GENWAL RESOURCES, INC
CRANDALL CANYON MINES
C/015/032

CHANGE TO
APPENDIX 7-65

THIS SUBMITTAL IS IN RESPONSE TO:

DIVISION ORDER DO10A, PARAGRAPH IV,
ITEM 1
(REVISED STIPULATION NOVEMBER 4, 2010)

SUBMITTED: NOVEMBER 30, 2010

C/015/032 Incoming

#3703

ac

COPY

GENWAL™ RESOURCES, INC.

P.O. Box 910, East Carbon, Utah 84520 794 North "C" Canyon Rd, East Carbon, Utah 84520
Telephone (435) 888-4000 Fax (435) 888-4002

Daron Haddock
Permit Supervisor
Utah Division of Oil, Gas and Mining
P.O. Box 145801
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

November 30, 2010

Re: Crandall Canyon Mines, C/015/032
Response to Division Order10A
Paragraph IV, Item 1

Dear Mr. Haddock:

Enclosed are six (6 ea.) copies of the response to Division Order 10A, paragraph IV, Item 1, according to the Revised Stipulation, dated November 4, 2010. This response consists of an amendment to Appendix 7-65, involving submittal of as-built drawings of the operational water treatment facility, and costs (capital, operational, maintenance) associated with the facility. It is important to note that these costs cannot be construed as representative of future treatment costs, given the emergency nature and "trial-and-error" nature of the development of the facilities to date (as described in detail in this amendment), and given the uncertainty of water treatment requirements in the future. The costs have been addressed in the amendment, as required, and a more detailed breakdown of those costs are attached to this letter.

If you have any questions or comments regarding this submittal please contact me at 435 888-4017.

Sincerely,

David Shaver
Resident Agent

cc: Denise A. Dragoo, Esq.

File in:
☐ Confidential
☐ Shelf
☒ Expandable
In C/0150032 Incoming
Date: 11302010, For additional information

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Form DOGM - C1 (Last Revised November 19, 2010)

COPY

File Folder # 3

APPLICATION FOR PERMIT PROCESSING

Permit Change ☐ | New Permit ☐ | Renewal ☐ | Transfer ☐ | Exploration ☐ | Bond Release ☐

Permit Number: 015/032

Title of Proposal: Response to Division Order DO10A, paragraph IV, item 1

Mine: Crandall Canyon Mines

Permittee: GENWAL Resources, Inc.

Description, include reason for application and timing required to implement:.

Instructions: *If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation specialist.*

☐ Yes	☑ No	1. Change in the size of the Permit Area? ______ acres Disturbed Area? ____ acres ☐ increase ☐ decrease.
☑ Yes	☐ No	2. Is the application submitted as a result of a Division Order?
☐ Yes	☑ No	3. Does application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes	☑ No	4. Does application include operations in hydrologic basins other than as currently approved?
☐ Yes	☑ No	5. Does application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	☑ No	6. Does the application require or include public notice/publication?
☐ Yes	☑ No	7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes	☑ No	8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes	☑ No	9. Is the application submitted as a result of a Violation?
☐ Yes	☑ No	10. Is the application submitted as a result of other laws or regulations or policies? Explain:
☐ Yes	☑ No	11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes	☑ No	12. Does the application require or include underground design or mine sequence and timing?
☐ Yes	☑ No	13. Does the application require or include collection and reporting of any baseline information?
☐ Yes	☑ No	14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes	☑ No	15. Does application require or include soil removal, storage or placement?
☐ Yes	☑ No	16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	☑ No	17. Does the application require or include construction, modification, or removal of surface facilities?
☐ Yes	☑ No	18. Does the application require or include water monitoring, sediment or drainage control measures?
☑ Yes	☐ No	19. Does the application require or include certified designs, maps, or calculations?
☐ Yes	☑ No	20. Does the application require or include subsidence control or monitoring?
☐ Yes	☑ No	21. Have reclamation costs for bonding been provided for?
☐ Yes	☑ No	22. Does application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes	☑ No	23. Does the application affect permits issued by other agencies or permits issued to other entities?

☐ **Attach _3_ complete copies of the application.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein. (R645-301-123)

[signature] agent 11/30/10

Signed - Name - Position - Date

Subscribed and sworn to before me this 30th day of November 2010

[signature: Mary V. Kava]
Notary Public

My Commission Expires: May 16, 2012

Attest: STATE OF Utah
COUNTY OF Carbon

MARY V. KAVA
NOTARY PUBLIC • STATE of UTAH
COMMISSION # 574260
COMM. EXP. 05-16-2012

Received by Oil, Gas & Mining

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ASSIGNED TRACKING NUMBER

Form DOGM - C2 (Last Revised 6/93)

File Folder # 3

COPY

Application for Permit Processing
Detailed Schedule of Changes to the MRP

Title of Application: Response to Division Order DO10A, paragraph IV, item 1	Permit Number: 015/032 Mine: CRANDALL CANYON MINES Permittee: GENWAL RESOURCES

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit application. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the existing mining and reclamation plan. Include page, section and drawing numbers as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☐ REPLACE	☐ REMOVE	Chapter 7, Appendix 7-65
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☑ REPLACE	☐ REMOVE	Replace narrative text
☐ ADD	☐ REPLACE	☐ REMOVE	Pages 1 thru 15
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	Add "As-Built" Iron Treatment Facility
☐ ADD	☐ REPLACE	☐ REMOVE	add drawing behind at end of
☐ ADD	☐ REPLACE	☐ REMOVE	Attachment 8
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

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Crandall Canyon Mine
2009-Present Costs for Construction and Operation

Year:	1/2 of Horizon Lab Cost	Total Cost:
2009	9,677.98	$128,863.50
2010	10,699.04	$430,665.37
	20,377.02	559,528.87
Total		$579,905.89

Crandall Canyon Mine - Iron Treatment Facility
2009 Costs for Construction and Operation

Requisition #		Nalco	Scamp	Bookcliff	WaterSolve	Badlands	CC Hydraulics	Chute Supply	Misc.
DS	240								
DS	248								
DS	263								
DS	264								
DS	268								
DS	285								
DS	286								
DS	307								
DS	317								
DS	322								
DS	334								
DS	339								
DS	343								
DS	355								
DS	359							2,500.00	
DS	360								18,000.00
DS	362								
DS	363								
DS	365								
DS	373								
DS	387								
DS	410								
DS	413								
DS	415								
DS	420								
DS	422								
DS	424							1,800.00	
DS	429								1,650.00
DS	430					250.00			
DS	431								
DS	432								
DS	433								300.00
DS	439								
		0.00	104,363.50	0.00	0.00	250.00	0.00	4,300.00	19,950.00
Total									128,863.50

Crandall Canyon Mine - Iron Treatment Facility
2010 Costs for Construction and Operation

Requisition #	Nalco	Scamp	Bookcliff	WaterSolve	Badlands	CC Hydraulics	Chute Supply	Misc.
DM-008	10,000.00							
DM-010	6,000.00							
DM-016								
DM-017								
DM-023								
DM-025								101.88
DM-026	22,018.32							
DM-027								
DM-028								
DM-029								
DM-039								
DM-046	22,018.32							
DM-047								
DM-048								
DM-051								
DS-509	15,800.00							
DM-052								
DM-053	3,500.00							
DM-054			5,200.00					
DM-055			1,300.00					
DM-057			1,300.00					
DM-060			500.00					
DM-062				12,000.00				
DM-063								
DM-064			1,810.00					
DM-065								
DM-066					2,300.00			
DM-067	23,000.00							
DM-068	3,500.00							
DM-072						100.00		
DM-075			1,810.00					
SD-876			1,200.00					
DM-076								
SD-875			3,600.00					
DM-078	275.00							
440								
444								
446								

