

Appendix B  
Event Chronology

## FERC SECTION 6 EVENT CHRONLOGY

### 6.1 January 2002 –December 2005

#### Taum Sauk Upper Reservoir Breach Time Line

Date	Event
January 3, 2002	<ul style="list-style-type: none"> <li>• Ameren sends plans and specs and design calculations for installation of a geomembrane liner to D2SI-CRO for review.</li> <li>• In letter, Ameren proposes starting construction on March 25, 2002.</li> </ul>
March 1, 2002	<ul style="list-style-type: none"> <li>• D2SI-CRO sends letter stating it has no comments on the plans and specs. The letter asks for an erosion control plan and states inspections will be performed in conjunction with the Operation Inspection and a final inspection near the end of construction.</li> </ul>
April 22, 2002	<ul style="list-style-type: none"> <li>• Ameren informs D2SI-CRO by phone that budget of the liner has been exceeded and work has not been completed within schedule. Ameren states the geomembrane installation will take place in Fall 2003.</li> <li>• Work completed to date includes installation of the toe sill and snap-lock around the interior perimeter, patching of critical areas with gunite, and pouring concrete in an area that has the most severe leakage.</li> </ul>
November 5, 2002	<ul style="list-style-type: none"> <li>• Ameren sends letter to D2SI-CRO stating between September 26 and October 18 of that year, the upper reservoir and penstocks were drained to do maintenance work on the units. During this time an inspection of the liner revealed cracks in the floor of the tunnel liner about 1500 feet up from the plant. Repairs were made at that time. <b>(What type of repairs?)</b></li> </ul>
March 6, 2003	<ul style="list-style-type: none"> <li>• Ameren sends letter to D2SI-CRO stating liner project is being postponed to start in September 2004 and be completed by the end of the year.</li> </ul>
April 24, 2003	<ul style="list-style-type: none"> <li>• D2SI-CRO sends letter to Ameren regarding postponement of liner installation. The letter notes leakage is steadily increasing from an average of 30</li> </ul>

	<p>cfs during 2000 to about 65 cfs during the first quarter of 2003. Some of the leakage has been attributed to leaky seals in the units. The revised schedule is accepted because Ameren is continually monitoring leakage and making underwater repairs to the concrete liner in the interim. Also, it is noted the pumped storage facility is frequently drained and can be drained should the leakage become excessive.</p>
March 15, 2004	<ul style="list-style-type: none"> <li>• D2SI-CRO sends letter to Ameren requiring a Quality Control and Inspection Program be submitted at least 60 days before doing liner work schedule for September 2004.</li> </ul>
July 23, 2004	<ul style="list-style-type: none"> <li>• Ameren submits QCIP for liner installation to D2SI-CRO. Notes contractor proposes to start work on September 13, 2004.</li> </ul>
September 9, 2004	<ul style="list-style-type: none"> <li>• D2SI-CRO sends letter to Ameren regarding liner installation.</li> <li>• States D2SI-CRO reviewed again the plans and specifications submitted in 2002 and QCIP and have no comments.</li> <li>• States the work is considered maintenance.</li> <li>• Requires monthly construction reports and certifications from the design engineer, QCIP manager, and licensee that project is constructed in accordance with design intent and plans and specs.</li> <li>• Notes if plans and specs are revised, the licensee must assure that changes are coordinated between the engineer, QCIP manager, FERC, and the licensee.</li> <li>• Notes any changes in operation must be authorized by the FERC and properly coordinated between the licensee, FERC, and the operators.</li> <li>• Requires a Final Construction Report within 45 days of completing construction.</li> </ul>
September 9, 2004 - November 15, 2004	<ul style="list-style-type: none"> <li>• Liner installed on upstream slope of upper reservoir.</li> <li>• All of the upper reservoir level control and protection devices were replaced. Three GE Druck 1230 transmitters were installed for normal shutdown of the pump/generators. The Low, Low/Low Warrick Conductivity switches are replaced in kind. The High, High/High float</li> </ul>

