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

APPROVED CHANGE TO:

APPENDIX 7-65
MINE DISCHARGE WATER
IRON TREATMENT FACILITY

ABATEMENT OF CITATION 10073

CLEAN COPIES....TASK 3996

SUBMITTED: FEBRUARY 7, 2012

File in:
☐ Confidential
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☒ Expandable
Date Folder 02/13/12 C/015/0032
Incoming

COVER LETTER.....CI/C2 FORMS

C/015/032 Incoming

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

February 2, 2012

Steve Christensen
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

Re: Crandall Canyon Mines, C/015/032
Change to Appendix 7-65
Abatement of Citation 10073
Clean Copies, Task 3996

Dear Mr. Haddock:

Enclosed are six (6 ea) clean copies of a the approved change to Appendix 7-65, "Crandall Canyon Mine, Mine Discharge Water Iron Treatment Facility". This submittal has been approved to address the requirements for abatement of Citation 10073, the deficiencies cited in Task 3827, and the deficiencies cited in Task 3941

Also, as per your letter of December 20, 2011 (Deficiencies, Task 3941), the estimated operating costs of the water treatment facility have been included in Appendix 7-65, and David Hibbs, President of Genwal Resources, Inc., has signed the notarized C1 form for this submittal.

This submittal also includes commitment language that "within 60 days of the final approval of the Burma Evaporation Basin, continued utilization of the Crandall Canyon sediment pond for iron sludge disposal will no longer be authorized by the Division." With the approval of this commitment language, as noted in your letter of January 24, 2012, we hereby request that we be allowed to resume the cleanout operation under the terms and conditions previously granted.

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

Sincerely,

David Shaver
Resident Agent

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FEB 13 2012
DIV. OF OIL, GAS & MINING

Form DOGM - C1 (Last Revised February 2, 2012)

File Folder # 3

APPLICATION FOR PERMIT PROCESSING

Permit Change ☐	New Permit ☐	Renewal ☐	Transfer ☐	Exploration ☐	Bond Release ☐	Permit Number: 015/032

[redacted] of Proposal: Change to Appendix 7-65, abatement of Citation 10073, clean copies, Task 3996

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? DO-10A
☐ 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? 10073
☐ 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?
[redacted]es	☒ 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? Water treatment operating costs
☐ 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)

Daniel W. Hill, President, 2/2/12

Signed - Name - Position - Date

[redacted]bed and sworn to before me this 2nd day of February, 2012

Lynnette Allred

Notary Public

My Commission Expires: August 31 2015

Attest: STATE OF } ss:
COUNTY OF Carbon

LYNNETTE ALLRED
Notary Public, State of Utah
Commission # 606839
My Commission Expires
August 31, 2015

Received by Oil, Gas & Mining

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FEB 13 2012

DIV. OF OIL, GAS & MINING

ASSIGNED TRACKING NUMBER

Form DOGM - C2 (Last Revised 6/93)

File Folder # 3

Application for Permit Processing
Detailed Schedule of Changes to the MRP

Title of Application:

Change to Appendix 7-65, abatement of Citation 10073, clean copies, Task 3996

Permit Number: 015/032

Mine: CRANDALL CANYON MINESA

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	Appendix 7-65:
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	Discussion
☐ ADD	☐ REPLACE	☐ REMOVE	Attachment 2
☐ ADD	☐ REPLACE	☐ REMOVE	Attachment 4
☐ ADD	☐ REPLACE	☐ REMOVE	Attachment 5
☐ ADD	☐ REPLACE	☐ REMOVE	Attachment 8 As built drawings (add to existing drawings)
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	Attachment 10 MSDS sheets
☐ ADD	☐ REPLACE	☐ REMOVE	Attachment 11 Stipulated Water Treatment Operating Costs
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	Chapter 7 text:
☐ ADD	☐ REPLACE	☐ REMOVE	pgs 7-xiii, 7-40, 7-41, 7-47
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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☐ ADD	☐ REPLACE	☐ REMOVE	

Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

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FEB 13 2012

DIV. OF OIL, GAS & MINING

CHAPTER 7 TEXT.....REPLACEMENT PAGES

CHAPTER 7
LIST OF PLATES

PLATE NUMBER	DESCRIPTION
PLATE 7-1	Crandall Creek Plan and Profile
PLATE 7-2	Crandall Creek Cross Sections
PLATE 7-3	Proposed Pond Details
PLATE 7-4	**DELETED**
PLATE 7-4A	**DELETED**
PLATE 7-5	Drainage Map
PLATE 7-5A(1,2)	As-Built Cross Sections
PLATE 7-5B	**DELETED**
PLATE 7-5C	Watershed Boundary Map
PLATE 7-6	**DELETED**
PLATE 7-6A	**DELETED**
PLATE 7-7	Exploration Drill Hole and Hiawatha Coal Outcrop Locations
PLATE 7-8	Blind Canyon Watershed Land Types
PLATE 7-9	Terratek Blind Canyon Watershed Subsidence Modeling
PLATE 7-10	Blind Canyon Watershed Land Types & Drainage
PLATE 7-11	Pre & Postmining Blind Canyon Topography
PLATE 7-12	Seep and Spring Locations
PLATE 7-13	**DELETED**
PLATE 7-14	Groundwater Rights

