According to reports in local media (WLUC-TV, Channel 6, and The Marquette Mining-Journal), the rain ended before noon on Monday, May 12, 2003. (Exh. 13) A front page newspaper account that same day stated that the reported rainfall was a record for the date and had resulted in flooding over many roads in the area. The article also stated that UPPCO was busy restoring service to customers who suffered outages because of the storm.

The following day, Tuesday, May 13, 2003, The Mining-Journal reported that high water had lifted a bridge located just north of the Dead River Basin off its foundation. Thus, the magnitude and impact of the storm was widely known among Marquette-area residents.

5.2.3 UPPCO Response to Rainstorm

5.2.3.1 UPPCO Did Not Conduct a Post-Storm Inspection at Silver Lake

UPPCO did not perform a post-storm inspection of the Silver Lake Reservoir or fuse plug, nor did it remove any spillway Bay 4 stop logs, or increase the opening of the low-level outlet following the storm. These points were confirmed by UPPCO representatives in a meeting held on May 16, 2003 at the UPPCO Ishpeming offices involving Tom Meinz (UPPCO), Gary Erickson (UPPCO), John Heikkila (UPPCO), Bob Meyers (UPPCO), Ben Trotter (UPPCO), Jim Evans (FERC), John Hawk (FERC), Norm Bishop (MWH), Craig Harris (MWH), and Manoshree Sundarum (MWH). The

[6] Table 5-1 NWS Marquette Station (actually located in Negaunee Township) precipitation, wind speed, direction, and other weather information for May 9-15, 2003 – the term "N" is not defined in the online data record.

Mining-Journal reported that a citizen stated it was widely known tbat the Silver Lake operator had been on vacation prior to the Event.

5.2.3.2 UPPCO Emergency Action Plan

In 2000, UPPCO prepared an Emergency Action Plan for Silver Lake, to he implemented in the event of a flood or dam failure incident. The Emergency Action Plan for Silver Lake was updated in December 2002, following construction of the Silver Lake fuse plug. MWH requested a copy of the 2002 Emergency Action Plan from FERC. MWH received a one-page transmittal letter with two enclosures—an organization chart and a record of training. If this represents the entire 2002 update, then the Emergency Action Plan was not revised to take the emergency fuse plug spillway or operational changes (e.g. stop log removal, low level outlet discharge) discussed in earlier sections of this report into account.

5.3 Post-Event Observations and Analyses

MWH engineers made the following observations at the Silver Lake facilities between Thursday, May 15, 2003 and Sunday, May 18, 2003, after the fuse plug released:

1. The low level outlet gate was just barely open to pass the October 4, 2002 FERC License minimum in-stream flow, and the manual control wheel was chain locked at this setting

2. The stop logs in Bay 4 were in place to 1486.15 ft. (Apparently the old stop logs had been completely removed and replaced with new stop logs at some time prior to the Event.)

The Silver Lake discharge capacity for certain conditions is shown in Table 5-1. This capacity was not utilized to draw down the reservoir following the storm on the morning of May 12, 2003. Assuming the May 12, 2003 reservoir level was 1483.35 ft (tbe reported level for May 7, 2003), over 1924 aere-ft of water could have been spilled in two days. This compares to an estimated 2400 acre-ft of inflow for May 11-14, 2003. **Thus, despite operating the reservoir almost two feet above the normal maximum, with timely action UPPCO could have created enough storage to have prevented tbe fuse plug release.**

Table 5-1 – Silver Lake Discharge Capacity

Reservoir Level (ft)	Low Level Outlet fully open(cfs)	Bay No. 4 with all stop logs removed (cfs)	Total Discharge Capacity (cfs)	24 Hour Discharge Capacity (acre-ft)
1483	378	107	485	962
1484	386	170	556	1102
1485	394	841	634	1259

Hydraulic simulations prepared by MWH establish that had UPPCO simply removed the Bay 4 stop logs to 1482.5 ft immediately following thc storm, the reservoir level would not have reached the pilot channels of the fuse plug. Figs 5-2 through 5-4, and Table 5-2, summarize the results of a hydraulic reservoir simulation of the 3.59 in. total rainfall at the NWS Marquette Station on May 11 and May 12,

