CAMECO RESOURCES
CROW BUTTE OPERATION

86 Crow Butte Road
P.O. Box 169
Crawford, Nebraska 69339-0169

(308) 665-2215
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December 21, 2010

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Keith I. McConnell, Deputy Director
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Mail Stop T8-F5
Washington D.C. 20555-0001

Re: Source Material License SUA-1534
Docket No. 40-8943
Notice of Cessation of Mining in Mine Unit #6
Request for an Alternate Decommissioning (Groundwater Restoration) Schedule

Dear Mr. McConnell:

In conformance with 10 CFR Part 40.42(d), Cameco Resources – Crow Butte Operation (CBO) is providing notice of cessation of mining in Mine Unit #6. On October 28, 2010, CBO permanently ceased injection of lixiviant into Mine Unit #6 and began implementation of the attached restoration plan. The sequence of restoration activities is outlined in the restoration plan and was approved by the Nebraska Department of Environmental Quality (NDEQ) on November 5, 2010.

As specified in 10 CFR Part 40.42(h)(1), CBO must also complete mine unit restoration within 24 months after mine unit restoration is initiated. If mine unit restoration requires more than 24 months to complete, CBO must notify the NRC and request an alternate schedule for completion of decommissioning, along with adequate justification for the request. The following table displays the schedule and timeline for the various phases of restoration for Mine Unit #6.

Proposed Mine Unit #6 Restoration Schedule

IX Treatment	**Flow**
November 1, 2010 through June 30, 2014 (3 pore volumes)	100 GPM
RO Treatment	
July 1, 2014 through June 30, 2016 (6 pore volumes)	400 GPM
Recirculation	
July 1, 2016 through December 31, 2017 (2 pore volumes)	200 GPM
Stability and Regulatory Approval	
January 1, 2018 through December 31, 2019	N/A

This schedule is based on the flow capacity through IX and RO circuits, the volume of waste water generated in these circuits, and the pore volume of the mine unit. The size of the mine unit, flow and piping capacity of the restoration circuit, deepwell disposal capacity, and the need to maintain a hydrologic balance between the mining and restoration units, makes it technically infeasible to restore Mine Unit #6 within a 24 month period. CBO believes that the alternate schedule is technically feasible and will not be detrimental to the public health and safety and is otherwise in the public interest.

If you have any questions please feel free to contact me at (307) 316-7595.

Sincerely,
Cameco Resources
Crow Butte Operation

Thomas P. Young
Vice-President of Operations

Attachment as Stated

cc: Ron Burrows – Project Manager - NRC
Jim Stokey – General Manager – CBO
CBO File
ec: Joe Brister – Cheyenne Office

Dave Heineman
Governor

STATE OF NEBRASKA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Michael J. Linder
Director
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1200 'N' Street
P.O. Box 98922
Lincoln, Nebraska 68509-8922
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NOV 05 2010

Mr. Thomas Young
Crow Butte Resources, Inc.
141 Union Boulevard, Suite 330
Lakewood, Colorado 80228

Dear Mr. Young:

On January 26, 2010 the Nebraska Department of Environmental Quality received a submittal of information from Crow Butte Resources, Inc. The submittal serves as a Notice of Intent (NOI) to Operate for Mine Unit 11 and contains Well Completion Reports and Casing Integrity Test Reports and baseline sampling and water quality assays for the wells associated with Mine Unit 11, and completion reports and integrity tests Wellhouse 61, the first well house constructed in Mine Unit 11.

On February 22, 2010 NDEQ denied the Notice of Intent for Mine Unit 11 contingent upon placing a mine unit into restoration. On October 28, 2010 Mine Unit 6 was placed into restoration.

The Department has reviewed all information submitted and determined that it is adequate and complete. Based upon the data presented in this NOI , Upper Control Limits and Restoration Values proposed for Mine Unit 11 are approved. Approval of additional portions of Mine Unit 11 will not alter those values. The Department hereby approves the NOI for Mine Unit 11, Wellhouse 61.

If you have any questions concerning this matter, please contact Jenny Coughlin of my staff at (402) 471-4290.

Sincerely,

Michael J. Linder
Director

ML/jlc
word/CBR/letter/NOI_MU11WH61.doc

Cc: Dave Carlson, NDEQ
Jim Stokey, CBR

CROW BUTTE RESOURCES, INC.

