Emergency Action Plan (EAP)

Lake Gregory Dam

San Bernardino County, California

No. 1803-003
NID # CA00224

Dam Owner: San Bernardino County Regional Parks Department

With assistance from:
Department of Water Resources
Division of Safety of Dams

View of Lake Gregory Dam Crest (Lake Drive)

Update 4/11/2011

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Record of Holders of Control Copies of the Lake Gregory Dam EAP

Copy Number	Organization	Person Receiving Copy
1	San Bernardino County – Regional Parks Department	Director
2	San Bernardino County – Lake Gregory Regional Park	Park Superintendent
3	San Bernardino County Special Districts Department	Director
4	State of California Department of Water Resources, Division of Safety of Dams	Chief
5	San Bernardino County Office of Emergency Services	Division Manager
6	Crestline Lake Arrowhead Water Agency CLAWA	General Manager

EAP Revisions

Revision Number	Description	Date
1	EAP Issued	xx/xx/2010

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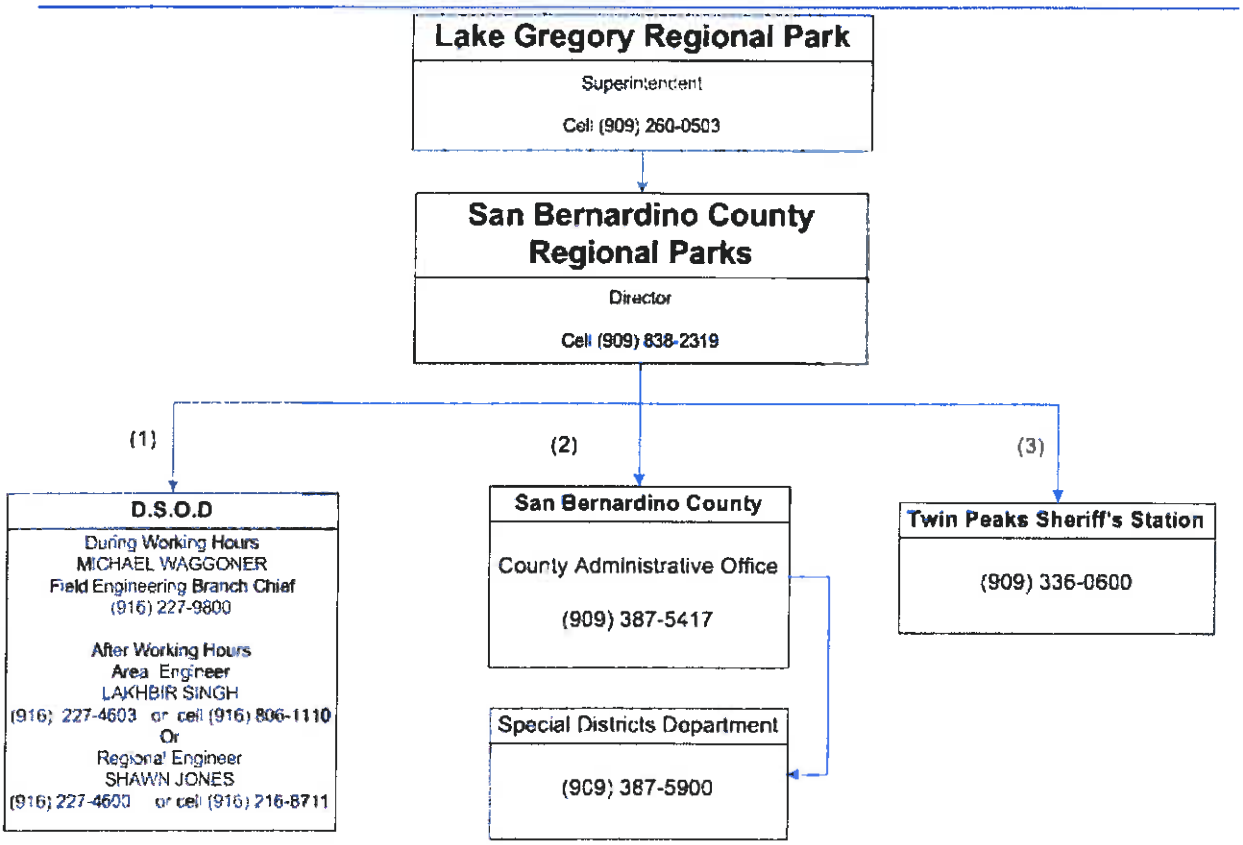
Reference 1a – Notification Flowchart for Emergency Level 1

