20040217-0201 Issued by FERC OSEC 02/12/2004 in Docket#: P-2277-000

OPERATION REPORT

Federal Energy Regulatory Commission
Chicago Regional Office
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For the period March 14, 2002 to October 23, 2003

Licensee Ameren UE Project No. 2277

Project Name Taum Sauk NATDAM Nos. MO30040 and MO30041

Location East Fork, Black River Reynolds Missouri
(Water or reservation) (County) (State)

License issued August 26, 1965 Expires June 30, 2010 Type Major

Date of last amendment March 3, 1977, Amended License Articles Nos. 7 and 35

Inspected by Kevin S. Richards Date October 23, 2003

Parts of Project Inspected All visible portions of water-retaining structures

Weather 58 degrees F., clear and dry.

Accompanied by Mr. Rick Cooper and Jeff Scott, representing the licensee

Summary

The impoundment and control structures appear to be in satisfactory condition with no deficiencies affecting dam or public safety. The licensee continues an effective program of inspection and maintenance. Security measures were discussed and appropriate actions taken. The licensee is in compliance with the license requirements.

Submitted: February 12, 2004
By: Kevin S. Richards, P.E. P.G.

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PERTINENT DATASHEET

---------- FERC.... D2SI.... Chicago Regional Office----------

General Data

Dam Number:	02277-01-01	River:	E FK BLACK
Project Name:	TAUM SAUK P/S	Drainage Area (sq/mi):	0
Development:	TAUM SAUK	D/S Hazard:	H
Lake Name:	UPPER RESERVOIR	DS City :	LESTERVILLE
Dam Name:	TAUM SAUK PS UPPER	Distance (mi):	6
State,County:	MO REYNOLDS	Completion Date:	1963
USGS Quad:	JOHNSON SHUT-INS 7.5'		
Latitude:	37.5333	Last Inspection Date:	10/23/2003
Longitude:	-90.8167		

Hydrologic Data

PMF (cfs):	
IDF (cfs):	
100-YR Flood (cfs):	
Flood of Record (cfs):	No Data
Minimum Flow Required (Y/N):	
Lowest Minimum Flow (cfs):	

Reservoir Data

Surface Area (acres):	
Normal:	200
Pool Elevation (msl)	
Max:	1,596.00
Normal:	1,589.00
Minimum:	1,505.00
Reservoir Storage (acre-ft)	
Maximum:	4,350
Normal:	2,560

Project Works

Type of Dam:	
Type 1:	ROCKFILL
Type 2:	
Type 3:	
Dam Height (ft):	84
Dam Crest Elevation (msl):	1597
Length of Dam (ft):	6562
Flashboards installed (Y/N):	N
Flashboard Elevation (msl):	Not Applicable
Uncontrolled Spillway Length (ft):	N/A
Uncontrolled Spillway Crest (msl):	N/A
Number of Powerhouses:	1
Authorized Gen. Capacity (kW):	468,000
Number of Generating Units:	2
Number of Penstocks:	1
Number of Canals:	0
Number of Tunnels:	3
Number of Locks:	0

Safety Requirements

Consultants Safety Inspection Report	
Required (Y/N)	Y
Latest Report Submitted	8/26/2003
Emergency Action Plan(EAP) Status:	SAT
Latest EAP/EAP Mod:	1/6/2004
Boat Restraining Barrier Req. (Y/N):	N
	Mo. Day
Date In :	
Date Out:	

Gate Count by Type

Category 1 Gates (Y/N): No

Tainter	Vert Lift	Slide	Drum	Bascule
0	0	0	0	0
Needle	Roller	Valve	Flap	Other
0	0	0	0	0

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PERTINENT DATASHEET

---------- FERC.... D2SI.... Chicago Regional Office----------

General Data

Dam Number:	02277-02-01	River:	E FK BLACK
Project Name:	TAUM SAUK P/S	Drainage Area (sq/mi):	88
Development:	Taum Sauk - Lower Reservoir	D/S Hazard:	H
Lake Name:	Lower Reservoir	DS City :	LESTERVILLE
Dam Name:	TAUM SAUK PS LOWER	Distance (mi):	3
State,County:	MO REYNOLDS	Completion Date:	1963
USGS Quad:			
Latitude:	37.4833	Last Inspection Date:	10/23/2003
Longitude:	-90.8333		

Hydrologic Data

PMF (cfs):	115000
IDF (cfs):	
100-YR Flood (cfs):	
Flood of Record (cfs):	36000
Minimum Flow Required (Y/N):	N
Lowest Minimum Flow (cfs):	

Reservoir Data

Surface Area (acres):	
Normal:	
Pool Elevation (msl)	
Max:	
Normal:	
Minimum:	
Reservoir Storage (acre-ft)	
Maximum:	
Normal:	

Project Works

Type of Dam:
Type 1: GRAVITY
Type 2:
Type 3:

Dam Height (ft):	60
Dam Crest Elevation (msl):	N/A
Length of Dam (ft):	390
Flashboards installed (Y/N):	N
Flashboard Elevation (msl):	Not Applicable
Uncontrolled Spillway Length (ft):	
Uncontrolled Spillway Crest (msl):	
Number of Powerhouses:	0
Authorized Gen. Capacity (kW):	
Number of Generating Units:	0
Number of Penstocks:	0
Number of Canals:	0
Number of Tunnels:	0
Number of Locks:	0

Safety Requirements

Consultants Safety Inspection Report
Required (Y/N) Y
Latest Report Submitted 8/26/2003

Emergency Action Plan(EAP) Status: SAT
Latest EAP/EAP Mod: 1/6/2004

Boat Restraining Barrier Req. (Y/N): Y

	Mo.	Day
Date In :	04	01
Date Out:	11	15

Gate Count by Type

Category 1 Gates (Y/N): No

Tainter	Vert Lift	Slide	Drum	Bascule
0	0	0	0	0
Needle	**Roller**	**Valve**	**Flap**	**Other**
0	0	0	0	1

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PERTINENT DATASHEET

---------- FERC.... D2SI.... Chicago Regional Office----------

General Data

Dam Number: 02277-03-01
Project Name: TAUM SAUK P/S
Development: Gravel Trap
Lake Name:
Dam Name: GRAVEL TRAP DAM
State,County: MO REYNOLDS
USGS Quad: JOHNSON SHUT-INS
Latitude: 37.4833
Longitude: -90.8333

River: E FK BLACK
Drainage Area (sq/mi): 65
D/S Hazard: L
DS City : LESTERVILLE
Distance (mi): 7
Completion Date: 1963

Last Inspection Date: 3/14/2002

Hydrologic Data

PMF (cfs): 85000
IDF (cfs): N/A
100-YR Flood (cfs): No Data
Flood of Record (cfs): No Data
Minimum Flow Required (Y/N):
Lowest Minimum Flow (cfs):

Reservoir Data

Surface Area (acres):
Normal: 4
Pool Elevation (msl)
Max: 748.00
Normal: 748.00
Minimum: 748.00
Reservoir Storage (acre-ft)
Maximum: 20
Normal: 20

Project Works

Type of Dam:
Type 1: OTHER
Type 2:
Type 3:

Dam Height (ft): 8
Dam Crest Elevation (msl): 748
Length of Dam (ft): 400
Flashboards installed (Y/N): N
Flashboard Elevation (msl): Not Applicable
Uncontrolled Spillway Length (ft):
Uncontrolled Spillway Crest (msl):
Number of Powerhouses: 0
Authorized Gen. Capacity (kW):
Number of Generating Units: 0
Number of Penstocks: 0
Number of Canals: 0
Number of Tunnels: 0
Number of Locks: 0

Safety Requirements

Consultants Safety Inspection Report
Required (Y/N) N
Latest Report Submitted

Emergency Action Plan(EAP) Status: SAT
Latest EAP/EAP Mod: 1/6/2004

Boat Restraining Barrier Req. (Y/N): N

	Mo.	Day
Date In :		
Date Out:		

Gate Count by Type

Category 1 Gates (Y/N): No

Tainter	Vert Lift	Slide	Drum	Bascule
0	0	0	0	0
Needle	Roller	Valve	Flap	Other
0	0	0	0	0

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A. Downstream Hazard Potential

The hazard rating for the Upper Dam was established following the 1989 operation inspection and review of the 1988 revisions to the EAP. A dam failure analysis was performed for the EAP, which qualitatively assessed the impacts of a breach in both the Upper and Lower Dams. The analysis did not determine the incremental rise in the downstream water surface elevation or the quantitative impacts on structures. The EAP only discusses a normal condition failure event since the Upper Dam is a pumped-storage reservoir. The Johnson Shut-Ins State Park and campgrounds are at risk from a failure of the west side of the Upper Dam. There are no developments in the projected floodway from a failure of the north or east sides. The flood wave from a failure of the Upper Dam would eventually flow into the lower reservoir via the Black River and place the recreational users of the lower reservoir at risk.

The present hazard rating for the Lower Dam was established following the 1999 operation inspection. After reviewing available data on recent flooding compared to the qualitative analysis for the EAP, we concluded that a definitive conclusion regarding the hazard classification could not be reached because of uncertainty in the available data and analysis. However, there is sufficient evidence to conclude that a failure of the Lower Dam during normal flow conditions might create a high risk for loss of life and significant property damage due to the proximity of the village of Lesterville and county highways.

Both the upper and lower dams are classified as having high hazard potential. The licensee maintains emergency action plans for both dams. No change in development in the vicinity of the project was reported or observed during this inspection. The current **High** hazard potential rating is appropriate.

B. Project Safety and Maintenance

This report includes 58 photographs and an exhibit annotated to show the position and orientation of the camera for each photograph. Exhibit 1 is a plan view of the project.

