2017 Oroville Dam Crisis: A Tale of a High-Stakes Evacuation and Response

Sheriff Kory Honea  
Butte County

Steve Stark, MHA, MSOP, ACHE  
Orchard Hospital

Matt Washburn  
Orchard Hospital

Kevin Brown, MD  
Enloe Medical Center

Stacy Vincent, RN, CEN, MICN  
Enloe Medical Center
2017
OROVILLE DAM SPILLWAY EVACUATION

PRESENTED BY
SHERIFF KORY L. HONEA

OROVILLE DAM COMPLEX

• OROVILLE DAM — EARTH-FILL EMBANKMENT DAM ON THE FEATHER RIVER IN BUTTE COUNTY
• IMPOUNDS LAKE OROVILLE — SECOND LARGEST MAN-MADE LAKE IN CALIFORNIA
• CAPABLE OF STORING MORE THAN 3.5 MILLION ACRE-FEET OF WATER
• AT 770 FEET, TALLEST DAM IN THE UNITED STATES
OROVILLE DAM COMPLEX (CONT.)

- Water crests the emergency spillway at an elevation of 900 ft.
  - 1730 ft. long — 30 ft. high
- Constructed between 1961-1968
- Owned and operated by California Department of Water Resources (DWR)
- Dam complex — Dam, powerhouse, flood control spillway & emergency spillway
FEBRUARY 7, 2017
PROBLEM AT THE DAM

• RECEIVED CALL FROM LOCAL MEDIA ASKING IF THERE WAS A PROBLEM AT THE DAM
• DIFFICULTY GETTING INFO FROM DWR
• ULTIMATELY LEARNED OF GAPING HOLE IN FLOOD CONTROL OUTLET (FCO)
• RECOGNIZED THERE WAS A THREAT TO PUBLIC SAFETY, BUT NOT SURE HOW THE THREAT WOULD MANIFEST ITSELF

HOLE IN FCO AT OROVILLE DAM

• 200 FT. LONG
• 30 FT. DEEP
• HEAD-CUTTING 20 FT. BACK
UNIFIED COMMAND SPILLWAY INCIDENT

• CHIEF KEVIN LAWSON
  — CALFIRE INCIDENT MANAGEMENT TEAM 3
• SHERIFF KORY HONEA
  — BUTTE COUNTY SHERIFF
• DIR. BILL CROYLE
  — DIRECTOR, DEPARTMENT OF WATER RESOURCES

BALANCING COMPETING INTERESTS & MANAGING RISK WITHOUT A PLAYBOOK

• HISTORIC RAINFALL & SNOWPACK FOLLOWING FIVE YEARS OF DROUGHT
  — WETTEST YEAR IN 122 YEARS OF KEEPING RECORDS
• DWR WAS TRYING TO MANAGE INFLOW THROUGH RELEASES FROM THE FCO & HYATT POWER PLANT
  — TRYING TO FIND THE "SWEET SPOT" — 40,000 TO 60,000 CUBIC FEET PER SECOND (CFS)
    o SHOOTING WATER PAST THE HOLE WITHOUT CAUSING FURTHER DAMAGE TO LOWER INFRASTRUCTURE
  — HYATT POWER PLANT NOT AT FULL CAPACITY
    o NOT ALL TURBINES FUNCTIONING
THE WATER KEPT RISING

• On Feb. 11, 2017, the lake level reached 900 ft. and water crested the emergency spillway for the first time in the history of the dam

• DWR was concerned, but believed it would be ok

DOES THE SHERIFF KNOW ABOUT THIS?

• Feb. 12, 2017
• Erosion — head-cutting
• Facing catastrophic failure of emergency spillway
• Uncontrolled release of millions of gallons of water
• 30 ft.-high wall of water, 1730 ft. long
• Pouring out until top 30 ft. of lake is drained
FOUR ORDERS THAT STARTED IT ALL …

<table>
<thead>
<tr>
<th>Evacuate</th>
<th>EVACUATE THE SOUTHERN PART OF BUTTE COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evacuate</td>
<td>EVACUATE BUTTE COUNTY SHERIFF’S OFFICE (BCSO) DISPATCH CENTER</td>
</tr>
<tr>
<td>Evacuate</td>
<td>EVACUATE THE BUTTE COUNTY JAIL</td>
</tr>
<tr>
<td>Call</td>
<td>CALL EVERYONE FOR HELP</td>
</tr>
</tbody>
</table>

EVACUATION OF THE COMMUNITY

- BASED ON INUNDATION MAP
- BROADCAST ORDER USING:
  - EMERGENCY MASS NOTIFICATION SYSTEM
  - TRADITIONAL MEDIA
    - TELEVISION, RADIO, NEWSPAPER
  - SOCIAL MEDIA
    - FACEBOOK
    - TWITTER
  - LEO’S IN THE FIELD
    - PA SYSTEMS
    - DOOR-TO-DOOR
EVACUATION OF THE COMMUNITY (CONT.)