Crandall Canyon Mine - Iron Treatment Facility
2010 Costs for Construction and Operation

Requisition #	Nalco	Scamp	Bookcliff	WaterSolve	Badlands	CC Hydraulics	Chute Supply	Misc.
447								
448								
449	2,800.00							
450	1,000.00							
451								
452								4,890.00
453								
454								300.00
455								1,600.00
456								5,000.00
457								
458								1,750.00
459	1,000.00							
462								260.00
463	6,700.00							
464								6,700.00
465	20,000.00							
468						252.00		
469								550.00
470								
472						225.00		
473						20.00		
474								820.00
475								706.70
479								
480						713.04		
481						87.40		
484						2,596.00		
486						2,485.00		
487								150.00
488						4,581.07		
489								279.52
492						3,228.68		
493								
496								
497						254.28		
499	1,232.80							
500								

Crandall Canyon Mine - Iron Treatment Facility 2010 Costs for Construction and Operation								
Requisition #	**Nalco**	**Scamp**	**Bookcliff**	**WaterSolve**	**Badlands**	**CC Hydraulics**	**Chute Supply**	**Misc.**
510								590.00
511					5,054.00			
515								6,400.00
525								4,120.00
535						724.00		
	138,844.44	206,262.36	16,720.00	12,000.00	7,354.00	15,266.47	0.00	34,218.10
Total								**430,665.37**

Crandall Canyon Mine - Iron Treatment Facility Horizon Lab Costs		
Date:	**Amount**	**Description**
02/04/09	150.00	Water Analysis
03/11/09	1,846.60	Water Analysis
03/26/09	4,478.70	Water Analysis
06/11/09	249.75	Water Analysis
07/15/09	328.50	Water Analysis
09/02/09	1,862.65	Water Analysis
09/10/09	4,185.65	Water Analysis
09/23/09	328.50	Water Analysis
10/14/09	1,160.60	Water Analysis
10/28/09	164.25	Water Analysis
11/11/09	4,600.75	Water Analysis
	19,355.95	
1/2# 2009	**9,677.98**	
03/24/10	5,231.85	Water Analysis
05/13/10	177.00	Water Analysis
05/27/10	4,715.80	Water Analysis
06/09/10	355.80	Water Analysis
07/08/10	1,239.65	Water Analysis
	21,398.08	
1/2# 2010	**10,699.04**	

Crandall Canyon Mine - Iron Treatment Facility
Scamp Costs for Construction and Operation

Date:	Amount	Invoice	Description
04/15/09	5,000.00	2246	Locate Discharge Pipe
04/30/09	10,000.00	2267	Drainage/Culvert
04/30/09	5,000.00	2268	Iron Treatment Facility
04/30/09	5,100.00	2269	Flow Meter
05/12/09	5,000.00	2282	Pump System for Decanting Sed Pond
05/28/09	4,500.00	2295	French Drain
05/28/09	5,797.50	2296	Portal Drain
06/24/09	4,800.00	2317	Anchor Pipe
08/06/09	4,630.00	2333	French Drain/Violation
08/06/09	4,880.00	2334	Sediment Pond Maintenance
08/06/09	4,880.00	2335	Anchor Pipe
08/06/09	4,876.00	2336	Install Valve Assembly
08/06/09	4,890.00	2337	Install Under-Drain
09/18/09	4,300.00	2352	Install Seep Collection System
09/21/09	1,000.00	2353	Install Flow Meter
09/21/09	1,000.00	2354	Materials for Flow Meter
11/11/09	23,950.00	2378	Dirt Work for Oxidizer
11/11/09	4,760.00	2379	Gravel Basin Berm
	104,363.50		
01/29/10	2,812.45	2439	Gravel-Basin Berm
02/03/10	6,053.21	2440	Portal Drainage
02/03/10	5,000.00	2442	Pit liner/Iron Sediment Pond
02/04/10	3,500.00	2443	Pit liner/Iron Sediment Pond
03/09/10	3,500.00	2477	Re-pipe/Add Curtain
03/09/10	4,789.00	2478	Install Valbes/Chemical Treatment
03/09/10	4,722.00	2479	Install Injection System
03/09/10	3,500.00	2480	Install NaOH Injection system
04/01/10	3,500.00	2499	Install NaOH Injection system
04/12/10	5,000.00	2505	Ops Assist Iron Treatment Facility
04/15/10	4,772.00	2515	Install Sludge Clean Out Tubes
04/28/10	10,640.00	2523	Maintenance Iron Treatment Facility
05/25/10	6,750.00	2540	Pond cleaning
05/28/10	6,950.00	2543	Iron Treatment Facility
05/28/10	6,842.00	2545	Sludge re-circulation
06/03/10	7,000.00	2546	Iron Treatment Facility
06/03/10	7,000.00	2547	Additional Iron Treatment Pond Work
06/18/10	4,817.00	2563	Ops Assist Iron Treatment Facility
07/07/10	6,980.00	2576	Oil Shed Iron Treatment Facility
07/19/10	5,420.00	2582	Iron Treatment Facility and Pond Cleaning
07/19/10	5,400.00	2583	Ops Assist Iron Treatment Facility
07/28/10	3,825.00	2606	Oil Shed Iron Treatment Facility
08/23/10	9,500.00	2623	Ops Assist Iron Treatment Facility
08/23/10	9,500.00	2624	Iron Treatment Cleaning August 2010
09/02/10	19,429.06	2633	Maintenance/Monitor Chemical Treatment
09/02/10	10,879.68	2634	Ops Assist Iron Treatment Facility
10/12/10	10,226.36	2667	Temp Chemical Injection Shed Enclosed
10/28/10	5,450.00	2705	Temp Chemical Injection Shed Enclosed
11/02/10	9,500.00	2706	Iron Treatment Pond Cleaning
11/05/10	13,004.60	2719	Monitor Ponds/Haul Water
	206,262.36		

NOTE TO REVIEWERS

THIS IS THE REPLACEMENT TEXT FOR
APPENDIX 7-65

DO NOT REPLACE ANY OF THE ATTACHMENTS

APPENDIX 7-65

CRANDALL CANYON MINE

MINE DISCHARGE WATER IRON TREATMENT FACILITY

Discussion

Attachment 1	Maelstrom Oxidizer Unit
Attachment 2	Iron Treatment Bench Test Results, and Settling Basin Volume Determination
Attachment 3	Pit Liner Information
Attachment 4	Wildcat Sediment Pond C Volume Determination
Attachment 5	Settling Basin Clean-up Volume Estimatation
Attachment 6	Drainage Information
Attachment 7	Safety Factor Determination
Attachment 8	Construction Specifications and Drawings
Attachment 9	Temporary Use of Crandall Sediment Pond

DISCUSSION

BACKGROUND

As a result of the Crandall Canyon Mine disaster of August 6, 2007, the mine has been de-activated and the portals have been sealed. Mine water inflow has built up to the extent that water is now discharging from the portals and is discharged through a 12" pipe into Crandall Creek under UPDES permit UT0024368. The mine is presently discharging approximately 500 gallons per minute, with the flow fluctuating with barometric pressure and seasons. In early 2009 the iron concentrations in the water began to exceed UPDES limits. By the summer of 2009, Crandall Creek below the mine began to display an orange discoloration from the iron staining, resulting in violations from both DOGM and Division of Water Quality. Because there is no way to treat the water underground the company has constructed an aeration treatment system located on the surface in the "old loadout" area, immediately below the portal bench. In concept, the facility consists of three basic components; 1) an aeration devise (a.k.a., "maelstrom" unit) which allows atmospheric oxygen to chemically react with the dissolved iron in the water, thereby creating iron particulates, 2) a chemical injection system which adds a coagulant (ahead of the maelstrom) and a flocculant (after the maelstrom), to enhance particle settling, and 3) a settling basin which allows the iron particulates to settle out of the water. (See Attachment 8 for the construction specifications and engineering drawings for the facility. Attachment 8 also contains an as-built drawing of the treatment facility as of November, 2010. It should be noted that construction is on-going as new improvements continue to be added.)

