RECLAMATION

Managing Water in the West

Caballo Dam Intake

Operational Issue

2016

U.S. Department of the Interior
Bureau of Reclamation

Operational Issues

Intake Structure flow restriction

- **What happened?**
- **Past History of intake sediment**
- **Timing of events**
- **Methods used to increasing/maintain flows from intake during irrigation season**
- **Crane Used to clean intake structure**

What Happened?

- During normal operation flows started to decrease without any changes to gate settings. (Saturday, August 13, 2016)
- Flows were approximately 100 cfs below expected release and was steadily decreasing.
- What was causing this?
  - Debris around intake
  - Sediment
  - Gate Failure
  - Debris in tunnel

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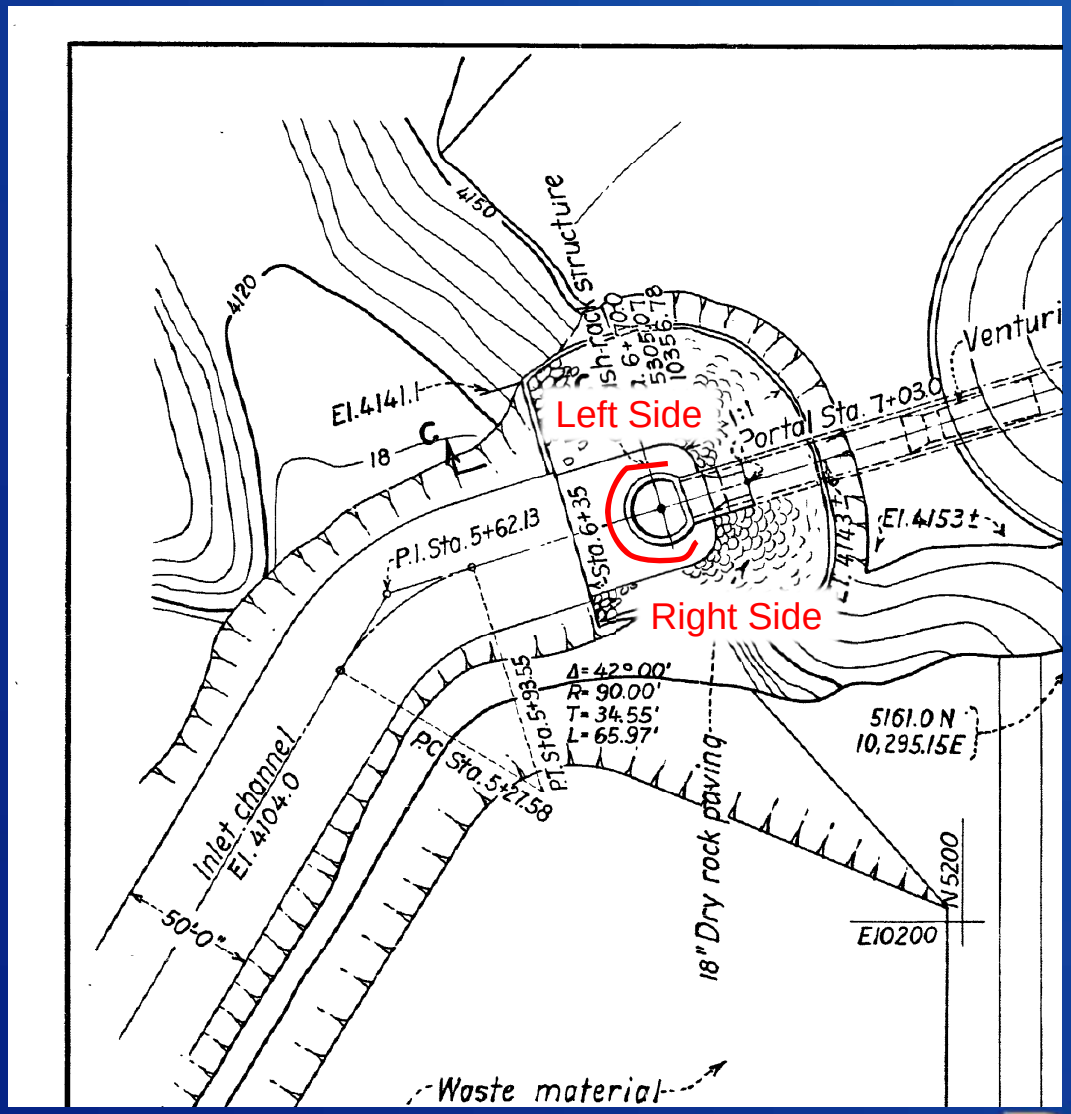
Past History