Table 7-10 Water Monitoring Program

Ground Water

Springs

1	SP-30	No Side Lower Crandall	Flow and field parameters quarterly
2	SP-36	No Side Lower Crandall	Flow, field parameters, and Table 7-4 parameters quarterly
3	SP-58	Forks of Crandall Crk.	Flow, field parameters, and Table 7-4 parameters quarterly
4	SP2-24	Top of East Mountain	Flow, field parameters, and Table 7-4 parameters quarterly
5	SP2-9	Top of East Mountain	Flow, field parameters, and Table 7-4 parameters quarterly
6	SP47A	Pt No of Crandall Mine	Flow and field parameters quarterly
7	SP1-3	Top of East Mountain	Flow and field parameters quarterly
8	SP1-19	Top of East Mountain	Flow and field parameters quarterly
9	SP1-22	Top of East Mountain	Flow and field parameters quarterly
10	SP1-33	Upper Joe's Valley	Flow, field parameters, and Table 7-4 parameters quarterly
11	SP1-47	Upper Joe's Valley	Flow and field parameters quarterly
12	SP2-1	Upper Joe's Valley	Flow and field parameters quarterly
13	SP1-9	Top of East Mountain	Flow, field parameters, and Table 7-4 parameters quarterly
14	SP1-24	Top of East Mountain	Flow and field parameters quarterly
15	LB-5A	Little Bear Canyon	Flow, field parameters, and Table 7-4 parameters quarterly
16	LB-7	Little Bear Canyon	Flow, field parameters quarterly
17	LB-7A	Little Bear Canyon	Flow, field parameters quarterly
18	LB-7B	Little Bear Canyon	Flow, field parameters quarterly
19	LB-7C	Little Bear Canyon	Flow, field parameters quarterly
20	LB-12	Little Bear Canyon	Flow, field parameters quarterly
21	SP-79	Huntington Canyon trib.	Flow, field parameters, and Table 7-4 parameters quarterly
22	Little Bear Spring		Flow, field parameters, and Table 7-4 parameters quarterly
23	SP-18	Shingle Canyon	Flow, field parameters quarterly.
24	SP-22	Shingle Canyon	Flow, filed parameters quarterly.

In-Mine Monitoring Wells **

1	DH-1	Main North (Dry)	Flow, field parameters, and Table 7-4 parameters quarterly
2	DH-2	In Sealed Area	Flow, field parameters, and Table 7-4 parameters quarterly
3	MW-1	At Portals	Flow, field parameters, and Table 7-4 parameters quarterly
4	MW-2	At Mouth of Main East	Flow, field parameters, and Table 7-4 parameters quarterly
5	MW-3	In Sealed Area	Flow, field parameters, and Table 7-4 parameters quarterly
6	MW-4	In Sealed Area	Flow, field parameters, and Table 7-4 parameters quarterly
7	MW-5	Destroyed	Flow, field parameters, and Table 7-4 parameters quarterly
8	MW-6	Main South (DEEP)	Flow, field parameters, and Table 7-4 parameters quarterly
9	MW-6a	Main South (No of Dike)	Flow, field parameters, and Table 7-4 parameters quarterly
10	MW-7	Main West	Flow, field parameters, and Table 7-4 parameters quarterly
11	MW-8	Main South (So of Dike)	Flow, field parameters, and Table 7-4 parameters quarterly

** Note: Monitoring of all In-Mine Monitoring wells has been discontinued since the mine was sealed up following the 2007 collapse of the mine. (See Plate 7-18 for locations)

Surface Water

Streams

1	Upper Flume Crandall Creek	Flow, field parameters, and Table 7-8 parameters quarterly
2	Lower Flume Crandall Creek	Flow, field parameters, and Table 7-8 parameters quarterly
3	Horse Canyon Creek	Flow, field parameters, and Table 7-8 parameters quarterly
4	Blind Canyon Creek	Flow, field parameters, and Table 7-8 parameters quarterly
5	Indian Creek	Flow, field parameters, and Table 7-8 parameters quarterly
6	IBC-1	Flow, field parameters, and Table 7-8 parameters quarterly
7	Section 4 Creek	Flow, field parameters, and Table 7-8 parameters quarterly
8	Section 5 Creek (lower)	Flow, field parameters, and Table 7-8 parameters quarterly
9	Section 5 Creek (Upper Right Fork)	Flow and field parameters quarterly
10	Section 5 Creek (Upper Left Fork)	Flow and field parameters quarterly
11	Little Bear Creek	Flow, field parameters, and Table 7-8 parameters quarterly
12	Shingle Creek	Flow, Field parameters quarterly.

