Canyon Fuel Company, LLC
A subsidiary of Wolverine Fuels Holding, LLC

Sufco Mine
John D. Byars
General Manager
397 South 800 West
Salina, Utah 84654
(435) 286-4400
Fax (435) 286-4499

April 8, 2020

C/041/0002
Received 4/17/20
Task #6136

Permit Supervisor, Utah Regulatory Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
PO Box 145801
Salt Lake City, UT 84114-5801

Re: Midterm Review, Task ID# 6058, Canyon Fuel Company, LLC, Sufco Mine, C/041/002

Dear Sirs:

Enclosed with this letter is a copy of revision to information in the Waste Rock Site permit, Appendix 5-9 Bond and revisions to Chapters 2 and 3 of the Sufco M&RP.

Please contact Vicky Miller at (435)286-4481 if there are questions or additional information is needed.

Sincerely,

Vicky L Miller for

John D. Byars
General Manager
Sufco Coal Mine

Encl.

Cc: DOGM Correspondence File

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: Canyon Fuel Company, LLC **Permit Number:** C/041/002
Mine: Sufco Mine
Title: Midterm Review, Task ID# 6058
Description. Include reason for application and timing required to implement

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

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

Please attach one (1) review copy of the application.

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

Jacob D. Smith
Print Name

Sign Name, Position, Date

Subscribed and sworn to before me this 4th day of April, 2024

Jill White
Notary Public

My commission Expires: 3/28, 2024

Attest: State of Utah } ss:
County of Sevier

JILL WHITE
Notary Public
State of Utah
My Commission Expires 03/28/2024
COMMISSION NUMBER 71112

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas &

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Canyon Fuel Company, LLC
Mine: Sufco Mine **Permit Number:** C/041/002
Title: Midterm Review, Task ID# 6058

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☐ Replace	☐ Remove	Waste Rock Disposal Site
☐ Add	☒ Replace	☐ Remove	Map 4D
☐ Add	☒ Replace	☐ Remove	Chapter 2, Page 2-4 and 2-5
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	MRP - Mine Site
☐ Add	☒ Replace	☐ Remove	Chapter 2, Pages 2-12, 2-20, 2-23, 2-24 and 2-25
☐ Add	☒ Replace	☐ Remove	Chapter 3, Pages 3-v,3-28 and 3-55
☒ Add	☐ Replace	☐ Remove	Appendix 3-6, add information to the back of existing information
☐ Add	☒ Replace	☐ Remove	Appendix 5-9
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	**Received by Oil, Gas & Mining**
April 8, 2020	

CHAPTER 2

SOILS

outslope. The remaining excavated material in the deeper cuts will be used as fill material for the access road and the north end of the substation pad. Substation #1 was never constructed and therefore when the site was examined in 2010, there was no topsoil stockpile or fill material available on site.

The soil to be removed at the Link Canyon Substation No. 2 will include the A horizons and a portion of the C horizon. As described in Appendix 2-6, six mapped soil units exist in the No. 2 pad area. Following is an estimated volume of soil to be salvaged and placed in the topsoil storage pile based on the area of each soil unit and average depth of salvage for each unit area. The actual total volume of soil stored may differ from the total provided below and is dependent upon conditions found during construction.

Soil Map Unit	Estimated Thickness (ave)	Mapped Area	Volume
A	24-inches	612 sf	24 CY
B	8-inches	579 sf	14 CY
C	6-inches	473 sf	9 CY
D	36-inches	600 sf (approx.)	67 CY
E	8-inches	28 sf	1 CY
F	5-inches	198 sf	3 CY
		TOTAL	118 CY

The A and C horizons will be removed together from the topsoil salvage area and stored in the pile as a single soil resource. Type D soils, the overcast from the east side of the trolley road, will be recovered prior to construction of the substation pad. All available suitable soils encountered during site construction will be salvaged and stored for final reclamation. A person qualified to make soil salvaging determinations will be on site during construction.

Six soil types and waste coal were identified by Dan Larsen (EIS) during his investigation of the soils in the Link Canyon Mine Portal disturbed area. The soil types and thicknesses of salvageable topsoil are listed below:

Soil Map Unit		Approx. Thickness	Mapped Area(approx.)	Volume
WC	Waste Coal	0 inches	250 sf	0 CY

approximately 12" of topsoil prior to placement of the subsoil. ~~Section 3.1.6 of Volume 3 of this M&RP contains more information pertaining to the soils stored at the waste rock disposal site.~~

2.3.2 Topsoil and Subsoil Removal

2.3.2.1 Topsoil Removal and Segregation

All topsoil thicker than 6 inches will be removed as a separate layer from the subsoil, segregated, and stockpiled separately. Topsoil less than 6 inches thick will be removed according to Section 2.3.2.3. However, in the areas of the Link Canyon Substation Nos. 1 and 2 pads, all soil will be removed and stored in one area as a single soil resource. At substation pad No. 1, the maximum projected volume of topsoil salvage based on the soil survey depth of 20 inches and the projected topsoil salvage area of 0.08 acres is 224 cubic yards. The salvaged topsoil will be removed as a separate layer, segregated and placed on the south end of the pad outslope. The remaining excavated material in the deeper cuts will be used as fill material for the access road and the north end of the substation pad. At substation No. 2, the volume of soil projected to be removed is 118 CY. Substation #1 was never constructed, as the site was examined in 2010 an assumption was made that the soils had been disturbed but not removed. The area appeared to have been roughened and has revegetated. There is not a soil stockpile at the Substation #1 site.

2.3.2.2 Poor Topsoil

Topsoil that is of an insufficient quantity, or of poor quality (for sustaining vegetation) will be removed as a separate layer and segregated. Such operations will be done with approval of the UDOGM, and in compliance with R645-301-233.100 (Section 2.3.3.1).

2.3.2.3 Thin Topsoil

Topsoil to be removed that is less than 6 inches thick will be removed with the immediately underlying unconsolidated materials (up to a total of 6 inches). This material mixture will be treated as topsoil and stockpiled together without any horizon segregation.

2.3.2.4 Minor Disturbances Not Requiring Topsoil Removal

Small Structures. Topsoil will not be removed prior to construction resulting in only minor disturbances as described in R645-301-232.400. Such construction activity includes work on small structures such as power poles, signs, fence lines, and other small structures which do not significantly disturb the site.

2.3.3.4 Testing of Substitute Topsoil

Only the substitute topsoil used in lieu of, or in conjunction with, on-site overburden and topsoil will be tested as described in Section 2.3.3.3.

2.3.4 Topsoil Storage

2.3.4.1 Topsoil Stockpiling

Topsoil removed will be stockpiled for later use in reclamation operations when it is impractical to promptly redistribute the topsoil on regraded areas.

Presently, the topsoil storage piles at the SUFCO Mine are of the small amounts of topsoil removed from the substation and sediment pond areas (Section 2.3.1.4).

2.3.4.2 Stockpiled Topsoil

Stockpiled Volumes at Sufco Mine Site *		
Location	Type	Volume (CY)
Substation Bin Wall	Subsoil	2160
Upper Sediment Pond	Topsoil	1200
Substation Pad	Topsoil	27
Overflow Pond (Lower)	Topsoil	1488
Volumes of Soils Stored at Waste Rock Disposal Site for distribution at Mine Site		
Waste Rock Disposal Site	Topsoil	8.2

Waste Rock Disposal Site	Subsoil	11,260
Waste Rock Disposal Site	Subsoil	487
Link Canyon Site*		
Portal	Topsoil	38
~~Substation #1**~~	~~Topsoil~~	~~224~~
Substation #2	Topsoil	~~118~~ 84**

* Per Sections 2.3.3.3, 2.3.1.4, 2.3.4.2 and Plates 5-2B, 5-2D, 5-2E,5-2F

~~** Assumed topsoil never removed or stored (Section 2.3.2.1)~~

**Quantity estimated by measurement of existing pile, actual salvage volume not available.

Stable Stockpile Site. Stockpiled materials will be placed on a stable site within the permit area. The topsoil pile containing the topsoil removed from the sediment pond site was stockpiled in a small area exemption pile on a stable surface area (0.105 acres) below the sediment pond (Section 2.3.1.4). Topsoil removed for the construction of the overflow pond is stockpiled southwest of the overflow pond, see Plate 7-4A, in a small area exemption pile on a stable surface area (0.141 acres) The topsoil pile containing the soil removed from the substation area (0.02 acres) is located in a small area exemption pile on the south side of the substation. Topsoil removed from the Link Canyon Substation No. 1 will be located on the outslope below the pad as shown on Plate 5-2D. Topsoil removed from the Link Canyon Substation No. 2 will be stored in the soil stockpile as shown on Plate 5-2E. Topsoil removed from the Link Canyon Mine Portal area will be stored in the soil stockpile as shown on Plate 5-2F.

Protection from Contaminants and Compaction. Stockpiled topsoil shall be protected from contaminants and unnecessary compaction. To protect the topsoil from contaminants and unnecessary compaction that could interfere with vegetation, the sediment pond topsoil and the

substation stockpiles are isolated with no means of access from the main surface area (Section 2.3.1.4). A topsoil storage sign was installed at the base of both stockpiles and will be placed on the Link Canyon Substation 2 ~~s Nos. 1 and 2~~ and Link Canyon Mine Portal storage areas.

Wind and Water Erosion Protection. All topsoil stockpiles will be protected from wind and water erosion by prompt establishment and maintenance of a vegetative cover (standard seed mix in section 3.4.1.2 minus the shrubs and trees). The sediment pond and substation topsoil stockpiles are protected from wind and water erosion by the establishment of a protective vegetative cover. The Link Canyon Portal topsoil pile will be protected by adding vegetative material removed during site construction. Grasses native to the area will be planted either through seeding or by obtaining and planting plugs from nearby undisturbed sites. A silt fence was installed below the stockpiles to help trap sediment runoff from the stockpiles.

Topsoil Redistribution. All stockpiled topsoil will not be moved until redistributed during reclamation operations unless approved by the UDOGM.

2.3.4.3 Topsoil Stockpile Relocation

Stockpiled topsoil in jeopardy of being detrimentally affected in terms of its quantity and quality by mine operations may be temporarily redistributed after approval from the UDOGM.

Host Site. Topsoil relocation may occur provided that such action does not permanently adversely affect topsoil of the host site.

Topsoil Suitability. Topsoil relocation may occur provided the topsoil is retained in a condition more suitable for redistribution than if stockpiled.

2.40 Reclamation Plan

2.4.1 General Requirements

CHAPTER 3

BIOLOGY

LIST OF APPENDICES

(Appendices appear in Volume 5)

Appendix

3-1 Report of 1983 Field Investigations

3-2 Aquatic Resource Inventory of Southern Utah Fuel Company Permit Area

3-3 Wildlife Assessment of the Southern Utah Fuel Company Mining Property and Adjacent Areas

3-4 Raptor and General Avifauna Studies

3-5 Fauna of Southeastern Utah and Life Requisites Regarding their Ecosystems

3-6 Vegetation Information Guidelines, Appendix A, Reference Area Reports and Plate

3-7 Power Line Correspondence

3-8 Bat Survey for the SUFCO Mine

3-9 Vegetation and Wildlife of the Pines Tract Project.

3-10 Monitoring and Mitigation Plan for Mining Under the East Fork of Box Canyon

3-11 Muddy Creek Technical Report-Wildlife

3-12 Mexican Spotted Owl Survey Muddy Tract

3-13 Vegetation and Wildlife of the West Coal Lease Modifications

3-14 Monitoring and Mitigation Plan for Undermining the South Fork of Quitchupah 2R2S Block "A" and 3R2S Block "B"

3-15 3R4E & 4R4E Reports (Confidential)

3-16 Greens Hollow Tract

- In upper Mud Spring Hollow (north of sinkhole) the spring was developed for livestock watering,but was dry in July 2008 and was disconnected and dilapidated in 2009. The seasonal wetland hydrology continued to support the sedges and rushes in 2008. The determination of wetland boundaries in the 2007 vegetation mapping is exaggerated in this area according to the EA. Impacts to springs associated with the wetland is expected to decrease with increasing overburden depth.
- The assesment of wildlife impacts was based on a site visit in July 2008, review of NEPA and other pertinent documents (Cirrus 2008a). Information on management indicator species (MIS) was provided by Fishlake National Forestt (Rodriguez et al 2006). Refer to Tables 3-3 and 3-4 of EA for additional information.
- In the Southern Rockies/Colorado Plateau Bird Conservation Region 16 there are 29 species of concern which could occur in the area. Three were most likely species were part of the Cirrus reported Biological Evaluation (2008). They were determined to be unaffected because habitat is either not present or would not be affected.
-Livestock grazing has occured on the area since the late 1800's and the area is currently grazed under the Forest Service Quitchupah Cattle and Horse Allotment. The area of Coal Lease U-47080was also a part of an Environmental Assessment in 1981as part of the lease application package.

3.2.2.3 Fish and Wildlife Service Review

If requested, the applicant authorizes the release of information pertaining to Section 3.2.2 and 3.3.3 to the U.S. Fish and Wildlife Service Regional and Field office for their review.

3.2.3 Maps and Aerial Photographs

The lease area was mapped by use of a mosaic of aerial photographs and assured by ground inspection. Vegetation sampling locations/reference areas are shown on Plate 3-1 and reference areas on a drawing in Appendix 3-6.

Greens Hollow. To the best of the applicants knowledge there are no reference areas, monitoring stations for fish and wildlife, habitat features, facilities used to protect and enhance fish/wildlife within the Greens Hollow Lease area. Land Uses for the Greens Hollow Lease are shown on Plate 4-1C.

3.2.3.1 Location and Boundary of Proposed Reference Area

The locations of the vegetative reference areas are found on Plate 3-1 and reference areas on a drawing in Appendix 3-6. Area 13 shown on Plate 3-1 is to be used as a mapping unit only and not

and forbs with Ponderosa pines growing within a couple hundred feet of the western edge of the sinkhole and reference area site (see photos Appendix 3-13).

Pre-Law Site Reclamation

A reference area nor success standard is required by Surface Mining Control and Reclamation Act (SMCRA) regulation for pre-law mining disturbance. Reclamation of pre-law mining activities is not specifically outlined in regulation by Federal or State agencies. According to two available sources the establishment of ground cover adequate to control erosion seems to be designated as the best practice for coal mining surface disturbance created pre-law (1977).

1) Abandoned mine land (AML) sites are coal mining disturbances that were not adequately reclaimed before the passage of SMCRA on August 3, 1977. Areas disturbed by mining activity prior to SMCRA and never reclaimed to the requirements of SMCRA will be required to establish a minimum ground cover adequate to control erosion.

2) "For previously mined areas that were not reclaimed to the requirements of these Rules as a minimum ground cover of living plants shall not be less than can be supported by the best available topsoil or other suitable material in the re-affected areas, shall not be less than the ground cover existing before redisturbance, and shall be adequate to control erosion (Colorado Division of Minerals and Geology, Regulation of the Colorado Mined Land Reclamation Board for Coal Mining, Section 4.15.10 - 1).

Within the disturbed area boundary Sufco Mine has pre-law disturbance at Link Canyon of approximately 0.411 acres and approximately 25.7 acres at the mine site. It should not be assumed that the entire acreage is vegetated, at both locations, litter, rock, rock outcrops and bare ground are part of the pre-law disturbance within the disturbed area boundary. The majority of the pre-law area has reestablished vegetation providing varying degree of cover.

Within the year prior to the start of reclamation a vegetation survey will be completed on a one acre area representative of the pre-law mine site disturbance and a vegetation survey of 0.5 acres at Link Canyon. The most representative location for the survey will be agreed upon between the Permittee and Division. The survey will be used to create an erosion control success standard for the pre-law disturbance.

Method Used for Planting and Seeding. The ~~entire~~ disturbed area will be revegetated using various seeding methods such as hydroseeding, broadcasting or drilling. The best available

APPENDIX 3-6

Vegetation Information Guidelines, Appendix A
Reference Area Reports and Plate

Vegetation Monitoring at the Link Canyon Portal Area: An Update

2013

View From the Link Canyon Portal Site

Prepared by

MT. NEBO SCIENTIFIC, INC.
330 East 400 South, Suite 6
P.O. Box 337
Springville, Utah 84663
(801) 489-6937

Patrick D. Collins, Ph.D.

for

CANYON FUEL COMPANY, LLC
SUFCO MINE
597 South SR 24
Salina, Utah 84654

February 2014

TABLE OF CONTENTS

INTRODUCTION 1

METHODS 2

RESULTS 2

SUMMARY & RECOMMENDATIONS 4

FIGURES 5

INTRODUCTION

In 2002, engineers for Canyon Fuel Company designed a new access portal and other minor surface facilities for the SUFCO Mine. The new portal was constructed in Link Canyon at the site of an old portal that was created from earlier mining activities. Construction of the portal created about 1/4 acre of new land disturbance, or more appropriately called re-disturbance.

The portal site in Link Canyon is located in Sevier County, Utah about 7 miles northwest of the town of Emery (GPS coordinates: NAD 27, 12 S, 471190E, 4312294N). Native plant communities at the site consisted primarily of pinyon-juniper and riparian types. Elevation at the site was approximately 7,600 ft above sea level.

The purpose of this document is to provide an update of the vegetation at the Link Canyon Portal site and also to provide recommendations for future studies.

Prior to construction of the new portal, field studies were conducted by *Mt. Nebo Scientific, Inc.* One such study provided a report called: Survey Report, Aquatic Fauna, Link Canyon Portal Area (July 2002). The objectives of this study were to 1) survey for presence of specific sensitive aquatic fauna species and 2) to assess the potential for the habitat to support other sensitive aquatic species. Another field study was conducted that resulted in a report called: Vegetation of the Link Canyon Portal Surface Facilities (August 2002). This study provided information about the plant communities at the site as well as proposed vegetation reference areas that could be used for revegetation success standards when the site is ultimately reclaimed. Information about potential threatened, endangered and sensitive plant species was also provided in that report.

Since the time the portal was constructed, the vegetation has been monitored by Mr. Keith W. Zobell, an environmental specialist. Mr. Zobell's reports provided color photographs at specific locations as well as a qualitative assessments of the vegetation at the Link Canyon Portal site.

METHODS

Field work was conducted at the Link Canyon Portal site on September 18, 2013. The entire disturbed area was surveyed including the portal, its access road, stream buffer zones, culverts and road cut slopes. The reference areas were also visited on that day. Qualitative notes as well as photographs were recorded.

RESULTS

The cover, density, diversity, productivity and vigor of the vegetation at the Link Canyon Portal site were in excellent condition. A list of plant species observed is shown on Table 1. One relevant or telling method of assessing the site it to observe the photographs taken during the field work. The portal site entrance gate is shown in Fig. 1, whereas the access road behind the gate is shown in Fig. 2. Not surprising because the road was not seeded, this is where some "weedy" species were located. The topsoil pile was covered with desirable vegetation (Fig. 3), and is was controlling erosion. Signs have been placed and remain in good condition at the stream buffer boundaries (Figs. 4 and 5). The stream has been protected by these buffer zones. The actual portal entrance is closed to the public by a chainlink gate (Fig. 6). The drainage culverts are clear, the bank around them is stable and has good vegetative cover (Fig. 7). Fig. 8 shows some of the general disturbance area – note the good cover and vigor of the vegetation here too. The access road fill banks have also been stabilized by plant growth, although some of it is comprised of a few weedy plants (Fig. 9). The weeds were a minor component here however, adding to the bank stability and probably not enough to be concerned about implementing weed control measures at this time.

The reference areas, or those communities chosen to represent future revegetation success standards at the time of final reclamation, remain in good condition. The Pinyon-Juniper Reference Area is shown in Fig. 10; the Riparian Reference Area is shown in Fig. 11.