Intake Structure

- Probing the area around the intake structure was completed in 2005, 2011 and 2014
- This probing gave estimates of what the profile in front of the intake structure was at those times.

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Past History

2005 Probing Results

- @ 90 – 7 ft of silt build up
- @ 180 – 0 ft of silt build up
- @ 270 – 2 ft of silt build up

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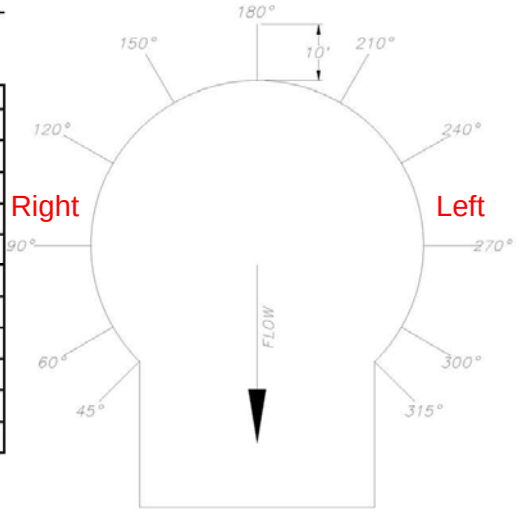
Probing Intake Structure

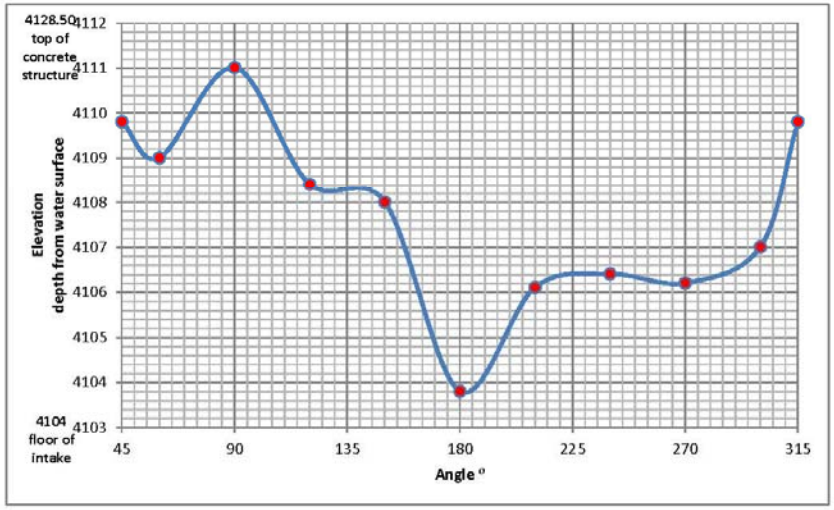
Date: 2005 Readings Taken By: M. McAdams/E. Rodriquez

Lake Elevation: 4131.51

Take readings approximately 10 ft from edge of concrete structure.

Depth Readings		
Angle	Depth (ft)	Elevation Depth
45	21.7	4109.81
60	22.5	4109.01
90	20.5	4111.01
120	23.1	4108.41
150	23.5	4108.01
180	27.7	4103.81
210	25.4	4106.11
240	25.1	4106.41
270	25.3	4106.21
300	24.5	4107.01
315	21.7	4109.81





