

EMERGENCY ACTION PLAN
SILVER LAKE WEST DAM

BUTTE-SILVER BOW
DEPARTMENT OF PUBLIC WORKS
WATER UTILITY DIVISION
124 WEST GRANITE STREET
BUTTE, MONTANA 59703-0667
(406) 497-6540

January 2019

If Silver Lake Dam is failing or failure seems imminent, call:

Anaconda-Deer Lodge County Sheriff..... 911 or (406) 563-5241

Disaster and Emergency Services- Deer Lodge County

Mr. Bill Converse.....Office: (406) 563-5571

.....Home: (406) 563-6723

.....Cel: (406) 560-3515

Mr. Marty Mavrincac (D.E.S. Assistant).....Office: (406) 563-5571

.....Home: N/A

.....Cel: (406) 560-8026

Mr. Mark Neary, Director of Public Works Office: (406) 497-6519

.....Home: (406) 782-2171

.....Cel: (406) 498-5467

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I. INTRODUCTION

A. Purpose

One of the most important goals of Butte-Silver Bow Public Works Water Utility Division in the operation of the Silver Lake Reservoir is to insure the safety of the public at large by the prevention of emergency conditions from occurring. This is to be accomplished by following specific, prescribed maintenance procedures as recommended by the DNRC and required in the dam operating permits. The operating procedures followed by of Butte-Silver Bow Public Works Water Utility Division for Silver Lake keep the reservoir levels well within the established safety limits of the dams.

The purpose of this emergency action plan (EAP) is primarily to safeguard the lives of the citizens of Anaconda-Deer Lodge County living downstream from Silver Lake West Dam and secondarily to reduce damage to their property in the unlikely event of flooding caused by a failure of the dam. Hopefully, this emergency action will not have to be implemented. However, should an emergency occur, this plan will be in place and periodically maintained and practiced in order to insure the viability and effectiveness of the EAP.

B. Description of Dam

Silver Lake West Dam is in Anaconda-Deer Lodge County, in Sections 21, Township 5 North (T5N), Range 13 West (R13W) of the Montana Principal Meridian. It is owned by of Butte-Silver Bow Public Works Water Utility Division. The Butte-Silver Bow Public Works Water Utility Division is the operator and is

also responsible for acquiring dam operating permits and the implementation of this EAP. Silver Lake East and West Dams impound water for industrial use and irrigation. Technical data pertaining to Silver Lake and its structures are shown in Appendix A.

C. Access to Dam

Silver Lake is located directly off of U.S. Highway A, about nine miles west of West Valley, Anaconda, MT. The nearest telephone with restricted access is at the Silver Lake Pump Station and the telephone number is (406) 563-6066. The nearest residence is the home located on the north end of the west dam.

D. Hazard Area

The evacuation area extends downstream from Silver Lake west to Georgetown Lake, as shown in the map in Appendix B. Hazards include the possible inundation of occupied dwellings and the Denton's Point Access Road. Inundation and evacuation maps are in Appendix B.

E. Responsibility and Authority

Pursuant to the Dam Safety Act, Chapter 15 of Title 85, MCA, high hazard dam owners are responsible for production, coordination, maintenance, and implementation of emergency action plans. Butte-Silver Bow Public Works Water Utility Division, as dam operator, has been assigned this responsibility by the owners of the dam. The extent of Butte-Silver Bow Public Works Water Utility Division implementation of the EAP was defined through coordination of this plan

with the Anaconda-Deer Lodge County Police Dept. and the coordinator of Anaconda-Deer Lodge County Engineer.

