

# **2015 PIPELINE MAINTENANCE AND REPAIR**

## **EAGLE MINE SITE MINTURN, COLORADO**

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## 2015 PIPELINE MAINTENANCE AND REPAIR

### EAGLE MINE SITE, MINTURN, COLORADO

This report summarizes the maintenance and repair work completed on the Eagle mine pipelines and associated structures in 2015 and the planned maintenance and upgrade tasks for 2016. Two systems carry water to the treatment plant or WTP. The main pipeline conveys mine water down the Eagle River canyon and a separate pipeline collects groundwater from two French drains at the Consolidated Tailings Pile (CTP).

Historically, the main pipeline carried tailings from Empire Zinc Company's 650-ton per day underground mill at Belden to a 20-acre pond near Tigwon Road. This area is now called the Old Tailings Pile or OTP. The tailings line was constructed of an 18-inch diameter reinforced concrete bell-and-spigot pipe (RCP) buried along the river and the railroad at a grade of 2 to 4 percent. The old tailings line crossed the river at what is now termed South Rex in 220 feet of 18-inch diameter suspended spiral steel pipe. Thereafter, 1420 feet of wood stave pipe on the ground conveyed the tailings to the OTP. In total the line was 8,820 feet long. The tailings disposal system and mill were in operation by 1929 (Borcherdt, 1937). In the 1940s, The New Jersey Zinc Company Inc. (NJZ) abandoned the OTP pond and extended the tailings line from South Rex across Rex Flats and the river, to a new tailings pond now called the CTP. With the extension to the CTP the total length of the pipeline was about 15,600 feet.

To maintain grade, the extension to the CTP was supported in large part by above-ground wood trestles. An 18-inch diameter wood stave pipe was used to convey the tailings. For the Superfund remedy, the buried RCP and the wood stave pipe were lined with 10-inch and 12-inch diameter high density polyethylene (HDPE) pipe. Where the line is buried in RCP, the old concrete manholes were demolished and replaced with HDPE saddle-type T inspection ports electro-fused to the main line. These T ports have bolt-on metal lids and rubber gaskets to prevent the entry of air and the leakage of water. Similar T ports were placed along the extension section by cutting holes in the wood stave pipe on 300 foot intervals. An 875-foot-long extension of 6-inch diameter HDPE pipe was buried from Belden upstream to collect water from the Tip Top mine.

The mine water conveyed by the pipeline is only moderately acidic (5.8 – 6.6 s.u.) and contains enough oxygen to cause the precipitation of iron as scale. Jetting of the lines to remove iron scale is accomplished using treated water from the WTP or river water obtained from the water right decree site at Belden. During jetting, the scale cuttings (also called iron chips or product) are loosened with a cutter head and spray (typically 2800 to 3200 psi). The scale, injected water and water in the pipeline are extracted with a vacuum truck at a T port immediately downstream of the work site. When the truck is full, 2500 to 3200 gallons, the water and scale are dumped at the Sludge Cell at the WTP. Included in Appendix A are diagrams of the pipelines with ports, manholes and cleanouts identified.

## 1 TIP TOP MINE AND ADIT 143

The Tip Top mine (Figure 1) is the most upstream seepage collection point on the main pipeline. Two pipes drain the Tip Top mine portal at elevation 8411 feet. One 3-inch diameter HDPE line drains groundwater that seeps from the rock around the Tip Top bulkhead (seep line) into the tunnel. This bulkhead is located 300 feet inboard from the portal. Another 3-inch diameter HDPE line drains the water that collects in the mine behind the mine bulkhead (pressure line). The two lines exit the portal area separately but join at a wye connection about 20 feet outside the portal. The joined flows are conveyed in a 3-inch diameter HDPE line to the Tip Top manhole located along the Crib Wall next to the railroad.

If the Tip Top mine fills with 35 feet of water, the mine pool behind the bulkhead will drain out of a secondary tunnel, Adit 143, at elevation 8446 feet. Originally, a 2-inch diameter drain line extended from Adit 143 to the Tip Top manhole (Figure 2). Over the years, rock slides and avalanches have destroyed the 2-inch diameter line and filled Adit 143 with rock. Overflow is difficult to detect due to the rock talus on the steep slope that has buried Adit 143.