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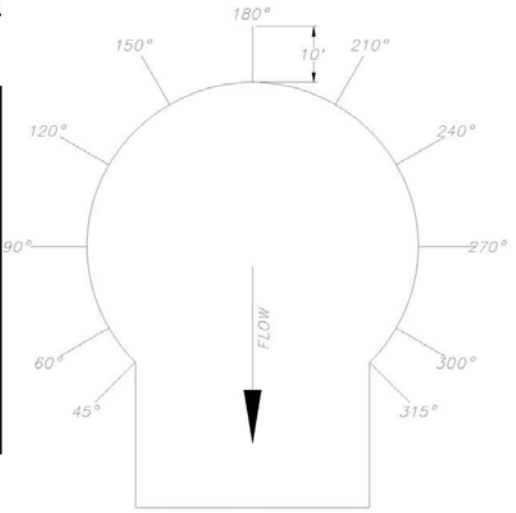
Probing Intake Structure

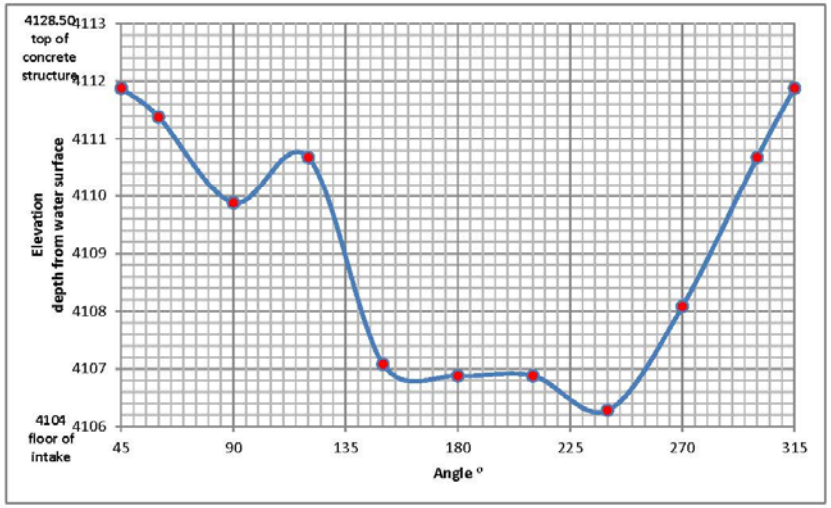
Date: 9/14/2011 Readings Taken By: B. Kalminson

Lake Elevation: 4128.88

Take readings approximately 10 ft from edge of concrete structure.

Depth Readings		
Angle	Depth (ft)	Elevation Depth
45	17	4111.88
60	17.5	4111.38
90	19	4109.88
120	18.2	4110.68
150	21.8	4107.08
180	22	4106.88
210	22	4106.88
240	22.6	4106.28
270	20.8	4108.08
300	18.2	4110.68
315	17	4111.88





Past History

2011 Probing Results

- @ 90 – 6 ft of silt build up
  - Decrease of 1 ft
- @ 180 – 3 ft of silt build up
  - Increase of 3 ft
- @ 270 – 4 ft of silt build up
  - Increase of 2 ft

