BUREAU OF RECLAMATION

El Vado Dam Rehabilitation Case Study: Hazardous Materials Mitigation

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- El Vado Dam is located on the Chama River in north central New Mexico
- Construction completed in 1935 by Middle Rio Grande Conservancy District
- Transferred to BOR in the 1950s
- Faceplate and Spillway are both steel lined and needed hazardous materials to be addressed during rehabilitation

Quick Recap from 1st Webinar: El Vado Dam Geomembrane

Recap

Not the best location for a dam. Geological instability with seepage and erosion issues.

The location is right in the middle of a landslide zone.

A major contributing factor for the rehabilitation work

Recap

One of the few steel faced rockfill dams in the country. The spillway is also steel faced.

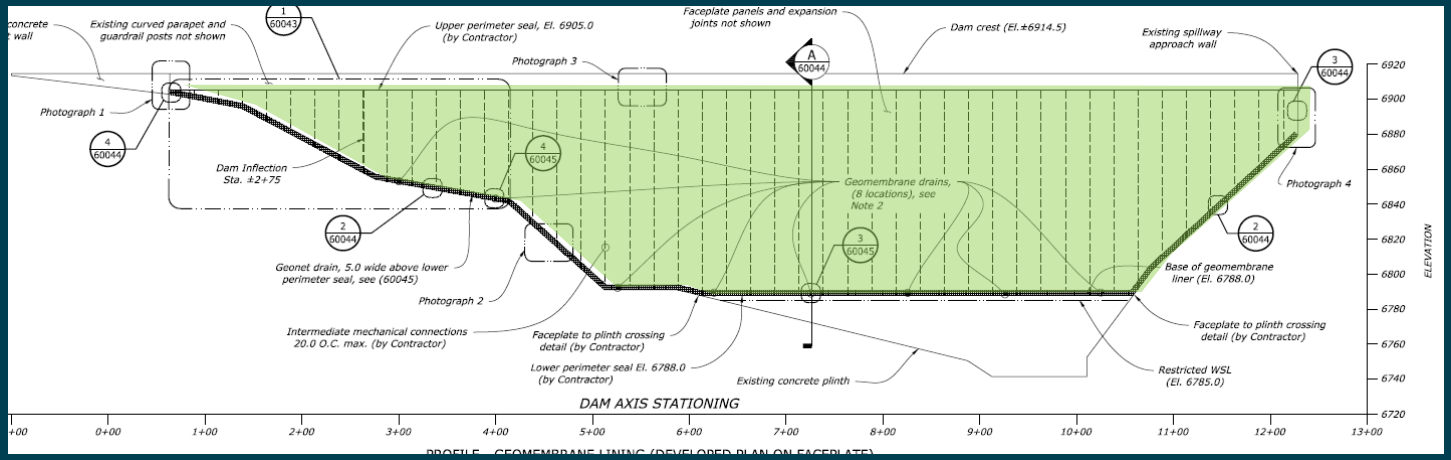
- Substantial settlement along the dam.
- Expansion joints of faceplate are cracked and allow water to seep through.
- Voids underneath the faceplate.
- Deformations and distress are occurring on the faceplate.

Recap

- The steel plating hasn't lost much thickness, via ultrasonic testing.

  Saving the steel!

- To reduce the seepage issues a PVC geomembrane was selected. The top 88% of the Dam will be lined.