UPDES

1	001	Sediment Pond Discharge	Flow, field parameters, and UPDES parameters per occurrence
2	002	Mine Water Discharge	Flow, field parameters, and UPDES parameters monthly

Mine Discharge

1	Pre-002	Pre-treated Mine Water	Flow, field parameters and Table 7-4(A) parameters monthly

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 2-5 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 the electronic water monitoring data base) on a monthly basis 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".

At the lower end of the treatment facility, the treated minewater water is collected into a buried pipeline which crosses underneath the road and connects to the existing discharge line. In this manner the treated water ends up reporting to the Crandall Canyon drainage (by way of the main bypass culvert) at the existing approved UPDES outfall point.

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. At the present time (January, 2012) it is uncertain whether or not long-term treatment of the mine discharge water will be required, because naturally-occurring chemical processes within the mine could potentially bring the iron content of the water to within compliance limits at some time in the future . This scenario is currently being addressed under Division Order DO-10 and is a matter of on-going legal negotiations between the company and the Division, as mandated by the Board of Oil, Gas and Mining. Until such time as the final terms of these on-going negotiations have been fully implemented, the company commits to collecting additional hydrologic baseline data. This data includes:

a) flow quantities from the seep in the sandstone ledge above the treatment facility,.

b) measurement of the discharge rate from the sealed portals; either continuously (e.g., using a data logger) or at a minimum, daily

c). monthly whole water chemical analysis and field measurements of the untreated mine discharge as specified on Table 7-4(A).

7.42.22 Sedimentation Pond

Design

The sedimentation pond located in Crandall Canyon has been redesigned to control the additional storm runoff from the pad extension and from the designated undisturbed drainage areas above the pad extension associated with the proposed culvert expansion. The topography and watershed boundaries are shown on Plate 7-5 and 7-5C. Cross sections of the pond design are shown on Plate 7-3.

APPENDIX 7-65.....DISCUSSION

APPENDIX 7-65

CRANDALL CANYON MINE

MINE DISCHARGE WATER IRON TREATMENT FACILITY

Discussion	
Attachment 1	Maelstrom Oxidizer Unit
Attachment 2	**DELETED, JANUARY, 2012**
Attachment 3	Pit Liner Information
Attachment 4	**DELETED, JANUARY, 2012**
Attachment 5	**DELETED, JANUARY, 2012**
Attachment 6	Drainage Information
Attachment 7	Safety Factor Determination
Attachment 8	Construction Specifications and Drawings
Attachment 9	Temporary Use of Crandall Sediment Pond
Attachment 10	MSDS Sheets for Nalco 7763 and Nalco 8187
Attachment 11	Estimated Operating Costs

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, 3) a sludge re-circulation system to provide additional seed particles for enhanced particle formation, 4) a settling basin which allows the iron particulates to settle out of the water, and 5) a series of suction tube located in the settling basin to aid in cleaning the sludge from the system. (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 January, 2011. 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, specifically Nalco 8187. 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, specifically Nalco 7763. The treated water is then sent to a settling basin. The MSDS sheets for both Nalco 8187 and Nalco 7763 are included in Attachment 10. Only treatment chemicals certified under NSF60 will be utilized for the mine water treatment system. The company will monitor the dosage rate (in mg/L) for all treatment chemicals used. The company will monitor treated water for carryover of treatment chemicals on a monthly basis or when dosage rates or chemical products are changed. Dosage rates will not exceed the NSF60 certified concentrations without a prior demonstration to the Division, Forest Service and DWQ that elevated dosages rates are acceptable based on analytical results for treated water samples.

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 for 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. 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 6000 gallons of coagulant. The bay also can store up to 2500 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. Presently (January, 2012), the flocculant is being prepared in the make-down unit at a concentration of 0.25%.

The treatment facility is presently (as of January, 2012) being upgraded so that all elements of the chemical treatment can be automatically controlled and monitored. A flow meter will soon 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 6000 gallon of coagulant (in 3 ea..2000 gallon tanks) and one tote of flocculant. At current injection rates, this will allow the system to operate about four months before requiring refill of the coagulant storage, and about 4 months for the flocculant. Therefore, the facility has been designed to operate on a long-term continuous basis without requiring any chemical replacement supply disruptions.

At present (January, 2012) the facility has been successfully treating the mine discharge water so that all UPDES compliance levels have been met for the past 22 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.

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 fer 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. Under current operating conditions the sludge is being re-circulated at a rate of 500 gpm.

The chemically treated water from the oxidizer unit is then sent to the settling basin. Iron precipitates generated in the oxidizer unit drops out of suspension and accumulates in the settling basin. The basin has been divided into five 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. 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. In order to facilitate cleaning the sludge material from the basin, the company has installed a number of cleaning tubes 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 more 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.

Clean-out is done on an as needed basis, based on visual observations of the extent, density and distribution of accumulations within the basin. Based on the limited historical experience to date, it appears as though the basin may require regular cleanout approximately once every several months. However, the company is experimenting with different cleaning techniques which may alter the clean-out frequency in the future.

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.

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, as per the previously approved plan.