Emergency Level 1

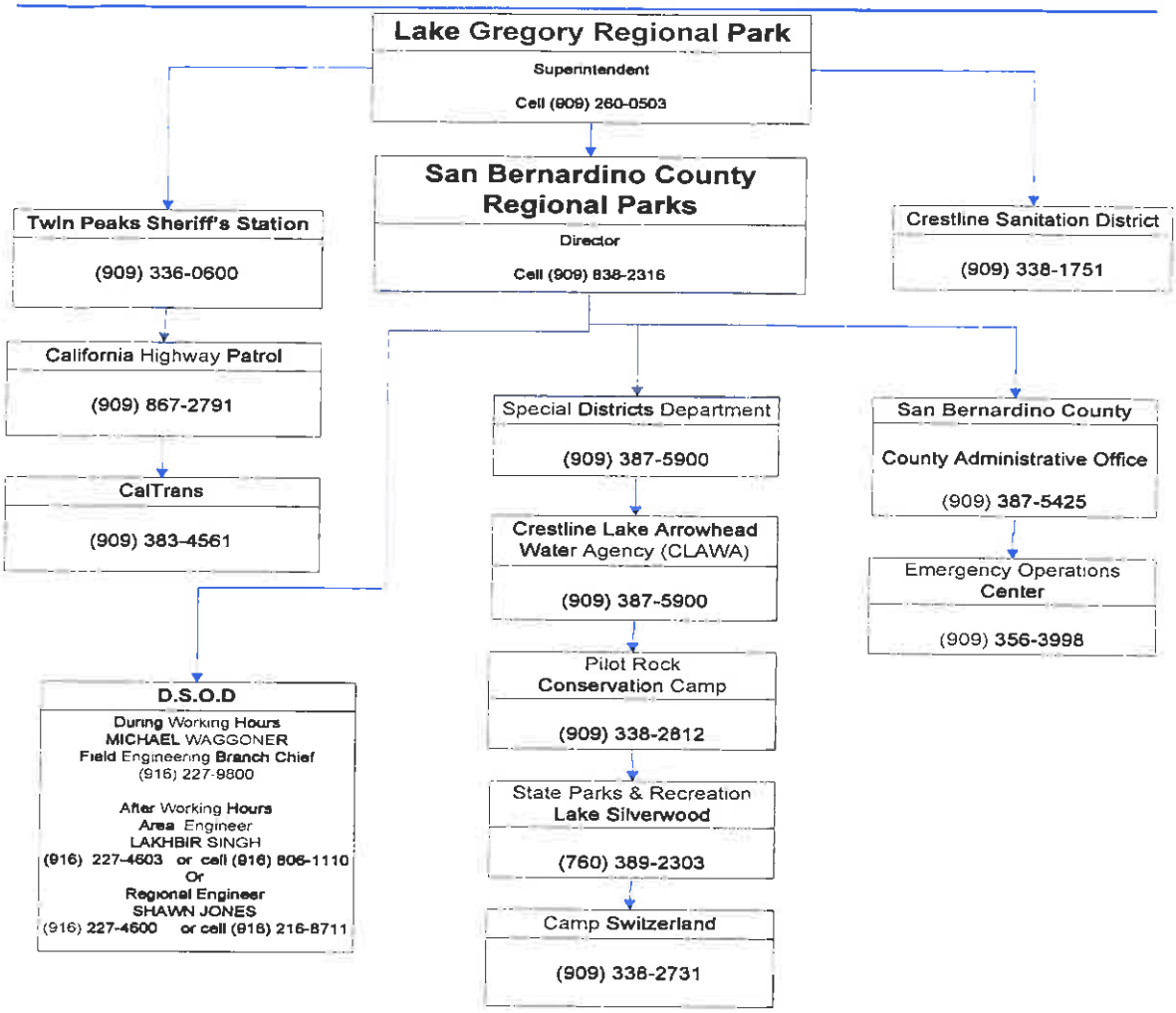
Unusual, slowly developing event



Reference 1b – Notification Flowchart for Emergency Level 2

Emergency Level 2

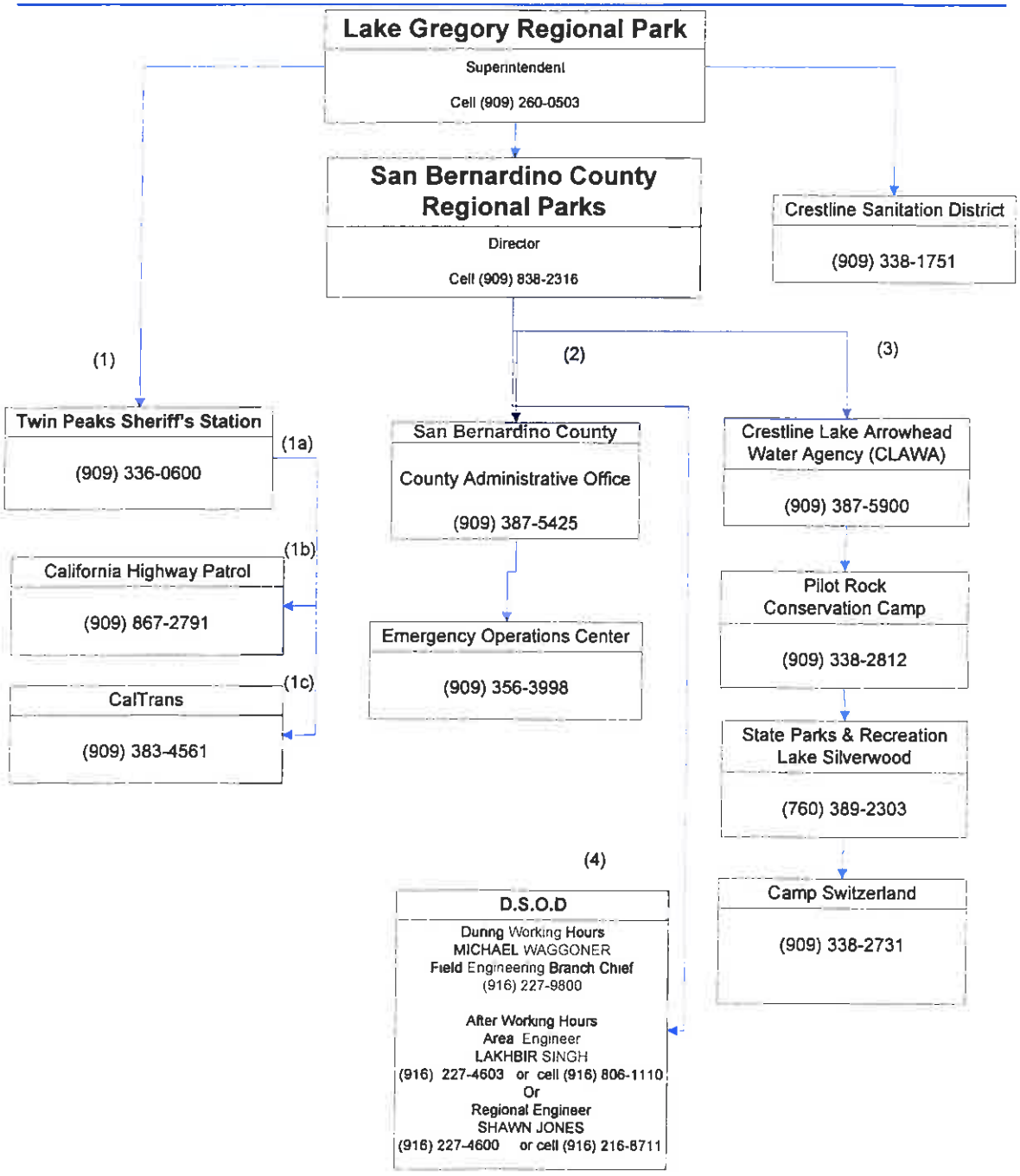
Potential Dam Failure Situation, Rapidly Developing



Reference 1c – Notification Flowchart for Emergency Level 3

Emergency Level 3

Dam failure appears imminent or is in progress



Reference 2 – Reporting Scripts

"My name is _____(name)_____, and I am the _____(Position/Title)_____ at Lake Gregory Dam, State ID number 1803-003, located in San Bernardino County along the CA Highway 138W. My immediate call-back number is _____(telephone #)_____. The alternate person to contact for dam information is _____(alt. name)_____ and their telephone number is _____(alt. telephone #)_____.

I am calling to report an activation of the Emergency Action Plan for Lake Gregory Dam. We are at Emergency Level ___(1, 2, or 3)___. Please initiate your procedures specified in the Emergency Action Plan for a ____(specify the emergency event)____."