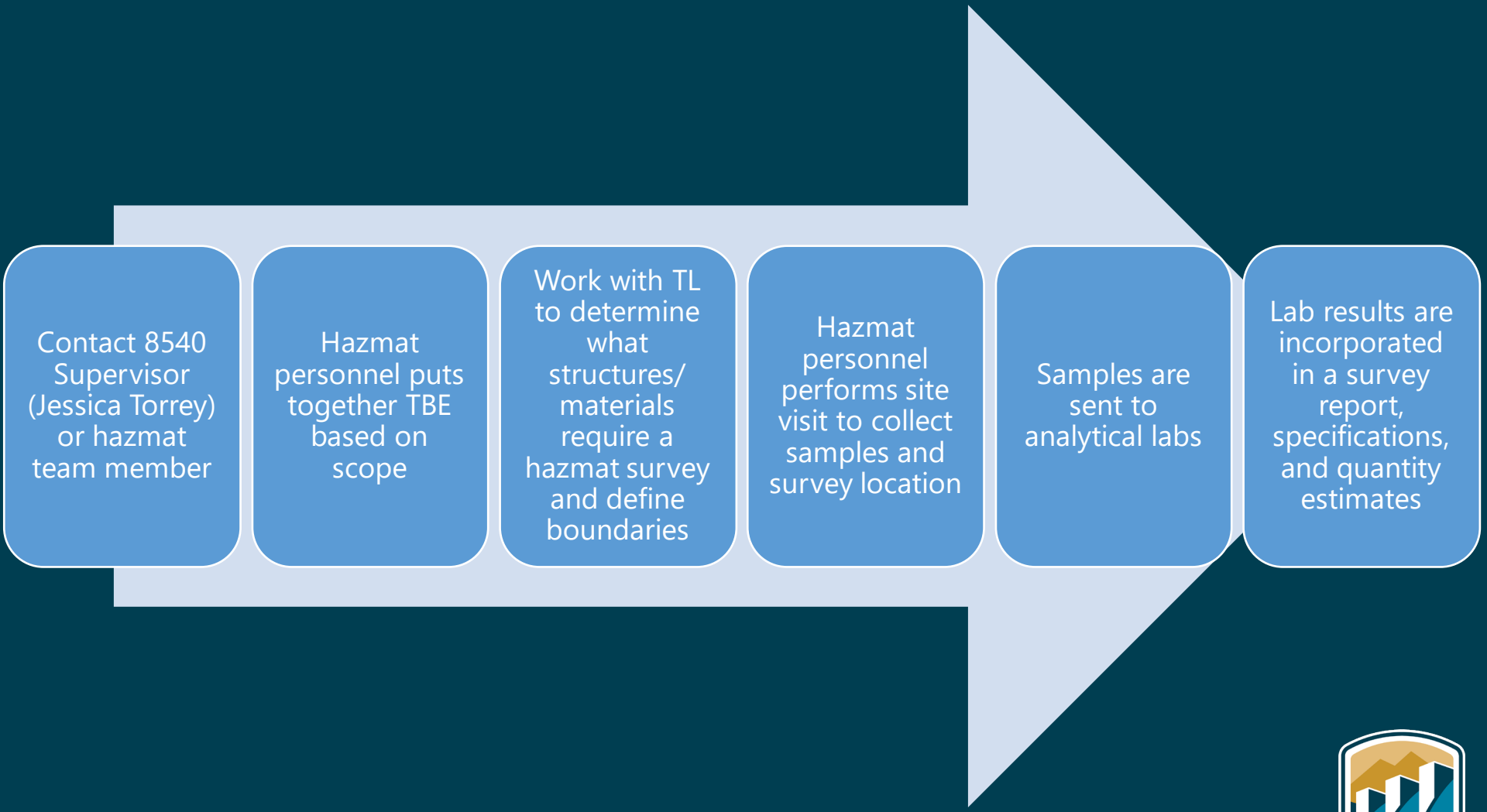


- The geomembrane will tie into the hazardous materials work that will be shared with you in this webinar.

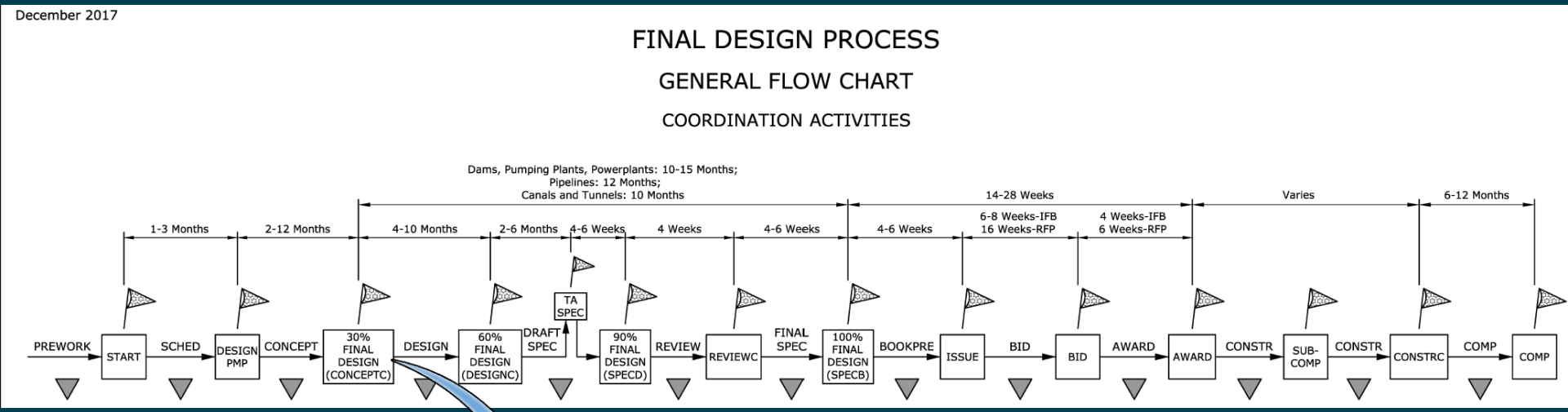
Coatings Replacement (~1950s)