Previously, this sludge material was hauled to the Wildcat Loadout (permitted under MRP C/007/033), where it was disposed of in Sediment Pond C. However, the company has recently turned ownership of the Wildcat Loadout over to the Intermountain Power Agency (IPA), and can no longer utilize Pond C for disposal. Therefore, as an alternate to the Wildcat disposal site, the company is now in the process of permitting a new disposal site in lower Huntington Canyon. This site is located on SITLA land and will consist of a shallow evaporation pond. This site would be permitted, designed and constructed as a permanent SMCRA disposal facility for the "non-coal waste" sludge material. In the meantime, the company will continue to experiment with alternate sludge disposal options, such as geo-bag filtration devices, which would hopefully provide a more cost-effective alternative for longer-term sludge disposal.

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. In an attempt to minimize the potential for emergency shut-downs, the company now maintains spare pumps, a spare make-down unit, and a back up flow meter on site. The system is currently being monitored continuously by computer interface so that off-site operating and maintenance personnel can stay apprised of the operational status of the facility on a real-time basis and respond as needed.

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.

RECLAMATION AND BONDING

At such time as the water treatment facility is no longer needed, the facility will be reclaimed. This could be at the time of final reclamation or prior to it, depending on circumstances at the time. The existing facility is currently approved and bonded for reclamation by the Division. Presently (January, 2012) the company and the Division are in negotiated discussions regarding the requirements for possible long-term treatment. As part of these negotiations, the Division and the company have agreed upon projected operating costs of the existing facility. These costs, and the stipulation agreement, are included in Attachment 11.

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) operational performance data demonstrating the effectiveness of the existing treatment system methodology. Specifics of the baseline monitoring for the ledge seep and the raw mine water discharge can be found in Chapter 7 text in Section 7.31.2.

Operational performance data: The company commits to gathering data to reflect on the effectiveness of the oxidation/settling methodology employed in the existing system. 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 parameters will include the following:

Laboratory Analysis:

Iron (total, dissolved)
Manganese (total and dissolved)
Aluminum (total and dissolved)

Alkalinity
Sulfate
TDS
TSS
Chloride
Dissolved Calcium
Dissolved Potassium
Dissolved Sodium
Dissolved Magnesium
Dissolved Silica
Hot Acidity

Field Parameters

pH
Dissolved Oxygen
Conductivity
Temperature
Ferrous Iron

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 performed an on-site inspection of the Crandall Creek drainage with the appropriate regulatory agencies in the summer of 2010). The purpose of the inspection was 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) made the determination to not remove the iron accumulations from the stream channel at this time. However, if needed, future inspections will be conducted by the Division (with concurrence with the Forest Service and consultation from other agencies) to make a determination as to what clean-up measures, if any, should be taken to remove the iron accumulations from the stream channel.

TEMPORARY USE OF CRANDALL SEDIMENT POND

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. Since the initial cleaning, additional cleaning tubes have been added and the pond has been cleaned several more times.

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 may include the use of mechanical filtration devices (geogbags) 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 autumn months when seasonal weather conditions will promote effective evaporation of the sludge material. By being able to temporarily store the material in the Crandall sediment pond, 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.

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.

As mentioned previously, this sludge material was hauled to the Wildcat Loadout (permitted under MRP C/007/033), where it was disposed of in Sediment Pond C. However, the company has recently turned ownership of the Wildcat Loadout over to the Intermountain Power Agency (IPA), and can no longer utilize Pond C for disposal. Therefore, as an alternate to the Wildcat disposal site, the company is now in the process of permitting a new disposal site in lower Huntington Canyon near the northern terminus of the Burma Road. This site is located on SITLA land and will consist of a shallow evaporation pond. Therefore, the company may seek approval from the Division to temporarily utilize the Crandall sediment pond for sludge disposal during the time period involved in permitting and constructing the "Burma" evaporation ponds. This usage would be under all of the same conditions as the previously approved temporary usage as specified above. On June 16, 2011, the Division granted approval for temporary iron sludge storage within the sediment pond. The company commits that within 60 days of final approval of the Burma Evaporation Basin the site will be constructed and operational. The company also acknowledges that after this same 60-day period continued utilization of the Crandall sediment pond for iron sludge disposal will no longer be authorized by the Division.

ESTIMATED OPERATING COSTS

Estimated operating costs for the treatment facility are presented in Attachment 11. These costs have been agreed upon by the Division and the Company as part of legal settlement negotiations relating to the abatement of NOV 10073 and resolution of Division Order DO-10A.