CROW BUTTE OPERATION

Mine Unit 6

Groundwater Restoration Plan

Nebraska Department of Environmental Quality

Underground Inject Control Permit Number NE0122611

OCTOBER 5, 2010

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INTRODUCTION

Crow Butte Resources, Inc. (CBR) operates the Crow Butte Uranium Mine in Dawes County, Nebraska. Underground Injection Control (UIC) Permit Number NE0122611 issued by the Nebraska Department of Environmental Quality (NDEQ) requires that CBR submit a plan to restore each mine unit after the cessation of mining activities. This document presents CBR's plan for the restoration of Mine Unit 6.

NDEQ Permit NE0122611 requires that each mine unit be returned to a wellfield average of the restoration parameters in Table 1. Concentrations for these parameters are approved by the NDEQ with the Notice of Intent to Operate for each mine unit. The restoration values for Mine Unit 6 were approved by a letter received by CBR from NDEQ on March 3, 1998.

The commercial groundwater restoration program consists of two stages, the restoration stage and the stabilization stage. The restoration stage consists of four possible activities:

1) groundwater transfer;
2) groundwater sweep;
3) groundwater treatment; and
4) wellfield recirculation.

The sequence of the activities will be determined by CBR based on operating experience and waste water system capacity. Not all activities of the restoration stage will be used if deemed unnecessary or not appropriate by CBR.

A reductant may be added at any time during the restoration stage to lower the oxidation potential of the mining zone. A sulfide or sulfite compound will be added to the injection stream in concentrations sufficient to reduce the mobilized species.

The stabilization stage consists of monitoring the restoration wells for at least six months following successful completion of the restoration stage. Stabilization will begin once restoration activities have returned the average concentration of restoration parameters to acceptable levels. Following the stabilization period, CBR will submit documentation to the regulatory agencies that the wellfield is restored.

1 RESTORATION STAGE

Restoration activities include four steps that are designed to optimize restoration equipment used in treating groundwater and to minimize the number of pore volumes circulated during the restoration stage. CBR will monitor the quality of selected wells during restoration to determine the efficiency of the operations and to determine if additional or alternate techniques are necessary.

Prior to commencing restoration activities, the NDEQ will be notified that mining has ceased in Mine Unit 6. CBR will determine post-mining water quality as required in the NDEQ UIC Permit.

1.1 Groundwater Transfer

During the groundwater transfer step, water may be transferred between the mining unit (MU) commencing restoration and a MU or wellhouse commencing mining operations. Baseline quality water from the MU starting mining will be pumped and injected into the MU in restoration. The higher Total Dissolved Solids (TDS) water from the MU in restoration will be recovered and injected into the MU commencing mining. The direct transfer of water will act to lower the TDS in the MU being restored by displacing water affected by the mining with baseline quality water. The recovered water may be passed through ion exchange (IX) column(s) and filtration during this step if suspended solids are sufficient in concentration to present a problem with blocking the injection well screens.

For the groundwater transfer step to occur, a newly constructed MU or wellhouse must be ready to commence mining. If a MU is not available to accept transferred water, groundwater sweep or other activity will be utilized as the first step of restoration.

The advantage of using the groundwater transfer technique is that it reduces the amount of water that must ultimately be sent to the wastewater disposal system during restoration activities.

1.2 Groundwater Sweep

During groundwater sweep, water is pumped without injection causing an influx of baseline quality water from the perimeter of the mining unit, which sweeps the affected portion of the aquifer. The cleaner baseline water has lower ion concentrations that act to strip off the cations that have attached to the clays during mining. The plume of affected water near the edge patterns of the wellfield is also drawn into the boundaries of the MU.

The number of pore volumes transferred during groundwater sweep, if any, is dependent upon the capacity of the wastewater disposal system and the success of the groundwater transfer step in lowering TDS.

1.3 Groundwater Treatment

During the groundwater treatment step, water will be pumped from production wells to treatment equipment and then re-injected into the wellfield. IX and reverse osmosis (RO) treatment equipment at a minimum will be utilized during this stage as shown on the generalized restoration flow sheet in Figure 1.

Water recovered from restoration containing a significant amount of uranium is passed through the ion exchange (IX) system. The IX column(s) exchange the majority of the contained soluble uranium for chloride or sulfate. A small amount of reductant may be metered into the restoration wellfield injection to reduce any oxidized minerals. The concentration and type of trace elements encountered determine the concentration of reductant injected into the formation.