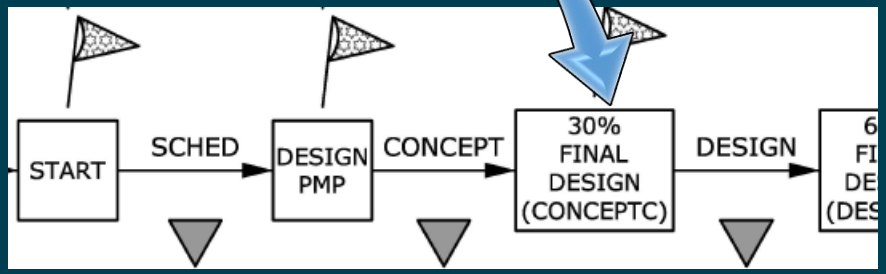
Hazardous Materials Sampling Background

Hazardous Materials Process



Hazmat in the Design Process





- Key milestone for hazmat: 30% Final Design
- Complete hazardous materials survey and report by this milestone
- Allows time to develop contract documents and cost estimates

Earlier in the design process is the best time to bring us in!

Hazardous Materials Survey Methods

- Sampling tools
  - Paint scraper
  - Chisel
  - Razor blade
  - Oscillating tool
  - Needle scaler
  - Paper pocket collector
  - Sample bags
- PPE
  - Respirator
  - Gloves
  - Safety glasses

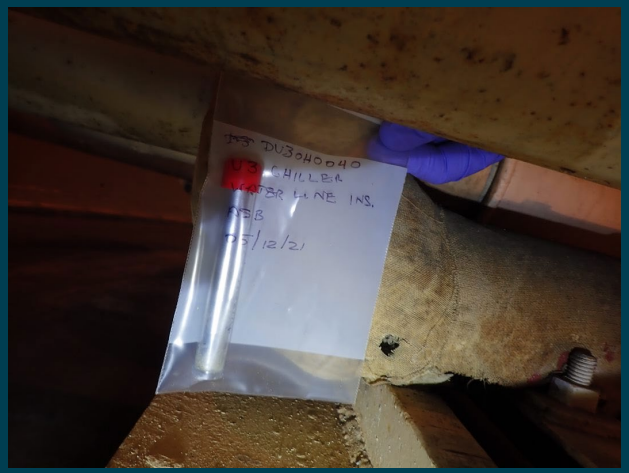
Hazardous Materials Sample Analysis

Asbestos requires ~5 grams of sample

Metals, PCBs, and PAHs require 30 grams of sample

- Can analyze samples for:
  - Asbestos
  - Regulated metals (Resource Conservation and Recovery Act [RCRA] 8 metals)
  - PCBs (polychlorinated biphenyls)
  - Coal tar (polycyclic aromatic hydrocarbons [PAHs])

An example of a coating sample that was analyzed for metals



An example of pipe insulation that was analyzed for asbestos

El Vado Dam Hazardous Materials

Two separate Dam Safety Projects with hazardous material needs:

1. Geomembrane attachments on the faceplate
   - Coatings have to be removed prior to geomembrane attachments
   - Need to assess the coatings that will be removed
   - Need to remove the coatings