APPENDIX 7-65.....ATTACHMENT 2

NOTE TO REVIEWERS:

PLEASE DELETE ATTACHMENT 2 FROM APPENDIX 7-65. IT IS NO LONGER RELEVANT

ATTACHMENT 2

********DELETED, JANUARY, 2012********

APPENDIX 7-65.....ATTACHMENT 4

NOTE TO REVIEWERS:

PLEASE DELETE ATTACHMENT 4 FROM APPENDIX 7-65. IT IS NO LONGER RELEVANT

ATTACHMENT 4

*******DELETED, JANUARY, 2012*******

APPENDIX 7-65.....ATTACHMENT 5

NOTE TO REVIEWERS:

PLEASE DELETE ATTACHMENT 5 FROM APPENDIX 7-65. IT IS NO LONGER RELEVANT

ATTACHMENT 5

********DELETED, JANUARY, 2012********

APPENDIX 7-65.....ATTACHMENT 8

NOTE TO REVIEWERS:

ADD THESE NEW DRAWINGS TO THE OTHER DRAWINGS IN ATTACHMENT 8 OF APPENDIX 7-65

AS-BUILT PLAN, IRON TREATMENT FACILITY

MINE-WATER TREATMENT AS-BUILT FLOW DIAGRAM

ATTACHMENT 8

CONSTRUCTION SPECIFICATIONS AND DRAWINGS

KEYED NOTES

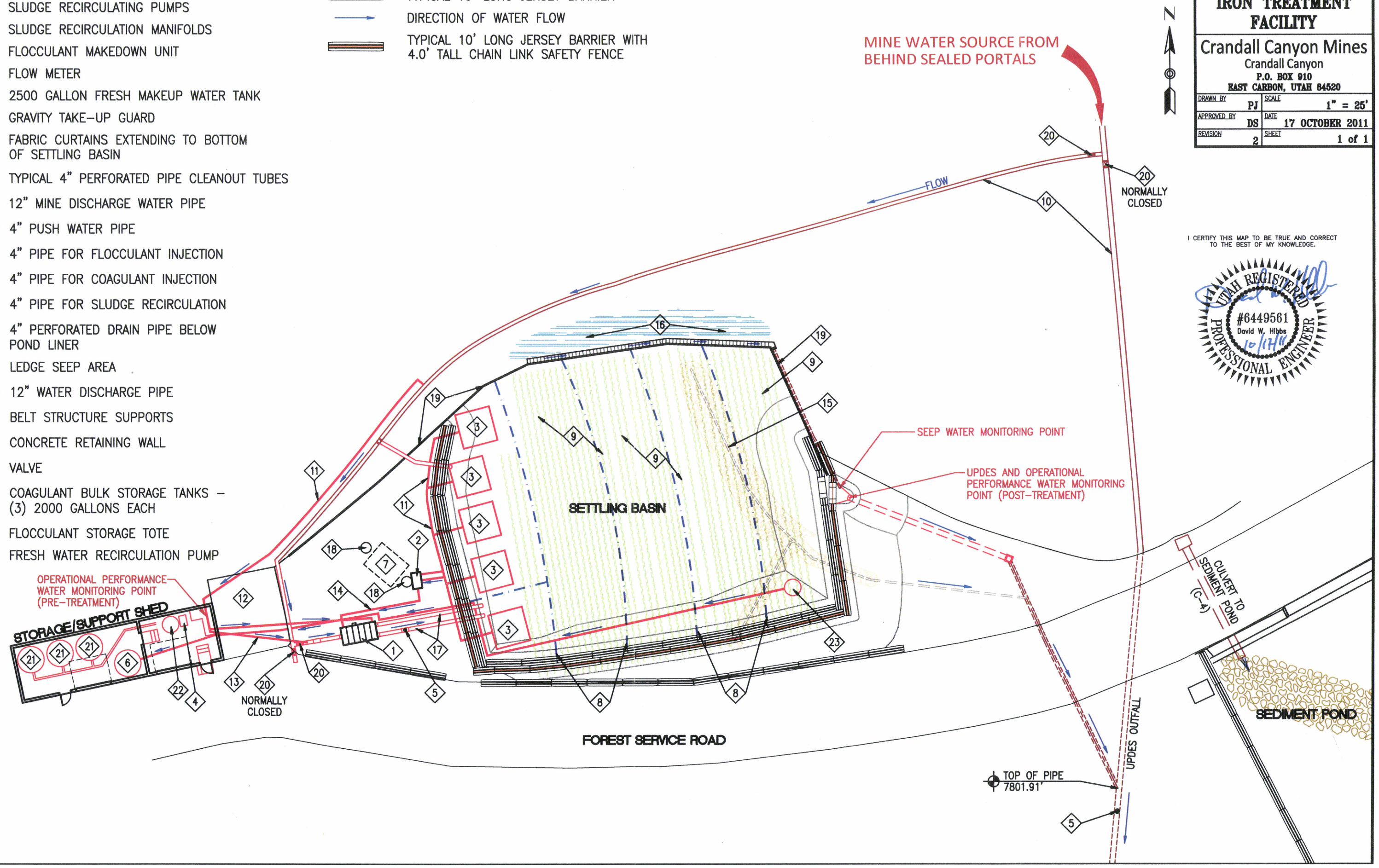
1. MAELSTROM OXIDIZING UNIT
2. SLUDGE RECIRCULATING PUMPS
3. SLUDGE RECIRCULATION MANIFOLDS
4. FLOCCULANT MAKEDOWN UNIT
5. FLOW METER
6. 2500 GALLON FRESH MAKEUP WATER TANK
7. GRAVITY TAKE–UP GUARD
8. FABRIC CURTAINS EXTENDING TO BOTTOM OF SETTLING BASIN
9. TYPICAL 4" PERFORATED PIPE CLEANOUT TUBES
10. 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 BULK STORAGE TANKS – (3) 2000 GALLONS EACH
22. FLOCCULANT STORAGE TOTE
23. FRESH WATER RECIRCULATION PUMP

