TATA SUBMITTAL:

Index

1) Requirements
2) The Mine Plan
    a. Section 2, R109W, T17N details (includes map, timing and trona extraction)
    b. Section 12, R109W, T17N details (includes map, timing and trona extraction)
    c. 15-Year Mine Plan
3) Reclamation Plan
    a. Tata Reclamation Plan
    b. Statement of surface disturbance –including egress and ingress
4) Statement of surface owner interference
5) Statement of reclamation for future use

REQUIREMENTS

§ 35-11-406. Application for permit; generally; denial; limitations, WY ST § 35-11-406

(x) For a surface mining operation granted a new permit after July 1, 1973, and prior to March 1, 1975, except for an operation legally operating under the 1969 Open Cut Land Reclamation Act, an instrument of consent from the surface landowner, if different from the mineral owner, to the mining plan and reclamation plan. If consent cannot be obtained as to either or both, the applicant may request a hearing before the environmental quality council. The council shall issue an order in lieu of consent if it finds:

(A) That the mining plan and the reclamation plan have been submitted to the surface owner for approval;

(B) That the mining plan and the reclamation plan is detailed so as to illustrate the full proposed surface use including proposed routes of egress and ingress;

(C) That the use does not substantially prohibit the operations of the surface owner;

(D) The proposed plan reclaims the surface to its approved future use, in segments if circumstances permit, as soon as feasibly possible;

3b) That the mining plan and the reclamation plan is detailed so as to illustrate the full proposed surface use including proposed routes of egress and ingress;

Tata has no planned or anticipated surface disturbances, including egress or ingress. All planned mining and trona processing activities will be underground and mining related surface subsidence will be minimized or eliminated.

4) That the use does not substantially prohibit the operations of the surface owner;

There is no planned or anticipated surface owner interference. All Tata related activities will be underground.

5) The proposed plan reclaims the surface to its approved future use, in segments if circumstances permit, as soon as feasibly possible.

Tata plans no surface disturbances. Therefore, future use will not be impacted or affected.

SECTION 2 (PRIVATE) –Mine Plan Summary

Total number of acres	294.25 acres
Total Tons available trona for total acreage of Sect. 2	6,423,777 tons
Total planned tons to be mined (based on current mine plan in Sect. 2)	2,703,652tons
Overall planned extraction rate of trona mined in Sect. 2	42%
Estimated start date into Sect. 2 (estimate only –actual start date subject to many unknown variables)	10/10/2017
Estimated finish date in Sect. 2 (estimate only)	2/10/2022

*If lease not acquired and fully permitted, well in advance of planned mining, the tonnages will be greatly reduced and the overall extraction rate for Section 2 will be reduced

SECTION 12 (PRIVATE) –Mine Plan Summary

Total number of acres	161.47 acres
Total Tons available trona for total acreage of the privately owned part of Sect. 12	3,122,254 tons
Total planned tons to be mined (based on current mine plan in the privately owned part of Sect. 12)	971,512 tons
Overall planned extraction rate of trona mined in the privately owned part of Sect. 12	31%
Estimated start date into the privately owned part of Sect. 12 (estimate only –actual start date subject to many unknown variables)	8/1/2020
Estimated finish date in the privately owned part of Sect. 12 (estimate only)	6/20/2027

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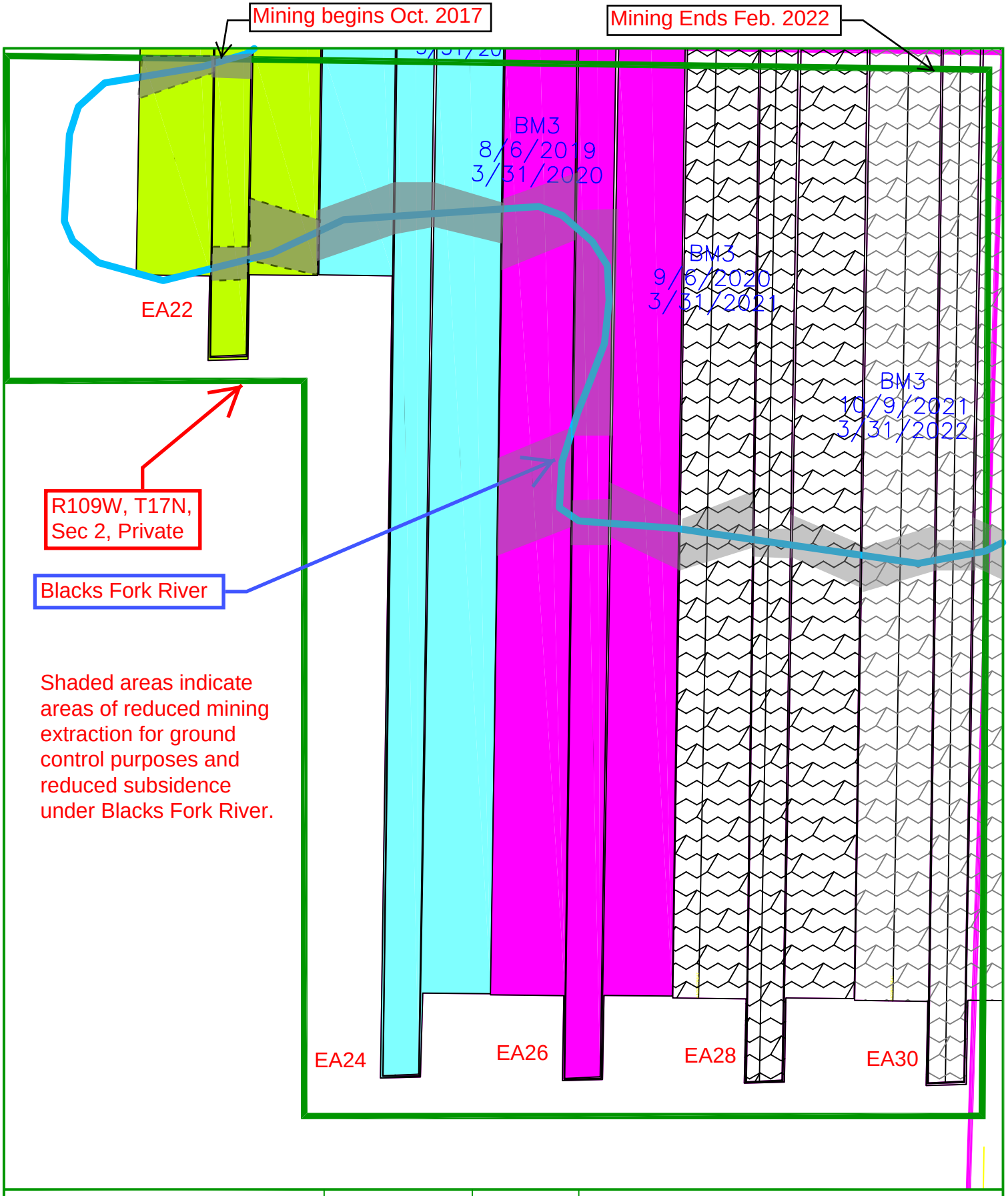
TATA CHEMICAL (SODA ASH) PARTNERS

TATA CHEMICALS (SODA ASH) PARTNERS
P.O. BOX 551
GREEN RIVER, WY 82935

SCALE: 1" = 1500'
DRAWN: RBP
DATE: 1 OCT 2015
PROJECT NO:
SHEET NO:

NORTH

15 YR. MINE PLAN
2015 THRU FY 2030



TATA CHEMICALS (SODA ASH) PARTNERS

P.O. BOX 551
GREEN RIVER, WY 82935

SCALE: 1" =

DRAWN: RBP

DATE: 17 OCT 2016

PROJECT NO:

SHEET NO:

NORTH

10 YEAR MINE PLAN
SECTION 2 PRIVATE

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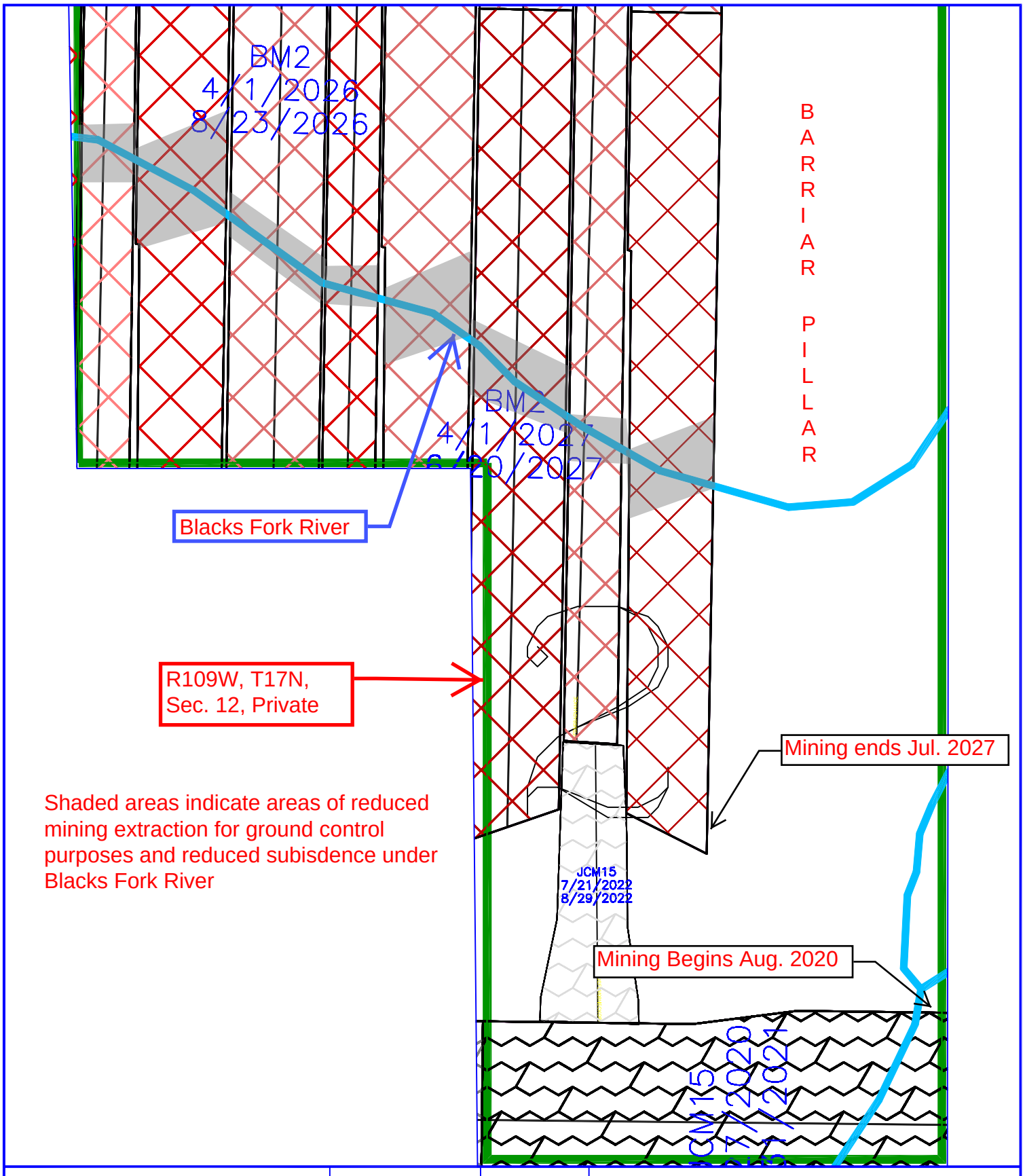

TATA CHEMICALS (SODA ASH) PARTNERS

P.O. BOX 551
GREEN RIVER, WY 82935

SCALE: 1" =

DRAWN: RBP

DATE: 17 OCT 2016

PROJECT NO:

SHEET NO:

NORTH

15 YEAR MINE PLAN
SECTION 12 PRIVATE

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VOLUME 3

RECLAMATION PLAN

The Reclamation Plan for the #7 Shaft is included in the RECLAMATION PLAN, VOLUME 3

RECLAMATION PLAN
GREEN RIVER WORKS

FOR

TATA CHEMICALS (SODA ASH) PARTNERS
GREEN RIVER, WYOMING

Prepared By
LAND RESOURCES TECHNOLOGY, INC.
Laramie, Wyoming
Revised December 1985

Revised By
WESTERN STATES MINING CONSULTANTS, P.C.
Casper, Wyoming
October, 2000
August, 2002

Revised By
Trihydro Corporation
Laramie, Wyoming
December 2012

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RECLAMATION PLAN

RP1.0 INTRODUCTION

RP1.1 Objectives

The overall objective of the Reclamation Plan is to reclaim the disturbed lands, using state-of-the-art techniques, to equal or better than the pre-mining capabilities. There are several phases which have been considered in developing the goals and objectives of this Reclamation Plan. The final conclusions and goals are reviewed in the ensuing discussion. The Reclamation Plan is based on reclaiming areas currently disturbed and areas to be disturbed during the life of the mine which is projected at about 20 years.

RP1.2 Soil Preservation and Restoration

Soil studies showed that a minimum of suitable topsoil is available for redistribution over the areas to be reclaimed after mining. This is due to the fact that, as noted in the 1982 Annual Report for permit No. 464 by Allied Chemical, topsoil is limited by prior use of the settling ponds without removal of topsoil or subsoil. The Reclamation Plan now provides for the stripping of all suitable soil followed by proper handling, stockpiling, monitoring, and conservation (i.e., erosion control) prior to

redistribution. The Reclamation Plan presents the detailed replacement, reconstitution, and revegetation procedures to be followed for restoration of the pre-mining land use capabilities.

RP1.3 Revegetation

Four native vegetation types (sagebrush/grassland; saltbrush/grassland; riparian woodlands, and badland/rockland) were originally found on the permit area (see 1976 report by VTN). Most of the disturbance is in the sagebrush/grassland and badland/rockland types. The Reclamation Plan has been designed to re-establish similar native vegetation types and restore cover, production, and density. This will be accomplished through use of native seed mixtures, planting shrubs, protection of reclaimed areas, and proper management of these areas.