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Past History

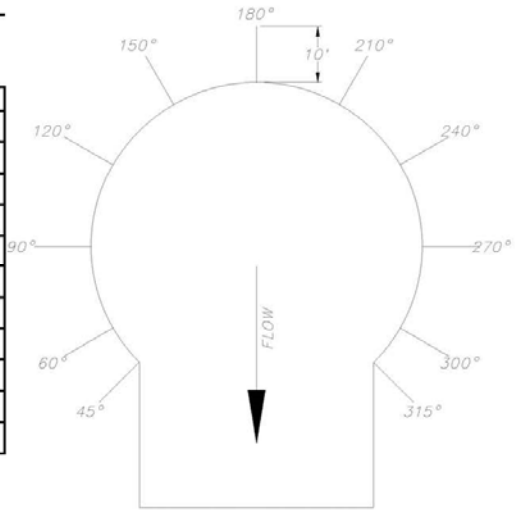
Caballo Dam
Probing Intake Structure

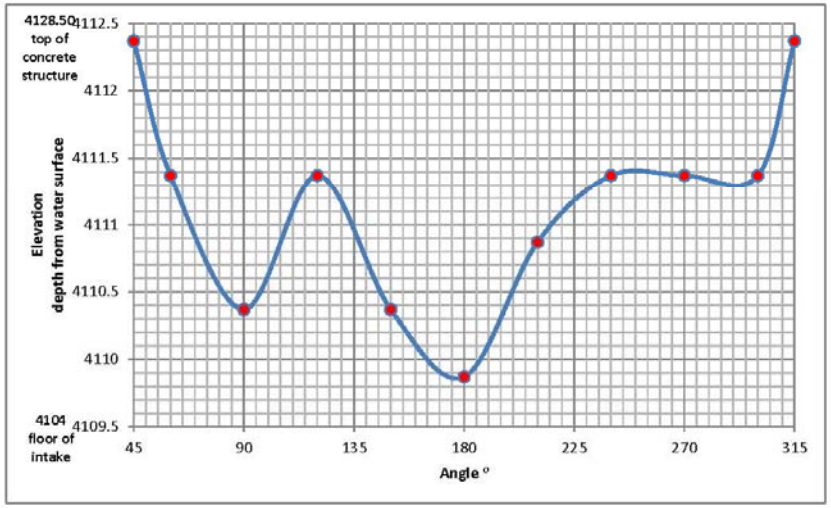
Date: 9/8/2014 Readings Taken By: D. Wright & B. Kalminson

Lake Elevation: 4137.37

Take readings approximately 10 ft from edge of concrete structure.

Depth Readings		
Angle	Depth (ft)	Elevation Depth
45	25	4112.37
60	26	4111.37
90	27	4110.37
120	26	4111.37
150	27	4110.37
180	27.5	4109.87
210	26.5	4110.87
240	26	4111.37
270	26	4111.37
300	26	4111.37
315	25	4112.37





2014 Probing Results

- @ 90 – 6 ft of silt build up
  - No change
- @ 180 – 6 ft of silt build up
  - Increase of 3 ft
- @ 270 – 7.5 ft of silt build up
  - Increase of 3.5 ft

- Steady increase from 2005 to 2014 with a build up of an average of 3 foot every three years.
- With this average increase it can only be assumed that in 2016 the intake had an average of 9 foot of silt build up.