	<p>switches were replaced with Warrick Conductivity probes. The upper reservoir PLC was replaced with an Allen Bradley PLC. The pump/generator shutdown relays at the plant are replaced with Allen-Bradley PLCs. The level indicators, alarming, and data acquisition systems were replaced with a WonderWare Operator Interface. (source: Joe Raybuck’s Draft Taum Sauk Upper Reservoir Level Control and Protection Systems - Information Sheet)</p> <ul style="list-style-type: none"> <li>• Instrumentation pipe supports are changed to cable support system (source: As-built Design Drawings).</li> <li>• Ameren replaced the existing staff gage, which had settled approximately one foot along with the reservoir wall. The staff gage had been used to measure the normal operating level of the upper reservoir, which was 1596 ft. Due to the settling, Ameren believes that the upper reservoir was actually operating at 1595 ft. instead of 1596 ft. before the liner replacement project. (Ameren Chronology)</li> <li>• During the outage new visual level indications were painted on the liner reflecting true elevations. (Ameren Chronology)</li> </ul>
October 6, 2004	<ul style="list-style-type: none"> <li>• Geo-Synthetic, Inc. (“GSI”), the installation contractor, raised concerns that the March 7, 2003 gage piping design did not provide for adequate anchoring and could compromise the integrity of the liner and gage piping. In response, Emcon/OWT, Inc. (“Emcon”), an engineering firm retained to design the liner and gage piping, provided a new design drawing (8304-X-155099, Rev. 5, dated 10/5/04) proposing a new gage piping anchoring system. (Ameren Chronology - <i>See Exhibit 8</i>).</li> </ul>
October 20-23, 2004	<ul style="list-style-type: none"> <li>• GSI installed the gage piping. (Ameren Chronology - <i>See Exhibit 9</i>). During installation, Ameren determined that Emcon’s design (8304-X-155099, Rev. 5, dated 10/5/04) for the gage piping could not be installed as shown due to field conditions. In consultation with Emcon and with its approval, Ameren made field changes to the anchoring system in order to adapt the design to field conditions and to make it more robust.</li> <li>• Subsequently, on November 12, 2004, Emcon and</li> </ul>

	Ameren performed a walk-through inspection of the liner and gage piping installation.
November 6, 2004	<ul style="list-style-type: none"> <li>Ameren field notes reported that the top of panel 72, the lowest known point on the upper reservoir parapet wall, was measured at elevation 1596.99 ft. (Ameren Chronology - <i>See Exhibit 10</i>).</li> </ul>
November 8, 2004	<ul style="list-style-type: none"> <li>Ameren field notes reflected that the level protection probes were intended to be installed at the following elevations: Lo-Lo probe: 1524 ft.; Lo probe: 1524.5 ft.; Hi probe: 1596 ft.; Hi-Hi probe: 1596.2 ft. (Ameren Chronology - <i>See Exhibit 11</i>.)</li> </ul>
Mid-November 2004	<ul style="list-style-type: none"> <li>The level control transducers and level protection probes were lowered into the gage pipes. Wiring from the transducers and probes to the upper reservoir gage house were marked with colored tape to distinguish one probe from another and to provide an elevation reference. Ameren believes the colored tape reflects the as-designed and installed elevations of the level protection probes. These elevations approximate those indicated in Ameren field notes. (Ameren Chronology.)</li> </ul>
November 15, 2004	<ul style="list-style-type: none"> <li>Ameren released the upper reservoir for operation. (Ameren Chronology - <i>See Exhibit 12</i>.) The normal operating level remained at 1596 ft., but now was being measured by the new level control transducers and visual level indications. As a result, the actual normal operating water level was 1596 ft. and not 1595 ft. as it had been prior to the liner replacement project, as further described in the September 10 entry.</li> </ul>
November 23, 2004	<ul style="list-style-type: none"> <li>Reference comment logged into the Upper Reservoir Programmable Logic Controller (“PLC”) program indicated that the Hi probe was at elevation 1596 ft. (Ameren Chronology - <i>See Exhibit 13</i>.)</li> <li>Reference comment logged into the Taum Sauk Common PLC program indicated that the Hi-Hi probe was at elevation 1596 ft. (Ameren Chronology - <i>See Exhibit 14</i>.)</li> <li>Ameren believes, but has been unable to verify, that Tony Zamberlan of Laramore, Douglass, and Popham Consulting Engineers (“LDP”), entered the comments. LDP was retained by Ameren to provide engineering services related to the new level control and protection instrumentation.</li> </ul>