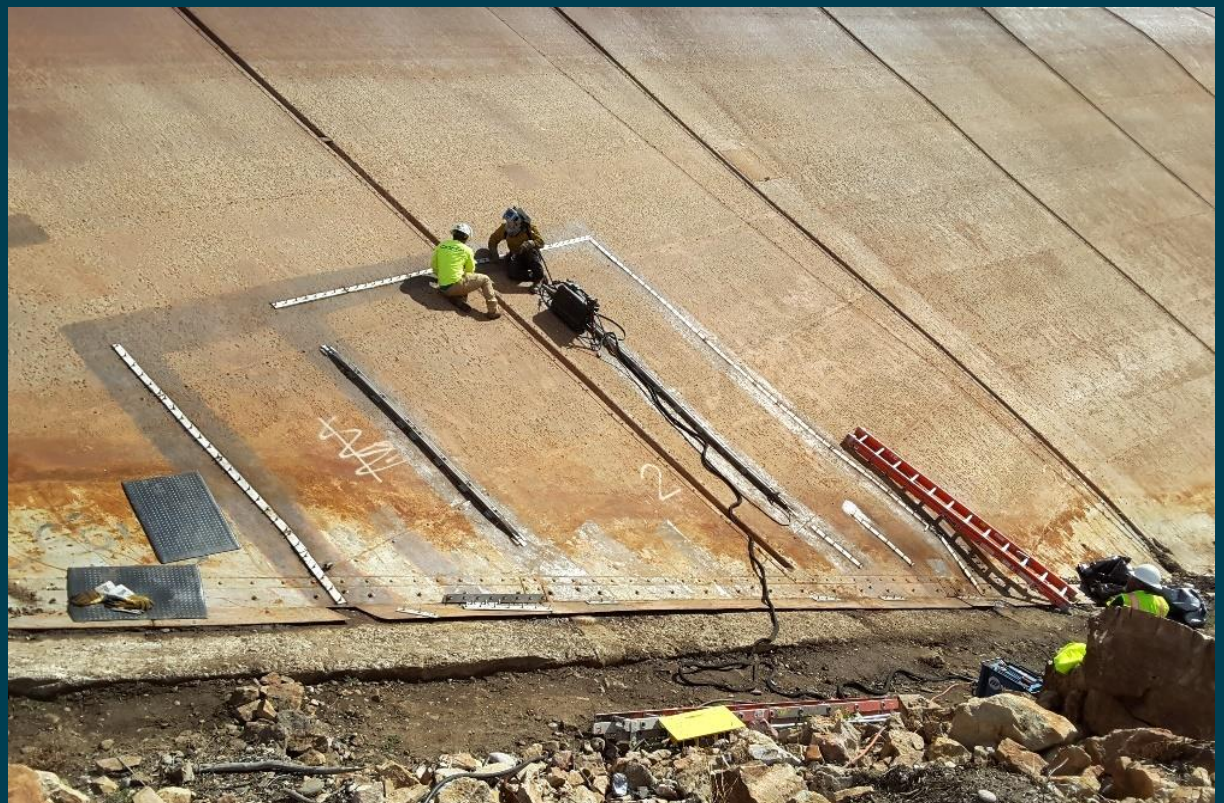
2. Spillway, gate, chute, bridge and actuator removal
   - Need to assess the hazardous materials in the infrastructure to be removed
   - Need to know containment needs, where to cut the old infrastructure, and how to properly dispose of it

El Vado Dam Faceplate

Hazardous Materials Assessment

Hazardous Materials Assessment

- Geomembrane attachment points needed coating removal and surface preparation
- Coating required hazardous materials testing



Hazardous Materials Assessment

Tools used:
- Paint scraper
- Pocket collector
- Sample bag

Where sample was taken

Photo documentation

Hazardous Materials Assessment

ANALYTICAL RESULTS

Project: EV001-003
Pace Project No.: 60292049

Sample: EV001 **Lab ID: 60292049001** Collected: 01/14/19 08:00 Received: 01/16/19 08:15 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050								
Arsenic	ND	mg/kg	4.8	2.1	2	01/17/19 13:36	01/18/19 16:50	7440-38-2	
Barium	28.5	mg/kg	2.4	0.34	2	01/17/19 13:36	01/18/19 16:50	7440-39-3	
Cadmium	0.56J	mg/kg	2.4	0.32	2	01/17/19 13:36	01/18/19 16:50	7440-43-9	
Chromium	11.6	mg/kg	2.4	0.68	2	01/17/19 13:36	01/18/19 16:50	7440-47-3	
Lead	118000	mg/kg	11.9	9.4	10	01/17/19 13:36	01/22/19 17:15	7439-92-1	
Selenium	ND	mg/kg	7.1	2.6	2	01/17/19 13:36	01/18/19 16:50	7782-49-2	
Silver	ND	mg/kg	3.3	0.65	2	01/17/19 13:36	01/18/19 16:50	7440-22-4	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471								
Mercury	ND	mg/kg	0.060	0.023	1	01/17/19 11:45	01/21/19 09:56	7439-97-6	

What do the lab results show?