RP1.4 Conservation Techniques

Procedures for all phases of the Reclamation Plan are based on previously submitted environmental assessments. Information from these assessments has been integrated throughout the plan to provide required conservation methods and insure that proper procedures and techniques are implemented.

Measures are provided in the plan to minimize wind and water erosion losses and topsoil degradation by reclaiming areas as soon as feasible after mining.

RP1.5 Hydrologic Restoration

Land recontouring has been developed to control runoff from disturbed areas and to capture and treat the runoff from these disturbed areas. Backfill and recontouring procedures have been designed to insure that surface drainage is maintained and avoids contaminated areas. Restoration of the pumpback systems for seepage control is also addressed (RP10.1.6).

RP2.0 POST-MINING LAND USE

RP2.1 Post-Mining Land Use

The post-mining land use plan is to return the area disturbed by mining to wildlife habitat and livestock grazing uses. Rangeland for domestic livestock and wildlife will be re-established on all areas disturbed by the operation. Returning the site to rangeland is comparable to the pre-mining use and will be compatable to the present functions of adjacent areas.

Grazing land and terrestrial wildlife habitat will be restored on all of the affected area by regrading the overburden to obtain gentle slopes, topsoiling, and

revegetating with native seed mixes. Specific areas will be selected for wildlife habitat enhancement through specialized management and the replanting of shrub species. Specific details of the reclamation activities needed to restore the land use are provided in Sections RP3.0 through RP12.0. The revegetation plan is discussed in Section RP6.0.

RP2.2 Support and Maintenance Activities

In order to achieve the desired levels of revegetation success, the pre-mining baseline studies will be consulted as a guide for adequate reclamation. Monitoring of the revegetated areas will commence after a reasonably self-perpetuating stand has become established. Monitoring activities will continue annually to report methods and results in the Annual Reports. Special attention will be paid and mitigating actions taken if undesirable and/or noxious weeds occur in quantities sufficient to limit the growth of the seeded desirables. Species diversity levels will be noted in conjunction with baseline studies to help determine the capability of the reclaimed rangeland.

Additional measures for tailings management, minimizing land disturbance, re-establishing topography, handling contaminated material, use of borrow sites, topsoil replacement, recontouring, and other practices which in some way facilitate re-establishment of the proposed post-mining

land use are discussed in detail under their respective headings.

RP2.3 Subsidence

Long-term monitoring of subsidence on Allied Chemical's Green River Works project is being conducted as outlined in the Mine Permit Application and Annual Reports. Subsidence has been prevented when mining beneath the mine plant structures by using proven techniques. Subsidence will be monitored following cessation of mining activities and any problems associated with subsidence will be rectified. However, by the time final reclamation approaches, long-term monitoring should provide enough background data to accurately predict the extent of subsidence. Allied Chemical will know from these predictions what problems can arise and will be prepared to deal with them beforehand.

RP3.0 BACKFILLING AND CONTOURING PLAN

RP3.1 Tailings Management - Solid Waste and Waste Water Disposal

Figure 1, 30-Year Waste Management Plan shows the location of tailings and waste water impoundments for the period 1998 through 2028. Table 1, Tailings Disposal Areas shows the cell designation, capacity and longevity of the cells.

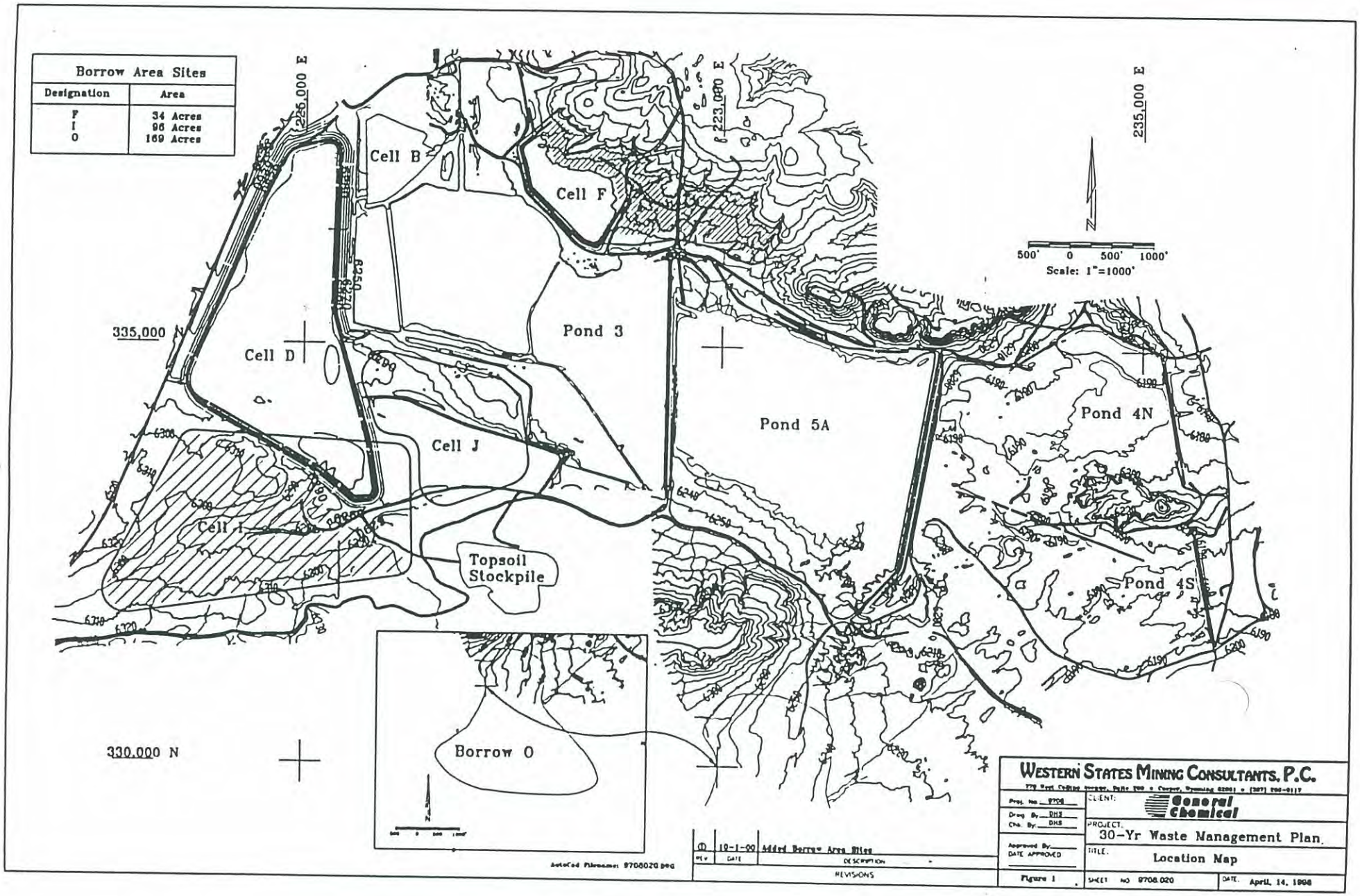
Borrow Area Sites
Designation | Area
F | 34 Acres
I | 96 Acres
O | 169 Acres
226,000 E
223,000 E
235,000 E
335,000 N
330,000 N
Cell B
Cell F
Cell D
Cell J
Cell I
Pond 3
Pond 5A
Pond 4N
Pond 4S
Topsoil Stockpile
Borrow O
500' 0 500' 1000'
Scale: 1"=1000'
WESTERN STATES MINING CONSULTANTS, P.C.
CLIENT: General Chemical
PROJECT: 30-Yr Waste Management Plan
TITLE: Location Map
SHEET NO 9708.020
DATE April, 14, 1998
Figure 1
REVISIONS
1 | 12-1-99 | Added Borrow Area Sites
AutoCad Filename: 9708020.dwg

Table 1a
Tailings Disposal Areas

Solid Waste Disposal Cells	Area (acres)	Capacity (acre-ft)	Life (years)
Cell D	120	2893	9
Cell I	137	3921	14
Cell J	55	2026	7
Cell F	50	913	UNK

Disposal Cells D, I and J are used for disposing of tailings which is the insoluble part of natural trona. Tailings consists primarily of oil shales and clay and mudstones. Cell F is designated for Bitterns disposal. Bitterns are waste product produced during processing of decahydrate and consist primarily of $NaSO_4$ and NaCl as well as Na_2CO_3

Table 1b, Waste Water Ponds, shows the pond designation and capacity of the waste water impoundment areas.

Table 1b
Waste Water Ponds

Evaporation Ponds	Area (acres)	Capacity (acre-ft)
Pond 3	168	2085
Pond 5A	173	3885
Ponds 4S&4N	175	882
Total	516	6852

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RP3.2 Grading

Fill areas (ponds, cells) will be graded to the most moderate slope possible and to blend with adjacent lands.

Filling and recontouring will begin as soon as mining ceases. Final backfilling and associated preparation will be initiated following shut down of the mine.

RP3.3 Material Balance

Table 2 shows the material quantities to be used in the various reclamation activities (tailings, pond, plant). Note that the existing gravel pits have been almost depleted and provide little material for the reclamation effort. A summary of material quantities is provided below and a map showing the locations of the area discussed is in Appendix C. Detailed discussion of these items are in the Supplementary Soil and Gravel Borrow Area Study implemented in 1983 and 1984 to provide data for the reclamation effort.

Topsoil Material

The GP-4 (gravel pit 4) area was the only area that yielded a source of substitute topsoil material. About 86 acre-feet of material was found (Table 2) in this area.

Table 2

Required Reclamation Quantities

		Capillary Barrier (cy)	Cover (cy)	Topsoil (cy)
1.0	**Tailings Disposal Area**	245,227	490,453	122,613
2.0	**Inactive Areas**	122,613	245,227	61,307
3.0	**Disposal Areas**	91,960	183,920	45,980
4.0	**Evaporation Ponds**	923,795	1,847,589	461,697
5.0	**Plant Site**		203,280	101,640
6.0	**Shaft 6 Site**			27,225
7.0	**#7 Shaft Site (estimated)**		1,000	7,500
8.0	**Stockpile/Borrow Areas**			52,030
9.0	**Miscellaneous Area**		181,823	90,911
	Total	1,383,595	3,153,292	970,903

Capillary Barrier

Capillary barrier will come from four primary sources, concrete from building demolition, ballast from railroad beds, rip-rap from slope protection on embankments and borrow from gravel and competent shale pits. The preparation of the material is as follows:

- Concrete - Concrete is broken into small pieces using jack hammers. Rebar is removed by hand using cutting torches.
- Ballast - Ballast material is already at a size suitable for capillary barrier.
- Rip-rap - The rip-rap material used as slope protection will require crushing to -6 inches to be suitable for capillary barrier.
- Shale/Gravel - The available gravel which is quite limited will require no preparation. It is naturally in a suitable size. The shale will require ripping for both sizing and ease of loading.

Expansion Areas - Cover Material

Areas around the existing gravel pits (GP) and potential gravel (Gravel) areas shown on the map in Appendix C were explored as sources for additional cover material. The best potential sources were adjacent (mainly west) of existing GP-3 and southeast of GP-3 and GP-4. The areas to the east of GP-3 and between GP-3 and GP-4 (to the northeast), which cover about 50 acres, were estimated to have a potential of as much or more than 20 feet of material useable for cover. This provides about 1,600,000 cy of material. The areas directly east and south of GP-4 were estimated to be able to provide at least 451,750 cy of cover material (i.e., about 35 acres of material with a depth of eight feet).

Table 3 presents a summary of available materials and provides a reference to the material source. Distribution depths by disturbed area are discussed in RP10(RECLAMATION OF MINE FACILITIES, ROADS, RAILROADS, TAILINGS DISPOSAL SYSTEMS AND OTHER AREAS).

RP3.4 Contaminated Material - Special Handling

Material determined to be contaminated will be segregated and disposed of in burial sited in areas already disturbed. Materials in the tailings disposal areas and evaporation ponds will be covered by a minimum of three and one half feet of total cover material to prevent migration of undesirable substances up into surface materials and plant root zones. The cover material will be composed of at least one foot of coarse sand, gravel concrete and durable shales (particle size .5mm - 16cm)referred to as the capillary barrier directly above contaminated material.

Table 3
Available Capillary Barrier, Cover, and Topsoil Material

Material	Source	Cubic Yards
Topsoil		
Required Volume		963,604
Available Volume	Topsoil Stockpiles	421,550
	Borrow Area "O" 170 acres	274,250
	Borrow Area "I" 137 acres	221,030
	Borrow Area "J" 35 acres	56,450
	Borrow Area "F" 34 acres	54,850
Total Topsoil Available		**1,028130**
Cover Material		
Required Volume		3,152,292
Available Volume	From leveling gravel and shale borrow areas (See discussion of Expansion Areas under RP3.3 for details)	2,471,600
	Borrow Area "O" 170 acres (8')	2,194,133
	Borrow Area "I" 142 acres (4')	916,373
Total Cover Available		**5,423,000**
Capillary Barrier		
Required Volume		1,383,595
Available Volume	Concrete From Buildings	11,551
	Ballast	11,733
	Rip-rap	15,509
	Gravel Pit 4	108,100
	Shale - Borrow Area "I" 137 acres (4')	884,106
	Shale - Borrow Area "J" 35 acres (6')	338,800
Total Capillary Barrier Available		**1,369,799**

Table 4
Summary of Disturbed Areas

	Description - Areas to be Topsoiled	Area (acres)
1.0	Tailings Disposal Area	200.3
2.0	Inactive Areas	76
3.0	Disposal Areas	67.1
4.0	Evaporation Ponds	707
5.0	Plant Site	126
6.0	Shaft 6 Site	33.8
7.0	#7 Shaft Site	9.30
8.0	Stockpile/Borrow Areas	73.5
9.0	Miscellaneous Area	112.7
	Total	**1,405.7**

Appendix C contains the map which shows cover material borrow areas. On top of this will be placed two feet of other cover material composed of natural subsoils from borrow areas listed in Table 3 followed by 0.5 feet of topsoil. All cover will be composed of materials which analysis has shown to be uncontaminated. The sides and bottom of the cells will also be covered by uncontaminated cover material. See Appendix A for methods proposed to identify contaminated materials in plant site area and in evaporation ponds 3, 4, and 5. See Table 2, Required Reclamation Quantities for quantities of cover and topsoil for the plant process area, tailings disposal areas, and the evaporation ponds.