November 30, 2004	<ul style="list-style-type: none"> <li>• The Hi probe actuated. An Osage operator recorded a trip of unit 2 with the upper reservoir level measuring elevation 1595.0 ft. (Ameren Chronology - <i>See</i> Exhibits 15 and 16.)</li> <li>• Later that day, the Lo Lo probe relay lost DC power and shut down both generators. (Ameren Chronology - <i>See</i> Exhibits 15 and 16.)</li> <li>• An email from Taum Sauk’s plant superintendent listed the shut down setpoints for the upper reservoir. (Ameren Chronology - <i>See</i> Exhibit 16.) When the average of the three level control transducer readings reflects that the upper reservoir level is at the following elevations, the corresponding pump shut downs will occur: <ul style="list-style-type: none"> <li style="padding-left: 40px;"><u>Elevation 1592 ft.</u> Normal shut down for first pump.</li> <li style="padding-left: 40px;"><u>Elevation 1596 ft.</u> Normal shut down for second or last pump.</li> <li style="padding-left: 40px;"><u>Elevation 1596.5 ft.</u> All pumps shut down.</li> </ul> </li> <li>• The superintendent also stated that the setpoint for the level protection probes is above elevation 1596.5 ft.</li> </ul>
December 1, 2004	<ul style="list-style-type: none"> <li>• To prevent intermittent trips, Tony Zamberlan added a one minute time delay to the PLC logic for all level protection probe relays. (Ameren Chronology - <i>See</i> Exhibits 17 and 18.)</li> <li>• According to Mr. Zamberlan’s Dec. 2nd email, he also was at the upper reservoir to “pull up the Hi level Warrick probes to 1596.5.” (Ameren Chronology - <i>See</i> Exhibit 17.) Mr. Zamberlan does not recall, and has been unable to explain why he set the probes at elevation 1596.5 ft., or how he determined that elevation.</li> <li>• Reference comment logged into the Upper Reservoir PLC program indicated that the Hi probe was at elevation 1596.7 ft. Ameren believes, but has been unable to verify, that Mr. Zamberlan entered the comment. (Ameren Chronology - <i>See</i> Exhibit 18.)</li> </ul>
December 10, 2004	<ul style="list-style-type: none"> <li>• LDP finalized and issued the schematic drawing for the</li> </ul>