Figure 5-2 Simulated Reservoir Water Levels at Silver Lake
Run 1

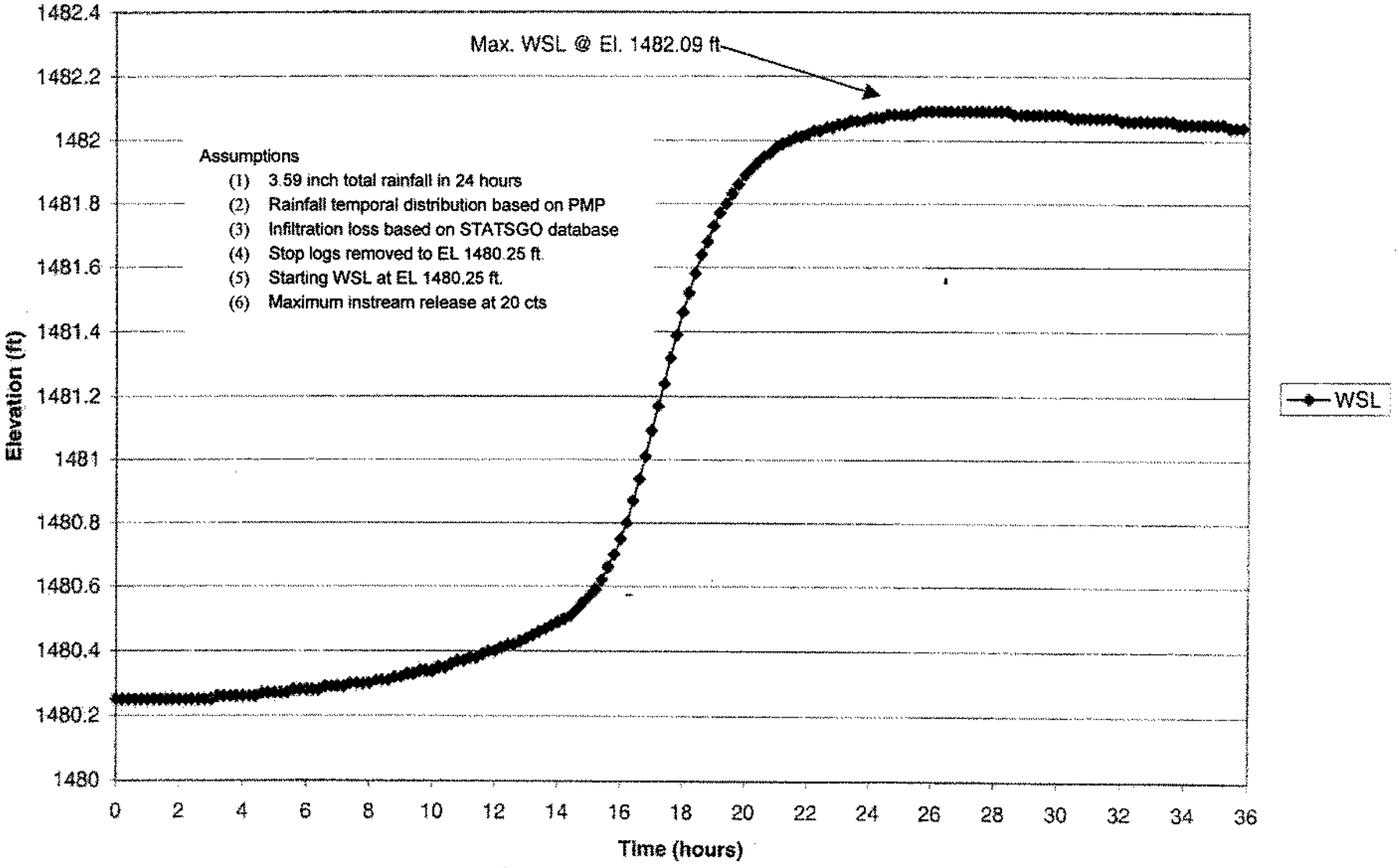


Figure 5-3 **Simulated Reservoir Water Levels at Silver Lake**
Run 2

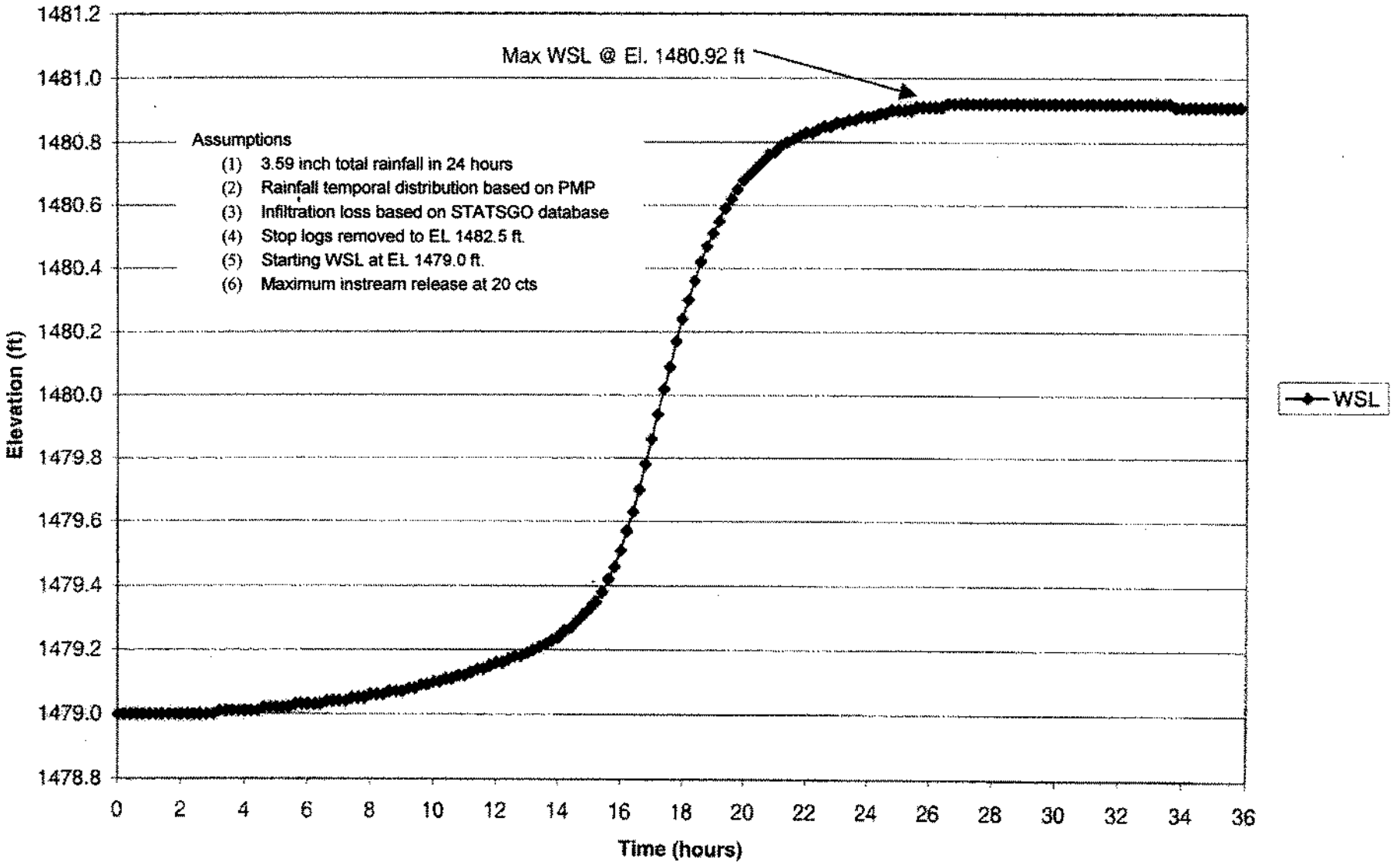
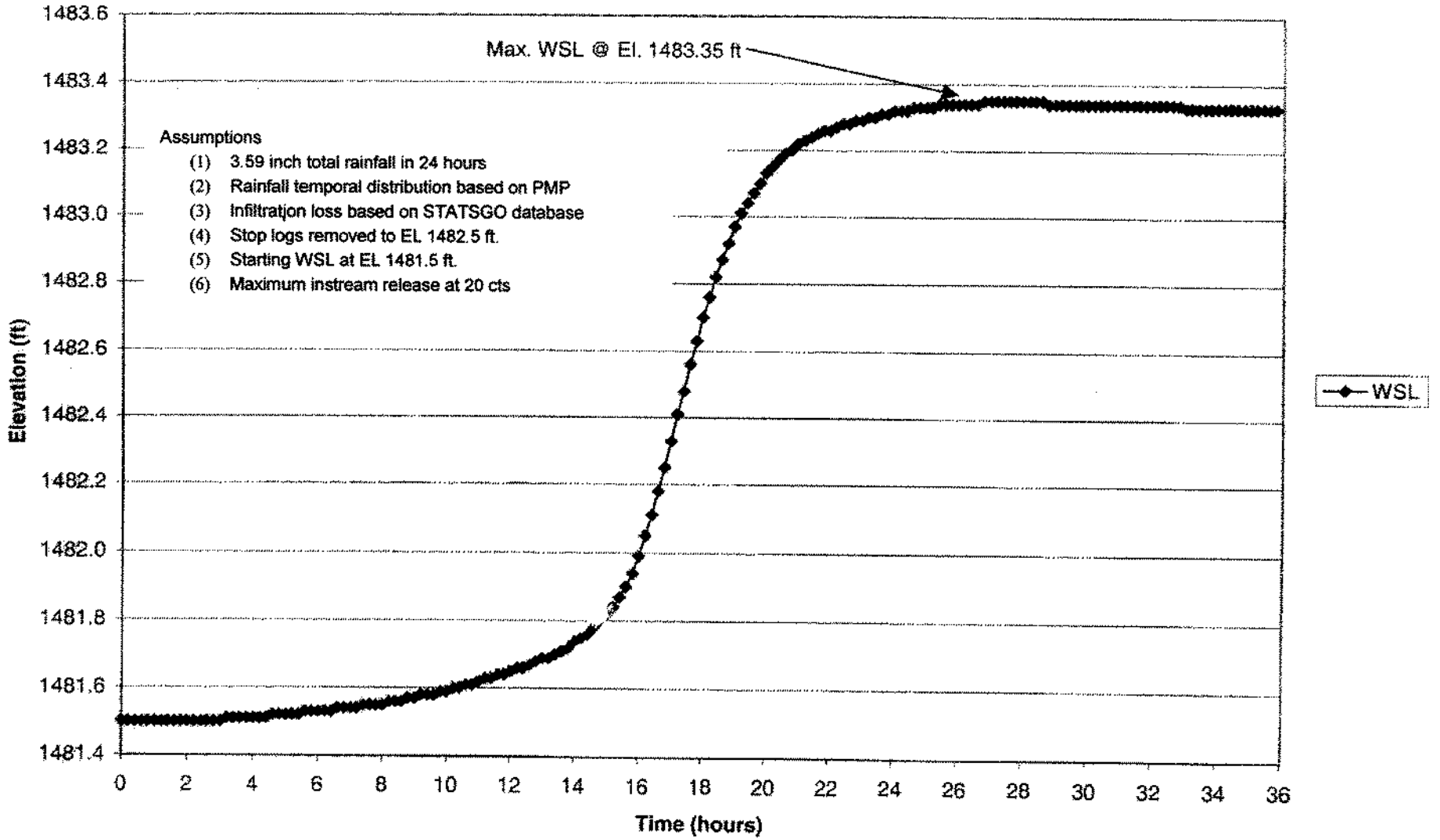


Figure 5-4 Simulated Reservoir Water Levels at Silver Lake Run 3



2003. The hydrologic reservoir simulation is based on a rainfall temporal and spatial distribution based on the Silver Lake PMP. Infiltration losses are based on NRCS STATSGO Database. The simulation demonstrates that under the most conservative scenario[7] listed in Table 5-2 below, the reservoir elevation would not have reached higher than 1483.35 ft, or 2.15 ft below the invert of the pilot channels of the fuse plug.

