---------- Forwarded message ----------
From: **John Hamrick** <John.Hamrick@cotterusa.com>
Date: Mon, Mar 4, 2013 at 9:35 AM
Subject: FW: UIC Permit Application
To: "Kaldenbach - DNR, Tom" <tom.kaldenbach@state.co.us>, "tony.waldron@state.co.us" <tony.waldron@state.co.us>

John Hamrick
Vice President, Mill Operations
719-275-7413 x 202 office
303-332-1504 cell

From: Ken Mushinski
Sent: Friday, March 01, 2013 7:04 PM
To: Craig Boomgaard P.G., PMP (Boomgaard.Craig@epa.gov)
Cc: John Hamrick
Subject: UIC Permit Application

Hello Craig,

Please find attached a letter, and associated Figure 1, providing additional information requested by EPA regarding Cotter's request for Authorization by Rule for a Class V Backfill Well at the Schwartzwalder Mine. In addition to the letter, also attached is a technical description and the associated preliminary drawings of Cotter's proposed system.

Please contact myself or John Hamrick if you have any comments or questions.

Best regards,

ken

Ken Mushinski
President, Cotter Corporation (N.S.L.)
+1 858.232.2816

VIA EMAIL

March 1, 2013

Mr. Craig Boomgard
United States Environmental Protection Agency
Region 8
1595 Wynkoop Street
Mail Code 8P-W-UIC
Denver, Colorado 80202-1129

Re: Request for Authorization by Rule for a Class V Backfill Well at the Schwartzwalder Mine in Golden, Colorado

Dear Mr. Boomgard:

The information that is enclosed with this letter supports the Class V mine backfill well inventory form submitted by Cotter Corporation (N.S.L.) ("Cotter") to the Environmental Protection Agency ("EPA") for the Schwartzwalder Mine. It supplements Cotter's response, dated December 28, 2012, to EPA's request for additional information regarding the form. Please find enclosed a description, maps and preliminary engineering drawings of the proposed system.

Cotter is the owner, operator and responsible party for the installation, operation and eventual reclamation of the proposed system. Cotter will be supported in this activity by Alexco Resource U.S. Corporation. This work will be carried out under Permit Number M-1977-300 ("Permit"), issued by the Division of Reclamation, Mining and Safety ("DRMS"). The DRMS Permit contains or will contain funding requirements, in the form of surety bonds, for installation, operation and reclamation of the system.

There is one drinking water well within one-quarter mile of the proposed injection site. The well is across Ralston Creek from the Steve Portal and is on property owned by Cotter. The well is used for domestic purposes but not as a source of drinking water. Please see Figure 1.

The phone and fax numbers for the mine site are (303)-642-3893 and (303)-642-7379, respectively. Any questions or requests should be directed to:

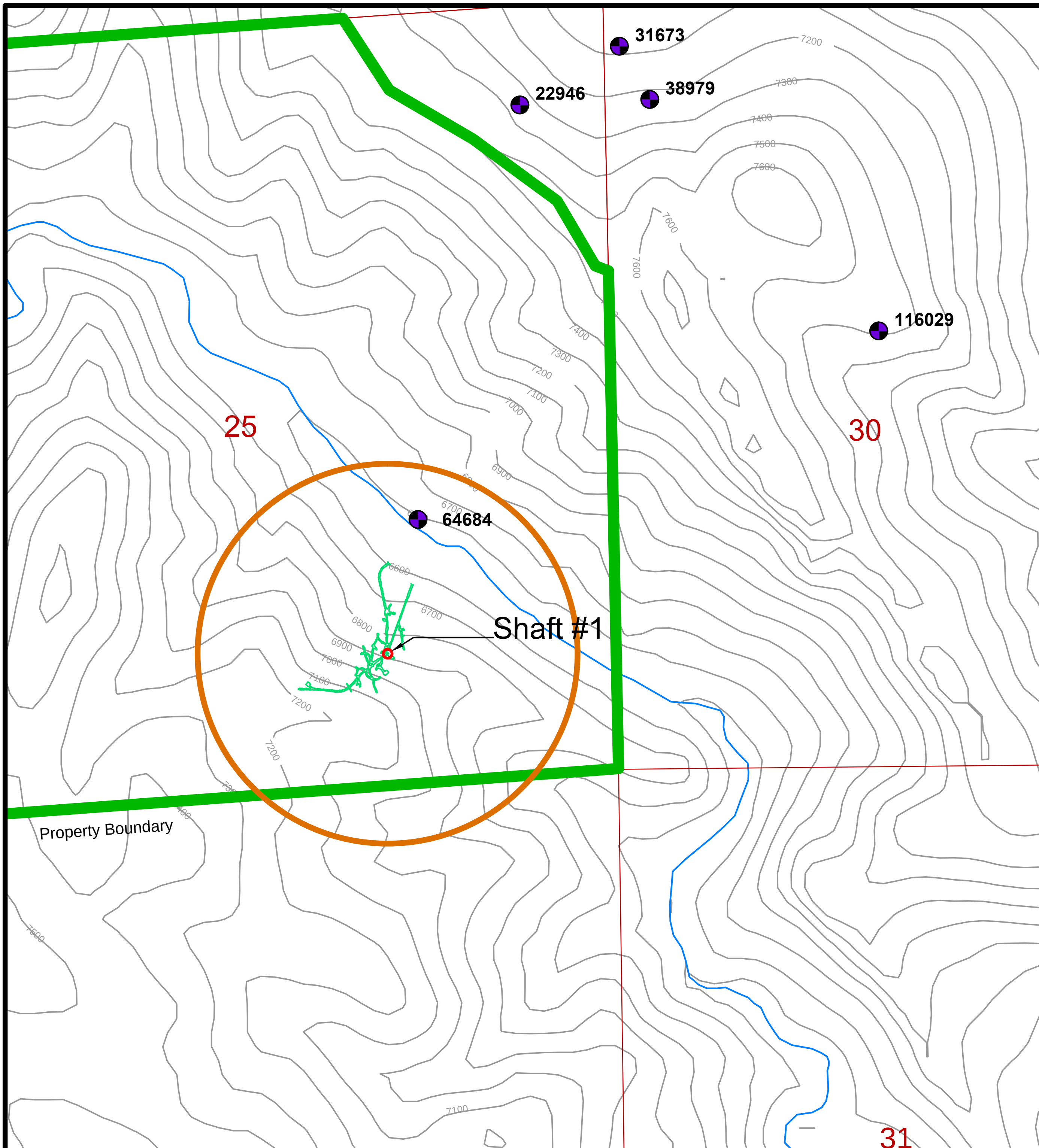
Cotter Corporation
7800 E. Dorado Place, Suite 210, Greenwood Village, CO 80111
Telephone (720) 554-6200
Fax (720) 554-6201