1. Dams, Dikes and Appurtenant Structures. This is a pumped-storage project, with an upper and a lower reservoir. The lower reservoir, operated as a run-of-river reservoir with outflow maintained approximately equal to natural inflow, provides storage for water to be pumped to the upper reservoir at night. The water volume used to generate electricity is cycled between the lower and upper reservoir, so the water elevations of the lower and upper reservoirs fluctuate depending on the pumping/generating modes of operation and time of day. The project structures include a concrete faced rockfill dam (dike), that encircles and forms the upper reservoir; a concrete gravity dam impounding the lower reservoir; a reversible turbine powerhouse; a gravel trap dam located upstream of outlet canal in the lower reservoir, and a small dike that impounds the seepage collection pond at the toe of the upper reservoir. The turbine/generator sets are designed to operate in reverse to pump water to the upper reservoir at

night. During the daylight peak-demand hours, the turbine/generator sets operate in normal gravity-feed mode to generate electricity.

Upper Reservoir:

Upper Dam- The upper reservoir is created by a kidney shaped ring dike (Upper Dam) at the top of a planed-off mountaintop. The rockfill Upper Dam has a maximum section approximately 94 feet high and is topped by a concrete parapet wall approximately 10 feet high (Photographs 1, 2 and 3).

Minor sloughing was observed in areas of Upper Dam that contained a greater proportion of aggregate. However, the underlying riprap appears stable and in good condition. No unusual settlement, leakage, or displacements were noted in the crest or parapet wall (Photographs 4, 5, and 6). Pattern cracking is present in the parapet wall, as noted in our previous inspections. The cracking has not changed appreciably since our previous inspection (Photograph 7). Significant leakage was observed on the northwest (Photographs 8, 9, and 10) and southeast (Photographs 11, 12, 13, 14, and 15) sides of the dike near the toe. Leakage is being adequately monitored and is reported to the FERC biannually. Over the past several years the leakage rate has gradually increased approximately 2-fold. Geomembrane was purchased in 2002 and is stockpiled on-site for installation in fall 2004. The work was originally scheduled to be completed in 2002 but was halted due to contractor delay in finishing the work. The work was to resume in the fall of 2003 but was again delayed to fall of 2004. We recommend that the licensee not delay the repairs beyond 2004 due to concerns related to the increased leakage (see below). The licensee has budgeted $2 million to complete the work this fall.

A concrete lined access tunnel is located on the northeast side of the Upper Dam, which allows access to the floor of the reservoir when it is dewatered. The access tunnel was inspected and found to be in good condition (Photographs 16, and 17). No significant cracks or leakage were noted in the lining. The steel bulkhead at the head of the tunnel was also in good condition with no leakage from the seals and the concrete reaction blocks were also in good condition with no signs of distress or deterioration (Photograph 18).

Collection Pond Dike- Drainage ditches surrounding the toe of the dike direct all leakage into a collection pond (Photograph 19). A small dike retains water in the collection pond, where it is pumped back into the upper reservoir (Photograph 20). When the leakage rate exceeds the pump back capacity, water spills from the collection pond and eventually wends its way down to the lower reservoir (Photograph 21). The spillway for the collection pond is a rockfill dike with a thin concrete slab on the crest. The concrete slab appears damaged with dislocated joints (Photograph 22). The licensee reported that the spillway was repaired with large riprap due to erosion and back-cutting that occurred in the spring of 2002. The erosion was due to a large amount of leakage from the Upper Reservoir after the plant was brought back on-line, which was also accompanied by heavy rainfall. Minor erosion was also noted on the downstream face of the collection pond dike where a low spot in the crest is present at the right abutment

(Photograph 23). Minor seepage was occurring near the toe in the same area. The seepage was clear, very low discharge, with red algae accumulation, indicating it has been present for some time. The downstream slope of the collection pond dike is heavily overgrown with brush and trees (Photographs 24 and 25). It was not possible to inspect the slope closely but the areas that were accessible appeared stable, dry and composed of rockfill. The dike has a very wide crest with an aggregate road on top, except in the area of the concrete spillway slab.

Based on review of the previous dam break analyses for Sunny Day failure of the Upper reservoir and comparison of the amount of storage in the Upper Reservoir to the small storage in the seepage collection pond we conclude that this structure has a Low Downstream Hazard potential. If the seepage collection pond dike were to fail, a small volume of water would discharge into the Lower Reservoir, which would contain the total volume of discharge. No adverse impact would occur downstream of the project. We recommend the seepage collection pond dike and spillway not be included in the license as a separate water retaining structure as it is just part of the seepage collection system and it is not critical to the overall operations of the project. However, the structure should be periodically inspected during future inspections as an ancillary structure to the Upper Reservoir.

Lower Reservoir:

Concrete Dam- The lower reservoir gravity dam is about 60 feet high and 390 feet long founded on rock with rock abutments at each end (Photograph 26). Both abutments were in good condition at the time of our inspection with no signs of instability or excessive seepage (Photographs 27, 28, and 29). The concrete appeared to be in good condition with no evidence of significant cracking, spalling, deterioration, or displacements (Photograph 26 and 30). Minor leakage was noted along horizontal joints in the right and 2 center monoliths but the discharge was very small (Photograph 26).

The minimum flow gate was open 6% at the time of our inspection with a flow of approximately 25 gpm (Photograph 31). No other flow was occurring over the dam. However, the creek below the Upper Dam was full of water due to the leakage from the Upper Reservoir (Photograph 32). The plunge pool below the toe of the dam appeared to have only minor scour and was in good condition (Photograph 31).

Minor modifications were made to the dam during this reporting period. A steel deck, stoplog rack, and lifting beam were added for storage and placement of stoplogs at the sluice gate bay (Photograph 33). This work was completed during the summer of 2003 and was not coordinated with the FERC. Upon review following this inspection, we found that the new deck would have no significant impact to the spillway capacity or stability of the dam, and therefore no further coordination is recommended. In addition to these modifications, the licensee replaced the cables on the boat barrier with stainless steel cables (Photograph 34).

Gravel Trap Dam: The gravel trap dam is a low head steel sheet-pile and rock crib structure designed to trap gravel in the river before it washes into the lower reservoir. The steel sheet piling was plumb with no separation of interlocks or leakage of fill.

Pump/Powerhouse: We closely inspected each level of the pump house/powerhouse and observed no significant cracking, concrete deterioration or other structural distress (Photographs 35, 36, and 37). Leakage in the abutment (in the exterior of the powerhouse) where the steel penstocks exit the tunnel portal, was similar to that noted during our previous inspection (Photograph 38). The leakage has increased during the past two years, the licensee is not sure if the water was due to leakage from the tunnel/penstocks or from natural groundwater. We noted that there was runoff exiting the slope above the penstock portal (Photograph 39). Upon closer inspection we found a spring near the ledge (Photograph 40). The source of the water was unknown. Since the quantity of seepage is small, and the licensee is monitoring the seepage, we recommend continued monitoring.

The headwall, where the steel penstocks enter the powerhouse, appeared in good condition with no significant cracking, and with efflorescence and very minor leakage from the joint around the opening (Photograph 41, 42).

2. Spillway Gates and Standby Power. Certification of gate operation is not required for the Taum Sauk Project. The lower dam contains a sluice gate and pipe gate used to regulate run-of-river and minimum flows, respectively. Both gates can be operated remotely from the plant via microwave (Photograph 43) or manually. The large sluice gate can pass up to 2,500 cfs. The gate motor, rising stem, gear box and manual crank appeared in good condition (Photograph 44). Backup power for the main sluice gate is a manual hand crank. The 20-inch diameter pipe is equipped with an electronic cutoff that stays 5% open to pass minimum flows. Debris is cleaned from the gates on an as-needed basis with an outside contractor. Neither gate is needed to pass the flood flows, as the dam is designed as an overflow structure. Gate valves in the powerhouse are used to isolate the pumps/generators from the penstock tunnel and upper reservoir. Steel bulkheads for the draft tubes, now stored on the upstream rack, were in good condition.

3. Power Plants. There have been no modifications to the generating equipment. The turbine nameplate ratings are 295,000 HP with a flow of 2,650 cfs under a 790' head. The generators are each rated at 204,000 KW, but the licensee reported power generation can be as much as 220,000 KW with an 80% gate opening.

The power plant equipment is well-maintained and clean (Photographs 45, 46, 47, 48, 49 and 50). At the time of our inspection the Headwater was 1583.7, Tailwater 737.1 with no discharge. Both units were off and generating no power.