	<p>upper reservoir level relaying and shut down controls (8303-P-26648, revision 15). (Ameren Chronology - See Exhibit 19.) The schematic indicated that the Hi probe was at elevation 1596.7 ft. and the Hi-Hi probe was at elevation 1596.9 ft. LDP personnel do not recall, and are unable to explain why the drawing reflects the stated elevations.</p>
<p>December 14, 2004</p>	<ul style="list-style-type: none"> <li>• Pump shutdown levels are indicated in the Taum Sauk PLC. When the average of the three level control transducer readings reflects that the upper reservoir level is at the following elevations, the corresponding pump shut downs will occur: <ul style="list-style-type: none"> <li><u>Elevation 1592 ft.</u> Normal shut down for first pump.</li> <li><u>Elevation 1596 ft.</u> Normal shut down for second or last pump.</li> <li><u>Elevation 1596.2 ft.</u> Normal all pumps shut down.</li> <li><u>Elevation 1596.5 ft.</u> Non-configurable all pumps trip that, if activated, requires a reset.</li> </ul> <p>(Ameren Chronology - See Exhibit 20.)</p> </li> <li>• Reference comment logged into the Taum Sauk Common PLC program indicated that the Hi-Hi probe was set at elevation 1596.5 ft. Ameren believes, but has been unable to verify, that Mr. Zamberlan entered the comment. (Ameren Chronology - See Exhibit 20.)</li> </ul>
<p>December 20, 2004</p>	<ul style="list-style-type: none"> <li>• Ameren sends to letter to D2SI-CRO in response to comments on the 8<sup>th</sup> Part 12D Report. As an attachment, Ameren includes the latest survey of the crest (taken November 2003 and corrected October 2004) and drawings and diagrams of the new Upper Reservoir Level Controls. The Schematic Diagram (revised on 12/10/2004) shows the Hi Warrick Probe set at 1596.7 feet and the Hi-Hi Probe set at 1596.9 feet. The design drawing of the instrument supports shows only three pipes.</li> </ul>

Fall 2004???	<ul style="list-style-type: none"> <li>• <b>Do we know when epoxy was installed in the tunnel crack???</b> Was this the same time as liner work?</li> </ul>
December 27, 2004	<ul style="list-style-type: none"> <li>• A malfunctioning Lo-Lo probe relay was replaced. (Ameren Chronology - <i>See Exhibit 21.</i>)</li> <li>• The PLC historian software recorded a Hi-Hi probe alarm at 3:38 p.m. PST, or 5:38 CST, at an upper reservoir level reading of elevation 1586.4 ft.<sup>1</sup> (Ameren Chronology - <i>See Exhibit 22.</i>) At the time of the alarm, the units were neither pumping nor generating. (Ameren Chronology - <i>See Exhibit 23.</i>)</li> <li>• Ameren believes this alarm may have been associated with maintenance activities at Taum Sauk.</li> </ul>
January 5, 2005	<ul style="list-style-type: none"> <li>• Ameren sends letter to D2SI-CRO showing leakage rate has significantly decreased since installation of liner (from around 50 cfs to around 15 cfs).</li> <li>• Indicates diver will seal all remaining leaks in the floor area during the Spring or Summer.</li> </ul>
February 12, 2005	<ul style="list-style-type: none"> <li>• Ameren sends letter to D2SI-CRO including the final construction report for the liner replacement. The report includes gage piping drawing (8304-X-155099, Rev. 5, dated 2/7/05) which does not identify the field changes made to the gage piping anchoring system. (Ameren Chronology - <i>See Exhibit 24.</i>)</li> </ul>
February 14, 2005	<ul style="list-style-type: none"> <li>• The PLC historian software recorded a six-second Hi-Hi probe alarm at 3:57 p.m. CST, at an upper reservoir level reading of elevation 1593.5 ft. (Ameren Chronology - <i>See Exhibit 22.</i>) At the time of the alarm, the units were neither pumping nor generating. (Ameren Chronology - <i>See Exhibit 25.</i>)</li> <li>• Ameren believes this alarm may have been associated with maintenance activities at Taum Sauk.</li> </ul>
February 15, 2005	<ul style="list-style-type: none"> <li>• The PLC historian software recorded multiple Hi-Hi probe alarms between 4:03 p.m. and 5:49 p.m. CST, at an upper reservoir level reading of elevation 1593.5 ft. (Ameren Chronology - <i>See Exhibit 22.</i>) At the time of the alarms, the units were neither pumping nor</li> </ul>

<sup>1</sup> On the date of the alarm, the PLC Historian software was programmed to Pacific time. In June 2005, the PLC Historian software was reprogrammed to Central time. Throughout this chronology, all noted alarms recorded by the PLC Historian software are expressed in Central time.