Table 5-2-- Summary of MWH Hydraulic Simulation Results

Run	Low Level Outlet	Stoplog Condition/ Elevation	Starting Reservoir Elevation	Maximum Reservoir Elevation Resulting from May 11-12 Storm
1	20 cfs	All removed 1480.25 ft	1480.25 ft	1482.09 ft
2	20 cfs	Normal 1482.5 ft	1479.0 ft (May 1 target)	1480.92 ft
3	20 cfs	Normal 1482.5 ft	1481.5 ft (NMOL and June 1 target)	1483.35 ft

5.4 Summary

The following facts clearly establish that UPPCO was responsible for the fuse plug release because of significant operational violations and failures:

- UPPCO did not have a plan to operate the reservoir in the fuse plug hydraulic regime
- UPPCO did not comply with the FERC License requirement to achieve a May 1 reservoir level of 1479.0 ft
- UPPCO allowed the reservoir to exceed the reservoir's NMOL for 24 consecutive days prior to the Event, thereby reducing flood storage capacity. Based on statements in the WGI report, (p. I-3) UPPCO intended to maximize storage, in clear violation of the License and the MDEQ 401 Water Quality Certification
- At the time of the storm, the low level outlet was almost closed and the Bay 4 stop logs were in place to 1486.15 ft
- UPPCO was or should have been aware of the record rainfall and its impact on reservoir levels
- UPPCO did not visit or inspect the Silver Lake facilities immediately following the May 11-12 storm
- UPPCO did not open the low level outlet or remove any Bay 4 stop logs after the rainstorm

[7] Bay 4 stop logs at the specified elevation of 1482.5 ft, minimum low-level outlet in-stream release of 20 cfs, and starting reservoir elevation of 1481.5 ft (NMOL).

6.0 WGI REPORT - - FACTUAL ERRORS AND INCORRECT ASSUMPTIONS

6.1 Introduction

MWH is still in the process of reviewing the WGI Report. However, following is a tabular summary of several factual errors and incorrect assumptions, accompanied by the correct information and MWH comments.

6.2 Initial Comments on Certain Statements Made in Washington Group International ("WGI") Report of October 6, 2003

WGI Statement	Fact(s)	Comments
Normal Maximum Operating Level is 1486.25 ft (pp. I-3).	Normal Maximum Operating Level is 1481.5 ft	1. WGI apparently misread the FERC license. The statement in the FERC license regarding a 1486.25 ft normal operating level was in a description of the Silver Lake facilities as they existed prior to the fuse plug project. 2. If 1486.25 ft was the NMOL the monthly target levels in the License would be meaningless and the fuse plug would have eroded before the reservoir level reaching that level. 3. The purpose of the fuse plug project was to permanently lower the NMOL of Silver Lake to provide required freeboard on the upstream side of the dam in the event of the PMF. To achieve this, the elements of the project were: o Abandon use of the concrete overflow spillway capacity in hydraulic calculations because if the PMF flowed over this spillway there would not be sufficient freeboard on the upstream side of the dam. o Lower normal maximum operating level to 1481.5 ft o Lower Bay 4 stop logs to 1482.5 ft

