

## **Section 10   Emergency Response**

### **10.1   Emergency Action Plan**

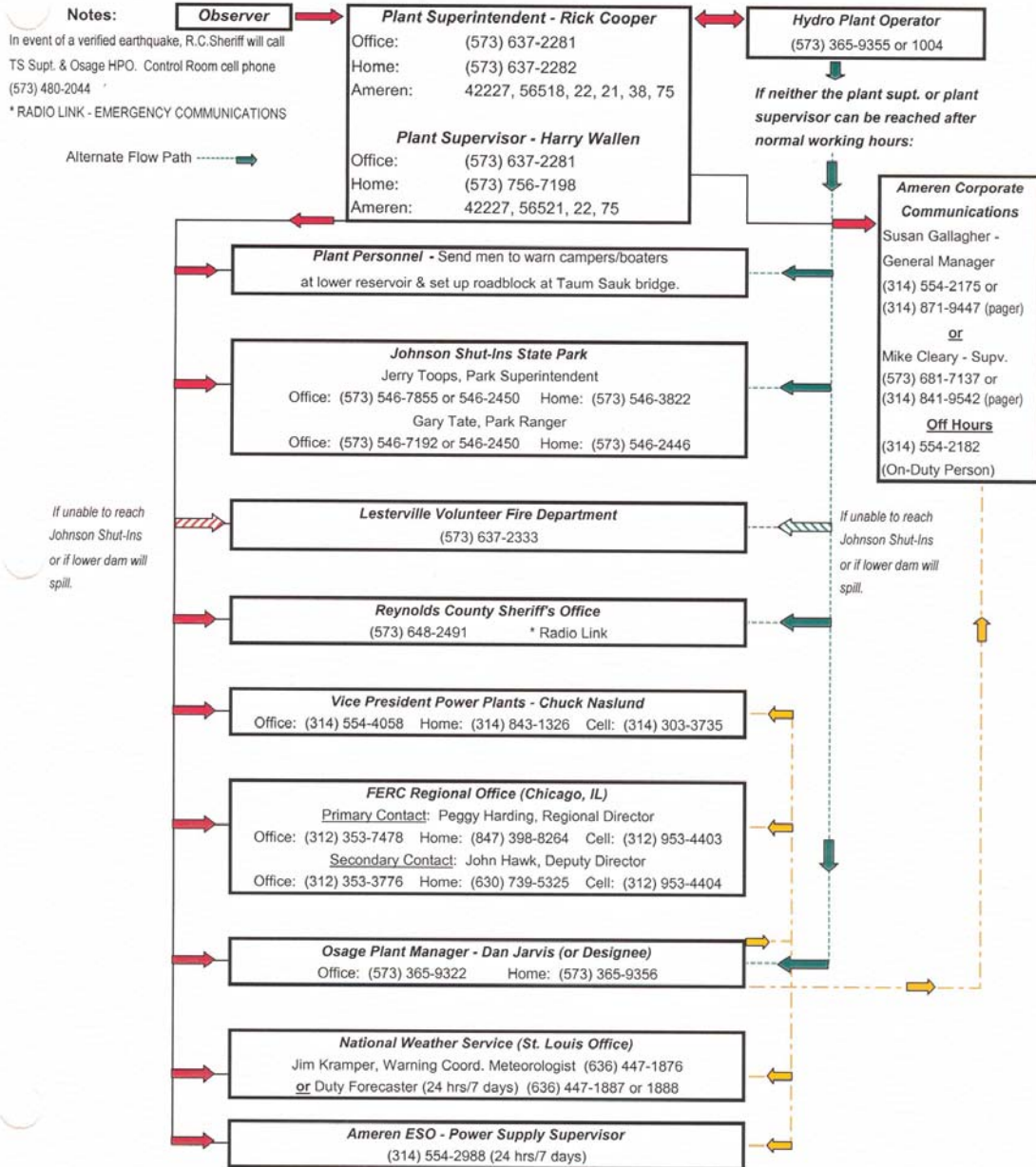
The Emergency Action Plan for the Taum Sauk Project was last reprinted in January 2003 and the most recent annual update was submitted by letter dated August 24, 2005.