John S. Hamrick
Vice President, Mill Operations
P.O. Box 1750
Cañon City, Colorado 81215-1750
(719)-275-7413 x202 (phone)
(719)-275-1669 (fax)

Sincerely yours,

Ken Mushinski
President

cc: Michael Harris, WQCD
Tom Kaldenbach, DRMS
Tony Waldron, DRMS



Explanation

Mine Workings, Steve Level

Cotter Property Boundary

82416 Well

Mine Shaft Location

Shaft #1, 1/4-Mile Radius

PLSS Section Line

Stream

NORTH

0 1000 2,000

Scale (ft)

Contour Interval = 100 ft

Schwartzwalder Mine
UIC Permit Application

Figure 1
Map Showing DWR-Permitted Domestic, Household, Water Supply, and Municipal Wells Located within 1/4 Mile of Shaft #1

File: 4109C_RegMap_130228.dwg

Date: 2/28/2013

Project No: 4109C

Scale: 1"=1000'

Drawn/Checked By: SW

cotter

Technical Note March 1, 2013

Re: Quantification of solids sedimentation from reverse osmosis retentate entering the Schwartzwalder Mine Pool.

By: Joseph G. Harrington, VP – Technology, Alexco Resource U.S. Corp
Prepared for Cotter Corporation (N.S.L.)

The Schwartzwalder Mine Pool contains metals and sulfate dissolved in water collected within the former workings of the Mine. Several actions are planned to provide treatment of the water quality within the Mine Pool, including dewatering the mine pool through reverse osmosis.

Reverse osmosis ("RO") involves the separation of clean water (the RO "Permeate") for discharge to Ralston Creek, and the retention by the RO membrane systems of solids and dissolved ions including metals and sulfate. Prior to pumping mine water to the RO system all contained sediments and sediment – forming compounds (such as iron and manganese) will be removed through oxidation of the iron and manganese and filtration for solids removal in a multi-media filter.

The mine pool waters are at or near saturation for dissolved gypsum, and upon treatment in the RO system, the RO retentate ("Retentate" or "Brine") will be above the saturation point for gypsum, calcite and silica. The Retentate will be combined with the backwashed solids flushed from the multi-media filter system, and the resulting "Backfill Slurry" will be nucleated with barium chloride in a flash mix tank immediately prior to pumping into the mine pool. The addition of barium chloride will trigger the co-precipitation of gypsum, calcite, radium sulfate, barium sulfate, silica and other minerals.

Additionally, Alexco plans to add a sufficient quantity of dense syrup (molasses or corn syrup), alcohol and other ingredients to stimulate biological growth of sulfate-reducing bacteria, and to thereby cause precipitation of iron and other metal sulfide minerals within the areas contacted by the falling / settling backfill slurry throughout the lower reaches of the Mine Pool. The density and other hydraulic characteristics of the Backfill Slurry conveys the soluble carbon treatment to deep areas of the Mine Pool that would not otherwise be as readily contacted with the biological treatment compounds. Therefore the Backfill Slurry is a beneficial treatment element and achieves treatment goals that are not otherwise readily obtainable.

The Backfill Slurry will be pumped to below the water line and released at depth in the Mine Pool. Because the slurry will contain a high amount of solids (about 0.5 – 1.0% solids), the slurry will be denser than the surrounding mine pool waters, and it will sink through the mine pool waters and come to rest at the bottom of the mine. The buoyancy difference between mine pool waters and the backfill slurry waters will be about 400% greater than the minimum differential necessary to ensure a sinking fluid.

Alexco Resource U.S. Corp
7720 E Belleview Ave, Suite B-104
Greenwood Village, CO 80111
Phone: 720.883.6700 • Fax 303.862.3926
Email: joeharrington@alexcoresource.com

To dewater to 150 feet below the Steve level via RO treatment and subsequent Permeate discharge to Ralsoton Creek requires the removal of about 7 million gallons of Mine Pool water, and the backfill of about 2.9 million gallons of slurry water comprised of RO Retentate, multi-media filter backwash solids and barium salts comprising over 300,000 pounds of dry solids. At a typical sediment composition of 20 - 30% solids, the quantity of settled backfill will be about 1.1 million pounds, or about 600 cubic yards of wet solids. These solids are anticipated to fall to at least the 1100 level of the Mine and to sediment onto horizontal surfaces throughout the Mine Pool.

Please feel free to contact Joe Harrington at (720) 883-6700 if you have any questions.