Another potential method for reducing the oxidation state of groundwater in the wellfield is through bioremediation. Bioremediation entails adding an organic electron donor, such as cheese whey, alcohol, or soybean oil, to the aquifer to stimulate native bacteria. As the bacteria feed on the organic media they generate a reducing environment which in turn causes most metals in solution to precipitate back to their original state. The concentration of native bacteria colonies returns to normal levels once the organic media is consumed. Crow Butte Resources, Inc. will seek approval from the NDEQ before initiating bioremediation in Mine Unit 6.

A portion of the restoration recovery water can be sent to the reverse osmosis (RO) unit. The use of a RO unit accomplishes the following goals:

- Reduces the total dissolved solids in the contaminated groundwater;
- Reduces the quantity of water that must be removed from the aquifer to meet restoration limits;
- Concentrates the dissolved contaminates in a smaller volume of brine to facilitate waste disposal; and
- Enhances the exchange of ions from the formation due to the large difference in ion concentration.

Before the water can be processed by the RO, soluble uranium can be removed by the IX system. The RO unit contains membranes that pass about 80 percent of the water through, leaving 60 to 90 percent of the dissolved salts in the water that will not pass the membranes. Table 2 shows typical manufacturers specification data for removal of ionic constituents. The clean water, called permeate, will be re-injected, sent to storage for use in the mining process, or to the wastewater disposal system. The twenty to forty percent of water that is rejected, called brine, contains the majority of dissolved salts and is sent for disposal in the wastewater system. Make-up water may be added to the wellfield injection stream or to the RO feed stream after passing through the IX system to control the amount of "bleed" in the restoration areas. The bleed in the restoration areas is dependent on the configuration of the mine unit in restoration and dependent on its location with respect to an active mining area. No bleed from an area that is in RO restoration is desirable if the mine unit is contiguous to an active mining mine unit.

The chemical reductant added to the injection stream during this stage will scavenge any oxygen and reduce the oxidation-reduction potential (eH or ORP) of the aquifer. During mining operations, certain trace elements are oxidized. By adding a reductant, the eH of the aquifer is lowered thereby decreasing the solubility of these elements. Hydrogen sulfide (H_2S), sodium sulfide (Na_2S) or a similar compound will be added as a reductant. A comprehensive safety plan regarding reductant use has been implemented.

The number of pore volumes treated and re-injected during the groundwater treatment stage will depend on the efficiency of the RO in removing TDS and the reductant in lowering the uranium and trace element concentrations.

1.4 Wellfield Recirculation

At the completion of the Groundwater Treatment Stage, wellfield recirculation may be initiated. In order to homogenize the aquifer, solutions can be recirculated by pumping from the production wells and re-injecting the recovered solution into injection wells.

Once the restoration activities are completed, CBR will sample the restoration wells and determine if the mining unit has achieved the restoration values, on a mine unit basis. Samples will be split with the Nebraska Department of Environmental Quality (NDEQ) in accordance with CBR's Class III Underground Injection Control (UIC) permit. CBR will submit the results of post-restoration sampling to the NDEQ. If the restoration values have been achieved, CBR will notify the regulatory agencies that it is initiating the Stabilization Stage and will submit supporting documentation that the restoration parameters are at or below the approved concentrations. If, at the end of restoration activities, the parameters are not at or below the approved values, CBR will either re-initiate certain steps of the restoration plan or submit documentation to the agencies that the best practical technology has been used in restoration. The documentation will include a justification for alternate parameter value(s) including available water quality data and a narrative of the restoration techniques used.

1.5 Proposed Restoration Wells

CBR is proposing the restoration wells listed in Table 3 – "Proposed MU6 Restoration Wells (Sept. 2010)" to be added to the restoration program in accordance with Part II, Section C.1 of the Class III UIC Permit. These wells are depicted and located on the attached map in Figure 3 – "MINE UNIT 6 PROPOSED RESTORATION WELLS"

2 STABILIZATION STAGE

Upon completion of restoration, a groundwater stabilization monitoring program will begin in which the restoration wells and any monitor wells on excursion status during mining operations will be sampled and analyzed for the parameter in Table 1. Sampling frequency will be one sample per month for a period of at least 6 months, and if the six samples show that the restoration values for all wells are maintained during the stabilization period and that there are no significant increasing trends, restoration shall be deemed complete.