LEGEND

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

12.5' 0 25' 50'

N



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: 17 OCTOBER 2011
REVISION: 2	SHEET: 1 of 1

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

UTAH REGISTERED #6449561 David W. Hibbs 10/14/11 PROFESSIONAL ENGINEER

\Current Drawings\MRP...s\Crandall Canyon\Current\CranDall Portal Reclamation\Settlement Pond As-Built 10-17-11.dwg, Plan View, .../2011 3:13:58 PM

G:\Current Drawings\Maps\Crandall Canyon\Current\CranDall Portal Reclamation\Settlement Pond Flow Diagram 10-17-11.dwg, 10/17/2011 3:14:59 PM

4" MIXING PROCESS WATER PIPE

PRE-TREATMENT OPERATIONAL PERFOMANCE WATER MONITORING POINT

BACKUP WATER SUPPLY

P

BYPASS

12" WATER PIPE

MINEWATER SOURCE FROM BEHIND SEALED PORTALS (±500 gpm)

FRESH WATER SUPPLY
1 EACH
2500 GALLON TANK

FLOCCULANT MAKE-DOWN UNIT

4" PIPE

12" WATER PIPE

FLOCCULANT
NALCO BRAND
"NALCLEAR 7763"
(POLYACRYLAMIDE)
±2.5 - 3 ppm (est.)**

M
TOTE

M
STATIC

FABRIC CURTAINS

SETTLING BASIN

SLUDGE RE-CIRCULATION

4" PIPE

4" PIPE

SLUDGE RE-CIRCULATION MANIFOLDS

UPDES AND OPERATIONAL PERFORMANCE WATER MONITORING POINT #002 (POST-TREATMENT)

4" PIPE

COAGULANT
NALCO BRAND
"ULTRION 8187"
(ALUMINUM CHLORIDE)
30 - 40 ppm (est.)**

MAELSTROM OXIDIZING UNIT

F

(2) 12" DISCHARGE PIPES

BLOWER

TO CRANDALL CREEK

4" DIA. PERFORATED PIPE CLEANOUT TUBES

SLUDGE TO DISPOSAL

ENCLOSED STORAGE / SUPPORT SHED

KEY

P PUMP

F FLOW METER

M MIXER

** CHEMICALS ARE CURRENT AS OF OCTOBER 2011. DOSAGE RATES ARE APPROXIMATE. CHEMICALS AND RATES MAY CHANGE IN THE FUTURE BASED UPON TRIAL TESTING RESULTS, AND IMPROVED MECHANIZATION AND CONTROL.

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

UTAH REGISTERED #6449561 David W. Hibbs PROFESSIONAL ENGINEER 10/17/11

MINE-WATER TREATMENT AS-BUILT FLOW DIAGRAM

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

DRAWN BY: PJ	SCALE: NONE
APPROVED BY: DH	DATE: 17 OCTOBER 2011
REVISION: 2	SHEET: 1 of 1

APPENDIX 7-65.....ATTACHMENT 10

NOTE TO REVIEWERS:

ADD THIS ATTACHMENT TO THE BACK OF APPENDIX 7-65. THIS ATTACHMENT CONTAINS THE TREATMENT CHEMICAL MSDS SHEETS

ATTACHMENT 10

MSDS SHEETS FOR NALCO 7763 AND NALCO 8187

NALCO

SAFETY DATA SHEET

PRODUCT

NALCLEAR® 7763

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCLEAR® 7763**

COMPANY IDENTIFICATION :

Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact. Toxic to aquatic organisms.
Do not get in eyes, on skin, on clothing. Do not take internally. Wear suitable protective clothing. Keep container tightly closed. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap and water. Protect product from freezing.
Wear suitable protective clothing, gloves and eye/face protection.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.
Water in contact with the product will cause slippery floor conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. If swallowed a jelly mass may form which in digestion may cause blockage.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
Frequent or prolonged contact with product may defat and dry the skin, leading to discomfort and dermatitis.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. Get medical attention.

SKIN CONTACT :
Remove contaminated clothing. Wash off affected area immediately with soap and plenty of water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. If symptoms develop, seek medical advice.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition. If swallowed a jelly mass may form which in digestion may cause blockage.