Tip Top flow on the pressure line is controlled by a gate valve inside the portal. With the valve in the fully open position, flows of 10 to 30 gpm can be generated depending on the height of the mine pool. The mine pool level is estimated by reading the shut-in (gate valve closed) pressure using a pressure gauge. A pressure of less than 1 psi indicates that the Tip Top mine is drained down to its base level of near 8411 feet. A pressure of 15 psi indicates that the mine pool is full to the level of Adit 143 and potentially draining from this secondary tunnel. On March 6, 2015 the line pressure was 6.5 psi. Spring inflow pushed the mine pool up and by April 1, 2015 the line pressure was 13 psi. Drainage throughout the summer and fall reduced the line pressure to about 6 psi in the winter of 2015.

### Work Completed

- Pipe flow at the Tip Top manhole in the crib wall (Figure 3) was viewed daily and recorded on inspection forms.
- The gauge pressure on the pressure line in the portal was measured periodically.
- On November 5, the pressure line from the Tip Top manhole uphill to the main valve in the portal was jetted.



Figure 1 Tip Top mine portal

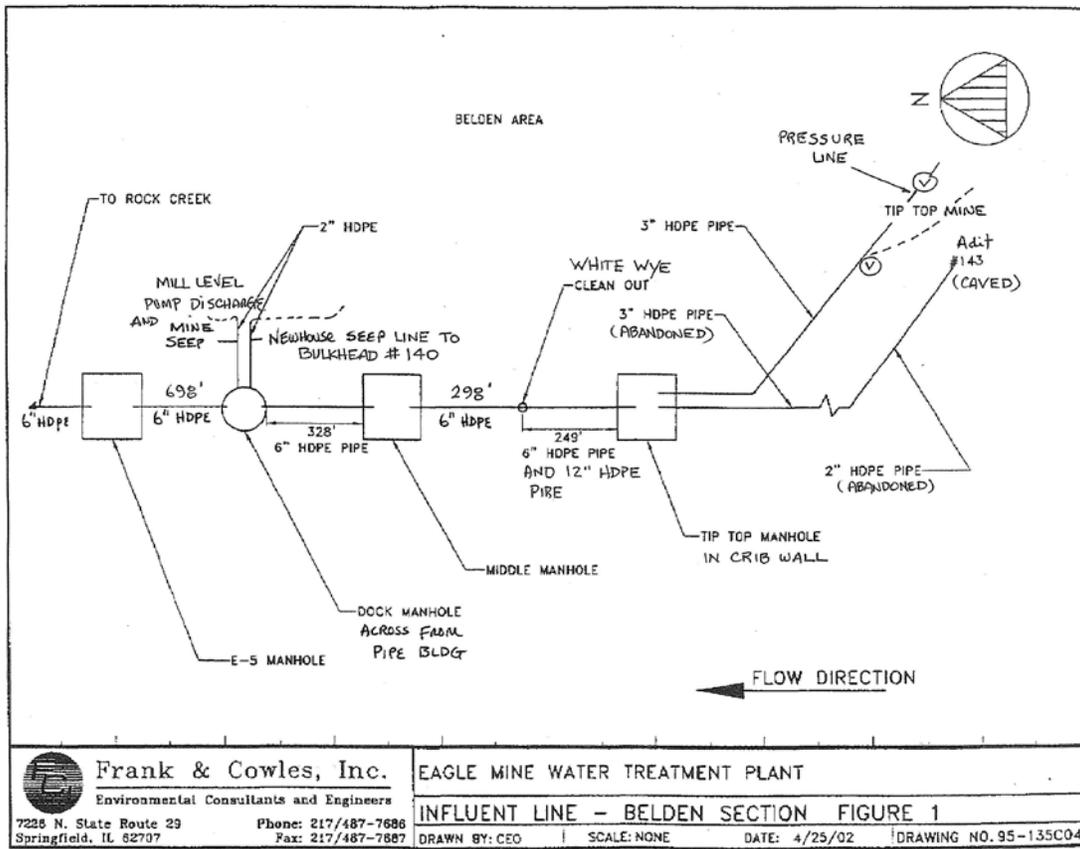


Figure 2 Tip Top and Belden Pipeline Layout



**Figure 3 Tip Top manhole in crib wall and 12-inch diameter HDPE pipe**

### **Work Planned for 2016**

- Inspect the pipe flow at the Tip Top manhole in the crib wall (Figure 3) daily.
- Measure the gauge pressure on the pressure line in the portal periodically.
- Run flow tests and jet pipelines as needed to maintain flow.
- Adjust flow with the gate valve on the pressure line as needed to maintain mine pool pressure at approximately 6 psi.

