Taum Sauk – Upper Reservoir Full

Figure 1-1
Taum Sauk Upper Reservoir Breached

Figure 1-2
Figure 2-1 Cross section from original design drawings
Trends in Type and Height of Rockfill Dams

Figure 3-1
Cabin Creek Upper Reservoir  Embankment

Figure 3-2
Total Settlement History
Upper Reservoir Pin Elevations

Figure 3-3
TAUM SAUK UPPER RESERVOIR
MONUMENT SURVEY DATA

Figure 3-4
(See Large Drawing S2 Provided)
Total Leakage (cfs) vs Time

Figure 3-6
Figure 6-1

Taum Sauk
Upper Reservoir
Breach 12/14/05
Penstock transducer
Reservoir transducers
Dec. 14th breach.

Figure 6-3
Eroded foundation, note rock jointing and overlying clay materials

Figure 6-5
Rockfill between top of rock and base of plinth

Figure 6-6
Rockfill between top of rock and base of plinth, note reddish grout in rockfill beneath the plinth

Figure 6-7
Rockfill between top of rock and base of plinth

Figure 6-8
Figure 6-9
Pressure Transducers TX2 and TX3 Compared to Reference Transducer

TX2 reads average of 7.86 feet high
TX3 reads average of 0.86 feet high

Figure 7-1

![Graph showing TX2 and TX3 readings compared to reference.](image)
Pressure Transducer Temperature Sensitivity

TX2 Output Shift Represents +7.11 Ft of Water Level at 5 degrees compared to 20 degrees.

Figure 7-2

TX2 (3647°F) at 40 psig

TX2 (3647°F) at 40 psig
Figure 7-3

Note turnbuckle unthreaded from lower bolt.
Note, straightening of protective pipes between dates of above photos.
Upper ends of protective pipes

and conductivity probes use the second pipe from left.
Pressure transducers use left pipe
with instrument cables in enclosure on parapet.

Figure 7-6
Protective pipe base plates are not anchored to reservoir.
Left guy cable has come loose from base plate in top photo.

Figure 7-7
Protective pipe support system as found. Note eye bolt unthreaded from turnbuckle. Also note lock washer in place at connection to U channel but lack of lock washer at turnbuckle.

Figure 7-8
Figure 7-9

Hurricane Rita Event

Graph showing data over time with specific dates and values on the y-axis.
Figure 7-10

Hurricane Rita Event

Pump 1 off

Pump 2 off
Generation start on day prior to Hurricane Rita. Note smaller level variations compared to next day.

Figure 7-11
Figure 7-13

Upper Reservoir Level from Dec. 1\textsuperscript{st} and 2\textsuperscript{nd}.
Dec. 2nd. Note erratic behavior on rising and lower level.

Figure 7-14: Compared to falling level.
January 2005 two pump operation.

Figure 7-15
April 2005 two pump operation.

Figure 7-16
Figure 7-17

June 2005 two pump operation.
July 2005 two pump operation.

Figure 7-18
Figure 7-19

August 1, 2005 two pump operation.
Figure 7-20

August 10, 2005 two pump operation.
August 17, 2005, two pump operation.

Figure 7-21
Figures 7-22

Sept. 2005 two pump operation.
Both units off. 2 Gen

Erratic level indications on Dec. 10th.

Figure 7-23
Pump 1 stop
Pump 2 stop
Level trend without offset -222 MW

Pump 1 start
Pump 2 start
Level indications after pump 2 start shows an offset. -222 MW = Completion of pump 2 start sequence.
Figure 7-25

Water level indications at breach event.

Pump 2 off 4:43
Pump 1 off 5:15
4 Ft./Hr. Rate for one pump above Elev. 1592
Figure 7-26

Water level indications (left scale) prior to breach event.

Estimated start of overtopping at panel 95.

Panel 72.
Daily maximum indicated levels.
Figure 7-28

Upper Reservoir Conductivity Probes

Parapet at probes

Hi-Hi probe as installed

Hi-Hi probe per field inspections

Estimated level during breach

Hi probe per field inspections

Breached parapet Panel 95

Minimum parapet elevation Panel 72

Hi-Hi probe per PLC comment & DWG

Hi probe per PLC comment & DWG

Hi-Hi probe as installed

Hi probe as installed

Elevation


Minimum parapet elevation Panel 72

Breached parapet Panel 95
Estimates of Maximum Reservoir Level Before Breach

Hi
Probe

Siemens
Report

Indexed
Pressure
Transducers

Hi-Hi
Probe

FERC
Pipe
Bend

Ameren
Pipe
Bend

Figure 7-30
Note: Due to programming error made on Sept. 16, 2005, Unit 2 pump shutdown due to level protection probe response was disabled.

As-founed, 12/14/2005

Tank Sunk Pump Shutdown Logic

Figure 7-31

Note: shores changes made on 10/10/2005.
Figure 7-32

BEST ESTIMATE OF ROCKFILL GRADATION