F. Periodic Review/Update

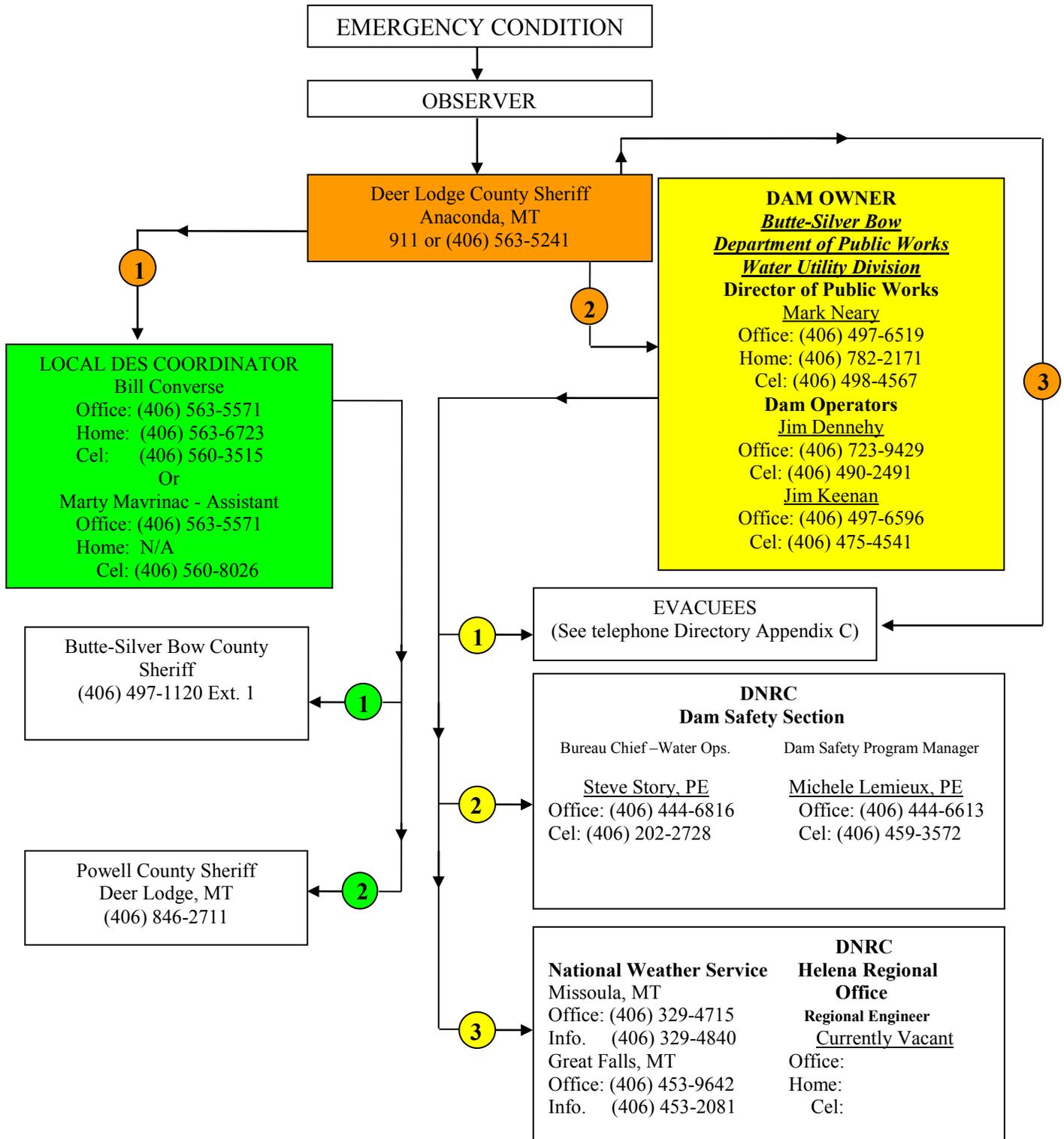
Butte-Silver Bow Public Works Water Utility Division will review/update this EAP annually. The EAP will be reviewed by a qualified professional engineer no less than every five years.