Sincerely,

Joseph G. Harrington
Vice President – Technology & Strategic Development

7720 E Belleview Ave, Suite B-104
Greenwood Village, CO 80111
Phone: 720.883.6700 • Fax 303.862.3926
Email: joeharrington@alexcoresource.com

REV.	DESCRIPTION	DATE	BY
A	INITIAL RELEASE	2/22/13	EJL

PROJECT LOCATION
Near Golden, Colorado

LOCATION MAP

SCALE: NONE

DRAWING CONFIDENTIAL: This drawing and all information contained thereon is and shall remain the property of Alexco as an instrument of professional service. This information shall not be used in whole or in part without the full knowledge and prior written consent of Alexco.

DESCRIPTION
COVER SHEET

Scope:
Design of a mine pool treatment system that delivers reagents to shaft #1, #2, and open hole, and then provides components allowing for mixing of the mine pool as needed.

Rev. Date
2/22/13

NOT TO SCALE

Schwartzwalder Mine
Water Treatment System

Alexco Resource US Corp
Mine Treatment System Designer: Eric Lancaster, PE - Project Manager
Reviewer: Joe Harrington - VP

SIZE	FSCM NO	DWG NO	REV
B		2010-01	A

SCALE	N/A	SHEET	1

ALEXCO
Alexco Resource US Corp
7720 East Belleview Avenue
Suite B-104
Greenwood Village, CO 80111
Main Office: 303.862.3929
www.alexcoresource.com

REV.	SHEET	DATE	BY
A	2	2/22/13	EJL

LIST OF DRAWINGS

DISCIPLINE	SHEET NO.	TITLE	REVISION NO. & DATE
GENERAL	1	COVER SHEET	
	2	LIST OF DRAWINGS	
	3	VOID VOLUMES	
	4	SCHWARTZWALDER MINE WORKINGS	
			Rev. A (2/22/13)
MECHANICAL	5	PHASE I TREATMENT FLOW SHEET	ALL DRAWINGS
	6	UNDERGROUND TREATMENT FLOW SHEET	
	7	BLENDING MANIFOLD FLOW SHEET	
	8	REVERSE OSMOSIS SYSTEM FLOW SHEET	
	9	PIPING AND INSTRUMENTATION LEGEND	
	10	RO TO MINE FLOW RATE CALCULATIONS	

