Emergency Action Plan (EAP)
Basin Creek Dam #1
Basin Creek Dam #2

City-County of Butte-Silver Bow
Department of Public Works
Water Utility Division
124 West Granite Street
Butte, Montana

National Inventory of Dams (NID)
Basin Creek Dam #1 - MT # 00374
Basin Creek Dam #2 - MT # 00868

Date: January 16, 2020
Modified from a template developed by the USDA-NRCS

Copy ____ of _____
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Basic EAP Data

Purpose
The purpose of this emergency action plan (EAP) is primarily to safeguard the lives of and secondarily to reduce property damage to the citizens of the City-County of Butte-Silver Bow living in or near the city of Butte, along Basin Creek, Silver Bow Creek and the Clark Fork River in the event of flooding caused by a failure of Basin Creek Dam #1 and/or Basin Creek Dam #2.

Potential Impacted Area
The evacuation area for both dams extends along Basin Creek, portions of the City of Butte, along Silver Bow Creek, and portions of areas along the Clark Fork River to a point about three miles southeast of Garrison, MT. Hazards include the possible inundation of occupied dwellings, Montana Rail Link Railroad, and Interstate Highway 15/90. Inundation and evacuation maps are in Appendix C-1. It is understood that all inundation from Dam #2 can be contained by Dam #1, therefore when discussing potential or imminent failure the hazard is focused on dam #1’s impact.
**Basin Creek Dam #1 Description**

<table>
<thead>
<tr>
<th><strong>Dam Owner/Operator:</strong></th>
<th>Butte-Silver Bow Public Works Department</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hazard Classification:</strong></td>
<td>High</td>
</tr>
<tr>
<td><strong>Drainage Area:</strong></td>
<td>13.6 Square Miles</td>
</tr>
<tr>
<td><strong>Dam Height/Length:</strong></td>
<td>80’ high, 275’ long</td>
</tr>
<tr>
<td><strong>Built:</strong></td>
<td>1897, 1913, 1930’s, 2006 (Rehabilitation)</td>
</tr>
<tr>
<td><strong>Dam Type:</strong></td>
<td>Rock Masonry Arch, with concrete buttress and earthfill</td>
</tr>
<tr>
<td><strong>Capacity:</strong></td>
<td>1,115 acre-feet (spillway crest)</td>
</tr>
<tr>
<td></td>
<td>1,170 acre-feet (dam crest)</td>
</tr>
<tr>
<td><strong>Legal Description:</strong></td>
<td>Section 12, T1N, R8W</td>
</tr>
<tr>
<td><strong>Latitude:</strong></td>
<td>45.85450° N</td>
</tr>
<tr>
<td><strong>Longitude:</strong></td>
<td>-112.54633° W</td>
</tr>
<tr>
<td><strong>National Inventory of Dams No.:</strong></td>
<td>MT-00374</td>
</tr>
</tbody>
</table>

**Basin Creek Dam #2 Description**

<table>
<thead>
<tr>
<th><strong>Dam Owner/Operator:</strong></th>
<th>Butte-Silver Bow Public Works Department</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hazard Classification:</strong></td>
<td>Not High Hazard</td>
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<tr>
<td><strong>Drainage Area:</strong></td>
<td>4.72 Square Miles</td>
</tr>
<tr>
<td><strong>Dam Height/Length:</strong></td>
<td>45’ high, 320’ long</td>
</tr>
<tr>
<td><strong>Built:</strong></td>
<td>1898, 1907</td>
</tr>
<tr>
<td></td>
<td>Partially breached in 1981, and 2017</td>
</tr>
<tr>
<td><strong>Dam Type:</strong></td>
<td>Rock Filled Timber Crib with concrete diaphragm wall</td>
</tr>
<tr>
<td><strong>Capacity:</strong></td>
<td>196 acre-feet (spillway crest)</td>
</tr>
<tr>
<td></td>
<td>290 acre-feet (dam crest)</td>
</tr>
<tr>
<td><strong>Legal Description:</strong></td>
<td>Section 18, T1N, R7W</td>
</tr>
<tr>
<td><strong>Latitude:</strong></td>
<td>45.84000° N</td>
</tr>
<tr>
<td><strong>Longitude:</strong></td>
<td>-112.52579° W</td>
</tr>
<tr>
<td><strong>National Inventory of Dams No.:</strong></td>
<td>MT-00868</td>
</tr>
</tbody>
</table>

**Overview and Directions to Dams**

**Basin Creek Dam #1** is in Silver Bow County, located on Basin Creek, at the confluence of Bear Gulch Creek. The dam is located at the end of Basin Creek Road, 7 miles south of the intersection with Harrison Avenue. It is owned by the Butte-Silver Bow Department of Public Works Water Utility Division, 124 West Granite Street, Butte, Montana 59701, and is used for municipal water supply for the Butte-Silver Bow area.

**Basin Creek Dam #2** is in Silver Bow County, southwest of Butte. It is located on Basin Creek approximately 1 mile upstream from Basin Dam #1 and is impounded by Basin Creek Dam #1. It is also owned by the Butte-Silver Bow Department of Public Works Water Utility Division, and is used for municipal water supply storage for the Butte-Silver Bow area.
Directions to Dams:

Basin Creek Dam #1 is located at the end of Basin Creek Road, about 10 miles south of Butte accessed by taking Harrison Avenue, and then veering right onto Basin Creek Road. Note that the county road may become flooded. The nearest telephone to the dams is at the old chlorinating building below the dam. Basin Creek Dam #2 is approximately one mile upstream of Basin Creek Dam #1 and accessed by continuing on Basin Creak Road east of Dam #1.
Figure 1: Directions to Basin Creek Dams

Figure 1 Directions from Butte to Basin Creek Dams

Legend:
- Dams
- Route

0 0.5 1 Miles

Butte
Harrison Avenue
Basin Creek Road
Basin Creek Dam #1
Basin Creek Dam #2
EAP Overview

Step 1:
Event Detection
Detect Event

Step 2:
Emergency Level Determination
Assess situation & determine emergency level
- **High Flow**
- **Non Failure**
- **Potential Failure**
- **Imminent Failure**

Step 3:
Notification and Communication
- Notify "High Flow" List
- Notify "Non Failure List"
- Notify "Potential Failure List"
- Notify "Imminent Failure List"

Step 4:
Expected Actions
- Monitor
- Monitor
- Save Dam Protective Actions
- Save People Evacuate

Step 5:
Termination & Follow Up
Termination & Follow Up
Roles and Responsibilities

Dams Owner & Operator (Butte-Silver Bow Department of Public Works)

• As soon as an emergency event is observed or reported, immediately determine the emergency level (see Step 2: Emergency Level Determination).
  – High Flow: flooding in system, no apparent threat to integrity of the dam
  – Non-Failure: unusual event, slowly developing
  – Potential Failure: potential dam failure situation, rapidly developing
  – Imminent Failure: dam failure appears imminent or is in progress
• Immediately notify the personnel in the order shown on the notification chart for the appropriate level (see Notification Chart in Step 2: Emergency Level Determination).
• Provide updates of the situation to the sheriff/dispatcher to assist them in making timely and accurate decisions regarding warnings and evacuations.
• Provide leadership to ensure the EAP is reviewed and updated annually and copies of the revised EAP are distributed to all who received copies of the original EAP.

Incident Commander (Sheriff, Butte-Silver Bow Law Enforcement Department)

• Serve as the primary contact person responsible for coordination of all emergency actions.
• When a High Flow Event situation occurs: Prepare emergency management for possible evacuations.
• When a Potential Failure situation occurs: Prepare emergency management personnel for possible evacuations that may be needed if an Imminent Failure Emergency Level situation occurs.
• When an Imminent Failure situation occurs:
  – Initiate warnings and order evacuation of people at risk downstream of the dam.
  – Notify local Emergency Management to carry out the evacuation of people and close roads within the evacuation area (see Inundation Maps; Appendix C-1).
• Decide when to terminate the emergency.
• Participate in an annual review and update of the EAP.

Emergency Management (Director, Butte-Silver Bow Office of Emergency Management)

• Maintain communication with media.
• When a High Flow Event situation occurs: Prepare emergency management for possible evacuations.
• When a Potential Failure situation occurs:
  – Prepare emergency management personnel for possible evacuations that may be needed if an Imminent Failure situation occurs.
  – Alert the public as appropriate.
• When an Imminent Failure situation occurs:
  – Prepare emergency management for evacuations.
  – Alert the public as appropriate.
• Participate in an annual review and update of the EAP.

Dam Operator’s Technical Representatives (Pioneer Technical Services, Inc.)

• Advise the dam operator of the emergency level determination, if time permits.
• Advise the dam operator of remedial actions to take if a Potential Failure event occurs, if time allows.
State Dam Safety Agency (Montana Department of Natural Resources, DNRC)

- Advise the dam operator of the emergency level determination, if not yet already done and if time permits.
- Advise the dam operator of remedial actions to take if a Potential Failure event occurs, if time permits.
- Participate in an annual review and update of the EAP.
The Five-step EAP Process

Step 1  Event Detection
This step describes the detection of an unusual or emergency event and provides information to assist the dam operator in determining the appropriate emergency level for the event.

Unusual or emergency events may be detected by:

- Observations at or near the dam by the dam owner, landowners, visitors to the dam, the public, or government personnel (local, state, or federal).
- Earthquakes felt or reported in the vicinity of the dam.
- Observations of any slumping of the downstream slope of the dam or new wet areas.
- Forewarning of conditions that may cause an unusual event or emergency event at the dam (for example, a severe weather or flash flood forecast).