Table 1: Plant species observed at the Link Canyon Portal Site.	
SCIENTIFIC NAME	COMMON NAME
Trees & Shrubs	
Betula occidentalis	Water birch
Chrysothamnus nauseosus	Rubber rabbitbrush
Clematis ligusticifolia	White virgins-bower
Cornus sericea	Red-osier dogwood
Ephedra viridis	Mormon tea
Eriogonum corymbosum	Corymb buckwheat
Juniperus osteosperma	Utah Juniper
Pinus edulis	Pinyon-pine
Pseudotsuga menziesii	Douglas fir
Rhus aromatica	Squaw bush
Ribes aureum	Golden current
Rosa woodsii	Wood's rose
Salix exigua	Coyote willow
Forbs	
Aster foliaceous	Leafy-bract aster
Halogeton glomeratus	Halogeton
Grasses & Grass-likes	
Agropyron cristatum	Crested wheatgrass
Elymus cinereus	Gt. Basin wildrye
Elymus smithii	Western wheatgrass
Elymus salinus	Salina wildrye
Juncus arcticus	Wiregrass
Stipa hymenoides	Indian ricegrass

SUMMARY & RECOMMENDATIONS

Over 10 years ago, a new mine portal was constructed at Link Canyon in south-central Utah. The new portal was placed in an area that was once disturbed by another portal from earlier mining operations. In 2002, prior to construction of the new portal, biological studies were conducted to gather baseline information at the site. These studies included aquatic fauna, vegetation and sensitive species work. Following construction of the new portal, the area was seeded and the vegetation has been regularly monitored. Status reports have been provided to the State of Utah, Division of Oil, Gas & Mining (DOGM).

This report provides the general condition of the vegetation at the Link Canyon Portal site in 2013. Vegetation has become well established on the road-cuts, road banks, topsoil pile, culvert bank, stream buffer zones and other disturbed areas. Signs and access gates are also in good condition.

The reference areas previously chosen to represent future revegetation success standards remain in good condition and continue to be viable to be used for comparisons at the time of final reclamation.

Because the vegetation has become well established, has stabilized over-time and remains in good condition with respect to cover, diversity, density and productivity, there appears no practical reason to continue to monitor the site on an annual basis – at least from a vegetation prospective – unless more mine-related disturbance is conducted, or until the time of final reclamation and revegetation.

Fig. 1: Portal Entrance

Fig. 2: Portal Access Road

Fig. 3: Topsoil Pile

Fig. 4: Stream Buffer Zone

Fig 5: Stream Buffer Zone

Fig 6: Link Canyon Portal

Fig 7: Drainage Culverts

Fig 8: General Disturbance

Fig 9: Road Fill Bank

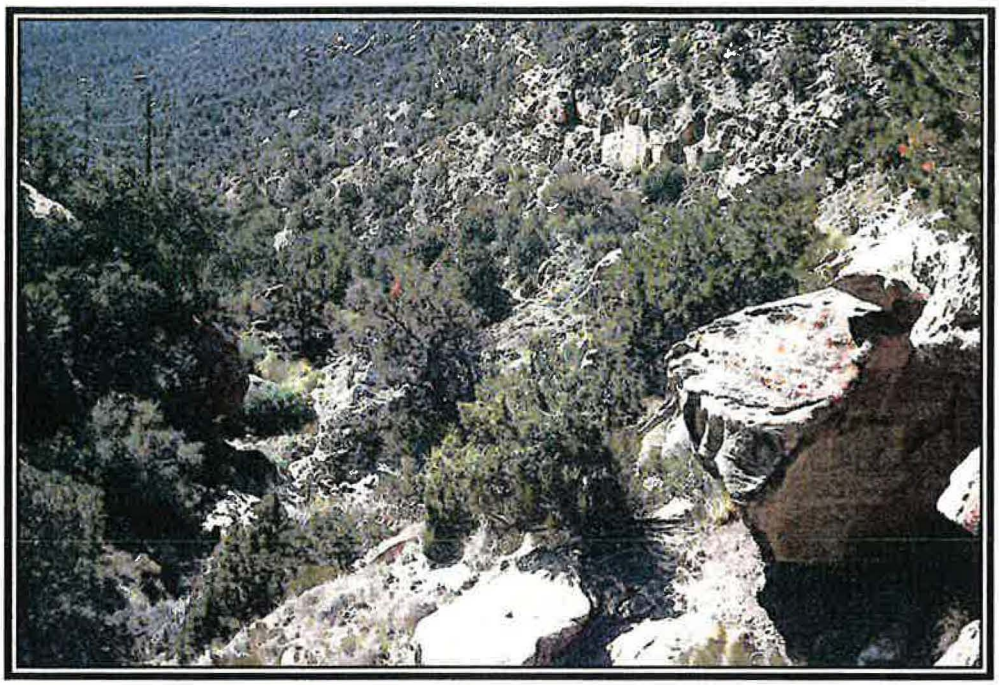


Fig 10: Pinyon-Juniper Reference Area

Fig 11: Riparian Reference Area

Vegetation & Sensitive Species of the Proposed Expansion at the Waste Rock Site

for the
SUFCO Mine

in
Sevier County, Utah

Coal truck passing the SUFCO Waste Rock Study Area

Prepared by

MT. NEBO SCIENTIFIC, INC.
330 East 400 South, Suite 6
P.O. Box 337
Springville, Utah 84663
(801) 489-6937

Patrick D. Collins, Ph.D.

for

CANYON FUEL COMPANY, LLC
SUFCO MINE
597 South SR 24
Salina, Utah 84654

February 2014

Table of Contents

Introduction 1
Proposed Disturbance 1
Revegetation Success Standards 1

Methods 2
Quantitative Sampling 2
Sampling Design & Transect/Quadrat Placement 3
Cover & Composition 3
Woody Species Density 3
Sample Size & Adequacy 3
Statistical Analyses 4
Photographs 4
Threatened, Endangered & Sensitive Species 4

Results 5
Proposed Disturbed Sagebrush/Grass Community 5
Sagebrush/Grass Reference Area 6
Proposed Disturbed Rabbitbrush/Sagebrush Community 7
Rabbitbrush/Sagebrush Reference Area 8
Proposed Disturbed Mountain Brush Community 9
Mountain Brush Reference Area 11
Data Summary Tables 13
Community Comparisons 25
Threatened, Endangered & Sensitive Species 28

Summary & Discussion 30

Color Photographs of the Sample Areas 33

Vegetation Study Area ..... Map 1

Introduction

Proposed Disturbance

Engineers at SUFCO have been planning to expand the mine's current Waste Rock Site to augment their coal mining operations in Sevier County, Utah. Prior to construction and disturbance to the existing plant communities within the boundaries of the expansion area, quantitative data were recorded to provide information about the baseline conditions of the vegetation.

Revegetation Success Standards

As required by applicable state and federal regulations, once a mining-related activity has run the course of its use and function, the site and land disturbances associated with it are subsequently reclaimed and revegetated. The restored plant communities must then achieve specific revegetation success standards. These standards are frequently derived by comparing similar plant communities, often adjacent to those being proposed for disturbance. These analogous communities, called the *reference areas*, are also quantitatively sampled prior to disturbance. The datasets of the areas are then compared to demonstrate their similarities (or differences). If they are approved as reference areas, the communities will again be compared to determine whether or not the restored communities meet specific revegetation success standards following final reclamation.

This document reports the results of sampling in the proposed disturbed areas of the expansion area as well as the reference areas for the Waste Rock Site. In addition, threatened, endangered and sensitive plant species were surveyed and addressed in the document.

Methods

Quantitative Sampling

Sample methods used for this study were performed in accordance with the vegetation guidelines supplied by the State of Utah, Division of Oil, Gas and Mining (DOGM). Quantitative and qualitative data were recorded within the plant communities proposed for disturbance and their respective reference areas in September 2013 (see Map 1 at the end of the report). The GPS coordinates for all sample areas are provided below.

GPS COORDINATES FOR SAMPLE AREAS FOR THE EXPANSION AREAS AT SUFCO'S WASTE ROCK SITE
(UTM, ZONE 12S, NAD 27)

Sample Area	Waypoint Name	Coordinates (m)	Community Type
A	SufWRSa	456113E 4305344N	Proposed Disturbed Sagebrush/Grass
B	SufWRSb	456408E 4305366N	Proposed Disturbed Sagebrush/Grass
C	SufWRSc	456356E 4305728N	Proposed Disturbed Sagebrush/Grass
D	SufWRSd	456189E 4305526N	Proposed Disturbed Sagebrush/Grass
E	SufWRSe	456179E 4305389N	Proposed Disturbed Rabbitbrush/Sagebrush
F	SufWRSf	456014E 4305471N	Proposed Disturbed Rabbitbrush/Sagebrush
G	SufWRSg	456636E 4305351N	Proposed Disturbed Mountain Brush
H	SufWRSh	456490E 4305436N	Proposed Disturbed Mountain Brush
I	SufWRSi	456379E 4305675N	Proposed Disturbed Mountain Brush
J	SufWRSj	456472E 4305694N	Proposed Disturbed Mountain Brush
K	SufWRSk	456197E 4305198N	Sagebrush/Grass Reference Area
L	SufWRSl	456231E 4305209N	Rabbitbrush/Sagebrush Reference Area
M	SufWRSm	456371E 4305195N	Mountain Brush Reference Area

Sampling Design & Transect/Quadrat Placement

Vegetation sample transect lines were placed randomly within the boundaries of the proposed disturbed and reference areas. The transect placement technique was employed with the goal to adequately sample a representation of the entire site. Once the transects were established, quadrat locations for sampling were chosen using random numbers on the transect lines with the objective to record data without preconceived bias. The following data were then recorded.

Cover & Composition

Cover estimates were made using ocular methods with meter-square quadrats. Species composition, cover by species, and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were notes such as: slope, exposure, grazing use, disturbance and/or other appropriate notes. Plant species nomenclature follows *A Utah Flora* (Welsh et al., 2008).

Woody Species Density

Density of woody plant species for the proposed disturbed and reference areas were estimated using the point-quarter distance method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual. The number of individuals per acre was the end result of the calculations.

Sample Size & Adequacy

Sampling adequacy for cover and density was attempted by using the formula given below.

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

nMIN	= minimum adequate sample
t	= appropriate confidence t-value
s	= standard deviation
x	= sample mean
d	= desired change from mean

With the values used for "t" and "d" above, the goal was to meet appropriate sample adequacy values.

Statistical Analyses

Student's t-tests were employed to compare the total living covers and total woody species densities of the proposed disturbed areas with their respective reference areas.

Photographs

Color photographs of the sample areas were taken at the time of sampling and have been submitted with this report.

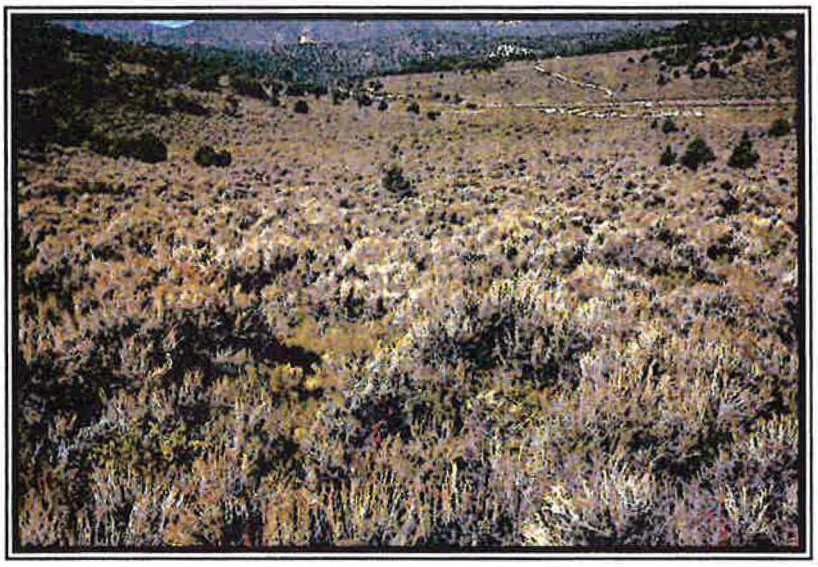
Threatened, Endangered & Sensitive Species

Prior to recording quantitative data on the plant communities, a sensitive plant species survey was conducted. To initiate the studies in the area, database searches and literature reviews were conducted for potential plant species that are known to be rare, endemic, threatened, endangered or otherwise sensitive in the general area. Additionally, the current list of federally protected species for Sevier County, Utah was reviewed along with potential habitats for these species in the areas proposed for disturbance.

Results

Proposed Disturbed Sagebrush/Grass Community

The Sagebrush/Grass Community was found in several areas within the Waste Rock Expansion site. Accordingly, sample transects were placed in several locations of this community throughout the study area [Sample Areas A, B, C, D (Map 1)]. As a method to more accurately represent all areas of the community, the datasets of all Sagebrush/Grass sample areas were combined for the summary tables.



Sagebrush/Grass (a collection of photographs of the sample areas later in the document)

The most common species by cover and frequency in this community, by far, were big sagebrush (*Artemisia tridentata* var. *tridentata*) and bluebunch wheatgrass (*Elymus spicatus*). Percent cover of big sagebrush was 19.88%, and its frequency value showed it occurred in 75.00% of the sample quadrats. Percent cover and frequency of bluebunch wheatgrass were 19.38% and 85.00%, respectively. These values, as well as the results for all other species encountered in the samples, are shown in Table 1.

The total living cover in the Sagebrush/Grass areas was estimated at 69.13%, where 68.00% of it came from understory and only 1.13% from overstory cover (Table 2-A). Composition of the combined data indicated that 53.57% of the understory cover were shrubs, 39.32% grasses

and 7.11% forbs (Table 2-B).

The total woody species density for the Sagebrush/Grass Community was estimated at 3,448 plants per acre. The most important species for this parameter by quite a wide margin was big sagebrush, however, other important woody species included snowberry (*Symphoricarpos oreophilus*), viscid rabbitbrush (*Chrysothamnus viscidiflorus*), Vasey's sagebrush (*Artemisia tridentata* var. *vaseyana*) and bitterbrush (*Purshia tridentata*). Density values for all species have been provided on Table 3.

Sagebrush/Grass Reference Area

The reference area chosen to represent future revegetation success standards [Sample Area K (Map 1)] was also dominated by many of the same species as the proposed disturbed area described above. Big sagebrush and bluebunch wheatgrass were again the clear dominates by cover and frequency and were nearly equally represented; the former had a cover and frequency of 21.83% and 76.67% and the latter 22.67% and 86.67%, respectively. For a list of all species found in the samples refer to Table 4.

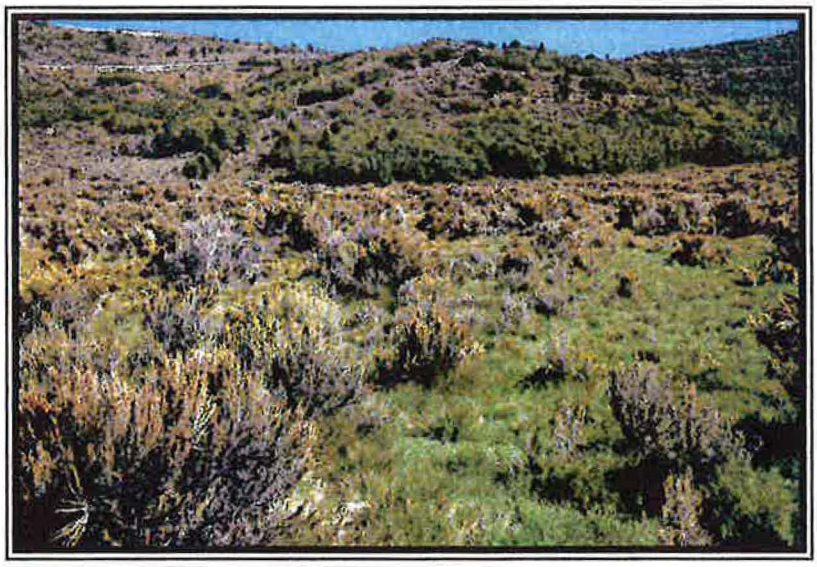
Sagebrush/Grass Reference Area

The total living cover for this reference area was estimated at 67.67% (Table 5-A). Composition of the total living cover was calculated at 47.57% grasses, 44.08% shrubs and 8.35% forbs (Table 5-B).

Total density of woody species was estimated at 2,944 individuals per acre – the most common were big sagebrush, followed distantly by snowberry, Vasey's sagebrush, viscid rabbitbrush and bitterbrush (Table 6).

Proposed Disturbed Rabbitbrush/Sagebrush Community

Another community type proposed for disturbance, a Rabbitbrush/Sagebrush Community [Sample Areas E, F (Map 1)], was historically probably quite similar to the Sagebrush/Grass Communities described above. It appears this community has been disturbed previously, which could have been the result of heavy grazing or stock handling pressure, and was later re-seeded with plant species that included some non-natives. This community was greatly dominated by crested wheatgrass (*Agropyron cristatum*), but rubber rabbitbrush (*Chrysothamnus nauseosus*) and big sagebrush were also important components as shown by cover and frequency values (Table 7). Reviewing Table 7 also suggests less diversity in this community when compared to the undisturbed Sagebrush/Grass Community above.



Rabbitbrush/Sagebrush

The total living cover in the community was estimated at 81.50% (Table 8-A); composition consisted of only grasses at 58.73% and shrubs at 41.27% (Table 8-B).

Woody species density totaled 1,673 plants per acre and was dominated with nearly equal densities of rubber rabbitbrush and big sagebrush (Table 9).

Rabbitbrush/Sagebrush Reference Area

The reference area chosen to represent future revegetation success standards [Sample Area L (Map 1)] was also dominated by some of the same species as the proposed disturbed area described above. For example, crested wheatgrass was also the most common species by cover and frequency (27.33% cover with a frequency of 70.00%) followed distantly, and nearly equally represented, by two rabbitbrush species (viscid and rubber rabbitbrush). Viscid rabbitbrush had a cover and frequency of 12.17% and 46.67% and rubber rabbitbrush was 11.83% and 43.33%, respectively. For a list of all species found in the samples refer to Table 10.

The total living cover for this reference area was estimated at 78.83% (Table 11-A). Composition of the understory cover was calculated at 47.96% grasses, 42.91% shrubs and 9.13% forbs (Table 11-B).

Total density of woody species here was estimated at 6,168 individuals per acre; the most common shrubs were rubber rabbitbrush, viscid rabbitbrush, snowberry and big sagebrush (Table 12).

Rabbitbrush/Sagebrush Reference Area

Proposed Disturbed Mountain Brush Community

While mapping the plant communities in the expansion area it was evident that there was a host of shrubland communities located within the study site – some of which were dominated by alder-leaf mountain-mahogany (*Cercocarpus montanus*), others by Utah serviceberry (*Amelanchier utahensis*), and still others by Gambel's oak (*Quercus gambelii* var. *gambelii*). There were also plant communities that appeared to have equal amounts of two or more of these woody species. Finally, there was one area that appeared to be a typical aspen (*Populus tremuloides*) community, but closer scrutiny suggested it was on the fringes of those communities described above (e.g. Gamble's oak and sagebrush were also major components within the community).

Mountain Brush

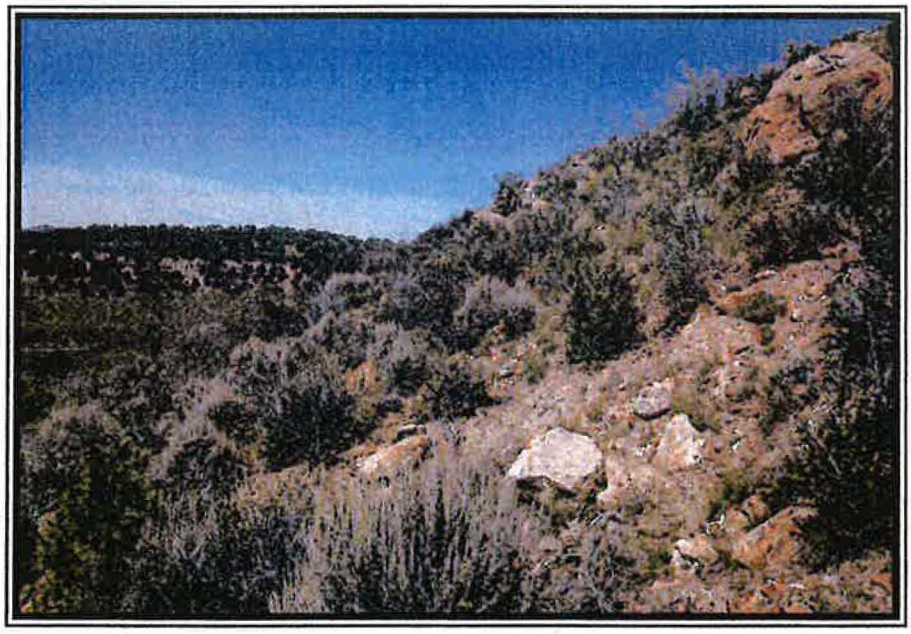
Rather than trying to separate all these communities into distinct types, it seemed prudent and more practical to place them into one community type called "Mountain Brush". Since they seemed to be more of a 'continuum' of each other, results from this logic should provide a meaningful baseline dataset for future revegetation planning. With this in mind, although the communities were sampled separately [Sample Areas G, H, I, J (Map 1)], the data were later combined or "lumped" to reflect averages or intermediate values of the variations between the community types.