RP3.5 Post-Mining Topography

Mining and reclamation will create a topography similar to the pre-mining conditions. Consolidation (a time-dependent effect) of the replaced spoils will cause an unknown amount of settling to occur. Settlement will be gradual and probably amount to not more than a few feet during a few decades following mining.

Even minor steep slopes and ledges (e.g., road cuts) created during mining will be eliminated from the post-mining topography. The post-mining slopes will be not steeper than 3H:1V, unless exceptions are granted. The waste cells (A, B, C, D and J) and Disposal Areas (1,3) will be approximately 25-50 feet higher after deposition of waste residual materials and placement of cover material (about 3 feet) and topsoil (0.5 feet). Post mining contours in the evaporation pond area will be graded to match pre-mining configuration in these areas and matched to existing contours on adjacent, undisturbed land. The reasons behind shaping the disturbed land in this fashion are many. The best habitat for native animal species is one similar to that which the species originally inhabited. Therefore, returning the area to its original configuration will encourage native animals to return to the area. This in turn will encourage native vegetation and wildlife species to adapt to the disturbed area. The final topography of the land will encourage native vegetation and wildlife species to adapt to the disturbed area. The

final topography of the land will approximate the original and blend in with the adjacent topography. The pre- and post-mining topography maps are included as Appendix B. Cross sections for the post-mining topography are included and numbered on the map. A short explanation of how the reclaimed cell topography was derived is included also.

RP3.6 Overburden Surface Preparation

Topsoil will be replaced after the cover material on the disturbed area has been finally contoured and graded. Where cover material is used the material will be ripped as needed to relieve compaction and promote root penetration and infiltration. Ripping will extend 12 to 18 inches into the compacted surface of the overburden. Ripping of overburden or subsoil will precede the replacement of topsoil to prevent deep-mixing of topsoil and overburden. Ripping will follow the contour on slopes. On relatively level areas where severe compaction is present, ripping will be in two directions in a rough grid pattern. Ripping will not be done when the material is wet. Better disaggregation of compacted material will result when the material is slightly moist.

RP4.0 TOPSOIL AND SUBSOIL REPLACEMENT

An average of about six inches of salvageable topsoil will be placed over the re-contoured cover material after suitable preparation. Topsoil is sparse in the area and the replacement thickness is based on the available topsoil. It

is assumed 18 inches of topsoil can be removed from the designated borrow areas, one foot to be used for topsoiling and the remaining six inches replaced in the borrow areas. This will also re-establish the capability for pre-mining use as discussed earlier. Any material which is unsuitable for use as topsoil or subsoil will be identified and placed below the surface of the backfill prior to preparation for top soiling and seeding. The identification of contaminated materials is discussed in the Annual Report (1982).

RP4.1 Methods of Topsoil Replacement

Topsoil will be removed from existing topsoil stockpiles or directly from topsoil stripping areas and re-spread on the graded overburden to an average depth of approximately 6.0 inches. Topsoil stripping areas are shown on the map in Appendix C.

Traffic on the re-spread topsoil will be limited to minimize compaction. However, if compaction does occur, it will be relieved by loosening to the depth of the re-spread topsoil using methods similar to those used on the graded overburden. Chisel plowing, discing or harrowing prior to seeding may be required to achieve proper topsoil tilth.

Replaced topsoil will average 6.0 inches in depth. Redistributing suitable soil material over the entire area, including areas that may have been contaminated will restore the productive potential of the total affected area.

RP4.2 Schedule for Replacement

Most topsoil removal has occurred with the exception of that in Disposal areas 3 and 4 which were surveyed in 1983. Topsoil placement will proceed on the waste areas after the mine has shut down (i.e., in approximately 20 years).

To minimize erosion, topsoil replacement will occur as soon as practicable or less than six months following grading and contouring of the fill areas. Topsoil replacement will not be conducted when climatic conditions are poor. This is to avoid handling topsoil that is extremely wet, frozen, or snow covered.

RP4.3 Special Soil Reconstruction Procedures

Although there is a shortage of topsoil as well as gravel and cover material for reconstruction of a capillary barrier between tailings (and contaminated areas) and the root zone, it is anticipated that special reconstruction procedures will allow the re-establishment of a suitable seedbed for the rangeland species to be revegetated. Topsoil stripped from the area to be disturbed will be segregated and used when the seedbeds are to be reconstructed. That topsoil will then be mixed with other suitable topsoil to provide a total depth of 9.0 inches on those acres.

To reclaim the permit area to rangeland requires certain conservation practices to provide optimum tilth

prior to mulching and seeding. For example, on slopes where water conservation measures are necessary, soil preparation (discing, ripping, etc.) will be implemented prior to mulching and seeding.

RP4.4 Determination of Topsoil Replacement Depth

Determination of the topsoil depth for the permit area was done in two steps. Soils on the permit area have been mapped and sampled since survey work was done under established guidelines (1977). It must be noted that the mining and related surface operations began before the soil inventories were required and implemented and no soil was salvaged beneath the ponds.

The soil surveys conducted since 1977 (i.e., the Supplementary Soil and Gravel Borrow Area Study, November, 1983) have distinguished topsoil suitable for reclamation purposes. These surveys have been used as a guide for removing topsoil while mining activities have continued. The volume of topsoil previously stripped (337 acre-feet) has been added to that which will be stripped (292.0 acre-feet) during the remaining life of the mine (See Table 2). This allows the determination of the total volume of suitable topsoil material (629.0 acre-feet) and the average replacement depth of about 6.0 inches for the 1194.5 acres that will require top soiling (See RP10 for details).

RP4.5 Erosion Control and Water Conservation Practices

The chief limiting factor to successful establishment of vegetative cover is soil moisture. Rainfall on the permit area is erractic and subject to extreme seasonal and annual variation. In years of below-average precipitation, the chances for successful revegetation are proportionately reduced and even in years of average precipitation it is desirable to consider any practice that will retain water that might otherwise be lost either as runoff or through evaporation.

The revegetation plan includes accepted conservation practices to maximize moisture retention and minimize erosion by reducing surface runoff and evaporation. Such conservation methods include soil pitting, ripping, or scarification operations and the use of soil-stabilizing cover crops.

All topsoil preparation practices (ripping, plowing, discing, seeding) will be conducted parallel to the contour of the slopes. The small berms or ridges of soil created during ripping or scarifying and seeding will shorten the effective length of slope, greatly reducing potential soil loss and sediment yield.

Prior to seeding all replaced topsoil will be mulched or cover cropped. Where hay or straw mulch is used, it will be applied at the rate of approximately two tons per acre

and crimped into the soil. Where cover cropping is used the area will be seeded with a cover crop of oats and then be seeded to a permanent perennial cover the following season (preferably fall). The cover crop method will also be used on areas requiring temporary reclamation which because of design, may be subject to erosion (topsoil stockpiles, ditch lines, construction areas, embankment areas). The cover crop approach, which provides a stubble mulch for either temporary cover or for later interseeding, is preferred as it provides a means of erosion control that is as effective as applying straw mulch.

Moisture conservation practices will vary with the topsoil and subsoil conditions, slope, surface, season, moisture and wind conditions of the area. In each situation, experienced judgment will be augmented by topsoil testing (see section RP5.6) to insure that the most effective conservation practices for conditions existing at that time will be implemented. The basis for determining which practices are appropriate includes evaluation of soil permeability and compaction, the need for stubble cover, mulching or pitting, and fertilization.

Prior to any seeding, the reclamation manager will determine the surface modifications or water conservation practices needed to attain maximum moisture retention. Pitting or berming may be used on slopes or other critical areas to improve water retention. Berming is usually used as

an erosion control practice but can also aid in moisture retention. If necessary, replaced topsoil will be ripped or chisel plowed on the contour to relieve compacted soil conditions and improve percolation rates in the upper six to twelve inches of soil.

Areas where rill and gully erosion develops and exceeds six inches in depth will either be filled in with suitable topsoil or reworked with a disc or chisel plow. Immediately after being reworked in the above manner, a cover crop of oats will be planted on these areas to minimize new erosion. At the earliest appropriate planting time, a permanent vegetative cover of native range species will be planted.

Establishing a permanent diverse vegetation cover will provide low cost erosion and sediment control practices during active mining operations. The roots of the native species used for permanent revegetation will stabilize the soil while the above-ground canopy and litter will slow runoff, promote infiltration and conserve moisture.

RP4.6 Soil Amendments

Before use on prepared fill areas, chemical analyses will be performed on topsoil stockpiled longer than one year to determine any treatment or amendments required to provide optimum seedbed material. In addition, a soil monitoring program will be implemented to obtain soil samples from random points on the redisturbed topsoil. Both sets of

analyses will follow the recommendations suggested in Table I-3 of Guideline No. 1 of the WDEQ (J.K.W. & D.F./January, 1981). The parameters that will be anlayzed include nitrate/nitrogen, phosphorous, organic matter, and potassium. Analyses will be conducted using the recommended procedure in Guideline No. 1. If required, soil amendments will be prescribed following evaluation of the results of the laboratory data.

RP4.6.1 Fertilization

Fertilizer will be added to nutrient-deficient soils identified in the testing programs described in Section RP4.6. Application rates will be determined from the results of the soil tests. Present rates are 80 lbs. of Nitrogen per acre and 20 lbs. of Phosphorus but these may be modified as testing proceeds. Fertilizer application will be carefully controlled to minimize losses to air and water.

RP5.0 REVEGETATION PRACTICES

RP5.1 Cover Crops

Cover crops will be seeded as an option to provide temporary cover protection against soil erosion or to prepare an area for seeding of permanent native perennial species. Oats will be drill seeded at the rate of 30 lbs./acre. Cover cropping will be implemented in the spring

only. Areas requiring broadcast seeding will be seeded at twice the drill seeding rate (60 lbs./acre). Cover crops will be mown either prior to seedhead development and volunteer stage or prior to permanent seeding, whichever comes first.

Temporary topsoil and overburden stockpiles will also be stabilized using the cover crop procedures discussed above.

RP5.2 Mulch

Mulch or an equivalent erosion control will be used during fall reclamation when a spring cover crop was not used. The basic reasons for mulching topsoiled areas are as follows:

1) Stabilize soil to minimize wind and water erosion;
2) Increase water infiltration and snow retention;
3) Influence soil microclimate by insulation and reduced evaporation;
4) Provide an additional source or organic matter to serve as a long-term reservoir for water and nutrients.

Areas to be permanently revegetated in the fall will be mulched with hay or straw (or a combination of both) at a minimum rate of two tons per acre. The hay or straw mulch will be applied uniformly on the area after permanent seeding has been implemented. Hay or straw mulching will be

anchored by a disc implement which crimps (or ties) the hay or straw into the soil on slopes of 3H:1V or less. On potential problem or highly erodible areas mulch will be anchored with a biodegradable netting material. These areas include drainage sites and sedimentation ponds or where erosion on topsoil and overburden piles is severe and on slopes in excess of 3H:1V.

RP6.0 PERMANENT REVEGETATION

RP6.1 Seeding and Stocking Rates

The proposed seed mixtures for re-establisning rangeland vegetation on the permit area is adapted to a variety of soils and will support the post-mining land use of wildlife habitat and livestock grazing. Only native plant species will be used because they are ecologically adapted to the area. The use of native species will produce forage that is equal in palatability for livestock and wildlife insuring that the area will be evenly grazed.

If it becomes necessary to change the approved seed mixture, approval will be obtained from the WDEQ prior to implementing the change. The seed mixture and pounds of pure live seed per acre to be used for different areas are discussed in RP6.2.

RP6.2 Native Rangeland

Most of the area will be mulched or cover cropped, and drill seeded to native rangeland species. If a cover crop is used, the seeding of rangeland will proceed in two steps. A cover crop, which will provide stubble mulch, will be planted in the spring. The native range mixture will then be interseeded the next fall. When a hay or straw mulch is applied (two tons/acre) in lieu of cover cropping, the mixture will be drilled prior to mulching. The grass and shrub seed mixture in pounds of pure live seed (PLS) per acre follows:

basin wildrye (Elymus cinereus)	2.0 #/acre
Indian ricegrass (Oryzopsis hymeniodes)	2.0 #/acre
needleandthread (Stipa comata)	2.0 #/acre
streambank wheatgrass (Agropyron riparium)	1.0 #/acre
thickspike wheatgrass (Agropyron dasystachyum)	1.0 #/acre
western wheatgrass (Agropyron smithii)	3.0 #/acre
fourwing saltbush (Atriplex canescens)	2.0 #/acre
shadscale (Atriplex confertifolia)	2.0 #/acre

big sagebrush (Artemisia tridentata)	.25#/acre
winterfat (Ceratoides lanata)	.25#/acre
gardener saltbush (Atriples gardneri)	1.0 #/acre
Douglas rabbitbrush (Chrysothamnus viscidiflorus)	1.0 #/acre
TOTAL	16.5 #/acre

When and if broadcast seeding is required, the above seeding rate will be doubled. Following any broadcast seeding, the seeded area will be raked or dragged to cover the seed with soil.

Rehabilitation of the shrub components of the vegetation types will occur in areas where reclamation has occurred in the past within the permit Areas 1 and 2 which were reclaimed in 1982. Planting strategy includes 10 groups 35 plants/group in Area 1 and three groups of 35 plants/group in Area 2 (see 1982 Annual Report, Section 6 part 1, for commitment).