INSTALLATION OF SETTLING BASIN

A new 12" HDPE pipeline has been tapped into the existing discharge line from the mine near the upper portals and extends to the new facility. It is equipped with shutoff valves, which allows the flow of mine water to be routed down to the treatment facility, or bypassed directly to the existing UPDES outfall. This line is supported by cables attached to bolts drilled into the ledgerock and epoxied in place.

The settling basin is contained on three sides by an earthen berm constructed from a structural granular borrow material. The berm was constructed in 8" lifts and compacted to 90% density using vibratory sheeps-foot mechanical compacting equipment, and the embankments do not exceed 2.5H/1V sideslopes. As shown in Attachment 7, the berm has been designed and constructed to achieve a 1.3 safety factor. Attachment 7 also includes geotechnical information about the granular borrow material used for construction of the berm. The settling basin and berm are constructed in the area previously referred to as the "Old Loadout Area". To make room for this old loadout, a large enclave was blasted out of the solid ledgerock in the past. This blasted rock was then used as fill material to extend the loadout area, and to construct the adjacent Forest Service road. This area was originally compacted for construction purposes, but was also compacted even more through many years of loading operations involving loaded trucks and front-end loaders operating on the site. Prior to constructing the settling basin berm all loose material was removed from the site, revealing the underlying compacted rock subsurface. Therefore, the foundational material for the berm and basin is either the solid sandstone bedrock from the original ledge, or else the highly compacted rock material located next to it. Refer to Figure 1 of Attachment 8, which shows the extent of the solid bedrock underlying the basin and berm. It should also be noted that the inner portion of the basin containment is constructed from a pre-existing concrete wall. This wall is a massive 12" thick, reinforced concrete structure which was part of the original "old loadout" system.

The berm is ringed on top with a double row of concrete Jersey barriers placed side-by-side with the intervening space filled with earthen material for added stability. The remaining side of the basin is constructed from the 12" thick pre-existing concrete wall mentioned above. The Jersey barriers on the earth berm, along with the existing concrete wall left over from the old loadout, define the limits of the settling basin. The barriers also provide public safety by keeping vehicular traffic, foot traffic and animals from entering the basin area.

The interior of the basin is lined with a pit liner similar to that used for containing drilling fluids in drilling operations. (See Attachment 3 for additional information on the liner material.) The pit liner is secured around the perimeter by tucking it into the space between the barrier walls and backfilling with earth material. A felt underlining was also placed down before (below) the pit liner to provide protection against damage. A chain link fence is installed around the basin atop the barriers to provide additional public security.

The outslopes of the berm have been covered with a layer of gravel to help prevent erosion and maintain stability. Also, the outer toe of the berm located adjacent to the Forest Service road has been armored with concrete jersey barriers sufficient to prevent potential erosion from surface runoff along the road.

Prior to constructing the berm and placing the pit-liner, an underdrain system was installed in the area of the basin. This underdrain system consists of cleaned drain rock and perforated drainpipe placed in a trench running along the upper toe of the berm at the lower (down-dip) end of the basin. The drain is then routed in a buried 4" pipe to the main discharge line. This underdrain system is designed to carry any water, possibly coming from pin-hole leaks in the pit liner, directly out from the basin so that it cannot saturate any portion of the berm. The pit liner is fabricated and fused as a single piece and is not expected to leak, but the underdrain system was installed as a measure of added insurance. As mentioned previously, the berm has been constructed on the site of the old loadout which was constructed on both solid rock blasted out of the ledge, and on previously compacted structural fill material.

INSTALLATION OF THE MAELSTROM UNIT

The treatment facility consists of a manufactured mechanical aeration device known as the "Maelstrom Oxidizer Unit". (See Attachment 1 for additional information regarding this unit.) This oxidizer unit consists of a pre-fabricated high-density plastic structure equipped with a series of baffles and a 20 hp blower. The mine water is fed into one end of the unit where it then travels a serpentine route over and under the baffles, and at the same time, a large volume of air is forced through the water by way of a number of nozzles located in the bottom of the unit. The unit has been sized according to the anticipated flow rate, such that the dissolved oxygen in the water as it exits from the unit is nearly 100%. The high oxygen content then reacts chemically to change the dissolved iron from the ferrous state to the ferric state, which forms iron precipitates which can then be settled out. The maelstrom unit is located ahead of the settling basin, and is also the focal point for the injection of the coagulant and flocculant treatment processes and the sludge re-circulation system described below.

INSTALLATION OF CHEMICAL INJECTION SYSTEM

Based on field trials it was determined that, in order to successfully settle out the iron it was necessary to add a chemical coagulant to the water ahead of the maelstrom, and also add a chemical flocculant to the water after the maelstrom. The coagulant presently used is an aluminum chloride compound. This coagulant provides the “seed” mechanism for the iron to adhere to as it goes through the oxidation process. After being oxidized the coagulated ferric iron particles are still too small to settle out on their own. Therefore, a flocculant is injected into the water after it exits from the maelstrom. The flocculant is a polyacrylamide. The treated water is then allowed to sent to a settling basin.

The chemical treatment equipment is housed within a pre-existing shed located adjacent to the settling basin. The shed has been retrofitted to accommodate the chemical injection apparatus, including new roofing, interior walls, insulation, heating, and lighting. Two overhead equipment doors have been installed to allow storage bulk storage of the chemicals within the shed, and a 2-ton jib crane has been installed to allow handling of the chemical storage totes. A 4" water line was installed, tapping off the main discharge line, to bring a continuous supply of mine water into the treatment shed. The shed is divided into two bays; a storage bay and a treatment bay. Both bays are heated and insulated. The storage bay is designed to store up to seven totes of coagulant and two totes of flocculant. The bay also can store up to 5000 gallons of clean water to be used as make-up water for the chemical system.

The treatment bay houses the chemical mixing and injection system. The coagulant is injected into the discharge water through an adjustable metering pump. This chemical is added to the 4" split of minewater and then piped out of the shed, where it is injected into the main flow of mine discharge water immediately ahead of the maelstrom unit. The flocculant chemical is premixed in a factory-built make-down unit. This unit automatically batches up a pre-determined quantity of concentrated floc solution which can then be used on an as-needed basis. During the batching process, the floc is pumped from the factory-supplied tote into the make-down unit through an adjustable-rate metering pump. At the same time, clean make-up water (stored in tanks in the adjacent storage bay) is pumped into the make-down unit at a controlled rate. This produces a floc solution with a consistent, known and pre-determined concentration. This solution is then pumped (at an adjustable rate) into a separate split of push water which is then pumped out of the shed and injected into the mine discharge water at the outlet end of the maelstrom unit, prior to discharge into the settling basin.