See the Guidance for Determining the Emergency Level table in Step 2: Emergency Level Determination for assistance in evaluating specific events to determine if they are unusual or potential emergency situations.
**Step 2  Emergency Level Determination**

After an unusual or emergency event is detected or reported, the Dam Owner (with assistance as necessary from their Consulting Engineer and DNRC) is responsible for classifying the event into one of the following four emergency levels:

**High Flow—Flooding downstream, no apparent threat to dam integrity:**
This situation indicates that flooding is occurring downstream, but there is no apparent threat to the integrity of the dam. The High Flow emergency level should be used by the Dam Owner to convey to outside agencies that downstream areas may be affected by the dam’s water release. The amount of flooding may be out of the control of the Dam operator, but information on timing and amount of release is helpful to authorities in making decisions regarding warnings and evacuations.

**Non-Failure—Nonemergency, unusual event, slowly developing:**
This situation is not normal but has not yet threatened the operation or structural integrity of the dam, but possibly could, if it continues to develop. State dam safety officials should be contacted to investigate the situation and recommend actions to take. The condition of the dam should be closely monitored, especially during storm events, to detect any development of a potential or imminent dam failure situation. The Sheriff should be informed if it is determined that the conditions may possibly develop into a worse condition that may require emergency actions.

**Potential Failure—Potential dam failure situation, rapidly developing:**
This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. The Sheriff should be notified of this emergency situation and placed on alert. The dam owner should closely monitor the condition of the dam and periodically report the status of the situation to the Sheriff. If the dam condition worsens and failure becomes imminent, the Sheriff must be notified immediately of the change in the emergency level to evacuate the people at risk downstream.

If time permits, state dam safety officials should be contacted to evaluate the situation and recommend remedial actions to prevent failure of the dam. The dam operator should initiate remedial repairs. Time available to employ remedial actions may be hours or days.

Emergency services should be on alert to initiate evacuations or road closures if the situation develops further.

**Imminent Failure—Urgent; dam failure appears imminent or is in progress:**
This is an extremely urgent situation when a dam failure is occurring or obviously is about to occur and cannot be prevented. Flash flooding will occur downstream of the dam. The Sheriff should be contacted immediately so emergency services can begin evacuations of all at-risk people and close roads as needed (see *Inundation Maps; Appendix C-I)*.
## Guidance for Determining the Emergency Level

<table>
<thead>
<tr>
<th>Event</th>
<th>Situation</th>
<th>Emergency Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spillway flow</td>
<td>Spillway flowing with active gully erosion</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise</td>
<td>Potential failure / High Flow Event</td>
</tr>
<tr>
<td></td>
<td>Spillway flowing with advancing head cut that is threatening the control section</td>
<td>Imminent failure</td>
</tr>
<tr>
<td></td>
<td>Spillway flow that is flooding people downstream</td>
<td>High Flow Event</td>
</tr>
<tr>
<td>Embankment overtopping</td>
<td>Reservoir level is 1 foot below the top of the dam</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Water from the reservoir is flowing over the top of the dam</td>
<td>Imminent failure</td>
</tr>
<tr>
<td>Seepage</td>
<td>New seepage areas in or near the dam</td>
<td>Non-failure</td>
</tr>
<tr>
<td></td>
<td>New seepage areas with cloudy discharge or increasing flow rate</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Seepage with discharge greater than 10 gallons per minute</td>
<td>Imminent failure</td>
</tr>
<tr>
<td>Sinkholes</td>
<td>Observation of new sinkhole in reservoir area or on embankment</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Rapidly enlarging sinkhole</td>
<td>Imminent failure</td>
</tr>
<tr>
<td>Embankment cracking</td>
<td>New cracks in the embankment greater than ¼-inch wide without seepage</td>
<td>Non-failure</td>
</tr>
<tr>
<td></td>
<td>Cracks in the embankment with seepage</td>
<td>Potential failure</td>
</tr>
<tr>
<td>Embankment movement</td>
<td>Visual movement/slippage of the embankment slope</td>
<td>Non-failure</td>
</tr>
<tr>
<td></td>
<td>Sudden or rapidly proceeding slides of the embankment slopes</td>
<td>Imminent failure</td>
</tr>
<tr>
<td>Earthquake</td>
<td>Measurable earthquake felt or reported on or within 50 miles of the dam</td>
<td>Non-failure</td>
</tr>
<tr>
<td></td>
<td>Earthquake resulting in visible damage to the dam or appurtenances</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Earthquake resulting in uncontrolled release of water from the dam</td>
<td>Imminent failure</td>
</tr>
<tr>
<td>Security threat</td>
<td>Verified bomb threat that, if carried out, could result in damage to the dam</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Detonated bomb that has resulted in damage to the dam or appurtenances</td>
<td>Imminent failure</td>
</tr>
<tr>
<td>Sabotage/vandalism</td>
<td>Damage to dam or appurtenance with no impacts to the functioning of the dam</td>
<td>Non-failure</td>
</tr>
<tr>
<td></td>
<td>Modification to the dam or appurtenances that could adversely impact the functioning of the dam</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Damage to dam or appurtenances that has resulted in seepage flow</td>
<td>Potential failure</td>
</tr>
<tr>
<td></td>
<td>Damage to dam or appurtenances that has resulted in uncontrolled water release</td>
<td>Imminent failure</td>
</tr>
</tbody>
</table>
Examples of Emergency Situations

The following are examples of conditions that usually constitute an emergency situation that may occur at a dam. Adverse or unusual conditions that can cause the failure of a dam are typically related to aging or design and construction oversights. Extreme weather events that exceed the original designed conditions can cause significant flow through the emergency spillway or overtopping of the embankment. Additionally, accidental or intentional damage to the dam may also result in emergency conditions. The conditions have been grouped to identify the most likely emergency-level condition. The groupings are provided as guidance only. Not all emergency conditions may be listed, and the dam operator is urged to use conservative judgment in determining whether a specific condition should be defined as an emergency at the dam.

Spillway Flows

Potential Failure—Potential dam failure situation; rapidly developing:

1. Significant erosion and/or head cutting of the spillway is occurring, but the rate does not appear to threaten an imminent breach of the spillway crest that would result in an uncontrolled release of the reservoir
2. Significant erosion, head cutting, or concrete slab loss of the spillway is occurring, but the rate does not appear to threaten an imminent breach of the spillway crest that would result in an uncontrolled release of the reservoir.
3. Flow through the spillway is expected to cause flooding that could threaten people, homes, and/or roads downstream from the dam

Imminent Failure—Urgent; dam failure appears imminent or is in progress:

1. Significant erosion and/or head cutting of the spillway is occurring at a rapid rate, and a breach of the control section appears imminent

High Flow—Flooding downstream, no apparent threat to dam integrity:

1. Flow through the spillway is causing flooding that is threatening people, homes, and/or roads downstream from the dam

Embankment Overtopping

Potential Failure—Potential dam failure situation; rapidly developing:

1. The reservoir level is within 1 foot from the top of the dam.

Imminent Failure—Urgent; dam failure appears imminent or is in progress:

1. The reservoir level has exceeded the top of the dam and flow is occurring over the embankment.

Seepage and Sinkholes

Potential Failure—Potential dam failure situation; rapidly developing:

1. Cloudy seepage or soil deposits are observed at seepage exit points or from internal drain outlet pipes.
2. New or increased areas of wet or muddy soils are present on the downstream slope, abutment, and/or foundation of the dam, and there is an easily detectable and unusual increase in volume of downstream seepage.
3. Significant new or enlarging sinkhole(s) near the dam or settlement of the dam is observed.
4. Reservoir level is falling without apparent cause.
5. The following known dam defects are or will soon be inundated by a rise in the reservoir:
   • Sinkhole(s) located on the upstream slope, crest, abutment, and/or foundation of the dam; or
   • Transverse cracks extending through the dam, abutments, or foundation.

**Imminent Failure—Urgent; dam failure appears imminent or is in progress:**
1. Rapidly increasing cloudy seepage or soil deposits at seepage exit points to the extent that failure appears imminent or is in progress.
2. Rapid increase in volume of downstream seepage to the extent that failure appears imminent or is in progress.
3. Water flowing out of holes in the downstream slope, abutment, and/or foundation of the dam to the extent that failure appears imminent or is in progress.
4. Whirlpools or other evidence exists indicating that the reservoir is draining rapidly through the dam or foundation.
5. Rapidly enlarging sinkhole(s) are forming on the dam or abutments to the extent that failure appears imminent or is in progress.
6. Rapidly increasing flow through crack(s) eroding materials to the extent that failure appears imminent or is in progress.

**Embankment Movement and Cracking**

**Potential Failure—Potential dam failure situation; rapidly developing:**
1. Settlement of the crest, slopes, abutments and/or foundation of the dam that may eventually result in breaching of the dam.
2. Significant increase in length, width, or offset of cracks in the crest, slopes, abutments, and/or foundation of the dam that may eventually result in breaching of the dam.

**Imminent Failure—Urgent; dam failure appears imminent or is in progress:**
1. Sudden or rapidly proceeding slides, settlement, or cracking of the embankment crest, slopes, abutments, and/or foundation, and breaching of the dam appears imminent or is in progress.
Pre-Existing Conditions

Pre-existing conditions at Basin Creek Dam #1:
According to previous reports, the original dam was constructed in the 1890’s. In 1913, the downstream face was buttressed with concrete along with the dam being raised 13 feet to its current top elevation of 5,873 (Note: This elevation is based on an old local datum, the top elevation in NAD88 is 5889.06). In the 1930s, earth fill was added on the downstream side of the dam to protect the exposed concrete face. A major rehabilitation was completed in 2006 to bring structure into compliance with Montana Dam Safety Regulations.

The 2005 and 2006 rehabilitation work primarily consisted of constructing a new concrete spillway with operable crest gate, rehabilitating the outlet works with new intake pneumatic valves, and slip-lining the existing conduits with new high-density polyethylene (HDPE) pipe.