II. NOTIFICATION PROCEDURES

A. Imminent or Actual Failure

If assistance is required to evaluate if a dam is threatened with imminent failure, advice can be sought from Dam Safety Section of the Department of Natural Resources and Conservation (DNRC). If Silver Lake West Dam is failing, two things must be done immediately: (1) the hazard area downstream from the dam must be evacuated, and (2) any steps that might save the dam or reduce damage to the dam or hazard area downstream should be taken. (Refer to the map in Appendix B to determine the areas that are likely to be inundated if the dam fails). The evacuation will be handled according to the county warning plan and should be initiated as shown in Figure 1.

**FIGURE 1
SILVER LAKE WEST DAM
ACTUAL OR IMMINENT FAILURE
"NOTIFICATION FLOWCHART"**



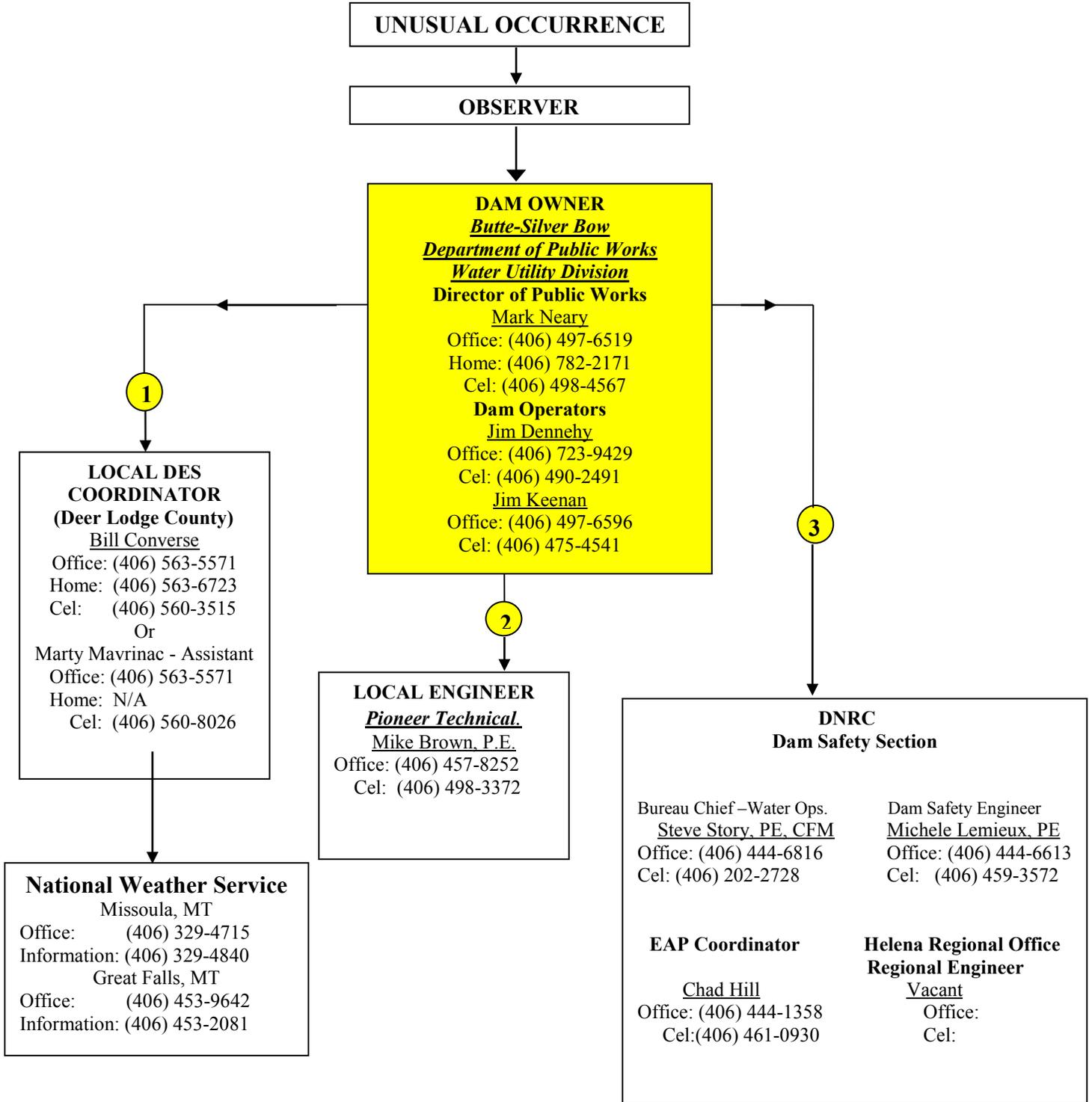
As dam owner, it is your responsibility to:

1. Call the Anaconda-Deer Lodge County Engineer at (406) 563-4015 or 563-5241. He will call other authorities and the media and begin the evacuation.
2. Do whatever is necessary to bring anyone in immediate danger to safety. This includes someone on the dam, directly below the dam, boating on the reservoir, or evacuees if so directed by the county chief of police.
3. Keep in frequent touch with the coordinator of Disaster and Emergency Services.
4. If all means of communication are lost:
 - a. Attempt to determine the cause of the failure of communications;
 - b. Try to locate another radio or telephone that is functional;
 - c. Get someone else to try to reestablish communications. If these means fail, handle the immediate problems as well as you can, and periodically try to reestablish contact with Disaster and Emergency Services.

B. Potentially Hazardous Situation

A potentially hazardous situation is an event or condition not normally encountered in the routine operation of the dam and reservoir. Among the unusual occurrences that may affect the dam are dam embankment problems, failure of the outlet works, heavy precipitation or rapid spring snow melt, landslides, earthquakes, erosion, theft, vandalism, acts of sabotage, and serious accidents. These occurrences may endanger the dam, the public, or the downstream valley and may necessitate a temporary or permanent revision of the dam's operating procedures. Help in these situations can be obtained by notifying those people shown in Figure 2.

**FIGURE 2
SILVER LAKE WEST DAM
POTENTIALLY HAZARDOUS SITUATION
"NOTIFICATION FLOWCHART"**



1. If Butte-Silver Bow Public Works Water Utility Division personnel discover an unusual condition of the dam embankment that could threaten the structure, we will:
 - a. Perform necessary operating adjustments if required to reduce the seriousness of the situation.
 - b. Contact a qualified engineer to inspect the dam as soon as possible to determine whether emergency action is necessary.
 - c. Notify the Anaconda-Deer Lodge County Engineer Chas. Ariss (406) 563-4015
 - d. Notify the county Disaster and Emergency Services Coordinator (406) 563-5571 of the potential problem.
 - e. Contact the Dam Safety Section of the Department of Natural Resources and Conservation (DNRC).

2. Among the conditions the dam maintenance personnel should watch for are:
 - a. Overtopping of the dam by floodwaters
 - b. Loss of material from the dam crest due to storm wave erosion
 - c. Slides on either the upstream or downstream slope of the embankment as evidenced by:
 - (1). Sloughing
 - (2). Cracking
 - (3). Bulging
 - (4). Scarping
 - d. Erosional flows through, beneath, or around the embankment as evidenced by:
 - (1). Excessive seepage
 - (2). Discoloration of the seepage

- (3). Boils on the downstream side
- (4). Sinkholes
- (5). Changes in the flow from drains
- e. Failure of outlets due to clogging or erosion
- f. Movement of the dam on its foundation as evidenced by:
 - (1). Misalignment
 - (2). Settlement
 - (3). Cracking

3. When Butte-Silver Bow Public Works Water Utility Division calls either our engineer or the DNRC to report a problem, we will use the form in Appendix D to ensure sufficient information is provided to the DNRC for the engineer to analyze the problems. Section III includes further guidelines for courses of action to take to mitigate the effect of many problems.