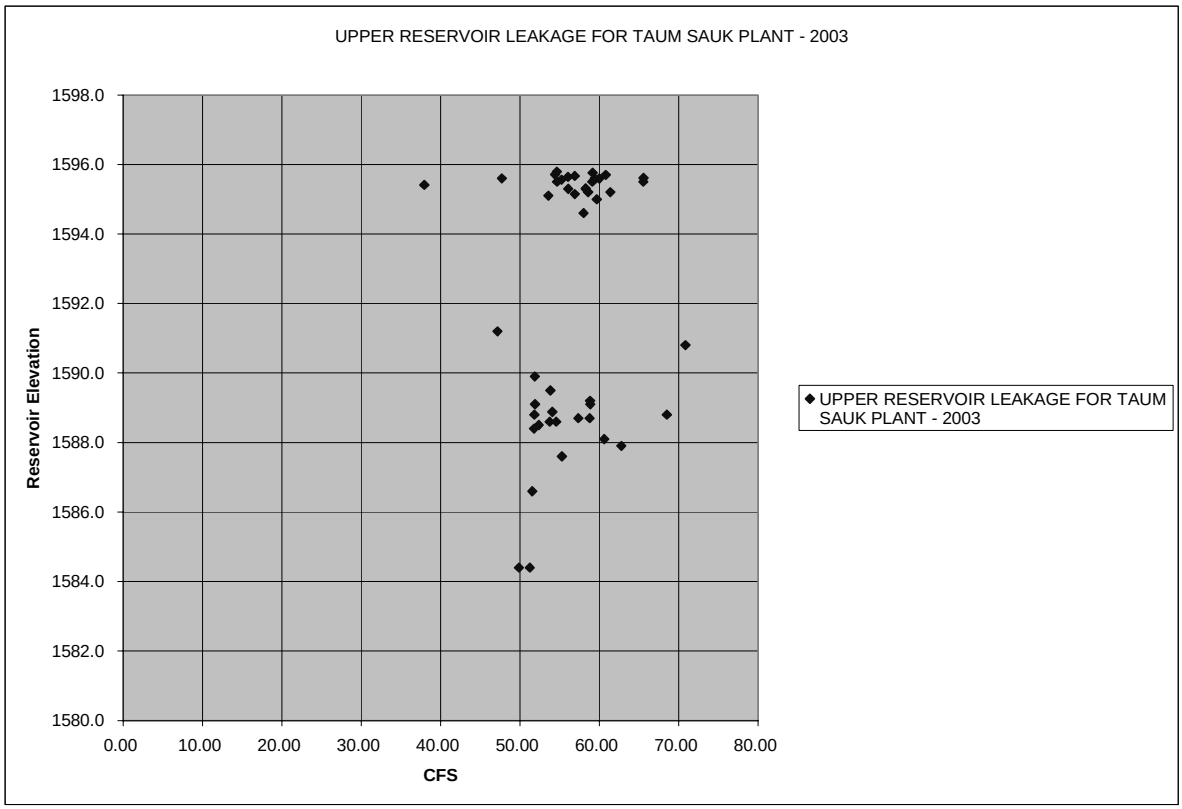
The licensee repaired cracks in the steel tunnel lining by welding, during this reporting period. A report concerning the repairs was filed on November 12, 2002.

4. Reservoirs. The upper reservoir contains a maximum of 2,672 acre feet which is temporarily stored in the lower reservoir in-between pumping cycles. The 2,672 acre feet are pumped back to the upper reservoir at night. Hence, the reservoir level of the lower reservoir fluctuates significantly depending on the time of day and power demands. The licensee began a program to stem leakage from the upper reservoir in 2002. A interim repair report was filed on November 12, 2002. The remaining work, installation of the geomembrane liner, is schedule for fall 2004.

Although the lower reservoir level fluctuates, the flow being passed to the downstream areas is being maintained at run-of-river by use of the minimum flow pipe and sluice gate at the lower dam. The lower dam was free of debris, no water was passing over the spillway (Photographs 51, and 52). The slopes of the lower reservoir appeared stable (Photographs 53, and 54). The licensee indicated they have raised the normal pool at the lower reservoir from 736.00 ft M.S.L. to 737.0 M.S.L. to provide needed storage for pump-back. Apparently the reservoir has silted in somewhat, reducing the available storage.

The upper reservoir was clear of debris and mostly full at the time of the inspection (Photograph 55).

5. Instrumentation. In accordance with Article 34 of the license, the licensee monitors the leakage from the upper reservoir and sends us a report on weekly observations every six months. The latest report was filed January 12, 2004. Leakage has decreased since repairs were performed in 2002 (see graph below) and appears to be relatively stable now at around 60 cfs +/- 10 cfs. The current amount of leakage is relatively independent of the reservoir elevation.



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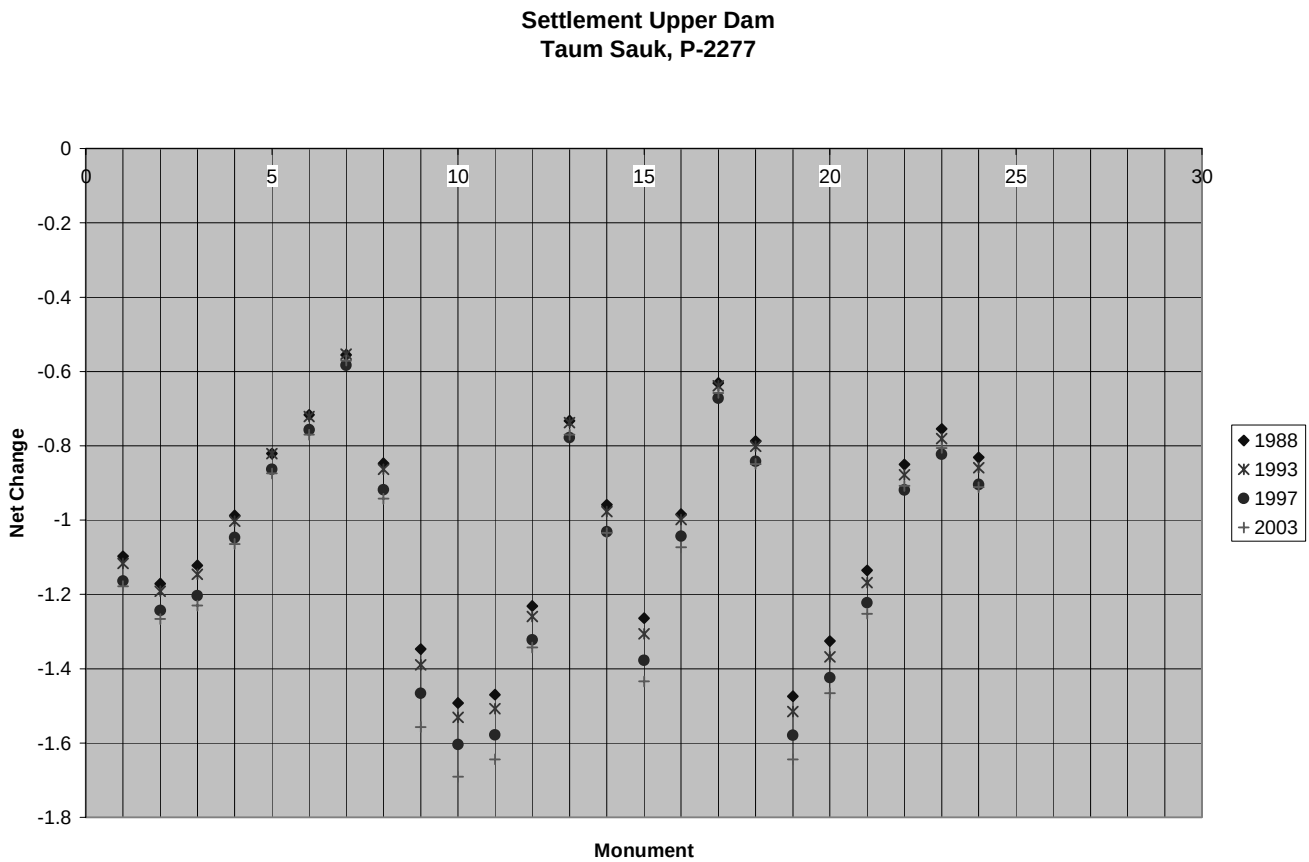
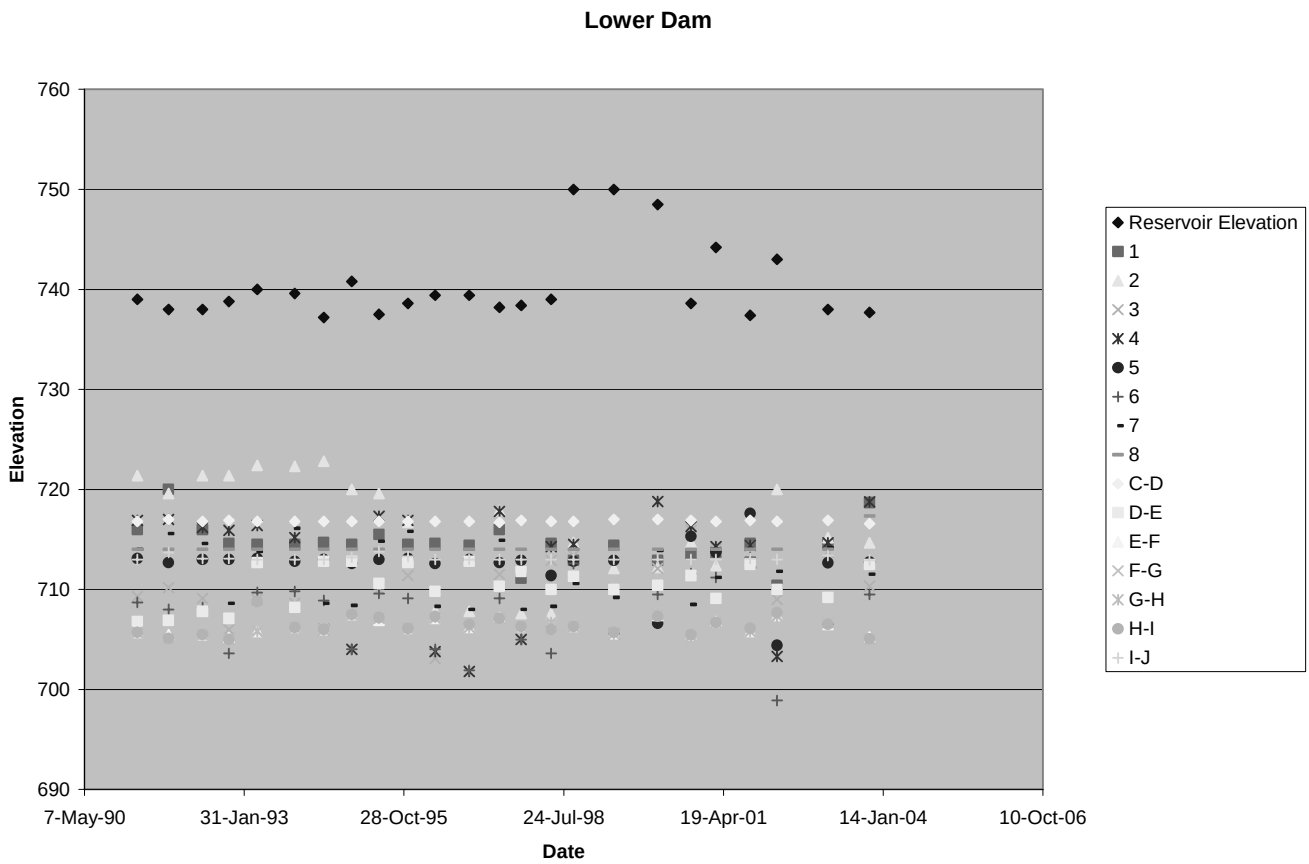
Settlement monuments are surveyed every five years in conjunction with the consultant's safety inspection. There were no significant settlements reported in the recent consultant's safety inspection; however, the survey for 2003 was not yet available at the time the Part 12D report was written and was not included in his analysis. We requested the 2003 survey data from the licensee in our letter of October 24, 2003, which was filed December 26, 2003. Historic settlement readings indicate a general asymptotic settlement trend leveling off around 1975. The readings taken in November 2003 were plotted for comparison to earlier data, the results are shown below. Note that the datum used for the 2003 survey is different from the previous surveys. Hence, interpretation of the readings is difficult, until we can clear up this discrepancy. The average difference in the change in elevations between 1997 and 2003 was about -0.5 feet at each monument. Since the readings had been more or less flat in the previous years, a +0.5 foot correction was made to the 2003 readings to estimate relative movements. The following graph includes this approximation for the current readings:



Note that the rate of settlement has appeared to increase slightly, especially in the monument with the maximum settlement. Monument 10 settled almost 1.2 inches. We will request an additional survey be taken in the next 12 months, to correct the datum error and confirm the apparent change in rate of settlement. The Part 12D consultant suggested that the settlement may have increased during this reporting period due to the increased seepage.

Elongation was monitored in earlier Part 12D reports by measuring and summing joint gaps in the parapet wall between each of the 111 panels. The movements were found to fall within normal tolerances due to temperature variation by the 1988 Part 12D report. Elongation readings are no longer taken.

The licensee also maintains eight piezometers in the gallery of the lower dam and monitors them twice a year. We reviewed piezometer readings for the past several years during this inspection, and found uplift pressures to fall within normal ranges (see graph on next page).



The licensee recently took soundings in the tailrace area near the gravel trap dam. This area is periodically dredged to prevent a sediment dam from forming at the outlet of the tailrace channel. No significant problems were noted. The area below the Lower Dam has not been sounded recently. The 2003 Part 12D inspection reported that the downstream toe of the dam was underwater and could not be inspected for scour, similar to the observations made during this inspection. One of the recommendations was to perform soundings, which the licensee plans to do within the next year.

An instrumentation inspection was conducted in 1998. The instrumentation program was satisfactory; however, we requested that some modifications be made pertaining to the recording and data reduction methods. During the present inspection, we noted that the charts have not

been updated since 1998 and that the licensee is only maintaining tabular records. We have requested that the licensee maintain graphical records.

No unusual instrumentation readings were reported. The licensee is continuing to monitor flow from the tunnel annular space. We requested that they also monitor flow exiting the slope above the tunnel. Other than those items discussed above, the licensee's instrumentation program was acceptable.

6. Licensee's Inspection Program. There have been no changes to the licensee's inspection program during this reporting period. The project is not manned 24 hours a day, but is monitored remotely 24/365 by operators at Bagnell Dam (Osage Project No. 459), which is continuously manned. The Plant Superintendent visits the structures at least once a week. On-site personnel drive the area at least twice a day. An independent consultant performs an inspection every 5-years. The licensee's inspection program is satisfactory.

7. Emergency Action Plan. An update to the Emergency Action Plan was filed on May 5, 2003. The latest notification list, dated May 1, 2003, was available in the plant superintendent's office. A copy is also kept in the control room of the licensee's Osage Project (FERC No. 459) which is manned 24 hours a day. The most recent annual test of the EAP was conducted on May 1, 2003 and the licensee reported that the annual training was conducted on the same day. Operators are trained in EAP procedures once a year, and a training log is kept in the Osage control room. The plant superintendent lives on site and checks for new development downstream each year. During our interview, the licensee demonstrated knowledge of actions required by the EAP, and his responsibilities in carrying out the plan. The flood inundation maps appeared adequate, with flood wave arrival times and structures that could potentially be impacted identified. The licensee reported no new downstream developments and none were observed during our inspection.

8. Status of Part 12D Reports. The licensee filed the eighth report, dated August 2003, with the Regional Engineer on August 26, 2003. His plan and schedule to address each of the actions recommended by the consultant was filed with the report. The consultant recommended that the licensee perform the following items, his plan and schedule is shown in parentheses.

I. Corrective Measures Required for the Structures
   a. Prepare drawing(s) that document the Upper Reservoir level controls that have been modified since construction. (This will be completed by the end of 2004, in conjunction with the completion of the liner installation.)
   b. Evaluate the cause of the buckling of the steel penstock liner and take appropriate corrective action. (Liner cracks were repaired during the fall 2003 outage, and the cause of cracking will be addressed further next year.)
   c. Sound the depth of the pool along the downstream toe of the Lower Dam to confirm that undermining is not occurring. (Soundings will be taken within the next year.)

II. Correction Measures Required for the Maintenance or Surveillance Procedures
   a. No corrective measures recommended.
III. Corrective Measures Required for the Methods of Operation of the Project Works
   a. No corrective measures for operation and maintenance are recommended.
IV. Schedule to Carry Out Each Corrective Measure
   a. The penstock liner should be evaluated within the next 2-years. All other corrective measures shall be completed within one year.
V. Additional Monitoring Instruments, Periodic Observations, or Other Methods of Monitoring Project Works or Conditions
   a. Survey the settlement of the Upper Dam crest every 5-years. (Settlement will be surveyed every five years.)
   b. Continue monitoring the uplift pressures beneath the Lower Dam. (Uplift pressures will continue to be monitored.)
   c. Keep records of the depth of overtopping when the Lower Dam Spillway discharges. (Depth of overtopping will be recorded when it occurs.)

On April 14, 1999, the Regional Director accepted the seventh Part 12 D report as satisfying the requirements of Part 12, Subpart D of the Commission's regulations. However, he stated that an independent analysis of the stability of the lower dam using the 1986 PMF loading conditions and revised tailwater elevations should be included in the next report. The eight Part 12 D report includes the requested stability analysis, which is currently under review. There were no outstanding action items from the previous Part 12D inspection.

9. Status of Previous Operation Inspection. We found that the licensee continued an effective program of inspection and maintenance of the dam. The structures appeared to be in satisfactory condition with no deficiencies affecting dam safety. No follow-up action was required in our letter of April 1, 2002.

10. Records. Operating data, copies of instrumentation data and plans of the project structures are kept in the superintendent's office in the powerhouse. Both hardcopy printouts and electronic backup files are maintained. Copies of electronic records are maintained at the licensee’s Osage Plant and at the Taum Sauk Plant. Completed maintenance related work items are recorded on work orders and the licensee is in the process of creating an electronic database tracking system. The licensee's maintenance of records meets the requirements of Section 12.12 of the Commission's regulations.

C. Environmental Requirements

The last Environmental and Public Use Inspection was completed on June 17, 2003. In our follow-up letter we found that the licensee was in compliance and that public safety items were in conformance with the public safety plan. We requested no remedial action as a result of the inspection. The report summarizes all of the environmental requirements of the license articles.

The licensee appeared to be in compliance with minimum flow requirements and Run-of-River operation for the lower reservoir, based on their frequent adjustments to the minimum flow gates and minimum gate opening settings.

D. Public Safety

The lower reservoir boat barrier was in-place at the time of our inspection and appeared to be in good condition (Photograph 34). The licensee maintains fences to restrict public access the project and has posted large warning signs on the lower reservoir dam facing upstream and downstream. The signs are illuminated at night. The licensee has posted many signs in the recreation area on the lower reservoir warning of possible rising waters and swift currents due to plant operations. Other signage and lighting was functional as shown on the Public Safety Plan that was filed on June 21, 1993 (Photographs 5, 56, 57). We noted one potential deficiency in the public safety plan. An access road leads to an area below the lower dam, which is also accessible by foot. During the past two inspections, pedestrians were noted in the area below the Lower Dam. Since the gates are automated, and the dam is not easily monitored by the licensee, and pedestrians have been observed close to the gate outlet, we recommend an automatic audible alarm or flashing warning light be added to warn of automatic gate openings. The facilities provided for public safety otherwise appeared to be adequate.

No accidents or deaths occurred during this reporting period.

E. Project Compliance

1. Unauthorized Project Modification or Uses. The licensee added a gate rack to the upstream face of the lower dam without prior coordination with the FERC (Photograph 58). The seepage collection pond spillway was damaged and repaired without coordination with the FERC (Photographs 21 and 22).

2. License Compliance. Based on review of all available information and our field inspection, the licensee is in compliance with license requirements during this reporting period.

F. Findings and Follow-up Actions

At the time of our inspection we found no dam safety deficiencies that would require immediate remediation. However, we noted several items related to routine surveillance and one item pertaining to public safety that should be addressed. Security measures were discussed and the licensee is taking appropriate action. The following items were conveyed to the licensee in our letter of January 20, 2004.

1. Seepage was noted at the right downstream toe of the small dike at the seepage collection pond, below the Upper Reservoir. The licensee should monitor this seepage and report if it increases or if sediment is being piped in the seepage water.