Based on findings cited from the 2019 Engineer’s Inspection:

- “The upstream face is concrete and only the portion above the water line was inspected. The visible portion of the concrete face showed no settlement or misalignment; however, the concrete has numerous cracks, spalling, and generally shows signs of severe deterioration. The cracks observed during the 2019 inspection were also evident in photos from the 2014 and 2009 inspections. Butte-Silver Bow staff indicated the concrete deteriorated considerably in the last couple of years. In several places there are surface voids approximately 12 inches in height, 6 inches deep, and varying in width up to 6 feet. Metal reinforcement was observed in several of the voids. The deterioration appears to be worsening from that observed from the 2014 inspection.”
- “The walkway behind the gantry crane appeared to have a hollow sound during the 2014 inspection. As observed during the 2019 inspection, the walkway continues to deteriorate and have a hollow sound when impacted with a hard object.”
- “In 2011, the dam overtopped near the right abutment and caused significant erosion on the downstream slope. Staff report that this happened when water flowed through a rectangular opening in the right side of the dam face. Behind this opening is a designed open space that pools water and subsequently flowed over the top of the right abutment. The rectangular opening and pooling area are remnants of past operations. The rectangular opening has since been closed to address this issue.”
- “Downstream embankment is earthen fill with grass cover. The right portion of the embankment suffered significant erosion when the dam overtopped in 2011 and was subsequently repaired. In 2018, BSB crews replaced the water bypass pipeline located near the right abutment. This work disturbed embankments soil which were subsequently regraded and reseeded. Straw waddles are still present in the reclaimed area.”
- “A damp area on the right side (near the stairs) was observed, with slight sloughing in the area. Small rodent burrows were observed.”
- “There was concrete deterioration found on the upstream face.”
Pre-existing conditions at Basin Creek Dam #2:
According to previous reports, the original dam was constructed as a rock-filled timber crib dam in 1898. In 1907, the concrete core wall (diaphragm) and steel sheet piling were placed upstream of the cribbing and earth fill was placed around the cribbing and core wall.

A concrete spillway structure is located on the left abutment. This structure remains in place but has been abandoned. The outlet works consists of a 12-inch diameter cast iron pipe with a gate valve located in a valve gallery near the downstream toe of the embankment. The valve is permanently kept in closed position, in poor condition, and may not be operable.

The dam was partially breached in 1981 by the Butte Water Company while removing a portion of the embankment and core wall at the right abutment. Subsequent to the 2014 Inspection, Pioneer Technical Services prepared an engineering design to further breach the dam such that the storage volume would be less than 50 acre-feet to reduce the hazard classification from high to low. A construction permit to perform the work was obtained from DNRC and BSB crews further breached the dam about 1 foot in 2017. The designed plan was to further breach the existing breach location an additional 5 feet; however, BSB limited the 2017 breach to 1-foot due to concerns with flushing sediment downstream. In 2018/2019 WET completed bathymetric surveys of the Upper and Lower Basin Creek Reservoirs and the corresponding stage/storage volumes.

Based on findings cited from the 2019 Engineer’s Inspection:
- “On the embankment upstream slope, the exposed concrete diaphragm wall shows signs of deterioration.”
- “Minor depressions were observed throughout the downstream slope. These depressions are located over an old concrete valve access chamber which was covered with fill at some point in the past (prior to 1978).”
- “A minor amount of seepage was present through and around the concrete valve gallery.”
- “The valve on the 12-inch cast iron outlet pipe is closed and appears to be in very poor condition. The valve is not readily accessible and has a steel grate bolted to the concrete valve gallery preventing access to the valve. The concrete valve gallery shows signs of deterioration, with both spalling and cracks being present. The valve is never operated due to the danger of it becoming stuck open. Seepage along the outlet was observed and measurements were taken using the downstream flume. The flume was flowing 0.40 feet deep. The flume likely is inaccurate due to vegetation in the flume and water flowing around it.”
- “The spillway is located on the left abutment and is constructed of concrete and is in poor condition”
- “The concrete spillway is severely deteriorated and contains numerous areas of spalling, cracks, and undercutting on the apron. Since the partial breach of the dam in 1981, the spillway has not been used.
- “The outlet apron of the spillway shows undercutting.”
Step 3 Notification and Communication

Notification

After the emergency level has been determined, the contacts on the following notification charts for the appropriate emergency level shall be notified immediately.

Communication

High flow — Flooding downstream, no apparent threat to dam integrity:
The Dam Owner should contact the Sheriff. The Sheriff should then contact downstream residents. The Dam Owner should then contact their Consulting Engineer and the Montana DNRC-Dam Safety. They should describe the situation and request technical assistance on next steps to take.

If warranted, the following message may be used to help describe the emergency situation to the Sheriff or emergency management personnel:

“This is an emergency. Identify Yourself; name; position.

The Basin Creek Dam #1 located 12 miles South of Butte, is exhibiting high flows. Downstream areas must be evacuated immediately. Repeat, the Basin Creek Dam #1 is exhibiting high flows; evacuate the low-lying areas of Basin Creek. Hazards include the possible inundation of occupied dwellings, Montana Rail Link Railroad, and Highway 2.

We have activated the Emergency Action Plan for this dam and are currently under the High Flow Emergency Event. Reference the Inundation Maps, Appendix C-1, in your copy of the Emergency Action Plan.

I can be contacted at the following number _____________. If you cannot reach me, please call the following alternative number _____________.”

The following message may be used as a guide for the Sheriff or emergency services personnel to communicate the status of the emergency with the public:

Attention: This is an emergency message from the Sheriff. Listen carefully. Your life may depend on immediate action.

Basin Creek Dam #1 located 12 Miles south of Butte, is exhibiting high flows. Repeat. Basin Creek Dam, located 12 Miles south of Butte, is exhibiting high flows.

If you are in or near this area, proceed immediately to high ground away from Basin Creek. Do not travel on Basin Creek Road, or Highway 2. Proceed immediately to high ground away from Basin Creek. Repeat message.
Non-failure — Nonemergency, unusual event; slowly developing:
The Dam Owner should contact their Consulting Engineer and the Montana DNRC – Dam Safety. Describe the situation and request technical assistance on next steps to take.

Potential Failure—Emergency event, potential dam failure situation; rapidly developing:
The Dam Owner should contact their Consulting Engineer and the Montana DNRC – Dam Safety. Describe the situation and request technical assistance on next steps to take.

The following message may be used to help describe the emergency situation to the Sheriff:

“This is Identify yourself; name; position.

We have an emergency condition at the Basin Creek Dam #1 located 12 miles south of Butte.

We have activated the Emergency Action Plan for this dam and are currently under the Potential Failure Emergency Level.

We are implementing predetermined actions to respond to a rapidly developing situation that could result in dam failure.

Evacuation of areas along low-lying portions of Basin Creek downstream of the dams, may be required on short-notice.

Reference the Inundation Maps, Appendix C-1, in your copy of the Emergency Action Plan.

We will advise you when the situation is resolved or if the situation gets worse.

I can be contacted at the following number ________________. If you cannot reach me, please call the following alternative number ______________.”
Imminent Failure—Urgent event; dam failure appears imminent or is in progress:

The Sheriff should be contacted immediately, and the area evacuated (see Inundation Maps; Appendix C-1). The following actions should be taken:

1. Call 911. Be sure to say, “This is an emergency.” They will call other authorities and the media and begin the evacuation. The following message may be used to help describe the emergency situation to the Sheriff or emergency management personnel:

   “This is an emergency. Identify Yourself: name; position.
   The Basin Creek Dam #1, located 12 miles south of Butte, is failing. Downstream areas must be evacuated immediately. Repeat, Basin Creek Dam, is failing; evacuate the low-lying areas portions of Basin Creek downstream.
   We have activated the Emergency Action Plan for this dam and are currently under the Imminent Failure Emergency Event. Reference the Inundation Maps, Appendix C-1, in your copy of the Emergency Action Plan.
   I can be contacted at the following number ________________. If you cannot reach me, please call the following alternative number _______________.”

2. Do whatever is necessary to bring people in immediate danger (anyone on the dam, downstream from the dam, recreating at the reservoir, or evacuees) to safety if directed by the Sheriff.

3. Keep in frequent contact with the Sheriff and emergency services to keep them up-to-date on the condition of the dam. They will tell you how you can help handle the emergency.

4. If all means of communication are lost: (1) try to find out why, (2) try to get to another radio or telephone that works, or (3) get someone else to try to re-establish communications. If these means fail, handle the immediate problems as well as you can, and periodically try to re-establish contact with the Sheriff and emergency services.

The following message may be used as a guide for the Sheriff or emergency services personnel to communicate the status of the emergency with the public:

Attention: This is an emergency message from the Sheriff. Listen carefully. Your life may depend on immediate action.

The Basin Creek Dam #1, located 12 miles south of Butte, is failing. Repeat. The Basin Creek Dam #1, located 12 miles south of Butte, is failing.