The treatment facility is presently (as of November 25, 2010) being upgraded so that all elements of the chemical treatment can be automatically controlled and monitored. A flow meter will be installed at the inlet to the maelstrom unit to give a continuous electronic reading of the mine-water flow. This flow rate will be sent back to a programmable controller which will automatically adjust the injection rate of both the coagulant and the flocculant as the mine-water discharge rate varies. This will allow the system to maintain a consistent level of chemical dosage at all times, and will allow the operators to easily make fine-tune adjustments of the chemical injection rates. The programmable controller will also constantly monitor the operational status of the facility, and can immediately send warning messages and alarms to company personnel in remote locations via computer interface if any part of the system needs maintenance or repair. The programmable controller will also keep data-base records of chemical usage, flow rates, and unplanned outages.

The treatment shed has been set up to allow storage of four totes of coagulant and one tote of flocculant. At current injection rates, this will allow the system to operate about six weeks before requiring refill of the coagulant storage, and about 6 months for the flocculant. However, addition stores of both chemical will always be available in the adjacent storage bay which can easily be pumped into the treatment bay storage totes. Therefore, the facility has been designed to operate on a long-term continuous basis without requiring any chemical replacement supply disruptions.

At present (November 25, 2010) the facility has been successfully treating the mine discharge water so that all UPDES compliance levels have been met for the past 9 months since March, 2010. However, the company is now implementing measures to minimize the amounts of both the coagulant and flocculant used in the treatment process. For example, the automated (programmable controller) control and monitoring system will allow precise fine-tuning of the chemical injection rate to the minimum needed for regulatory compliance. The company is also considering the installation of a TSS meter at the UPDES outfall monitoring location which could constantly monitor water quality. Experience has shown that if there is any problem with the coagulant/flocculant system it is reflected in elevated suspended particles at the outfall. Continuous automated monitoring of TSS at this location will provide additional assurance of water quality control.

As mentioned previously, the purpose of the coagulant is to provide seed particles for the oxygenated ferric iron to adhere to in preparation for settling. In an attempt to reduce the amount of coagulant usage, the company has also experimented with re-circulation of the iron sludge back through the maelstrom unit. In theory, the precipitated iron particles in the re-circulated sludge can then provide the seed particles for the mine-water ferric iron to adhere to, thus reducing the need for the aluminum chloride coagulant to accomplish the same function. Toward this end, the company has installed six intake suction manifolds in the upper bay of the settling basin. From these manifolds, concentrated iron sludge material is pumped back into the inlet end of the maelstrom unit over and over again. This re-circulation system now appears to be effective in holding down the necessary dosage of coagulant. However, since the flocculant make-down unit (described above) was only recently installed, and has not yet been fully adjusted, the full extent of the efficacy of the sludge re-circulation system is not yet known. This is because there are multiple variables affecting the ultimate treatment parameters, including mine-water discharge rate, coagulant injection rate, flocculant injection rate, and re-circulation concentration and volume rate. Due to the on-going, inter-related chemical reactions required for successful treatment, each variable affects all the others, and makes qualitative analysis of the individual variable somewhat more complicated and time-consuming. However, efforts to fine-tune the system in an effort to reduce the overall chemical consumption continues.

~~Samples of the Crandall mine water were sent to the factory for bench testing and the results were very encouraging, showing treated water well within UPDES compliance levels. (Results of the bench test are included in Attachment 2.)~~

~~While the bench testing indicates that the iron should settle in 5.5 hours sufficient to meet UPDES compliance levels, the option remains open to treat the water with chemical flocculants as well if needed to enhance the settling rate. Previous bench tests conducted by Nalco Chemical showed that particle settling rates can be greatly accelerated through the application of a small amount of chemical additives. Electric power has been installed to the unit which could be utilized in the future for a chemical pumping/injection system. However, a simpler and perhaps more dependable system would involve the use of chemical gel-logs. These logs are designed to be immersed in to stream flow after aeration and dissolve at a predetermined rate in order to add the proper amount of chemical flocculant to the discharge water ahead of the settling basin. Typically, such gel-log applications can operate for several weeks without requiring attendance. The oxidizer unit has been constructed such that if, in the future, iron levels in the mine-water increase sufficiently to the extent that chemical treatment is required in addition to the oxidization, either a chemical injection system or gel-log chamber can easily be fitted to the unit.~~

The chemically treated water from the oxidizer unit is then sent to the settling basin~~. This basin is constructed within a compacted earthen berm.~~ Iron precipitates generated in the oxidizer unit drops out of suspension and accumulates in the settling basin. The basin has been designed with nearly twice the volume (i.e., retention time) recommended from the bench testing in order to maximize the potential for meeting UPDES compliance level (see Attachment 2 for details). The basin has been divided into four individual cells, separated one from another by filter fabric curtains extending across the full width of the basin. These dividing curtains have been installed to force the water flow through the basin to follow a serpentine pattern from inlet to outlet. This is designed to maximize the retention time of the water in the basin to allow maximum settling of the iron sludge material. The treated water exits the basin through a spillway, dropping into an inlet structure to a discharge pipe which is buried under the road and connects to the existing discharge line leading to the designated UPDES outfall point. ~~A flow meter has also been installed in the line.~~ The UPDES water samples are taken at the outlet of the basin prior to entering the pipe leading to the outfall. This is similar to the manner and location in which the UPDES monitoring was previously conducted, and is agreeable to Division of Water Quality.

CLEAN-OUT

Precipitated iron is allowed to settle and accumulate in the settling basin. ~~Because of the~~

newness of this type of facility it is not known at this time the exact nature of the iron precipitate material that is expected to accumulate in the settling basin as a result of the oxidizer treatment. It is assumed that the accumulations will be visible as they begin to settle out in the bottom of the basin, because the water is generally clear and inherently devoid of suspended solids. Also regular sampling of the water at the approved UPDES outfall will provide a good indication that the settling mechanism is functioning properly. By utilizing both visual observations and sampling results it should become apparent when the basin is ready to be cleaned. Since the rate of accumulations is expected to be consistent (unlike a sediment pond that fills up in response to often violent precipitation events), the cleaning process can be anticipated well in advance. Also, due to the slow rate of accumulation, the accumulation level should be easy to monitor. A series of floating booms will be strung across the basin to slow down and spread out the flow of water through the basin, in order to maximize retention time and to help direct the pattern of material accumulation within the bottom of the basin.

As indicated by the calculations appearing in Attachment 5, the basin should be capable of holding several years of accumulation before cleaning is required. However, in order to be safe, the company commits to cleaning the basin when accumulations have reached the 7812' level, which would be about 3' deep at the deepest part of the basin. As explained in Attachment 5, this still leaves ample pond volume above the accumulation level to achieve the 5.5 hour settling time recommended by the bench testing. Several staff gauges (sediment markers) will be installed in the deepest areas of the basin to serve as a visual aid in determining when the basin should be cleaned. Because the iron staining may render the tick marks of the staff gauges illegible, additional markers will be also be installed beside the gauges whose top is cut off at the 7812' elevation in order to make visual observations of the accumulation level easier. The company proposes to use the accumulation level of 7812' for the initial cleaning. However, based on operational experience, this level may be changed to reflect actual (versus hypothetical) accumulation rates, refinements in clean-out techniques, topographic and spatial patterns of accumulations within the basin, and other operational dynamics.