DESCRIPTION

LIST OF DRAWINGS

REV.	SHEET	DATE	BY
A	3	2/22/13	EJL

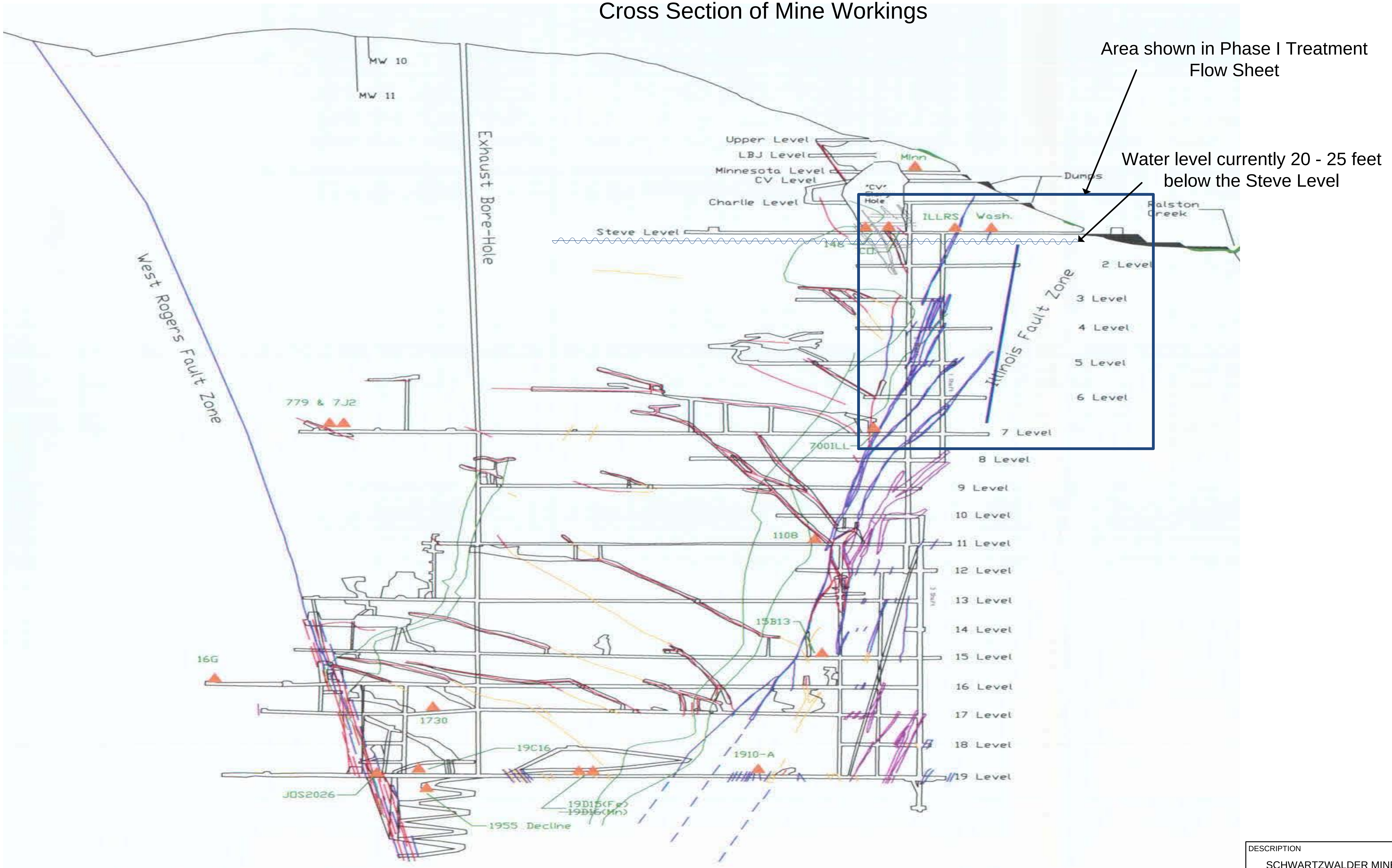
Schwartzwalder Mine:
Void Volumes

Level	Bottom Elevation (ft)	Top Elevation (ft)	Volume (ft^3)	Gallons per foot	Cumulative Volume (ft^3)
Above Steve	6,602	6,949	2,568,698	55,371	21,861,745
200	6,479	6,601	609,236	37,353	19,293,047
300	6,352	6,478	669,047	39,718	18,683,811
400	6,245	6,351	498,698	35,191	18,014,764
500	6,118	6,244	756,206	44,892	17,516,066
600	5,993	6,117	985,274	59,434	16,759,860
700	5,861	5,992	2,360,088	134,759	15,774,586
800	5,764	5,860	256,162	19,959	13,414,498
900	5,660	5,763	2,284,199	165,882	13,158,336
1000	5,556	5,659	1,013,990	73,637	10,874,137
1100	5,453	5,555	784,829	57,554	9,860,147
1200	5,351	5,452	458,321	33,943	9,075,318
1300	5,246	5,350	621,218	44,680	8,616,997
1400	5,140	5,245	125,914	8,970	7,995,779
1500	5,033	5,139	1,273,234	89,847	7,869,865
1600	4,929	5,032	1,174,644	85,304	6,596,631
1700	4,823	4,928	1,061,254	75,602	5,421,987
1800	4,718	4,822	213,873	15,382	4,360,733
1900	4,598	4,717	3,438,490	216,134	4,146,860
2000	4,485	4,597	216,185	14,438	708,370
2100	4,380	4,484	492,185	35,399	492,185

DESCRIPTION
VOID VOLUMES

REV.	SHEET	DATE	BY
A	4	2/22/13	EJL

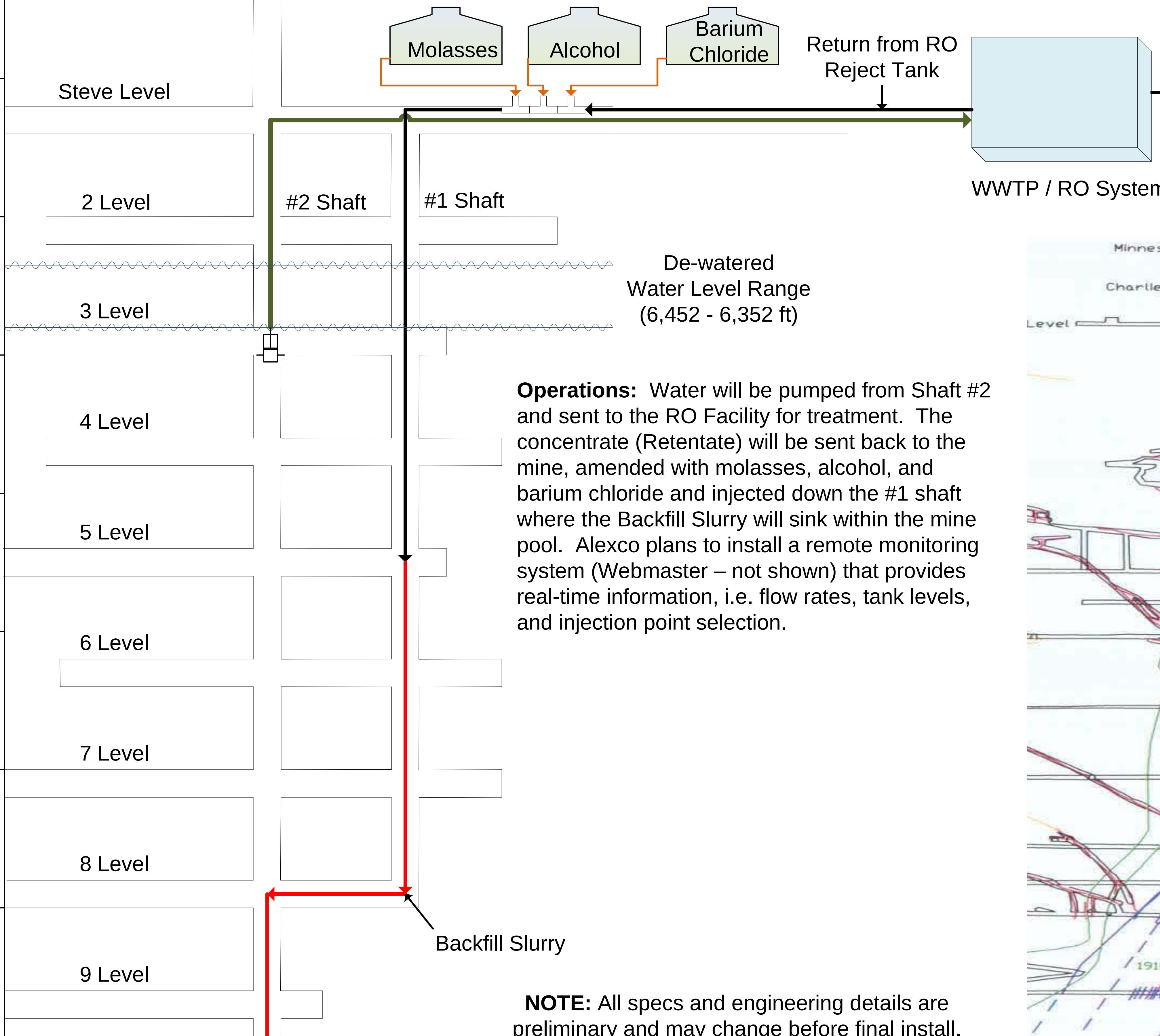
Schwartzwalder Mine:
Cross Section of Mine Workings