According to cover and frequency values the most important plant species in the proposed

disturbed Mountain Brush Community were alder-leaf mountain mahogany, bluebunch wheatgrass, Vasey's sagebrush, Gambel's oak, Utah serviceberry and snowberry (Table 13).

The total living cover of the community was estimated at 66.70%, which was comprised of 57.90% understory and 8.80% overstory cover (Table 14-A). The composition of the understory cover was comprised of 62.05% trees/shrubs, 29.93% grasses and 8.02% forbs (Table 14-B).

The mean total woody species density of the sample areas was estimated at 3,937 individuals per acre (Table 15). The most important species for this parameter were alder-leaf mountain-mahogany, Gambel's oak, Vasey's sagebrush, snowberry, Utah serviceberry and aspen.



Mountain Brush

Mountain Brush Reference Area

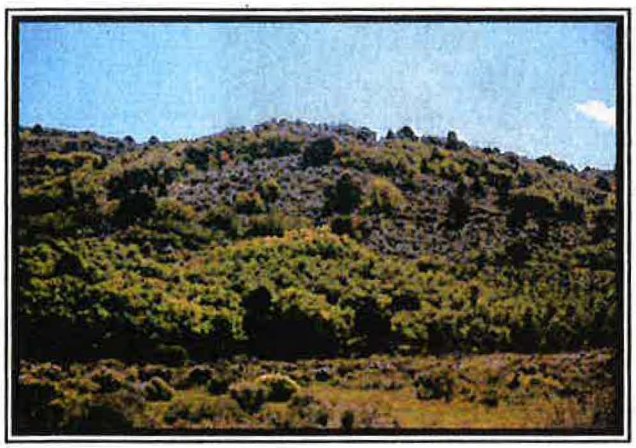
A reference area was chosen that seemed to be intermediate or transitional to most of the communities described in the proposed disturbed Mountain Brush Communities above [Sample Areas M (Map 1)].

Mountain Brush Reference Area

The most common species in the Mountain Brush Reference Area by cover and frequency were alder-leaf mountain-mahogany, Sandberg's bluegrass (*Poa secunda*), Gambel's oak, Utah serviceberry and Vasey's sagebrush (Table 16).

The total living cover for this reference area was estimated at 63.33% (Table 17-A). Composition of the understory cover was calculated at 73.62% trees/shrubs, 22.82% grasses and 3.56% forbs (Table 17-B).

Total density of woody species was estimated at 4,092 individuals per acre; the most common were alder-leaf mountain-mahogany, followed by Gambel's oak, Vasey's sagebrush, Utah serviceberry and snowberry (Table 18).



Mountain Brush Reference Area

The next several pages present the data summary tables referenced above. Included after the tables are the follow report sections:

- Community Comparisons
- Discussion about Threatened, Endangered & Sensitive Species
- Summary & Discussion

Data Summary Tables

Table 1: Waste Rock Site Expansion Areas at the SUFCO Mine. Cover and Frequency by Plant Species (2013).

Proposed Disturbed Sagebrush/Grass Sample Areas: A, B, C, D (combined)			n=40
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
Amelanchier utahensis	0.75	3.46	5.00
Juniperus osteosperma	0.38	2.34	2.50
UNDERSTORY			
TREES & SHRUBS			
Amelanchier utahensis	0.50	3.12	2.50
Artemisia tridentata var. tridentata	19.88	15.10	75.00
Artemisia tridentata var. vaseyana	2.25	6.98	10.00
Chrysothamnus nauseosus	0.75	3.27	5.00
Chrysothamnus viscidiflorus	6.50	10.14	35.00
Gutierrezia sarothrae	0.25	1.56	2.50
Juniperus osteosperma	0.63	3.90	2.50
Purshia tridentata	2.63	7.58	12.50
Symphoricarpos oreophilus	3.00	7.48	17.50
FORBS			
Achillea millefolium	0.50	3.12	2.50
Antennaria dimorpha	0.75	4.68	2.50
Artemisia ludoviciana	0.25	1.56	2.50
Castilleja sp.	0.38	2.34	2.50
Cirsium sp.	0.50	2.45	5.00
Eriogonum racemosa	0.25	1.56	2.50
Machaeranthera grindelioides	0.38	1.32	7.50
Penstemon watsonii	2.00	4.72	17.50
GRASSES			
Agropyron cristatum	4.88	9.58	27.50
Bromus inermis	0.50	2.18	5.00
Elymus spicatus	19.38	12.71	85.00
Poa secunda	1.88	5.88	10.00

Table 2: Waste Rock Site Expansion Areas at the SUFCO Mine. Total Cover and Composition (2013).

Proposed Disturbed Sagebrush/Grass Sample Areas: A, B, C, D (combined)		n=40
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory (O)	1.13	4.11
Understory (U)	68.00	10.23
Litter	16.93	8.31
Bareground	11.73	8.94
Rock	3.35	2.36
O + U	69.13	9.61
B. % COMPOSITION		
Trees/Shrubs	53.57	18.81
Forbs	7.11	11.25
Grasses	39.32	16.08

Table 3: Waste Rock Site Expansion Areas at the SUFCO Mine. Woody Species Density (2013).

Proposed Disturbed Sagebrush/Grass Sample Areas: A, B, C, D (combined)	n=40
SPECIES	**Individuals/Acre**
Amelanchier utahensis	43.10
Artemisia tridentata var. tridentata	1917.98
Artemisia tridentata var. vaseyana	280.15
Chrysothamnus nauseosus	64.65
Chrysothamnus viscidiflorus	387.91
Juniperus osteosperma	64.65
Purshia tridentata	193.95
Symphoricarpos oreophilus	474.11
Tetradymia canescens	21.55
TOTAL	**3448.05**

Table 4: Waste Rock Site Expansion Areas at the SUFCO Mine. Cover and Frequency by Plant Species (2013).

Sagebrush/Grass Reference Area Sample Area: K			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
TREES & SHRUBS			
Artemisia tridentata var. tridentata	21.83	15.99	76.67
Artemisia tridentata var. vaseyana	2.00	7.48	6.67
Chrysothamnus viscidiflorus	1.00	5.39	3.33
Mahonia repens	1.00	2.00	20.00
Symphoricarpos oreophilus	4.17	9.04	23.33
FORBS			
Cirsium sp.	2.83	4.22	36.67
Eriogonum racemosa	2.00	3.32	30.00
Lupinus argenteus	0.67	2.13	10.00
GRASSES			
Agropyron cristatum	5.17	11.22	26.67
Bromus inermis	0.33	1.80	3.33
Elymus elymoides	0.67	3.59	3.33
Elymus spicatus	22.67	13.15	86.67
Poa secunda	3.33	7.11	20.00

Table 5: Waste Rock Site Expansion Areas at the SUFCO Mine. Total Cover and Composition (2013).

Sagebrush/Grass Reference Area Sample Area: K		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Total Living Cover	67.67	8.83
Litter	21.33	6.94
Bareground	8.63	7.39
Rock	2.37	1.87
B. % COMPOSITION		
Shrubs	44.08	17.89
Forbs	8.35	8.41
Grasses	47.57	18.94

Table 6: Waste Rock Site Expansion Areas at the SUFCO Mine. Woody Species Density (2013).

Sagebrush/Grass Reference Area Sample Area: K	n=30
SPECIES	**Individuals/Acre**
Artemisia tridentata var. tridentata	2305.84
Artemisia tridentata var. vaseyana	220.77
Chrysothamnus viscidiflorus	171.71
Purshia tridentata	24.53
Symphoricarpos oreophilus	220.77
TOTAL	**2943.62**

Table 7: Waste Rock Site Expansion Areas at the SUFCO Mine. Cover and Frequency by Plant Species (2013).

Proposed Disturbed Rabbitbrush/Sagebrush Sample Areas: E, F (combined)			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
TREES & SHRUBS			
Artemisia tridentata var. tridentata	12.67	15.26	43.33
Chrysothamnus nauseosus	14.83	19.43	46.67
Chrysothamnus viscidiflorus	6.00	10.98	26.67
Symphoricarpos oreophilus	0.33	1.80	3.33
FORBS			
GRASSES			
Agropyron cristatum	38.50	23.31	86.67
Elymus spicatus	9.17	13.61	36.67

Table 8: Waste Rock Site Expansion Areas at the SUFCO Mine. Total Cover and Composition (2013).

Proposed Disturbed Rabbitbrush/Sagebrush Sample Areas: E, F (combined)		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Total Living Cover	81.50	8.48
Litter	12.17	7.47
Bareground	4.70	4.37
Rock	1.63	1.02
B. % COMPOSITION		
Shrubs	41.27	20.88
Forbs	0.00	0.00
Grasses	58.73	20.88

Table 9: Waste Rock Site Expansion Areas at the SUFCO Mine. Woody Species Density (2013).

Proposed Disturbed Rabbitbrush/Sagebrush Sample Areas: E, F (combined)	n=30
SPECIES	**Individuals/Acre**
Artemisia tridentata var. tridentata	655.24
Chrysothamnus nauseosus	669.18
Chrysothamnus viscidiflorus	278.83
Symphoricarpos oreophilus	69.71
TOTAL	**1672.96**

Table 10: Waste Rock Site Expansion Areas at the SUFCO Mine. Cover and Frequency by Plant Species (2013).

Rabbitbrush/Sagebrush Reference Area Sample Area: L			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
TREES & SHRUBS			
Artemisia tridentata var. tridentata	2.00	5.42	13.33
Artemisia tridentata var. vaseyana	0.67	2.81	6.67
Chrysothamnus nauseosus	11.83	15.94	43.33
Chrysothamnus viscidiflorus	12.17	16.87	46.67
Symphoricarpos oreophilus	6.50	7.21	53.33
Rosa woodsii	0.33	1.25	6.67
FORBS			
Achillea millefolium	2.50	6.02	16.67
Cirsium sp.	0.17	0.90	3.33
Erigeron sp.	1.67	6.24	6.67
Iva axillaris	1.67	4.35	13.33
Penstemon watsonii	1.17	4.41	6.67
GRASSES			
Agropyron cristatum	27.33	23.16	70.00
Elymus smithii	3.00	12.95	6.67
Elymus spicatus	6.00	12.07	23.33
Poa pratensis	1.50	5.65	6.67
Poa secunda	0.33	1.80	3.33

Table 11: Waste Rock Site Expansion Areas at the SUFCO Mine. Total Cover and Composition (2013).

Rabbitbrush/Sagebrush Reference Area Sample Area: L		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Total Living Cover	78.83	8.91
Litter	13.73	8.28
Bareground	6.17	5.13
Rock	1.27	0.77
B. % COMPOSITION		
Shrubs	42.91	24.00
Forbs	9.13	14.69
Grasses	47.96	23.80

Table 12: Waste Rock Site Expansion Areas at the SUFCO Mine. Woody Species Density (2013).

Rabbitbrush/Sagebrush Reference Area Sample Area: L	n=30
SPECIES	**Individuals/Acre**
Artemisia tridentata var. tridentata	1079.41
Chrysothamnus nauseosus	2313.02
Chrysothamnus viscidiflorus	1387.81
Rosa woodsii	102.80
Symphoricarpos oreophilus	1285.01
TOTAL	**6168.04**

Table 13: Waste Rock Site Expansion Areas at the SUFCO Mine. Cover and Frequency by Plant Species (2013).

Proposed Disturbed Mountain Brush Sample Areas: G, H, I, J (combined)			n=50
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
TREES & SHRUBS			
Amelanchier utahensis	0.30	2.10	2.00
Cercocarpus montanus	0.30	2.10	2.00
Populus tremuloides	2.60	7.09	12.00
Quercus gambelii	5.60	9.88	24.00
UNDERSTORY			
TREES & SHRUBS			
Amelanchier utahensis	6.00	12.37	24.00
Artemisia tridentata var. tridentata	0.90	3.70	6.00
Artemisia tridentata var. vaseyana	6.20	10.42	30.00
Cercocarpus montanus	11.50	15.07	44.00
Chrysothamnus nauseosus	0.30	2.10	2.00
Populus tremuloides	0.90	3.96	6.00
Purshia tridentata	0.50	3.50	2.00
Quercus gambelii	5.60	13.14	18.00
Rosa woodsii	0.20	1.40	2.00
Symphoricarpos oreophilus	4.20	8.96	6.00
FORBS			
Achillea millefolium	1.00	4.24	6.00
Erigeron engelmannii	0.20	1.40	2.00
Lupinus argenteus	1.90	4.68	16.00
Machaeranthera grindelioides	0.40	1.69	6.00
Penstemon watsonii	0.60	2.37	6.00
Taraxacum officinale	0.20	1.40	2.00
GRASSES			
Bromus carinatus	0.20	1.40	2.00
Elymus canadensis	2.20	10.50	6.00
Elymus salinus	2.60	6.73	16.00
Elymus spicatus	8.00	10.82	44.00
Poa secunda	3.90	8.38	22.00
Stipa hymenoides	0.40	2.80	2.00

Table 14: Waste Rock Site Expansion Areas at the SUFCO Mine. Total Cover and Composition (2013).

Proposed Disturbed Mountain Brush Sample Areas: G, H, I, J (combined)		n=50
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory (O)	8.80	11.56
Understory (U)	57.90	10.40
Litter	19.76	11.99
Bareground	12.66	10.12
Rock	9.68	9.13
O + U	66.70	12.51
B. % COMPOSITION		
Trees/Shrubs	62.05	24.74
Forbs	8.02	15.11
Grasses	29.93	20.08

Table 15: Waste Rock Site Expansion Areas at the SUFCO Mine. Woody Species Density (2013).

Proposed Disturbed Mountain Brush Sample Areas: G, H, I, J (combined)	n=50
SPECIES	**Individuals/Acre**
Amelanchier utahensis	354.33
Artemisia tridentata var. tridentata	78.74
Artemisia tridentata var. vaseyana	531.50
Ceratoides lanata	39.37
Cercocarpus montanus	1259.85
Chrysothamnus nauseosus	78.74
Juniperus osteosperma	19.69
Pinus edulis	19.69
Populus tremuloides	295.28
Purshia tridentata	59.06
Quercus gambelii	767.72
Rosa woodsii	39.37
Symphoricarpos oreophilus	393.70
TOTAL	**3937.03**

Table 16: Waste Rock Site Expansion Areas at the SUFCO Mine. Living Cover and Frequency by Plant Species (2013).

Mountain Brush Reference Area Sample Area: M			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
Juniperus osteosperma	0.67	3.59	3.33
Pinus edulis	1.00	3.00	10.00
Quercus gambelii	2.33	6.80	13.33
UNDERSTORY			
TREES & SHRUBS			
Amelanchier utahensis	5.67	9.37	33.33
Artemisia tridentata var. tridentata	2.00	8.43	6.67
Artemisia tridentata var. vaseyana	5.00	8.37	33.33
Cercocarpus montanus	19.17	20.58	60.00
Chrysothamnus viscidiflorus	0.33	1.80	3.33
Gutierrezia sarothrae	0.33	1.80	3.33
Penstemon watsonii	1.50	3.20	20.00
Pinus edulis	3.33	8.79	13.33
Quercus gambelii	5.83	11.26	23.33
Symphoricarpos oreophilus	0.50	1.98	6.67
FORBS			
Antennaria dimorpha	0.50	1.98	6.67
Erigeron sp.	0.33	1.80	3.33
Juniperus osteosperma	1.00	5.39	3.33
Machaeranthera grindelioides	0.33	1.80	3.33
Tetradymia canescens	0.00	0.00	3.33
GRASSES			
Bromus carinatus	1.33	7.18	3.33
Elymus spicatus	4.83	9.17	26.67
Poa secunda	6.33	8.46	46.67
Stipa hymenoides	1.00	5.39	3.33

Table 17: Waste Rock Site Expansion Areas at the SUFCO Mine.
Total Cover and Composition (2013).

Mountain Brush Reference Area Sample Area: M		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory (O)	4.00	7.68
Understory (U)	59.33	8.73
Litter	15.17	9.70
Bareground	9.17	4.30
Rock	16.33	11.90
O + U	63.33	6.87
B. % COMPOSITION		
Trees/Shrubs	73.62	20.29
Forbs	3.56	9.99
Grasses	22.82	19.03

Table 18: Waste Rock Site Expansion Areas at the SUFCO Mine. Woody Species Density (2013).

Mountain Brush Reference Area Sample Area: M	
SPECIES	**Individuals/Acre**
Amelanchier utahensis	477.41
Artemisia tridentata var. tridentata	102.30
Artemisia tridentata var. vaseyana	511.51
Cercocarpus montanus	1568.63
Chrysothamnus viscidiflorus	68.20
Gutierrezia sarothrae	34.10
Juniperus osteosperma	136.40
Pinus edulis	170.50
Quercus gambelii	716.11
Symphoricarpos oreophilus	238.70
Tetradymia canescens	68.20
TOTAL	**4092.07**

Community Comparisons

When the **total living cover** of the Proposed Disturbed Sagebrush/Grass Community was compared to the Sagebrush/Grass Reference Area, the difference was not statistically significant (Figure 1).

Figure 1. A statistical comparison (Student's t-tests) of the **total living cover** between the Proposed Disturbed and Reference Areas of the Waste Rock Site.

	$\bar{x}$	s	n	t	df	SL
Sagebrush/Grass						
Proposed Disturbed (Sample Areas A,B,C,D)	69.13 (o+u)	9.61	40			
Reference Area (Sample Area K)	67.67	8.83	30			
t-test				0.6510	68	N.S.

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom
n/a = not applicable

p = probability
SL= Significance Level
N.S.=Non-Significant
u = understory
o = overstory

Also, when the **woody species densities** between these two communities were compared statistically, results from a Student's t-test also suggested that the difference was non-significant (Figure 2).

Figure 2. A statistical comparison (Student's t-tests) of the **woody species density** between the Proposed Disturbed and Reference Areas of the Waste Rock Site.

	x	s	n	t	df	SL
Sagebrush/Grass						
Proposed Disturbed (Sample Areas A,B,C,D)	3448.05	1172.92	40			
Reference Area (Sample Area K)	2943.63	1154.60	30			
t-test				1.7925	68	N.S.

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom

p = probability
SL= Significance Level
N.S.=Non-Significant

Next, when the **total living cover** value of the Proposed Disturbed Rabbitbrush/Sagebrush Community was compared with the Rabbitbrush/Sagebrush Reference Area, the difference was again non-significant (Figure 3).

Figure 3. A statistical comparison (Student's t-tests) of the **total living cover** between the Proposed Disturbed and Reference Areas of the Waste Rock Site.

	$\bar{x}$	s	n	t	df	SL
Rabbitbrush/Sagebrush						
Proposed Disturbed (Sample Areas E, F)	81.50	8.48	30			
Reference Area (Sample Area L)	78.83	8.91	30			
t-test				1.1889	58	N.S.

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom
n/a = not applicable

p = probability
SL= Significance Level
N.S.=Non-Significant

However, when the **woody species densities** of these two areas were compared, the difference was significant statistically (Figure 4).

Figure 4. A statistical comparison (Student's t-tests) of the **woody species density** between the Proposed Disturbed and Reference Areas of the Waste Rock Site.

	$\bar{x}$	s	n	t	df	SL
Rabbitbrush/Sagebrush						
Proposed Disturbed (Sample Areas E, F)	6168.04	2017.02	30			
Reference Area (Sample Area L)	1672.96	801.92	30			
t-test				11.3428	58	p<.01

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom

p = probability
SL= Significance Level
N.S.=Non-Significant

Next, when the **total living cover** of the Proposed Disturbed Mountain Brush Community was compared to its reference area, the difference was once again non-significant statistically (Figure 5).

Figure 5. A statistical comparison (Student's t-tests) of the **total living cover** between the Proposed Disturbed and Reference Areas of the Waste Rock Site.

	$\bar{x}$	s	n	t	df	SL
Mountain Brush						
Proposed Disturbed (Sample Areas G,H,I,J)	66.70 (o+u)	12.51	50			
Reference Area (Sample Area M)	63.33	6.87	30			
t-test				1.3557	78	N.S.