In order to facilitate cleaning the sludge material from the basin, the company has installed a number of cleaning tube in the basin. Each tube consists of several segments of 4" pvc pipe glued together to make a long continuous tube which extends across the width of the basin. The far end of the tubes are sealed closed, and the near end (located at the road-side of the basin) is open. There are mor than twenty of these cleaning tubes installed parallel to each other from the top end of the basin to the bottom. Each of the tubes has a number of holes drilled at closely-spaced intervals along the top and across the entire length of the tube. During the cleaning operation, a 2" flexible non-collapsible suction hose is inserted into the cleaning tube. This suction hose is then connected to a pump or vacuum truck. The overlying sludge material is sucked though the holes in the top of the cleaning tube and into the inner suction hose. As cleaning proceeds, the inner hose is slowly pulled across the length of the basin, cleaning the sludge above it as it moves. After one of the tubes is cleaned in this manner, the inner suction hose is inserted in the adjacent tube, and the process is repeated.

After the accumulated material has reached the 7812' level (which is 4' below the surface level), the clean-out will begin. Without prior operational experience it is difficult at this time to predict the exact nature of the precipitated iron accumulation material that will have to be cleaned out of the bottom of the basin. However, based on input from Division staff, literature on treatment systems for mining sites suggest that solids content in the accumulation material is about 5%. This consistency of material would allow removal by vacuum methods. Vacuum tanker trucks will be positioned along the road next to the basin in preparation for clean-up. The semi-flexible 4" suction inlet line will be lowered into the deepest part of the basin, which is located at the lower (outlet) end of the facility, where iron accumulations are expected to be deepest, and the material will be sucked up into the waiting trucks. Care will be taken during the clean-out process to minimize stirring up the accumulations so that suspended iron particles do not begin to flow out of the pond. During the clean-out process, excelsior logs or other suitable sediment control (filtration) devises will be installed at the basin outlet spillway to help trap any iron material stirred up. Visual observations and sampling of the water will be made at the spillway (i.e., UPDES monitoring point) to make certain that stirred up iron material is not exiting the basin. If needed, cleaning operations will be delayed until sufficient time is allowed to re-settle any stirred up material. Experience will help refine the cleaning technique. For example, it may be determined that using a perforated suction line that allows multiple access points for material entry along the length of the pipe is more effective than a single entry point. It may also be determined that several cleanup suction lines can be left permanently in place at designated locations within the basin to make future clean-out efforts quicker and easier. Experience will tell.

Prior to cleaning operation a sample of the iron material will be taken an analyzed for RCRA hazardous constituents. If the RCRA analysis shows the material to be hazardous, it will be disposed of at an approved, licensed hazardous waste diposal facility. However, if the results of this RCRA analysis showsthe material to be non-hazardous, the iron precipitate material from the basin clean-out will be hauled to the company-owned Wildcat Loadout where it will be disposed of in Sediment Pond C. During the initial cleaning, a sample of the sludge was taken and analyzed for RCRA metals and other constituents. The results show the material to be non-toxic and non-hazardous. A copy of the analysis is presented in Attachment 9. Several cleaning operations have been initiated, each with notification of the Division. Initially, the sludge was quite fluffy. The material was sucked out of the basin using a vacuum truck, and was hauled off site and disposed of at the Wildcat Loadout Sediment Pond C. There it can dry out and remain in-place until buried at final reclamation, or if the volume is excessive, it can be scooped out and moved to the approved refuse disposal pile located at the loadout. Under the currently approved Mining and Reclamation Plan for the Wildcat Loadout (C/007/033), this refuse pile will be buried under at least 4' of earthen material upon final reclamation. (As shown in Attachment 4, Sediment Pond C is a very large pond with ample capacity to contain more than 2.5 acre-ft (108,900 cu. ft.) of material and still have sufficient volume to contain a 10-year/24-hour precipitation event. This is far more volume than is expected to be needed to accommodate the iron clean-out material, as explained in Attachment 5. However, under no circumstance will the pond level be allowed to exceed the 10-year/24-hour design capacity level. Additional information about Wildcat Sediment Pond C and the refuse disposal pile can be found in Mining & Reclamation Plan C/007/033 on file with the Division.

The initial sludge material hauled to Wildcat was determined by laboratory analysis to be more than 94% water. Therefore, attempts have been made to densify the sludge to allow for more efficient cleaning and disposal in the future. The sludge re-circulation (mentioned above, to reduce the coagulant usage), had the desirable side effect of making the sludge much more dense. The company also attempted to run the sludge through a cyclone separator during the cleaning process in hopes of obtaining a more concentrated sludge, but this was not successful. The company then conduced a series of cleanings wherein the sludge material was pumped directly into geotube filtration bags. This technique showed encouraging results, but unfortunately, freezing winter weather conditions, and the complexities of rigging up a separate flocculant system has prevented the geobag option from being as yet fully explored and developed. However, given the promising preliminary results, the company intends to resume geobag cleaning trials as soon as weather conditions permit.

Prior to initiating any cleaning of the basin, the company will provide a minimum of 24-hour notice to the Division.

MAINTENANCE

There may be times during required maintenance that the oxidizer must be shut down for repair or cleaning, at which time the mine discharge water will need to bypass the treatment system. By opening the by-pass valve located ahead of the oxidizer unit, the water will be directed into a flexible 8" discharge hose which will route the water around the settling basin and into the main sediment pond through the existing disturbed ditch DD-10 and culvert C-4 located immediately below the treatment facility. Information included in the back of Attachment 6 shows that an 8" hose can carry nearly 1300 gpm, which is adequate for bypassing the normal flow from the mine discharge. Disturbed ditch DD-10 and culvert C-4 are both sized to adequately handle the maximum anticipated bypass flow of about 1000 gpm in addition to the potential flow from a 10-year, 24-hour precipitation event, as shown in Appendix 7-4.

Prior to bypassing any mine water into the sediment pond for maintenance or cleaning of the settling basin the static water level in the sediment pond will be decanted to as low as possible below the elevation level of 7773.2'. This will ensure that there is still sufficient capacity left in the pond to accommodate a 10-year/24-hour precipitation event. At no time during the flow bypass will the water level in the sediment pond be allowed to exceed the 7773.2' level, unless specifically authorized by the Division. A clearly visible reference marker will be installed within the sediment pond to clearly delineate the 7773.2' elevation level so that persons in charge of the maintenance operations can observe the water level at all times during any bypass situation. Any decanting of the sediment pond will be done according to the requirements of the approved UPDES permit for this outfall point. Also, prior to bypassing any water into the sediment pond, the sediment level in the pond will be verified to be below the approved clean-out level of 7769'. *(Note: The sediment pond was completely cleaned in December of 2009, immediately prior to putting the iron treatment facility into operation, and certification reports were supplied to the Division).* Since the required capacity volume for a 10yr-24hr event is 2.45 acre-ft, this leaves a usable volume of 0.77 acre-ft for the purpose of maintenance bypass, assuming the water level has been previously decanted down to the sediment cleanout level of 7769' This equates to 251,000 gallons At an average flow rate of 500 gpm from the mine, the sediment pond could theoretically contain over 8 hours worth of by-passed discharge flow. In other words, this could allow more than 8 hours of time to perform maintenance work on the treatment facility before the sediment pond was filled to within the 10/24 capacity volume level at the maximum level of 7773.2'. This should provide sufficient time for most routine or emergency maintenance procedures, especially in light of the mechanical simplicity of the system. Details of the sediment pond capacity for this scenario can be found in Appendix 7-4.

Prior to initiating any routine or scheduled maintenance on the oxidizer unit or the settling basin, the company will provide a minimum 24-hour notice to the Division. Emergency maintenance occasions will be reported to the Division immediately.