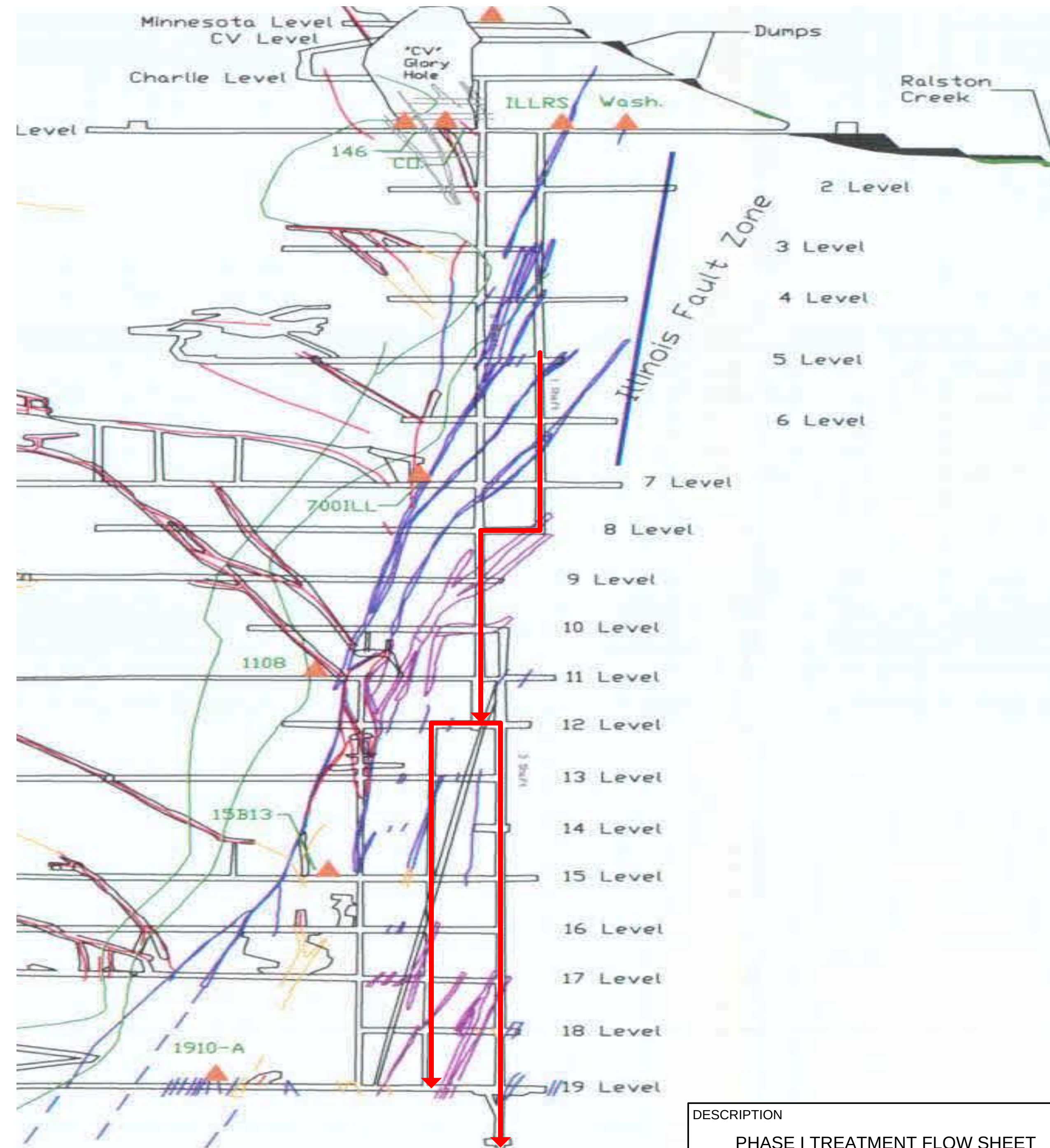
DESCRIPTION
SCHWARTZWALDER MINE WORKINGS

REV.	SHEET	DATE	BY
A	5	2/22/13	EJL

Schwartzwalder Mine:
Phase I – Backfill Slurry Injection



Operations: Water will be pumped from Shaft #2 and sent to the RO Facility for treatment. The concentrate (Retentate) will be sent back to the mine, amended with molasses, alcohol, and barium chloride and injected down the #1 shaft where the Backfill Slurry will sink within the mine pool. Alexco plans to install a remote monitoring system (Webmaster – not shown) that provides real-time information, i.e. flow rates, tank levels, and injection point selection.



NOTE: All specs and engineering details are preliminary and may change before final install.