### **Maintenance Summary**

The pipe flow and gauge pressure are checked regularly. If the pipeline plugs downstream of the junction of the two lines (outside the portal), the excess water in the pressure line can back up in the seep line, filling the Tip Top tunnel. If this happens, the 300-foot-long tunnel may fill and overflow out of the portal door to a seepage collection basin.

The Tip Top mine pool level is checked regularly as it is an indicator of the condition of the pressure line. If the main valve is opened and an uncontrollable rise in the pool is experienced, the stainless steel pipe through the bulkhead or the HDPE pipe downstream of the bulkhead is likely plugged.

## 2 TIP TOP MINE TO BELDEN

Drainage from the Tip Top mine flows 875 feet from the Tip Top manhole in the Crib Wall to the Dock manhole in Belden in buried 6-inch and 12-inch diameter HDPE lines as diagrammed in Figure 2. The portion of the pipeline from Tip Top manhole to the White Wye, buried at the base of the Crib Wall, is shown in Figure 4.



**Figure 4 Crib wall and location of buried 12-inch diameter HDPE pipeline looking downstream of Tip Top manhole**

### Work Completed

- On March 20, 2015 the main line was jetted from the Tip Top manhole in the Crib Wall downstream to the Middle manhole at the Belden loading dock.
- On April 8, 2015 the main line was jetted from the White Wye clean out downstream through Belden to the E-7 manhole downstream of Belden (see Section 3).
- On November 5, 2015 the main line was jetted from the White Wye upstream to the Tip Top manhole.

### Work Planned for 2016

- Run flow tests and jet pipelines as needed to maintain unrestricted flow.

## Maintenance Summary

This segment regularly plugs with soft iron flocculent and requires regular field checks using flow tests to visually determine if there are constrictions or plugs that could cause a backup in the line.

### 3 BELDEN TO ROCK CREEK

Drainage from Belden flows in a 6-inch diameter buried HDPE line to the New Manhole at the base of Rock Creek, then past a T fitting at the Pumpback vault, then joining flow from the MDD vault at the Structure Box as diagrammed in Appendix A. The total length of this 6-inch line is approximately 3500 feet. Seepage (2 gpm) from the Adit 6 bulkhead at elevation 8298 feet is collected at the Adit 6 portal and flows in a 3-inch diameter HDPE line to the Adit 6 manhole on the main line. Water that is collected in Rock Creek collection basins (see Section 4.3) joins the 6-inch diameter main line at the New Manhole.

#### Work Completed

- On March 20, 2015, the 6-inch diameter line was jetted from the New Manhole upstream 200 feet to the Adit 6 manhole, then downstream 200 feet to the Structure Box where the 6 in. line meets the 10 in. line.
- On May 8, 2015, the 6-inch diameter line was jetted from E-7 upstream 600 feet through two ports.

#### Work Planned for 2015

- Run flow tests and jet pipelines as needed to maintain flow.

## Maintenance Summary

The 6-inch diameter line requires regular checks using flow tests to determine if there are constrictions in the line. This buried line does not hold grade, and it is suspected that high and low spots are locations where soft iron flocculants hang up and form restrictions to pipe flow. Flow velocity is observed daily in the E-7 manhole and the New Manhole, weather permitting. The level of the pool in the Adit 6 portal is checked daily; if it rises, the 3-inch line draining the pool at the portal is partially blocked. This condition is remedied by hand using a small-diameter pipe as a plunger or by jetting.

## 4 ROCK CREEK PIPELINES

There are three pipelines in Rock Creek: the mine drawdown or MDD line, the Mine Water Return System or Pumpback, and the seep collection line that conveys flow from Adit 5, Seep 7 and the lower Waste Rock Pile 8 collection basin to the main pipeline at the bottom of the canyon.