DRAINAGE

The "old loadout area" is depicted on Plate 7-5 and in Appendix 7-4 (Sedimentation and Drainage Control Plan) as disturbed drainage area WSDD-10. Much of this area is now dedicated to the installation of the iron treatment facility. The treated minewater, along with any direct precipitation falling into the settling basin, is discharged into Crandall Creek via the original approved UPDES outfall point. Therefore, part of this treatment area is now excluded from draining into the sediment pond as disturbed area drainage. The basin berm, which supports the concrete barrier wall, serves to effectively separate the settling basin from the disturbed area drainage around it. Effectively, all surface drainage now bypasses the treatment facility area, and there is no co-mingling of storm surface runoff with the mine discharge water undergoing treatment. Relevant drainage information from Appendix 7-4 is included in Attachment 6 for ease of reference. This attachment also contains information that shows the adequacy of the basin spillway and the discharge pipe to handle the combined flow of the mine water and a 10 year/24 hour precipitation event on the surface.

While the facility is neither an ASCA nor a small area exemption, it represents a small area within the disturbed area wherein runoff is treated along with the mine discharge water and discharges through an approved UPDES outfall point, and therefore does not drain to the sediment pond. Also, the outer toe of the berm located adjacent to the Forest Service road has been armored with concrete jersey barriers sufficient to prevent potential erosion from surface runoff along the road, and to route surface drainage around the basin into drainage ditch DD-10, thence into culvert C-4, and thence into the sediment pond. Calculations in Appendix 7-4 show that these drainage structures are adequately sized to handle the bypass flow (at a peak of about 1200 gpm) in addition to the 10 yr-24 hr precipitation event design flow.

~~FINAL RECLAMATION~~

~~There is every reason to believe that water will permanently discharge from the Crandall Mine portals. The iron level of the mine water historically was very low, and began rising only after the water began to build up and impound within the mine workings following the mine collapse of 2007. It is now the consensus that the elevated iron concentration will be a permanent situation, and that the reclamation plan must provide for a permanent means of treating the discharge water so as to meet UPDES requirements, even subsequent to final reclamation. To~~

~~address this situation, the company commits to revising the reclamation plan in the near future.~~

~~Based on recent input from various state and federal agencies (Div. Oil, Gas and Mining, Forest Service, BLM, Div Water Resources, Div. Wildlife Resources) a conceptual treatment plan for final reclamation was agreed upon. This plan would utilize a passive aeration system (modifying the existing portal access road into a long, cascading, open-air aeration waterway), emptying out into a set of large settling basins to be constructed in the area presently occupied by the shop/warehouse building.~~ ~~The company commits to collecting the necessary baseline data, consulting with the appropriate agencies, and revising the reclamation plan in accordance with the agreed-upon passive concept, so that the revised reclamation plan can be approved by August 1, 2010. This plan will include not only the facility design but also projected operating and maintenance costs for long-term (perpetual) bonding considerations. In light of the long-term treatment requirements for final reclamation, the existing treatment facility is now considered temporary (i.e., short-term, operational) and will be removed at the time of final reclamation after the permanent (post-reclamation) passive facility is constructed.~~

BASELINE MONITORING

Additional baseline data has been incorporated into the approved plan. This data includes: 1) flow quantities from the seep in the sandstone ledge above the treatment facility, 2) historical data concerning the iron concentration levels in the mine discharge water, and 3) performance data demonstrating the effectiveness of the existing treatment system methodology of oxidation/settling. as opposed to other treatment methods such as reverse-osmosis, fine-element filtration, chemical coagulants/flocculants, etc.

1) Ledge seep water flow: The treatment area is separated from the portal bench above by a massive sandstone ledge of bare sandstone rock. There are several seeps emanating from this ledge and this seep water drains down the ledge toward the area of the settling basin. Based on previous measurements, the flow is minimal (approximately 1-2 gpm), but constant. A concrete trough has been poured behind the existing retaining wall (between the ledge rock and the back of the wall) to collect this seepage water and route it through a 4" PVC pipe to the settling basin overflow culvert inlet. In this manner the seepage water is contained, can be monitored, and is also subject to treatment thru dilution. The flow data collected from monitoring this seep will be provided to the Division and will assist in determining the most appropriate geotechnical method for future reclamation of this area, i.e., final reclamation. Monitoring will be conducted monthly, although freeze/thaw conditions in winter months will have to be factored into interpreting the data. The monitoring information will be provided to the Division (via email) prior to the end of each month and will continue until the Division determines that it is no longer necessary~~, and at a minimum, until such time as the revised final reclamation plan has been approved, since this information will be needed in order to properly design the approximate-original-contour requirements for the "old loadout area"~~.

The location of the seep water discharge pipe into the basin overflow culvert inlet provides safe and convenient access for collection of this data. It should also be noted that much of the seep water seems to be coming from underneath the concrete pad of the old crusher building sitting on top of the ledge. Since this building, and its concrete floor, will be removed during final, there is a high probability that much of the seep water can be isolated and contained at time of final reclamation. ~~This issue will be addressed in greater detail in the preparation of the revised final reclamation plan.~~ Details of this seep collection system can be found in the engineering drawings in Attachment 8.

2) Mine discharge water quality: This data is essentially the monthly UPDES sampling and monitoring that is presently on-going.

3) Operational performance data: In addition to the normal UPDES data (item 2), the company commits to gathering data to reflect on the effectiveness of the oxidation/settling methodology employed in the existing system. ~~This data will facilitate the design of a final reclamation treatment system that will include perpetual treatment of the mine-water discharge.~~ This data will be collected monthly and will be provided to the Division via email. Samples will be collected from the 12" HDPE pipeline prior to the oxidizer unit, and at the UPDES sampling point at the outlet of the settling basin. The analytical parameters will include the following:

Iron (total, dissolved, and ferrous)
Manganese (total and dissolved)
Aluminum (total and dissolved)
Alkalinity
Sulfate
pH
Dissolved Oxygen

~~BONDING~~

~~As described above (under FINAL RECLAMATION) this facility is to be considered as a short-term, operational facility, designed to treat to the discharge water up until the time of final reclamation, but not thereafter. Because the facility has been constructed using non-permanent structures it will be easy to reclaim. For example, the earthen berm has been constructed out of less than 700 cubic yards of granular borrow which can easily be hauled off or used as backfill material during final reclamation. The oxidizer unit is a pre-fabricated unit that can be removed with a fork-lift. The Jersey barriers can be removed with a backhoe and hauled off to be re-used elsewhere. There is no concrete to be removed and disposed of. The only concrete associated with the facility is a small amount which was poured behind the existing retaining wall which will remain in place during final reclamation. Because all components can easily be dismantled and removed (i.e., are not permanent), any increased costs for reclamation should be negligible. Indeed, if the iron concentrations of the mine water come back into compliance naturally, as they have always been in the past, the treatment facility might no longer be needed and could be disassembled prior to final reclamation of the minesite. Based on discussions with Division, in light of the short-term, non-permanent nature of construction of the facility, the cost of reclamation would be less than $3000, which include demolition and disposal costs.~~

~~It should also be noted that at the present time (November, 2009), the Crandall Canyon~~

~~Mines reclamation bond contains positive coverage for the following reasons:~~

~~1) The East Mountain Drillpads have been reclaimed and the ivision has determined that the site now qualifies for Phase 1 bond release. This bond is presently posted at $286,196. Phase 1 release would free up 60% of this amount, or $171,717 which could be transferred to apply to any increase resulting from the treatment facility.~~