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom
n/a = not applicable

p = probability
SL= Significance Level
N.S.=Non-Significant
P-J = Pinyon-Juniper
u = understory
o = overstory

Finally, when the **woody species density** of the Proposed Disturbed Mountain Brush Community was compared to the Mountain Brush Reference Area, the difference was statistically non-significant (Figure 6).

Figure 6. A statistical comparison (Student's t-tests) of the **woody species density** between the Proposed Disturbed and Reference Areas of the Waste Rock Site.

	$\bar{x}$	s	n	t	df	SL
Mountain Brush						
Proposed Disturbed (Sample Areas G,H,I,J	3937.13	1535.74	50			
Reference Area (Sample Area M)	4092.07	2402.10	30			
t-test				0.3523	78	N.S.

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom

p = probability
SL= Significance Level
N.S.=Non-Significant

Threatened, Endangered & Sensitive Species

A table of federally listed threatened, endangered and candidate species for Sevier County, Utah has been provided below (Table 19). The table also includes the status of the species, along with site-specific notes about the area proposed for disturbance and the probabilities of their occurrences in the study area.

Table 19: Federally listed threatened, endangered and candidate species for Sevier County, Utah (last updated January 12, 2012).

ENDANGERED		SITE-SPECIFIC NOTES
Sclerocactus wrightiae	Wright fishhook cactus	Wright's fishhook cactus is known to be present primarily in salt desert habitats on Mancos Shale, Dakota, Morrison, Summerville and Entrada Sandstone formations. This habitat is not present in the study area. Consequently, there will be no impact to this species as a result of expansion of the waste rock site.
THREATENED		
Astragalus montii	Heliotrope milkvetch	This species is known to occur only in Flagstaff Limestone, a formation that is not present at the waste rock site. There should be no impact to this species as a result of proposed expansion.
Townsendia aprica	Last chance townsendia	Although this species can be found in pinyon-juniper communities and this community is relatively close to the study area, it most commonly occurs on clay and clay-silt exposures on the Mancos Shale formation. This formation is not found in the study area. There should be no impact to this species as a result of proposed expansion.
Lynx canadensis	Canada lynx	State of Utah, Division of Wildlife Resources (DWR) distribution maps show that the general area on the Wasatch Plateau in Sevier County may be "critical habitat" for this species. The Canada lynx range extends from Canada and Alaska south to Maine, the Rocky Mountains, and also to the Great Lakes region. DWR biologists state that, *although sightings of the Canada lynx in Utah over the past twenty years are exceedingly rare, the USDA Forest Service recently announced that Canada lynx hair was*

Table 19: Federally listed threatened, endangered and candidate species for Sevier County, Utah (last updated January 12, 2012).		
		found in the Manti-La Sal National Forest during 2002. The preferred habitat of the Canada lynx is montane coniferous forest, where it often hunts snowshoe hares. Coniferous forests do not exist at the study area. Consequently, there will be no impact to this species as a result of expansion of the waste rock site.
CANDIDATE		
Centrocercus urophasianus	Greater sage-grouse	Greater sage-grouse inhabit sagebrush zones in Utah's mountain valleys and foothills. There is no brooding or winter habitat for this species shown on the DWR database maps at or near the study area. Utah's Conservation Plan for Greater Sage-grouse (February 14, 2013) shows areas near, but outside the study area to have "Opportunity Area" habitats for the sage-grouse in this portion of the Parker Mtn-Emery Sage-Grouse Management Area (SGMA). No leks have been mapped near the site. Consequently, there should be no impact to this species as a result of expansion of the waste rock site.
Cynomys parvidens	Utah prairie-dog	Habitat for this prairie-dog does not exist in the study area. Consequently, there will be no impact to this species as a result of the proposed waste rock expansion.
EXTIRPATED		
Ursus arctos	Brown (grizzly) bear	The brown (grizzly) bear was extirpated from Utah in the 1920s. It probably once occurred in the Wasatch Plateau. Even though the brown bear may have been present in the general area historically, suitable habitat for the brown bear at or near the study area is questionable. There will be no impact to this species as a result of the proposed waste rock expansion.

The State of Utah, Department of Natural Resources' biodiversity database specialist was consulted with regard to threatened, endangered or otherwise sensitive species in the mine area in 2013. Findings for this research indicated no such species, plant or animal, were

found within a 2-mile radius of the mine site.

Additionally, GIS data and shape files from the State of Utah, Division of Wildlife Resources (DWR), Utah Conservation Data Center (UCDC) database were consulted for potential habitats of sensitive species. This database suggested there could be general habitat for one sensitive mammal in the Wasatch Plateau area, the big free-tailed bat (*Nyctinomops macrotis*). Below is some descriptive information provided by DWR.

> *"The big free-tailed bat occurs in the western United States, as well as in much of Latin America. The species is rare in Utah, occurring primarily in the southern half of the state, although individuals may rarely occur in northern Utah. The big free-tailed bat is included on the Utah Sensitive Species List."*
>
> *"The big free-tailed bat prefers rocky and woodland habitats, where roosting occurs in caves, mines, old buildings, and rock crevices. The species is typically active year-round, spending summers in temperate North America and migrating to warmer areas in North America and South America for the winter."*

Although there are woodlands in the expansion area, there is no or very little of the roosting habitat described above. Based on that fact and the rareness of the species, it is unlikely the proposed expansion project would impact this species.

Summary & Discussion

Quantitative sampling has been conducted in those plant communities that have the potential of being impacted by construction of proposed expansion areas of SUFCO's Waste Rock Site. Additionally, similar plant communities outside the expansion area were also sampled with the goal to find appropriate revegetation success standards when the site is reclaimed in the future. These communities are called *reference areas*.

Statistical comparisons between the means of the proposed disturbed and reference areas (Figures 1 through 6), suggested that nearly all differences were non-significant. When the

mean **total living covers** for the Proposed Disturbed Sagebrush/Grass, Rabbitbrush/ Sagebrush and Mountain Brush Communities were compared with their reference areas, there were no statistically significant differences. This suggests that the reference areas chosen may be appropriate to be used for revegetation success standards for living cover at the time of final reclamation.

Additionally, when statistics were used to make comparisons to their respective reference areas, the mean total **woody species densities** of the Proposed Disturbed Sagebrush/Grass and Mountain Brush Communities had differences were also non-significant. The one exception was that the total density of the Proposed Disturbed Sagebrush/Rabbitbrush Community was significantly greater than its reference area. As mentioned, these communities were probably not in their native condition – they have been somewhat altered by previous activities unrelated to mining. State R645 regulations require lands previously disturbed "*and that are remined by or otherwise redisturbed by coal mining and reclamation operations, at a minimum the vegetative cover will be not less than the ground cover that existed before redisturbance and will be adequate to control erosion*". A discussion regarding this site as well as other suggestions for revegetation success standards are provided below.

Because they match so closely, it seems appropriate that the reference areas could be used for final revegetation success standards for total living cover values. Regarding the woody species densities, however, it has been suggested at other future reclamation sites that perhaps the high woody species density values in some of the native plant communities are a result of domestic livestock and wildlife grazing pressure which often selects for the herbaceous species over the woody plants. Consequently, after consultations with the DWR biologists, sometimes less woody species density values may provide more opportunity for increased forb and grass species establishment that could provide greater species diversity in the summer range for the resident wildlife species as well as domestic livestock. Consequently, a pre-set woody species value of 2,000 plants per acre may be a more appropriate recommendation for a revegetation standard for the proposed disturbed Rabbitbrush/Sagebrush as well as the Sagebrush/Grass sites at the Waste Rock Site. Subject

to approval by biologists from the State of Utah, Division of Oil, Gas and Mining (DOGM), revegetation success standards for each area are shown on Table 20.

Table 20: Summary of revegetation recommended success standards for the expansion area of the Waste Rock Site at the SUFCO Mine.

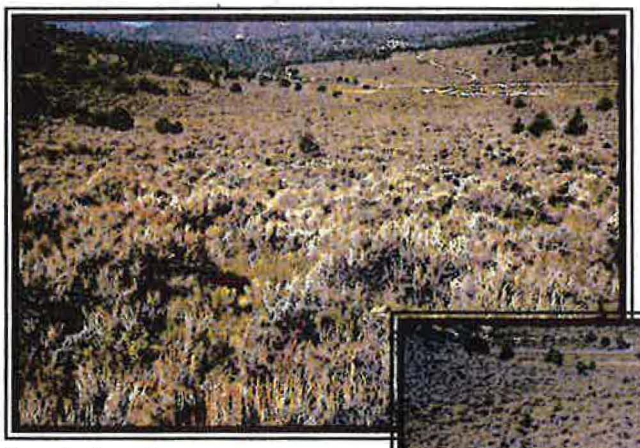
PROPOSED DISTURBED AREA	COVER	DENSITY	DIVERSITY
Sagebrush/Grass	Sagebrush Reference Area	2,000 plants/acre	Sagebrush Reference Area
Rabbitbrush/Sagebrush	Rabbitbrush/Sagebrush Reference Area	2,000 plants/acre	Rabbitbrush/Sagebrush Reference Area
Mountain Brush	Mountain Brush Reference Area	Mountain Brush Reference Area	Mountain Brush Reference Area

Finally, with relation to the success standards described above, there is one very important consideration for final reclamation and revegetation planning – this is the final post-mining topography. If the final slopes, aspects and elevations deviate greatly from the current, pre-disturbance topography (and they probably will), thought should be given to what community types and the extent of them should be created at specific locations on the reclaimed land.

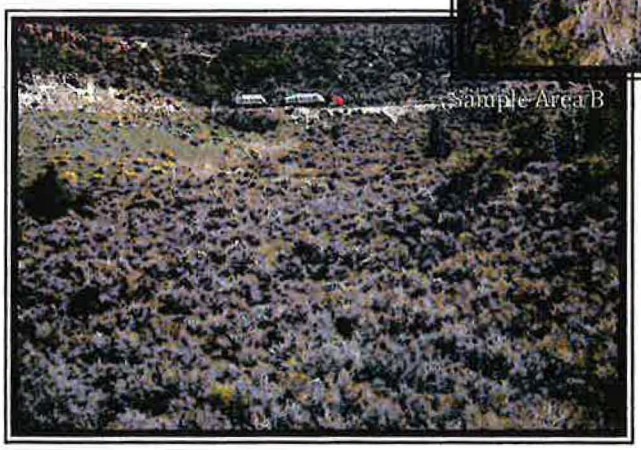
Color Photographs of the Sample Areas

Proposed Disturbed Sagebrush/Grass Community

Sample Area A



Sample Area B



Sample Area C

Sample Area C

Sample Area D

Sample Area D

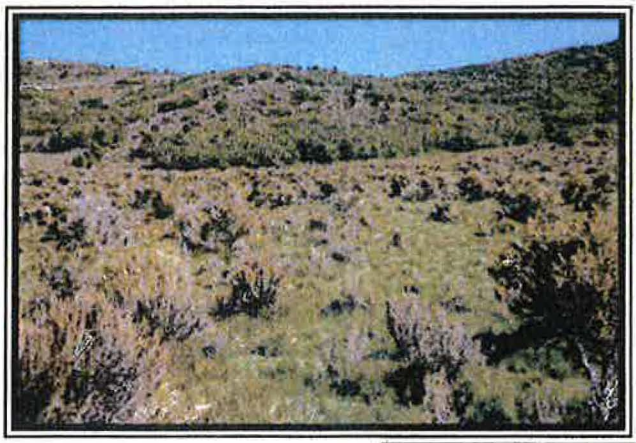
Proposed Disturbed Rabbitbrush/Sagebrush Community