### 4.1 MDD

The 6-inch diameter MDD line drains water by gravity from the Eagle Mine pool through the bulkhead in Adit 5 (elev. 8436 feet) to the MDD vault (Figure 5), a steep drop of about 130 feet. The velocity of the water in the MDD line is high, the pH is approximately 6.0, and the oxygen content is near 7 mg/L. Taken together, these parameters indicate that the MDD water is not conducive to the generation of iron scale. No maintenance issues were identified in 2015.



Figure 5 Lowermost portion of 6-inch diameter MDD pipeline

## 4.2 Mine Water Return System (aka Pumpback)

The mine water return system is located at the base of Rock Creek and was designed to provide the capability to pump water collected in Rock Creek and Belden back into the mine pool via a 6-inch diameter HDPE pipe that runs into the mine through Adit No. 8 at elevation 8574 feet. The purpose of the mine water return system is to allow the complete shutoff of flow in the pipeline downstream of Rock Creek so that repairs can be made to the pipeline or WTP.

The mine water return system consists of a 900 gallon concrete vault, a 150 gpm mine water return pump and turbine motor housed in a shed at the base of Rock Creek, a float control system that operates the pump, a shut-off valve below the MDD vault, and a 6-inch diameter HDPE pipe which runs from the 900 gallon concrete vault into Adit No. 8. The Pumpback system is currently not used. A diagram of the Pumpback is included in Appendix A.

## 4.3 Seep Collection Line

Seasonal flow from the lower Waste Rock Pile 8 collection basin in upper Rock Creek is conveyed downhill by gravity in a 3-inch diameter pipeline to the Seep 7 (or S-7) collection basin, a lined basin on the north side of Rock Creek about 300 feet upstream of Adit 5. The collected flow runs through a buried 4-inch diameter PVC pipe and empties into a manhole in front of Adit No. 5. Water from around the Adit 5 bulkhead (Seep 5 or S-5) collects in a concrete basin inside the portal door (Figure 6). The collected flow, usually less than 5 gpm, runs through a buried 3-inch diameter HDPE pipe and empties into the manhole in front of Adit No. 5. The combined flow of S-5 and S-7 is conveyed through a 350-foot long, buried 6-inch diameter HDPE pipe from the Adit 5 manhole through two intermediate manholes that allow access and cleanout. Flow from the lower intermediate manhole (Figure 7) is in a buried 2-inch diameter pipe to the New Manhole at the base of Rock Creek.

### Work Completed

- The S-5 seep line plugs frequently with iron and other debris from the Adit 5 floor. Weekly visits to the sediment basin in the portal of Adit 5 were made to clear debris that may clog the S-5 seep line. Snow depth and avalanche danger limit winter inspections.
- Leaves in the S-7 and lower Waste Rock Pile 8 collection basins frequently clog the drain pipes. Weekly visits to the basins, weather permitting, were made to clear the leaves that prevent flow into these two seep lines.
- Daily inspections of flow from S-5 and S-7 were made at the New Manhole.



**Figure 6 Adit 5 Portal Door**



**Figure 7 2-inch diameter pipe exiting lower intermediate manhole in Rock Creek**

- Water level warning indicators were placed in the New Manhole and in the MDD vault in November 2015. When the float level is exceeded the indicators send an electronic signal to the WTP.

### **Work Planned for 2016**

- Run flow tests and jet pipelines as needed to maintain flow.
- Conduct inspections to observe flow and clear obstructions.
- Discuss a plan to move the seep line such that it discharges through the Adit 7 bulkhead and into the mine pool instead of discharging to the New Manhole
- Remove accumulated debris in the Pumpback vault by vacuum, as needed.

### **Maintenance Summary**

The seep collection lines require frequent inspection and maintenance due to the entry of debris, especially during spring snowmelt. The Adit 5 improvements that were completed in late 2013 resulted in less maintenance of the S-5 line in 2015. Routing the S-5 seep line to Adit 7 is expected to continue this trend.