If you are in or near this area, proceed immediately to high ground away from Basin Creek. Do not travel on Basin Creek Road, Highway 2 or return to your home to recover your possessions. You cannot outrun or drive away from the high-water event. Proceed immediately to high ground away from Basin Creek. Repeat message.
High Flow Emergency Level Notifications
Flooding downstream; no imminent failure to dam

**Public Report Observations**

**Incident Commander**
Sheriff, Ed Lester
Butte-Silver Bow Law Enforcement Department
406-497-1120 Ext. 1 or 911

Butte-Silver Bow Office of Emergency Management
Director - Dan Denneh
406-497-6295 (Office)
406-490-5802 (Cell)

National Weather Service (Missoula)
406-329-4840 (Office)

**State Dam Safety Official**
Montana DNRC
Michelle Lemieux
Civil Engineering Specialist
406-444-6613 (Office)

**Butte-Silver Bow Department of Public Works - Water Utility Division**
Director of Public Works:
Mark Neary
406-497-6519 (Office)
406-498-5467 (Cell)

**Dam Operators**
Jim Denneh
406-723-9429 (Office)
406-490-2491 (Cell)
Jim Keenan
406-497-6596 (Office)
406-475-4541 (Cell)

**Dam Owner’s Consulting Engineer**
Pioneer Technical Services
Mike Browne
406-457-8252 (Office)
406-498-3372 (Cell)

**Note:**
1, 2, etc., denotes call sequence

**Legend:**
Calls by operator ______
Second level calls - - - - -

See Emer. Services Contacts tab for contact information for back-ups to the persons shown above and other emergency personnel.
Non-Failure Emergency Level Notifications

Nonemergency unusual event; slowly developing

Legend:
Calls by operator ______
Second level calls - - - -

Public Report Observations

Dam Owner
Butte-Silver Bow Department of Public Works - Water Utility Division
Director of Public Works:
Mark Neary
406-497-6519 (Office)
406-498-5467 (Cell)

Dam Operators
Jim Dennehy
406-723-9429 (Office)
406-490-2491 (Cell)
Jim Keenan
406-497-6596 (Office)
406-475-4541 (Cell)

Dam Owner’s Consulting Engineer
Pioneer Technical Services
Mike Browne
406-457-8252 (Office)
406-498-3372 (Cell)

State Dam Safety Official
Montana DNRC
Michele Lemieux
406-444-6613 (Office)
406-459-3572 (Cell)

Note:
1, 2, etc., denotes call sequence

See Emer. Services Contacts tab for contact information for back-ups to the persons shown above and other emergency personnel.
Potential Failure – Emergency Level Notifications

Emergency event, potential dam failure situation; rapidly developing

Legend:
Calls by operator _______
Second level calls - - - - -

Note:
1, 2, etc., denotes call sequence

See Communications tab for prescribed messages.

See Emer. Services Contacts tab for contact information for back-ups to the persons shown above and other emergency personnel.

Director of Public Works:
Mark Neary
406-497-6519 (Office)
406-498-5467 (Cell)

Jim Dennehy
406-723-9429 (Office)
406-490-2491 (Cell)

Jim Keenan
406-497-6596 (Office)
406-475-4541 (Cell)

Butte-Silver Bow Department of Public Works
Water Utility Division

Butte-Silver Bow Office of Emergency Management
Director - Dan Dennehy
406-497-6295 (Office)
406-490-5802 (Cell)

Montana Disaster and Emergency Services
406-324-4777 (Office)
406-431-0411 (Cell)

National Weather Service (Missoula)
406-329-4840 (Office)

Dam Operator’s Consulting Engineer
Pioneer Technical Services
Mike Browne
406-497-5822 (Office)
406-498-3372 (Cell)

Dam Owner
Butte-Silver Bow Department of Public Works
Water Utility Division

Sheriff, Ed Lester
Butte-Silver Bow Law Enforcement Department
406-497-1120 Ext. 1 or 911

Butte-Silver Bow Office of Emergency Management Director - Dan Dennehy
406-497-6295 (Office)
406-490-5802 (Cell)

Montana Disaster and Emergency Services
406-324-4777 (Office)
406-431-0411 (Cell)

State Dam Safety Official
Montana DNRC
Michele Lemieux
406-444-6613 (Office)
406-459-3572 (Cell)

DNRC Regional Engineer
Larry Schock
406-542-5885 (Office)
406-360-1632 (Cell)

DNRC Bureau Chief
Steve Story
406-444-6816 (Office)

DNRC Regional Engineer
Larry Schock
406-542-5885 (Office)
406-360-1632 (Cell)

National Weather Service (Missoula)
406-329-4840 (Office)

Jim Dennehy
406-723-9429 (Office)
406-490-2491 (Cell)

Jim Keenan
406-497-6596 (Office)
406-475-4541 (Cell)

Incident Commander
Sheriff, Ed Lester
Butte-Silver Bow Law Enforcement Department
406-497-1120 Ext. 1 or 911

Butte-Silver Bow Office of Emergency Management Director - Dan Dennehy
406-497-6295 (Office)
406-490-5802 (Cell)

Montana Disaster and Emergency Services
406-324-4777 (Office)
406-431-0411 (Cell)

State Dam Safety Official
Montana DNRC
Michele Lemieux
406-444-6613 (Office)
406-459-3572 (Cell)

DNRC Regional Engineer
Larry Schock
406-542-5885 (Office)
406-360-1632 (Cell)

DNRC Bureau Chief
Steve Story
406-444-6816 (Office)

Public Report
Observations

Downstream Residents
(1)
(2)
(3)
(1)
(2)
(1)
Imminent Failure Emergency Level Notifications

Urgent event, dam failure appears imminent or is in progress

Public Report or Observations

City-County of Butte-Silver Bow 911 Dispatcher On Duty

(1) Incident Commander
Sheriff, Ed Lester
Butte-Silver Bow Law Enforcement Department
406-497-1120 Ext. 1 or 911

(2) Downstream Residents
Butte-Silver Bow Office of Emergency Management
Director - Dan Dennehy
406-497-6295 (Office)
406-490-5802 (Cell)

(3) Dam Owner
Butte-Silver Bow Department of Public Works Water Utility Division
Director of Public Work
Mark Neary
406-497-6519 (Office)
406-496-5467 (Cell)

Dam Operators
Jim Dennehy
406-723-9429 (Office)
406-490-2491 (Cell)

Jim Keenan
406-497-6596 (Office)
406-475-4541 (Cell)

(4) State Dam Safety Official
Montana DNRC
Michele Lemieux
406-444-6613 (Office)
406-459-3572 (Cell)

DNRC Regional Engineer
Larry Schock
406-542-5885 (Office)
406-360-1632 (Cell)

DNRC Bureau Chief
Steve Story
406-444-6816 (Office)

(5) Dam Owner’s Consulting Engineer
Pioneer Technical Services
Mike Browne
406-457-8252 (Office)
406-498-3372 (Cell)

Note:
1, 2, etc., denotes call sequence

Legend
Calls by operator
Second level calls - - - -

See Emer. Services Contacts tab for contact information for back-ups to the persons shown above and other emergency personnel.

See Communications tab for prescripted messages.
<table>
<thead>
<tr>
<th>Agency / Organization</th>
<th>Principal contact</th>
<th>Address</th>
<th>Office telephone number</th>
<th>Alternate telephone numbers</th>
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<tbody>
<tr>
<td>Dam Owner – Butte-Silver Bow Dept. of Public Works Water Utility Division</td>
<td>Mark Neary</td>
<td>124 West Granite St. Butte, MT 59703</td>
<td>406-497-6519</td>
<td>406-498-5467 (C)</td>
</tr>
<tr>
<td>Dam Operator</td>
<td>Jim Dennehy</td>
<td>124 West Granite St. Butte, MT 59703</td>
<td>406-723-9429</td>
<td>406-490-2491(C)</td>
</tr>
<tr>
<td>Dam Operator</td>
<td>Jim Keenan</td>
<td>124 West Granite St. Butte, MT 59703</td>
<td>406-497-6596</td>
<td>406-475-4541(C)</td>
</tr>
<tr>
<td>Butte-Silver Bow Law Enforcement Department Sheriff</td>
<td>Ed Lester</td>
<td>225 Alaska ST Butte, MT 59701</td>
<td>406-497-1120</td>
<td>911</td>
</tr>
<tr>
<td>Butte-Silver Bow Office of Emergency Management DES</td>
<td>Dan Dennehy</td>
<td>Butte Justice Center 3619 Wynne Av. Butte, MT 59701</td>
<td>406-497-6295</td>
<td>406-490-5802 (C)</td>
</tr>
<tr>
<td>Montana DNRC –</td>
<td>Larry Schock, Regional Engineer</td>
<td>2705 Spurgin Road, Bld C PO Box 5004 Missoula, MT 59806</td>
<td>406-542-5885</td>
<td>406-360-1632 (C)</td>
</tr>
<tr>
<td>Montana DNRC – Helena</td>
<td>Michele Lemieux, Dam Safety Engineer</td>
<td>1429 9th Ave, Helena, MT 59620</td>
<td>406-444-6816</td>
<td>406-459-3572 (C)</td>
</tr>
<tr>
<td>Pioneer Technical Services</td>
<td>Mike Browne, P.E.</td>
<td>201 E Broadway St # C, Helena, MT 59601</td>
<td>406-457-8252</td>
<td>406-498-3372 (C)</td>
</tr>
<tr>
<td>Pioneer Technical Services (Alternate)</td>
<td>Casey Briggs</td>
<td>1101 S Montana St, Butte, MT 59701</td>
<td>406-723-1943</td>
<td>406-491-5720 (C)</td>
</tr>
<tr>
<td>Butte-Silver Bow County Road Department</td>
<td>Tom Loggins</td>
<td>1700 Civic Center Rd. Butte, MT 59701</td>
<td>406-497-6567</td>
<td>406-490-0053</td>
</tr>
<tr>
<td>Butte-Silver Bow County Fire Department</td>
<td>Jeff Miller</td>
<td>120 South Idaho Street Butte, MT 59701</td>
<td>406-490-5785</td>
<td>406-782-9509</td>
</tr>
<tr>
<td>Montana Disaster and Emergency Services</td>
<td>Audrey Walleser</td>
<td></td>
<td></td>
<td>406-281-3533</td>
</tr>
<tr>
<td>Montana Highway Department (MDT)</td>
<td>Kam Wrigg,</td>
<td>3751 Wynne Butte, MT 59702</td>
<td>406-494-9627</td>
<td>406-494-9600 (Butte Office)</td>
</tr>
<tr>
<td>Company</td>
<td>Address/Contacts</td>
<td>Phone Numbers</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Jim Gilman Excavating Inc</td>
<td></td>
<td>406-423-8234</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xylem Pumps</td>
<td>3860 Helberg Drive, Helena, MT 59602</td>
<td>406-495-1335</td>
<td>406-5384</td>
<td></td>
</tr>
<tr>
<td>Railroad - BSNF</td>
<td>Brant Pierson</td>
<td>406-249-7550</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rarus Railroad Co.</td>
<td>Matt Mavrinac</td>
<td>(406) 563-2661</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Red Cross</td>
<td>Regional Headquarters – Great Falls</td>
<td>800-272-6668</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1/2/2020
Step 4  Expected Actions

If the police or Sheriff receive a 911 call regarding observations of an unusual or emergency event at the dam, they should immediately contact the Dam Owner. After the Dam Owner determines the emergency level (with any necessary assistance), the following actions should be taken. If time permits, the Dam Owner’s Consulting Engineer and the Montana DNRC should be contacted for technical consultation.