C. Posting of the Notification Flowchart and Distribution of the EAP

The Notification Flowchart is posted at the dam and a copy of the EAP is in the pump house. The Anaconda- Deer Lodge County Police Dept. and the DES Coordinator have copies of the plan.

III. MITIGATION ACTIONS

Besides normal monitoring of the dam's condition, which is done monthly most of the year and weekly or daily as conditions warrant during the water storage season, Butte-Silver Bow Public Works Water Utility Division will provide continuous monitoring and inspection during and after extreme events such as storms and earthquakes. Information on the magnitude of an earthquake or storm can be obtained from the DNRC Dam Safety Section and from the Montana Bureau of Mines and Geology ((406) 496-4167). Actions are suggested below to mitigate problems that may develop, but those actions should never be continued at the risk of injury or at the expense of lessening efforts related to evacuation. Monitoring should identify any of the following potential problems.

A. Potential Problems and Immediate Response Actions

1. OVERTOPPING BY FLOOD WATERS

- a. Open outlet to its maximum safe capacity.
- b. Initiate pumping from one or both vertical turbine pumps as deemed necessary.
- c. Place sandbags along the crest to increase freeboard and force more water through the outlet.
- d. Provide erosion-resistant protection to the downstream slope by placing plastic sheets or other materials over eroding areas.
- e. Divert flood waters around the reservoir basin by utilizing the Storm Lake and Twin Lake diversion systems.

- f. Create additional spillway capacity by making a controlled breach in a low embankment or dike section where the foundation materials are erosion-resistant.

2. LOSS OF FREEBOARD OR DAM CROSS SECTION DUE TO STORM WAVE EROSION

- a. Place additional riprap or sandbags in damaged areas to prevent further embankment erosion.
- b. Lower the water level to an elevation below the damaged area.

3. SLIDES IN THE UPSTREAM OR DOWNSTREAM SLOPE OF THE EMBANKMENT

- a. Lower the water level at a rate and to an elevation considered safe, given the slope condition. If the outlet is damaged or blocked, pumping, siphoning, or a controlled breach may be required.
- b. Stabilize slides on the downstream slope by:
 - (1). weighting the toe area with additional soil, rock, or gravel, and then
 - (2). restoring lost freeboard by placing sandbags at the crest.

4. EROSIONAL FLOWS THROUGH THE EMBANKMENT, FOUNDATION, OR ABUTMENTS

- a. Plug the flow with whatever material is available (hay bales, bentonite, or plastic sheeting if the entrance to the leak is in the reservoir basin).

- b. Lower the water level until the flow decreases to a non-erosive velocity or stops.
- c. Place a protective sand-and-gravel filter or boil ring over the exit area to hold materials in place.

5. FAILURE OF APPURTENANT STRUCTURES

- a. Implement temporary measures to protect the damaged structure, such as closing an outlet or protecting a damaged outlet discharge with riprap.
- b. Lower the water level to a safe elevation. If the outlet is inoperable, pumping, siphoning, or a controlled breach may be required.

6. MASS MOVEMENT OF THE DAM ON ITS FOUNDATION (SPREADING OR MASS SLIDING FAILURE)

- a. Immediately lower the water level until excessive movement stops.

7. EXCESSIVE SEEPAGE AND HIGH LEVEL SATURATION OF THE EMBANKMENT

- a. Lower the water to a safe level.
- b. Continue frequent monitoring for signs of slides, cracking or concentrated seepage.

8. EXCESSIVE SETTLEMENT OF THE EMBANKMENT

- a. Lower the water level by releasing it through the outlet, pumping, siphoning, or a controlled breach.
- b. If necessary, restore freeboard, preferably by placing sandbags.

B. Emergency Supplies and Resources

Material suitable for riprap to be accessed in an emergency situation is located in Daly Gulch near the Gold Coin Mine approximately one-half mile west of Silver Lake West Dam and north of U.S. Highway A. Fill material is also located approximately 400 yards due west of the West Dam in a sand and gravel quarry and available at the Trigger Mine above the south shore of Silver Lake and approximately three-quarter mile east of the West Dam along the dirt access road. Permission to access fill material in an emergency will be obtained from the owners of both of these properties prior to August 1, 1995. The location of the emergency materials is shown on the map in Appendix B.