WGI Statement	Fact(s)	Comments
The fuse plug was designed and constructed too low (pp. ES-2).	1. The fuse plug was designed at an elevation determined through several hydraulic studies. 2. The fuse plug crest elevation was reviewed and approved by FERC and UPPCO.	1. WGI apparently misunderstood the FERC license, and the design concept. The normal maximum operating level was established by the MDEQ in its 401 Water Quality Certification. 2. There is no basis for this WGI statement.
The [Bay 4] stop logs are not readily removable (p. I-5).	1. The stop logs were removed and replaced by UPPCO within the past two years. 2. UPPCO has a written procedure for removal of the stop logs. 3. UPPCO has stoplogs at several dams and knows how to remove them	1. There is no basis in fact for this WGI statement. 2. Any analysis not considering the discharge capacity of spillway Bay 4 with stop logs removed to 1482.5 ft will yield incorrect results.
The low level outlet has a discharge capacity of about 300 cfs at a water surface level of about El. 1485 ft (p. I-6).	The low level outlet has a discharge capacity of 394 cfs at a reservoir level of 1485 ft.	WGI underrated the low level outlet discharge capacity by almost 25 percent.
The Silver Lake fuse plug design approach was contrary to the key standard design concept which is for the fuse plug to wash out in a predictable and controlled manner when the flow capacity needed exceeds the normal capacity of the service spillway and the outlet works (p. II-1).	The various reports consistently referred to the proposed fuse plug as an emergency spillway which would operate when there was a PMF—a very rare event.	The Silver Lake fuse plug design approach was consistent with the key standard design concept - - to erode in the event of a PMF.

The fuse plug spillway was designed to allow flow through the pilot channel before the lake level reached the crest of the concrete ogee service spillway (p. II-1).	1. This is a correct statement, but is neither relevant nor stated in the correct context 2. The concrete ogee service spillway is not a component of the fuse plug design. It had to be abandoned because of safety/freeboard concerns.	The operating sequence was quite simple and well understood by UPPCO: 1. Maintain reservoir level to meet monthly targets, but not to exceed normal maximum operating level of 1481.5 ft. 2. Maintain Bay 4 stop logs at 1482.5 ft under normal conditions. 3. Regulate reservoir levels via use of low level outlet valve and, if necessary, removal of Bay 4 stop logs.
Fundamentally, the fuse plug spillway became the service spillway (p. II-1)	The fuse plug spillway was designed to operate only after the combined capacity of the low level outlet and Bay 4 were exceeded, i.e. as an emergency spillway	The fuse plug spillway operated because UPPCO had not: 1. Removed Bay 4 stop logs to 1482.5 as required by the design and as it had committed to do. 2. Met the May 1 target (maximum) elevation of 1481.5. 3. Used the low-level outlet or removed stop logs or both, to spill water after the storm.
An assumed normal maximum lake level of 1481.5 ft conflicts with the normal lake operating elevation provided in the license (p. II-3)	1. The maximum target reservoir elevation stated in the License is 1481.5 ft. 2. The normal maximum lake level was not assumed. It was developed through simulation and flood routing studies, and review/analysis/ concurrence by UPPCO and FERC.	1. This was derived from the monthly operating ranges required by MDEQ 2. There is no conflict.

The designers' hydrology and hydraulics evaluations for the 2002 design modification should have verified the ability of the project operational features, i.e., the low level outlet in bay 4, the concrete spillway (with stop logs as it was configured) to control the lake elevation and the lake level from increasing to 1485.5 ft (pilot channel invert elevation). (pp. II-3 and 4)	Flood routing reports and hydraulic simulations did just that.	The flood routing reports were reviewed and approved by FERC and UPPCO.
There is no requirement in the FERC license to remove the stop logs to elevation 1482.25. (p. II-4)	1. This is true; the license is an operating license. 2. Removal of the stop logs was to have taken place during construction. 3. Stop log removal was clearly required by design reports and the draft construction drawings and specifications. 4. Stop log removal was deleted from the scope of the construction contract by UPPCO. 5. UPPCO stated that it would remove the stoplogs to 1482.5 ft. 6. UPPCO did not remove the stop logs to 1482.5 ft.; it replaced them to 1486.1 ft.	1. Using the logic of this WGI statement, the fuse plug construction should have been required hy the License. 2. By not removing the stop logs as it said it would, UPPCO intentionally maximized reservoir storage as it had in past years, in clear violation of the License.