#### ***10.1.1 Notification Flow Charts***

The EAP contains two notification flow charts. Figure 10.1 is the flow chart is for an incident at the Upper Reservoir. There is also another flow chart for an incident at the Lower Reservoir. The Upper Reservoir version calls for immediate notifications of the Johnson's Shut-Ins Park Superintendent and sends plant personnel to warn boaters/campers on the Lower Reservoir. Following these actions, calls are made to the Lesterville Fire Department, Reynolds County Sheriff, AmerenUE employees, FERC staff, and the National Weather Service. The flow chart for the Lower Reservoir is similar except the Johnson's Shut-Ins Superintendent is not notified since they are upstream of the Lower Reservoir and would not be impacted.

The EAP contains the names, addresses, and phone numbers of all residents downstream of the Lower Reservoir that would need to be evacuated from a dam breach. The Lesterville Fire Department would be divided into three teams to notify these residents.

### NOTIFICATION FLOWCHART UPPER RESERVOIR



Rev. 2, 12/01/02

Figure 10.1 – EAP Notification Flow Chart

### ***10.1.2 Detection of Emergencies***

The EAP explains how an emergency at the project would be detected and evaluated. It was expected an emergency would be detected by (1) first hand observation by plant and security personnel; (2) monitoring of the local and remote instrumentation at the Taum Sauk plant, Osage plant, or load dispatch office; and (3) current weather and new and forecasts obtained from several media sources. The plant and security personnel are on duty from 7:00 am to 6:30 pm and the plant superintendent lives at the project site. It was also noted that abnormal leakage or signs of failure could be observed at Johnson's Shut-Ins State Park by the presence of high or muddy flows.

### ***10.1.3 Inundation Maps***

The inundation maps were prepared for a dam breach of the Upper Reservoir and Lower Reservoir Dams. The maps are based on dambreak analysis performed in 1988. It is not clear what kind of computer model was used to perform the analysis.

#### **10.1.3.1 Upper Reservoir – Inundation Maps**

The inundation zone assumed a breach of the west slope of the Upper Reservoir. The failure scenario was initiated by a parapet wall failure leading to breach of the dam. The assumed failure would be preceded by an increase of leakage which would trigger the EAP. About 0.5 hour after the leakage started, the parapet wall fails, releasing 4,500 cfs. It was expected to take about 15 minutes for these flows to reach the flood plain between Highway N and the Johnson's Shut-Ins. In another 0.5 hour, the first slab would breach releasing 14,000 cfs. In the next two hours additional slabs would fail and the reservoir would empty, peak flows would be 30,000 cfs. The final breach would have a bottom width of 60 feet, 1:1 side slopes, and a top width of 240 feet. The peak flow estimate of 30,000 cfs is comparable to the flood of record for the East Fork of the Black River which occurred in 1986. It was expected that the Lower Reservoir would be able to hold the majority of the breach flows.

The path of the flows from the breach is divided into four sections: (1) from the dam, flows would travel 9,000 feet down the wooded slope to the East Fork of the Brown River; (2) flows would travel through the level 5,000 foot flood plain along the East Fork between Highway N and the Johnson's Shut-Ins; (3) flows would travel through a campground and the narrow rock canyon of the Johnson Shut – Ins; (4) flows would pass through 700-foot-long stretch of the East Fork and then enter the Lower Reservoir.

The inundation map for the Upper Reservoir does not include arrival times or times to peak flows.

There are no developments in the projected floodway from a breach of the north or east sides of the Upper Reservoir. Therefore, the inundation maps do not show a breach in these areas. The flood wave from a breach of the north or east sides would eventually flow into the lower reservoir via the Black River and place the recreational users of the lower reservoir at risk.

#### **10.1.3.2 Lower Reservoir – Inundation Maps**

The inundation maps assume a sudden breach of the dam from the crest at elevation 750 ft to the bottom of the gallery at elevation 720 ft. This would release a peak flow of 50,000 cfs. The river channel downstream of the dam is wide and opens to about 1000 feet wide within 1500 feet of the dam. The channel widens further over the next three miles to the Town of Lesterville. Beyond Lesterville, the channel is restricted by a road fill and steel bridge. About one mile downstream of the bridge the East Fork merges with the Middle Fork of the Black River. Eventually flows would travel to the U.S. Army Corps of Engineers' Clearwater Dam, located about 10 miles downstream of the Lower Dam.

The first structure would be impacted by a breach of the Lower Dam in about 15 minutes. Flows would reach Lesterville in about an hour. It was estimated about 25 structures could be impacted upstream of the bridge in Lesterville. About 0.25 mile downstream of the bridge is a summer recreational camp.