SITUATION STATUS

(Provide a summary description of the emergency event, citing dates, times, and quantities, if known.)

ACTIONS TAKEN

(Provide a description of what actions you have taken up to this point.)

ASSISTANCE NEEDED

(Request assistance as needed and as it pertains to the specific event. Typically, for a Level 1 event, the following will suffice: *"This is an advisory call only and no assistance is being requested at this time."*)

Reference 3– Events, Emergency Levels, and Expected Actions

Event	Situation	Emergency Level	Expected Actions for Levels 1 and 2
Earthquakes	Measurable earthquake felt or reported within 50 miles of the dam	1	Quickly inspect Lake Gregory Dam and evaluate the damage sustained and the potential danger of failure. Check for seeage, cracks, displacements, and settlement. Inspect the outlet works and spillways. If the dam is damaged to the extent that there is increased flow passing downstream, immediately implement the failure is imminent or has occured procedures.
	Earthquake resulting in visible damage to the dam or appurtenances	2	
	Earthquake resulting in uncontrolled release of water from the dam	3	
Embankment Cracking or Settlement	New cracks in the embankment greater than ¼ inch wide without seepage	1	Lower the water level by releasing it through the outlet or by pumping or siphoning. If necessary, restore freeboard, preferably by placing sandbags. Lower water level in the reservoir to a safe level; continue operating at a reduced level until repairs can be made.
	Cracks in the embankment with seepage	2	
Embankment Movement	Visual movement/slippage of the embankment	2	Lower the water level in the reservoir by opening all gates and valves at a rate, and to an elevation, that is considered safe given the slide condition. If the outlet is damaged or blocked, pumping, siphoning, or a controlled breach may be required.
	Sudden or rapidly proceeding slides of the embankment slope	3	

Reference 3 – Events, Emergency Levels, and Expected Actions (Con't)

Event	Situation	Emergency Level	Expected Actions for Levels 1 and 2
Erosion of Spillway	Failure that could move into the spillway and cause rapid displacement of large volumes of water	2	Provide temporary protection at the point of erosion by placing sandbags, riprap materials, or plastic sheets weighted with sandbags. Consider pumps and siphons to help reduce the water level in the reservoir. When inflow subsides, lower the water level in the reservoir to a safe level; continue operating at a lower water level in order to minimize spillway flow.
Fire	There is a significant fire in the area that affects access to Lake Gregory Dam	1	Implement the fire procedures
Instrumentation Reading (Abnormal)	Instrumentation reading beyond predetermined values	1	Conduct periodic inspections of the dam to check and record the following: reservoir elevation, instrumentation reading, new or changed conditions associated with this event.
Outlet System Failure	Releases are causing erosion around the outlet works	2	Implement temporary measures to protect the damaged structure, such as closing the inlet or providing temporary protection for a damaged spillway. Employ experienced, professional divers, if necessary, to assess the problem and possibly implement repair. Lower the water level in the reservoir to a safe elevation. If the inlet is inoperable, pumping, siphoning, or a controlled breach may be required.
	Uncontrolled releases caused by failure of the outlet works tunnel	3	

Reference 3 – Events, Emergency Levels, and Expected Actions (Con't)

Event	Situation	Emergency Level	Expected Actions for Levels 1 and 2
Sabotage / Vandalism	Damage to dam or appurtenances with no impacts to the functioning of the dam	1	If malicious human activity that could endanger public safety is suspected, contact law enforcement to help evaluate. If the embankment or spillway has been damaged or partially removed, provide temporary protection in the damaged area by placing sandbags, riprap materials, or plastic sheets weighted with sandbags. Use pumps and siphons to help reduce the water level in the reservoir. Employ experienced, professional divers, if necessary, to assess the problem and possibly implement repair. If the principal spillway has been damaged or plugged, implement temporary measures to protect the damaged structure. If the water supply has been contaminated, immediately close all inlets to the water supply system and notify appropriate authorities.
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam	2	
	Damage to dam or appurtenances that has resulted in seepage flow	2	
	Damage to dam or appurtenances that has resulted in uncontrolled water release	3	
Sand boils	New sand boil appears in or near the dam	2	Determine the location, and size of affected area. Estimate the discharge and nature of discharge(cloudy or clear seepage). Provide temporary protection at point of erosion by placing sandbags and rip rap material. If necessary, lower water level in reservoir to a safe level until permantent repairs can be made.
	New sand boil continues to increase in size or another appears	2	
	Increasing seepage with cloudy discharge	3	