## **5 ROCK CREEK TO MANHOLE 0 (MH-0)**

At the bottom of Rock Creek, flow from the Belden segment joins MDD flow at the 6-foot diameter Structure Box and moves downstream in a buried pipeline to MH-0 (Figure 8). The line consists of 5,760 feet of 10-inch diameter HDPE with access ports and manholes at roughly 300 foot intervals. The upstream portion, 1783 feet long, ends at the Mud Slide manhole or Coffin Box as shown on the diagram in Appendix A. The lower segment extends 3980 feet from the Coffin Box to MH-0; the HDPE pipe is contained within the original 16 – inch diameter concrete bell-and-spigot tailings pipe.

### **Work Completed**

- A partial blockage between manholes upstream of MH-0 was jetted on December 31, 2014 and on January 6, 2015 at which time unobstructed flow was reestablished.
- On January 28, 2015, the pipeline was jetted from the Coffin Box upstream to manhole #15.
- Flow through the MDD vault was observed to be sluggish on January 26; on January 28, 2015 the pipeline was jetted from the vault downstream to manhole #19 to remove the blockage.

- On April 30, 2015, jetted the intersection of the 6-inch and 10-inch diameter lines in the Structure Box. Additionally, the pipeline between manhole #9 and #12 was jetted to increase velocity.
- On May 7, 2015, the Adit 6 manhole and Coffin Box were repaired. Manhole #14 was replaced with a larger 36-inch diameter manhole and lid.
- On May 28, 2015, new port #21.5 was installed and used as access to jet 1100 feet upstream to the Coffin Box.
- On June 1, 2015, the pipeline was jetted from manhole #24 upstream to new port #21.5.
- On August 18, 2015, the section from manhole #15 upstream to manhole #17 was jetted resulting in an appreciable increase in velocity at #17 but poor results at #15.
- On August 28, 2015, the pipeline was jetted from the Coffin Box upstream to remedy the situation at manhole #15. This effort was successful.

### Work Planned for 2016

- Run flow tests and jet pipeline as needed to maintain flow.
- Add deep snow markers at manholes #14 and #15.



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**Figure 8 MH-0 looking upstream to Gate #2**

## Maintenance Summary

Because it is located upstream of the flooded bypass, this segment is susceptible to air locks that restrict flow. Several vents allow air in and out to break the air locks. Plugging of the downstream bypass or 12-inch diameter trestle line will cause the water to back up in this section, typically to manhole #25. This condition is observable by briefly opening one of several one-inch-diameter gate valves mounted on top of the inspection ports. Air should issue from the valve. If it is water, then a restricted condition exists downstream that requires jetting to establish full flow.

## 6 MH-0 TO 8 - INCH DIAMETER BYPASS LINE

A 100-foot-long segment of deeply buried 10-inch diameter pipeline turns sharply at MH-0 to the west under the railroad, surfacing at a concrete junction box called South Rex. From South Rex Flats the old 18-inch diameter wood stave pipeline is slip-lined with 12-inch diameter HDPE pipe, all of which is suspended on a 2-foot to 10-foot high wooden trestle extending 200 feet from the junction box downstream to the junction of the 8-inch diameter bypass and 12-inch diameter HDPE lines (Figure 9).



**Figure 9 Junction of 8-inch diameter bypass pipeline and 12-inch diameter trestle pipeline, upper Rex Flats**

## Work Completed

- In January 2015, two new ports were installed to provide access to accumulations of scale lodged upstream of the wye junction (Figure 9).
- The above segment was jetted on January 7 and 13, 2015.
- On November 5, 2015, the segment was jetted from the concrete vault upstream past MH- 0 to manhole #28.
- On December 10, 2015, the 12-inch diameter valve (Figure 9) was sealed off with a bolt-on steel blind flange. This flange effectively stopped flow across the trestle at Rex Flats.

## Work Planned for 2016

- Run flow tests and jet pipeline as needed to maintain flow.
- The blind flange will be removed to restore flow to the trestle line in the spring.

## Maintenance Summary

The design of the buried pipe downstream of MH-0 under the railroad is unknown, but the tight corner has been a problem spot historically with accumulating scale and requires annual jetting. Because it is located directly upstream of the flooded 8-inch diameter bypass, this segment is susceptible to air locks that restrict flow. Jetting requires extreme care since scale that evades capture by the vacuum will flow by gravity to the bypass in Rex Flats or out over the wooden trestle.