DESCRIPTION
PHASE I TREATMENT FLOW SHEET

REV.	SHEET	DATE	BY
A	6	2/22/13	EJL

Schwartzwalder Mine:
Phase II – Mine Pool Injection & Mix

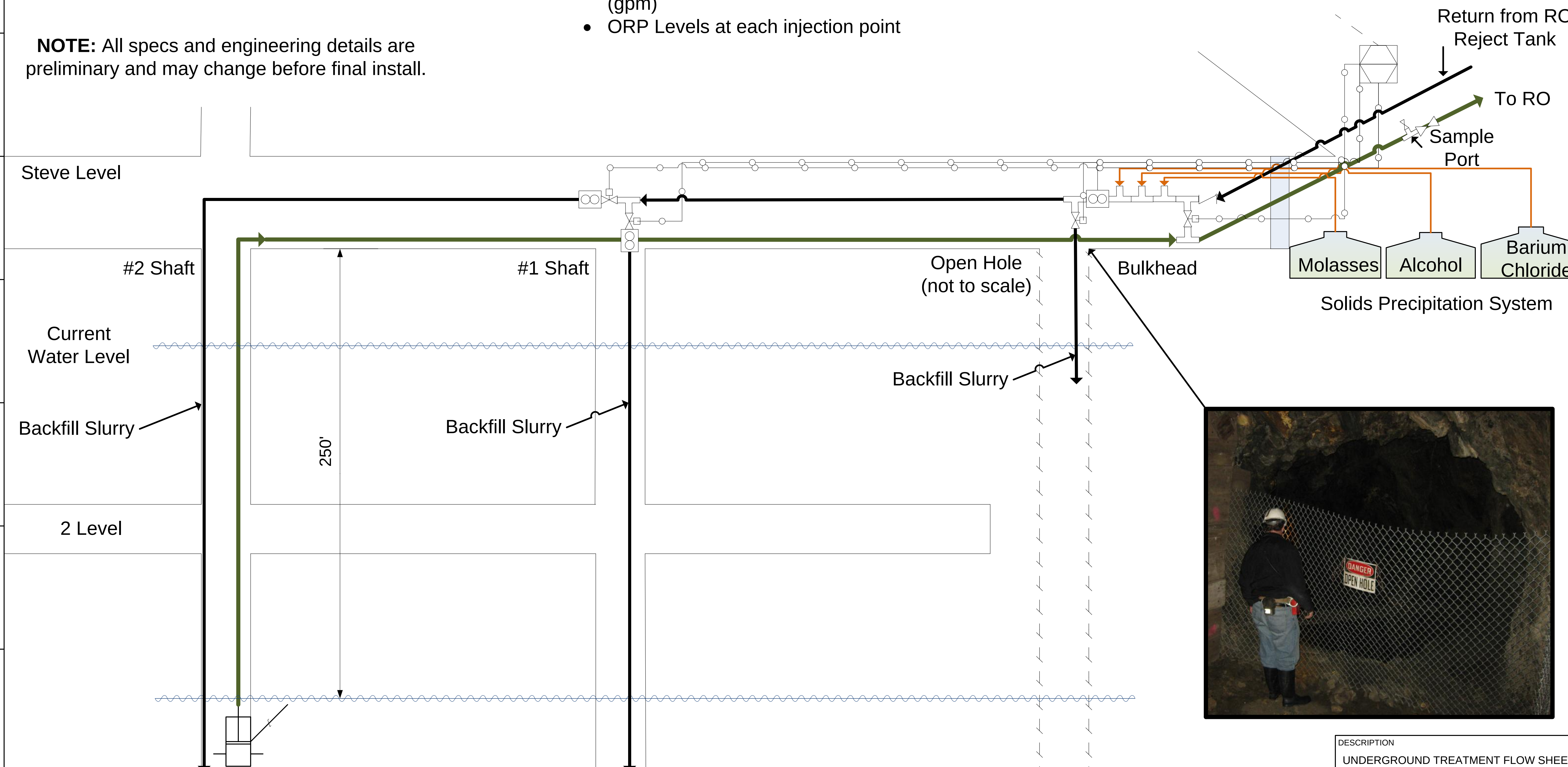
Operations: Water will be pumped from Shaft #2 and sent to the blending manifold near the bulkhead where it will be amended with reagents prior to re-injection. Alexco will install a remote monitoring system (Webmaster) that provides real-time information, i.e. flow rates, tank levels, and injection point selection.

NOTE: All specs and engineering details are preliminary and may change before final install.

System:

Control:
- Recirculation Control Valve (1X)
- Powered Control Valves (3X)

Monitor:
- Recirculation or Brine Rate (gpm)
- Unique Flowrate of reinjection (gpm)
- ORP Levels at each injection point