5. FIRE FIGHTING MEASURES

FLASH POINT :	Not flammable
LOWER EXPLOSION LIMIT :	Not flammable
UPPER EXPLOSION LIMIT :	Not flammable

EXTINGUISHING MEDIA :
Foam, Dry powder, Carbon dioxide, Other extinguishing agent suitable for Class B fires

UNSUITABLE EXTINGUISHING MEDIA :
Do not use water unless flooding amounts are available.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. Water in contact with the product will cause slippery floor conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Notify appropriate government, occupational health and safety and environmental authorities. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Spill may be slippery.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Water in contact with the product will create a voluminous, slippery gel. Soak up as thoroughly as possible with inert absorbent material or sawdust. Do NOT hose down area until all possible traces of polymer are removed. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
This product is toxic to fish and other water organisms. Do not discharge directly into lakes, ponds, streams, waterways or public water supplies.

7. HANDLING AND STORAGE

HANDLING :
Do not take internally. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Do not get in eyes, on skin, on clothing. Use with adequate ventilation. Keep the containers closed when not in use.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed. Store separately from oxidizers. Protect product from freezing.

SUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

Substance(s)	Category:	ppm	mg/m3	Non-Standard Unit

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Due to its low volatility and toxicity, the hazard potential associated with this material is relatively low. Respiratory protection is not normally needed.

HAND PROTECTION :
Nitrile gloves PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Emulsion
APPEARANCE	Opaque Off-white
ODOR	Hydrocarbon
SPECIFIC GRAVITY	1.03 - 1.07 @ 77 °F / 25 °C
DENSITY	8.6 - 9.0 lb/gal
SOLUBILITY IN WATER	Emulsifiable
pH (100 %)	8
VISCOSITY	400 - 1,200 cps @ 77 °F / 25 °C
FREEZING POINT	< -4 °F / < -20 °C
VOC CONTENT	27.4 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures. Extremes of temperature

MATERIALS TO AVOID :
Addition of water results in gelling. Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product and a 1% aqueous solution of the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Sheepshead Minnow	96 hrs	> 1,000 mg/l	1% Aqueous Solution of a Similar Product
Rainbow Trout	96 hrs	> 1,000 mg/l	1% Aqueous Solution of a Similar Product
Fathead Minnow	96 hrs	34.3 mg/l	Product
Inland Silverside	96 hrs	52.5 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	280 mg/l		1% Aqueous Solution of Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	400 mg/l		1% Aqueous Solution of Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	70 - 90%

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 176.170 Components of paper and paperboard in contact with aqueous and fatty foods and 21 CFR 176.180 Components of paper and paperboard in contact with dry foods.

Limitation: For use as an adjuvant in the manufacture of paper and paperboard in an amount not to exceed that necessary to accomplish the technical effect and not to exceed 2 percent (as polymer) by weight of the paper or paperboard.

NSF INTERNATIONAL :
This product has received NSF/International certification under NSF/ANSI Standard 60 in the coagulation and flocculation category. This product has received NSF/International certification under NSF/ANSI Standard 60 in the Filtration Aid category. The official name is "Polyacrylamide." Maximum product application dosage is : 1 mg/l.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product. Trace levels of listed components may be present.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
Not considered a WHMIS controlled product.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Moderate

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS® CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS® CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight® CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS® CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight® (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight® CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS® CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 11/06/2009
Version Number : 1.20

NALCO

SAFETY DATA SHEET

PRODUCT

ULTRION® 8187

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **ULTRION® 8187**

APPLICATION : WATER CLARIFICATION AID

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Aluminum Chloride Hydroxide	12042-91-0	30.0 - 60.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Irritating to eyes.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
Not flammable or combustible. May evolve HCl under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause moderate irritation.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. May cause mucosal damage.

INHALATION :
Not a likely route of exposure. May cause irritation of mucous membranes.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. Get medical attention.

SKIN CONTACT :
Remove contaminated clothing. Wash off affected area immediately with plenty of water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Not expected to burn. Use extinguishing media appropriate for surrounding fire. Keep containers cool by spraying with water.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. May evolve HCl under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

STORAGE CONDITIONS :
Store the containers tightly closed. Store separately from bases.

SUITABLE CONSTRUCTION MATERIAL :
PVC, Buna-N, Polyurethane, Polypropylene, Polyethylene, Viton, HDPE (high density polyethylene), 100% phenolic resin liner

UNSUITABLE CONSTRUCTION MATERIAL :
Brass, Hypalon, Stainless Steel 304, EPDM, Mild steel, Stainless Steel 316L, Neoprene, Epoxy phenolic resin

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

Country/Source	Substance(s)	Category:	ppm	mg/m3

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Due to its low volatility and toxicity, the hazard potential associated with this material is relatively low. Respiratory protection is not normally needed.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Colorless
ODOR	None
SPECIFIC GRAVITY	1.34 @ 77 °F / 25 °C
DENSITY	11.1 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	3.5
FREEZING POINT	32 °F / 0 °C
BOILING POINT	219.2 °F / 104 °C
VAPOR PRESSURE	Same as water
VOC CONTENT	0.00 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Avoid extremes of temperature.