Reference 3 – Events, Emergency Levels, and Expected Actions (Con't)

Event	Situation	Emergency Level	Expected Actions for Levels 1 and 2
Security Threats	Unauthorized personnel is seen or reported to be at the dam	1	Contact law enforcement.
	Verified bomb threat that, if carried out, could result in damage to the dam	2	
	Detonated bomb that has resulted in damage to the dam or appurtenances	3	
Seepage, Springs, Piping	New areas in or near the dam	1	If the leak is originating from within the reservoir in the upstream embankment, plug the flow with whatever material is available (hay bales, bentonite, or plastic sheeting). Lower the water level in the reservoir until the flow decreases to a non-erosive velocity or until it stops. Place an inverted filter (a protective sand and gravel filter) over the exit area to hold materials in place. Continue lowering the water level until a safe elevation is reached; continue operating at a reduced level until repairs are made. Stabilize damaged areas on the downstream slope by weighting the toe area below the slide with additional soil, rock, or gravel.
	New areas with cloudy discharge or increasing flow rate	2	
	Seepage with cloudy discharge greater than 10 gallons per minute	3	

Reference 3 – Events, Emergency Levels, and Expected Actions (Con't)

Event	Situation	Emergency Level	Expected Actions for Levels 1 and 2
Storm Event	The reservoir water surface threatens to exceed the design maximum elevation.	**1**	Conduct periodic (at least daily) inspections of the dam to check and record the following: reservoir elevation, rate the reservoir is rising, weather conditions (past, current, forecasted), discharge conditions of creeks/rivers downstream, new or changed conditions associated with this event.

Reference 4– Project Fact Sheet

Dam Description and Statistics

Dam Name:	Lake Gregory Dam	**Dam No:**	1803-003	**NID No:**	CA00224
Dam Owner:	San Bernardino County Regional Parks Department				

Lat:	34° 14.58'	**Long:**	121° 15.78'	**Sec/T/R/ Baseline:**	S 23	T 2N	R 4W SB B&M

Stream:	Houston Creek	**County:**	San Bernardino

Type of Dam:	Earth	**Year Constructed:**	1938
Dam Height:	90 ft	**Dam Length:**	475 ft
Crest Elev:	4530.0 ft	**Spillway Elev:**	4517 ft
Drainage Area:	2.8 sq mi	**Federal Haz Class:**	High
Total FB:	13.0 ft	**Storage Capacity:**	2,100 ac-ft
Spillway Type:		**Peak Outflow:**	cfs

Estimated Evacuation (check one): ☐<10 ☒10-100 ☐100-1000 ☐>1000

Directions to Dam: From CA-210, take Exit 76 to CA-18 North/Waterman Avenue. Head north on CA-18/Waterman Avenue for approximately 11 miles and merge onto CA-138 W. Bear right to stay on CA-138 W; continue onto Lake Drive. Lake Drive crosses the crest of the dam.

Description of Potential Downstream Impacts: There is a campground located at the toe of the downstream embankment, as well as Pilot Rock Conservation Camp located approximately 2 miles downstream of Lake Gregory Dam.

Lake Drive is used by local communities and crosses directly over the Lake Gregory Dam crest.

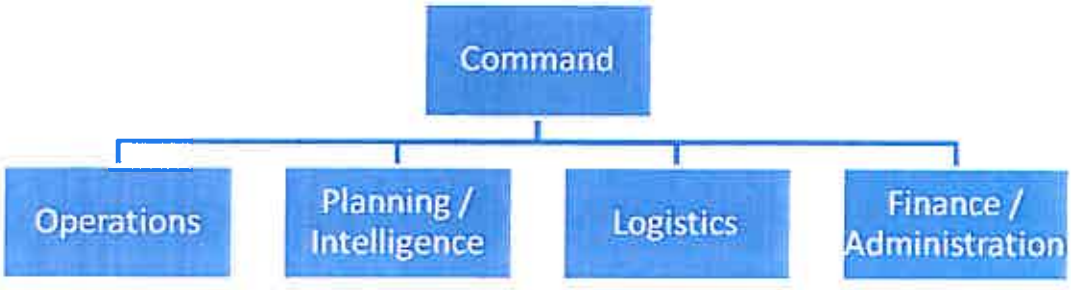
I. Introduction

a. Statement of Purpose

The purpose of this plan is to reduce the risk loss of human life and injury and to minimize property damage in the event of an actual or potential emergency situation associated with Lake Gregory Dam. These situations include, but are not limited to: dam instability, felt earthquakes, extreme storm events, major spillway releases, overtopping of the dam, outlet system failure, abnormal instrument readings, vandalism or sabotage, spillway gate failures, or failure of the dam. **Reference 4** includes a project description and statistics for the dam, and **Appendix B1** contains a contact listing for available resources, an inundation map, schematic of the dam and appurtenant structures, and other dam-specific data that could be helpful during an emergency.