Non-Failure Emergency Level —Nonemergency, unusual event; slowly developing:

A. The Dam Owner should inspect the dam. At a minimum, inspect the full length of the upstream slope, crest, downstream toe, and downstream slope. Also, check the reservoir area, abutments, and downstream channel for signs of changing conditions. If increased seepage, erosion, cracking, or settlement are observed, immediately report the observed conditions to the Consulting Engineer and Montana DNRC; refer to the emergency level table for guidance in determining the appropriate event level for the new condition and recommended actions.

B. Record all contacts that were made on the Contact Checklist (Appendix A–1). Record all information, observations, and actions taken on the Event Log Form (Appendix A–2). Note the time of changing conditions. Document the situation with photographs and video, if possible.

C. The Dam Owner should contact DNRC and their Consulting Engineer and request technical staff to investigate the situation and recommend corrective actions.

Potential Failure Emergency Level —Potential dam failure situation; rapidly developing:

A. The Dam Owner should contact their Consulting Engineer and the Montana DNRC Dam Safety Contact to report the situation and, if time permits, request technical staff to investigate the situation and recommend corrective actions.

B. The Dam Owner should contact the Sheriff to inform him/her that the EAP has been activated and if current conditions get worse, an emergency situation may require evacuation. Preparations should be made for possible road closures and evacuations.

C. Provide updates to the Sheriff and emergency services personnel to assist them in making timely decisions concerning the need for warnings, road closures, and evacuations.

D. If time permits, the Dam Owner’s representative who is familiar with the dam should inspect it. At a minimum, inspect the full length of the upstream slope, crest, downstream toe, and downstream slope. Also, check the reservoir area, abutments, and downstream channel for signs of changing conditions. If piping, increased seepage, erosion, cracking, or settlement are observed, immediately report the observed conditions to the Montana DNRC Dam Safety Contact; refer to the emergency level table for guidance in determining the appropriate event level for the new condition and recommended actions.

E. Record all contacts that were made on the Contact Checklist (Appendix A–1). Record all information, observations, and actions taken on the Event Log Form (Appendix A–2). Note the time of changing conditions. Document the situation with photographs and video, if possible.

F. If time permits, the following emergency remedial actions should be taken as appropriate:
**Emergency remedial actions**

If time permits, the following emergency remedial actions should be considered for Potential Failure conditions. Immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam. Several of the listed adverse or unusual conditions may be apparent at the dam at the same time, requiring implementation of several modes of remedial actions. Close monitoring of the dam must be maintained to confirm the success of any remedial action taken. Time permitting, any remedial action should be developed through consultation with the Consulting Engineer and the Montana DNRC Dam Safety Contact. See the *Intervention Toolkit Forms* (Appendix B-3) for sources of equipment/materials to assist with remedial actions.

**Embankment overtopping**

1. If the water level in the reservoir is no longer rising, place sandbags along the low areas of the top of the dam to control wave action, reduce the likelihood of flow concentration during minor overtopping, and to safely direct more water through the spillway.
2. Cover the weak areas of the top of the dam and downstream slope with riprap, sandbags, plastic sheets, or other materials to provide erosion-resistant protection.

**Seepage and sinkholes**

1. If the entrance to the seepage origination point is observed in the reservoir (possible whirlpool) and is accessible, attempt to reduce the flow by plugging the entrance with readily available materials such as hay bales, bentonite, soil or rockfill, or plastic sheeting.
2. Cover the seepage exit area(s) with several feet of sand/gravel to hold fine-grained embankment or foundation materials in place. Alternatively, construct sandbag or other types of ring dikes around seepage exit areas to retain a pool of water, providing backpressure and reducing the erosive nature of the seepage.
3. Prevent vehicles and equipment from driving between the seepage exit points and the embankment to avoid potential loss from the collapse of an underground void.

**Embankment movement**

1. Open outlet(s) and lower the reservoir to a safe level at a rate commensurate with the urgency and severity of the condition of the slide or slump. If the gate is damaged or blocked, pumping or siphoning may be required.
2. Repair settlement of the crest by placing sandbags or earth and rockfill materials in the damaged area to restore freeboard.
3. Stabilize slides by placing a soil or rockfill buttress against the toe of the slide.

**Earthquake**

1. Immediately conduct a general overall visual inspection of the dam.
2. Perform a field survey to determine if there has been any settlement and movement of the dam embankment, spillway, and low-level outlet works.
3. Drain the reservoir, if required.
**Imminent Failure Emergency Level—Urgent; dam failure appears imminent or is in progress:**

A. The Dam Owner shall immediately contact the Sheriff and others shown on the notification chart.

B. The Sheriff shall lead the efforts to carry out warnings, close roads, and evacuate people at risk downstream from the dam (see *Inundation Maps* – Appendix C-1)

C. Emergency Management personnel shall alert the public and upon direction of the Sheriff, assist in evacuating at-risk people and close roads as necessary.

D. The Dam Owner shall maintain continuous communication and provide the Sheriff with updates of the situation to assist him/her in making timely decisions concerning warnings and evacuations.

E. The Dam Owner should record all contacts that were made on the *Contact Checklist* (Appendix A–1). Record all information, observations, and actions taken on the *Event Log Form* (Appendix A–2). Note the time of changing conditions. Document the situation with photographs and video, if possible.

F. Advise people monitoring the dam to follow safe procedures. Everyone should stay away from any of the failing structures or slopes and out of the potential breach inundation areas.
Step 5  Termination
Whenever the EAP has been activated, an emergency level has been declared, all EAP actions have been completed, and the emergency is over, the EAP operations must eventually be terminated and follow-up procedures completed.

Termination responsibilities
The Sheriff is responsible for terminating EAP operations and relaying this decision to the Dam Owner. It is then the responsibility of each person to notify the same group of contacts that were notified during the original event notification process to inform those people that the event has been terminated.

Prior to termination of an Imminent Failure Emergency Level event that has not caused actual dam failure, the State Dam Safety Officer will inspect the dam or require the inspection of the dam to determine whether any damage has occurred that could potentially result in loss of life, injury, or property damage. If it is determined that conditions do not pose a threat to people or property, the Sheriff will be advised to terminate EAP operations as described above.

The Dam Owner shall ensure that the Dam Safety Emergency Situation Report (Appendix A–3) is completed to document the emergency event and all actions that were taken. The Dam Owner shall distribute copies of the completed report to the Montana DNRC Dam Safety.
Maintenance—EAP Review and Revision

EAP annual review
The Dam Owner will review and, if needed, update the EAP at least once each year. The EAP annual review will include the following:

- Calling all contacts on the four notification charts in the EAP to verify that the phone numbers and persons in the specified positions are current. The EAP will be revised if any of the contacts have changed.
- Contacting the local law enforcement agency to verify the phone numbers and persons in the specified positions. In addition, the Dam Owner will ask if the person contacted knows where the EAP is kept and if responsibilities described in the EAP are understood.
- Calling the locally available resources to verify that the phone numbers, addresses, and services are current.

Revisions
The Dam Owner is responsible for updating the EAP document. The EAP document held by the Dam Owner is the master document. When revisions occur, the Dam Owner will provide the revised pages and a revised revision summary page to all the EAP document holders. The document holders are responsible for revising outdated copy of the respective document(s) whenever revisions are received. Outdated pages shall be immediately discarded to avoid any confusion with the revisions.

EAP periodic test
The Dam Owner will host and facilitate a periodic test of the EAP at least once every 5 years.

The periodic test will consist of a meeting which shall include a tabletop exercise. Attendance should include the Dam Owner, DNRC staff, at least one representative of the local law enforcement agency, and others with key responsibilities listed in the EAP. At the discretion of the Dam Owner, other organizations that may be involved with an unusual or emergency event at the dam are encouraged to participate. Before the tabletop exercise begins, meeting participants will visit the dam during the periodic test to familiarize themselves with the dam site.

The tabletop exercise will begin with the facilitator presenting a scenario of an unusual or emergency event at the dam. The scenario will be developed prior to the exercise. Once the scenario has been presented, the participants will discuss the responses and actions that they would take to address and resolve the scenario. The narrator will control the discussion, ensuring realistic responses and developing the scenario throughout the exercise. The Dam Owner should complete an event log as they would during an actual event.