• IMPACTED APPROXIMATELY 180,000 PEOPLE IN THE REGION
  — BUTTE, YUBA, SUTTER

• FEMA — LARGEST PEACETIME EVACUATION NOT INVOLVING A HURRICANE IN U.S. HISTORY

• CHAOTIC & STRESSFUL
  — NO MAJOR INJURIES OR DEATHS
EVACUATION OF BCSO DISPATCH

- Dispatch ordered to evacuative
- Left center in time to avoid traffic jam
- Re-established operations in 3 separate locations:
  - BCSO sub-station — Chico
  - Chico Police Department
  - Butte College Staging
JAIL EVACUATION

- 578 inmates evacuated to Alameda County — 6 days
- 150 sets of waist chains
- 37 vehicles — 13 school buses
- Two deputies per bus
  — One armed, one not
- Patrol & SWAT escort
- CHP escort through Yuba City
- Bus broke down in Stockton
- No escapes, deaths or injuries
EVACUATION OF COMMUNITY MUTUAL AID RESPONSE

MASSIVE CANYON IN FRONT OF THE EMERGENCY SPILLWAY
HEAD-CUTTING

- Areas where erosion was head-cutting back to the face of the spillway
- Moving at 30 ft. per hour
- 30 ft. away
- “We can never let water go over the spillway again” — DWR geologist

EROSION THREATENING EMERGENCY SPILLWAY
EMERGENCY REPAIRS

$5 MILLION A DAY

THE AFTERMATH...
FLOOD CONTROL OUTLET AT 100,000 CFS

FEBRUARY 14, 2017

• MANDATORY EVACUATION ORDER REDUCED:
  – LAKE LEVEL BELOW EMERGENCY SPILLWAY
  – AREA OF EROSION IN FRONT OF EMERGENCY SPILLWAY FORTIFIED
  – REDUCED TO EVACUATION WARNING
Orchard Hospital — The Evacuation

Steve Stark, MHA, MSOP, ACHE
Chief Executive Officer

Matt Washburn
Disaster Coordinator & Safety Officer

February 12, 2017

• At 1615, order to evacuate was issued by Sheriff Kory Honea
• CEO arrives at 1630 and initiates incident command, and activates emergency team to prepare for evacuation
• At 1900, CEO instructs staff that a partial evacuation will take place
The Evacuation

- A staff member conducts an inventory of staff and private vehicles
- Vehicles are lined up along the hospital’s west entrance
- CEO contacted Enloe EMS for patient transport assistance
- Enloe responded with 10 ambulances and three helicopter transports to evacuate 26 patients
- More ambulances arrived, but were not needed

Partial Evacuation?

- CDPH concerns
- OSHPD concerns with reopening
- Lessons learned — SNF patients
  - Transportation
  - Returning back to normal
  - Billing/reimbursement
Getting Back to Normal

- Repopulation strategy initiated on Feb. 16, 2017
- Lessons learned
  - EVS
  - Maintenance

Reimbursement

- FEMA
- Butte County Public Health
- Enloe Rehab
Enloe Medical Center — Receiving Hospital Challenges

Kevin Brown, MD
Hospitalist

Stacy Vincent, RN, CEN, MICN
Manager, Quality Management

A Disaster of a Different Kind ...
Enloe Medical Center

- 30 miles north of Oroville
- 228-bed facility
- Level II Trauma Center
- Regional Transfer Center

Partnering for Preservation

- Butte County and surrounding areas have experienced a variety of large-scale events
  - Wildfire evacuations
  - Large-scale multi-casualty incidents — Enloe Medical Center is located just east of the I-5 corridor
  - Threat of mass flooding
- We have learned over time to get involved early in county-wide events. We have a “protect the house” philosophy so that our resources are utilized appropriately and not prematurely exhausted
### Enloe Medical Center — Timeline of Events

- Monitoring water levels for week prior to threat of flood
- Hospital Command Center activated just after Sheriff’s order to evacuate was placed
- Orchard Hospital evacuating, Enloe to receive 29 patients (9 inpatient, 20 skilled-nursing facility residents)

### Receiving Evacuated Patient Successes

- All patients expected from the Orchard skilled-nursing facility arrived except one
- Seven patients arrived at main hospital and were admitted as inpatients by hospitalists
- Patient taken to Enloe Rehab met by assigned hospitalist
- Patients taken to main hospital met by assigned hospitalist
- Staff that accompanied patients were credentialed to assist with patient care
Receiving Evacuees: Opportunities

- Evacuated patients did not have medical records with them upon arrival, some did not have armbands
- Patient Access Representatives needed to be present at both receiving areas

Establishing a Medical Shelter

Promise effort, not outcomes ...
Lessons Learned

• Clearly define check-in, treatment and flow of patients
• Create roles and use visible identifiers
• Utilize an all-purpose medical record and patient identifier
• Establish clinic hours
• Utilize allied health professionals
• Design effective formulary

Opportunities for “Next Time”

• For management of high-needs patients, consider high-needs clinic areas …
  – Diabetes area with glucometer and insulin station
  – Respiratory area with Nebulizer station
  – Anticoagulation area
  – Temporary medication refill call-in station
• Disposition of patients from shelter when evacuation is “all clear”
Things We Will Continue Doing

- We established communication and coordination with the Butte County Health Department physician early on
- Strong operational documentation of the event and resource requests allowed reimbursement from Butte County for supplies and staffing

Thank you!

Sheriff Kory Honea  
Butte County

Steve Stark  
Orchard Hospital

Matt Washburn  
Orchard Hospital

Kevin Brown  
Enloe Medical Center  
Kevin.Brown@Enloe.org

Stacy Vincent  
Enloe Medical Center  
Stacy.Vincent@Enloe.org

MWashburn@OrchardHospital.com