	<p>generating. (Ameren Chronology - <i>See Exhibit 25.</i>)</p> <ul style="list-style-type: none"> <li>• These alarms were associated with functional checks of the Hi-Hi probe alarm that were performed by a contractor at the direction of Ameren personnel. The contractors lowered the Hi and Hi-Hi probes into the water.</li> <li>• The generator trip logic for the Lo and Lo-Lo probes was modified from parallel logic to series logic by Tony Zamberlan. (Ameren Chronology - <i>See Exhibits 26 and 27.</i>) In series logic, the generators would only shut off if both the Lo and Lo-Lo probes actuate. A similar change was made by Mr. Zamberlan to the pump trip logic for the Hi and Hi-Hi probes. Ameren believes the generator trip logic for the Lo and Lo-Lo probes was modified to prevent spurious actuations. Ameren has been unable to determine why the pump trip logic for the Hi and Hi-Hi probes was modified. T. Zamberlan stated the changes were made for consistency sake.</li> </ul>
July 20, 2005	<ul style="list-style-type: none"> <li>• The PLC historian software recorded a one-second Hi-Hi probe alarm at 5:15 p.m. CDT, at an upper reservoir level reading of elevation 1573.8 ft. (Ameren Chronology - <i>See Exhibit 22.</i>) At the time of the alarm, the units were generating. (Ameren Chronology - <i>See Exhibit 28.</i>)</li> <li>• Ameren has been unable to determine why this alarm was recorded, but around the time of the alarm, a storm, likely accompanied by lightning, moved through the area of the project works. The storm may have caused momentary induced voltages on the wiring running between the Hi-Hi probe relay and the plant PLC input card resulting in the PLC Historian recording a false Hi-Hi probe alarm.</li> </ul>
August 14, 2005	<ul style="list-style-type: none"> <li>• The PLC historian software recorded a one-second Hi-Hi probe alarm at 3:50 p.m. CDT, at an upper reservoir level reading of elevation 1591.6 ft. (Ameren Chronology - <i>See Exhibit 22.</i>) At the time of the alarm, the units were generating. (Ameren Chronology - <i>See Exhibit 29.</i>)</li> <li>• Ameren has been unable to determine why this alarm was recorded, but at the time of the alarm, a storm, accompanied by lightning, moved through the area of the project works. The storm may have caused momentary induced voltages on the wiring running between the Hi-Hi probe relay and the plant PLC input card resulting in the PLC Historian recording a false Hi-Hi probe alarm.</li> </ul>

September 25, 2005	<ul style="list-style-type: none"> <li>• Remnants of Hurricane Rita pass through area.</li> <li>• Workers witness overtopping, referred to as “Niagara Falls at the Northwest corner of the reservoir”</li> <li>• Units are immediately put on generate mode to lower reservoir. (source: 9/27/2005 email from Richard Cooper)</li> <li>• Refer to September 24-26 Operations Time Line</li> </ul>
September 27, 2005	<ul style="list-style-type: none"> <li>• The plant superintendent notes the visual level of the reservoir (as measured down from the crest of the parapet wall) does not match the average transmitter level. The visual level was about 4 inches from the top of the parapet wall near “a couple of wet areas on the west side of the reservoir parapet walls”, even though the transducers were showing elevation 1596 feet. <i>(Note: if the referred to west area was around panel 72, which is the lowest panel on the west side of the dam – 4 inches from the top of the crest would be elevation 1596.66 feet.)</i></li> <li>• One transmitter is found to be reading “a foot higher than the other two” and is eliminated from the average, leaving two transmitters. When the one transmitter was taken out of the average, the reading was 1596.2 feet. Since this did not match the elevation in the field, a 0.4 (foot) adjustment was made to the two remaining transmitter readings, making the level read 1996.6 feet.</li> <li>• The plant superintendent states they would “check on what this does to the actual level the next several mornings.” (source 9/27/2005 email from Richard Cooper)</li> <li>• At 10:11 a.m., an Osage operator noted in the operator log a “high upper resv. alarm [and] small gate setting changed to 7.7% by itself. HPT’s are working on something @ Sauk.” (Ameren Chronology - See Exhibit 31.) At the time the notation was made, the units were neither pumping nor generating. Ameren believes this alarm is related to work being done on the PLC at approximately the same time. (Ameren Chronology - See Exhibit 22.) Between 10:03 and 10:05 a.m.,</li> </ul>