2. Erosion was noted at the unlined spillway at the left side of the small dike at the seepage collection pond. The licensee should closely monitor this area and maintain the spillway as needed to ensure the integrity of the dike.
3. Repairs to the Upper Reservoir liner should be completed before the end of 2004. The magnitude of seepage flow into the seepage collection pond area should be maintained at acceptable levels.
4. Charts and graphs of piezometer readings should be updated and reviewed after each set of new readings is taken.
5. Either an audible alarm and/or flashing warning lights should be added at the lower dam, so that persons (fishermen or hikers) immediately downstream of the dam are adequately warned of automated gate changes.
6. Leakage was observed exiting the flat area above the penstocks at the powerhouse. The licensee should visually monitor this area and report any increase in seepage.

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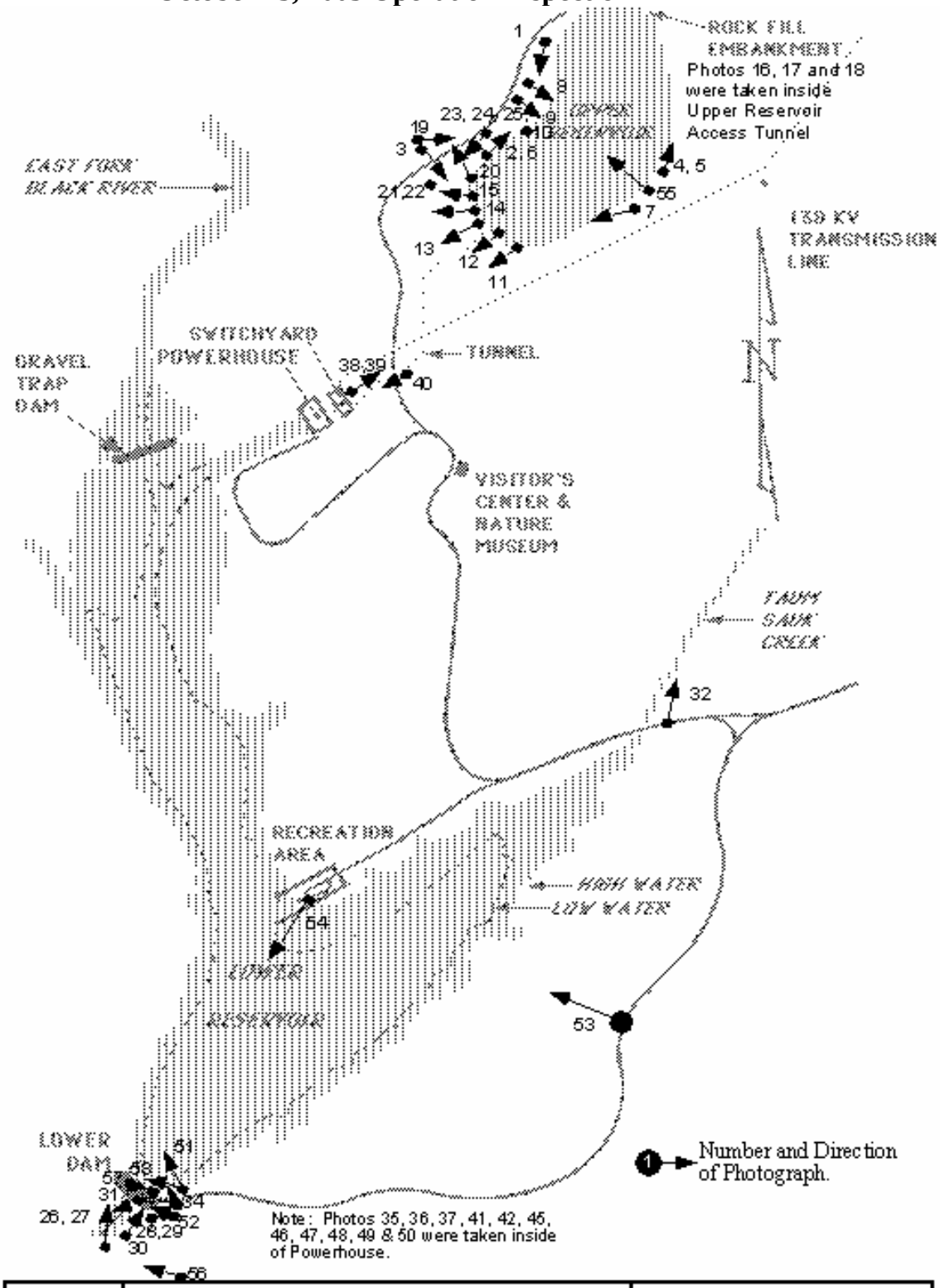
58 photographs and 1 Exhibit, follows;

Taum Sauk Hydroelectric Project, No. 2277
October 23, 2003 Operation Inspection



Contains Critical Energy Infrastructure Information - Do Not Release

Taum Sauk Hydroelectric Project, No. 2277
October 23, 2003 Operation Inspection

Photograph 1- The rockfill Upper Dam has a maximum section approximately 94 feet high and is topped by a concrete parapet wall approximately 10 feet high.

Photograph 2- Minor shallow sloughing is present in some areas where finer materials make up the shell.

Taum Sauk Hydroelectric Project, No. 2277
October 23, 2003 Operation Inspection

Photograph 3- A 10-foot high parapet wall crowns the embankment. Seepage is pumped back into the reservoir from a mid-level pump station (blue shed).

Photograph 4- The parapet wall was in similar condition as our previous inspection. No leakage was observed from any of the parapet wall joints. The membrane batten anchors are in-place. A membrane will be installed during fall 2004.

Photograph 5- The parapet wall was generally plumb, note fresh sealer in joint. Fencing and signs are in-pace as public safety measures.

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Photograph 6- No significant defects were noted in either the parapet wall or rockfill embankment.

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Photograph 7- Pattern cracking is unchanged from previous inspection.

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Photograph 8- There were a number of prominent seeps exiting the toe of the embankment, similar to that shown above.

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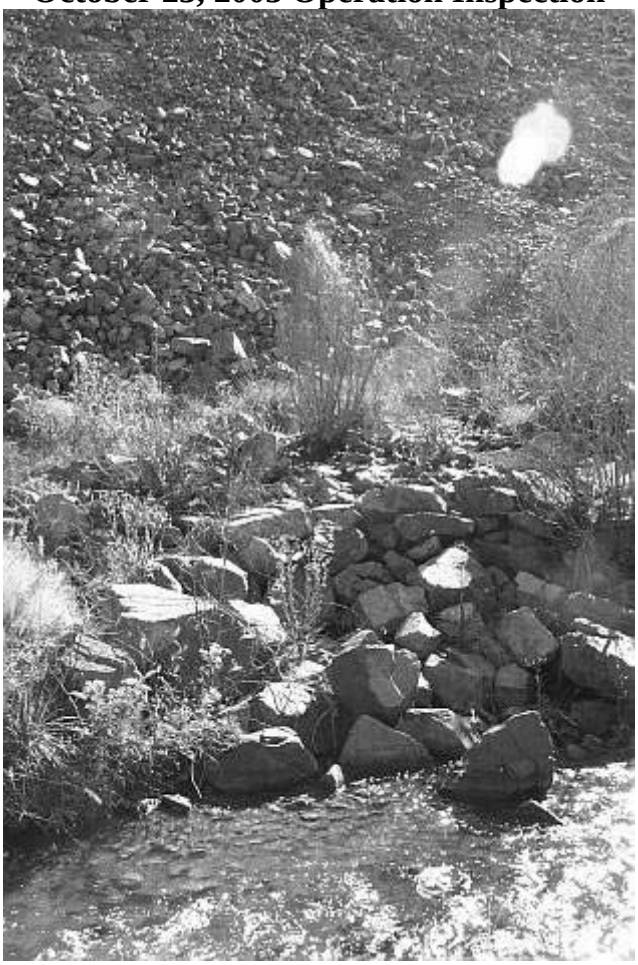

Photograph 9- Seep at toe of dam.

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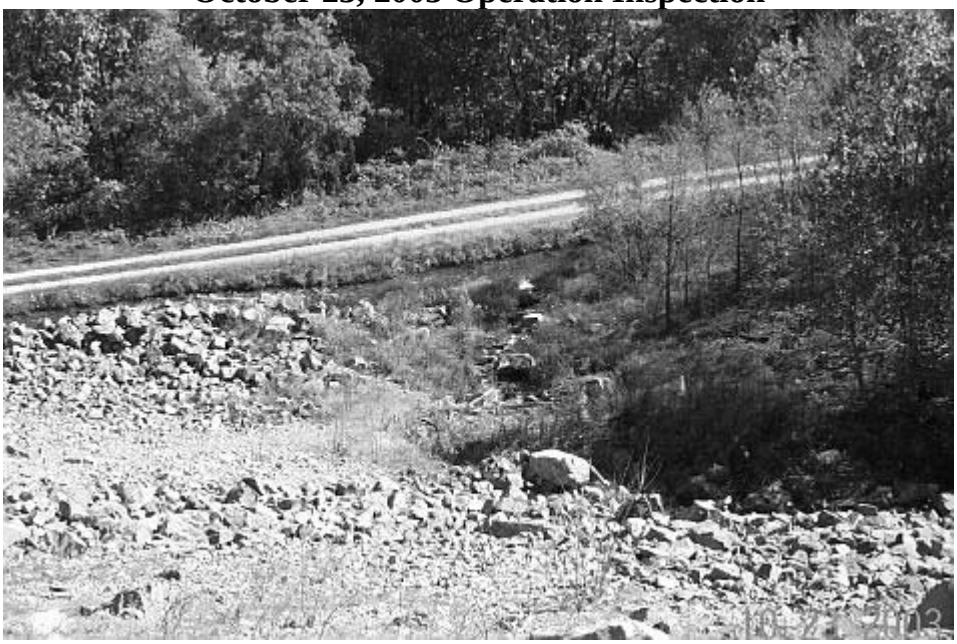
Photograph 10- Large seep from toe of dam.