Sample Area E

Sample Area E

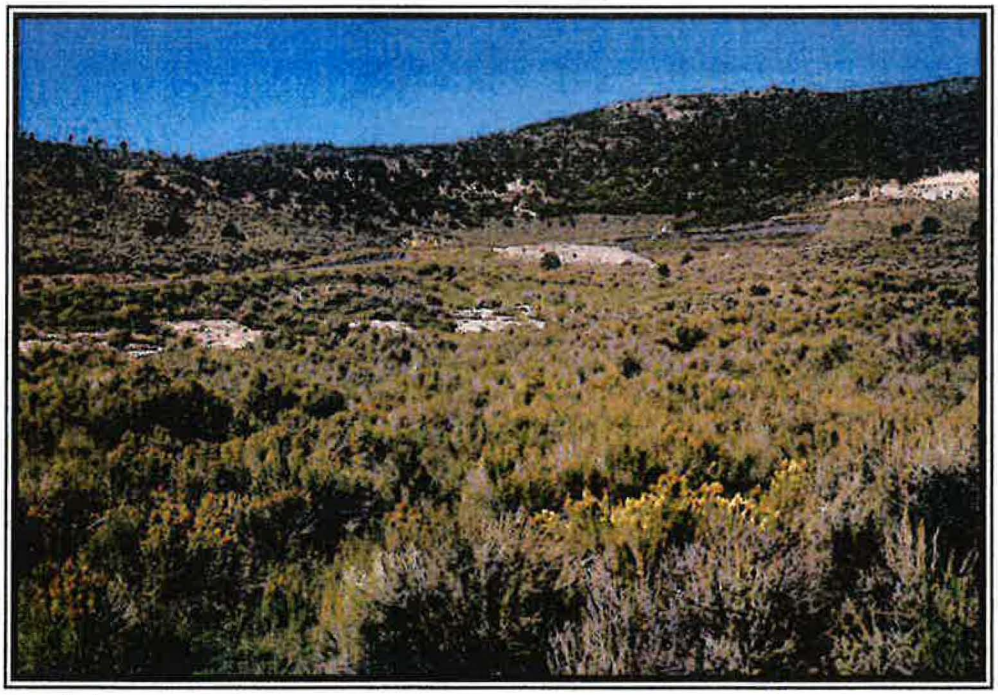
Sample Area E

Sample Area E



Sample Area E

Sample Area F



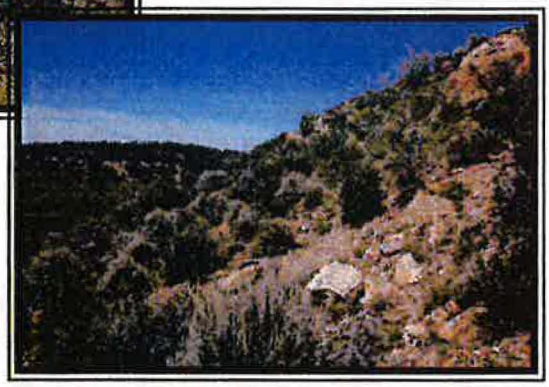
Sample Area F

Proposed Disturbed Mountain Brush Community

Sample Area G

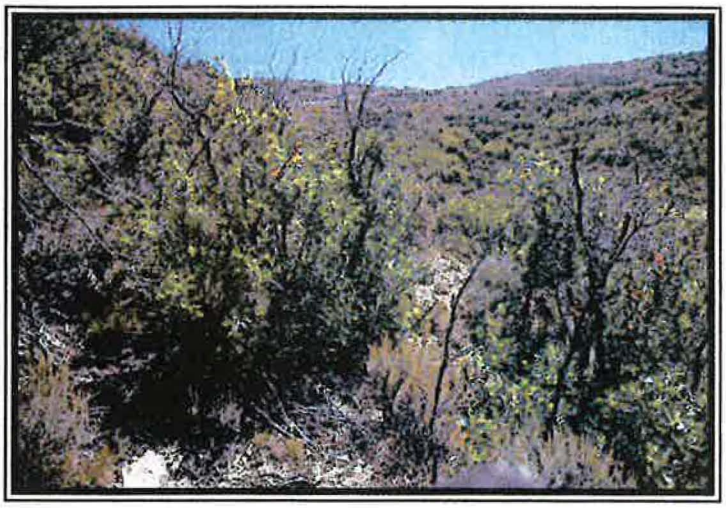
Sample Area G

Sample Area H



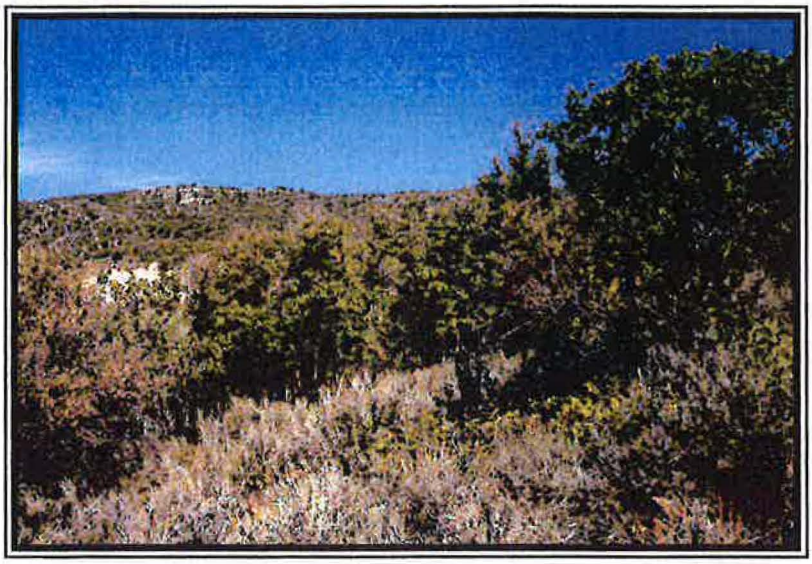
Sample Area H

Sample Area H



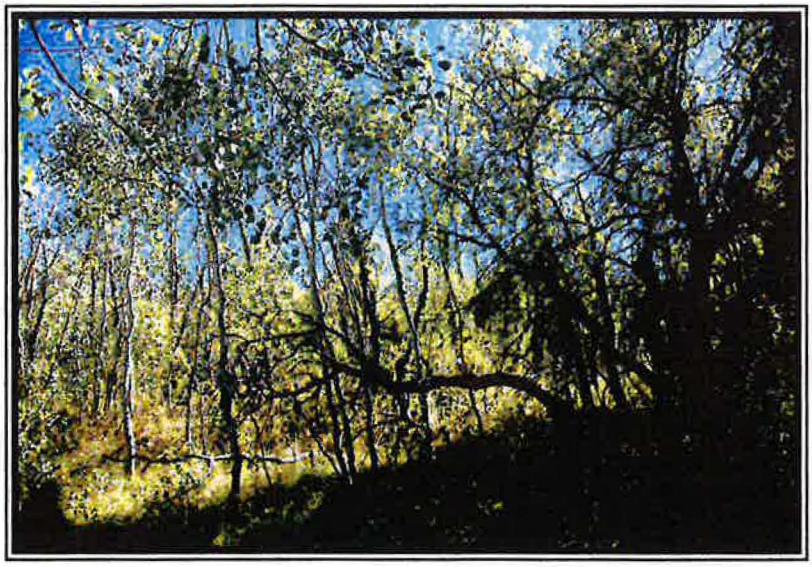
Sample Area H

Sample Area I



Sample Area I

Sample Area J



Sample Area J

Sagebrush/Grass Reference Area

Sample Area K

Sample Area K

Sample Area K

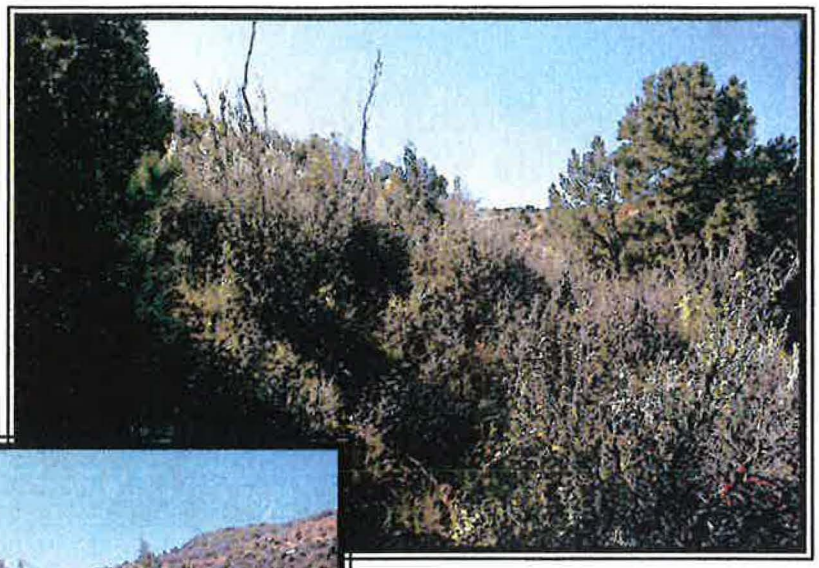
Rabbitbrush/Sagebrush Reference Area

Sample Area L

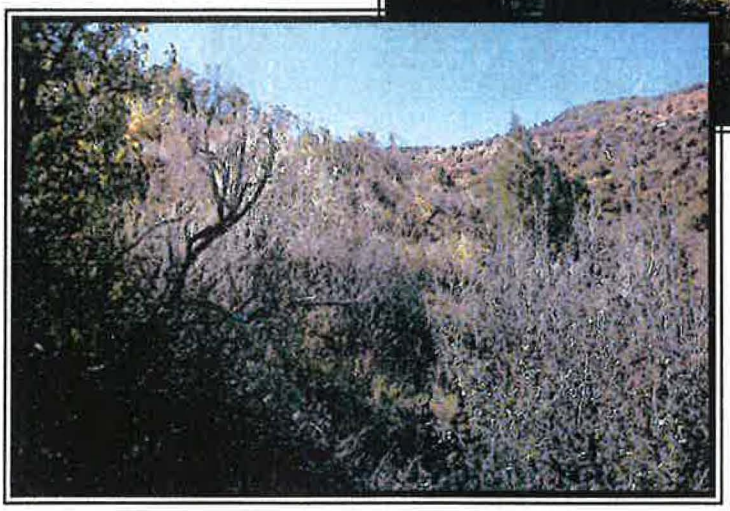
Sample Area L

Sample Area L

Mountain Brush Reference Area

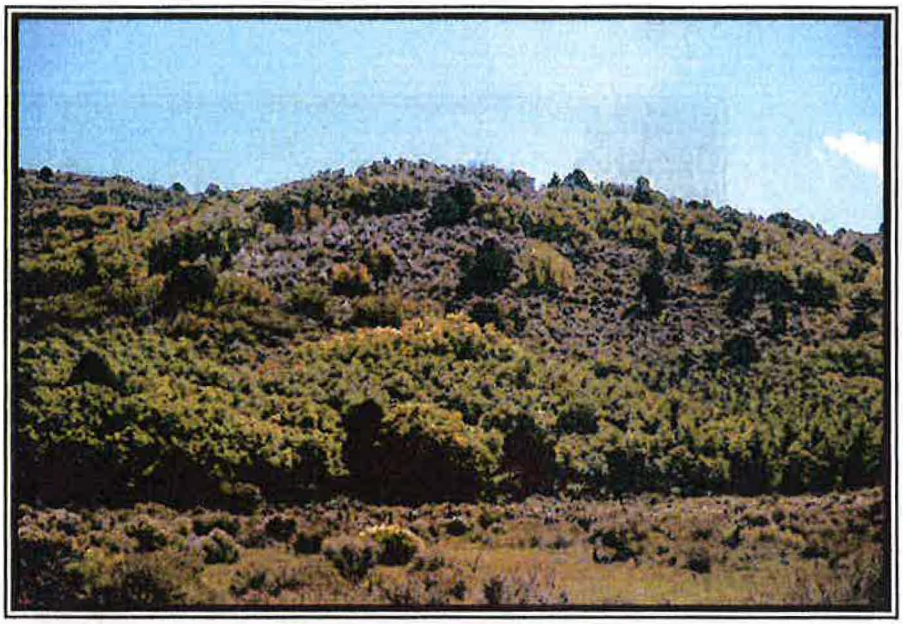


Sample Area M



Sample Area M

Sample Area M



Sample Area M

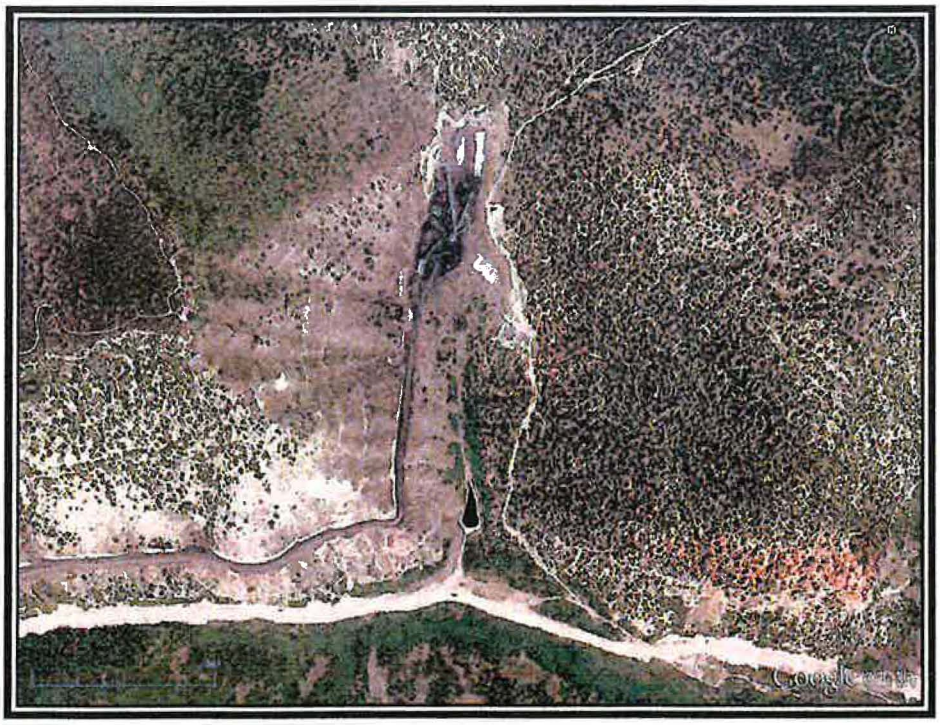
Sample Area M

Sample Area M

Vegetation & Sensitive Species of the Segregation Facility Area in Convulsion Canyon

at the
SUFCO Mine

in
Sevier County, Utah



Aerial view of the mine site and study area

Prepared by

MT. NEBO SCIENTIFIC, INC.
330 East 400 South, Suite 6
P.O. Box 337
Springville, Utah 84663
(801) 489-6937

Patrick D. Collins, Ph.D.

for

CANYON FUEL COMPANY, LLC
SUFCO MINE
597 South SR 24
Salina, Utah 84654

October 2014

Table of Contents

Introduction 1
- Proposed Disturbances 1
- Reference Areas 1

Methods 2
- Quantitative Sampling 2
- Sampling Design & Transect/Quadrat Placement 2
- Cover & Composition 2
- Woody Species Density 3
- Sample Size & Adequacy 3
- Statistical Analyses 3
- Photographs 3
- Threatened, Endangered & Sensitive Species 3

Results 4
- Oak Brush Community (proposed disturbed) 4
- Oak Brush Reference Area 5
- Pinyon-Juniper Community (proposed disturbed) 6
- Pinyon-Juniper Reference Area 7
- Grassland Community (proposed disturbed) 7
- Riparian/Willow Communities (proposed disturbed) 8
- Data Summary Tables 10
- Community Comparisons 22
- Threatened, Endangered & Sensitive Species 25

Discussion 28

Summary 31

Plant Communities and Sample Locations ..... Map A

Introduction

Proposed Disturbances

Construction activities are planned to build a Segregation Facility at the SUFCO Mine, an underground coal mine located in Sevier County, Utah. In doing so, the construction will entail disturbances to portions of the resident plant communities that exist in and adjacent to Convulsion Canyon. Convulsion Canyon is situated in central Utah at the southern end of the Wasatch Plateau. Construction of the facility will impact native plant communities as well as other areas that have been disturbed previously by activities associated with mining and road building. The scope of this report is to provide quantitative data results from sampling those plant communities, both native and previously disturbed, that will be impacted by the proposed construction activities planned at the SUFCO Mine site.

Reference Areas

As required by applicable state and federal regulations, once mining-related activities have terminated, final reclamation of the impacted areas is mandatory. Following revegetation and at the end of the "*Responsibility Period*", the restored plant communities are required to attain specific **revegetation success standards**. These standards are frequently derived by comparing the revegetated areas with native plant communities that are often situated near or adjacent to those that have been disturbed or proposed for disturbance. Before construction activities begin, these analogous communities, called *reference areas*, are quantitatively sampled along with those that are to be disturbed. The datasets of the areas are then compared to demonstrate their similarities (or differences). If the reference areas are approved, the communities will again be compared to determine whether or not the restored communities meet specific revegetation success standards following final reclamation.

This document reports the results of sampling in the proposed disturbed areas as well as the potential reference areas for the Segregation Facility. In addition, threatened, endangered and sensitive plant species were surveyed and addressed in the document.

Methods

Quantitative Sampling

Sample methods used for this study were performed in accordance with the vegetation guidelines recommended by the State of Utah, Division of Oil, Gas and Mining (DOGM). Quantitative and qualitative data were recorded within the plant communities proposed for disturbance and their respective reference areas in June 2014 (see Map A).

Sampling Design & Transect/Quadrat Placement

Sample transect lines were placed randomly within the boundaries of the proposed disturbed and reference areas. The transect placement technique was employed with the goal to adequately sample a representation of the entire site. Once the transects were established, quadrat locations for sampling were chosen using random numbers on the transect lines with the objective to record data without preconceived bias. The following data were then recorded.

Cover & Composition

Cover estimates were made using ocular methods with meter-square quadrats. Species composition, cover by species, and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were notes such as: slope, exposure, grazing use, disturbance and/or other appropriate notes. Plant species nomenclature follows *A Utah Flora* (Welsh et al., 2008).

Woody Species Density

Density of woody plant species for the proposed disturbed and reference areas were estimated using the point-quarter distance method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual

distance was equal to the square root of the mean area per individual. The number of individuals per acre was the end result of the calculations.

Sample Size & Adequacy

Sampling adequacy for cover and density was attempted by using the formula given below.

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

nMIN	= minimum adequate sample
t	= appropriate confidence t-value
s	= standard deviation
x	= sample mean
d	= desired change from mean

With the values used for "t" and "d" above, the goal was to meet appropriate sample adequacy values.

Statistical Analyses

Student's t-tests were employed to compare the total living covers and total woody species densities of the proposed disturbed areas with their respective reference areas.

Photographs

Color photographs of the sample areas were taken at the time of sampling and a subset of them have been submitted with this report.

Threatened, Endangered & Sensitive Species

Prior to recording quantitative data on the plant communities, a sensitive plant species and

habitat survey was conducted. To initiate the studies in the area, database searches and literature reviews were conducted for potential species that are known to be rare, endemic, threatened, endangered or otherwise sensitive in the general area. Additionally, the current list of federally protected species for Sevier County, Utah was reviewed along with potential habitats for these species in the areas proposed for disturbance.

Results

Oak Brush Community (Proposed Disturbed)

The proposed disturbed oak brush community was located near the lower elevations and at several aspects of the study area (Map A). This undisturbed plant community was dominated by quite a large margin by scrub oak (*Quercus gambelii*) and bigtooth maple (*Acer grandidentatum*). These two woody species were most important in the overstory and understory cover as well as frequency of occurrences in the sample quadrats. However, other species present here included chokecherry (*Prunus virginiana*), Indian ricegrass (*Stipa hymenoides*), and mountain brome (*Bromus carinatus*). For a list of all plant species that occurred in the samples along with their cover and frequency values, refer to Table 1.

Oak Brush (proposed disturbed)

The total living cover of the oak brush community was estimated at 72.17%, of which 46.33% came from understory and 25.83% from overstory (Table 2-A). Species composition of the understory cover was comprised of 87.28% trees & shrubs, 8.64% grasses and 4.09% forbs

(Table 2-B).

When woody species density was measured, results indicated that the most species were scrub oak, bigtooth maple and chokecherry. The total density in the oak brush community was estimated at 3,476 individuals per acre (Table 3).

Oak Brush Reference Area

Another oak brush community in the general vicinity, but outside the proposed disturbed area, was chosen to represent future revegetation success standards (Map A). Like the community it was chosen to represent, the dominant species by cover and frequency were scrub oak and bigtooth maple. Other important species included snowberry (*Symphoricarpos oreophilus*) and Rocky Mountain juniper (*Juniperus scopulorum*). The complete list of species including their cover and frequency values is shown on Table 4.

Oak Brush Reference Area

The total living cover in this reference area was estimated at 70.00%. Of that total, 46.00% consisted of understory cover and the remaining 24.00% came from overstory (Table 5-A). Composition of the understory was 89.67% trees and shrubs, 7.00% forbs and 3.33% grasses (Table 5-B).

The total woody species density of the Oak Brush Reference Area was estimated at 4,926 plants per acre with the dominants that included scrub oak, bigtooth maple and snowberry (Table 6). Other woody species present in the samples included Rocky Mountain juniper and

Utah serviceberry (*Amelanchier utahensis*).

Pinyon-Juniper Community (Proposed Disturbed)

A native pinyon-juniper plant community has also been proposed for disturbance by the construction activities at the Segregation Facility (Map A). The cover and frequency values for this community show the dominant plants species to be Salina wildrye (*Elymus salinus*) and pinyon-pine (*Pinus edulis*) . Other species present in the sample quadrats were corymb buckwheat (*Eriogonum corymbosum*), broom snakeweed (*Gutierrezia sarothrae*), scrub oak and Utah juniper (*Juniperus osteosperma*). For a complete list of all species present, refer to Table 7.

Pinyon-Juniper (proposed disturbed)

The total living cover in the proposed disturbed pinyon-juniper community was estimated at 44.50%, with most of it coming from understory, or 36.00% of the total cover (Table 8-A). The composition of the understory cover consisted of 60.69% grasses, 36.17% trees/shrubs and 3.14% forbs (Table 8-B).

Total woody species density in this community was estimated at 1,520 individuals per acre with the dominants here consisting of corymb buckwheat, pinyon-pine, rubber rabbitbrush (*Chrysothamnus nauseosus*), broom snakeweed, scrub oak and Utah juniper (Table 9). The remaining and less-common species present here included curl-leaf mountain mahogany (*Cercocarpus ledifolius*), and big sagebrush (*Artemisia tridentata*).

Pinyon-Juniper Reference Area

The location of the native, undisturbed plant community chosen as a reference area is also shown on Map A. The dominant plant species by cover and frequency in this area were pinyon-pine, salina wildrye, scrub oak and Utah juniper (Table 10).

The total living cover for the Pinyon-Juniper Reference Area was 45.33%. Of that total, understory cover made up 32.33% and overstory 13.00% (Table 11-A). The composition consisted of only woody plants at 65.69% and grasses at 34.31% (Table 11-B).

Pinyon-Juniper Reference Area

The woody species density measurements showed the total to be 1,223 plants per acre and consisted of pinyon-pine, scrub oak, curl-leaf mountain mahogany, Utah juniper and corymb buckwheat (Table 12).

Grassland Community (Proposed Disturbed)

Another plant community proposed for disturbance to create the Segregation Facility at the mine site was a grassland type (Map A). This community was established as

Grassland (proposed disturbed)

a result of re-seeding after previous mine and road building activities were conducted. Consequently, community has therefore been altered from its natural or native state.

The grassland community was greatly dominated by crested wheatgrass (*Agropyron cristatum*). Other, but less-important taxa from a cover and frequency perspective, included Russian wheatgrass (*Elymus junceus*), bluebunch wheatgrass (*E. spicatus*), corymb buckwheat, rubber rabbitbrush and cheatgrass (*Bromus tectorum*). For the complete list of species encountered in the samples, refer to Table 13.

The total living cover in this community was estimated at 45.83%, all of which was understory (Table 14-A). The composition was comprised of grasses, trees/shrubs and forbs at 80.92%, 16.04% and 3.03%, respectively (Table 14-B).

There were relatively few woody plants established in this area. Total woody species density measurements showed only 147 individuals per acre with the most common species being corymb buckwheat and rubber rabbitbrush (Table 15).

Riparian/Willow Communities (Proposed Disturbed)

Other areas have been proposed for disturbance, but will not be reclaimed to their current condition (additional information about this is provided later in the report). One such area supports riparian vegetation and is located directly adjacent a small creek. The creek has been augmented by additional waters from mine-related activities and was dominated by willows (*Salix exigua* and *S. lucida*) and

Riparian (proposed disturbed)

Red-osier dogwood (*Cornus sericea*). Another area, located adjacent to the stream-side vegetation and slightly more upland, supported a similar community. This area was dominated by the same species, but at somewhat different proportions (Table 16). Map A shows these areas. The two areas were sampled separately, but because of their similarities, their datasets were lumped together.

The total living cover with their layers of overstory and understory combined was 134.33%; 80.67% was comprised of understory cover and 53.67% from overstory (Table 17-A). Composition of the understory cover for riparian/willow community consisted of 78.38% trees/shrubs, 18.78% forbs and 2.84% grasses (Table 17-B).

Total woody species density was measured to be 8,822 individuals per acre with the same three species mentioned above as the most common, however, Wood's rose (*Rosa woodsii*) was also an important species for this parameter (Table 18).

Willows (proposed disturbed)

NOTE: Community Comparisons, Sensitive Species review, Discussion and Summary follow the date summary tables below.

Data Summary Tables

Table 1: Segregation Facility at the SUFCO Mine. Living Cover and Frequency by Plant Species (2014).

Proposed Disturbed Oak Brush Community			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
Acer grandidentatum	11.67	21.58	26.67
Juniperus scopulorum	1.33	7.18	3.33
Pinus edulis	0.50	2.69	3.33
Prunus virginiana	0.83	4.49	3.33
Quercus gambelii	11.50	18.26	36.67
UNDERSTORY			
TREES & SHRUBS			
Acer grandidentatum	10.00	20.33	36.67
Juniperus scopulorum	0.83	3.67	6.67
Mahonia repens	0.83	2.91	10.00
Prunus virginiana	5.67	14.13	16.67
Quercus gambelii	21.83	22.82	60.00
Symphoricarpos oreophilus	0.67	2.81	6.67
FORBS			
Physaria chambersii	0.17	0.90	3.33
Smilacina stellata	1.33	6.32	6.67
GRASSES			
Bromus carinatus	1.17	4.78	6.67
Elymus junceus	0.67	3.59	3.33
Elymus salinus	1.00	3.00	10.00
Stipa hymenoides	2.17	6.01	13.33

Table 2: Segregation Facility at the SUFCO Mine. Total Cover and Composition (2014).

Proposed Disturbed Oak Brush Community		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory (O)	25.83	21.95
Understory (U)	46.33	20.77
Litter	21.67	18.36
Bareground	18.63	15.82
Rock	13.37	12.17
O + U	72.17	9.19
B. % COMPOSITION		
Trees/Shrubs	87.28	22.11
Forbs	4.09	18.05
Grasses	8.64	15.28

Table 3: Segregation Facility at the SUFCO Mine. Woody Species Density (2014).

Proposed Disturbed Oak Brush Community	n=30
	Individuals/Acre
Acer glabrum	28.97
Acer grandidentatum	927.01
Chrysothamnus nauseosus	115.88
Eriogonum corymbosum	28.97
Gutierrezia sarothrae	86.91
Juniperus scopulorum	57.94
Pinus edulis	86.91
Prunus virginiana	492.47
Quercus gambelii	1622.26
Symphoricarpos oreophilus	28.97
TOTAL	**3476.28**

Table 4: Segregation Facility at the SUFCO Mine. Living Cover and Frequency by Plant Species (2014).

Oak Brush Reference Area			n=20
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
Acer grandidentatum	6.50	16.21	15.00
Juniperus scopulorum	3.75	9.07	15.00
Quercus gambelii	13.75	18.70	40.00
UNDERSTORY			
TREES & SHRUBS			
Acer grandidentatum	11.75	17.70	50.00
Juniperus scopulorum	2.25	6.02	15.00
Pachystima myrsinites	3.25	7.12	20.00
Quercus gambelii	18.25	19.12	65.00
Symphoricarpos oreophilus	7.75	14.01	35.00
FORBS			
Ligusticum porteri	0.50	2.18	5.00
Osmorhiza obtusa	1.00	3.39	10.00
Smilacina stellata	0.75	2.38	10.00
GRASSES			
Stipa hymenoides	0.50	2.18	5.00

Table 5: Segregation Facility at the SUFCO Mine. Total Cover and Composition (2014).