	<p>the elevation level readings for the upper reservoir were not recorded, suggesting that the PLC was offline so that an adjustment to the logic could be made. The adjustment may have resulted in an alarm indication once the PLC came back online.</p>
September 28, 2005	<ul style="list-style-type: none"> <li>• The PLC historian software recorded a one-second Hi-Hi probe alarm at 6:18 p.m. CDT, at an upper reservoir level reading of elevation 1544.1 ft. (Ameren Chronology - <i>See Exhibit 22.</i>) At the time of the alarm, the units were neither pumping nor generating. (Ameren Chronology - <i>See Exhibit 31.</i>)</li> <li>• Ameren has been unable to determine why this alarm was recorded, but at the time of the alarm, a storm, accompanied by lightning, moved through the area of the project works. The storm may have caused momentary induced voltages on the wiring running between the Hi-Hi probe relay and the plant PLC input card resulting in the PLC Historian recording a false Hi-Hi probe alarm.</li> </ul>
September 30, 2005	<ul style="list-style-type: none"> <li>• The Hi and Hi-Hi Warrick Probes are verified to be 7 inches and 4 inches below the crest of the wall, respectively. (<i>Note: This results in elevations 1597.417 ft and 1597.667 ft, respectively, based on the recent survey of the parapet wall near the instrumentation.</i>) (Source: 10/7/2005 email from Thomas Pierie and Ameren Chronology.)</li> </ul>
October 3-4, 2005	<ul style="list-style-type: none"> <li>• A visual inspection of the upper reservoir revealed that portions of the gage piping support system had failed, allowing the gage piping to move. The piping was observed to be bent. Ameren operators recognized that a bend in the piping would produce an elevation reading that is lower than the actual elevation of the upper reservoir. (Ameren Chronology - <i>See Exhibit 33.</i>)</li> </ul>
October 6, 2005	<ul style="list-style-type: none"> <li>• The plant superintendent notes the pvc pipes have come loose from the cables and are bowing at least 5 feet out at about 50 feet down.</li> <li>• In the evening, Unit 1 tripped in the generate mode due to high vibrations. (Source: 10/7/2005 email from Richard Cooper)</li> </ul>
October 7, 2005	<ul style="list-style-type: none"> <li>• The maximum operating level is set at 1594 feet instead of the normal 1596 feet.</li> <li>• The set point for the “all pumps” shutdown was lowered from elevation 1596.2 ft. to elevation 1594.2 ft. (Ameren Chronology)</li> </ul>