Photograph 11- Seepage on south side of Upper Dam, at toe & abutment contact.

Photograph 12- Another area of seepage near toe and abutment.

Photograph 13- Large stream of collective seepage entering seepage collection ditch. Seepage is from toe/abutment area on south side of dam.

Photograph 14- Area of seepage at toe.

Photograph 15- Last area of seepage at toe. Due to the configuration of the road and ditch on the south and east sides of the reservoir, it was not possible to closely inspect the seepage other than from the crest of the dam (which is where this and the previous photos were taken).

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Photograph 16- The concrete lined access tunnel to the floor of the Upper Reservoir was in similar condition as our last inspection. No significant defects were noted. Minor cracking is present in the crown and walls. No significant leakage or concrete deterioration was observed, although some minor leakage was noted.

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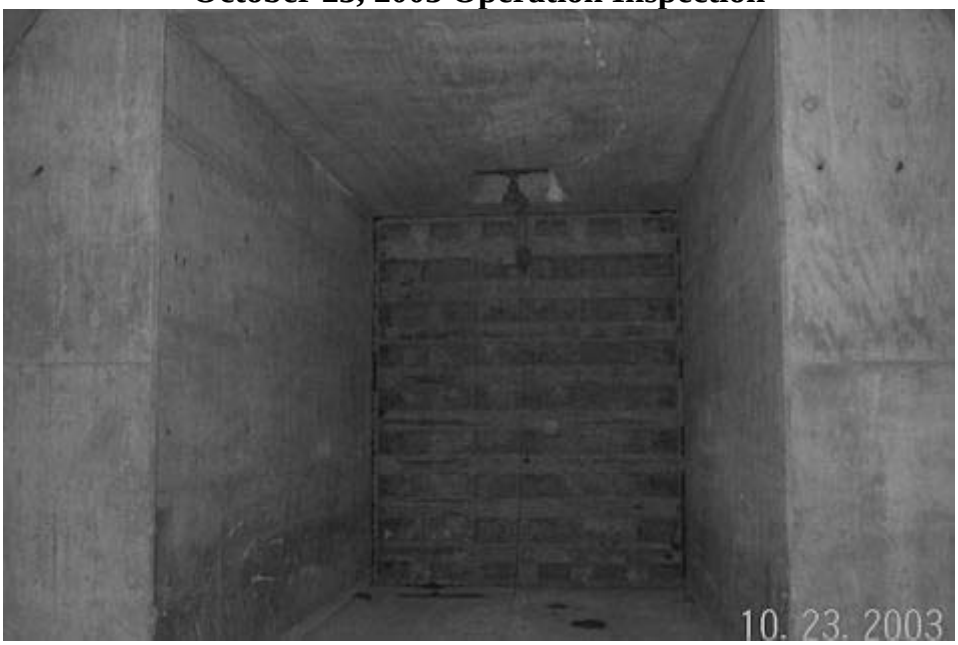
Photograph 17- Minor leakage along joint in access tunnel.



Photograph 18- The steel access portal bulkhead was in good condition and the seals dry. The concrete anchor blocks were in good condition with no signs of leakage, cracking, or distress.

Photograph 19- Drainage ditch entering seepage collection pond from east side of Upper Dam.

Photograph 20- A small hillside dike impounds the seepage collection pond. It is topped with an aggregate road. A portion of the dike is topped with a thin concrete slab, where water spills over the dam near the pump house. The amount of water retained by the dike is very small, as compared to the size of the Upper Reservoir.

Photograph 21- Large rock was added to the Seepage Collection Pond spillway area, where overflow exits the seepage collection pond. This area was damaged due to large seepage and runoff volume, and was subsequently repaired during this reporting period.

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Photograph 22- The seepage collection pond spillway was damaged due to head-cutting. Note how some of the concrete slab is undermined or askew. Large rock was placed in this area to prevent further erosion.

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Photograph 23- An area of seepage was found at the right toe, near the abutment of the small rockfill dike that forms the seepage collection pond. Note red algae (circled). We requested the licensee periodically inspect this area.

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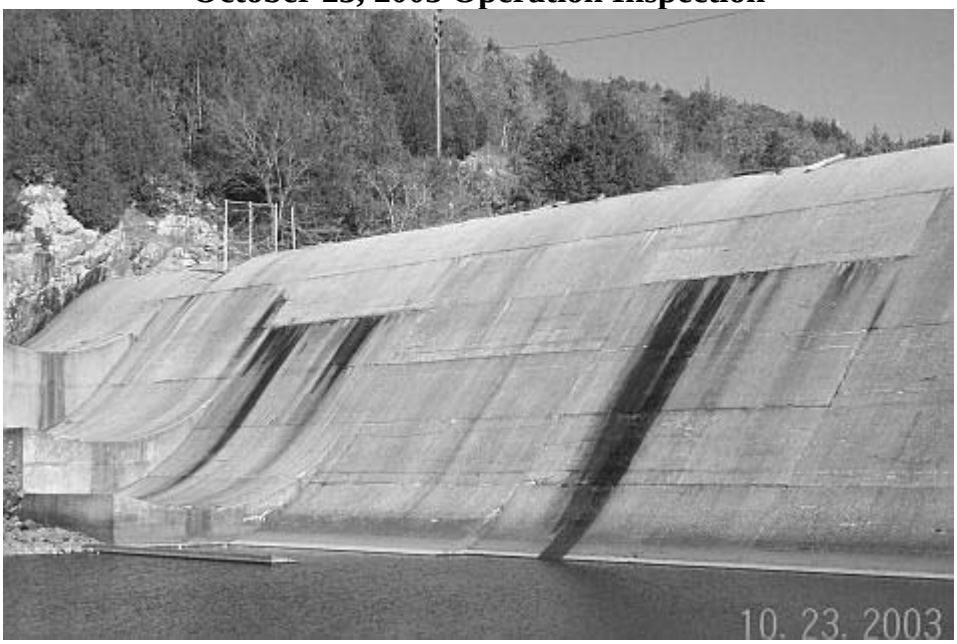
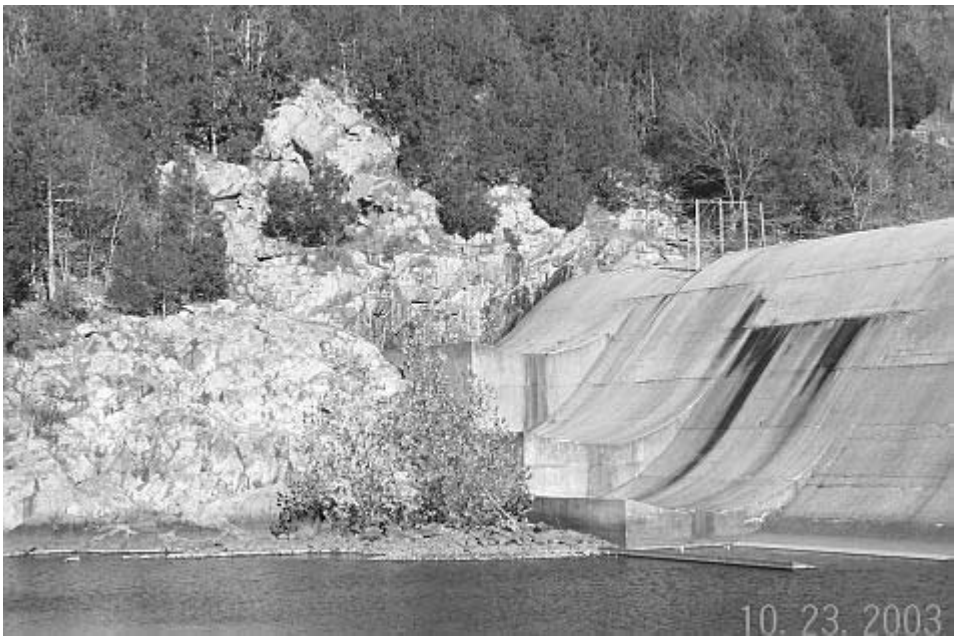
Photograph 24- The downstream slope of the Seepage Collection Pond dike was heavily forested.

Photograph 25- Downstream slope of Seepage Collection Pond dike.



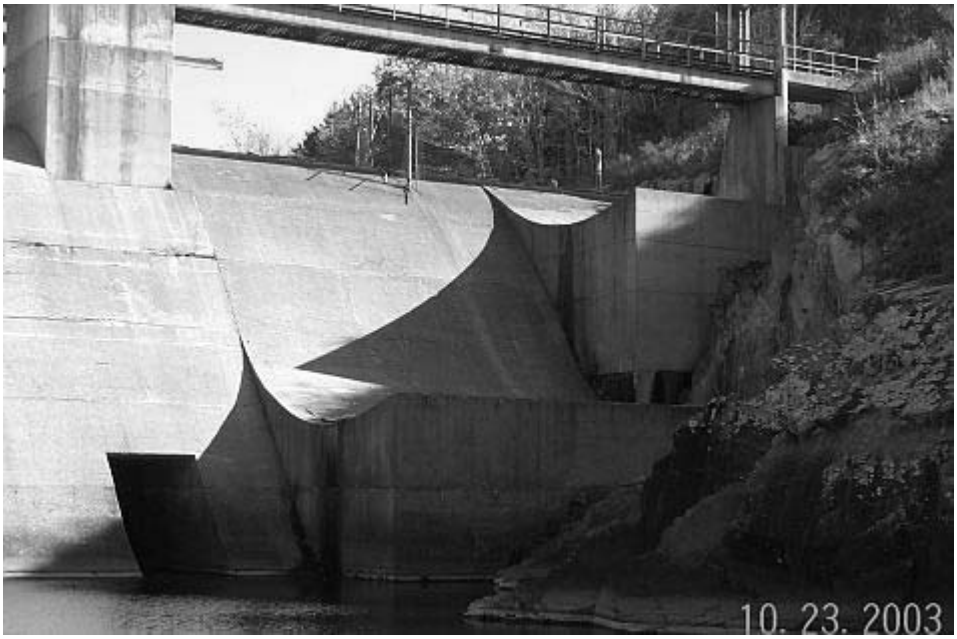
Photograph 26- Minor leakage was occurring along a horizontal joint in the lower dam, similar in magnitude to that observed during our last inspection.