2.1 Initial Stabilization Sample

CBR will sample and analyze discrete grab samples from each individual restoration well during the post-restoration (i.e., first round of stabilization) sampling. These samples will be split with the NDEQ. A physical composite sample will also be prepared from the individual well samples as discussed in Section 2.2 and included with the discrete grab sample for analysis of parameters in Table 1.

2.2 Subsequent Stabilization Samples

In subsequent monthly stabilization sampling, each designated restoration well will be sampled. A composite sample of these individual well samples will be prepared in the CBR laboratory and submitted to the contract laboratory for analysis of the constituents listed in Table 1. The individual samples from the restoration wells will be properly preserved and retained at the CBR laboratory until analytical results are received from the contract laboratory. If the analytical results indicate increasing trends in any monitored parameter(s), the individual well samples may be sent to the contract laboratory to determine whether the changes are due to increases in specific areas of the mine unit.

In addition to the composite sampling, CBR will analyze the discrete grab sampling from each individual restoration well approximately three months after the post-restoration sampling (i.e., first round of stabilization sampling). A physical composite sample of the individual wells will also be included with these discrete grab samples.

2.3 Final Stabilization Sample

During the final stabilization sample, CBR will sample and analyze discrete grab samples from each individual restoration well for the constituents listed in Table 1. A physical composite sample will also be prepared from the individual well samples as discussed in Section 2.2 and included with the discrete grab samples for analysis.

2.4 Stabilization Determination

The data from the stabilization period will be evaluated to confirm that the mine unit has remained stable during the monitoring period. If the stabilization samples show that the restoration standards are met during the minimum stabilization period and that there are no significant increasing trends, restoration shall be deemed complete.

If one or more of the monitored constituents exhibits significant increasing trends after the minimum six-month stability monitoring period, the stabilization period may be extended by the Director.

3 REPORTING

The initial step in the restoration process is notification of the NDEQ of the cessation of mining activities and determination of post-mining water quality in the mine unit as required in the NDEQ UIC Permit.

During the restoration process CBR will perform daily, weekly, and monthly analyses as needed to track restoration progress. These analyses will be provided to NDEQ in the Monthly Restoration Report as shown in Figure 2. A summary of this information will also be included in the final report on restoration.

Upon completion of restoration activities, all designated restoration wells in the mine unit will be sampled for the constituents listed in Table 1. The results of restoration and notification of the initiation deny initiation of stabilization based on the results of restoration. If restoration activities have returned the wellfield average of restoration parameters to concentrations at or below those approved by the NDEQ, CBR will continue with the stabilization phase of restoration.

During stabilization all designated restoration wells will be sampled monthly for constituents listed in Table 1. At the end of a minimum six-month stabilization period, CBR will compile all water quality data obtained during restoration and stabilization and submit a final report to the regulatory agencies. At that time CBR would request the mine unit be declared restored.

TABLE 1

RESTORATION PARAMETERS

Element
Ammonia (NH4 as N)
Arsenic (As)
Barium (Ba)
Cadmium (Cd)
Chloride (Cl)
Copper (Cu)
Fluorine (F)
Iron (Fe)
Mercury (Hg)
Manganese (Mn)
Molybdenum (Mo)
Nickel (Ni)
Nitrate as N (NO3)
Lead (Pb)
Radium 226 (Ra-226)
Selenium (Se)
Sulfate (SO4)
Uranium (U)
Vanadium (V)
Zinc (Zn)
pH
Sodium (Na)
Calcium (Ca)
Total Carbonate
Potassium (K)
Magnesium (Mg)
Total Dissolved Solids (TDS)

Table 2
Typical Membrane Rejection[1]

Name	Symbol	Percent Rejection
	CATIONS	
Sodium	Na^{+}	94-96
Calcium	Ca^{+2}	96-98
Magnesium	Mg^{+2}	96-98
Potassium	K^{+1}	94-96
Iron	Fe^{+2}	98-99
Manganese	Mn^{+2}	98-99
Aluminum	Al^{+3}	99+
Ammonium	NH_4^{+1}	88-95
Copper	Cu^{+2}	98-99
Nickel	Ni^{+2}	98-99
Zinc	Zn^{+2}	98-99
Strontium	Sr^{+2}	96-99
Hardness	Ca and Mg	96-98
Cadmium	Cd^{+2}	96-98
Silver	Ag^{+1}	94-96
Mercury	Hg^{+2}	96-98
	ANIONS	
Chloride	Cl^{-1}	94-95
Bicarbonate	HCO_3^{-1}	95-96
Sulfate	SO_4^{-2}	99+
Nitrate	NO_3^{-1}	95+
Fluoride	F^{-1}	94-96
Silicate	SiO_2^{-8}	80-95
Phosphate	PO_4^{-3}	99+
Bromide	Br^{-1}	94-96
Borate	$B_4O_7^{-2}$	35-70
Chromate	CrO_4^{-2}	90-98
Cyanide	CN^{-1}	90-95
Sulfite	SO_3^{-2}	98-99
Thiosulfate	$S_7O_3^{-2}$	99+
Ferrocyanide	$Fe(CN)_6^{-3}$	99+