RP6.3 Seeding Depth

Seeding depth is governed by soil texture and seed size. The optimum depth of planting for all drilled species would be 1/4 to 3/4 inch below the surface. Shrub seed will be planted with special drills or broadcast on the surface and harrowed or raked in to no deeper than 1/4 inch.

RP6.4 Time of Seeding

Time of seeding is very critical in the semiarid west. The species to be used will be planted in fall or early spring. For the permit area, the most appropriate period is in the fall after mid-September and in late April and early May when optimum soil moisture conditions exist to allow planting and covering the seed with the recommended depth of soil. Any area prepared for reclamation and not seeded by May 30 will be planted with a cover crop as previously discussed. The permanent species will then be drilled into the standing stubble at the proper time.

RP6.5 Seeding Method

It is anticipated that all seeding (both of cover crop and permanent species) will be done with a drill. Techniques will be used to insure a mellow surface and a relatively firm seedbed for maximum seed germination and seedling establishment. If any condition should be encountered which would preclude the use of a drill, the seed will be broadcast at double the drilling rate and the area harrowed and packed to obtain soil coverage over the seed. Drill seeding will be done on the contour where slopes permit.

RP6.6 Shrub Planting

Experimental shrub plantings will be conducted prior to implementing full scale reclamation. Results of these plantings will be included in the mines annual reports to WDEQ. The results of these plantings along with results of the establishment of shrubs from seeding will be used to enhance future reclamation efforts.

Shrub plantings will be done in patches using containerized plants and/or by digging up clumps of shrubs on site and placing them on reclaimed areas. Sites chosen for planting will be areas where survival should be maximized. These areas may include drainages, north facing ridges, and hillsides. Initial plantings will help determine what shrubs species and sites are best suitable for establishment. The amount of shrub plantings required will also be determined by establishment success from seedings.

RP7.0 REVEGETATION MONITORING

RP7.1 Revegetated Areas

During implementation of the baseline vegetation studies, each of the vegetation types was delineated. These types are discussed in related environmental studies.

RP7.2 Success of Revegetation

The permanent vegetative cover established on all affected lands will be diverse, stable, and of the same seasonal variety native to the area. The permanent revegetation will be capable of stabilizing the soil. No introduced species will be used.

RP7.3 Evaluation Techniques for Revegetation

Reclamation must satisfy three conditions for total success: (1) adequate cover (for soil protection), (2) adequate productivity (for forage), and (3) suitable species composition (for forage, shelter and ecological stability).

Evaluation of revegation success will occur annually for any particular parcel of revegetated land. To determine revegetation success, the reclaimed areas will be observed to evaluate cover, production and species composition on an annual basis and the results documented in the Annual Report. Evaluation of revegetated areas for bond release will consist of comparing data collected on those reclaimed areas to data collected on specific comparison areas which meet prior WDEQ approval.

Standard techniques will be used to determine vegetative cover on reclaimed lands. Both total cover (single-layer vegetation, litter-rock, and bare ground) and

cover by species (multiple-layer vegetation, letter-rock and bare ground) will be estimated.

Cover determinations by species will provide data to evaluate species diversity on the reclaimed areas. An analysis of the data will be provided when requesting bond release to demonstrate that an acceptable diverse community is present on the reclaimed areas and will satisfy the goals of the post-mining land use plan.

Shrub re-establishment will be evaluated using the standards recommended by WDEQ-LQD and the Wyoming Game and Fish Department. The standards to be used will be 1 shrub/m^2 in a mosiac pattern on 10% of the acreage and 1 shrub/$9m^2$ on the rest of the area. This standard will be used to evaluate shrub density reclamation success for rangeland.

RP7.4 Species Composition

Species composition data obtained from revegetation monitoring sampling will be analyzed and evaluated to compare post-mining diversity levels to pre-mining. Any recommendations to alter reclamation techniques in relation to these data will be subjected to the WDEQ for approval and documented in the annual report.

Plant species selected for reclamation have significant value as livestock and wildlife forage, browse, or cover value for erosion protection. The vegetative species comprise a major proportion of the existing undisturbed

vegetation cover on the permit area and are ecologically adapted to the area. The species selected for revegetation are compatible with the post-mining land use of wildlife habitat and livestock grazing. The species composition will be capable of withstanding grazing pressure at least comparable to that which the land sustained prior to being affected by mining and related activities.

RP7.5 Irrigation

Irrigation has not been deemed necessary or practical as a post-mining management technique on the site.

RP8.0 WEED CONTROL

All disturbed areas will be regularly monitored to determine the need for weed control. This applies to lands with either temporary or final vegetative cover as well as road shoulders and other affected areas where cover will be difficult to re-establish. Weeds can reduce the availability of moisture, nutrients, and light for desirable species.

During the initial stages of revegetation, the control of annual weed species is critical and an intricate part of the reclamation program. Before implementation, weed control programs will be submitted to the WDEQ for approval.

All weed control programs implemented will take into consideration whether or not certain species are important to wildlife habitats and livestock grazing. Livestock

grazing areas should not exhibit a high density of poisonous species such larkspurs, lupines, or milkvetch.

Weed species can be introduced to disturbed sites through a wide variety of methods. Probably the most important method is from residual seeds occurring in the topsoil itself. Other common agents transporting weed seed in from removed areas are mulching materials (hay, straw), native herbivores and upland birds, wind and water. Native grass hays used as mulching materials have been shown to commonly contain various weedy annual and perennial species.

Specific weed problems will be discussed with the district office of the Wyoming Weed and Pest Control Unit. All weed control programs will be submitted to the WDEQ for approval before implementation.

Strict monitoring will be implemented for problems arising from the use of herbicides. Records containing the dates and rates of application will be kept.

RP9.0 WILDLIFE HABITAT RESTORATION

The overall objective of post-mining reclamation and restoration of wildlife habitat is to minimize disturbance and adverse impacts on fish, wildlife, and related environmental values, and achieve enhancement of such resources where practicable. These objectives will be met using the best technology currently available and will be consistent with the approved post-mining land use. The

habitat restoration plan is tailored to restore and enhance habitat quality by providing breeding, production and foraging areas for a variety of wildlife species that naturally frequented the area prior to mining. The variety of plant species to be used in revegetation work will provide both forage and cover. Finally, habitat types will be re-established in an interspersed manner (e.g., shrub planting) so as to provide a maximum amount of habitat interface (edge effect). Details of revegetation seeding mixtures are provided in Section RP6.

RP10.0 RECLAMATION OF MINE FACILITIES, ROADS, RAILROADS, TAILINGS DISPOSAL SYSTEMS, AND OTHER AREAS

RP10.1 Plant Site and Support Facilities

After the mining operation has been completed, all plant site structures erected for the mining operation will be removed unless it is shown that they will be useful in accomplishing the post-mining land use. Concrete or masonary structures will be demolished and the rubble will be used as capillary barrier.

All electrical and communication utilities including support towers, overhead cables, underground lines and conductors will be dismantled and removed from the permit area.

Compacted areas (areas beneath structures, parking lots, haul roads and access roads) will be ripped prior to the application of topsoil. Following these procedures, these areas will be reclaimed in the same manner as mined areas. This will include top soiling to the specified depth and revegetation with native species outlined in Section RP6. Specifically the procedures are described in the sections that follow. Material balances and sources for topsoil, gravel, and cover material are presented in section RP3.3. Refer to Figure RP-2, Overall Site Plan and Figure RP-3, Pond Area, for locations.

RP10.1.1 Tailings Disposal Areas - 152 Acres

a. This area is the current tailings disposal area which is composed of Cells D and B. Cell D is a tailings disposal cell and Cell B is a fly ash disposal cell.

b. The Tailings Disposal Areas are assumed to be filled tailings.

c. The Tailings Disposal Areas will be allowed to dry by solar evaporation. The tailings will be left in place with the embankments graded to a maximum slope of 4:1. Drainage will be reestablished throughout the area.

d. The tailings area will be covered by one foot of capillary barrier and two feet of cover material as discussed in Section RP3.4. With the soil from g (about six inches) the total cover will be approximately 3.5 feet.

R108W
R109W

N

Scale: 1" = 1 mile

U.P. MAIN LINE

BLACKS FORK RIVER

80

Shaft 4

Shaft 6

Permit Boundary

Rail Spur

Plant Site

Shafts 1,2&3

Pond Area
(See Figure RP-3)

Shaft 5

T19N
T18N

T18N
T17N

R109W
R110W

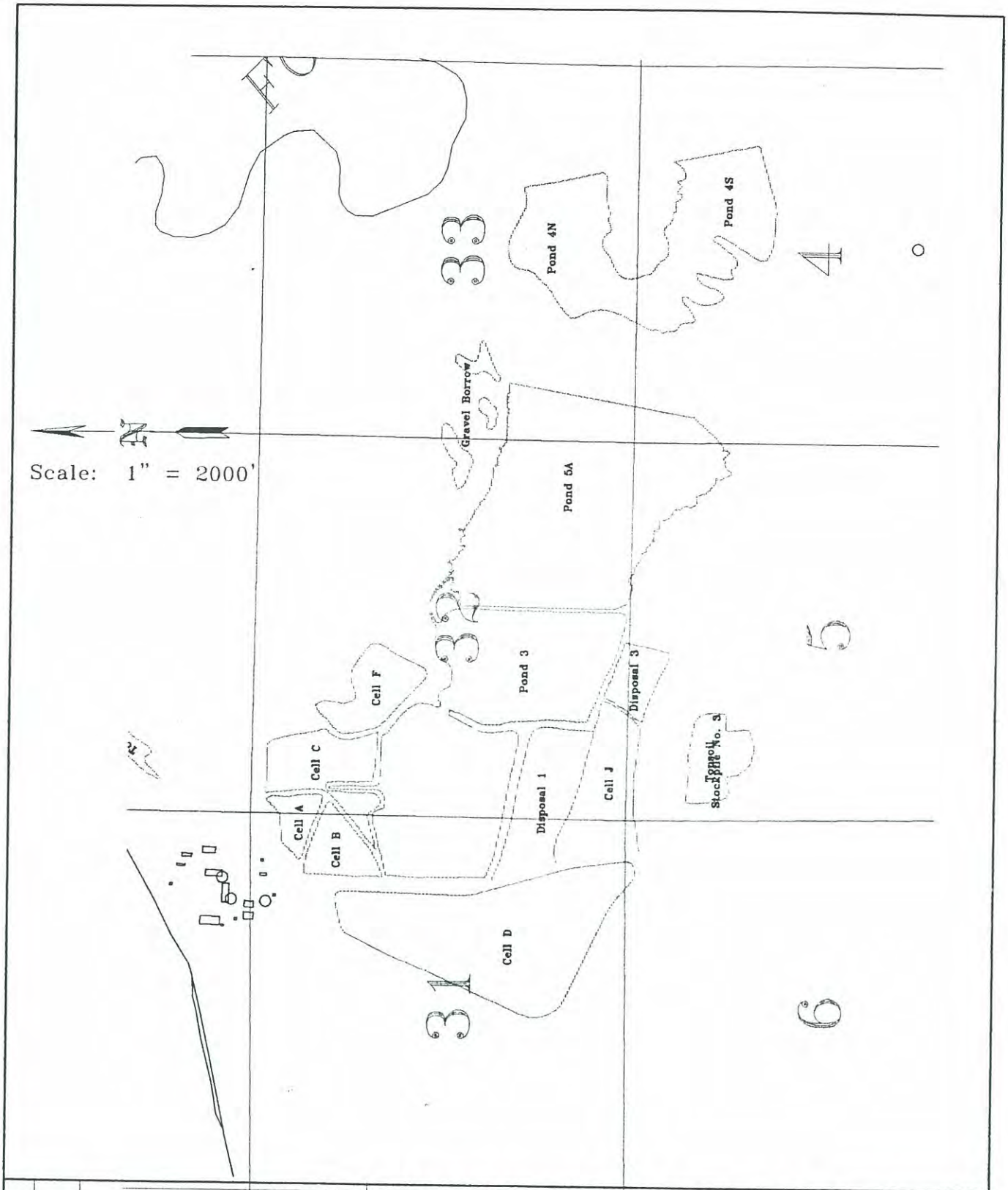
AutoCad Filename: 0010.001.DWG

REV.	DATE:	DESCRIPTION
		REVISIONS

WESTERN STATES MINING CONSULTANTS, P.C.
6911 Casper Mountain Road • Casper, Wyoming 82601 • (307) 266-9117

Proj. No.: 0010	CLIENT: General Chemical
Drwg. By: DHS	
Chk. By: DHS	PROJECT: Reclamation Plan
Approved By: DATE APPROVED	TITLE: Overall Site Plan
DATE: 3-7-02	SHEET NO. 0010.001 — Figure RP-2

Revised 8-08-02



DATE: 3-7*02 SHEET NO. 0010.001	Pond Area	WESTERN STATES MINING CONSULTANTS, P.C. 6911 Casper Mountain Road • Casper, Wyoming 82601 • (307) 266-0117 General Chemical	Proj. No.: 0010 Drwn. By: DHS Chk. By: DHS Approved By: DATE APPROVED
		Figure RP-3	

Revised 8-08-02

This material is to provide a capillary barrier to prevent upward migration of sodium salts which may be toxic to vegetation.

e. The tailings area will be covered with topsoil to a depth of six inches. The area will be seeded for revegetation, mulched, and fertilized.

f. Topsoil, capillary barrier, and cover material requirements: Topsoil - 76 acre-feet; cover - 304 acre-feet; Capillary Barrier - 152 acre-feet.

RP10.1.2 Inactive Area - 76 Acres

a. The inactive areas are those which have been used for tailings disposal but are not currently being used. This area is composed of Cells A, C and J.

b. These cells will be covered with one foot of capillary barrier, two feet of cover material and six inches of topsoil.

c. The area will be seeded for revegetation, mulched and fertilized.

d. Topsoil, capillary barrier and cover material requirements: Topsoil - 38 acre-feet; cover material - 152 acre-feet; capillary barrier - 76 acre-feet.