b. NIMS, SEMS, and ICS

This plan leverages the National Incident Management System (NIMS), Standardized Emergency Management System (SEMS), and the Incident Command System (ICS) when responding to emergencies. The basic organizational structure is shown below:



NIMS Information - http://www.fema.gov/emergency/nims/

NIMS provides a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment.

SEMS Guidelines - http://cms.calema.ca.gov/prep_SEMS.aspx

SEMS is used in emergency events to gain needed resources and help differing governmental levels work with one another. SEMS is comprised of

ICS, Multi/Inter-Agency Coordination, Mutual Aid, and an Operational Area Concept. The organizational levels of SEMS include Field (Incident Command), Local Government (city), Operational Area (county), Region, and State (Cal EMA's Region and State Operations Center). SEMS can be scaled to match the magnitude of the event.

ICS is a standardized, on-scene, all-hazard incident management concept. It allows personnel from a variety of agencies to meld into an integrated organizational structure to match the complexities and demands of single or multiple incidents without being hindered by jurisdictional boundaries. ICS promotes the safety of responders and others, the achievement of tactical objectives, and the efficient use of resources.

II. The Five-Step EAP Process

a. STEP 1 – DETECTION

Step 1 involves emergency detection, evaluation, and incident classification. Regular surveillance at the site will be the normal methods of detecting potential emergency situations. For conditions beyond the normal range of operations, contact the Division of Safety of Dams, DSOD, for assistance with evaluation of the conditions.

Each event or situation will be placed in one of the following classifications:

i. Emergency Level 1 - Unusual Event or Slowly Developing Situation

This classification indicates a situation is developing; however, the dam is not in danger of failing. Spillway related flooding is possible or expected. Downstream residents need to be notified if flooding threatens life or property.

ii. Emergency Level 2 - Potential Failure

This classification indicates that a situation is developing that could cause the dam to fail. A reasonable amount of time is available for analysis before deciding on evacuation of residents. Emergency responders in affected areas shall be alerted that an unsafe situation is developing.

iii. Emergency Level 3 - Imminent Failure

This classification indicates dam failure is imminent or flooding threatens life and property. When it is determined that there is no longer time available to implement corrective measures to prevent failure, an order for evacuation of residents in potential inundation areas shall be issued.

b. STEP 2 – EMERGENCY LEVEL DETERMINATION

Step 2 involves determining the appropriate emergency level for a given event. **Reference 3** provides guidance for determining the emergency level for a variety of events that could develop at the dam.

c. STEP 3 – NOTIFICATION FLOWCHARTS

Notification flowcharts have been prepared to assist personnel during an emergency for the various levels. The charts in **Reference 1a, 1b, and 1c** identify who is responsible for notifying representatives and/or emergency management officials; what is the prioritized order in which individuals are to be notified; and who is to be notified. **Appendix A-1: Contact Check List** may be used to track the notifications that have been made or attempted. The contacts within the notification flowcharts will be reviewed annually.

d. STEP 4 - PREVENTATIVE ACTIONS

Step 4 provides the Dam Owner's Representative with a set of potential preventative actions and steps to take for each emergency level. These are not inclusive of all that needs to happen. **Reference 3** contains preventative action guidelines for specific events that may occur at the dam. **Appendix A-2: Unusual or Emergency Event Log** may be used during the emergency event to document conditions, actions, and event progression.

i. Emergency Level 1

For an unusual event that is slowly developing, follow the notification chart and the expected actions outlined in **Reference 1a,** and use the script in **Reference 2**. Then follow the expected actions outlined in **Reference 3.**

ii. Emergency Level 2

For a potential dam failure situation or a rapidly developing situation, make the necessary notifications in **Reference 1b**, and use the suggested script in **Reference 2.** Then follow the expected actions outlined in **Reference 3.**

iii. Emergency Level 3

For a dam failure that is in progress or appears to be imminent, make the necessary notifications in **Reference 1c**, and use the suggested script in **Reference 2.** If dam failure is in progress or appears to be imminent, nothing further can be done to save the dam. Personal safety must take priority.

e. STEP 5 – TERMINATION & FOLLOW-UP

Step 5 involves event termination and follow-up activities. Once conditions indicate that there is no longer an emergency at the dam site, the EAP operations must eventually be terminated and follow-up procedures completed.