## 7 WOODEN TRESTLE

The 2,000-foot long wooden trestle across Rex Flats supports an 18-inch diameter wood-stave pipeline that is slip-lined with 12-inch diameter HDPE pipe (Figure 10). The trestle was taken out of service in 2010 when the 8-inch diameter HDPE bypass was constructed as described in Section 6. The wooden trestle line was activated from April 6 – November 13, 2015.

## Work Completed

- A leak from a Dresser coupling above the main underpass in Rex Flats was repaired on April 6, 2015.
- Two Dresser couplings covering older access ports were tightened on November 13, 2015.
- On December 10, 2015, flow over the trestle was eliminated when the 12 – inch diameter valve (Figure 9) was sealed off with a bolt-on steel blind flange.



**Figure 10** Wooden trestle crossing Rex Flats and typical T port on the 12-inch diameter HDPE pipe inside the wood stave pipe.

### Work Planned for 2016

- Replace a cross brace on the west side of the Tigwon bridge.
- Replace or tighten Dresser couplings as needed to prevent leaks.
- If no leaks are found, switch flow from the bypass to the trestle line from March to October 2016. .

### Maintenance Summary

- The trestle presents access difficulties for jetting equipment due to its height above the ground and location in Rex Flats.
- Seasonal and diurnal expansion/contraction of the HDPE pipe places stress on the Dresser couplings that cover access holes in the pipe. Pipe creep and the tendency to “snake” places stress on support components.
- The 12-inch diameter pipe is better than half-full of scale. This condition has not been a limiting factor to flow.
- Operation of the trestle pipeline offers high flow rates and no problems with air locks because it is a gravity flow pipe on a steady grade.
- Leaks in winter turn to icicles that require removal and leak repairs.

## 8 8-INCH DIAMETER BYPASS TO OTP MANHOLE

Approximately 2,000 feet of 8-inch diameter HDPE pipe was installed in 2010 on the ground from the south end of Rex Flats to the steel overpass at the river. On the downstream end of the bypass, a 45-foot-high riser pipe extends from ground level to the trestle level and crosses the river and Tigwon Road on a steel-frame bridge (Figure 11). This segment ends at a concrete manhole on the west side of the river, the OTP manhole. A Rock Box and auxiliary cleanout (Figure 12) near the bottom of the riser collect rock chips and allow access for jetting.

### Work Completed

- The 4-inch diameter gate valve at the Rock Box was replaced in March 2015.
- On September 22, 2015, a 4-inch diameter hole was cut into the bypass to allow jetting to relieve a partial blockage of flow.
- On November 12, 2015, timber blocks were used to raise low spots in the bypass in an effort to increase flow velocity and decrease scaling.
- On November 18, 2015, a second 4-inch diameter hole was cut into the bypass to allow jetting to relieve a partial blockage of flow.



**Figure 11 Pipe and Catwalk on Steel Bridge over Tigwon Road**



**Figure 12 Rock Box (left) and auxiliary cleanout being installed on bypass**

### **Work Planned for 2016**

- Install a third 4-inch diameter hole into the bypass to allow additional jetting in the segment above the Rock Box. Place a third Dresser coupling over the new access port.
- Drain and jet the bypass as needed to maintain flow.
- Replace the 8-inch diameter gate valves at the wye (Figure 9) and riser with fully sealing butterfly valves.
- Construct an insulated shed that contains the Rock Box valve to provide the opportunity to drain the line in winter.

### **Maintenance Summary**

The bypass provides a conveyance alternative to the trestle. When in use, the 8-inch diameter pipeline is full of water and under pressure up to about 20 psi. The flooded bypass presents air lock problems in the vicinity of MH-0; the air is relieved using air relief valves or by opening ports by hand. If not removed entrapped air can restrict pipe flow.

Prior to jetting, the bypass must be drained and extracted water hauled to the WTP. Partial blockages are a problem, especially in the winter when access by heavy equipment is difficult and the 4-inch diameter drain valve at the Rock Box is frozen.