RP10.1.3 Disposal Areas - 57 Acres

a. The Disposal Areas are sites previously used for the disposal of dry tailing excavated from wet tailings disposal cells. These are no longer in use except to use as borrow for embankment construction. These areas are referred to as Disposal 1 and 3 as shown on Figure RP-2.

b. These cells will be covered with one foot of capillary barrier, two feet of cover material and six inches of topsoil.

c. The area will be seeded for revegetation, mulched and fertilized.

d. Topsoil, capillary barrier and cover material requirements: Topsoil - 23.5 acre-feet; cover material - 114 acre-feet; capillary barrier - 57 acre-feet.

RP10.1.4 Evaporation Pond Areas - 572.6 Acres

a. The Evaporation Pond Area includes Ponds 3, 5A, 4, and Cell F which is currently in use. These ponds, as a part of the evaporation process, fill up with Decahydrate ($Na_2CO_3 \cdot 10H_2O$). The Decahydrate will be reclaimed and re-processed prior to final reclamation.

b. After decahydrate removal, the area will be covered with one foot of capillary barrier from slope protection rip-rap and shale/gravel borrow areas. The area will be covered with two feet of cover material coming from both the embankments and borrow areas shown on Figure 1, 30 Year Solid Waste Management Plan.

c. The pond areas will then be covered by six inches of suitable topsoil. This will be obtained from the areas adjacent, topsoil storage areas, and the areas surveyed in 1983 (see RP10.1.5).

d. The area will be seeded, mulched and fertilized for vegetation.

e. Topsoil and cover (barrier) material requirements: Topsoil - 286.3 acre-feet; cover - 1145.2 acre-feet; capillary barrier - 572.6 acre-feet.

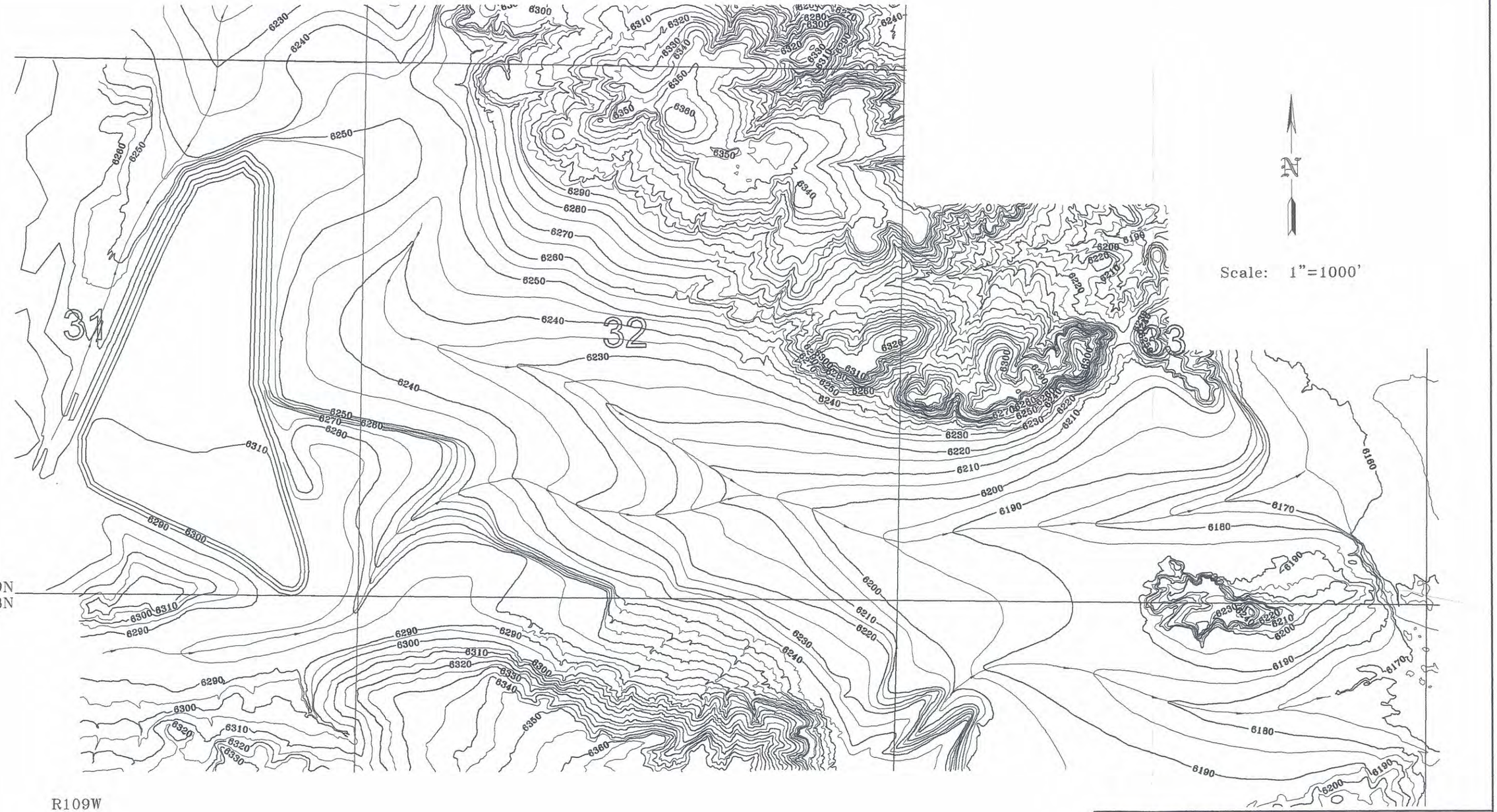
RP10.1.5 Process Plant Area - 126 Acres

a. All process facilities, buildings and structures will be dismantled and hauled away. Process vessels and equipment will be scrapped or disposed of to used equipment dealers.

b. Contaminated soils, concrete, and foundation materials will be broken up and put into the mine shafts.

c. Mine shafts will be sealed and areas regraded.

d. The plant area will be ripped to loosen soil and contoured to provide a level gentle slope from south to north.



AutoCad Filename: 0010.003.DWG

REV.	DATE:	DESCRIPTION
		REVISIONS

WESTERN STATES MINING CONSULTANTS, P.C.
6911 Casper Mountain Road • Casper, Wyoming 82601 • (307) 268-9117

Proj. No.:
Drwg. By:
Chk. By:
Approved By:
DATE APPROVED
DATE: 8-28-02

CLIENT: General Chemical
PROJECT: Reclamation Plan
TITLE: Final Topography
SHEET NO. 0010.003 | Figure RP-4

d. The plant area will be ripped to loosen soil and contoured to provide a level gentle slope from south to north.

e. The area will be covered with six inches of topsoil from topsoil storage and one foot of cover material.

f. The area will be seeded, mulched, and fertilized for re-vegetation.

g Topsoil and cover (barrier) material requirements: Topsoil - 63 acre-feet; cover - 126 acre-feet.

RP10.1.6 Shaft Sites 6 and 7

RP10.1.6.1 Shaft 6 Site - 33.75 Acres

a. Shaft 6 is remote from the plant site and will ultimately be equipped for men and equipment to access the mine. There will also be buildings to house engineering, change rooms, warehouses and shops. Currently the site contains waste rock and top soil stockpiles and a total containment pond.

b. This area will be covered with one foot of cover material and six inches of topsoil.

c. The area will be seeded, mulched and fertilized for re-vegetation.

d. Topsoil and cover material requirements: Topsoil -16.9 acres-feet; cover material 33.75 acres-feet.

RP10.1.6.2 #7 Shaft Site – 9.30 Acres

a. Shaft 7 is remote from the plant site and will ultimately be equipped for ventilation of the mine workings and provide communications lines into the mine. There will also be buildings to serve as maintenance/warehouses for the fans and an electrical controls building. Currently the site is barren. The proposed shaft disturbance area is 5.1 acres. The proposed disturbance area of upgrading the two-track road is 4.2 acres.

b. Once the shaft closure plug has been constructed, excavated and stockpiled cover soil stored at the site will be used to backfill the shaft. This area will then be re-graded to match surrounding grade and covered with six inches of topsoil.

c. The road will be re-graded to match surrounding grade and covered with six inches of topsoil.

d. The areas will be seeded, mulched, and fertilized for re-vegetation.

e. Topsoil and cover material requirements: Topsoil - 7,500 cubic yards; sub-soil - 1,000 cubic yards. Volumes are estimated.

RP10.1.7 Topsoil Salvage and Borrow Areas - 64.5 Acres

a. The stockpiles are limited to the topsoil piles north and south of the pond area. The borrow areas are located north of Pond 5A. Borrow areas used for final reclamation are not included in this area as they are not currently disturbed. Their locations are defined in the "30 Year Solid Waste Management Plan".

b. The area will be covered with six inches of topsoil.

c. The area will be seeded for re-vegetation, mulched and fertilized.

d. Topsoil requirements: Topsoil - 62.3 acres-feet.

RP10.1.8 Miscellaneous Area - 112.7

a. The miscellaneous area includes those areas which have not been previously defined. Miscellaneous areas include the landfills, total containment pond, sewage lagoon and various roads around the property.

b. The miscellaneous areas will be covered with one foot of cover material and six inches of topsoil.

c. The area will be re-seeded for re-vegetation, mulched and fertilized.

d. Topsoil and cover material requirements: Topsoil - 66.4 acres-feet; Cover Material - 112.7 acres-feet.

RP10.1.9 Hydrologic Restoration

The following section is derived from the "1995 Ground-Water Restoration Plan".

10.1.9.1 Ground-water Hydrology

a. Geologic and hydrologic data were compiled from proprietary files of monitoring wells installed at the site, State Engineer records, and the following reports: ***5 Year Reclamation Plan and Bond Estimate, Green River Works,*** prepared for General Chemical Corporation by Worthington, Lenhart and Carpenter, Inc., March, 1991; ***Ground Water Impact Report, Proposed Evaporation Pond, Green River Soda Ash Plant,*** prepared for Church and Dwight Company by Dames and Moore, June, 1989; ***Ground-Water Hydrology at the General Chemical No. 4 Tailings,*** prepared for General Chemical Company by Hydro-Engineering, June, 1991.

b. Aquifer Properties - The focus of this study is the surficial aquifer, which is composed of two hydrogeologic units. The aquifer is unconfined and contains seepage water from the tailings and evaporation ponds. The upper unit of the aquifer is Quaternary alluvium, consisting of silty sands and silty clays which are generally confined to the drainages. This unit has the best aquifer properties and contains most of the seepage water volume. The bedrock unit underlying the alluvium is

the Eocene Bridger Formation, consisting of weathered and fractured mudstone and siltstone.

The alluvium has a maximum thickness of approximately 30 feet. Water levels vary, but a saturated thickness of 20 feet is thought to be representative of the site. Reported transmissivities vary from 16,000 to 32,000 gpd/ft. A transmissivity of 12,000 gpd/ft was used in rate calculations in Pond Wash to compensate for the reduction of aquifer permeability due to the precipitation of decahydrate by the seepage water. NE Draw demonstrates a higher rate of flow to Cell D Interceptor Trench and the shallow recovery wells located in the lower draw; therefore, a transmissivity of 24,000 gpd/ft was used for the flow rate calculations in this area. Rates calculated using these values compare favorably with rates observed in the present recovery systems. A value of 0.05 for specific yield is appropriate for aquifers of this type.

The Bridger Formation is a low-permeability aquifer. A transmissivity of 50 gpd/ft is representative of this unit at the site. Rate calculations using this value compare favorably with test data for monitor wells at the site. A specific yield of 0.05 has been estimated for this unit.

c. Ground-water Volume – Ground-water volumes within the surficial aquifer were calculated for three areas at the site in which the presence of seepage water has been documented; Upper NE Draw, NE Draw, and Pond Wash shown in Figure 1. These volumes were calculated using $v_w=SA\Delta h$, where v_w is the volume of water in cubic feet derived from the water level change, Δh in feet, S is the storativity, and A is the area of the water-level change in square feet. A saturated thickness of 20 feet was estimated for all calculations.

Volumes calculated for the three areas are:

<u>Upper NE Draw</u>

A=10.4 MM sq ft
S=0.05
Δh=20'

V_w=10.4 MM cu ft = 77.8 MM gal

NE Draw

A=13.8 MM sq ft
S=0.05
Δh=20'
V_w=13.8 MM cu ft = 102.9 MM gal

Pond Wash

A=35.5 MM sq ft
S=0.05
Δh=20'
V_w=35.5 MM cu ft = 265.9 MM gal

d. Ground-water Rates - Rates of ground-water flow were calculated for both the alluvium and the bedrock (Bridger Fm.) aquifers. The largest contribution to the total flow is from the alluvium.

Flow rates were calculated using the relationship Q=TIL, where Q is the rate in gpd, T is the transmissivity in gpd/ft, I is the gradient, and L is the "length" of flow (cross-sectional width) in feet. The rate calculated for NE Draw applies to Upper NE Draw also.

NE Draw

Alluvium

T=24,000 gpd/ft
I= 0.011
L=800 ft
Q=288,000 gpd = 147 gpm

Bedrock

T=50 gpd/ft
I= 0.011
L=2000 ft
Q=1100 gpd = 0.8 gpm

Pond Wash

Alluvium

T=12,000 gpd/ft
I= 0.010
L=1500 ft
Q=180,000 gpd = 125 gpm

Bedrock

T=50 gpd/ft
I= 0.010

L=4000 ft
Q=2000 gpd = 1.4 gpm

Actual rates observed in the existing recovery systems are: 148 gpm each at Cell D Interceptor Trench and the shallow recovery well system in NE Draw, and an average of 49 gpm from the two trenches below Pond 4 in Pond Wash.

e. Dewatering - The basic premise of this scenario assumes the surficial aquifer, consisting of alluvium and fractured, weathered mudstone, has been primarily charged with seepage waters from the tailings ponds on the General Chemical site. Therefore, this aquifer must be de-watered during reclamation. Dewatering will consist of two phases. The first phase is the evaporation of surface waters contained in the evaporation ponds. Pumping from the existing ground-water interceptor systems will continue during this phase. These waters will be returned to the evaporation ponds, so some recycling of water will be occurring. The second phase will commence once the ponds are dry. During this phase, the surficial aquifer will be de-watered by pumping into a lined evaporation pond. As dewatering occurs, the water table will decline, resulting in a decrease in saturated thickness and hydraulic head. These factors will result in decreasing transmissivity and discharge to the interceptor systems.