[1] Source: Osmonics, Inc.

TABLE 3

BASELINE RESTORATION WELLS

MINE UNIT 6

1265	1397
1266	1398
1267	1423
1268	1581
1269	1584
1270	1600
1272	1601
1273	1602
1274	1667
1285	CM5-14
1348	CM5-15
1355	CM5-16
1356	CM5-17
1357	CM6-6 (Excursion)
1358	CM6-7 (Excursion)
1396	

TABLE 4

PROPOSED MU6 RESTORATION WELLS (1 per acre)

1426
1399
1439
1318
1446
1590
1611
1376
1703
1457
1706
1612
1494
1765
1832
1624
1751
1532
1800
1625
1663
1690
1843
1689

FIGURE 1

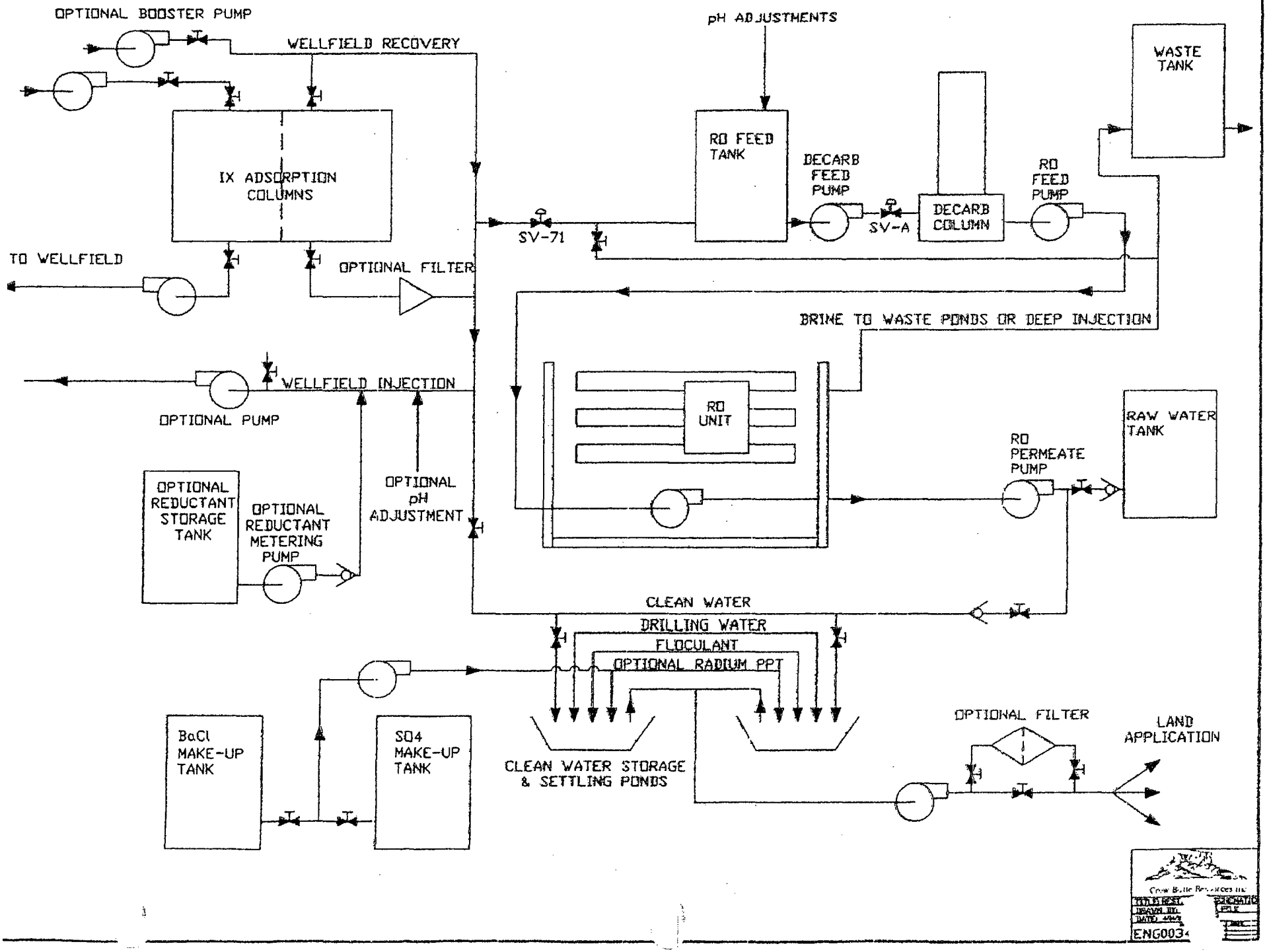
OPTIONAL BOOSTER PUMP
WELLFIELD RECOVERY
IX ADSORPTION COLUMNS
TO WELLFIELD
OPTIONAL FILTER
pH ADJUSTMENTS
RO FEED TANK
DECARB FEED PUMP
SV-71
SV-A
DECARB COLUMN
RO FEED PUMP
WASTE TANK
BRINE TO WASTE PONDS OR DEEP INJECTION
WELLFIELD INJECTION
OPTIONAL PUMP
RO UNIT
RO PERMEATE PUMP
RAW WATER TANK
OPTIONAL REDUCTANT STORAGE TANK
OPTIONAL REDUCTANT METERING PUMP
OPTIONAL pH ADJUSTMENT
CLEAN WATER
DRILLING WATER
FLOCULANT
OPTIONAL RADIUM PPT
BaCl MAKE-UP TANK
SO4 MAKE-UP TANK
CLEAN WATER STORAGE & SETTLING PONDS
OPTIONAL FILTER
LAND APPLICATION
ENG003