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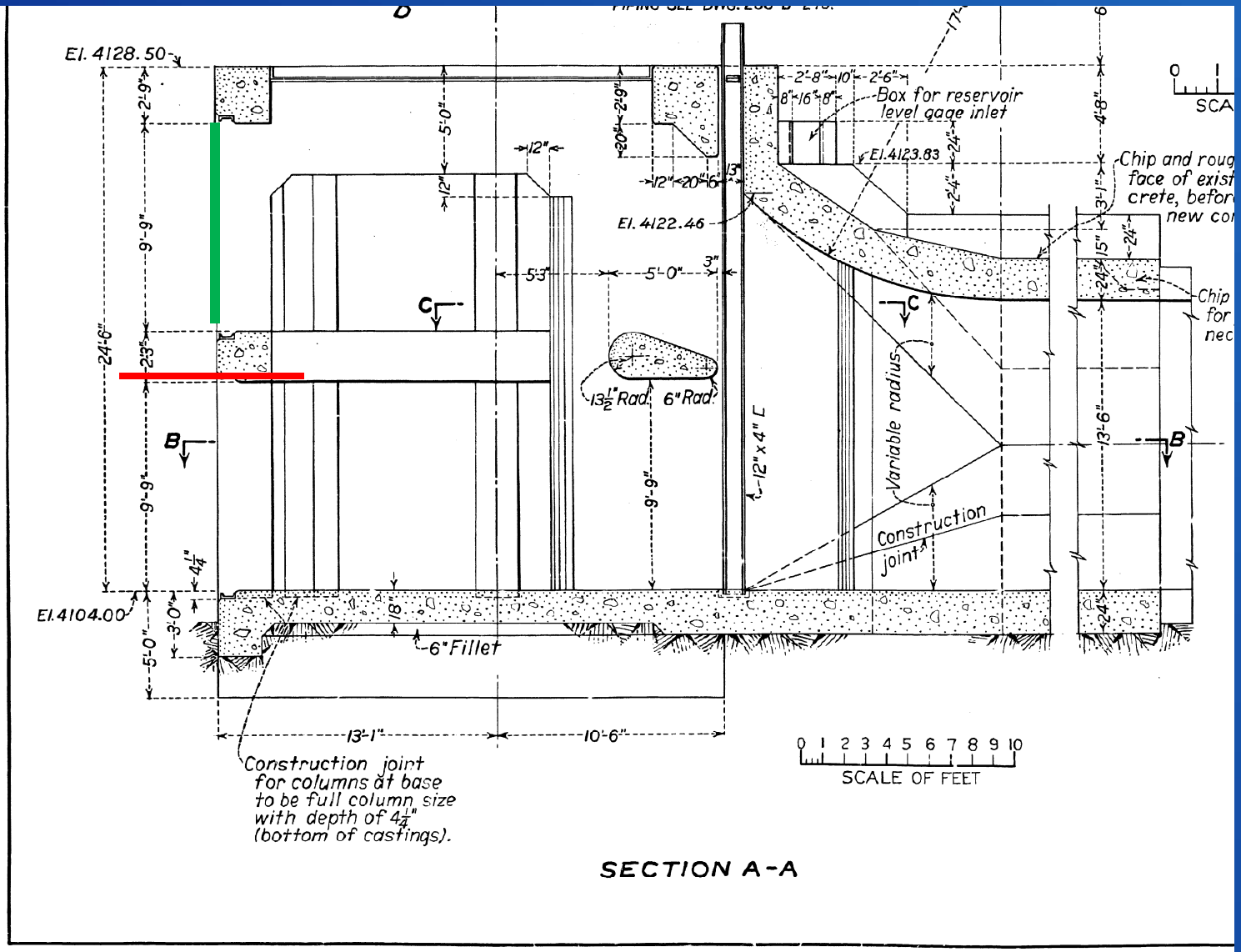
How clogged was intake?



Top
4128.5

Bottom
4104.00

Total Height
24.5 feet

54% open

Approx. 9 feet of silt build up

Not including debris build up which was clogging up the rest of the intake.

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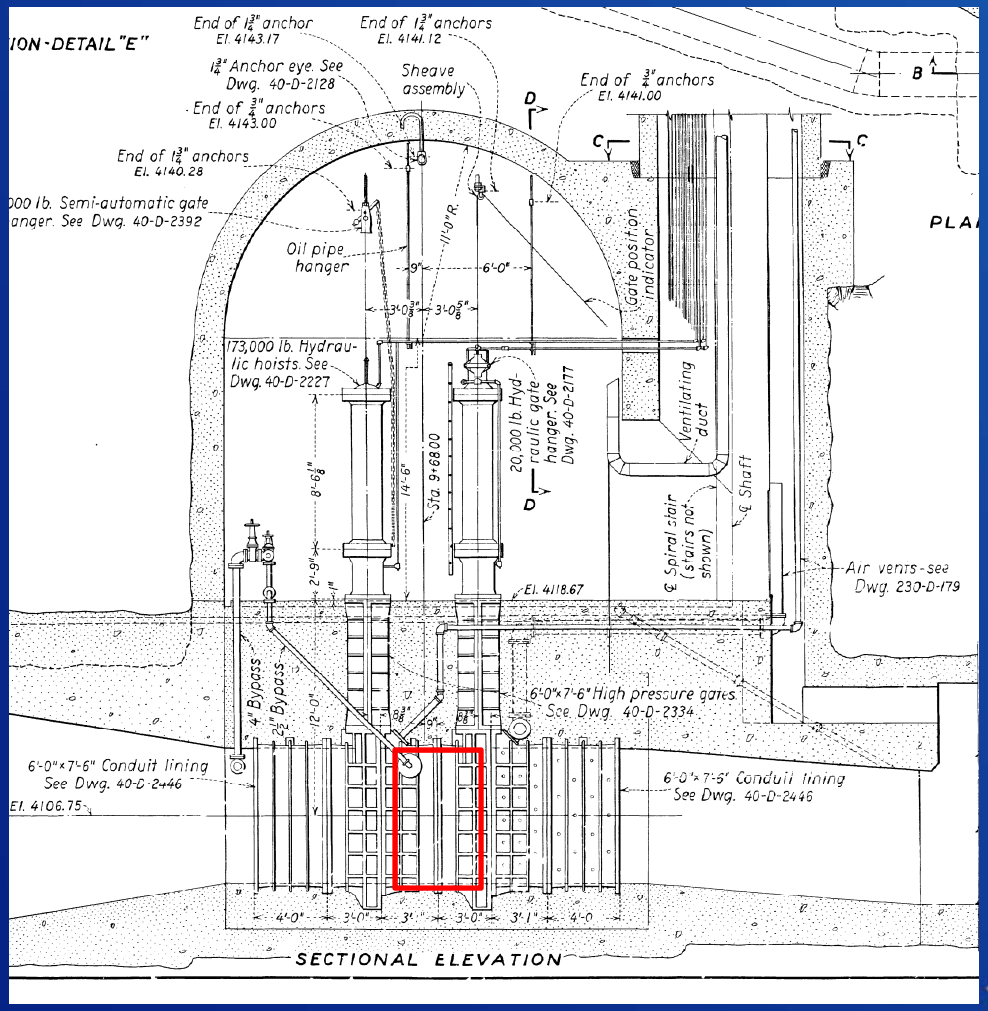
Timing of Events