Pond Wash

The evaporation ponds in Pond Wash have a surface area of 6.1 MM sq ft and contain 45.8 MM gallons of water. The evaporation rate at the site is 48 in/yr. The pump rate from the interceptor trench during this phase has been adjusted with a decline rate of 11 percent per foot of water level change. The decline can be attributed to the decrease in hydraulic head, the decrease in saturated thickness and the decrease in permeability because of decahydrate precipitation in the aquifer. The evaporation of the surface water, adjusted for pumpback volume, will take approximately 4 1/4 years.

Approximately 50 percent of the aquifer volume will have been removed during the evaporation of the surface water in Phase I. the volume remaining in the aquifer at the start of Phase II will be approximately 134.4 MM gallons. Saturated thickness is estimated at 10 ft. A decrease of 1 ft in the water table represents a volume of 13.5 MM gallons. The discharge at the start of this phase will be approximately 27.8 gpm. A decline rate of 40 percent per foot was used until the discharge rate reached 10 gpm, then held constant. The following table summarizes the Phase II dewatering.

Saturated Thickness (ft)	Quantity (gpm)	Volume (MM gal)	Time (yrs)
10	22.3	134.4	1.2
9	16.7	120.9	1.5
8	10	107.4	2.5
7	10	93.9	2.5
6	10	80.4	2.5
5	10	66.9	2.5
4	10	53.4	2.5
3	10	39.9	2.5
2	10	26.4	2.5
1	10	12.9	2.5

Total time, Phase II = 22.7 yrs.
Total time, Phase I and II = 26.7 yrs.

NE Draw

NE Draw is subdivided into upper and lower areas. The upper area is drained by Cell D Interceptor trench and the lower area by a shallow collector well system. Discharge rates of these two systems are presently 148 gpm each, for a combined 296 gpm or 155.6 MM gal/yr. A decline rate of 40 percent per foot of water level change was used until a rate of 10 gpm was reached, then held constant. These waters are placed in Pond 2, which has an evaporation capacity of 240 MM gal/yr. An initial

saturated thickness of 20 ft was estimated for NE Draw. Minimum recycling of pond water is expected. Dewatering summaries are presented below.

Upper

Initial volume = 77.8 MM gal
Initial Q = 123.6 gpm
Volume/ft = 3.9 MM gal
De-watering time = 11.4 yrs

Lower

Initial volume = 102.9 MM gal
Initial Q = 123.6 gpm
Volume/ft = 5.2 MM gal
De-watering time = 15.2 yrs

10.1.9.2 Reclamation Plan

a. The facilities at the General Chemical site have two primary evaporation ponds currently being utilized, Pond 2 & 3 which behave as a single pond and Pond 5. Ponds 4S and 4N which are located below Pond 5 store a minimum amount of water on a seasonal basis and are therefore not considered for their evaporative capacities for the purpose of this report. Evaporation also takes place in Cell D, the solid waste disposal cell, the total containment pond and the sewage lagoon. These ponds will also be insignificant when the plant is no longer in operation and are not considered in this plan.

The plan for ground-water restoration is a two phase plan, which first eliminates the surface water in the ponds through solar evaporation. When this is complete, a lined pond will be constructed and water from the three ground-water recovery sources will be pumped into this pond. Phase I begins immediately upon plant shut down and Phase II begins approximately five years later.

b. Phase I - Phase I of the ground-water restoration plan will eliminate the source of ground-water recharge. Recharge to the local ground-water is the tailings disposal cells and the evaporation ponds.

Ponds 2 & 3 are approximately 180 acres and have a depth of only a couple of feet. Assuming an average annual evaporation rate of 48 inches per year, the approximately 369 acre-feet of water will be evaporated in less than one year. Both water from the Cell D Interceptor Trench and the wells in the NE Wash will be pumped into Ponds 2 & 3. At the initial rate of nearly 300 gpm, the evaporation rate exceeds the pumping rate. It is assumed the rate of flow from the NE Wash and the Upper NE Wash will decline at a rate of 40 percent per foot of water level change.

Pond 5 is approximately 120 acres with depths of as much as 14 feet. Water from the interceptor trench below Ponds 4S and 4N will be pumped into Pond 5. Adding the water pumped into the pond and subtracting the evaporation, Pond 5 should be fairly dry in approximately four and one quarter years. It was assumed the pumping rate would decline at a rate of 11 percent during the time Pond 5 is evaporating.

c. Phase II - At the point in time when all surface water has evaporated, a 25 acre fully lined pond will be constructed in Pond 4S. This lined pond will be used to solar evaporate the remaining ground-water being pump from the two interceptor trench and the wells in the NE Wash. The recharge sources will have been eliminated and the pumping rates will be fairly low.

10.1.9.3 Reclamation Cost Estimate

a. General - Costs for ground-water restoration can be broken into two items; operating and replacement cost for pumps in the Pond Draw and the NE Wash areas, and the construction of a lined pond in Pond 4S.

b. Pumping - During the initial five years of this plan, pumping will continue in a similar fashion to the pumping being done while the plant is in operation. All water from the NE Wash area will be pump into Pond 2 as is currently being done. Water from the interceptor trenches below Ponds 4S and 4N is currently being pumped in to Pond 4. With this plan, the water will be pumped into Pond 5. This

will allow Pond 4 to dry out for preparation of the lined pond construction.

As the quantity of water decreases, the number of pumps required decreases as well as the pump utilization. Initially, seven pumps are operating. This drops to six pumps in year three, five pumps in year five, four pumps in year 11, three pumps in year 12 and two pumps in year 16 for the remaining time. Because the length of time these pumps will be operating is so long after plant shut down, a present worth method of calculating pumping costs was utilized for the purpose of calculating the bond amount. A discount rate of six percent for this project.

c. Lined Evaporation Pond - A 25 acre fulling lined pond will be constructed in Pond 4S approximately five years after plant shutdown. The lined pond will be constructed with 60 mil HDPE liner. The pond will be constructed in such a manner as to disallow surface water from flowing into the pond and will have no outlet.

Construction of the pond will require minor excavation and grading, placement of the liner and securing the liner will a thin layer of sandy soil.

d. Cost Estimate

Pumping

Operating Costs -
Using an operating cost of $5000 per year per pump, decreasing the number of pumps at the schedule stated above and using a discount rate of 6%, the operating cost for pump operations is $277,200.

Evaporation Pond

Construction -

Grading	25 acres @ $150/acre	$ 3,750
Liner	121,000 sy @ $4.32/sy	522,720
Liner cover	40,000 cy @ $2.00/ cy	80,000
	Total Pond Costs	$ 606,470

Summary

Pumping Costs	$ 277,200
Pond Costs -	606,470
Sub-Total	$ 883,670
Contingency (15 percent)	132,550
Total	$1,016,220

RP10.1.10 Building Demolition

All of the buildings on site will be decommissioned during final reclamation. Each of the buildings and their footprint areas are listed in the Reclamation Bond Estimate. These buildings currently house a plethora of equipment including tanks, steel pipe, electric motors, pumps, steel grating, I-beams, etc. The majority of this equipment has a substantial salvage value. For the purposes of this cost estimate, it is conservatively assumed that the cost to remove the building contents will equal the salvage value. It is also assumed that as much as 30,000 tons of material in the buildings will not be salvageable. This includes walls and flooring in the administration building and partitions in other buildings around the plant. This also includes rubber/plastic pipes and hoses. This material will be placed in one of the shafts located at the plant site at a cost of $15.70/ton.

The cost items for decommissioning once the buildings are emptied are the actual tearing down of the buildings and demolition of the concrete flooring and footings. As mentioned earlier, the concrete from the floorings and footing will be used as capillary barrier in the pond area so the cost shown here is the cost required to break up the concrete. The cost of loading and hauling the concrete is covered in the capillary barrier cost.

RP10.1.11 Ancillary Facilities

The ancillary facilities are items such as the tailing pipelines, power lines, maintenance roads, the rail-spur and closures of the mine shafts. This section is divided into three parts:

a. Tailings lines, power lines and maintenance roads. - We have assumed this to be a five week project for a three man crew. The equipment required is a crane, a flatbed truck and a welding truck.

b. The rail-spur is six miles of track coming off the Union Pacific main line. An eight man crew is capable of dismantling one mile of track every 12 days. Therefore, 72 days are required for the project. The equipment required is a crane, fork lift and two flatbed trucks. The cost for this is conservative because in actuality, the rail and ties have a substantial salvage value and the cost to decommission the rail-spur will be a negative value.

   The ballast and sub-ballast will be used as a capillary barrier. The cost to load and haul this material is included in the capillary barrier cost.

   The reclamation of the surface area is included in the Miscellaneous Area Cost.

c. Mine Shafts - Currently there are seven shafts in the permit area. For ease of calculation, the seven shaft diameters were averaged. The average shaft diameter is 18 feet with an area of 254 sq. ft. Each shaft will be closed with a structural concrete closure. The concrete closure will consist of steel bridge decking with two feet of reinforced concrete on the decking. The closures for Shafts 1-5 will be approximately three feet below the surface. Because of the shaft design on Shafts 6 and 7, the concrete closure will be 36 feet deep and require more extensive back-filling.

RP11.0 RECLAMATION SCHEDULE

Reclamation will proceed immediately following the termination of the plant operation with the exception of reclaiming small annual disturbances. Borrow areas for soil, gravel, or other cover material for contaminated materials have been kept to a minimum.

RP12.0 RECLAMATION COSTS

RP12.1 Surface Reclamation

There are basically two types of surface reclamation required for the disturbed areas; those areas contaminated with soda ash and those areas not contaminated. The contaminated areas are those in which the ground has been saturated with soda ash such as the tailings disposal areas, both active and inactive, the disposal areas which are "dry" tailings and the evaporation ponds. Remaining areas such as the plant site and stockpile areas are considered non-contaminated.

This section will describe the reclamation method used for each type of area and provide a sample calculation. The bond calculations are shown in spreadsheet form in Table 1, Reclamation Bond Estimate.

a. Contaminated Areas

The following steps will be taken to reclaim the contaminated areas.

- Grading - Grading is required to smooth the area and re-establish drainage. It is assumed volume required will be equivalent to one foot of depth. A Caterpillar D8 Dozer will be utilized for grading. Grading is to be completed as described in each of the areas with the following exceptions:

  Cell D - The tailings cells are constructed with a 3:1 slope. This is the maximum slope which provides a stable embankment. Final reclamation of Cell D will leave the tailings in place but reduce the slope to 4:1. The grading volume used for Cell D is the amount of material required to make this reduction.

  Sample calculation: Tailings Disposal Area(152 acres)

  Re-grading will be done using a Caterpillar D8 Dozer. Reducing the existing slopes to 4:1 will require moving approximately 167,000 cubic yards of tailings. This is based on an average slope height of 30 feet and a slope distance of 10,000 feet. The average push distance will be 125 feet. Costs are as follow:

  Cost/hour with operator D8 - $150/hr (Searle

Brothers Construction Company)
Production - 900 cy/hr x .83% efficiency - 747 cy/hr
(Caterpillar Performance Handbook)
Cost/cy- $150/hr / 747cy/hr=$0.20

Total Cost for re-grading - 167,000cy x $0.20/cy = $33,400

Operating time: 167,000cy / 747 cy/hr = 224 hours

- Capillary Barrier - A one foot thick capillary barrier will be placed directly on the contaminated soil. This is to prevent sodium from leaching to the surface. The source of the capillary barrier material will be one of four sources:

- The concrete in the building foundations and flooring.
- The rip-rap used as slope protection on the evaporation pond embankments.
- Ballast from the rail-spur.
- Competent shale outcrops adjacent to cover material borrow areas.

Concrete from the plant site and ballast from the railroad will account for approximately 19 percent for the capillary barrier in the Inactive Areas. Riprap from slope protection on the embankments will account for approximately two percent of the capillary barrier for the Evaporation Ponds. The remaining capillary barrier material will come from shale borrow material.

The capillary barrier material will be prepared as follows:

- Concrete - Concrete demolished from the building sites will have rebar mixed with the concrete. A laborer with a cutting torch will clean the rebar from the material. It will then be loaded using a Caterpillar 966 loader and hauled with Caterpillar D250 articulating haul trucks.

- Ballast - Ballast will be loaded with 966 loaders and hauled with D250 haul trucks.

- Riprap - Riprap will be crushed with a portable jaw crusher, loaded with 966 loaders and hauled with D250 haul trucks.

- Shale - The competent shale will be ripped using a Caterpillar D9 dozer with a ripper and loaded with 966 loaders and hauled with D250 haul trucks.

Sample calculation: Tailings Disposal Area (152 acres)

The capillary barrier will be one foot of material using shale from the borrow areas. The material will be ripped with a Caterpillar D9 dozer, loaded with a Caterpillar 966 loader, hauled and spread using Caterpillar D240 trucks. The average haul distance from the borrow to the tailings area is approximately 3600 ft.