~~2) Due to the construction of the Crandall Canyon Memorial, the upper end of the mineyard has been deeded over to Emery County, and will not be reclaimed as reflected in the current mine reclamation bond. Based on estimates previously submitted to the Division (Task #3092, April 6, 2009, reprint available on request), this should result in a reduction of the reclamation costs of the minesite by about estimated amount of $77,798. This positive bonding re-adjustment could also be utilized to cover any increase resulting from the installation of the treatment facility.~~

~~As stated previously, the company is committed, under Division Order DO09A, to revising the final reclamation plan to include a permanent, passive treatment facility which will replace the existing one. This revised reclamation plan will include a major re-evaluation of the overall reclamation costs of the Crandall Canyon minesite, and subsequent bond re-adjustments. In light of this pending revision, and the relatively minor reclamation and operating costs associated with the existing facility, and the existing bonding excess presently in place, the company requests that bonding considerations for this existing facility be delayed temporarily and worked into the up-coming "permanent facility" revised reclamation plan and bond.~~

OFF-SITE IMPACTS

In early 2009 the iron concentrations in the water began to exceed UPDES limits. By the summer of 2009, Crandall Creek below the mine began to display an orange discoloration from the iron staining, resulting in violations from both DOGM and Division of Water Quality. Therefore, the company commits to perform an on-site inspection of the Crandall Creek drainage with the appropriate regulatory agencies. ~~once access is possible (late spring/early summer 2010)~~. The purpose of the inspection will be to assess the extent of the total iron accumulations within Crandall Creek. Following the site-visit, the Division (with concurrence with the Forest Service, and consultation from other agencies) will make a determination as to what clean-up measures, if any, should be taken to remove the iron accumulations from the stream channel.

~~BACK UP/CONTINGENCY PLAN~~

~~The company commits to establishing a back-up/contingency plan for the oxidizer unit once it has been demonstrated that the mine-water discharge levels of total iron are within UPDES limits for three consecutive months.~~

TEMPORARY USE OF CRANDALL SEDIMENT POND

(Note: This section has been added subsequent to the initial approval of the iron treatment

facility)

During late April and early May of 2010, the iron accumulation material (a.k.a., cleanout sludge) was cleaned out of the settling basin for the first time. There was at this time approximately three months worth of sludge material accumulated in the basin. Cleanout was accomplished by installing a total of ten cleanout tubes sequentially across the entire width of the the basin, from top to bottom. Each cleanout tube was constructed of 4" pvc pipe with ½" holes drilled on 8" centers along the top of the pipe. At the time of cleaning, a 2" flexible hose was inserted into the cleanout tube, with the other end connected to a vacuum truck. During cleanout, the open end of the vacuum hose was slowly retracted through the length of the cleanout tube, sucking the sludge from the immediate area through the holes in the outer tube. This process was then repeated for each tube until the entire length of the basin had been cleaned. The sludge material was then hauled by tanker truck to the Wildcat Loadout and discharged into Sediment Pond C, as per the plan. In total, 38 truckloads of sludge were cleaned from the basin, totaling 216,000 gallons of material.

Laboratory analysis of the cleanout sludge shows that it is in compliance with all standards for RCRA metals (see Exhibit 4, Attachment 9). Lab analysis also shows that the sludge material is mostly water, being 94.12% water, 5.88% solids (see Exhibits 1 and 5, Attachment 9). Shortly after the cleanout, representatives of the Division inspected the material in Pond C at Wildcat. By this time much of the solids had settled out, leaving a clear supernate on top. This supernate material was sampled and analyzed (see Exhibits 2 and 6, Attachment 9). Exhibit 3, Appendix 9 shows additional photos of the Wildcat Pond C as the sludge continued to settle and dry out. Within the next several weeks the sludge material dried up entirely, leaving only a thin residue caked in the bottom of Pond C.

The company is now experimenting with various methods to improve on the cleanout process. The sludge material in the settling basin is voluminous, but mostly water (94% water, 6% solids). Therefore, efforts to remove as much of the water as possible from the sludge prior to disposal are now being explored. These efforts will include the use of ~~hydrocyclones and/or~~ mechanical filtration devices (i.e., geotubes) used during cleanout, on a trial basis. To facilitate the testing of these new methods, the company will utilize the Crandall Canyon Mine sediment pond on a temporary basis for short-term storage of the cleanout material. ~~This period of utilization will be restricted during the summer and early autumn months 2010 when seasonal weather conditions will promote effective evaporation of the sludge material.~~ By being able to store the material in the Crandall sediment pond, rather than hauling it 40 mines away to Wildcat, a greater degree of flexibility can be employed in the trial-and error methods for developing the most effective de-watering process. Such de-watering process will then be incorporated into the long-term cleanout program. It should be emphasized that use of the Crandall sediment pond during this testing period will be temporary, ~~ending October 30, 2010.~~ Due to present wintertime freezing conditions (November, 2010,) further testing of the geotubes has been postponed until next spring. The company will seek permission from the Division to once again be allowed to utilize the Crandall sediment pond on a temporary basis to assist in the testing of the geobags.

It should be noted that in no case will the sediment level (of the combined sediment/sludge material) in the pond be allowed to accumulate above the presently approved 7770' maximum sediment level. It should also be noted that at no time will the total water level in the sediment pond be allowed to exceed the 7773.2' elevation as a result of the cleaning/testing. By not exceeding this level, the sediment pond will still maintain sufficient capacity to hold surface runoff from a 10-year, 24-hour precipitation event. A high-water level marker has been installed in the pond to make certain that this level is not exceeded during cleaning and testing. In the unlikely event that any supernate water needs to be decanted from the pond during this time, it will be decanted in accordance with the approved UPDES permit. It is encouraging to note that, should decanting be necessary, analysis of the supernate from the initial cleaning showed compliance with all UPDES parameters. It should also be noted that any sludge material deposited in the Crandall sediment pond during this time will eventually be removed and disposed of as part of the normal approved sediment pond clean-out procedure.

~~FUTURE COMMITMENTS~~

~~*(Note: This section has been added subsequent to the initial approval of the iron treatment facility)*~~

~~Following the termination of the clean out testing period (ending October 30th, 2010), the following revisions to Appendix 7-65, Mine Discharge Water Iron Treatment Facility, will be submitted to the Division of Oil, Gas and Mining by November 30th, 2010:~~

a) ~~Deletion of any previously approved language, discussion or attachment that is no longer relevant or applicable based upon current conditions.~~

b) ~~Revisions that reflect the design, as-built construction, operation, clean out and maintenance aspects of the Mine Discharge Water Iron Treatment System.~~

c) ~~A summary/chronology of the experimental process that led to the final design including:~~

   ~~A summary of the various treatment methods that were examined/tested.~~

   ~~A discussion as to the chemical additives that were employed during the trial and error process. The discussion shall include the ratios of chemicals that were utilized in the various test configurations as well as the corresponding water quality results.~~

   ~~An up to date tabulation of the mine-water flow data that has been collected since the installation of the AVF Flow Meter~~

   ~~The field data and lab analytical results that were obtained during the various test configurations/water treatment approaches that were explored.~~

d) ~~A discussion of iron sludge disposal options as contingency in the event that the Wildcat Loadout facility is no longer available to receive the material.~~

e) ~~An up to date summary of the operational costs for the operational water treatment system configuration including: chemical costs, labor costs, maintenance costs, clean-out costs and equipment repair/replacement costs.~~