C. Local Contractors and Engineers

Local Contractors:

Jordan Contracting (Anaconda, MT)(406) 563-8276
 Ed McCarthy, (Jordan Contracting –Anaconda)Cel: (406) 691-0103
 Bob Lash, (Jordan Contracting-Butte)Cel: (406) 691-0102

In an extreme emergency, end loaders, dozers, and other heavy equipment are available from the following:

- Silver Bow County Maintenance Shop, Butte,(406) 497-6565
- Jocko Stajcar(406) 497-6569
- Jocko Stajcar mobile(406) 560-7895

Engineers:

- Pioneer Technical Services (Helena, MT).....(Office) (406) 457-8252
- Brad Archibald, P.E. (Home) (406) 494-6549
..... (Cel) (406) 490-3032
- Mike Browne, P.E. (Cel) (406) 498-3372

Dam Operations, Butte-Silver Bow Water Utility Division

- Jim Dennehy(Office) (406) 723-9429
..... (Cel) (406) 490-2491

APPENDICES

APPENDIX A

TECHNICAL DATA

FOR

SILVER LAKE WEST DAM

Technical Data for Silver Lake West Dam

Location of Dam:

Section 21, T5N, R13W, MPM; Approx. 9 miles west of West Valley, Anaconda, Mt.

Height of Dam..... **17 feet**

Length of Dam Crest.....**1292 feet**

Crest Width.....**15 to 20 feet**

Slope of Upstream Face of Dam (Horizontal to Vertical)(variable) **2:1**

Slope of Downstream Face of Dam (Horizontal to Vertical)**1.4:1 to 2:1**

Outlet Works.....Steel head gate with 45-inch concrete culvert

Low Level Pumps: two vertical turbine pumps at 15,000 gpm each located in pump house on lake. Pump discharge pipe is 30-inch diameter concrete and steel through Silver Lake East Dam.

Reservoir Capacities

Maximum Capacity as Measured to The Lowest Dam Crest Elevation

(East Dam, 6485.5 ' local datum)**17,800 acre-feet**

Reservoir Capacity Measured to The Normal Pool Target Elevation

(6475.0').....**14,700 acre-feet**

Flood Surcharge Storage from Normal Pool to First Overtopping (6485.5'): **3,100 acre-feet**