FIGURE 2

CROW BUTTE MINE

MONTHLY RESTORATION REPORT

DATE:

MINE UNIT 6

1. RESTORATION ACTIVITY DURING MONTH:

	YES	NO	
a. Groundwater Transfer			(if yes, complete part 2)
b. Groundwater Sweep			(if yes, complete part 3)
c. Groundwater Treatment			
d. Wellfield Recirculation			
e. Other (explain):			

2. LIST WELLS USED IN GROUNDWATER TRANSFER DURING THE MONTH:

3. LIST WELLS USED IN GROUNDWATER SWEEP DURING THE MONTH:

4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:


CROW BUTTE PROJECT
Mine Unit 6 Proposed Restoration Wells
Production Well
Injection Well
Monitor Well
Baseline Monitor Well
Proposed Designated Restoration Wells
Updated by JGH 9/20/10
File:\\Lincoln85\geology\ACADFILE\MU6
0 50 100 meters
0 100 200 300 400 feet
Sec 13 T31N R52E
Sec 18 T31N R51E
Sec 24 T31N 52E
Sec 19 T31N R51E

FIGURE 3

PROPOSED RESTORATION TABLE
MINE UNIT 6

All parameters are in mg/l unless otherwise noted.

Parameter	*Groundwater Standard*	*Wellfield Average*	*Standard Deviation*	*Restoration Value*
Ammonia	10			10
Arsenic	0.05			0.05
Barium	1.00			1.00
Cadmium	0.01			0.01
Chloride	250			250
Copper	1.00			1.00
Fluoride	4.00			4.00
Iron	.30			.30
Mercury	0.002			0.002
Manganese	0.05			0.05
Molybdenum	1.00			1.00
Nickel	0.15			0.15
Nitrate	10.0			10.0
Lead	0.05			0.05
Radium (pCi/l)	5.0	80.6	121.9	325
Selenium	0.01			0.01
Sulfate	250	361	14.6	390
Uranium	5.0			5.0
Vanadium	0.20			0.20
Zinc	5.			5.
pH (std. units)	6.5 - 8.5	8.6	0.2	6.5 - 9.0
Calcium	---	12.8		128
Total Carbonate	---	367.1		596
Potassium	---	11.9		119
Magnesium	---	3.2		32
TDS	---	1,192	28.1	1,220