ON-GOING STATUS AS OF NOVEMBER, 2010

The company has been working on the design, permitting, construction and operation of the iron treatment facility since January, 2009. Under the existing treatment system, the mine-water discharge has been brought into compliance with UPDES parameters since March, 2010. Presently, the facility is being upgraded to allow greater dependability under the constraints of the requirements for continuous 24/7 operational performance and regulatory compliance. Much of the work has been on a "trial-and-error" basis because the iron treatment issue is relatively new to the Utah coal industry, and accepted treatment methodologies for eastern coal mines often involve dis-similar water chemistry and differing operating and environmental circumstances. Also, much of the construction/operation of the facility has been under near-emergency conditions, given the fact that the company was in violation with several state agencies, and the discharge into Crandall Creek has been under constant scrutiny from other federal and local agencies. The constant pressure and necessity to keep the discharge water in compliance at all times has made it more difficult to make adjustments, add new equipment or explore new treatment options. To date, the company has spent nearly $600,000 on construction, operation, clean-out and maintenance of the system. It is important to note that these costs cannot be construed as representative of future treatment costs, given the emergency nature, and "trial-and-error" nature of the development of the facilities to date. The company will continue efforts to improve the system to provide increased reliability, develop more efficient sludge removal/disposal techniques and to minimize the amount of chemicals used in the treatment. Once these more pressing and immediate objectives have been met, the company will be able to explore other options and alternatives for treatment.

NOTE TO REVIEWERS

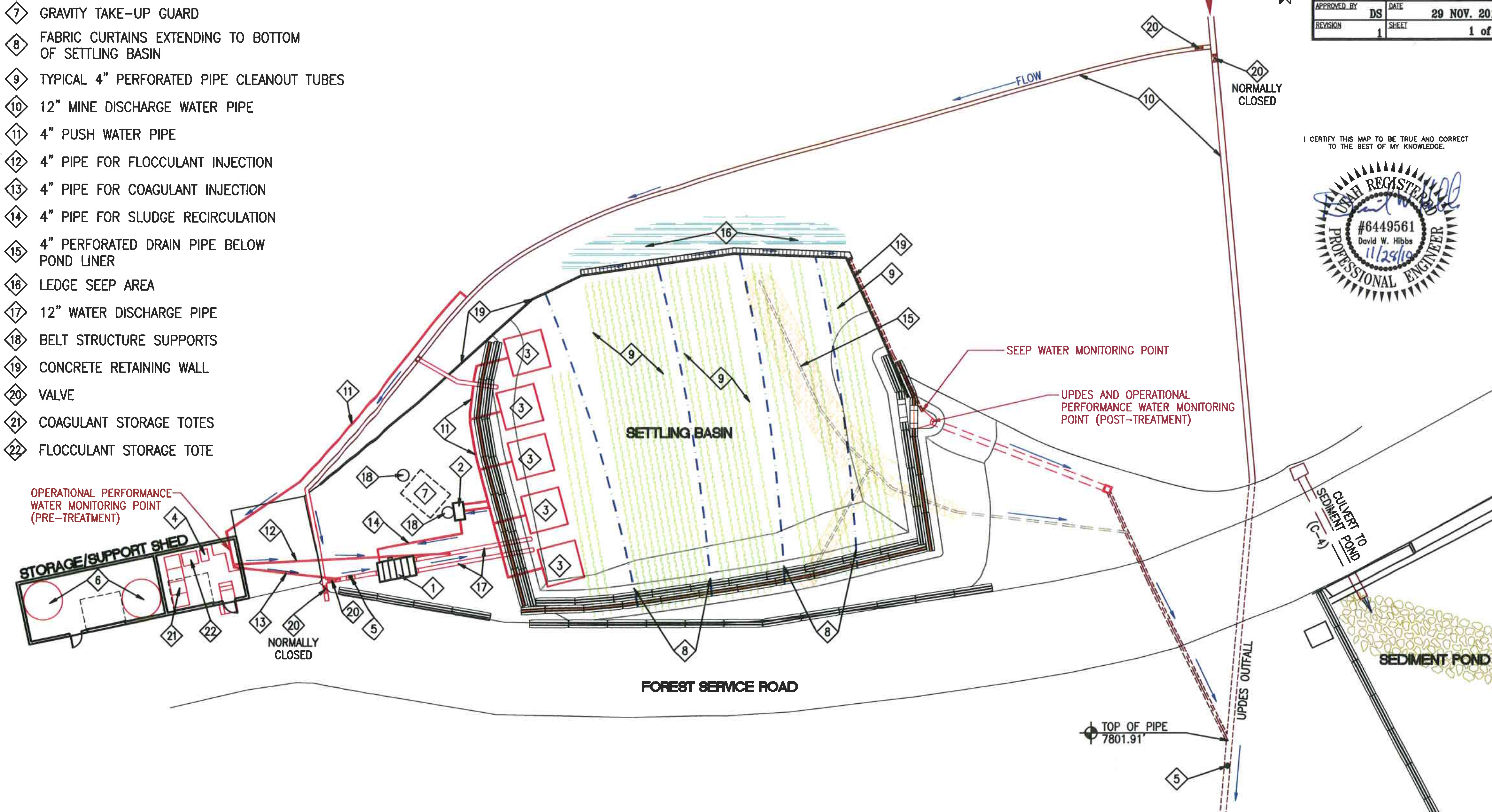
ADD THIS "AS-BUILT" DRAWING TO THE OTHER DRAWINGS IN ATTACHMENT 8
OF
APPENDIX 7-65

KEYED NOTES

1. MAELSTROM OXIDIZING UNIT
2. SLUDGE RECIRCULATING PUMPS
3. SLUDGE RECIRCULATION MANIFOLDS
4. FLOCCULANT MAKEDOWN UNIT
5. FLOW METER
6. 2500 GALLON FRESH MAKEUP WATER TANK
7. GRAVITY TAKE-UP GUARD
8. FABRIC CURTAINS EXTENDING TO BOTTOM OF SETTLING BASIN
9. TYPICAL 4" PERFORATED PIPE CLEANOUT TUBES
10. 12" MINE DISCHARGE WATER PIPE
11. 4" PUSH WATER PIPE
12. 4" PIPE FOR FLOCCULANT INJECTION
13. 4" PIPE FOR COAGULANT INJECTION
14. 4" PIPE FOR SLUDGE RECIRCULATION
15. 4" PERFORATED DRAIN PIPE BELOW POND LINER
16. LEDGE SEEP AREA
17. 12" WATER DISCHARGE PIPE
18. BELT STRUCTURE SUPPORTS
19. CONCRETE RETAINING WALL
20. VALVE
21. COAGULANT STORAGE TOTES
22. FLOCCULANT STORAGE TOTE

LEGEND

- TYPICAL 10' LONG JERSEY BARRIER
- DIRECTION OF WATER FLOW
- TYPICAL 10' LONG JERSEY BARRIER WITH 4.0' TALL CHAIN LINK SAFETY FENCE



AS-BUILT PLAN

IRON TREATMENT FACILITY

Crandall Canyon Mines
Crandall Canyon
P.O. BOX 910
EAST CARBON, UTAH 84520

DRAWN BY	PJ	SCALE	1" = 25'
APPROVED BY	DS	DATE	29 NOV. 2010
REVISION	1	SHEET	1 of 1

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER #6449561 David W. Hibbs 11/29/10

\Current Drawings\MRP Maps\Crandall Canyon\Current\CranDall Portal Reclamation\Settlement Pond As-Built 11-19-10.dwg, Plan View, 11/29/2010 3:55:57 PM