After the tabletop exercise, the five sections of the EAP will be reviewed and discussed. Mutual aid agreements and other emergency procedures can be discussed. The Dam Owner will prepare a written summary of the periodic test and revise the EAP, as necessary.
# Record of Holders of Control Copies of this EAP

<table>
<thead>
<tr>
<th>Copy</th>
<th>Organization</th>
<th>Person receiving copy</th>
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<tr>
<td>1</td>
<td>Butte-Silver Bow Department of Public Works Water Utility Division</td>
<td>Mark Neary</td>
</tr>
<tr>
<td></td>
<td>124 Granite Street, Butte, MT 59703</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Butte-Silver Bow Law Enforcement Department Sheriff</td>
<td>Ed Lester</td>
</tr>
<tr>
<td></td>
<td>225 Alaska Street, Butte, MT 59701</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Butte-Silver Bow Office of Emergency Management DES</td>
<td>Dan Dennehy</td>
</tr>
<tr>
<td></td>
<td>3619 Wynne Avenue, Butte MT, 59701</td>
<td></td>
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<tr>
<td>4</td>
<td>Montana DNRC – Missoula</td>
<td>Larry Schock</td>
</tr>
<tr>
<td></td>
<td>2705 Spurgin Road, Bld C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PO Box 5004 Missoula, MT 59806</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Montana DNRC – Helena</td>
<td>Michele Lemieux</td>
</tr>
<tr>
<td></td>
<td>1429 9th Ave, Helena, MT 59620</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pioneer Technical Services – Consulting Engineer</td>
<td>Mike Browne, PE</td>
</tr>
<tr>
<td></td>
<td>201 E Broadway St # C, Helena, MT 59601</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>National Weather Service – Missoula</td>
<td>Ray Nickless</td>
</tr>
<tr>
<td></td>
<td>6633 Aviation Way, Missoula, MT 59808</td>
<td></td>
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Total Copies – 7
# Record of Revisions and Updates Made to EAP

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Appendices

Forms, Glossary, Maps, and Supporting Data

Appendix A

A–1 Contact Checklist
A–2 Unusual or Emergency Event Log Form
A–3 Dam Emergency Situation Report Form
A–4 Glossary of Terms

Appendix B

B–1 Watershed Map
B–2 Plan Drawings
B–3 Intervention Toolkit Forms

Appendix C

C–1 Inundation Maps
Appendix A–1

Contact Checklist

Basin Creek Dam
City-County of Butte-Silver Bow, Montana

Date _____________

The following contacts should be made immediately after the emergency level is determined (see pages 9-12 for guidance to determine the appropriate emergency level for a specific situation). The person making the contacts should initial and record the time of the call and who was notified for each contact made. See the Notification Charts for critical contact information and Emergency Services Contacts for contact information for other possible emergency services.

<table>
<thead>
<tr>
<th>High Flow (see page 23)</th>
<th>Person Contacted</th>
<th>Time Contacted</th>
<th>Contacted by</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ Sheriff ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Consulting Engineer ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Montana DNRC ___</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Failure (see page 24)</th>
<th>Person Contacted</th>
<th>Time Contacted</th>
<th>Contacted by</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ Consulting Engineer ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Montana DNRC ___</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential Failure (see page 25)</th>
<th>Person Contacted</th>
<th>Time Contacted</th>
<th>Contacted by</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ Consulting Engineer ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Sheriff ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Montana DNRC ___</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Imminent Failure (see page 26)</th>
<th>Person Contacted</th>
<th>Time Contacted</th>
<th>Contacted by</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ Sheriff ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Dam Owner ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Montana DNRC ___</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___ Consulting Engineer ___</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix A–2

Unusual or Emergency Event Log
(to be completed during the emergency)

Dam name: ____________ County: City-County of Butte-Silver Bow, Montana

When and how was the event detected?
_____________________________________________________________________________
_____________________________________________________________________________

Weather conditions: ____________________________________________________________
_____________________________________________________________________________

General description of the emergency situation:
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Emergency level determination: ____________ Made by: ______________________________

Actions and Event Progression

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Action/event progression</th>
<th>Taken by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Report prepared by: _______________________________________ Date: ________________
Dam name: ___________________
National Inventory of Dams (NID) No.: ______________
Dam location: 12 Miles S. of Butte, MT           City-County of Butte-Silver Bow           Basin Creek
(City) (County) (Stream/River)
Date: _______ Time: _______
Weather conditions: ____________________________________________________________

General description of emergency situation:
_____________________________________________________________________________
_____________________________________________________________________________

Area(s) of dam affected:
_____________________________________________________________________________
_____________________________________________________________________________

Extent of dam damage: _________________________________________________________
Possible cause(s): ______________________________________________________________
Effect on dam’s operation:_______________________________________________________
Initial reservoir elevation: _________________________ Time: ______________
Maximum reservoir elevation: _____________________ Time: ______________
Final reservoir elevation: _________________________ Time: ______________
Description of area flooded downstream/damages/injuries/loss of life: _____________________
_____________________________________________________________________________
_____________________________________________________________________________

Other data and comments:
_____________________________________________________________________________
_____________________________________________________________________________
Observer’s name and telephone number:_____________________________________________

Report prepared by: _____________________________ Date: ______________
## Appendix A–4

### Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abutment</strong></td>
<td>That part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer looking downstream from the dam.</td>
</tr>
<tr>
<td><strong>Acre-foot</strong></td>
<td>A unit of volumetric measure that would cover 1 acre to a depth of 1 foot. One acre-foot is equal to 43,560 cubic feet or 325,850 gallons.</td>
</tr>
<tr>
<td><strong>Berm</strong></td>
<td>A nearly horizontal step (bench) in the upstream or downstream sloping face of the dam.</td>
</tr>
<tr>
<td><strong>Boil</strong></td>
<td>A disruption of the soil surface due to water discharging from below the surface. Eroded soil may be deposited in the form of a ring (miniature volcano) around the disruption.</td>
</tr>
<tr>
<td><strong>Breach</strong></td>
<td>An opening through the dam that allows draining of the reservoir. A controlled breach is an intentionally constructed opening. An uncontrolled breach is an unintended failure of the dam.</td>
</tr>
<tr>
<td><strong>Conduit</strong></td>
<td>A closed channel (round pipe or rectangular box) that conveys water through, around, or under the dam.</td>
</tr>
<tr>
<td><strong>Control Section</strong></td>
<td>A usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.</td>
</tr>
<tr>
<td><strong>Cross section</strong></td>
<td>A slice through the dam showing elevation vertically and direction of natural water flow horizontally from left to right. Also, a slice through a spillway showing elevation vertically and left and right sides of the spillway looking downstream.</td>
</tr>
<tr>
<td><strong>Dam</strong></td>
<td>An artificial barrier generally constructed across a watercourse for the purpose of impounding or diverting water.</td>
</tr>
<tr>
<td><strong>Dam failure</strong></td>
<td>The uncontrolled release of a dam’s impounded water.</td>
</tr>
<tr>
<td><strong>Dam Operator</strong></td>
<td>The person(s) or unit(s) of government with responsibility for the operation and maintenance of dam.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Drain, toe or foundation, or blanket</strong></td>
<td>A water collection system of sand and gravel and typically pipes along the downstream portion of the dam to collect seepage and convey it to a safe outlet.</td>
</tr>
<tr>
<td><strong>Drainage area (watershed)</strong></td>
<td>The geographic area on which rainfall flows into the dam.</td>
</tr>
<tr>
<td><strong>Drawdown</strong></td>
<td>The lowering or releasing of the water level in a reservoir over time or the volume lowered or released over a particular period of time.</td>
</tr>
<tr>
<td><strong>Emergency</strong></td>
<td>A condition that develops unexpectedly, endangers the structural integrity of the dam and/or downstream human life and property, and requires immediate action.</td>
</tr>
<tr>
<td><strong>Emergency Action Plan (EAP)</strong></td>
<td>A formal document identifying potential emergency conditions that may occur at the dam and specifying preplanned actions to minimize potential failure of the dam or minimize failure consequences including loss of life, property damage, and environmental impacts.</td>
</tr>
<tr>
<td><strong>Evacuation/Inundation map</strong></td>
<td>A map showing the geographic area downstream of a dam that should be evacuated if it is threatened to be flooded by a breach of the dam or other large discharge.</td>
</tr>
<tr>
<td><strong>Filter</strong></td>
<td>The layers of sand and gravel in a drain that allow seepage through an embankment to discharge into the drain without eroding the embankment soil.</td>
</tr>
<tr>
<td><strong>Freeboard</strong></td>
<td>Vertical distance between a stated water level in the reservoir and the top of dam.</td>
</tr>
<tr>
<td><strong>Gate, slide or sluice, or regulating</strong></td>
<td>An operable, watertight valve to manage the discharge of water from the dam.</td>
</tr>
<tr>
<td><strong>Groin</strong></td>
<td>The area along the intersection of the face of a dam and the abutment.</td>
</tr>
<tr>
<td><strong>Hazard classification</strong></td>
<td>A system that categorizes dams (high, significant, or low) according to the degree of their potential to create adverse incremental consequences such as loss of life, property damage, or environmental impacts of a failure or mis-operation of a dam.</td>
</tr>
<tr>
<td><strong>Height, dam</strong></td>
<td>The vertical distance between the lowest point along the top of the dam and the lowest point at the downstream toe, which usually occurs in the bed of the outlet channel.</td>
</tr>
<tr>
<td><strong>Hydrograph, inflow or outflow, or breach</strong></td>
<td>A graphical representation of either the flow rate or flow depth at a specific point above or below the dam over time for a specific flood occurrence.</td>
</tr>
<tr>
<td><strong>Incident Commander</strong></td>
<td>The highest predetermined official available at the scene of an emergency situation.</td>
</tr>
<tr>
<td><strong>Instrumentation</strong></td>
<td>An arrangement of devices installed into or near dams that provide measurements to evaluate the structural behavior and other performance parameters of the dam and appurtenant structures.</td>
</tr>
<tr>
<td><strong>Inundation Area or Map</strong></td>
<td>The geographic area downstream of the dam that would be flooded by a breach of the dam or other large discharge.</td>
</tr>
<tr>
<td><strong>Notification</strong></td>
<td>To immediately inform appropriate individuals, organizations, or agencies about a potentially emergency situation so they can initiate appropriate actions.</td>
</tr>
<tr>
<td><strong>Outlet Works (principal spillway)</strong></td>
<td>An appurtenant structure that provides for controlled passage of normal water flows through the dam.</td>
</tr>
<tr>
<td><strong>Piping</strong></td>
<td>The progressive destruction of an embankment or embankment foundation by internal erosion of the soil by seepage flows.</td>
</tr>
<tr>
<td><strong>Probable Maximum Precipitation (PMP) or Flood (PMF)</strong></td>
<td>The theoretically greatest precipitation or resulting flood that is meteorologically feasible for a given duration over a specific drainage area at a particular geographical location.</td>
</tr>
<tr>
<td><strong>Reservoir</strong></td>
<td>The body of water impounded or potentially impounded by the dam.</td>
</tr>
<tr>
<td><strong>Riprap</strong></td>
<td>A layer of large rock, precast blocks, bags of cement, or other suitable material, generally placed on an embankment or along a watercourse as protection against wave action, erosion, or scour.</td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td>A measure of the likelihood and severity of an adverse consequence.</td>
</tr>
<tr>
<td><strong>Seepage</strong></td>
<td>The natural movement of water through the embankment, foundation, or abutments of the dam.</td>
</tr>
<tr>
<td><strong>Slide</strong></td>
<td>The movement of a mass of earth down a slope on the embankment or abutment of the dam.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Spillway (auxiliary or emergency)</td>
<td>The appurtenant structure that provides the controlled conveyance of excess water through, over, or around the dam</td>
</tr>
<tr>
<td>Spillway Capacity</td>
<td>The maximum discharge the spillway can safely convey with the reservoir at the maximum design elevation.</td>
</tr>
<tr>
<td>Spillway Crest</td>
<td>The lowest level at which reservoir water can flow into the spillway.</td>
</tr>
<tr>
<td>Tailwater</td>
<td>The body of water immediately downstream of the embankment at a specific point in time.</td>
</tr>
<tr>
<td>Toe of Dam</td>
<td>The junction of the upstream or downstream face of an embankment with the ground surface.</td>
</tr>
<tr>
<td>Top of dam (crest of dam)</td>
<td>The elevation of the uppermost surface of an embankment which can safely impound water behind the dam.</td>
</tr>
</tbody>
</table>
Appendix B–1