- Coating has 4 out of 8 regulated metals
- Coating has lots of lead
- IT IS A HAZARDOUS MATERIAL

Disclaimer: All data and findings should not be construed as an endorsement of any product or firm by Reclamation. The products evaluated in the report were evaluated for purposes specific to the Bureau of Reclamation mission.

Methods of Coating Removal

Coating removal handled by coatings contractors; however, some removal methods allow a reduction in hazardous waste. We tested before and after use of the following:

Blue Bear 690PB Lead Paint Remover: product said to react with lead in coating to convert it to a non-hazardous waste

Methods of Coating Removal

Blue Bear 690PB
Lead Paint Remover
Initial application

Methods of Coating Removal

Blue Bear 690PB
Lead Paint Remover
After application

Methods of Coating Removal

Before Blue Bear 690PB

ANALYTICAL RESULTS

Project: EV001-003
Pace Project No.: 60292049

Sample: EV001 Lab ID: 60292049001 Collected: 01/14/19 08:

Results reported on a "wet-weight" basis

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Chromium	11.6	mg/kg	2.4	0.68	2
Lead	118000	mg/kg	11.9	9.4	1
Selenium	ND	mg/kg	7.1	2.6	2
Silver	ND	mg/kg	3.3	0.65	2
7471 Mercury	Analytical Method: EPA 7471 Preparation Method:				
Mercury	ND	mg/kg	0.060	0.023	1

After Blue Bear 690PB

ANALYTICAL RESULTS

Project: EL VADO DAM RCRA8
Pace Project No.: 60343964

Sample: EV002 Lab ID: 60343964002 Collected: 07/16/20 08:0

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	MDL	DF
6010 MET ICP, TCLP	Analytical Method: EPA 6010 Preparation Method: EP				
	Leachate Method/Date: EPA 1311; 07/31/20 12:53 Ini				
	Pace Analytical Services - Kansas City				
Arsenic	ND	mg/L	0.50	0.0049	1
Barium	0.66J	mg/L	2.5	0.0015	1
Cadmium	0.0010J	mg/L	0.050	0.00045	1
Chromium	0.0087J	mg/L	0.10	0.0011	1
Lead	3.7	mg/L	0.50	0.0030	1
Selenium	0.038J	mg/L	0.50	0.0061	1
Silver	0.016J	mg/L	0.10	0.0020	1
7470 Mercury, TCLP	Analytical Method: EPA 7470 Preparation Method: EP				
	Leachate Method/Date: EPA 1311; 07/31/20 12:53 Ini				
	Pace Analytical Services - Kansas City				
Mercury	ND	mg/L	0.0020	0.00026	1

TCLP test

- Findings:
  - Hazardous metal content drastically reduced for top coating layer
  - Makes for safer and easier removal and disposal of coatings
  - Blue Bear did not work on the primer

Methods of Containment

Traditional:

- Poly plastic Containment
- Ventilation
- Negative pressure
- HEPA Filters

Head Cover Recoating
Yellowtail Rewind Project

Flatiron PP Penstocks

Glove Bag Containment

Methods of Containment

Traditional forms of containment not as practical on El Vado Dam Faceplate -

- Outdoors (wind load, weather, etc.)
- Special care not to contaminate the environment
- Need for mobile containment, not fixed in place
- Slope of faceplate adds complication for traditional containment

Possible Containment Solution:

- Contractor proposed
- Vacuum Blasting Workhead (nozzle)
- Not doing large area- so this is an option

El Vado Dam Spillway, Gate, Bridge, and Actuators

Steel lined spillway, chute, radial gate, bridge and actuators set to be torn out and disposed of

- Need to know proper disposal
- What toxic components are present?