## 9 OTP MANHOLE TO WTP

Once across the river and Tigwon Road, the 12-inch diameter HDPE line extends from the concrete OTP manhole (Figure 13), through the concrete Garage manhole (Figure 14) to a concrete vault near the Upper Surge Pond at the WTP. While some of the line is at ground level, the greater portion is slip-lined in the old wood stave pipe supported by a wooden trestle identical to the trestle across Rex Flats (Section 7). Figure 15 shows the river crossing and Tigwon Road, and the upstream end of the OTP manhole to WTP segment. The total length of this segment is approximately 3200 feet. A pipeline diagram is included in Appendix A.

Two pipes leave the Upper Pond vault: a primary 10-inch diameter line to the Upper Pond and a secondary 12-inch diameter line with valves that can be used to direct flow to either or both the Upper and Lower Ponds. Flow is usually directed to the Upper Pond through the 10-inch diameter pipe to a tailpipe suspended with barrel floats.

### Work Completed

- On June 5, 2015, the trestle-supported section downstream of the Garage Manhole was jetted 300 feet to manhole T-12 with poor results.
- On June 11, 2015, sags near T-5 and T-6 were raised and supported with timbers.
- On June 17, 2015, the section between manhole T-7 and T-11 was jetted. This work restored flow below the Garage Manhole to the WTP.



**Figure 13 OTP manhole, downstream is to the right**



**Figure 14** Garage Manhole looking downstream in the direction of WTP



**Figure 15** Trestle crossing Rex Flats (left) to WTP segment (right). Tigwon Road crosses the photograph from right to left.

### Work Planned for 2016

- Repair small leaks that occur.
- Run flow tests and jet pipeline as needed to maintain flow.
- Vacuum sediment from the Upper Pond vault and the tailpipe in the Upper Pond as needed.
- Install a new double-wye port 200 feet downstream of OTP manhole on an elevated section.
- Repair failed or weakened posts and stringers in the trestle supported sections.

### Maintenance Summary

- About 60% of this segment was jetted in 2012 to loosen and remove scale that had collected over the years. Design grade was reestablished in 2012 by repairing sags. Both of these actions were important to putting this segment back into a condition where it would dependably carry greater than 250 gpm from the mine. An overflow at the Garage Manhole in late May was the only serious maintenance issue in 2015. A restriction in the section between manhole T-7 and T-11 was jetted to restore flow and relieve the overflow.

## 10 CTP PIPELINES

Groundwater collected at the North and East extraction trenches at the CTP is pumped in a buried force main line to the Surge Ponds at the WTP. The 3000 foot long force main is constructed of 3-inch and 4-inch diameter HDPE pipe with five cleanouts identified in the diagrams as CO#1 - #5. The East extraction trench is connected to the force main near CO#3 by a 135-foot-long 3-inch diameter HDPE line. Diagrams of the force main layout are presented in Appendix A.

### Work Planned for 2016

- Monitor in-line pump pressure and flow rates for the East and North pumps.
- Monitor groundwater levels in monitoring well ET-1 at the East extraction trench to assess groundwater capture.
- Continue to observe the river bank near the East extraction trench for any sign of groundwater seepage from the CTP.

### Maintenance Summary

About 80% of the force main was jetted in 2013 to loosen and remove the soft iron scale that had collected over the years. This action increased flow rates and reduced the

pump pressure required to move the extracted groundwater to the Surge Ponds. The 3-inch diameter pipeline from the East extraction trench to the force main (135 feet long) could not be accessed with the jet equipment in 2013. In 2014, the remaining 20% of the force main was jetted near the North Trench. This work and replacement of the older East Trench plumbing and jetting of the short East trench tributary line to the force main resulted in an additional increase in flow rates and reduced pump pressure.

## 11 BIBLIOGRAPHY

Borcherdt 1937. The Underground Mill at Gilman, Colorado. AIME Tech. Bul. 808.

NewFields 2013. 2012 Eagle Mine Pipeline Inspection and Maintenance Report, January, 2013.

NewFields 2014. 2013 Eagle Mine Pipeline Inspection and Maintenance Report, February 14, 2014.

NewFields 2015. 2014 Pipeline Maintenance and Repair. April 15, 2015.

URS 2011. Audit of Collection and Conveyance Systems for Eagle Mine, Minturn, CO. Prepared for EPA and CDPHE, January 2011.

## **APPENDIX A**

# **PIPELINE DRAWINGS AND SCHEMATICS**