The Incident Commander is responsible for terminating the emergency event and relaying this decision.

Prior to the termination of an Emergency Level 3 event that has not caused actual dam failure, DSOD will inspect 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, then the Incident Commander will terminate EAP operations as described above.

Dam Owner's/Operator's Representative shall assure that **Appendix A-3: Dam Emergency Situation Report** is completed to document the emergency event and all actions that were taken. The dam owner shall distribute copies of the completed report to DSOD. If the event is escalated to an ICS/SEMS event, the Dam Owner's/Operator's Representative may also be involved with preparing the After Action Report.

III. Roles and Responsibilities

a. Dam Owner's Representative

The Dam Owner's Representative includes both the on-site maintenance personnel, administrative members.

i. As soon as an emergency event is observed or reported, immediately determine the emergency level:

Emergency Level 1: Unusual event, slowly developing
Emergency Level 2: Potential dam failure situation, rapidly developing
Emergency Level 3: Dam failure appears imminent or is in progress

ii. Immediately notify the personnel in the order shown on the notification chart for the appropriate level.

iii. Provide updates of the situation to the police/sheriff dispatcher to assist them in making timely and accurate decisions regarding warnings and evacuations.

iv. 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.

b. Incident Commander (San Bernardino County Sheriff)

The command function consists of establishing the Incident Command Post, protecting life and property, controlling personnel and equipment resources, maintaining accountability for responder and public safety, and establishing and maintaining an effective liaison with outside agencies and organizations. Duties include the following:

i. Establishing command.
ii. Ensuring responder safety.
iii. Assessing incident priorities.
iv. Determining operational objectives.
v. Developing and implementing the Incident Action Plan.
vi. Developing an appropriate organizational structure.
vii. Maintaining a manageable span of control.
viii. Managing incident resources.
ix. Coordinating overall emergency activities.
x. Coordinating the activities of outside agencies.
xi. Authorizing the release of information to the media.
xii. Terminating the emergency.
xiii. Participating in an annual review and update of the EAP.

c. California Emergency Management Agency (Cal EMA)

Cal EMA plays dual roles in managing an emergency; one at the Regional level and the other at the State level. The Regions include Inland Region, Coastal Region, and Southern Region, while the State level constitutes the Executives and brokers resources between the Regions. The State level also interfaces with the National Response Framework, informs the Governor and Legislature, implements State Level Media Policy, and provides the primary coordination with the National Incident Management System (NIMS) at the federal level. Cal EMA will participate in the annual review and update of the EAP as well.

d. DWR – Division of Safety of Dams (DSOD)

DSOD's mission is to protect people against loss of life and property from dam failure. The California Water Code entrusts this regulatory power to the Department of Water Resources which delegates the program to DSOD. In the event of an emergency at the dam, DSOD may do the following:

i. Advise the dam operator of the emergency level determination.
ii. Advise the dam operator of remedial actions to take.
iii. Inspect the dam during the emergency.

IV. EAP Maintenance

a. Training& Exercises

All people involved in the EAP shall be trained to ensure that they are thoroughly familiar with the elements of the plan, their responsibilities and duties in the plan, and if applicable, types and availability of equipment. Personnel should be trained in problem detection and evaluation, and appropriate corrective measures. This training is essential for proper evaluation of developing situations at all levels of responsibility.

The EAP should also be exercised in the form of at least a Tabletop Exercise on a periodic basis.

b. Annual Review

This plan shall be reviewed and updated at least once a year by the dam owner and local emergency management agency personnel. The EAP annual review will include the following:

i. Calling all contacts on the 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.

ii. Contacting the local law enforcement agency to verify the phone numbers and persons in the specified positions. In addition, the agency representative will be asked if they know where the EAP is kept and if the responsibilities described in the EAP are understood.

iii. Calling the locally available resources to verify that the phone numbers, addresses, and services are current.

c. 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. A list of revisions can be found in the preface of this document.

d. Distribution

Control copies of this Emergency Action Plan have been provided to all individuals or groups who are involved in the plan. The holders of the control copies of this EAP can be found in the preface of this document.