	<ul style="list-style-type: none"> <li>• Arrangements are made to have a diver evaluate whether the piping could be straightened and reattached without draining the reservoir (Ameren Chronology – <i>See Exhibit 34</i>).</li> <li>• Plans were made to add redundancy to the upper reservoir level protection system. A wind speed measurement, transmitter and alarm, were ordered for installation at the upper reservoir. Ameren also planned to install an additional probe 2” below the normal last pump shut down setpoint (<i>i.e., at elevation 1595.83 ft.</i>) so that the level transmitters could be checked. (Ameren Chronology - <i>See Exhibit 32.</i>)</li> <li>• In the morning, Unit 2 tripped on high vibration in the pump mode.</li> <li>• The plant superintendent believes some epoxy material is coming loose from the tunnel liner that was installed last fall. The epoxy was installed in the tunnel to cover cracks in the steel liner. The size of the epoxy patch was about 1 inch thick, 6 feet wide and 100 feet long. The tunnel drains were found to be flowing at full pipe link they were before the epoxy patch was installed. The vibration protection trips on the units were set to normal levels and the superintendent believed these would protect the units if more material is released. (Source: 10/7/2005 email from Richard Cooper)</li> </ul>
October 11, 2005	<ul style="list-style-type: none"> <li>• A diver visits the site and says the pipes can be straightened out but Ameren needs to develop/manufacture a new tie down system. (Source: 10/11/2005 email from Richard Cooper)</li> </ul>
October 25, 2005	<ul style="list-style-type: none"> <li>• The preliminary design was completed and materials were ordered for the gage piping support retrofit. (Ameren Chronology - <i>See Exhibit 35.</i>)</li> </ul>
November 2, 2005	<ul style="list-style-type: none"> <li>• The PLC historian software recorded a nine-second Hi-Hi probe alarm at 12:49 p.m. CST, at an upper reservoir level reading of elevation 1578.4 ft. <i>See Exhibit 22.</i> At the time of the alarm, the units were neither pumping nor generating. (Ameren Chronology - <i>See Exhibit 36.</i>) Ameren has been unable to determine why this alarm was recorded.</li> </ul>
November 23, 2005	<ul style="list-style-type: none"> <li>• All materials are on hand to make repairs.</li> <li>• Emails indicate Ameren is having trouble</li> </ul>

	scheduling repairs and notes the diver may not be available through the end of the year. (Source: 11/23/2005 email from Steven Bluemner)
December 13, 2005	<ul style="list-style-type: none"> <li>• Operations data shows the transmitter elevations drop about 1.9 feet at about 11:20 pm although both units are pumping. (Source: Ameren's Operation Data)</li> <li>• See December 13-14 Operations Time Line</li> </ul>
December 14, 2005	<ul style="list-style-type: none"> <li>• Dam Overtops and Breaches</li> <li>• See December 13-14 Operations Time Line</li> </ul>

**6.2 Events of September 24- 26, 2005 Overtopping due to the Remnants of Hurricane Rita**

**September 24-26 Operations Time Line  
Taum Sauk Project, P-2277**

<b>Date</b>	<b>Time</b>	<b>Transmitter Elev. (ft)</b>	<b>Unit Info.</b>	<b>Weather at Farmington, MO</b>	<b>Coincident Events</b>
Sept. 24	13:00	1595.82	Generator 1 on-line	Wind 8 knots coming from 110 degrees of North, Clear	
	13:11	1595.03	Generator 2 on-line	Same	
	18:01	1544.91	Generator 1 off-line	Wind 5 knots coming from 100 degrees of North, Clear	
	18:02	1544.91	Generator 2 off-line	Same	
	18:58	1544.75	Generator 2 on-line	Wind 4 knots coming from 110 degrees of North, Clear	
	19:01	1544.20	Generator 1 on-line	Same	
	20:01	1532.00	Generators 1 & 2 off-line	Wind 6 knots coming from 110 degrees of North	
Sept. 25	00:27	1531.65	Pump 2 on-line	Wind 3-4 knots coming from 30-120 degrees of North	
	01:57	1539.80	Pump 1 on-line	Wind 5 knots coming from 70 degrees of North	
	08:03	1592.11	Pump 2 off-line	Wind 9 knots (gust to 16 knots) coming from 80 degrees of North, precip.	
	9:03	1595.96	Pump 1 off-	Wind 14 knots	Ameren

		line	(gust to 20 knots) coming from 80 degrees of North, precip.	guards note overtopping during this period.
	11:03	1595.97	Generator 2 on-line	Wind 8 knots coming from 100 degrees of North, precip.
	12:15	1590.92	Generator 2 off-line	Wind 8-9 knots coming from 80-100 degrees of North, precip.
	13:56	1590.85	Generators 1 & 2 on-line	Wind 7 knots coming from 140 degrees of North, precip.
	18:03	1547.91	Generators 1 & 2 off-line	No wind, slight precip.
	18:59	1547.78	Generator 1 on-line	No wind
	19:01	1547.68	Generator 2 on-line	Same
	20:35	1528.18	Generator 2 off-line	Wind 3 knots coming from 310 degrees of North
	20:59	1525.80	Generator 1 off-line	Same
	21:58	1525.42	Pump 2 on-line	Wind 7 knots coming from 350 degrees of North
	23:01	1531.49	Pump 1 on-line	Same
Sept. 26	05:53	1591.96	Pump 2 off-line	Wind 3 knots coming from 300 degrees of North, Clear
	06:43	1594.9	Pump 1 off-line	Wind 5 knots coming from 260 degrees of North, Clear