#### ***10.1.4 Training and Exercises***

The project operators received annual training on the EAP. The plant superintendent also performed an annual drill based on a made-up failure scenario and included both licensee personnel and emergency response personnel on the notification flow chart (i.e., Reynolds County Sheriff, Lesterville Fire Department, National Weather Service). The participants were warned of the drill prior to implementing the scenario. The drill was meant to ensure Osage and Taum Sauk Operators acknowledge the alarm and followed their internal procedures and the Taum Sauk superintendent or designee performs notifications according to the postulated emergency. After the drill, the superintendent made follow-up calls to all participants to evaluate the procedures.

The last functional exercise for the Taum Sauk Project was performed in May 1998. The licensee alternated functional exercises between its Osage and Taum

Sauk Projects. A functional exercise was performed at Osage in 2003 and the next functional exercise at Taum Sauk is scheduled for 2008.

### **10.2 Licensee's Account of the December 14, 2005 EAP Activation and Coordination**

By letter dated December 27, 2005, AmerenUE provided their detailed account of the EAP detection, activation, and coordination. The following is a paraphrased version. For more details, see AmerenUE's December 27, 2005 letter.

<b>Time</b>	<b>Event</b>
5:40 a.m.	Plant Superintendent Richard Cooper receives call from Osage operator that they lost indication of the upper reservoir, tailrace, and penstock level transmitter (i.e., the Osage Operator received alarms that reservoir was too low).
6:00 a.m.	Mr. Cooper arrives at project and notices tailrace is muddy.
	As Mr. Cooper enters powerhouse he receives call from Lesterville Fire Department reporting flooding at Johnson Shut-Ins. Mr. Cooper informs Fire Department that there are signs the Upper Reservoir has breached. The Fire Department states it will contact the Reynolds County Sheriff, who was currently on another line.
	Mr. Cooper notified the parties on the notification list, with the exception of the Lesterville Fire Department and Reynolds County Sheriff who were already warned. The Johnson's Shut-Ins park superintendent, Mr. Jerry Toops, is on the notification list, but Mr. Cooper received no answer.
6:30 a.m.	Mr. Cooper completed the EAP contact list.
	In addition to the contact list, Mr. Cooper also has telephone contact with additional FERC staff, AmerenUE personnel, the U.S. Coast Guard, and Missouri Highway Patrol

According to their December 27, 2005 letter, AmerenUE states there were no significant problems with implementing the EAP.

### **10.3 Interview with Reynolds County Emergency Personnel**

On January 10, 2006, FERC staff met with Reynolds County Sheriff Gary Barton regarding the emergency response during the dam breach. Also in attendance were the Reynolds County Board of Supervisors and other Reynolds County employees.

Sheriff Barton explained that at 5:41 a.m. the Reynolds County 911 dispatcher received a call from a motorist on Route N with a report of high water. The dispatcher immediately called the Lesterville Fire Department and Reynolds County Sheriff with this information. Ironically, the Taum Sauk annual drill was scheduled to take place on this date and the 911 dispatcher asked the Sheriff if this could be part of the drill. The Reynolds County Sheriff assured the dispatcher the drill would not be happening at this time of the day. The Sheriff advised the dispatcher to get their copy of the EAP and keep it handy.

Reynolds County personnel began making emergency contacts. The Lesterville Fire Department contacted with Taum Sauk Superintendent Mr. Cooper. A call was placed to the Toops' house but there was no answer.

Emergency personnel arriving at the scene noted the Toops house was destroyed, a tractor trailer and car traveling on Route N had been carried into a field upstream of the Toops house, a dump truck traveling on Route N was inundated, and the surrounding area was devastated by the high flows. The Toops family had been pushed by the flood wave in the upstream direction across Rte. N and into a field. Flows receded in about 30 minutes and emergency personnel were able to rescue the drivers, as well as the Toops family. According to logs of the event, the ambulance carrying the Toops left the scene at 7:24 a.m.

By 7:00 a.m. the decision was made to close the Lesterville School so it could be used as a shelter. Both the American Red Cross and the Salvation Army provided aid at the shelter. AmerenUE also rented a local motel as an additional shelter. Following the National Weather Service announcement of the possibility for severe flooding downstream of the lower dam, emergency response personnel began going house-to-house to evacuate residents. The sheriff said the evacuations were not mandatory.

By noon, a helicopter had flown over the impacted site to look for any others that could have been impacted by the breach.

Route N was closed throughout the day due to flooding damage. Portions of Route K and Highway 49 were also closed during the day due to the threat of flooding. The Johnson Shut-Ins Campground, playground, and shower house were found to be severely damaged.