DESCRIPTION

UNDERGROUND TREATMENT FLOW SHEET

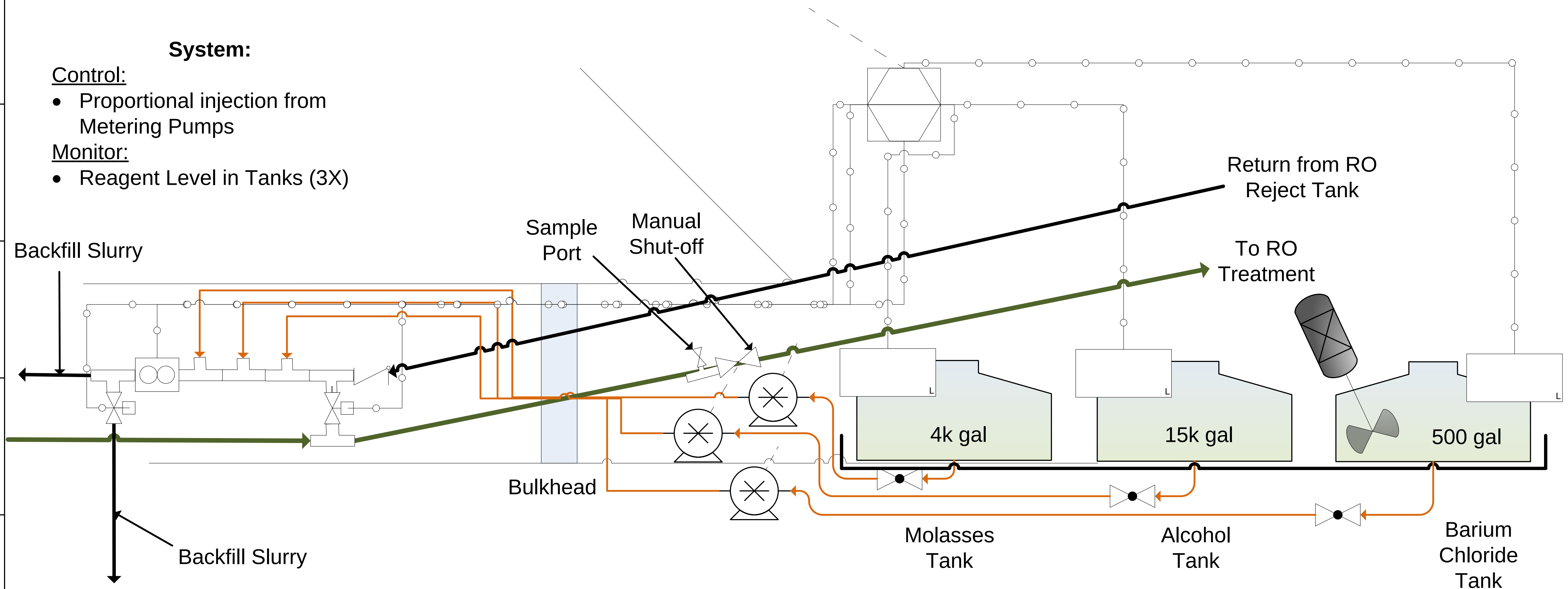
REV.	SHEET	DATE	BY
A	7	2/22/13	EJL

Schwartzwalder Mine:
Phase II Solids Precipitation System

System:

Control:
- Proportional injection from Metering Pumps

Monitor:
- Reagent Level in Tanks (3X)



NOTE: All specs and engineering details are preliminary and may change before final install.

DESCRIPTION
BLENDING MANIFOLD FLOW SHEET

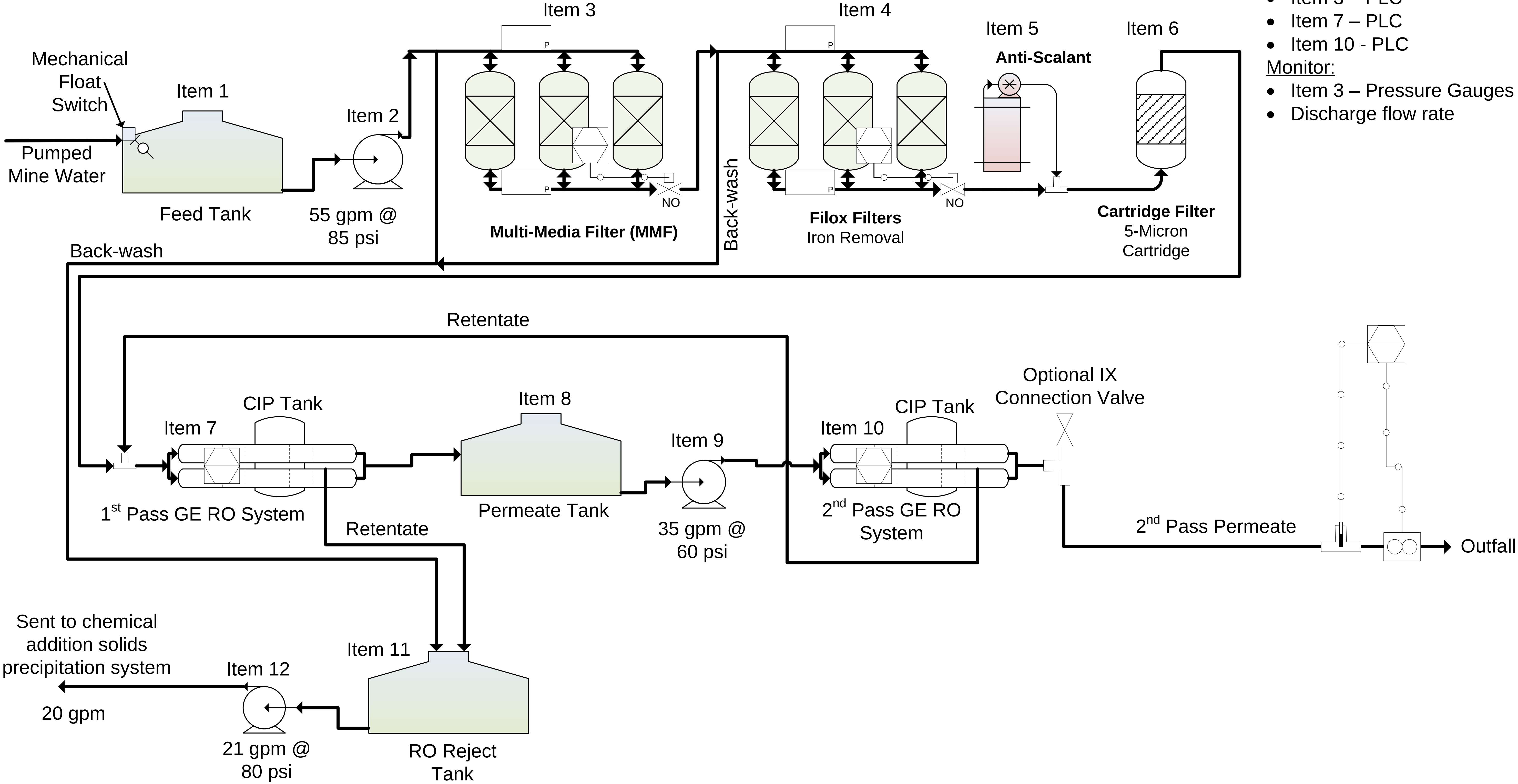
REV.	SHEET	DATE	BY
A	8	2/22/13	EJL

Schwartzwalder Mine:
RO Treatment Flow Sheet

System:

Control:
- Item 3 – PLC
- Item 7 – PLC
- Item 10 - PLC

Monitor:
- Item 3 – Pressure Gauges
- Discharge flow rate



NOTE: All specs and engineering details are preliminary and may change before final install.