APPENDIX A

Appendix A-1: Contact Check List

Dam Name: Lake Gregory Dam

Dam No: 1803-003

Date: 3/31/11

County: San Bernardino

The following contacts should be made immediately after the emergency level is determined. The person making the contacts should initial and record the time of the call and who was notified for each contact made.

Emergency Level 1	Person Contacted	Time Contacted	Contacted By
Regional Parks Director			
D.S.O.D.			
County Executive Office			
Special Districts			
Twin Peaks Sanitation			
Crestline Sanitation			
Emergency Level 2	**Person Contacted**	**Time Contacted**	**Contacted By**
Regional Parks Director			
County Executive Office			
D.S.O.D			
Emer. Ops Center			
Twin Peaks Sheriff's Station			
Special Districts			
Camp Switzerland			
Pilot Rock Con. Camp			
Crestline Sanitation			
CA Highway Patrol			
Lake Silverwood St. Park			

Appendix A-1: Contact Check List

Dam Name: Lake Gregory Dam
Dam No: 1803-003
Date: _____ County: San Bernardino

The following contacts should be made immediately after the emergency level is determined. The person making the contacts should initial and record the time of the call and who was notified for each contact made.

Emergency Level 3	Person Contacted	Time Contacted	Contacted By
Regional Parks Director			
County Executive Office			
Camp Switzerland			
Emer. Ops Center			
Special Districts			
Crestline Sanitation			
Pilot Rock Con.Camp			
Lake Silverwood State Park			
California Highway Patrol			
CLAWA			
Twin Peak's Sheriff's Station			

Appendix A-2: Unusual or Emergency Event Log

(to be completed **during** the emergency event)

Dam Name: Dam No:

Date: County:

Reservoir Level: _____

When and how was the event detected? _____

_____

_____

Weather conditions : _____

_____

General description of the emergency situation: _____

_____

_____

Emergency Level Determination : _____ Made by: _____

Actions and Event Progression

Date	Time	Action/Event Progression	Taken by

Report prepared by: _____ Date : _____

Appendix A-3: Dam Emergency Situation Report

(to be completed **following** the termination of the emergency)

Dam Name: _____ Dam No. _____

Dam location: _____ *City* _____ *County* _____ *Stream/River*

Date : _____ Time: _____

Weather Conditions: _____

General description of emergency situation: _____

_____

_____

Area(s) of dam affected: _____

_____

_____

Extent of damage to dam: _____

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 : _____

_____

_____

Other data and comments: _____

_____

Observer's name and telephone number : _____

Report prepared by: _____ Date: _____

APPENDIX B

Appendix B-1: Available Resources

The following equipment is permanently assigned to Crestline Sanitation District and through an interagency agreement will be available to Lake Gregory Regional Park fo the Lake Gregory Dam during any emergency:

Front End Loader
Backhoe
Water Truck
Transport
Portable Pumping Unit

If these resources are required, contact one of the flowing Civil Maintenance personnel:

- Crestline Sanitation District
  Cathy Whelan(909) 338-1751

The equipment is located at the dam site and upon notification the equipment will be made available in not more than an hours notice.

Other locally available resources include:

Heavy equipment service and rental

Home Depot
695 E. Hospitality Lane
San Bernardino CA
(909) 884-4055

Ready Equipment Rentals
3969 North Sierra Way
San Bernardino CA
(909) 886-4714

Pumps

Tri-County Pump Co.
241 South Arrowhead
San Bernardino, CA
(909) 888-7706

Sand and gravel supply

Graham Equipment
17109 Eureka
Victorville, CA
(760) 245-7695

Vulcan Materials
2400 W. Highland Avenue
San Bernardino, CA
(909) 875-1150

Sand bags

Crest Forest Fire Dpt.
24385 Lake Drive
Crestline, CA
(909) 338-3311

Ready-mix concrete supply

Robertson's Ready Mix
29750 Hwy 18
Lake Arrowhead, CA
(800) 834-7337

4th Street Rock
1945 W. 4th Street
San Bernardino, CA
(909) 885-6866

Appendix B-2: Inundation Map

Appendix B-3: Schematic of Dam and Appurtenant Structures

Appendix B-4: Spillway Rating Curve