MATERIALS TO AVOID :
Strong Bases

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: HCl

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Inland Silverside	96 hrs	> 5,000 mg/l	Product
Rainbow Trout	96 hrs	590 mg/l	Product
Fathead Minnow	96 hrs	1,094 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	> 5,000 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	4,773 mg/l		Product
Ceriodaphnia dubia	48 hrs	> 5,000 mg/l		Product

CHRONIC INVERTEBRATE RESULTS :

Species	Test Type	NOEC / LOEC	End Point	Test Descriptor
Ceriodaphnia dubia		15 mg/l / 30 mg/l	Reproduction	Product

PERSISTENCY AND DEGRADATION :

Total Organic Carbon (TOC) : 99 mg/l

Chemical Oxygen Demand (COD) : 490 mg/l

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	< 14 mg/l	Product

Greater than 95% of this product consists of inorganic substances for which a biodegradation value is not applicable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Aluminum Chloride Hydroxide : Eye irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 176.170 Components of paper and paperboard in contact with aqueous and fatty foods and 21 CFR 176.180 Components of paper and paperboard in contact with dry foods.

Product must be used at a pH above 5.5 to retain its FDA status. Limitations: no more than required to produce intended technical effect.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

NSF INTERNATIONAL :
This product has received NSF/International certification under NSF/ANSI Standard 60 in the coagulation and flocculation category. The official name is "Polyaluminum Chloride." Maximum product application dosage is : 180 mg/l.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
D2B - Materials Causing Other Toxic Effects - Toxic Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
This product contains substance(s) which are not in compliance with the Law Regulating the Manufacture and Importation Of Chemical Substances and are not listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 07/31/2009
Version Number : 3.0

APPENDIX 7-65.....ATTACHMENT 11

NOTE TO REVIEWERS:

ADD THIS ATTACHMENT TO THE BACK OF APPENDIX 7-65. THIS ATTACHMENT CONTAINS THE STIPULATION FOR THE ESTIMATED OPERATING COSTS

Steven F. Alder (# 00033)
Emily E. Lewis (# 13281)
Assistants Utah Attorney General
1594 West North Temple St. #300
Salt Lake City, Utah 84118
Telephone 801 538 5348

FILED
DEC 0 6 2011
SECRETARY, BOARD OF
OIL, GAS & MINING

BEFORE THE BOARD OF OIL, GAS AND MINING
DEPARTMENT OF NATURAL RESOURCES
STATE OF UTAH

In the Matter of the Petition of Genwal Resources, Inc. for Review of Division Order DO10A, Crandall Canyon Mine	**STIPULATION AS TO COSTS OF WATER TREATMENT FOR THE CRANDALL CANYON MINE** Docket No. 2010-026 Cause No. C/015/0032

The Utah Division of Oil, Gas and Mining (the "Division") and Petitioner Genwal Resources, Inc. ("Genwal") through their respective counsel hereby jointly Stipulate as follows:

1. In lieu of proceeding with an evidentiary hearing on the annual operating costs for the water treatment system at the Crandall Canyon mine at the December 7, 2011 Board Hearing, the parties stipulate that the total annual costs are $240,000.00 as itemized on the schedule of costs attached hereto as Exhibit A. These costs are based on each party's estimates and data and are presented as a good faith compromise while acknowledging differences of opinion may exist.

2. This amount and itemized schedule may be used by the Division and the Board to satisfy any current permit obligations to provide treatment costs and details and will be

subject to continued permit oversight including abating the pending notice of violation, and to address the requirements of the Division Order 10-A.

3. This estimate of costs is based on current operations. In the event of significant changes in the operational costs or process, either party may petition the Board for a review of this number with regard to any purposes for which the estimated operation costs may be used.

4. If Genwal's cost of treatment substantially change or for any other reason, the Division and Genwal each reserve the right to request a modification of the amount based on additional information and to request a hearing before the Board to determine a modified estimate of costs if necessary.

5. The parties have entered into this Stipulation, subject to the Board of Oil, Gas and Mining's ("Board") approval.

The foregoing Stipulation is approved by signature of counsel as of the date shown.

Division of Oil, Gas and Mining

BY: _____

Dated: 12/6/11

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GENWAL RESOURCES, INC.

BY: _____

Dated: 12/6/11

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Mine Water Treatment Operations and Maintenance Cost Estimates

	Stipulated Costs
Operations	
Labor **(1)**	$ 54,152
Treatment Chemicals – Coagulant	80,500
Treatment Chemicals – Flocculant	9,800
Water Haulage	0
Snow Removal **(2)**	3,600
Laboratory Analysis **(3)**	6,864
Propane	0
Power **(4)**	6,144
Telephone **(5)**	540
UPDES Permit **(6)**	0
Subtotal Operations:	$ 161,600
Maintenance	
Sludge Cleanout & Disposal **(7)**	$ 72,000
Disposal Site Land Cost **(8)**	3,000
Equipment Maintenance **(9)**	0
Pond Maintenance **(10)**	2,100
Equipment Replacement **(11)**	1,300
Subtotal Maintenance:	$ 78,400
Total Operations & Maintenance	**$ 240,000**