Haul Distance: 3600' average
Capillary Material Volume:1 ft. depth 152 Acres
490,453 cy

Production Capacity D9:
Base Productivity - 1,875 cy/hr
Efficiency - 83%
Final Productivity - 1,556 cy/hr
Equipment Cost - $240/hr
Cost per cy - $0.13/cy

Production Capacity 966F:
5 cy bucket
Level grade
2% Rolling Resistance
50' Travel Distance
Travel Time=0.075 minutes loaded
Travel Time=0.06 minutes empty
Cycle Time=0.135 minutes
Production=5 cy/cycle x 1 cycle/.135min. x 50 min/hr=1852 cy/hr.
Total Loading Time:932,795cy x 1 hr/1852cy= 498.8 hrs.
Equipment/Op. Cost: $116/hr.
Cost per cy=$.06/cy

Production Capacity D250E Articulated End-Dump

Truck(18 cy Capacity):
18 cy average load
Level grade
2% Rolling Resistance
3600' average haul
Travel Time Loaded:1.80 minutes
Travel Time Empty: 1.40 minutes
Production:18 cy/load x 1 load/3.20 minutes x 50 min./hr=281 cy/hr.
Total Loading Time:245,227 cy x 1hr/281 cy=873 hrs.
Equipment/Op. Cost: $174/hr.
Cost per cy=$0.619/cy

Cost for Capillary Barrier - 245,227 cy x (0.13+0.06 + $0.619)/cy=$199,891

Operating Time - 245,227cy/281/6 =146 hours

Cover Material - Two feet of sub-soil or cover material will be placed over the capillary barrier. This material will come from the evaporation pond embankments and from borrow sources identified in the "30 Year Waste Management Plan".

The placing of cover material will be accomplished with the use of Caterpillar 657 Push-Pull Scrapers working in tandem . A Caterpillar 16H Grader will go over the area to perform light grading in preparation of topsoil placement.

Sample calculations: Tailing Disposal Area (152 acres)

Cost/hour Caterpillar 657 w/operator - $240/hr (Searle Brothers Construction Company)
Average Haul Distance - 3200 feet
Production Rate - 560cy/hr x 83% efficiency = 465 cy/hr (Caterpillar Performance Handbook)
Cost/cy - $0.52/cy

Required Material - (152 acres x 43,560 ft^2/acre x 2 ft) / 27ft^3/cy = 490,453 cy

Cover Material placement cost - 490,453 cy x $0.52/cy = $253,246

Cost/hr 16H Motor Grader - $89 (Searle Brothers Construction Company)

Productivity - 1 acre/hr.

Total cost, light grading - 152 acres x 1 acre/hr x $89/hr = $13,528

Total cost, Cover Material - $253,246 + $13528 = $266,774

Operating Time: 490,453cy / 930 cy/hr = 528 hrs.

- Topsoil Placement - Six inches of topsoil will be place over the cover material. Placement of topsoil will also be done using Caterpillar 657 Push-Pull Scrapers working in tandem. A Caterpillar 16H Grader will perform light grading over this area in preparation of the re-vegetation.

Sample calculations: Tailings Disposal Area (152 acres)

Cost/hour Caterpillar 657 w/operator - $240/hr. (Searle Brothers Construction Company)

Average Haul Distance - 4200 feet

Production Rate - 470 cy/hr. x 83% efficiency = 390 cy/hr (Caterpillar Performance Handbook)
Cost/cy - $240/hr / 390cy/hr = $0.62/cy

Required Topsoil (152 acres x 43,450 ft^2/acre x .5 ft) / 27ft^3/cy = 122,613 cy

Topsoil placement cost - 122,613 cy x $0.62/cy = $775,435

Cost/hr 16H Motor Grader - $89 (Searle Brothers Construction Company)
Productivity - 1 acre/hr.
Total cost, light grading - 152 acres x 1 acre/hr x $89/hr = $13,528

Total cost, Topsoil - $76,020 = $13,528 = $88,963

Operating Time: 122,613 cy / 780 cy/hr - 157 hrs.

- Re-vegetation - Re-vegetation will consist of a diverse and stable mixture of plants of the same variety native to the area. The re-vegetation activity will consist of disking the topsoil, drill seeding and then placing two tons of mulch per acre over the entire area. The equipment to do this will consist of a heavy duty Rangeland Disk, a heavy duty Rangeland Drill and a Rotary Mulcher.

  Costs for this item are based on actual 2001 re-vegetation costs and are as follows:

Mobilization/Demobilization (1-time cost)=	$ 1,500.00
Disking:	$ 65.00
Drill Seeding:	$ 65.00
Mulching (2 tons/acre:	$ 175.00
Seed Cost:	$ 187.66
Mulch Cost (2 ton/acre):	$ 195.00
Total Cost/acre =	$ 687.66

- Supervision - Supervision is provided to oversee the reclamation process. Supervision is calculated by adding the hours required for each task and using 20 percent of the number of hours to determine the supervisory cost. The 20 percent factor is used because multiple tasks will be going on at the same time and the supervisor is capable of watching the whole operation.

b. Non-Contaminated Area

- The non contaminated areas such as the plant site, stockpiles, borrow areas and miscellaneous area will undergo similar reclamation methods. Each site will be graded using an estimated one foot of material moved to smooth the area and to re-establish drainage. The capillary barrier is not required because possible soil contamination caused by spills, etc. will be cleaned prior to reclamation. The required cover material over this area is one foot. Topsoil placement, re-vegetation and supervision will be similar to that used for the contaminated areas.

RP12.2 Reclamation Costs

The proceeding was a general description of the activities required to perform total reclamation of the TATA Chemicals Plant in accordance with the Reclamation Plan in the Permit to Mine. The bond calculations are shown in spreadsheet form as Table 6 Reclamation Bond Estimate. A summary of the costs are shown below in Table 5 Summary, Reclamation Costs

Table 5

Summary, Reclamation Costs

	Description	Area	Cost
1.0	Tailings Disposal Area	200.3 acres	$1,031,252
2.0	Inactive Areas	76.0 acres	$464,992
3.0	Disposal Areas	67.1 acres	$362,343
4.0	Evaporation Ponds	707.0 acres	$3,905,110
5.0	Plant Site	126.0 acres	$381,839
6.0	Shaft 6 Site	33.8 acres	$54,153
7.0	Stockpile/Borrow Areas	73.5 acres	$80,007
8.0	Miscellaneous Area	112.7 acres	$341,534
9.0	Hydrologic Restoration		$2,083,852
10.0	Building Demolition		$7,895,691
11.0	Ancillary Facilities		$426,196
12.0	#7 Shaft Site	9.3 acres	$80,769
	Total	1,405.7 acres	**$17,107,740**
	Contingency (20%)		**$3,421,548**
	Grand Total		**$20,529,288**

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Table 6
Reclamation Bond Estimate
TATA Chemicals (Soda Ash) Partners

		Area (acres)	Depth (ft)	Equip	Units	Equip ($/hr)	Haul Dist. (ft)	Cycle Time	Units	Payload (cy)	Productivity Base (cy/hr)	Eff (%)	Final (cy/hr)	Units	Quantity		Cost/Unit	Cost	Cost	Total Costs (M$)	Time (hrs)
1.0	**Tailings Disposal Area**	200.3																			
	Grading			D9H	1	$ 231	125				900	83	747	cy/hr	167,000	cy	$ 0.31	$ 51,643			224
																			$ 51,643		
	Capillary Barrier																				
	Ripping			D9H	1	$ 231					1,875	83	1,556	/LCY	323,151	cy	$ 0.15	$ 47,966			
	Loading		1	966F	1	$ 136	50	0.135	min.	5	2,222	83	1,844		323,151	cy	$ 0.07	$ 23,827			
	Hauling			D250E	6	$ 183	3600	3.2	min.	18	338	83	280		323,151	cy	$ 0.65	$ 211,108			192
																			$ 282,902		
	Cover Material		2	657E	2	$ 268	3200				560	83	465		646,301	cy	$ 0.58	$ 372,652			695
				16H	1	$ 155	NA						1	ac/hr	200		$ 155.00	$ 31,047			
																			$ 403,699		
	Topsoil		0.5	657E	2	$ 268	4200				470	83	390		161,575	cy	$ 0.69	$ 111,003			207
				16H	1	$ 155	NA						1	ac/hr	200		$ 155.00	$ 31,047			
																			$ 142,049		
	Re-Vegetation														200		$ 687.86	$ 137,778			
																			$ 137,778		
	Supervision @ 20%					$ 50													$ 13,182		1,318
	Total Tailings Disposal																			**$ 1,031**	
2.0	**Inactive Areas**	76																			
	Grading		1	D9H	1	$ 231	125				900	83	747	cy/hr	122,613	cy	$ 0.31	$ 37,917			164
																			$ 37,917		
	Capillary Barrier																				
	From Plant Site																				
	Rebar Removal			Torch	1	$ 50	(Laborer @$25/hr with cutting torch)						10		11,551	cy	$ 5.00	$ 57,755			
	Loading		1	966F	1	$ 136	50	0.135	min.	5	2,222	83	1,844		11,551	cy	$ 0.07	$ 852			
	Hauling			D250E	6	$ 183	2400	3.2	min.	18	338	83	280		11,551	cy	$ 0.65	$ 7,546			7
	From Ballast																				
	Loading			966F	1	$ 136	50	0.135	min.	5	2,222	83	1,844		11,733	cy	$ 0.07	$ 865			
	Hauling			D250E	6	$ 183	4800	3.35	min.	18	322	83	268		11,733	cy	$ 0.68	$ 8,024			
	From Borrow																				
	Ripping			D9H	1	$ 231					1,875	83	1,556	/LCY	99,329	cy	$ 0.15	$ 14,744			
	Loading		1	966F	1	$ 136	50	0.135	min.	5	2,222	83	1,844		99,329	cy	$ 0.07	$ 7,324			
	Hauling			D250E	6	$ 183	3600	3.2	min.	18	338	83	280		99,329	cy	$ 0.65	$ 64,890			59
																			$ 162,000		
	Cover Material		2	657E	2	$ 268	3200				560	83	465		245,227	cy	$ 0.58	$ 141,396			264
				16H	1	$ 155	NA						1	ac/hr	76		$ 155.00	$ 11,780			
																			$ 153,176		
	Topsoil		0.5	657E	2	$ 268	4200				470	83	390		61,307	cy	$ 0.69	$ 42,118			79
				16H	1	$ 155	NA						1	ac/hr	76		$ 155.00	$ 11,780			
																			$ 53,898		
	Re-Vegetation														76		$ 687.86	$ 52,277			
																			$ 52,277		
	Supervision @ 20%					$ 50													$ 5,725		572
	Total Inactive Area																			**$ 465**	

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Table 6
Reclamation Bond Estimate
TATA Chemicals (Soda Ash) Partners

		Area (acres)	Depth (ft)	Equip	Units	Equip ($/hr)	Haul Dist. (ft)	Cycle Time	Units	Payload (cy)	Productivity Base (cy/hr)	Eff (%)	Final (cy/hr)	Units	Quantity		Cost/Unit	Cost	Cost	Total Costs (M$)	Time (hrs)
3.0	**Disposal Areas**	67.1																			
	Grading		1	D9H	1	$ 231	125				900	83	747	cy/hr	108,255	cy	$ 0.31	$ 33,476			145
																			$ 33,476		
	Capillary Barrier																				
	Ripping			D9H	1	$ 231					1,875	83	1,556	/LCY	108,255	cy	$ 0.15	$ 16,069			
	Loading		1	966F	1	$ 136	50	0.135	min.	5	2,222	83	1,844		108,255	cy	$ 0.07	$ 7,982			
	Hauling			D250E	6	$ 183	3600	3.2	min.	18	338	83	280		108,255	cy	$ 0.65	$ 70,721			64
																			$ 94,771		
	Cover Material		2	657E	2	$ 268	3200				560	83	465		216,509	cy	$ 0.58	$ 124,838			233
				16H	1	$ 155	NA						1	ac/hr	67		$ 155.00	$ 10,401			
																			$ 135,238		
	Topsoil		0.5	657E	2	$ 268	4200				470	83	390		54,127	cy	$ 0.69	$ 37,186			69
				16H	1	$ 155	NA						1	ac/hr	67		$ 155.00	$ 10,401			
																			$ 47,586		
	Re-Vegetation														67		$ 687.86	$ 46,155			
																			$ 46,155		
	Supervision @ 20%					$ 50													$ 5,116		512
	Total Disposal Areas																			**$ 362**	
4.0	**Evaporation Ponds**	706.97																			
	Grading		1	D9H	1	$ 231	125				900	83	747	cy/hr	1,140,578	cy	$ 0.31	$ 352,709			1,527
																			$ 352,709		
	Capillary Barrier																				
	From Riprap																				
	Crushing			Crusher	1	$ 100							100		15,509	cy					
	Loading			966F	1	$ 136	50	0.135	min.	5	2,222	83	1,844		15,509	cy	$ 0.07	$ 1,144			
	Hauling			D250E	6	$ 183	500	0.7	min.	18	1,543	83	1,281		15,509	cy	$ 0.14	$ 2,216			
	From Borrow																				
	Ripping			D9H	1	$ 231					1,875	83	1,556	/LCY	1,125,069	cy	$ 0.15	$ 166,998			
	Loading		1	966F	1	$ 136	50	0.135	min.	5	2,222	83	1,844		1,125,069	cy	$ 0.07	$ 82,957			
	Hauling			D250E	6	$ 183	3600	3.2	min.	18	338	83	280		1,125,069	cy	$ 0.65	$ 734,985			669
																			$ 984,940		
	Cover Material		2	657E	2	$ 268	3600				560	83	465		2,281,157	cy	$ 0.58	$ 1,315,297			2,454
				16H	1	$ 155	NA						1	ac/hr	707		$ 155.00	$ 109,580			
																			$ 1,424,877		
	Topsoil		0.5	657E	2	$ 268	5000				375	83	311		570,289	cy	$ 0.86	$ 491,044			916
				16H	1	$ 155	NA						1	ac/hr	707		$ 155.00	$ 109,580			
																			$ 600,624		
	Re-Vegetation														707		$ 687.86	$ 486,296			
																			$ 486,296		
	Supervision @ 20%					$ 50													$ 55,663		5,566
	Total Evaporation Ponds																			**$ 3,905**	
5.0	**Plant Site**	126																			
	Grading		1	D9H	1	$ 231	125				900	83	747	cy/hr	203,280	cy	$ 0.31	$ 62,862			272
																			$ 62,862		
	Cover Material		1	657E	2	$ 268	3200				560	83	465		203,280	cy	$ 0.58	$ 117,210			219
				16H	1	$ 155	NA						1	ac/hr	126		$ 155.00	$ 19,530			
																			$ 136,740		
	Topsoil		0.5	657E	2	$ 268	4200				470	83	390		101,640	cy	$ 0.69	$ 69,827			130
				16H	1	$ 155	NA						1	ac/hr	126		$ 155.00	$ 19,530			
																			$ 89,357		
	Re-Vegetation														126		$ 687.86	$ 86,670			
																			$ 86,670		
	Supervision @ 20%					$ 50													$ 6,211		621
	Total Plant Site																			**$ 382**	