The sheriff praised AmerenUE personnel for their coordination prior to and during the emergency. He had face-to-face meetings with the Taum Sauk superintendent and participated in annual drills as preparation for what his role would be in just such a scenario. He was familiar with the inundation maps from previous drills and found them helpful. He said during previous drill when it was thought a radio

line between the Taum Sauk plant and the Sheriff's office would enhance communication during an emergency, AmerenUE provided one quickly.

Sheriff Barton stated there were a couple problems during the emergency. He explained there were two 911 lines which were inundated with hundreds of calls and the operators could not handle all the calls. He estimates they received 600-800 calls that day. He said during the emergency his office received a large number of calls reporting missing people. He believed the calls were made by people that could not initially contact local residents. As the day progressed, the list of missing persons diminished until all people were accounted for.

The sheriff had concerns with the National Weather Service flood warning which assumed a breach of the lower reservoir. He said early during the event it was apparent that the lower dam was not in danger of breaching but the flood warning was not called off until later in the day. In response to this warning, emergency personnel were sent to evacuate people downstream of the Lower Reservoir.

The sheriff made suggestions for possible improvements to handling similar emergency. He suggested some type of early warning system, such as an automatic call out system or siren, be installed to ensure downstream residents could be notified in a timely manner. This is particularly a concern during warmer months when the Johnson's Shut-Ins campground is full. He also noted that during emergencies it would be helpful to have a single point of contact for the media, so reporters would not be getting information from non-experts.

#### 10.4 Interview with National Weather Service

On January 12, 2006, FERC staff met with National Weather Service staff at their St. Charles, MO offices. During the meeting, NWS staff explained their emergency response during the December 14, 2005 event and provided copies of the flood warnings and flood statements which they issued following the breach. The following is a chronology of NWS' actions:

<b>Date</b>	<b>Time</b>	<b>Event</b>
12/14/2005	6:20 AM	NWS is notified of breach by AmerenUE.
	6:27 AM	NWS issues flash flood warning for Northeastern Reynolds County. The warning states large quantities of water will move downstream causing extreme flooding of the Black (River) below the Dam. It states flooding can be expected in Lesterville, Highway N and areas in and near Johnson Shut-In Park
	6:52 AM	NWS issues second flash flood warning for

		Northeastern Reynolds County, effective until 8:45 a.m. This warning predicts water will reach Highway K west of Annapolis, MO by 9:00 a.m. and reach a level of 20 feet (flood stage is 8 feet). The warning stated the record crest was 27 feet. <i>Although not stated in the warning, the flood crest is based on a worst case scenario where the Lower Dam would also breach. The flood crests at Annapolis are based on the Inundation Maps in the EAP.</i>
	6:57 AM	NWS issues a flood warning for the Black River, gives the estimated 20 foot crest at Annapolis and states the forecast is based on the Taum Sauk Lake Dam breach.
	8:54 AM	NWS issues a flood statement stating the flood warning for the Black River remains in effect. Statement calls for crest of 20 feet at Annapolis around noon. States the forecast is based on the breach of the Taum Sauk Lake Dam and crest is based on a worse case failure (Lower Reservoir failure.)
	12:01 PM	NWS issues a flood statement saying the flood warning for the Black River is still in effect. It downgrades the crest at Annapolis to 12 feet which would occur at 3:00 PM assuming the Lower Taum Sauk Lake holding and not failing.
	3:04 PM	NWS issues a flood statement saying the flood warning for Black River is still in effect. It downgrades the crest at Annapolis to 8.0 feet at 6:00 PM. States most of the flood water was captured by the Lower Reservoir and AmerenUE officials state the Lower Reservoir is structurally sound.
	9:01 PM	NWS downgrades flood crest to 4.0 feet at Annapolis.
12/15/2005	2:16 AM	NWS cancels the flood warning for the Black River.

During the January 12, 2006 meeting, NWS staff discussed the incident and their response.

They pointed out NWS was notified of the breach almost one hour after it occurred which detracted from how quickly it could issue warnings for downstream residents.

They noted they had closer coordination with the Taum Sauk Plant Superintendent after both parties attended the 2003 functional exercise at the Osage Project and participated in their 2004 annual drill. They also pointed out the 2005 annual drill was scheduled for the day the breach occurred.



They noted it was difficult to receive information from AmerenUE employees early during the event. This led the NWS to use the worst case scenario that the Lower Reservoir dam would also breach. As the day went on and more information became available, NWS lowered their downstream crest estimates after it was clear the Lower Reservoir Dam was not at risk of failing.