\* Information for this chart is from Ameren's operation data & Metar Data provided by National Weather Service.

### 6.3 Events of December 13 and 14 2005

#### December 13-14 Operations Time Line Taum Sauk Project, P-2277

Date	Time	Transmitter Elev. (ft)*	Unit Info.	Weather at Farmington, MO	Coincident Events
Dec. 13	06:05	1591.52	Generator 1 on-line	36 <sup>o</sup> , Wind at 5 knots coming from 60 degrees from North	
	06:06	1591.54	Generator 2 on-line	Same	
	7:08	1581.57	Generators 1 & 2 off-line	34 <sup>o</sup> , No wind	
	16:43	1581.29	Generator 1 on-line	43 <sup>o</sup> , Wind at 3 knots coming from 180 degrees from North	
	16:50	1580.63	Generator 2 on-line	Same	
	20:06	1548.08	Generator 1 off-line	45 <sup>o</sup> , Wind at 9 knots coming from 160 degrees from North	
	20:27	1546.39	Generator 2 off-line	45 <sup>o</sup> , Wind at 11 knots coming from 180 degrees from North	
	22:33	1546.85	Pump 1 on-line	43 <sup>o</sup> , Wind at 11 knots coming from 160 degrees from North	
	23:13	1548.59	Pump 2 on-line	41 <sup>o</sup> , Wind at 8 knots coming from 140 degrees from North	At about 23:20 there is a 1.9 foot drop in the transmitter readings, although both pumps are



					operating.
Dec. 14	04:43	1591.85	Pump 2 off-line	39 <sup>o</sup> , Wind at 8 knots coming from 150 degrees from North	
	05:16	1593.39	Pump 1 off-line	39 <sup>o</sup> , Wind at 16 knots coming from 160 degrees from North	Between 5:15 and 5:30, USGS Gage 07061270 (East Fork Black River Near Lesterville) located near Highway N was damaged by the flood surge.
	05:20	1581.59			
	05:25	1548.09			
	05:30	1522.52			
	05:35	1510.78		39 <sup>o</sup> , Wind at 13 knots (gust to 19 knots) coming from 170 degrees from North	At 5:38, the Osage Operator logs that the upper reservoir indication, tailwater level indication, and generate permissives were not reading normal on the LDS and STADA System
	05:40	1507.00			At 5:40, Osage Operator notifies Taum Sauk Superintendent of unusual readings. At 5:41, the Reynolds County 911 dispatcher

				received a call about water on Highway N.
05:45	1505.72			
05:50	1505.12			
05:55	1504.77			
06:00	1504.55		37 <sup>o</sup> , Wind at 11 knots (gust to 16 knots) coming from 160 degrees from North	At 6:00, the plant superintendent confirms tailrace is muddy. The Lesterville Fire Department and Reynolds County Sheriff contact the Plant Superintendent to confirm the upper reservoir dam has breached. The plant superintendent begins contacting others on EAP.
08:00	1503.52		36 <sup>o</sup> , Wind at 8 knots coming from 150 degrees from North, slight precip.	

\* Transmitter readings are not the true elevations of reservoir.

\*\* Information for this chart is from Ameren's operation data, NOAA's thrice hourly surface climate data for Farmington, MO Airport Station, Ameren's 12.10 letter, an interview with Reynolds County Sheriff, and a 1/23/2006 email from USGS.