DESCRIPTION
REVERSE OSMOSIS SYSTEM FLOW SHEET

REV.	SHEET	DATE	BY
A	9	2/22/13	EJL

PRIME MOVERS FOR MOTOR DRIVEN EQUIPMENT

SUBMERSIBLE PUMP

METERING PUMP

CENTRIFUGAL PUMP

INSTRUMENT LINE SYMBOLS

DATA LINE

120V A/C 1-PHASE

480V A/C 3-PHASE

PIPE LINE DESIGNATIONS

REAGENT HOSE

3" PIPELINE

2" PIPELINE

PATH OF BACKFILL SLURRY

PIPING ACCESSORIES AND DETAILS

IPS TEE

SYMBOLS FOR VALVE ACTION IN THE EVENT OF ACTUATOR POWER FAILURE

NC

SYMBOL LOCATED BY VALVE – USED ONLY WHERE NECESSARY TO INCREASE UNDERSTANDING OF THE SYSTEM.

NO = NORMALLY OPEN

NC = NORMALLY CLOSED

INSTRUMENTATION

L

LEVEL SENSOR/ FLOAT SWITCH

FLOW METER

WEBMASTER OR PLC

P

PRESSURE GAUGE

pH PROBE

VALVE SYMBOLS

GATE

GLOBE

BALL

BUTTERFLY

CHECK

POWERED VALVE

ADDITIONAL COMPONENTS

STORAGE TANK

MECHANICAL AGITATOR

DESCRIPTION

PIPING & INSTRUMENTATION LEGEND

REV.	SHEET	DATE	BY
A	10	2/22/13	EJL

Schwartzwalder Mine:
Calculations for the Backfill Slurry Pressure Drop (psi)

RO Facility to Steve Bulkhead				Steve Bulkhead to Injection Point (Horizontal)				Total		
Max. Flow Rate (gpm)	Pipe Velocity (ft/sec)	Dynamic Head Loss (ft)	Total Head Loss (ft)	Max. Flow Rate (gpm)	Pipe Velocity (ft/sec)	Dynamic Head Loss (ft)	Total Head Loss (ft)	Total Head Loss (ft)	Total Head Loss (psi)	
2.50	0.24	0.25	10.25	2.50	0.24	0.15	0.15	10.40	4.50	
5.00	0.48	0.89	10.89	5.00	0.48	0.55	0.55	11.44	4.95	
7.50	0.72	1.88	11.88	7.50	0.72	1.17	1.17	13.05	5.65	
10.00	0.96	3.20	13.20	10.00	0.96	2.00	2.00	15.19	6.58	
12.50	1.20	4.83	14.83	12.50	1.20	3.02	3.02	17.85	7.73	
15.00	1.43	6.77	16.77	15.00	1.43	4.23	4.23	21.00	9.09	
17.50	1.67	9.01	19.01	17.50	1.67	5.63	5.63	24.64	10.67	
20.00	1.91	11.54	21.54	20.00	1.91	7.21	7.21	28.75	12.45	
22.50	2.15	14.35	24.35	22.50	2.15	8.97	8.97	33.32	14.43	Est. Backfill Slurry Flow Rate - Min
25.00	2.39	17.44	27.44	25.00	2.39	10.90	10.90	38.34	16.60	
27.50	2.63	20.81	30.81	27.50	2.63	13.00	13.00	43.81	18.97	
30.00	2.87	24.44	34.44	30.00	2.87	15.28	15.28	49.72	21.53	
32.50	3.11	28.35	38.35	32.50	3.11	17.72	17.72	56.07	24.28	
35.00	3.35	32.52	42.52	35.00	3.35	20.33	20.33	62.85	27.21	
37.50	3.59	36.95	46.95	37.50	3.59	23.10	23.10	70.05	30.33	Est. Backfill Slurry Flow Rate - Max
40.00	3.83	41.65	51.65	40.00	3.83	26.03	26.03	77.67	33.63	
42.50	4.07	46.59	56.59	42.50	4.07	29.12	29.12	85.72	37.12	
45.00	4.30	51.80	61.80	45.00	4.30	32.37	32.37	94.17	40.78	
47.50	4.54	57.25	67.25	47.50	4.54	35.78	35.78	103.04	44.61	
50.00	4.78	62.96	72.96	50.00	4.78	39.35	39.35	112.31	48.63	

Constants - RO to Bulkhead	
Inside Diameter of Pipe (in)	2.067
Max. Elevation difference Pump to Mine (ft)	10
Distance from RO pump to mine (ft)	1200
Hazen-Williams Roughness Constant (plastic)	130

Constants - Bulkhead to Injection Point	
Inside Diameter of Pipe (in)	2.067
Max. Elevation difference mine to injection (ft)	0.0
Horz Distance from mine to discharge (ft)	750
Hazen-Williams Roughness Constant (plastic)	130

DESCRIPTION
RO TO MINE FLOW RATE CALCULATIONS