Probable Maximum Flood.....**759 to 890 acre-feet**

APPENDIX B

INUNDATION AND EVACUATION MAPS

P O R T O R E S T

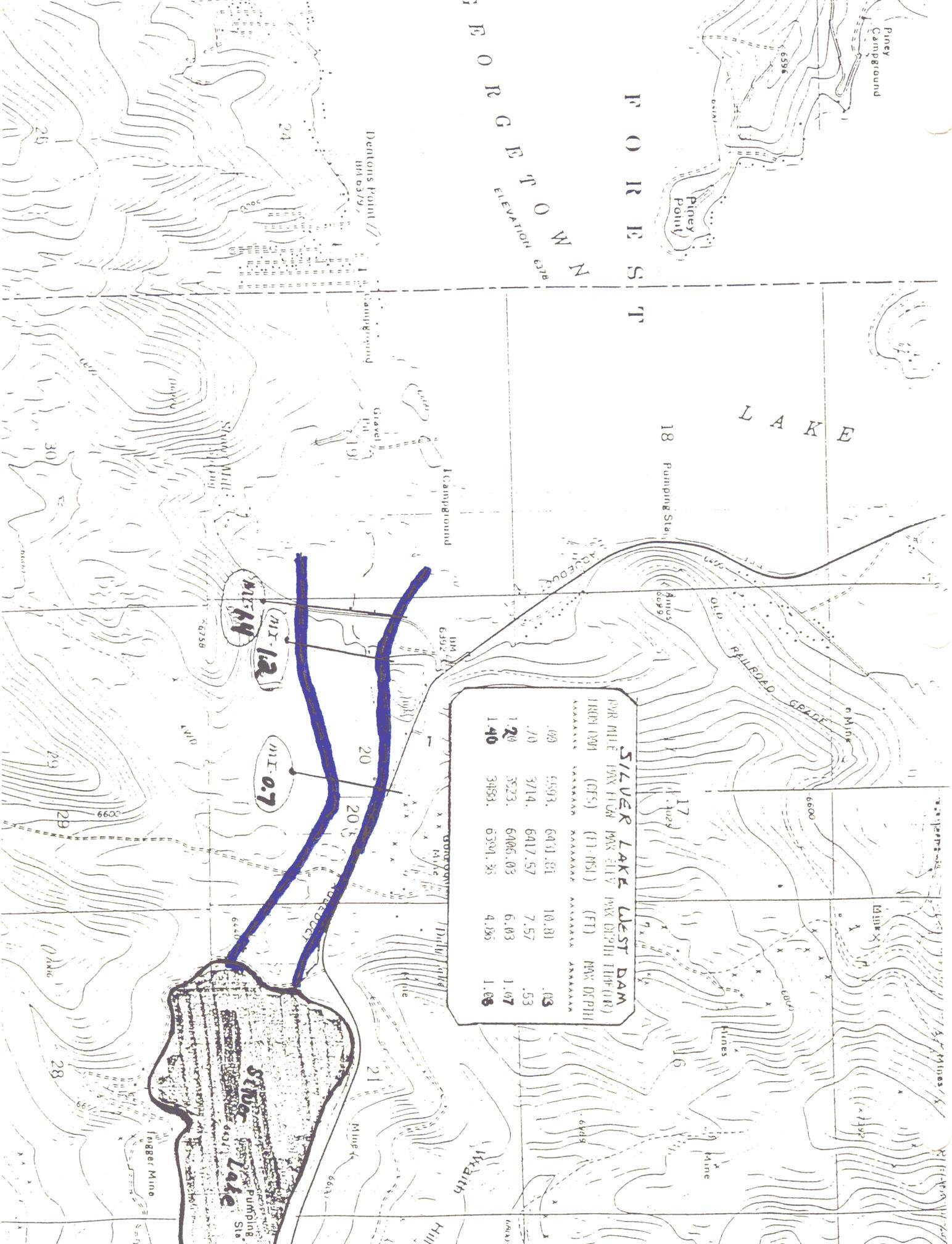
T O W N F O R G E T

ELEVATION 6328

L A K E

18 Pumping Sta.

| SILVER LAKE WEST DAM | | | | |
|----------------------|----------|-----------|-----------|-----------|
| PER MILE | MAX HIGH | MAX ELEV | MAX DEPTH | TH (FOR) |
| IRON DAM | (GFS) | (FT. MSJ) | (FT) | MAX DEPTH |
| 0.60 | 5493. | 6431.81 | 10.81 | .03 |
| .70 | 3714. | 6417.57 | 7.57 | .53 |
| 1.20 | 3523. | 6406.03 | 6.03 | 1.07 |
| 1.40 | 3453. | 6394.36 | 4.36 | 1.08 |



APPENDIX C

TELEPHONE DIRECTORY

TELEPHONE DIRECTORY

A. Priority One

1. Butte-Silver Bow Public Works Water Utility Division

a. Director of Public Works: Butte-Silver Bow Water Utility Division

Mr. Mark Neary. Office: (406) 497-6519
..... Home: (406) 782-2171
..... Cel: (406) 498-4567

b. Silver Lake Pump Station(406) 563-6066

c. Georgetown Dam: Northwest Energy System

Operations Control Center (406) 494-4131

1. EMERGENCY NUMBER911

Deer Lodge County Police.....911 OR (9:00 A.M.-5:00 P.M.) (406) 563-5241

2. DISASTER AND EMERGENCY SERVICES

a. Deer Lodge County.....(Office) (406) 563-5571

Bill Converse.....(Home) (406) 563-6723

..... (Cel) (406) 560-3515

Marty Mavrinac.....(Home) N/A

..... (Cel) (406) 560-8026

b. MT Disaster and Emergency Services Division (Helena)