- August 13 – Flows decreased with out gate changes
- August 15 – Burping of the gates
- August 16 – EBFD maintenance staff started to clear debris away from intake
- From August 16 to August 25 worked daily to keep flows steady
- September 1 PR package to procurement to get crane with clam shell
- September 14 contract awarded to Crane Services Inc.
- September 27 crane began to clean debris and silt from in front of intake structure
- October 1 crane completed cleaning of intake

Methods Used

Methods used to increase/maintain flows from Caballo



- **Burping gates**
  - **This is done by closing both gates and then opening regulating gates then closing gate to trap air between the gates. Then open emergency gates and air has only one place to go, to the intake structure.**

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Methods Used

Methods used to increase/maintain flows from Caballo

- Using boats props
  - Put the front of the boat onto the dry rock paving and using prop to push material away

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Methods Used

Methods used to increase/maintain flows from Caballo

- **Using 6” Water Pump**
  - **Pulling water from the reservoir and pumping into the interior of the intake structure**

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Methods Used

Methods used to increase/maintain flows from Caballo

- Using Compressed Air
  - Using three air compressors, 25 foot steel pipes were attached to the hose and used to push past the debris that had built up on the top of intake structure. Then used to push debris away from face intake structure.

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Crane Work Day 1

- Intake has lots of debris on the trash rack portion of the structure. First Day on site.

- Crane arrived on site September 27
- Started work that afternoon

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Crane Work Day 2

- Progress had been made the first day along with reservoir continuing to drop
- Debris has been knocked off with bucket

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Crane Work Day 2

- Example bucket load

- The reach of the crane

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Crane Work Day 3

Interior of intake structure looking in from RIGHT side.

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Crane Work Day 3

Interior of intake structure looking in from LEFT side.

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Crane Work Day 3

- See more of intake and cutting of fore bay

- See different layers of history in silt

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Crane Work Day 3

- Example bucket load

- Pile of debris and silt

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Crane Work Day 4

- Intake

- Up-close look at intake trash rack

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Crane Work Day 4

Crane working

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Crane Work Day 5

- Intake cleaned as much as possible

- Gates closed but still working to get silt that flowed in out

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Crane Work Day 5

Before

After

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Final Cleaning

After reservoir equalized

Did final cleaning of debris on top of intake structure

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Conclusion

- Was able to maintain flow through Caballo dam
- Worked as a team
- Used creative ideas
- Procurement came through to get crane
- Crane Services Inc. did a excellent job in cleaning around the intake
- Intake clean so now flows will be back to normal

Thank You

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