Oak Brush Reference Area		n=20
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory (O)	24.00	19.08
Understory (U)	46.00	18.55
Litter	38.50	19.56
Bareground	9.45	9.97
Rock	6.05	9.28
O + U	70.00	8.06
B. % COMPOSITION		
Trees/Shrubs	89.67	23.44
Forbs	7.00	12.76
Grasses	3.33	14.53

Table 6: Segregation Facility at the SUFCO Mine. Woody Species Density (2014).

Oak Brush Reference Area	n=30
Acer grandidentatum	1108.26
Amelanchier utahensis	123.14
Juniperus scopulorum	184.71
Quercus gambelii	2832.23
Symphoricarpos oreophilus	677.27
TOTAL	**4925.62**

Table 7: Segregation Facility at the SUFCO Mine. Living Cover and Frequency by Plant Species (2014).

Proposed Disturbed Pinyon-Juniper Community			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
Cercocarpus ledifolius	1.17	6.28	3.33
Pinus edulis	6.83	15.03	23.33
Quercus gambelii	0.50	2.69	3.33
UNDERSTORY			
TREES & SHRUBS			
Chrysothamnus nauseosus	0.67	2.13	10.00
Chrysothamnus viscidiflorus	0.50	1.98	6.67
Eriogonum corymbosum	2.67	6.67	20.00
Gutierrezia sarothrae	2.67	7.82	13.33
Juniperus osteosperma	1.33	4.27	10.00
Mahonia repens	0.17	0.90	3.33
Pinus edulis	4.33	10.14	16.67
Quercus gambelii	1.67	6.24	6.67
FORBS			
Cryptantha flava	0.17	0.90	3.33
Penstemon palmeri	0.27	1.44	3.33
Physaria chambersii	0.50	1.50	10.00
GRASSES			
Elymus salinus	19.90	12.47	90.00
Stipa hymenoides	1.17	4.41	6.67

Table 8: Segregation Facility at the SUFCO Mine. Total Cover and Composition (2014).

Proposed Disturbed Pinyon-Juniper Community		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory (O)	8.50	15.77
Understory (U)	36.00	9.78
Litter	14.67	11.69
Bareground	17.83	8.23
Rock	31.50	10.34
O+ U	44.50	13.12
B. % COMPOSITION		
Trees/Shrubs	36.17	35.31
Forbs	3.14	7.24
Grasses	60.69	34.61

Table 9: Segregation Facility at the SUFCO Mine. Woody Species Density (2014).

Proposed Disturbed Pinyon-Juniper Community	n=30
Artemisia tridentata	12.66
Cercocarpus ledifolius	50.65
Chrysothamnus viscidiflorus	12.66
Chrysothamnus nauseosus	253.27
Eriogonum corymbosum	354.58
Gutierrezia sarothrae	202.62
Juniperus osteosperma	126.64
Pinus edulis	329.26
Quercus gambelii	177.29
TOTAL	**1519.65**

Table 10: Segregation Facility at the SUFCO Mine. Living Cover and Frequency by Plant Species (2014).

Pinyon-Juniper Reference Area			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
Cercocarpus ledifolius	1.83	5.55	10.00
Juniperus osteosperma	2.00	7.59	10.00
Pinus edulis	8.50	13.43	36.67
Quercus gambelii	0.67	3.59	3.33
UNDERSTORY			
TREES & SHRUBS			
Juniperus osteosperma	2.50	8.24	10.00
Pinus edulis	13.33	15.56	53.33
Quercus gambelii	5.83	13.11	20.00
FORBS			
GRASSES			
Elymus salinus	10.33	14.26	40.00
Stipa hymenoides	0.33	1.80	3.33

Table 11: Segregation Facility at the SUFCO Mine. Total Cover and Composition (2014).

Pinyon-Juniper Reference Area		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory	13.00	13.88
Understory	32.33	9.55
Litter	26.33	16.68
Bareground	18.17	12.94
Rock	23.17	12.81
O + U	45.33	7.95
B. % COMPOSITION		
Trees/Shrubs	65.69	43.39
Forbs	0.00	0.00
Grasses	34.31	43.39

Table 12: Segregation Facility at the SUFCO Mine. Woody Species Density (2014).

Pinyon-Juniper Reference Area	n=30
Cercocarpus ledifolius	163.12
Eriogonum corymbosum	20.39
Juniperus osteosperma	142.73
Pinus edulis	693.27
Quercus gambelii	203.90
TOTAL	**1223.41**

Table 13: Segregation Facility at the SUFCO Mine. Living Cover and Frequency by Plant Species (2014).

Proposed/Previously Disturbed Grassland Community			n=30
	Mean Percent	Standard Deviation	Percent Frequency
TREES & SHRUBS			
Atriplex canescens	1.17	6.28	3.33
Chrysothamnus nauseosus	2.67	6.16	16.67
Clematis ligusticifolia	1.33	4.99	6.67
Eriogonum corymbosum	3.00	9.27	10.00
FORBS			
Artemisia ludoviciana	0.33	1.80	3.33
Penstemon palmeri	1.17	4.41	6.67
Penstemon sp.	0.33	1.80	3.33
GRASSES			
Agropyron cristatum	21.00	15.67	80.00
Bromus tectorum	2.17	4.78	20.00
Elymus hispidus	0.33	1.80	3.33
Elymus junceus	7.17	10.06	40.00
Elymus spicatus	4.17	9.84	16.67
Stipa hymenoides	1.00	3.74	6.67

Table 14: Segregation Facility at the SUFCO Mine. Total Cover and Composition (2014).

Proposed/Previously Disturbed Grassland Community		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Understory	45.83	10.96
Litter	16.33	6.82
Bareground	20.00	13.48
Rock	17.83	7.92
B. % COMPOSITION		
Trees/Shrubs	16.04	24.76
Forbs	3.03	9.65
Grasses	80.92	24.68

Table 15: Segregation Facility at the SUFCO Mine. Woody Species Density (2014).

Proposed/Previously Disturbed Grassland Community	n=30
Atriplex canescens	15.95
Chrysothamnus nauseosus	50.31
Clematis ligusticifolia	3.68
Eriogonum corymbosum	68.72
Gutierrezia sarothrae	1.23
Quercus gambelii	4.91
Rosa woodsii	2.45
TOTAL	**147.25**

Table 16: Segregation Facility at the SUFCO Mine. Living Cover and Frequency by Plant Species (2014).

Proposed Disturbed Riparian/Willow Community			n=30
	Mean Percent	**Standard Deviation**	**Percent Frequency**
OVERSTORY			
Cornus sericea	9.50	20.95	20.00
Salix exigua	36.17	28.54	66.67
Salix lucida	8.00	20.44	13.33
UNDERSTORY			
TREES & SHRUBS			
Clematis ligusticifolia	1.00	5.39	3.33
Cornus sericea	20.33	30.96	33.33
Rosa woodsii	5.00	16.23	13.33
Salix exigua	29.50	26.31	66.67
Salix lucida	8.83	21.36	16.67
FORBS			
Urtica dioica	13.67	20.89	33.33
GRASSES			
Carex nebrascensis	1.00	5.39	3.33
Phragmities australis	1.33	7.18	3.33

Table 17: Segregation Facility at the SUFCO Mine. Total Cover and Composition (2014).

Proposed Disturbed Riparian/Willow Community		n=30
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Overstory	53.67	15.91
Understory	80.67	14.19
Litter	12.27	12.56
Bareground	5.93	6.36
Rock	1.13	0.72
Overstory + Understory	134.33	22.35
B. % COMPOSITION		
Trees/Shrubs	78.38	30.18
Forbs	18.78	30.02
Grasses	2.84	10.81

Table 18: Segregation Facility at the SUFCO Mine. Woody Species Density (2014).

Proposed Disturbed Riparian/Willow Community	n=30
Acer glabrum	73.52
Clematis ligusticifolia	147.04
Cornus sericea	1690.91
Rosa woodsii	735.18
Salix exigua	5219.76
Salix lucida	955.73
TOTAL	**8822.12**

Community Comparisons

Oak Brush Communities. Statistical analyses were employed to compare parameters of the proposed disturbed plant communities with similar native communities chosen as reference areas that could represent future revegetation success standards. When the **total living cover** of the proposed disturbed oak brush community was compared to the reference area the differences were non-significant. This was true when the overstory and understory values were combined together and compared (Figure 1-A) as well as when the understory only values were compared (Figure 1-B).

Figure 1. A statistical comparison (Student's t-tests) of the **total living cover** (overstory + understory combined and understory only) between the Proposed Disturbed Oak Brush and Reference Area of the Segregation Facility at the SUFCO Mine.

	$\bar{x}$	s	n	t	df	SL
Oak Brush						
A. Proposed Disturbed (o+u)	72.17	9.19	30			
Reference Area (o+u)	70.00	8.06	20			
t-test				0.8581	48	NS
B. Proposed Disturbed (u)	46.33	20.77	30			
Reference Area (u)	46.00	18.55	20			
t-test				0.0574	48	NS

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom
n/a = not applicable

p = probability
SL= Significance Level
N.S.=Non-Significant
u = understory
o = overstory

When the total **woody species density** values for these two communities were compared statistically, the difference was significant – the reference area had significantly more plants per acre than the proposed disturbed area (Figure 2).

Figure 2. A statistical comparison (Student's t-tests) of the **woody species density** between the Proposed Disturbed Oak Brush and Reference Area of the Segregation Facility at the SUFCO Mine.

	x̄	s	n	t	df	SL
Oak Brush						
Proposed Disturbed	3476.28	1471.81	30			
Reference Area	4925.63	1182.93	20			
t-test				3.6787	48	p<0.01

x̄ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom

p = probability
SL= Significance Level
N.S.=Non-Significant

Pinyon-Juniper Communities. When the proposed disturbed pinyon-juniper was compared to that of the reference area, the **total living covers** were not statistically significant (Figure 3).

Figure 3. A statistical comparison (Student's t-tests) of the **total living cover** between the Proposed Disturbed Pinyon-Juniper and Reference Areas of the Segregation Facility at the SUFCO Mine.

	x̄	s	n	t	df	SL
Pinyon-Juniper						
Proposed Disturbed (o+u)	44.45	13.12	30			
Reference Area (o+u)	45.33	7.95	30			
t-test				0.3142	58	N.S.

x̄ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom

n/a = not applicable

p = probability
SL= Significance Level
N.S.=Non-Significant

Next, when the total **woody species density** values of the proposed disturbed and reference areas were statistically compared, the difference was again non-significant (Figure 4).

Figure 4. A statistical comparison (Student's t-tests) of the **woody species density** between the Proposed Disturbed Pinyon-Juniper and Reference Areas of the Segregation Facility at the SUFCO Mine.

	$\bar{x}$	s	n	t	df	SL
Pinyon-Juniper						
Proposed Disturbed	1519.65	964.91	30			
Reference Area	1223.41	453.35	30			
t-test				1.5220	58	N.S.

$\bar{x}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom

p = probability
SL= Significance Level
N.S.=Non-Significant

Grassland Community. The grassland area proposed for disturbance by the construction plans had been disturbed previously and later re-seeded as a result of mine-related and road building activities. Current state regulations have different revegetation success standards for previously disturbed areas – they must be returned to their current condition or better. Consequently, no reference area was chosen to be compared to at the time of final reclamation and revegetation for this community.

Willow/Riparian Communities. As mentioned in the RESULTS section above, there are areas that support water-loving willows and riparian vegetation, but these areas are currently not in their natural or undisturbed condition. At the time of final reclamation, these sites will not have the present waters concentrated in those specific areas, so a riparian reference area was not chosen for revegetation success standards. Specific details about this rationale have been provided in the DISCUSSION below.

Threatened, Endangered & Sensitive Species

A table of federally listed threatened, endangered and candidate species for Sevier County, Utah has been provided below (Table 19). The table also includes the status of the species, along with site-specific notes about the area proposed for disturbance and the probabilities of their occurrences in the study area. The State of Utah, Department of Natural Resources' biodiversity database specialist was consulted with regard to threatened, endangered or otherwise sensitive species in the mine area in 2013. Findings for this research indicated no such species, plant or animal, were found within a 2-mile radius of the mine site.

Additionally, GIS data and shape files from the State of Utah, Division of Wildlife Resources (DWR), Utah Conservation Data Center (UCDC) database were consulted for potential habitats of sensitive species. This database suggested southern Wasatch Plateau area could be general habitat for the northern goshawk (*Accipter gentilis*). In Utah, however, the greatest proportion of nests for this raptor occur in mixed lodgepole pine (*Pinus contorta*) and Quaking aspen (*Populus tremuloides*), neither of which occur in the study area. No other sensitive species are known to occur in the study area.

Table 19: Federally listed threatened, endangered and candidate species for Sevier County, Utah (last updated January 12, 2012).

ENDANGERED		SITE-SPECIFIC NOTES
Sclerocactus wrightiae	Wright fishhook cactus	Wright's fishhook cactus is known to be present primarily in salt desert habitats on Mancos Shale, Dakota, Morrison, Summerville and Entrada Sandstone formations. This habitat is not present in the study area. Consequently, there will be no impact to this species as a result of construction of the Segregation Plant.
THREATENED		
Astragalus montii	Heliotrope milkvetch	This species is known to occur only in Flagstaff Limestone, a formation that is not present at the waste rock site. There should be no impact to this species as a result of construction of the Segregation Plant.
Townsendia aprica	Last chance townsendia	Although this species can be found in pinyon-juniper communities and this community is relatively close to the study area, it most commonly occurs on clay and clay-silt exposures on the Mancos Shale formation. This formation is not found in the study area. There should be no impact to this species as a result of construction of the Segregation Plant.
Lynx canadensis	Canada lynx	State of Utah, Division of Wildlife Resources (DWR) distribution maps show that the general area on the Wasatch Plateau in Sevier County may be "critical habitat". for this species. The Canada lynx range extends from Canada and Alaska south to Maine, the Rocky Mountains, and also to the Great Lakes region. DWR biologists state that; *although sightings of the Canada lynx in Utah over the past twenty years are exceedingly rare, the USDA Forest Service recently announced that Canada lynx hair was found in the Manti-La Sal National Forest during 2002.* The preferred habitat of the Canada lynx is montane coniferous forest, where it often hunts snowshoe hares. Coniferous forests do not exist at the study area. Consequently, there will be no impact to this species as a result of construction of the Segregation Plant.

Table 19: Federally listed threatened, endangered and candidate species for Sevier County, Utah (last updated January 12, 2012).		
CANDIDATE		
Centrocercus urophasianus	Greater sage-grouse	Greater sage-grouse inhabit sagebrush zones in Utah's mountain valleys and foothills. There is no brooding or winter habitat for this species shown on the DWR database maps at or near the study area. Utah's Conservation Plan for Greater Sage-grouse (February 14, 2013) shows areas near the "Opportunity Area" habitats for the sage-grouse in this portion of the Parker Mtn-Emery Sage-Grouse Management Area (SGMA). No leks have been mapped near the site and little and no habitat is located is located at the study site for this species. Consequently, there should be no impact to this species as a result of expansion of construction of the Segregation Plant.
Cynomys parvidens	Utah prairie-dog	Habitat for this prairie-dog does not exist in the study area. Consequently, there will be no impact to this species as a result of construction of the Segregation Plant.
EXTIRPATED		
Ursus arctos	Brown (grizzly) bear	The brown (grizzly) bear was extirpated from Utah in the 1920s. It probably once occurred in the Wasatch Plateau. Even though the brown bear may have been present in the general area historically, suitable habitat for the brown bear at or near the study area is questionable. There will be no impact to this species as a result construction of the Segregation Plant.

Discussion

The statistical analyses reported above for **oak brush** community cover included comparisons for the total living cover of the overstory and understory (combined) as well as a comparison of the understory total living cover (only). When the total living covers of the communities were compared to the reference area, the differences were statistically non-significant.

The woody species density values for proposed disturbed oak brush and reference area were, however, significantly different – the reference area had more individuals per acre when compared to the proposed disturbed community. Although the proposed disturbed community's woody species density was lower than the reference area, an even lower success standard for density may be warranted here. Previous consultations with state wildlife biologists sometimes resulted in suggestions for a lesser woody species density value because it may provide more opportunity for increased forb and grass species establishment and could provide greater species diversity in the summer range for the resident wildlife species. Consequently, a pre-set woody species value of 2,000 plants per acre may be a more appropriate recommendation for a revegetation success standard for the proposed disturbed oak brush once the site is reclaimed. Consequently, and subject to approval by biologists from the State of Utah, Division of Oil, Gas and Mining (DOGM), revegetation success standards for each area are shown on Table 20. That said, the reference area values remain an option for final success standards.

Table 20: Summary of recommended final revegetation success standards for the Segregation Facility at the SUFCO Mine.			
PROPOSED DISTURBED	**COVER**	**DENSITY**	**DIVERSITY**
Oak Brush	Compare to Oak Brush Reference Area (understory)	2,000 plants/acre [(a)]	Compare to Oak Brush Reference Area
Pinyon-Juniper	Compare to Pinyon-Juniper Reference Area	Compare to Pinyon-Juniper Reference Area	Compare to Pinyon-Juniper Reference Area
Grassland	46.00% [(b)]	150 plants/acre [(b)]	No standard
Riparian/Willow	55.00% (understory)[(a)]	2,000 plants/acre [(a)]	No standard

[(a)] Pre-set standard; [(b)] Based on current baseline data

When the proposed disturbed **pinyon-juniper** community was compared to the reference area, there was not a statistically significant difference for total living cover or woody species density.

As mentioned, the **grassland** community had been re-seeded following previous disturbance from mine-related and road building activities. In those plant communities that have been disturbed previously by other activities and not reclaimed to the current revegetation standards, applicable regulations state that "*at a minimum, the vegetative ground cover will be not less than the ground cover existing before redisturbance and will be adequate to control erosion*". Consequently, a reference area was not chosen to represent future final revegetation success standards for this *previously disturbed* area located within the proposed *new disturbances* of the Segregation Facility. Nonetheless, the grassland community was sampled to reveal its current total living cover, cover by species, composition and woody species density. Consequently, these baseline values may be used for future revegetation success standards at the time of final reclamation (Table 20).

Also mentioned above, there are other areas that support more water-loving riparian plants, but these areas are not currently in their natural, undisturbed state. For example, the small creek that supports willows and other riparian species such as Red-osier dogwood, is in a drainage that has had water added to it by activities associated with the mining operations.