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Table 6
Reclamation Bond Estimate
TATA Chemicals (Soda Ash) Partners

		Area (acres)	Depth (ft)	Equip	Units	Equip ($/hr)	Haul Dist. (ft)	Cycle Time	Units	Payload (cy)	Productivity Base (cy/hr)	Eff (%)	Final (cy/hr)	Units	Quantity		Cost/Unit	Cost	Cost	Total Costs (M$)	Time (hrs)
6.0	**Shaft 6 Site**	33.75																			
	Grading		1	D9H	1	$ 231	125				900	83	747	cy/hr	54,450	cy	$ 0.31	$ 16,838			73
																			$ 16,838		
	Topsoil		0.5	657E	1	$ 268	700				1080	83	896		27,225	cy	$ 0.30	$ 8,140			0
				16H	1	$ 155	NA						1	ac/hr	34		$ 155.00	$ 5,231			
																			$ 13,371		
	Re-Vegetation														34		$ 687.86	$ 23,215			
																			$ 23,215		
	Supervision @ 20%					$ 50													$ 729		73
	Total Shaft 6																			**$ 54**	
7.0	**Stockpile/Borrow Area**	73.5																			
	Topsoil		0.5	657E	2	$ 268	700				1080	83	896		59,290	cy	$ 0.30	$ 17,726			33
				16H	1	$ 155	NA						1	ac/hr	74		$ 155.00	$ 11,393			
																			$ 29,119		
	Re-Vegetation														74		$ 687.86	$ 50,558			
																			$ 50,558		
	Supervision @ 20%					$ 50													$ 331		33
	Total Stockpile/Borrow																			**$ 80**	
8.0	**Miscellaneous Area**	112.7																			
	Grading		1	D9H	1	$ 231	125				900	83	747	cy/hr	181,823	cy	$ 0.31	$ 56,226			243
																			$ 56,226		
	Cover Material		1	657E	2	$ 268	3200				560	83	465		181,823	cy	$ 0.58	$ 104,838			196
				16H	1	$ 155	NA						1	ac/hr	113		$ 155.00	$ 17,469			
																			$ 122,306		
	Topsoil		0.5	657E	2	$ 268	4200				470	83	390		90,911	cy	$ 0.69	$ 62,456			117
				16H	1	$ 155	NA						1	ac/hr	113		$ 155.00	$ 17,469			
																			$ 79,925		
	Re-Vegetation														113		$ 687.86	$ 77,522			
																			$ 77,522		
	Supervision @ 20%					$ 50													$ 5,555		556
	Total Miscellaneous																			**$ 342**	
9.0	**Hydrologic Restoration**																				
	Sampling/Analyses/Reports	49	wells	2	samples per year		26.7	years		$ 54	/sample								$ 141,296		
	Technician									$ 50	/ sample								$ 130,830		
	Pumping																				
	Labor	$ 1,804	/yr																		
	Materials	$ 2,830	/yr																		
	Operation costs	$ 178	/yr																		
	Total Cost per Pump	$ 4,812	/yr	26.7 yrs at schedule decreasing pump rate															$ 459,087		
	Pond Construction																				
	Grading	25	acrea	16H	1	$ 155.00							1	ac/hr	25		$ 155.00		$ 3,875		
	Liner	121,000	sy		$ 9.45	/sy													$ 1,143,450		
	Liner Cover	40,000	cy		$ 4.00	/cy													$ 160,000		
	Monitor Well (locate and reclaim/Mob-demob)	143	wells		$47.50	$/well													$ 6,793		
	Abandonment	143	wells	40	$6.28	$/Ft.													35,922		
	Report to WDEQ	65	$/Hr.	40															2,600		
	Total Hyrologic Restoration																			**$ 2,084**	

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Table 6
Reclamation Bond Estimate
TATA Chemicals (Soda Ash) Partners

	Area (acres)	Depth (ft)	Equip	Units	Equip ($/hr)	Haul Dist. (ft)	Cycle Time	Units	Payload (cy)	Productivity Base (cy/hr)	Eff (%)	Final (cy/hr)	Units	Quantity	Cost/Unit	Cost	Cost	Total Costs (M$)	Time (hrs)

10.0 Building Demo	Number		Area (sq ft)	Height (ft)	Volume (cu ft)	Footing (LF)	Slab (cu yd)
SEE FACILITIES MAP (Map No. 1)							
GRI/II							
Plant	100		44,520	90	4,006,800	960	
Pumphouse	101		11,850	20	237,000	330	
Recycle House	102		4,000	18	72,000	280	
Cooling Tower	103		13,500	45	607,500	510	
Fire Water Building	104		400	12	4,800	80	
Floc Building	105		1,250		0	150	
Coal Calciner Storage Building	106		3,200	16	51,200	240	
Paste Plant (2011)	107		1,256	85	106,760		6,400
Associated Tanks and Bins (See Attachment)					900,734		
GRIII							
Plant	200		48,475	59	2,860,025	1,050	
Cooling Tower	201		13,500	45	607,500	510	
Water Treatment	202		850	12	10,200	190	
GRIII Shop	203		1,575	15	23,625	160	
Associated Tanks and Bins (See Attachment)					1,386,228		
Powerhouse							
Plant	300		33,500	135	4,522,500	915	
Coal Handling (Truck Unloading)	301		1,200	30	36,000	160	
E Boiler	302		6,750	30	202,500	330	
Associated Tanks and Bins (See Attachment)					166,787		
Shops							
Main Shop	400		24,990	25	624,750	710	
Lab/electrical Shop	401		12,375	16	198,000	635	
M&C Shop	402		3,200	20	64,000	240	
Mobile Shop	403		3,600	25	90,000	240	
Mine Shop	404		4,200	20	84,000	260	
Associated Tanks and Bins (See Attachment)					3,776		
Administration							
Admin Building	500		41,625	28	1,165,500	1,670	
Warehouse	501		39,775	16	636,400	885	
Guard House	502		400	12	4,800	80	
Employee Tunnel	503		2,604	8	20,832	868	

Building Demo	Number		Area (sq ft)	Height (ft)	Volume (cu ft)	Footing (LF)	Slab (cu yd)
Mine Surface Buildings							
Crusher	601		4,800	135	648,000	274	
#2 Hoist House	602		7,300	30	219,000	455	
#2 Hoist Headframe	603			48	0		
#2 Hoist Collar	604			20	0		
#3 Hoist Headframe Bldg.	605		3,260	120	391,200	376	
#3 Hoist MCC	606		2,012	17	34,204	180	
Mine Storage Building	607		2,400	16	38,400	220	
Surface Equipment Building	608		3,600	24	86,400	240	
Rescue Team Building	609		1,200	17	20,400	140	
Associated Tanks and Bins (See Attachment)					4,637		

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	Area (acres)	Depth (ft)	Equip	Units	Equip ($/hr)	Haul Dist. (ft)	Cycle Time	Units	Payload (cy)	Productivity Base (cy/hr)	Eff (%)	Final (cy/hr)	Units	Quantity	Cost/Unit	Cost	Cost	Total Costs (M$)	Time (hrs)
Product Loading/storage																			
Plo Office	700		1,500	12	18,000	160													
Plo Loading House	701		1,250	15	18,750	150													
Truck Loading House	702		400	18	7,200	80													
Plo Transfer Tower	703		3,250	80	260,000	230													
Associated Tanks and Bins (See Attachment)					2,080,923														
Misc. Sheds, Vaults, Buildings																			
Miscellaneous	800		4,972			1,048													
Total Square Footage (Flooring)			**354,539**					Floor Demolition Cost =				$ 3.88	/sq ft				1,375,611	**$ 1,376**	
Total Lineal Footage (Footings)						**15,006**		Footing Demolition Cost =				$ 12.54	/LF				188,175	**$ 188**	
Total Slab Yardage (Slabs)							**6,400**	Slab Demolition Cost =				$ 10.80	/CY				69,120	**$ 69**	
Building Demolition		**Bldg.Vol.=**			**22,521,331**			Building Demolition Costs =				$ 0.24	/cu ft				5,495,205		
Pipe Rack Demolition (See Attachment)																	149,279		
Converyor Demolition (See Attachment)																	147,300		
																		$ 5,792	
Disposal of Debris/Unsalvageable)				**30,000**	**tons**		Loading and Haulage Costs =				$ 15.70	/ton					471,000	**$ 471**	

11.0 Ancillary Facilities

Tailings pipeline, powerlines and maint. road																			
	3	man crew		$ 77	/hr	5	weeks		$ 15,400										
	1	20 ton crane		$ 1,100	/wk	5	weeks		$ 5,500										
	1	flat bed truck		$ 220	/day	5	weeks		$ 5,500										
	1	welding truck		$ 440	/wk	5	weeks		$ 2,200										
																	$ 28,600		
Railroad Spur Reclamation Costs																			
Railroad spur removal($5.44/linear ft.)	6	miles	31680	5.44	$/Ft.												$ 172,339		
Ballast removal/dispos @ $2.52/CY	2.52	$/CY	14256														$ 35,925		
Contour & Revegetate railroad footprint @3022.00/Ac.	44	acres	3022														$ 132,968		
Hi-Vol. Sampling Site s (4)		4 sites	$480/site						$ 1,920								$ 1,920		
Shafts	254	sq. ft.	2	ft thick	19	cy concrete/shaft													
1 through 5	Decking																		
	Mat'ls	$ 588	/shaft																
	Labor	$ 115	/shaft																
	Concrete																		
	Labor	$ 1,375	/shaft																
	Mat'ls	$ 2,642	/shaft																
	Finishing	$ 241	/shaft																
	Shaft Prep																		
	Labor	$ 800	/shaft	(2 men @16 hrs.@ $25/hr.)															
	Equipment	$ 2,688	/shaft	(Cat330 trackhoe-16 hrs. @$168/hr.)															
	Backfilling	$ 120	/shaft																
	Total	$ 8,569															$ 42,845		
	Backfilling	$ 3,150	(1260CY@$2.50/CY)														$ 11,599		
	Total	$ 11,599																**$ 426**	

12.0 #7 Shaft Site

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Table 6
Reclamation Bond Estimate
TATA Chemicals (Soda Ash) Partners

	Area (acres)	Depth (ft)	Equip	Units	Equip ($/hr)	Haul Dist. (ft)	Cycle Time	Units	Payload (cy)	Productivity Base (cy/hr)	Eff (%)	Final (cy/hr)	Units	Quantity		Cost/Unit	Cost	Cost	Total Costs (M$)	Time (hrs)
#7 Shaft	254	sq. ft.	1	ft thick																
	Decking																			
	Mat'ls	$ 6,585		(materials equivalent cost of $350/cy concrete)																
	Labor	$ 4,000		(4 men @ 40 hrs @ $25/hr)																40
	Concrete		19	cy	(2 ft thick reinforced)															
	Labor	$ 800		(4 men @ 8 hrs @ $25/hr)																8
	Mat'ls	$ 3,851		concrete and pump truck																
	Finishing	$ 200																		
	Shaft Prep																			
	Labor	$ 4,000		(4 men @ 40 hrs.@ $25/hr.)																40
	Equipment	$ 3,360		(Cat330 trackhoe-20 hrs. @$168/hr.)													$ 22,796			
	Backfilling		D9H	1	$ 231					900	83	747	cy/hr	1,000	cy	$ 0.31	$ 309			
			966F	1	$ 136	50	2	min.	5	150	83	125	cy/hr	1,000	cy	$ 1.09	$ 1,092			
Supervision @ 20%					$ 50												880			88
																		$ 25,078		
#7 Shaft Site Reclamation	9.3																			
Grading - site	9.3	1	D9H	1	$ 231	NA				900	83	747	cy/hr	15,004	cy	$ 0.31	$ 4,640			20
Ripping - roads (Bonomo & Upgraded 2-Track)	16,743'x18'	2	D9H	1	$ 231	16,743	650	ft/hr	6 ft/pass	3 passes	75	488	ft/hr	103.03	hr		$ 23,801			103
Grading - roads (Bonomo & Upgraded 2-Track)	16,743'x18'	1	16H	1	$ 155	16,743	900	ft/hr	16 ft/pass	2 passes	83	747	ft/hr	67.24	hr		$ 10,422			67
																		$ 38,863		
Topsoil - site		0.5	657E	1	$ 268	700				1080	83	896		7,502	cy	$ 0.30	$ 2,243			8
			16H	1	$ 155	NA						1	ac/hr	9.3	ac	$ 155.00	$ 1,442			
																		$ 3,684		
Re-Vegetation - site														9.3	ac	$ 687.86	$ 6,397			
Re-Vegetation - roads (Bonomo & Upgraded 2 track)														6.9	ac	$ 687.86	$ 4,759			
																		$ 11,156		
Supervision @ 20%					$ 50													$ 1,987		199
Total #7 Shaft																			**$81**	

Total	**$ 17,108**
20% Contingency	**$ 3,422**
Grand Total	**$ 20,529**
Rounded to the next $1000	**$ 21,000**

Re-Vegetation Details

Type of Equipment:	Four Wheel Drive Ford Tractor	
	Heavy Duty Rangeland Disk	
	Heavy Duty Rangeland Drill	
	Rotary Mulcher	
Costs:	Mobilization/Demobilization (1-time cost)=	$ 1,500.00
	Disking:	$ 65.00
	Drill Seeding:	$ 65.00
	Mulching (2 tons/acre):	$ 175.00
	Seed Cost:	$ 187.66
	Mulch Cost (2 ton/acre):	$ 195.00
	TOTAL COST/ACRE=$687.86	**$ 687.66**