Photograph 27- The right abutment of the Lower Dam was in good condition.

Photograph 28- The left abutment was in good condition, with no sign of leakage or deterioration.

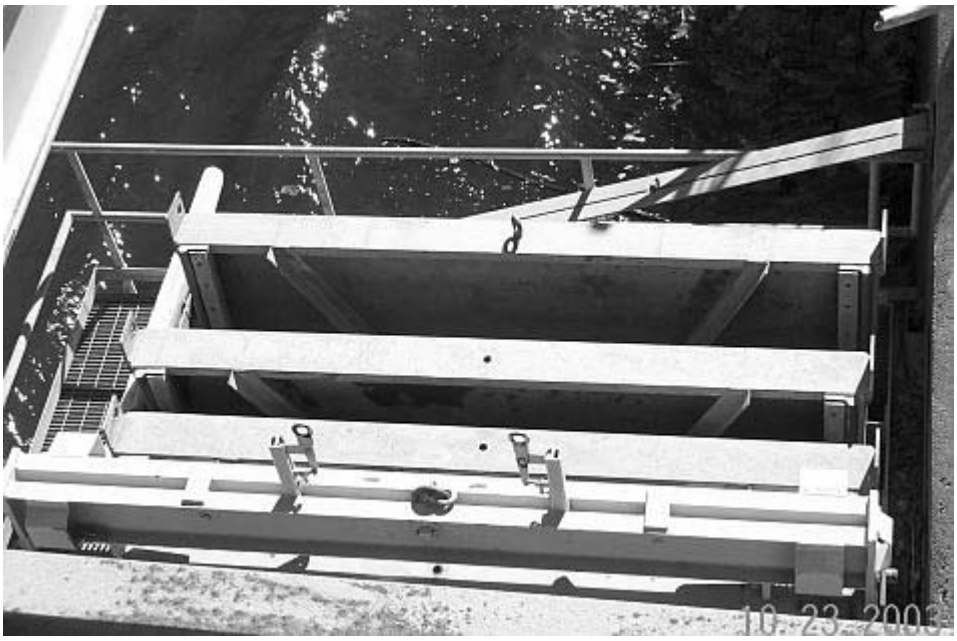
Photograph 29- Left abutment, just downstream of the Lower Dam.



Photograph 30- Sluiceway outlet and left abutment of the Lower Dam. The concrete is in good condition.

Photograph 31- There appears to be a scour hole downstream of the apron. We have asked the licensee to take soundings.

Photograph 32- Leakage from the Upper Dam contributed to significant flow in the downstream channel.



Photograph 33- Gates for the lower dam sluice are now stored on a platform that was constructed on the upstream face of the dam.

Photograph 34- The Lower Reservoir slopes appeared stable. The reservoir was free of debris. Note the boat barrier in front of the Lower Dam.

Photograph 35- The powerhouse area was in good condition. The equipment is well maintained.

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Photograph 36- No problems were noted in the exterior of the powerhouse.

Photograph 37- Only minor cracks with efflorescence were noted in the powerhouse walls.

Photograph 38- The penstock portal area has not changed since our previous inspection. The licensee continues to monitor seepage from the tunnel lining annular space.

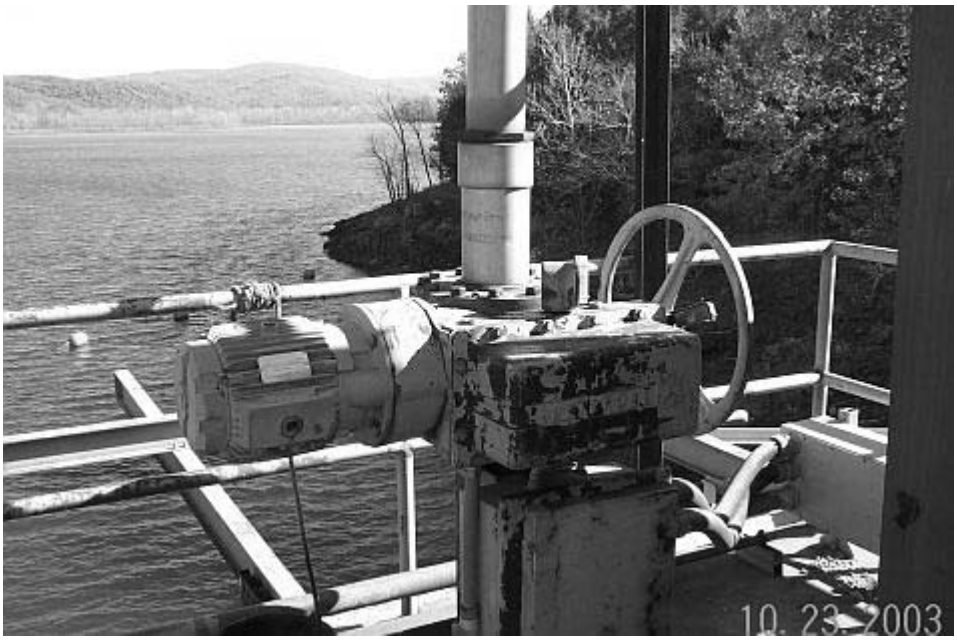
Photograph 39- Seepage is exiting the slope above the tunnel. We requested the licensee monitor this seepage and report any increase.

Photograph 40- Area near source of seepage shown in previous photograph. It was not due to surface runoff but appeared to be coming from a spring over the tunnel.

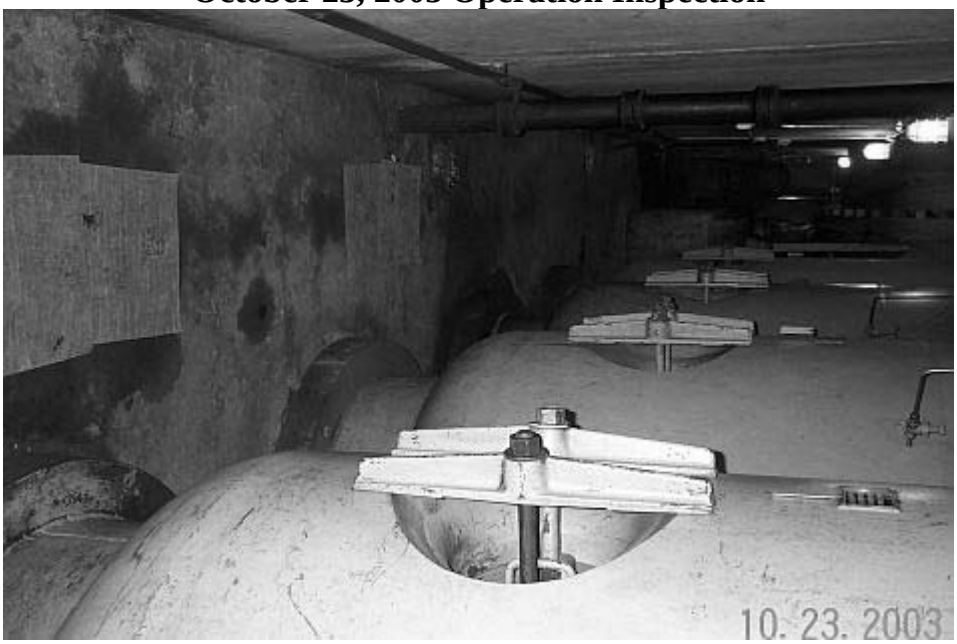
Photograph 41- Minor leakage and efflorescence from seals around the penstock.

Photograph 42- The same condition was observed in the second penstock.

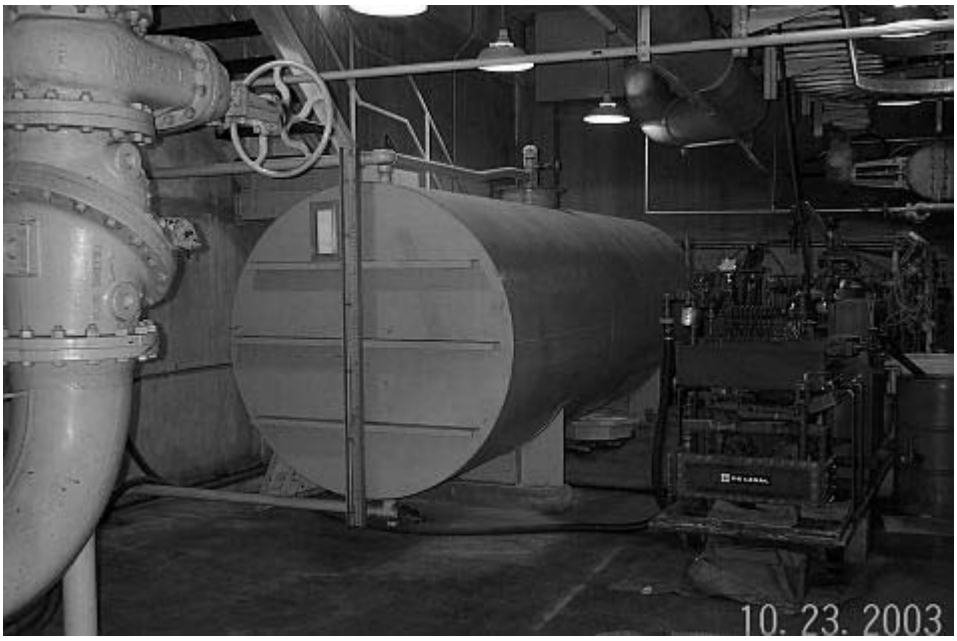
Photograph 43- The licensee controls the lower dam gates via microwave.