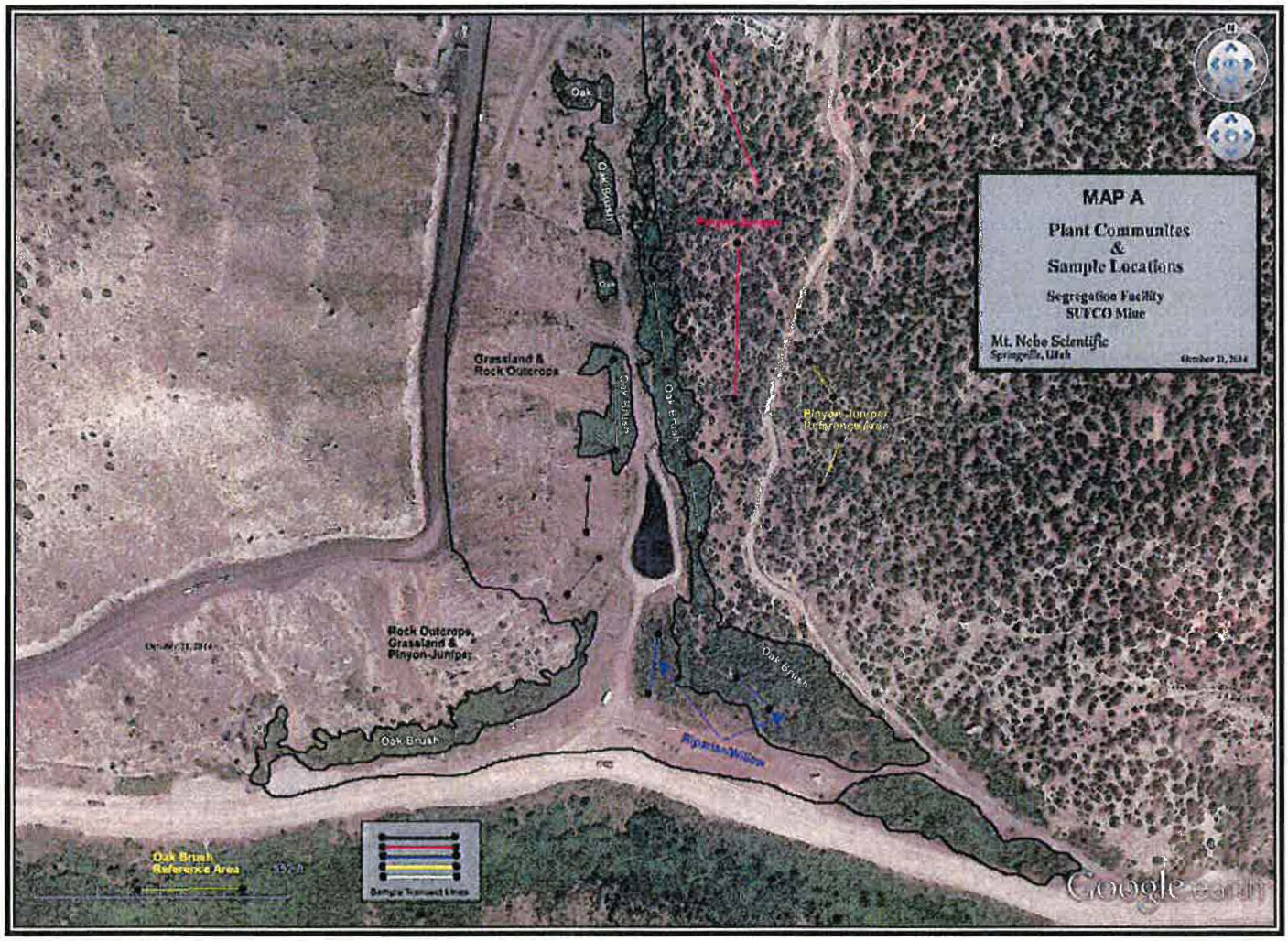
Evidently, prior to building the lower sediment pond there were some small seeps or springs located in that general vicinity. At that time, these seeps did not travel more than a few feet and did not reach the existing drainage, at least from surface flows. During construction, these flows were collected and artificially directed to the drainage below the pond, thus encouraging and supporting the stream-side riparian plants as well as the more upland willow stands as shown in the photographs above on Map A.

These riparian/willow areas were sampled and the results have been submitted herein to document the existing condition of the vegetation in the study area. However, it did not seem prudent to choose and sample a riparian reference area that would be used for future revegetation success standards if the present concentrated creek flows are dissimilar at the time of final reclamation. When the area is reclaimed, it will probably return to a pre-mining condition where the seeps and springs will be restored and the drainage will return to a dryer creek-bed and become ephemeral at best. Likewise, if there is enough water concentrated in those areas to support wetland and riparian species at that time, they will likely be restored naturally and without augmented seeding practices.

Summary

Engineers for the SUFCO Mine have proposed to construct the Segregation Facility at their coal mine site to augment current operations. In doing so, the construction activities will impact existing plant communities. The native plant communities that would be impacted by the proposed construction activities included: oak brush and pinyon-juniper. Additionally, there were other plant communities that had been disturbed previously by other activities including: grasslands and riparian/willow. All plant communities that could be impacted were quantitatively sampled and the results have been provided in this report. Additionally, reference areas, or those native plant communities that were similar to those proposed for disturbance were also sampled. These areas will remain undisturbed for the life of the Segregation Facility and will be used for revegetation success standards at the time of final reclamation. Those plant communities within the construction zone that had been disturbed by previous activities were sampled to provide baseline data to be used as future revegetation success standards.

Additionally, surveys for potential threatened, endangered or sensitive (TES) species were conducted in the study area. No TES species or their habitats were found at the site.


MAP A
Plant Communities
&
Sample Locations
Segregation Facility
SUFCO Mine
Mt. Nebo Scientific
Oak
Oak Brush
Grassland &
Rock Outcrops
Oak Brush
Oak Brush
Pinyon-Juniper
Reference Area
Rock Outcrops,
Grassland &
Pinyon-Juniper
Oak Brush
Oak Brush
Riparian Willow
Oak Brush
Reference Area
Sample Transect Lines
Google earth

SUFCO Mine Reclamation Sites and Associated Reference Area

	Estimated Acreage of Disturbance	Reference area
MINE SITE		
Lower Pond	1.3	Riparian
Exterior of Lower Pond and Spring Collection System	2	Oakbrush
Soil Nail Wall	0.02	Pinyon Juniper
Substation	0.28	Pinyon Juniper
Portals	2.5	Pinyon Juniper
Leachfield	0.8	Sagebrush/Grass
Sinkhole	0.45	Sagebrush/Grass
Link Canyon		
Culvert	0.001	Riparian
Substation and Access Road	0.5	Pinyon Juniper
Waste Rock Site		
Site (except as listed below)	48	Sagebrush/Grass
Large Sediment Pond	2	Rabbitbrush/Sagebrush
Hillside lifts 4 & 5	9	Mountain brush

Pre-Law Disturbance Not Requiring Reference Area

Mine Site

All except what is listed above

Link Canyon

All except what is listed above

EXPLANATION

REFERENCE AREA BOUNDARY

1100 0 1100

PROFESSIONAL ENGINEER No. 6073281 JACOB D. SMITH STATE OF UTAH

I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE

REVISIONS				
NO.	DATE	REQ. BY	DWG. BY	REMARKS

Canyon Fuel Company, LLC
SUFCO Mine
597 South SR 24 – Salina, UT 84654
(435) 286-4880 Phone
(435) 286-4499 Fax

PLATE
REFERENCE AREA

PEN TBL:	SCALE:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO:
_15Ntnrd-SUFENP1.ctb	1" = 1100'	12/2/2019	J.G.C.	V.M.	V.M.	PLATE R.A.
SHT SET: #### / PROJECT NUMBER: ####	FILE NAME: H:\DRAWINGS\MRP\PLATES\PLATE REF AREA.dwg					

APPENDIX 5-9

Reclamation Bond Estimate

Direct Costs

Subtotal Demolition and Removal	$1,725,251	
Subtotal Backfilling and Grading	$1,652,064	
Subtotal Revegetation	$183,809	
Direct Costs	$3,561,124	*2019 Dollars*

Indirect Costs

Mob/Demob	$356,112	10.0%
Contingency	$178,056	5.0%
Engineering Redesign	$89,028	2.5%
Main Office Expense	$242,156	6.8%
Project Mainagement Fee	$89,028	2.5%
Subtotal Indirect Costs	$954,380	26.8%

Total Cost	**$4,515,504.00**	*2019 Dollars*

Escalation factor for 2019		*0.0232*
Number of years to next midterm (2023)		*4*
Escalation Amount	*$463,739.28*	
Reclamation Cost Escalated	*$ 4,979,243*	*2023 Dollars*

Bond Amount (rounded to nearest $1,000) 2023 Dollars	**$4,979,000.00**

Posted Bond 2018	$5,103,000.00
Difference Between Cost Estimate and Bond	$124,000.00
Percent Difference	2.43%

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost 2019 Dollars
Mine Site Cut and Fill															843965
Waste Rock Site															799147
Link Canyon Substation															678
Link Canyon Portals															3526
SITLA Muddy Tract Exploration															4748
Subtotal															1652064

Mine Site Cut and Fill

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	2019 Cost
D9R Semi-U EROPS (9-35) (2H14)	23835	250	0.1	48.9	472.87	1	472.87	$/HR	93606	CY	150	CY/HR	624	HR	295071
826H ((6-12) (2N14)	23545	250	0.1	48.9	471.06	1	471.06	$/HR					624	HR	293941
CLAB					56.55	1.5	62.1	$/HR					624	HR	38750
8,000 gal H2O truck Diesel (20-16) (2N14)	13165	72.35	0.1	56.55	218.42	1	218.42	$/HR					624	HR	136294
Pickup Truck Crew 4x4 1 ton (20-17) (2N14)	850	9	0.1	36.5	51.71	1	51.71	$/HR					624	HR	32267
Foreman Average, Outside					76.35	1	76.35	$/HR					624	HR	47642
Subtotal															**843965**

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Waste Rock Site															
D9R Semi-U EROPS (9-35) (2H14)	23835	250	0.1	48.9	472.87	1	472.87	$/HR	132944	CY	225	CY/HR	590.86	HR	279401
826H ((6-12) (2N14)	23545	250	0.1	48.9	471.06	1	471.06	$/HR					590.86	HR	278332
CLAB					56.55	1.5	62.1	$/HR					590.86	HR	36693
8,000 gal H2O truck Diesel (20-16) (2N14)	13165	72.35	0.1	56.55	218.42	1	218.42	$/HR					590.86	HR	129056
Pickup Truck Crew 4x4 1 ton (20-17) (2N14)	850	9	0.1	36.5	51.71	1	51.71	$/HR					590.86	HR	30553
Foreman Average, Outside					76.35	1	76.35	$/HR					590.86	HR	45112
Phase 1									33700	CY					
Phase 2 & Transition topsoil removal Lift 1&2									33241	CY					
Phase 3/4 Topsoil									36510	CY					
Phase 3/4 Subsoil									29493	CY					
Total Phase 1 through 4									132944	CY					
Subtotal															**799147**

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Link Canyon Substation															
Place Backfill Material															
CAT 325DL (10-20)(2nd14)	11225	120	0.1	48.9	251.06	1	251.06	$/HR	423	CY	225	CY/HR	1.9	HR	477
Place Topsoil															
CAT 325DL (10-20)(2nd14)	11225	120	0.1	48.9	251.06	1	251.06	$/HR	170	CY	225	CY/HR	0.8	HR	201
Subtotal															678

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Link Canyon Portals															
Place Backfill Material															
CAT 325DL (10-20)(2nd14)	11225	120	0.1	48.9	251.06	1	251.06	$/HR	267	CY	36	CY/HR	7.4	HR	1858
Place Topsoil															
CAT 325DL (10-20)(2nd14)	11225	120	0.1	48.9	251.06	1	251.06	$/HR	67	CY	36	CY/HR	1.9	HR	477
Support															
Pickup Truck Crew 4x4 1 ton (20-17) (2N14)	850	9	0.1	36.5	51.71	1	51.71	$/HR					9.3	HR	481
Foreman Average, Outside					76.35	1	76.35	$/HR					9.3	HR	710
Subtotal															**3526**

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
SITLA Muddy Tract Exploration															
410J EROPS 4WD EXTEN. (9-22)(2nd14)	3950	41	0.1	48.9	118.69	1	118.69	$/HR					40	HR	4748
Subtotal															4748

Ref.	Description	Materials	Unit	Length	Width	Height	Diameter	Area	Number	Unit	Quantity	Unit	Cost 2019 Dollars
	Main Facilities												
2	Ambulance Garage												$3,403.00
3	Annex Building												$27,858.50
4	Blast Channels A												$135,099.00
5	Blast Channels B												$43,846.00
6	Bulk and Used Oil Storage												$3,636.00
7	Cap Magazine			See Clorinator Building									$0.00
8	Chlorinator Bld												$812.00
9	Diesel Tank - 16,900 Gal												$4,644.50
10	Drainage Culverts												$40,895.00
11	Electrical Bld												$1,498.00
12	Fan												$13,878.00
13	Fire Water Tank 300,000 Gal												$12,731.00
14	Fuel Dock												$1,591.00
15	Guard House												$546.00
16	Loadout Belt												$4,358.00
17	Lower Stacker Coal Storage												$3,524.00
18	Lump Coal Belt												$1,587.00
19	Lump Coal Storage												$2,596.00
20	Mine 1 Pad												$5,346.00
21	No 1 Belt												$4,544.00
22	Office Building												$137,212.00
23	Pavement Removal												$189,413.00
24	Powder Magazine												$157.00
25	Pump House												$1,891.00
26	Riprap Filter Fabric												$391,150.00
27	Rock Dust Bin												$4,982.00
28	ROM MCC Building	Storage											$1,543.00
29	ROM Coal Storage	Building											$25,610.00
30	Sampler Building												$918.00
31	Sand and Salt Storage												$3,527.00
32	Seal Portals												$60,168.00
33	Sediment Trap												$2,626.00
34	Septic Tanks												$16,388.00
35	Shelves												$5,619.00
36	Shop and Warehouse												$106,593.00
37	Shop Garage												$13,427.00
38	Shop Office												$3,006.00
39	Side Release Tank												$1,162.00
40	Steam Cleaner Building												$11,171.00
41	Stoker Belt												$2,024.00
42	Stoker Bin												$16,011.00
43	Stoker Coal Storage												$3,796.00
44	Stoker Oil Tank												$4,412.00
45	Storage Trailers												$2,050.00
46	Substation Lower												$111,202.00
47	Ticket Printers				See Tipple Building								$0.00
48	Tipple Building												$71,900.00
49	Tipple MCC Buidling												$5,313.00
50	Tipple Office Building												$4,535.00
51	Trash Pit												$913.00
52	Transfer Building												$12,157.00
53	Truck Loader Bin												$2,175.00
54	Truck Scale												$47,313.00
55	Water Tank Lower												$1,150.00
56	Water Tank Upper												$1,150.00
57	West Lease Tunnels												$52,006.00
58	Yard Hoist				See Transfer Building								$0.00
	Link Canyon Facilities												
60	Link Canyon Portals												$5,386.00
61	Link Canyon Substation												$38,899.00
	Fourth East Facilities												
63	Fan Generator Building												$2,371.00
64	Four East Fan												$19,072.00
	Mitigation												
66	Northwater Mitigation												$32,730.00
	Total												$1,725,521.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019 Dollars w O&P
	Vegetation																			
	Waste Rock Site	**Waste Rock Site***																		
	Soil Preparation	Ripping	31 23 16.32 2800	0.43	BCY					34.08						AC		54983	CY	$ 23,643
	Seed	Seed -SUFCo WasteRock	SUFCo1	389	/AC					34.08						AC		34.08	AC	$ 13,257
	Hydro seed Equipment and Labor	Hydro Seeding, Mulch & Fertilizer	32 92 19.14 5800	41.5	/MSF					34.08						AC		1485	MSF	$ 61,628
	Mulch	Hay 1"	31 25 14.16 1200	910	TON					34.08						AC		1	ton/acre	$ 910
	Tackifer	Tackifer	Tackifer	52.5	/AC					34.08						AC		60	lb/ac	$ 3,150
		Existing & Phases 1 - 5																		**102588**
	Mine Facilities	**Mine Site**																		
	Soil Preparation	Ripping	31 23 16.32 2800	0.43	BCY					19.214						AC		30999	CY	$ 13,329
	Seed	Seed -SUFCo WasteRock	SUFCo1	746	/AC					19.214						AC		19	AC	$ 14,174
	Hydro seed Equipment and Labor	Hydro Seeding, Mulch & Fertilizer	32 92 19.14 5800	41.5	/MSF					19.214						AC		19.21	MSF	$ 797
	Mulch**	Hay 1"	31 25 14.16 1200	910	TON					6.9						AC		1	ton/acre	$ 910
	Tackifer**	Tackifer	Tackifer	52.5	/AC					6.9						AC		60	lb/ac	$ 3,150
	Plant Seedlings**	SUFCoTransplants	SUFCo3	487	/AC					6.9						AC		6.9	AC	$ 3,360
	Plant Seedlings**	Bare root seedlings 3 to 5 inch heavy soil	32 93 43.10 0560	0.74	EA					6.9						AC		2933	EA	$ 2,170
	Subtotal																			**37890**
	Link Canyon Portal	**Link Canyon Portal**																		
	Soil Preparation	Ripping	31 23 16.32 2800	0.43	BCY					0.48						AC		774.4	CY	$ 333
	Seed	Seed -SUFCo WasteRock	SUFCo1	746	/AC					0.48						AC		0.48	AC	$ 358
	Hydro seed Equipment and Labor	Hydro Seeding, Mulch & Fertilizer	32 92 19.14 5800	41.5	/MSF					0.48						AC		20.91	MSF	$ 868
	Mulch	Hay 1"	31 25 14.16 1200	910	TON					0.48						AC		1	ton/acre	$ 910
	Tackifer	Tackifer	Tackifer	52.5	/AC					0.48						AC		60	lb/ac	$ 3,150
	Plant Seedlings	SUFCoTransplants	SUFCo3	487	/AC					0.48						AC		0.48	AC	$ 234
	Plant Seedlings	Bare root seedlings 3 to 5 inch heavy soil	32 93 43.10 0560	0.74	EA					0.48						AC		204	EA	$ 151
	Subtotal																			**6004**
	2RWL Sinkhole	**Sinkhole**																		
	Soil Preparation	Ripping	31 23 16.32 2800	0.43	BCY					0.35						AC		565	CY	$ 243
	Seed (Broadcast, doubled amount of seed)	Seed -SUFCo WasteRock	SUFCo1	389	/AC					0.35						AC		0.7	AC	$ 272
	Subtotal																			**515**
		Subtotal																		**146997**
		25% Revegetation Rate																		**36812**
	Total	**TOTAL**																		**183809**

* Includes Phases 1-5

** **Post Law Disturbed Area**

Acreage Associated with Reference Areas	Acres
Lower Pond	3.3
Soil Nail Wall	0.02
Substation	0.28
Portals	2.5
Leachfield	0.8
TOTAL	**6.9**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Ambulance Garage																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						7888					CF		7888	CF	2840
	Subtract 30% No Interior Walls		02 41 16 13 0750												852					
																	0.1	29	CY	
	Truck's Capacity										12					CY		2.4	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.8	DAY	
	Transportation Cost Steel Truck Drive																	6.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			3600
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						19					CY		19	CY	261
	Concrete's Vol. Demolished																1.3	25	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	/CY													25	CY	33
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.63	/CY													25	CY	91
	Disposal Costs	On site disposal	02 41 16 17 4200	10.8	/CY													25	CY	270
	Subtotal																			655
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**3403**

Ref.	Description **Annex Building**	Materials	Means Reference Num	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						11263					CF		11263	CF	4055
	Subtract 30% No Interior Walls		02 41 16 13 0750												1216					
	Structure's Vol. Demolished																0.1	41.71	CY	
	Truck's Capacity										12					CY		3.5	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	2	DAY	
	Transportation Cost Steel Truck Drive																	16	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															1520
	Subtotal																			5575
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						563					CY		563	CY	7741
	Concrete's Vol. Demolished																1.3	732	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													732	CY	974
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													732	CY	2591
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													732	CY	8125
	Subtotal																			19431
	SOIL NAIL WALL																			
	Concrete Demolition																			
	Demolition Cost	Concrete w/ rienforcing 6' high	02 41 13.90 0400	16.2	LF	65					42.5					CY		65	LF	1053
	Concrete's Vol. Demolished																1.3	55	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													55	CY	73
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													55	CY	195
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													55	CY	611
	Subtotal																			1932
	CHAIN LINKFENCE																			
	Chainlink Removal	8'-10' - Crew Includes Loader	02 41 13.60 1700	4.42	/LF	119.42									119.42	LF		119	LF	526
	Concrete demolition	Footings 2' thick and 3' wide Gate posts	02 41 16.17 1140	20.5	LF	3									12	LF		12	LF	246
	Concrete demolition	Footings 2' thick and 3' wide Line post	02 41 16.17 1140	20.5	LF	2									20	LF		20	LF	410
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													4	CY	14
	Chain link Gates	Two Gates (3' & 5')	02 41 13.62 0100	66	EA										2	EA		2	EA	132
	Chain link Gates	10' Wide heavy duty gate	02 41 13.62 0200	123	EA										1	EA		1	EA	123
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													4	/CY	14
	Post Removal	Gate Post 3"x 9' SCH 40 GALV	02 41 13.62 1000	24.5	ea										3			3	EA	74
	Bollards Removal	6" bollards	02 41 13.92 0800	24.5	EA										2			2	EA	49
	Post Braces	Braces on end and gate Braces	02 41 13.62 0800	0.76	EA										9			9	EA	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													4	/CY	14
	Disposal Costs	On site disposal (Dozer)	02 41 16 17 4200	11.1	/CY													4	/CY	44
	Subtotal																			188
	Total																			**27859**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Blast Channels A																			
	Reach 2																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						496					CY		496	CY	9672
	Volume of Rubble																1.3	645	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													645	CY	858
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													645	CY	839
	Subtotal																			11369
	Reach 3																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						1227					CY		1227	CY	23927
	Volume of Rubble																1.3	1595	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													1595	CY	2121
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													1595	CY	2074
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	LCY													1595	CY	17705
	Subtotal																			45827
	Reach 4																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						2708					CY		2708	CY	52806
	Volume of Rubble																1.3	3520	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													3520	CY	4682
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													3520	CY	4576
	Subtotal																			62064
	Reach 5																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						259					CY		259	CY	5051
	Volume of Rubble																1.3	337	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													337	CY	448
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													337	CY	438
	Subtotal																			5937
	Reach 6																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						432					CY		432	CY	8424
	Volume of Rubble																1.3	562	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													562	CY	747
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													562	CY	731
	Subtotal																			9902
	Total																			**135099**