Watershed Project Maps

Figures Courtesy of USGS: StreamStats
Appendix B–2

Plan Drawings
NOTE:
Drawing has been modified to show conditions observed on 10 May 1978.

BASIN CREEK DAM NO. 2

PLATE 12
Appendix B–3

Intervention Toolkit Forms
(Refer to Forms 1-6 on Following Page)
Form 1: *Summary of Key Dam Characteristics*

<table>
<thead>
<tr>
<th>Dam Name:</th>
<th>Basin Creek Dam #1</th>
<th>NID ID:</th>
<th>MT-00374</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam Owner:</td>
<td>Butte Silver Bow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dam Operator:</td>
<td>Butte Silver Bow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>County:</td>
<td>Silver Bow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latitude:</td>
<td>45.85450° N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitude:</td>
<td>-112.54633° W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contributing Stream:</td>
<td>Basin Creek and Bear Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Drainage Area:</td>
<td>13.6 mi²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal Pool Elevation:</td>
<td>5886.0 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal Pool Volume:</td>
<td>950.6 acre-ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top of Dam Elevation:</td>
<td>5889.06 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dam Height:</td>
<td>80 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embankment Crest Length:</td>
<td>275 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embankment Toe Length:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dam Crest Width:</td>
<td>5 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dam Base Width:</td>
<td>115 est.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upstream Slope:</td>
<td>0 ft H: 1 ft V = 0 ft H: 1 ft V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upstream Slope Length:</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downstream Slope:</td>
<td>1.75 ft H: 1.0 ft V = 1.75 ft H: 1 ft V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downstream Slope Length:</td>
<td>130 est.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principal Spillway Type:</td>
<td>Concrete with Obermeyer gate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principal Spillway Crest Elevation:</td>
<td>5888.06 closed / 5884.56 open ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principal Spillway Capacity:</td>
<td>23 gate closed / 203 gate open cfs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary Spillway Type:</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary Spillway Crest Elevation:</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary Spillway Crest Length:</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary Spillway Capacity:</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Level Outlet Conduit Type:</td>
<td>HDPE pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Level Outlet Invert Elevation:</td>
<td>5814.66 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Level Outlet Diameter:</td>
<td>1.33 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Level Outlet Capacity:</td>
<td>60 cfs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Slope Length Calculator**

\[ L = \sqrt{H^2 + \left( \frac{S}{0.5} \right)^2} \]

**Upstream Slope Input**
- Horizontal Component of Upstream Slope \((S_u)\): \_\_\_\_\_\_ ft H:1ft V
- Dam Height \((H)\): \_\_\_\_\_\_ ft

**Output**
- Length \((L_u)\): \_\_\_\_\_\_ ft

**Downstream Slope Input**
- Horizontal Component of Downstream Slope \((S_d)\): \_\_\_\_\_\_ ft H:1ft V
- Dam Height \((H)\): \_\_\_\_\_\_ ft

**Output**
- Length \((L_d)\): \_\_\_\_\_\_ ft

*Assume: Embankment slope is constant throughout length.*

*Note: Output is calculated from the Pythagorean Theorem \([c^2 = a^2 + b^2]\) in conjunction with the slope equation \([m = \frac{y}{x}]\).*
Form 2: Dam Access Details

<table>
<thead>
<tr>
<th>Access Road Culmination (i.e. Embankment Toe, Dam Crest, etc...):</th>
<th>Embankment Toe.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directions to Access Road (from nearest major roadway):</td>
<td>Basin Creek Dam #1 is located at the end of Basin Creek Road about 10 miles south of Butte. The dam is accessed by heading south on Harrison Ave then veering right onto Basin Creek Road/MT-393. There are two locked gates on each end of the park that is located near the base the dam that need to be unlocked in order to access the dam. Note that the road may become flooded. The nearest telephone to the dams is at the old chlorinating building below the dam. Basin Creek Dam #2 is located approximately one mile upstream of Basin Creek Dam #1.</td>
</tr>
</tbody>
</table>

| Access Road Condition: | Asphalt paved and maintained dirt. |

<table>
<thead>
<tr>
<th>Number of Access Gates/Locks:</th>
<th>Two gates with locks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock Location</td>
<td>Lock Combination or Key Location/Contact</td>
</tr>
<tr>
<td>North End of Basin Creek Park</td>
<td>Contact BSB personnel for key</td>
</tr>
<tr>
<td>South End of Basin Creek Park</td>
<td>Contact BSB personnel for key</td>
</tr>
</tbody>
</table>

* Complete form for each access road or entryway
<table>
<thead>
<tr>
<th>Year Designed:</th>
<th>1890's original design</th>
<th>Year Constructed:</th>
<th>1897, 1913, 1930's, 2006 Rehab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Purpose:</td>
<td>Potable Water Supply</td>
<td>Secondary Purpose(s):</td>
<td></td>
</tr>
<tr>
<td>Original Hazard Classification:</td>
<td></td>
<td>Current Hazard Classification:</td>
<td>High Hazard</td>
</tr>
<tr>
<td>Frequency of Inspection:</td>
<td>5 year Engineer / Annual by Owner</td>
<td>Emergency Action Plan Available (Y/N): Y</td>
<td></td>
</tr>
<tr>
<td>Summary of Rehabilitation:</td>
<td></td>
<td>Year: 2005-2006</td>
<td></td>
</tr>
<tr>
<td>The 2005 and 2006 rehabilitation work primarily consisted of constructing a new concrete spillway with operable crest gate, rehabilitating the outlet works with new intake pneumatic valves, and slip-lining the existing conduits with new high-density polyethylene (HDPE) pipe.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summary of Engineering Study Performed: 2019 Inspection</th>
<th>Year: 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>• &quot;The upstream face is concrete and only the portion above the water line was inspected. The visible portion of the concrete face showed no settlement or misalignment; however, the concrete has numerous cracks, spalling, and generally shows signs of severe deterioration. The cracks observed during the 2019 inspection were also evident in photos from the 2014 and 2009 inspections. Butte-Silver Bow staff indicated the concrete deteriorated considerably in the last couple of years. In several places there are surface voids approximately 12 inches in height, 6 inches deep, and varying in width up to 6 feet. Metal reinforcement was observed in several of the voids. The deterioration appears to be worsening from that observed from the 2014 inspection.&quot;</td>
<td></td>
</tr>
<tr>
<td>• &quot;The walkway behind the gantry crane appeared to have a hollow sound during the 2014 inspection. As observed during the 2019 inspection, the walkway continues to deteriorate and have a hollow sound when impacted with a hard object.&quot;</td>
<td></td>
</tr>
<tr>
<td>• &quot;In 2011, the dam overtopped near the right abutment and caused significant erosion on the downstream slope. Staff report that this happened when water flowed through a rectangular opening in the right side of the dam face. Behind this opening is a designed open space that pools water and subsequently flowed over the top of the right abutment. The rectangular opening and pooling area are remnants of past operations. The rectangular opening has since been closed to address this issue.&quot;</td>
<td></td>
</tr>
<tr>
<td>• &quot;Downstream embankment is earthen fill with grass cover. The right portion of the embankment suffered significant erosion when the dam overtopped in 2011 and was subsequently repaired. In 2018, BSB crews replaced the water bypass pipeline located near the right abutment. This work disturbed embankments soil which were subsequently regraded and reseeded. Straw waddles are still present in the reclaimed area.&quot;</td>
<td></td>
</tr>
<tr>
<td>• &quot;A damp area on the right side (near the stairs) was observed, with slight sloughing in the area. Small rodent burrows were observed.&quot;</td>
<td></td>
</tr>
<tr>
<td>• &quot;There was concrete deterioration found on the upstream face.&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Note: Form can be extended as necessary to provide more dam history information.
<table>
<thead>
<tr>
<th>Supplies*</th>
<th>Location</th>
<th>Contact</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Extinguishers</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597 (406) 475-4541 (Cell)</td>
<td>Safety precaution</td>
</tr>
<tr>
<td>Flashlights</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597 (406) 475-4541 (Cell)</td>
<td>Recommend to be stored on-site for immediate response</td>
</tr>
<tr>
<td>Sandbags</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>Recommend an adequate supply be stored nearby and identify outside contacts</td>
</tr>
<tr>
<td>Sand</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>Consider stockpiling nearby; used to create sandbags and construct filters</td>
</tr>
<tr>
<td>Gravel</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>Used to construct filtered drainage berms and maintain access roads</td>
</tr>
<tr>
<td>Clay/Soil Fill</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>Identify possible clay and soil borrow areas that can be safely accessed</td>
</tr>
<tr>
<td>Riprap/Rock Fill</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>Consider stockpiling nearby due to broad usage; identify outside contacts</td>
</tr>
<tr>
<td>Concrete/Grout</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>Concrete structure repair; identify outside contacts</td>
</tr>
<tr>
<td>Plastic Sheeting</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>6 mil polyethylene sheeting recommended for flood fighting applications</td>
</tr>
<tr>
<td>Geotextile</td>
<td>Tom Loggins</td>
<td>(406) 497-6567 (406) 490-0053 (Cell)</td>
<td>Preferably non-clogging and woven</td>
</tr>
<tr>
<td>Caulk</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597 (406) 475-4541 (Cell)</td>
<td>Recommend flexible sealant be stored nearby for concrete structure repair</td>
</tr>
<tr>
<td>Shovels</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597 (406) 475-4541 (Cell)</td>
<td>Recommend to be stored nearby for immediate response</td>
</tr>
<tr>
<td>Buckets</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597 (406) 475-4541 (Cell)</td>
<td>Recommend to be stored nearby for immediate response</td>
</tr>
<tr>
<td>Rope</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597 (406) 475-4541 (Cell)</td>
<td>Broad usage</td>
</tr>
<tr>
<td>Extension Cords</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597 (406) 475-4541 (Cell)</td>
<td>Power to equipment</td>
</tr>
</tbody>
</table>