Hazardous Materials Assessment

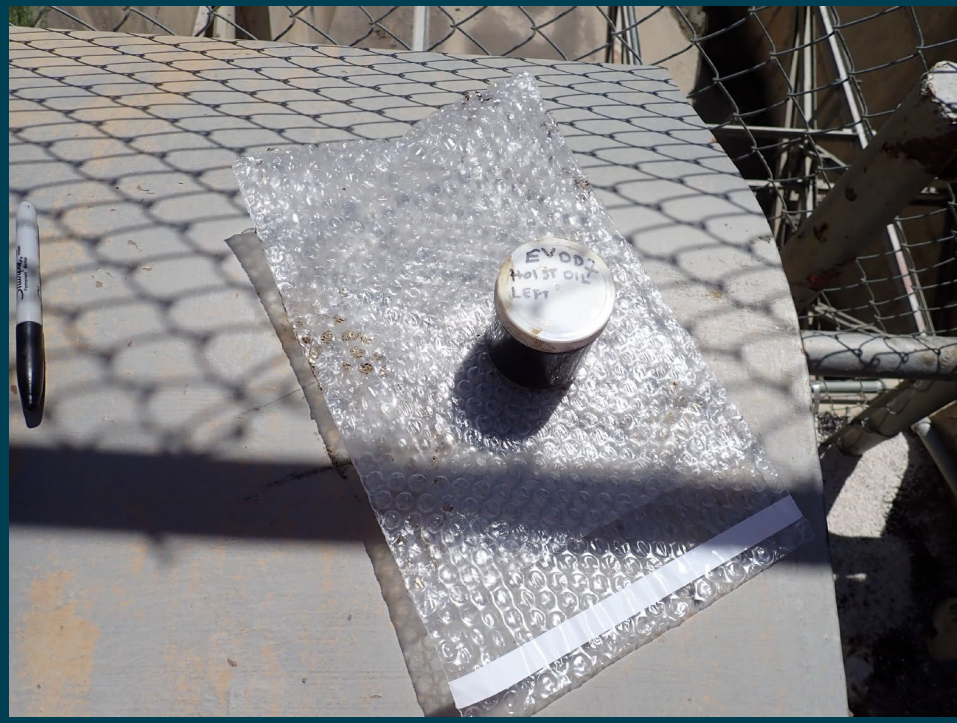
Emergency gate coating sample collection

Hazardous Materials Assessment

Bridge over Emergency Spillway Gate
Under the bridge deck, sample collection

Hazardous Materials Assessment

Emergency spillway radial gate actuator
Hydraulic oil sample collection



Hazardous Materials Assessment Lab Results

Table 1. Summary of Analytical Results.

Sample ID	Location	Media Tested	Metals	Asbestos	PCBs	PAHs
EV001	Radial Gate	Coating	X	ND	X	-
EV002	Railings	Coating	X	ND	X	-
EV003	Bridge (Underside)	Coating	X	ND	ND	X
EV004	Bridge girders (Underside)	Coating	X	ND	ND	X
EV005	Radial Gate Hoist (Interior)	Coating	X	ND	ND	-
EV006	Radial Gate Hoist (Exterior)	Coating	X	ND	X	-
EV007	Radial Gate Actuator Left	Oil	X	-	ND	-
EV008	Radial Gate Actuator Right	Oil	X	-	ND	-

Notes:

- : Not tested

X: detected

ND: tested but not detected

- All samples were positive for metals
- No asbestos was found
- Some PCBs and PAHs were found

Lab results determine level of care needed during removal and disposal

- Environmental regulations
- Worker safety

Proper disposal

- If no asbestos, removed coating may be sent to a hazardous waste or solid waste landfill depending on the results of the EPA Test Method 1311, Toxicity Characteristic Leaching Procedure (TCLP) test
- If metal equipment is being disposed without the coating being removed, it can be recycled as scrap metal, even if the coating contains regulated metals, in the state of New Mexico

Typically, coatings removal is handled by the contractor. Hazardous coatings removal and disposal must follow state and federal environmental regulations. State regulations have precedence over federal regulations.

How to handle El Vado disposal based on the hazmat survey?

- Radial gate
  - Recycle as scrap metal because coating is left in place
- Spillway
  - Remove, and the new one will be concrete
- Bridge
  - Non-metal from old bridge can go to landfill
  - Metal from old bridge will go to scrap metal recycler
- Actuators-hydraulic oil
  - Metal concentration above regulatory limit → oil is a hazardous waste

Current Status and Construction Schedule of El Vado Rehabilitation

- Mobilization ~ March 2022
- Grouting ~ May 2022 – March 2023
- Geomembrane Installation ~ May – Sept 2023
- Demolition intake and crest ~ Oct – Nov 2023
- Demolition spillway chute ~ Oct 2023 – March 2024
- Installation gate CP ~ Jan 2026

Materials & Corrosion Lab Capabilities: Hazardous Materials

- Technical expertise related to hazardous materials:
  - Regulations
  - Disposal requirements

- Services:
  - Hazardous materials surveys
  - Expert recommendations
  - Hazmat design specifications (Divisions 02/51), QEWs
  - Construction support (submittals)
  - Environmental compliance audits
  - Phase I and Phase II environmental site assessments
  - Waste minimization and pollution prevention plans
  - Disposal for the labs

Questions?