Photograph 44- The gates can also be manually operated. The gate lift motor, gearbox and stem appeared in good condition and well maintained.



Photograph 45- The interior of the powerhouse was clean with no chemical or oil spills. Hydraulic pressure vessels are shown above.



Photograph 46- No spills were observed and the equipment is well maintained.

Photograph 47- The battery area was clean. The interior of the powerhouse was dry.

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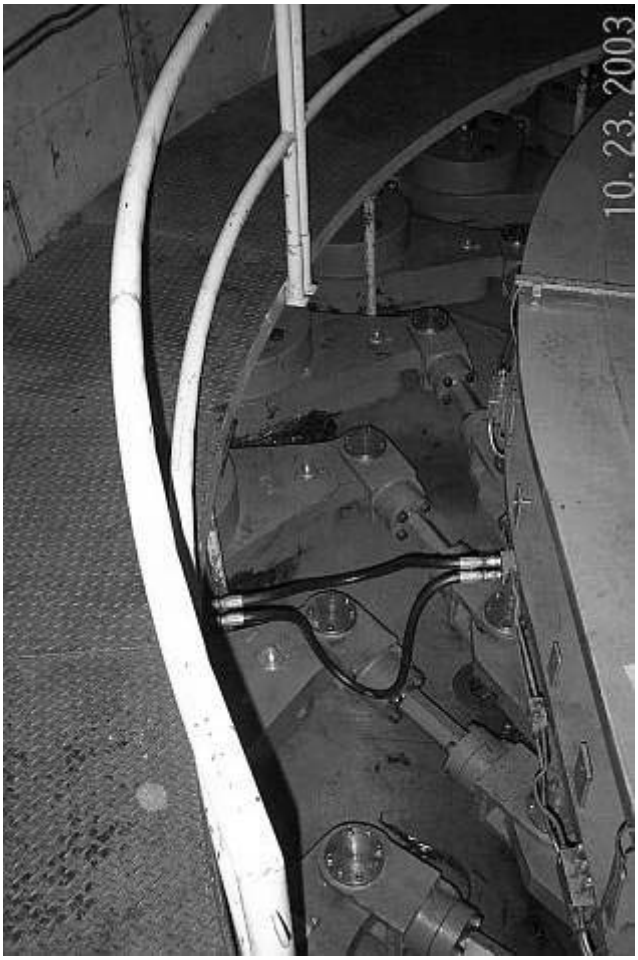
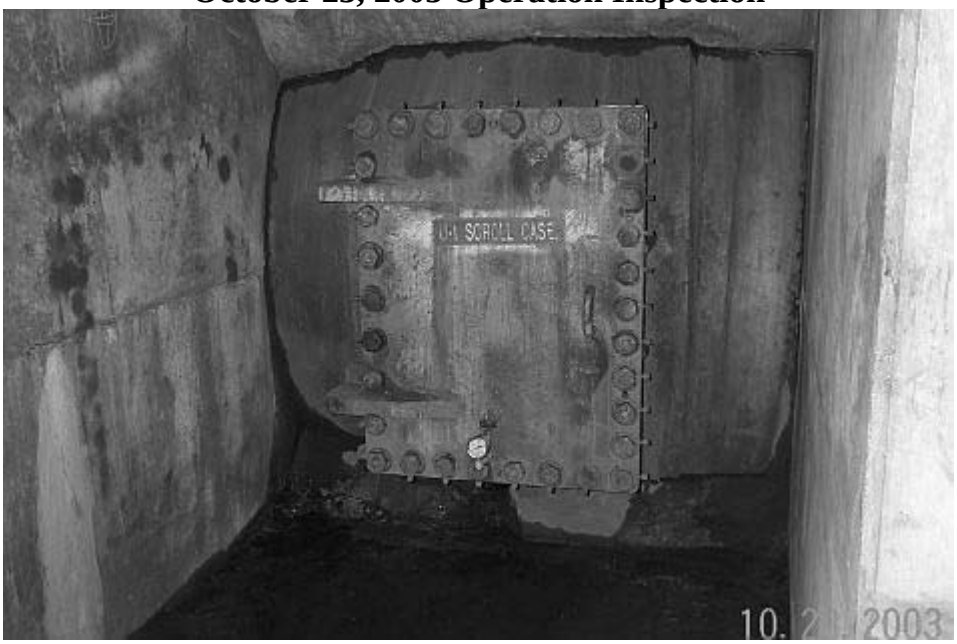
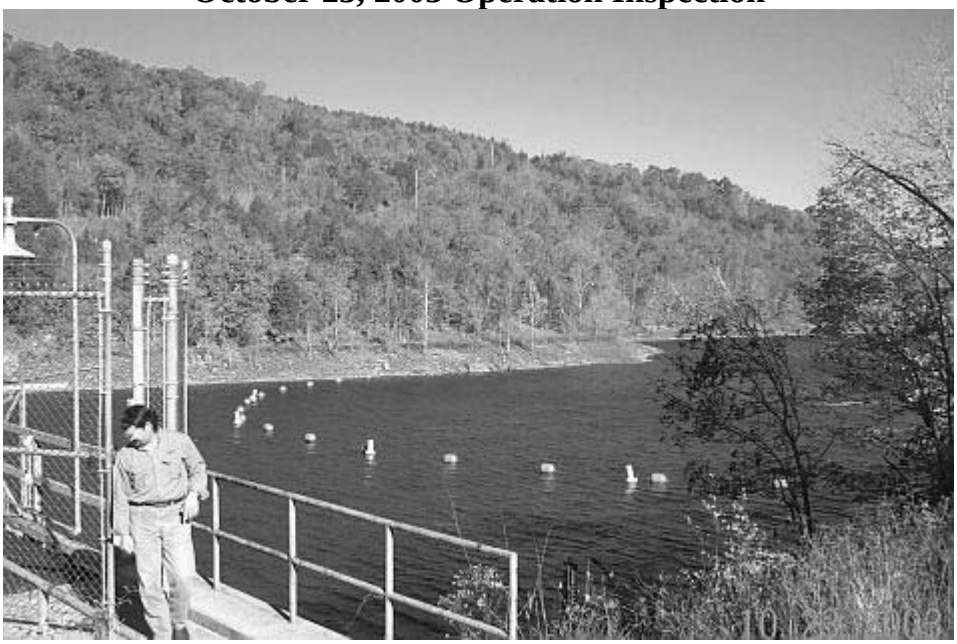


Photograph 48- A small amount of standing oil was present in the wicket gate assembly. Wicket gate linkages appeared to be in good condition.



Photograph 49- The scroll case manhole covers had minor leakage. The Steel plate and bolts were slightly corroded, but in acceptable condition.

Photograph 50- The steel generator shafts were not turning during our inspection, due to lack of energy demand. The plant is used as a peaking plant and is generally busiest during the summer months.



Photograph 51- The boat barrier was in-place and in good condition. Slopes near the lower dam appeared stable.

Photograph 52- No water was spilling over the Lower Dam during our inspection. The licensee reportedly raised the normal pool elevation 1 foot, to provide additional water for pumping to the Upper Reservoir. The additional water was needed due to loss of storage capacity in the lower reservoir from sedimentation.

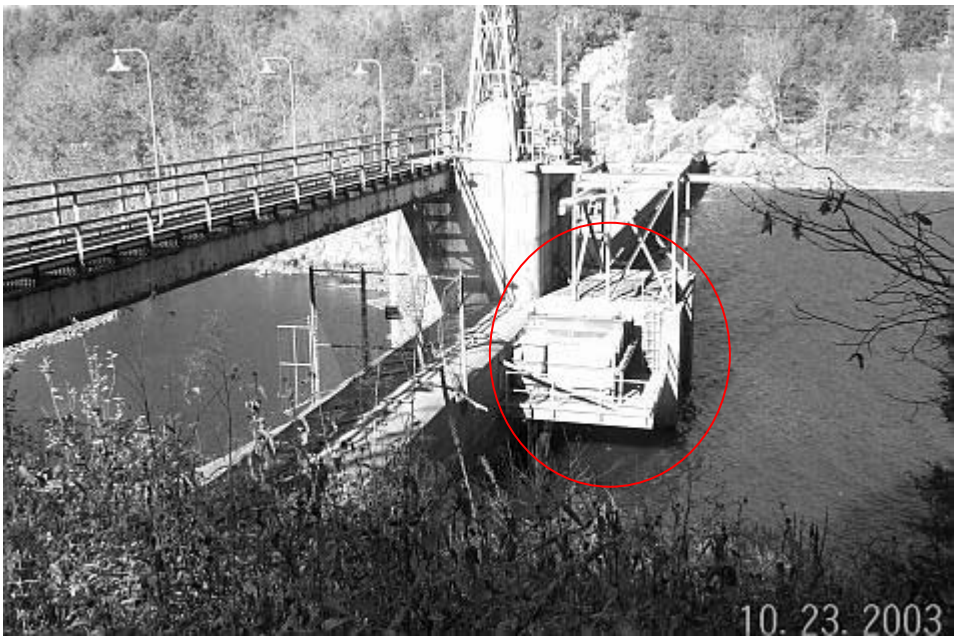
Photograph 53- The lower reservoir slopes appeared stable.

Photograph 54- The abutment slopes at the lower dam were stabile (Lower Dam is circled).

Photograph 55- The upper reservoir was full. No debris was noted.

Photograph 56- Signage was legible and conforms to the public safety plan.

Photograph 57- Life rings were in good condition. Signage on the Lower Dam is lighted.



Photograph 58- The licensee modified the Lower Dam with the addition of a platform for the sluiceway stoplogs (circled).