* When filling out information for the material providers, it is important to consult the 'Cautions, Consideration, and Initiation of Intervention' section of the following chapter as not all types of material used for emergency dam intervention are eligible for grant or loan reimbursement.
<table>
<thead>
<tr>
<th>Supplies</th>
<th>Location</th>
<th>Contact</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication System</td>
<td>Basin Creek WTP</td>
<td>(406) 497-6597</td>
<td>Two-way radios are preferred due to reliability and multiple users</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(406) 475-4541 (Cell)</td>
<td></td>
</tr>
<tr>
<td>Heavy Equipment (dump truck,</td>
<td>Tom Loggins</td>
<td>(406) 497-6567</td>
<td>Identify several sources which could provide equipment</td>
</tr>
<tr>
<td>backhoe, excavator, front-end</td>
<td></td>
<td>(406) 490-0053 (Cell)</td>
<td></td>
</tr>
<tr>
<td>loader, bulldozer, etc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumps</td>
<td>Xylem Pumps</td>
<td>(406) 495-1335</td>
<td>Identify suppliers which could provide pumps</td>
</tr>
<tr>
<td>Siphon Materials</td>
<td>Xylem Pumps</td>
<td>(406) 495-1335</td>
<td>Identify material providers that could supply siphon construction/installation materials</td>
</tr>
<tr>
<td></td>
<td>Northwest Pipe</td>
<td>(406) 494-2120</td>
<td></td>
</tr>
<tr>
<td>Generators</td>
<td>Dan Dennehy</td>
<td>(406) 497-6295</td>
<td>Power source; note that large flood events often result in power outage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(406) 497-6295 (Cell)</td>
<td></td>
</tr>
<tr>
<td>Floodlights</td>
<td>Dan Dennehy</td>
<td>(406) 497-6295</td>
<td>Identify adequate lighting source for night/low visibility consideration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(406) 497-6295 (Cell)</td>
<td></td>
</tr>
<tr>
<td>Sand Bags and Filling Equipment</td>
<td>Tom Loggins</td>
<td>(406) 497-6567</td>
<td>Identify for the event in which a large scale sandbagging job is deemed necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(406) 490-0053 (Cell)</td>
<td></td>
</tr>
</tbody>
</table>
## Expertise/Engineering Related

<table>
<thead>
<tr>
<th>Agency/Organization</th>
<th>Principal Contact</th>
<th>Work/Office Phone</th>
<th>24-Hour Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montana DNRC-Helena</td>
<td>Michele Lemieux</td>
<td>(406) 444-6816</td>
<td>(406) 459-3572</td>
</tr>
<tr>
<td>Montana DNRC-Helena</td>
<td>Chad Hill</td>
<td>(406) 444-1358</td>
<td>(406) 461-0930</td>
</tr>
<tr>
<td>Montana DNRC-Missoula</td>
<td>Larry Schock</td>
<td>(406) 542-5885</td>
<td>(406) 360-1632</td>
</tr>
<tr>
<td>Pioneer Technical Services</td>
<td>Mike Browne</td>
<td>(406) 457-8252</td>
<td>(406) 498-3372</td>
</tr>
<tr>
<td>Pioneer Technical Services</td>
<td>Casey Briggs</td>
<td>(406) 723-1943</td>
<td>(406) 491-5270</td>
</tr>
</tbody>
</table>

## Labor/Construction Related

<table>
<thead>
<tr>
<th>Organization</th>
<th>Principal Contact</th>
<th>Work/Office Phone</th>
<th>24-Hour Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSB Road Department</td>
<td>Tom Loggins</td>
<td>(406) 497-6567</td>
<td>(406) 490-0053</td>
</tr>
<tr>
<td>Jim Gilman Excavating</td>
<td></td>
<td>(406) 423-8243</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C-1
Inundation Maps
**Time of Arrival:** 0 min
**Time to Peak Discharge:** 1 min
**Peak Elevation:** 5836.2 ft
**Max Depth:** 38.46 ft
**Peak Flow:** 215,045 cfs

**Time of Arrival:** 3 min
**Time to Peak Discharge:** 4 min
**Peak Elevation:** 5780.3 ft
**Max Depth:** 20.6 ft
**Peak Flow:** 144,289 cfs

**Time of Arrival:** 9 min
**Time to Peak Discharge:** 12 min
**Peak Elevation:** 5723.3 ft
**Max Depth:** 24.6 ft
**Peak Flow:** 49,781 cfs

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**PANEL LOCATOR MAP**

**COUNTY:** SILVER BOW

**MAP FEATURES**
- PANEL BOUNDARY
- TIME OF ARRIVAL (MIN)
- POLICE DEPT
- SHELTER
- HEALTHCARE
- SCHOOL
- FIRE DEPARTMENT
- IMPACTED PARCELS
- TOWNSHIP LINES
- ROADS

**DEPTH**
- Value
  - 55’
  - 50’
  - 45’
  - 40’
  - 35’
  - 30’
  - 25’
  - 20’
  - 15’
  - 10’
  - 5’
  - 0’

---

**BASIN CREEK DAM 1 BREACH ANALYSIS**

**DATA SOURCES:** MICROSOFT AND ITS DATA SUPPLIERS, ESRI, USGS, MT CADASTRAL, MSDI

**MAP PROJECTION:** NAD 1983 MONTANA FIPS 2500, INTERNATIONAL FOOT DEFINITION

**PLEASE NOTE:** THE INFORMATION PROVIDED IN THIS DOCUMENT HAS BEEN ASSEMBLED FROM A VARIETY OF PUBLIC RECORDS, OTHER READILY AVAILABLE PUBLIC SOURCES, AND PERTINENT DESIGN DATA. AFOREMENTIONED INFORMATION AND SUPPORTING DOCUMENTATION IS ALSO AVAILABLE IN DIGITAL FORMAT.

**RETURN TO INDEX SHEET**

**ISSUED:** 1/9/2020

**PANEL:** 1-1
Please note: The information provided in this document has been assembled from a variety of public records, other readily available public sources, and pertinent design data. Aforementioned information and supporting documentation is also available in digital format.

Data Sources: Microsoft and its data suppliers, ESRI, USGS, MT Cadastral, MSDI

Map Projection: NAD 1983 Montana FIPS 2500, International Foot Definition

Return to Index Sheet
Janney Gulch
Sand Creek
Little Basin Creek
US HIGHWAY 2
LATIGO LN
JANNEY RD
BIRD DOG LN
PORTER AVE
INDIAN ROCK RD
BEACON RD
JANNEY RD
JANNEY RD
BASIN CREEK RD
S PARKMONT ST
BLACK ANGUS LN
BASIN CREEK RD
GUN CLUB RD
BEAVER POND RD
APPLE ORCHARD RD
JANNEY RD
N PARKMONT ST
US HIGHWAY 2
TECHNOLOGY WAY
NILS DR
2N 8W
2N 7W
Time of Arrival: 24 min
Time to Peak Discharge: 56 min
Peak Elevation: 5675.8 ft
Max Depth: 5 ft
Peak Flow: 2,860 cfs

Time of Arrival: 1 hr 37 min
Time to Peak Discharge: 2 hr 3 min
Peak Elevation: 5562.9 ft
Max Depth: 14.8 ft
Peak Flow: 5,653 cfs

PLEASE NOTE: THE INFORMATION PROVIDED IN THIS DOCUMENT HAS BEEN ASSEMBLED FROM A VARIETY OF PUBLIC RECORDS, OTHER READILY AVAILABLE PUBLIC SOURCES, AND PERTINENT DESIGN DATA. AFOREMENTIONED INFORMATION AND SUPPORTING DOCUMENTATION IS ALSO AVAILABLE IN DIGITAL FORMAT.

DATA SOURCES: MICROSOFT AND IT’S DATA SUPPLIERS, ESRI, USGS, MT CADASTRAL, MSDI
MAP PROJECTION: NAD 1983 MONTANA FIPS 2500, INTERNATIONAL FOOT DEFINITION

RETURN TO INDEX SHEET
ISSUED: 1/9/2020
PANEL 1-3