.....(406) 324-4777

3. EVACUEES

a. Evacuees will be encouraged to sign up for NIXEL First Alert System to be notified electronically if required. Local authorities (First Responders, Police, etc.) will setup barricades and go door – to – door to notify residents.

B. Priority Two

4. LOCAL ENGINEERS

- a. Pioneer Technical Services (Helena, MT).....(Office) (406) 457-8252
- b. Mike Browne, P.E. (Cel) (406) 498-3372
- c. Pioneer Technical Services (Butte, MT) (Office) (406) 782-5177
- d. Brad Archibald, P.E. (Home) (406) 494-6549
..... (Cel) (406) 490-3032

5. MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

- a. Dam Safety Section.....(Office) (406) 444-6613
- b. Steve Story P.E., Bureau Chief..... (Home) (406) 444-6816
.....(Cel) (406) 202-2728
- c. Michele Lemieux, P.E.(Office) (406) 444-6613
..... (Cel) (406) 459-3572
- d. Chad HillOffice) (406) 444-1358
..... (Cel) (406) 461-0930
- e. Larry Schock, Regional Engineer
(Missoula Regional Office)(Office) (406) 542-5885
..... (Home) (406) 721-2073
.....(Cel) (406) 360-1632
- f. Vacant, Regional Engineer
(Helena Regional Office).....(Office) (406) 444-9724

6. NATIONAL WEATHER SERVICE

- Great Falls, MT(406) 453-9642
- Information (406) 453-2081
- Missoula, MT(406) 329-4715
- Information (406) 329-4840

7. LOCAL CONTRACTORS

- a. Jordan Contracting (Anaconda, MT)..... (406) 563-8276
Ed McCarthy (Jordan Contracting –Anaconda)... Cel: (406) 691-0103

Bob Lash (Jordan Contracting-Butte)Cel: (406) 691-0102

b. Jim Gilman Excavating Inc., (Butte, MT).....(406) 723-8324

In an extreme emergency, end loaders, dozers, and other heavy equipment are available from the following:

- a. Silver Bow County Maintenance Shop, Butte,(406) 497-6565
 - Jocko Stajcar.....(406) 497-6569
 - Jocko Stajcar (cell)(406) 560-7895

- 8. BUREAU OF LAND MANAGEMENT (406) 533-7600
- 9. MONTANA DEPARTMENT OF STATE LANDS..... (406) 444-2074
- 10. U.S. FOREST SERVICE, REGIONAL ENGINEERING OFFICE (406) 494-2147

APPENDIX D
DAM INCIDENT REPORT FORM

DAM INCIDENT REPORT FORM

DATE _____ TIME _____

NAME OF DAM _____

STREAM NAME _____

LOCATION _____

COUNTY _____

OBSERVER _____

OBSERVER TELEPHONE _____

NATURE OF PROBLEM _____

LOCATION OF PROBLEM AREA (Looking Downstream) _____

EXTENT OF PROBLEM AREA _____

FLOW QUANTITY AND COLOR _____

WATER LEVEL IN RESERVOIR _____

IS SITUATION WORSENING? _____

EMERGENCY STATUS _____

CURRENT WEATHER CONDITIONS _____

ADDITIONAL COMMENTS _____

APPENDIX E
REFERENCES AND ACKNOWLEDGEMENT

1. Department of Natural Resources and Conservation Dam Safety Section, "Dam Safety Operation and Maintenance Plan Notebook" and Diskette. The use of this reference is greatly appreciated.