Note: Blasted Material will be placed as fill during reclamation

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Blast Channels B																			
	Reach 7																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						492					CY		492	CY	9594
	Volume of Rubble																1.3	640	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													640	CY	851
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													640	CY	832
	Subtotal																			11277
	Reach 8																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						820					CY		820	CY	15990
	Volume of Rubble																1.3	1066	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													1066	CY	1418
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													1066	CY	1386
	Subtotal																			18794
	Reach A-1, A-2																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						151					CY		151	CY	2945
	Volume of Rubble																1.3	196	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													196	CY	261
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													196	CY	255
	Subtotal																			3461
	Reach A-3, A-4, A-5																			
	Blasting																			
	Blasting Cost	Drill and Blast open face under 1,500 CY	31 23 16 30 0020	19.5	BCY						450					CY		450	CY	8775
	Volume of Rubble																1.3	585	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	LCY													585	CY	778
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													585	CY	761
	Subtotal																			10314
	Total																			**43846**

Note: Blasted Material will be placed as fill during reclamation, therefore there will be no on site disposal

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Bulk and Used Oil Storage																			
	Structure's Demolition Cost	Steel Tank	02 65 10.30 1023	830	EA	21			8		1055				1	FT/FT^3/ea		1	EA	830
		Steel Tank	02 65 10.30 1023	830	EA	5.5	10.5	10.5			606				1	FT/FT^3/ea		1	EA	830
	Structure's Vol. Demolished																0.1	6	CY	
	Truck's Capacity										12					CY		1	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.3	DAY	
	Transportation Cost Steel Truck Drive																	2.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			2420
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						35					CY		35	CY	481
	Concrete's Vol. Demolished																1.3	46	CY	
	Loading Cost	Front end loader track 3 CY	31 23 16 42 1601	1.33	/CY													46	CY	61
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													46	CY	163
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													46	CY	511
	Subtotal																			1216
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**3636**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Chlorinator Bld																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	5.8	2.4	6.6										92	CF	34
	Subtract 30% No Interior Walls		02 41 16 13 0750												10					
	Cap Magazine																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	4	5.75	4.8										110	CF	40
	Subtract 30% No Interior Walls		02 41 16 13 0750												12					
	Structure's Vol. Demolished																0.1	92.41	CY	
	Truck's Capacity										12					CY		1	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.3	DAY	
	Transportation Cost Steel Truck Drive																	2.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			834
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**812**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Diesel Tank - 16,900 Gal																			
	Structure's Demolition Cost	Petro tank 9000-12000 excavate load	02 65 10.30 0130	1825	EA	20			12		2261				1	FT/ FT^3		1	EA	1825
	Structure's Vol. Demolished																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Transportation Cost Truck/Driver	Haul tank to certified dump, 100 miles rd	02 65 10.30 1029	1150	EA													1	EA	1150
	Subtotal																			2975
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition	Foundations <15"	Nielson '14	13.75	CY	84	6	0.5								FT		9	CY	124
	Concrete's Vol. Demolished														9	CY	1.3	12	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													12	CY	16
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													12	CY	42
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													12	CY	133
	Subtotal																			315
	Concrete Demolition	Foundations <15"	Nielson '14	13.75	CY	20	26	0.5								FT		10	CY	138
	Concrete's Vol. Demolished														10	CY	1.3	13	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													13	CY	17
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													13	CY	46
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													13	CY	144
	Subtotal																			345
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**4645**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Drainage Culverts																			
	42" Mud Spring Canyon CMP removal																			
	42" Culvert Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	445	3.5	7								FT		404	CY	727
	42" Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	445	3.5	7								FT	1.3	525	CY	1307
	72" East Spring Canyon CMP																			
	72" Culvert Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	1554	6	12								FT		4144	CY	7459
	72" Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	1554	6	12								FT	1.3	5387	CY	13414
	48" East Spring Canyon CMP																			
	48" Culvert Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	505	4	8								FT		599	CY	1078
	48" Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	505	4	8								FT	1.3	778	CY	1937
	24" East Spring Canyon CMP																			
	24" Culvert Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	250	2	4								FT		74	CY	133
	24" Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	250	2	4								FT	1.3	96	CY	239
	66" East Spring Canyon Contech Pipe																			
	66" Culvert Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	340	5.5	4								FT		277	CY	499
	66" Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	340	5.5	4								FT	1.3	360	CY	896
	18" CMP Sediment Pond Diversion																			
	18" Culver Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	1300	2	4								FT		385	CY	693
	18" Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	1300	2	4								FT	1.3	501	CY	1247
	6" ADS Sediment Pond Diversion																			
	6" Culvert Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	230	2	4								FT		68	CY	122
	6" Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	230	2	4								FT	1.3	89	CY	222
	Backfill ROM 84" Escapeway CMP	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY						108					CY	1.3	140	CY	349
	Backfill Concrete Reclaim Tunnel	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY						600					CY	1.3	780	CY	1942
	Subtotal																			32264
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						58.9					CY		59	SF	811
	Concrete's Vol. Demolished																1.3	77	CY	
	Loading Cost	Front End Loader 3CY	31 23 16 42 1601	1.33	BCY													77	CY	102
	Transportation Cost	12 CY (16Ton) Dump Truck 1/2 mi. md. Trip	31 23 23 20 1014	3.54	LCY													77	CY	273
	Disposal Costs	On Site disposal	02 41 16 17 4200	11.1	LCY													77	CY	855
	Subtotal																			2041
	Upper Yard Paving & Drainage -belt sump																			
	Culvert Excavation	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	78	2	4										23	CY	41
	Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	78	2	4									1.3	30	CY	75
	Culvert Excavation	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.80	BCY	30	3	4										13	CY	23

	Culvert Backfill	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	2.49	LCY	30	3	4									1.3	17	CY	42
	Removal of CMP	CMP aluminum 6"-10"	02 41 13.40 0100	1.98	LF	3237												3237	LF	6409
	Disposal Costs																			
	Subtotal																			6590
	Total																			40895

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Electrical Bld																			
	Structure's Demolition Cost	Masonry Building	02 41 16 13 0080	0.39	/CF						1700					CF		1700	CF	663
	Subtract 30% No Interior Walls		02 41 16 13 0750												200					
	Structure's Vol. Demolished																	63	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	On site disposal	02 41 16 17 4200	11.1	/CY													63	CY	699
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			1362
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						4					CY		4	CY	55
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													5	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													5	CY	18
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													5	CY	56
	Subtotal																			136
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			1498

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Fan																			
	Structure's Demolition Cost	Fan Removal (3)	23 05 05.10 3600	1250	TON										6	ton		6	ton	7500
	Structure's Vol. Demolished																			
	Truck's Capacity											2				tons		6		
	Haulage																	3	trip	
	Transportation Cost Steel Truck	Nelson Con. 10 wheel dump truck 12 CY	Truck/driver	760	day													2	day	1520
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			9020
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						33					CY		33	CY	454
	Concrete's Vol. Demolished																1.3	43	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	LCY													43	CY	57
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													43	CY	56
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	LCY													43	CY	477
	Subtotal																			1044
	Backfill Fan Portal	Backfill Trench Mininal Haul 2 1/4 CY	31 23 16 13 3080	1.77	LCY						150					CY	1.3	195	CY	345
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						115.2					CY		115	CY	1581
	Concrete's Vol. Demolished																1.3	150	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													150	CY	200
	Transportation Cost	F.E loader 80HP 50' haul clay	31 23.23.14 2000	1.3	LCY													150	CY	195
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													150	CY	1665
	Subtotal																			3641
	Total																			**13878**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Fire Water Tank 300,000 Gal																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						300000					Gal		40107	CF	10829
	Subtract 30% No Interior Walls		02 41 16 13 0750												3249					
	Structure's Vol. Demolished																0.1	149	CY	
	Truck's Capacity										12					CY		12.4	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	4.1	DAY	
	Transportation Cost Steel Truck Drive																	32.8	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															3800
	Subtotal																			14629
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						39					CY		39	CY	536
	Concrete's Vol. Demolished																1.3	51	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													51	CY	68
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													51	CY	181
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													51	CY	566
	Subtotal																			1351
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**12731**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Fuel Dock																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY	30	41.5	1								FT		46	CY	633
	Concrete's Vol. Demolished														46	CY	1.3	60	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													60	CY	80
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													60	CY	212
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													60	CY	666
	Subtotal																			1591
	Total																			**1591**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Guard House																			
	Structure's Demolition Cost	Mixed Materials Building	02 41 16 13 0100	0.39	/CF	8	14	10										1120	CF	437
	Subtract 30% No Interior Walls		02 41 16 13 0750												131					
	Structure's Vol. Demolished																0.35	15	CY	
	Truck's Capacity										12					CY		1.25	Trips	
	Haulage	Front end loader 3 CY	31 23 16 42 1300	1.33	/CY									3		Trip/Day		15	CY	20
	Transportation Cost Non Steel Truck	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													15	CY	53
	Transportation Cost Non Steel Drive																	15	CY	167
	Disposal Cost Non Steel	On site disposal	02 41 16 17 4200	11.1	/CY															
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			677
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			546

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Loadout Belt																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	259	5.5	3.5								FT		4986	CF	1795
	Subtract 30% No Interior Walls		02 41 16 13 0750												538					
	Structure's Vol. Demolished																0.1	18	CY	
	Truck's Capacity										12					CY		2	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.7	DAY	
	Transportation Cost Steel Truck Drive																	5.6	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			2555
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						68					CY		68	CY	935
	Concrete's Vol. Demolished																1.3	88	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													88	CY	117
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													88	CY	312
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													88	CY	977
	Subtotal																			2341
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**4358**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Lower Stacker Coal Storage																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	173	5.5	3.5								FT		3330	CF	1199
	Subtract 30% No Interior Walls		02 41 16 13 0750												360					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						2462					CF		2462	CF	886
	Subtract 30% No Interior Walls		02 41 16 13 0750												266					
	Structure's Vol. Demolished																0.1	21	CY	
	Truck's Capacity										12					CY		2	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.7	DAY	
	Transportation Cost Steel Truck Drive																	5.6	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			2845
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						8					CY		8	CY	110
	Concrete's Vol. Demolished																1.3	10	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													10	CY	13
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													10	CY	35
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													10	CY	111
	Subtotal																			269
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						30					CY		30	CY	413
	Concrete's Vol. Demolished																1.3	39	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													39	CY	52
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													39	CY	138
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													39	CY	433
	Subtotal																			1036
	Total																			**3524**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Lump Coal Belt																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	80	4	3								FT		960	CF	346
	Subtract 30% No Interior Walls		02 41 16 13 0750												104					
	Structure's Vol. Demolished																0.1	4	CY	
	Truck's Capacity										12					CY		0.333	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.1	DAY	
	Transportation Cost Steel Truck Drive																	0.8	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			1106
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						17.07					CY		17	CY	234
	Concrete's Vol. Demolished																1.3	22	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													22	CY	29
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													22	CY	78
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													22	CY	244
	Subtotal																			585
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**1587**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Lump Coal Storage																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						75					CY		75	CY	1031
	Concrete's Vol. Demolished																1.3	98	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													98	CY	130
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													98	CY	347
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													98	CY	1088
	Subtotal																			2596
	Total																			**2596**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Mine 1 Pad																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						160					FT		160	CF	58
	Subtract 30% No Interior Walls		02 41 16 13 0750												17					
	Structure's Vol. Demolished																0.1	0.59	CY	
	Truck's Capacity										12					CY		1	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.3	DAY	0
	Transportation Cost Steel Truck Drive																	2.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			818
	Structure's Demolition Cost																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						131.5					CY		132	CY	1815
	Concrete's Vol. Demolished																1.3	171	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													171	CY	227
	Transportation Cost	F.E loader 80HP 50' haul	31 23 23 20 1014	3.54	LCY													171	CY	605
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													171	CY	1898
	Subtotal																			4545
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**5346**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	No 1 Belt																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	200	4	15								FT		12000	CF	4320
	Subtract 30% No Interior Walls		02 41 16 13 0750												1296					
	Structure's Vol. Demolished																0.1	44	CY	
	Truck's Capacity										12					CY		4	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck	Truck dump 16 ton payload																1.3	DAY	
	Transportation Cost Steel Truck Drive	Truck Driver, Heavy																10.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															1520
	Subtotal																			5840
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			4544

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Office Building																			
	Structure's Demolition Cost	Mixed Material Building	02 41 16 13 0100	0.39	/CF						236842					CF		236842	CF	92368
	Structure's Vol. Demolished																0.35	3070	CY	
	Truck's Capacity										12					CY		64	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	21.3	DAY	
	Transportation Cost Steel Truck Drive																	170.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															16720
	Subtotal																			109088
	Equipment 's Disposal Cost																			
	Dismantling Cost	Manhole Demo	02 41 13.42 0200	22	SF Face	4.43	3.77	4	2						32.8	SF Face		33	SF Face	726
	Equipment 's Vol. Demolished																1.3	2	CY	
	Loading Costs	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													2	CY	3
	Transport Costs	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													2	CY	7
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													2	CY	22
	Subtotal																			758
	Asphalt Demo																			
	Demolition Cost	Asphalt 6 inches thick	02 41 13 17 5050	9.6	/SY						292					CY		584	SY	5606
	Ashpalt's Vol. Demolished																1.3	380	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													380	CY	505
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													380	CY	1345
	Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													380	CY	4199
	Subtotal																			11655
	Concrete Demolition																			
	Demolition Cost	4' gutter bituminous	02 41 13.17 6300	3.73	/LF	207										LF		207	LF	772
	Concrete's Vol. Demolished																1.3	13	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													13	CY	17
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													13	CY	46
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													13	CY	144
	Subtotal																			979
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						21.3					CY		21	CY	289
	Concrete's Vol. Demolished																1.3	28	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													28	CY	37
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													28	CY	99
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													28	CY	311
	Subtotal																			736
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						292					CY		292	CY	4015
	Concrete's Vol. Demolished																1.3	380	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													380	CY	505
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													380	CY	1345
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													380	CY	4218

	Subtotal																			10083
	Untreated Base Course																			
	Demolition Cost	8 inches untreated base course								6617						CF		245	CY	
	Base Course's Vol. Demolished																	245	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													245	CY	326
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trip	31 23 23 20 1014	3.54	/CY													245	CY	867
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													245	CY	2720
	Subtotal																			3913
	Total																			137212

Description	Materials	Means Number	Unit	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell	Quantity	Unit	Cost 2019
Pavement Removal																			
Loading Dock																			
Concrete Demolition																			
Demolition Cost	Demo foundation 6" thick Rods	02 41 16.17 0440	0.99	SF						15					CY		810	SF	802
Concrete's Vol. Demolished																	15	CY	
Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY												1.3	19.5	CY	26
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													19.5	CY	69
Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													19.5	CY	215
Subtotal																			1112
Pavement in Front of Shop																			
Asphalt Demolition									1657.658								1658	SY	11755
Demolition Cost	Pavement Removal 4-6"	02 41 13 17 5050	7.09	SY						184					CY		184	CY	
Concrete's Vol. Demolished																1.3	239	CY	
Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													239	CY	318
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													239	CY	846
Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													239	CY	2641
Subtotal																			15560
Pavement in Front of Shop																			
Concrete Demolition									1279.279								1279	SY	9068
Demolition Cost	Pavement Removal 4-6"	02 41 13 17 5050	7.09	SY						142					CY		142	CY	
Concrete's Vol. Demolished																1.3	185	CY	
Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													185	CY	246
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													185	CY	655
Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													185	CY	2044
Subtotal																			12013
Pavement In Front of Office																			
Asphalt Demolition									4207.207								4207	SY	29828
Demolition Cost	Pavement Removal 4-6"	02 41 13 17 5050	7.09	SY						467					CY		467	CY	
Concrete's Vol. Demolished																1.3	607	CY	
Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													607	CY	807
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													607	CY	2149
Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													607	CY	6707
Subtotal																			39491
Roadway Paving																			
Asphalt Demolition									5477.477								5477	SY	38832
Demolition Cost	Pavement Removal 4-6"	02 41 13 17 5050	7.09	SY						608					CY		608	CY	
Concrete's Vol. Demolished																1.3	790	CY	
Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													790	CY	1051
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													790	CY	2797
Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													790	CY	8730
Subtotal																			51410
Fuel Dock Paving																			
Concrete Demolition									288.2883								288	SY	2042
Demolition Cost	Pavement Removal 4-6"	02 41 13 17 5050	7.09	SY						32					CY		32	CY	
Concrete's Vol. Demolished																1.3	42	CY	
Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													42	CY	56
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													42	CY	149
Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													42	CY	464
Subtotal																			2711

	Upper Yard Paving																			
	Asphalt Demolition									6000								6000	SY	42540
	Demolition Cost	Pavement Removal 4-6"	02 41 13 17 5050	7.09	SY						666					CY		666	CY	
	Concrete's Vol. Demolished																1.3	866	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													866	CY	1152
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trip	31 23 23 20 1014	3.54	/CY													866	CY	3066
	Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													866	CY	9569
	Subtotal																			56327
	Upp Yard Gutter																			
	Concrete Demolition									909.9099								910	SY	6452
	Demolition Cost	Pavement Removal 4-6"	02 41 13 17 5050	7.09	SY						101					CY		101	CY	
	Concrete's Vol. Demolished	upper yard gutter	02 41 13.17 6000	5.45	LF	413												413	LF	2251
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY												1.3	131	CY	174
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trip	31 23 23 20 1014	3.54	/CY													131	CY	464
	Disposal Costs	Off site disposal	31 23 23 20 1100	11.05	/CY													131	CY	1448
	Subtotal																			10789
	Total																			189413

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Powder Magazine																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	4	5.75	4.8										110	CF	40
	Subtract 30% No Interior Walls		02 41 16 13 0750												12					
	Structure's Demolition Cost	Steel Building (vault)	02 41 16 13 0020	0.36	/CF	8	8	8												
	Subtract 30% No Interior Walls		02 41 16 13 0750												55			512	CF	184
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Transportation Cost Truck/Driver																			
	Subtotal																			224
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			157

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Pump House																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						3001					CF		3001	CF	1080
	Subtract 30% No Interior Walls		02 41 16 13 0750												324					
	Structure's Vol. Demolished																0.1	11	CY	
	Truck's Capacity										12					CY		1	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.3	DAY	
	Transportation Cost Steel Truck Drive																	2.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			1840
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						11					CY		11	CY	151
	Concrete's Vol. Demolished																1.3	14	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													14	CY	19
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													14	CY	50
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													14	CY	155
	Subtotal																			375
	Total																			**1891**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Riprap Filter Fabric																			
	Reach 1																			
	Riprap Area	Machine placed rip-rap slope protection	31 37 13 10 0100	58.85	LCY						3248					CY	1.3	4222	CY	248465
	Filter Fabric Area	Fabric, in trench, poly, ideal cond.	31 25 14.16 0070	0.81	/SY					1949						SY		1949	SY	1579
	Subtotal																			250044
	Upper Intercept Ditch																			
	Riprap Area	Machine placed rip-rap slope protection	31 37 13 10 0100	58.85	LCY						93					CY	1.3	121	CY	7121
	Filter Fabric Area	Fabric, in trench, poly, ideal cond.	31 25 14.16 0070	0.81	/SY					186						SY		186	SY	151
	Subtotal																			7272
	Lower Intercept Ditch																			
	Riprap Area	Machine placed rip-rap slope protection	31 37 13 10 0100	58.85	LCY						79					CY	1.3	103	CY	6062
	Filter Fabric Area	Fabric, in trench, poly, ideal cond.	31 25 14.16 0070	0.81	/SY					158						SY		158	SY	128
	Subtotal																			6190
	East Collector Channel																			
	Reaches B-1, B-2, B-4, B-5																			
	Riprap Area	Machine placed rip-rap slope protection	31 37 13 10 0100	58.85	LCY						766					CY	1.3	996	CY	58615
	Filter Fabric Area	Fabric, in trench, poly, ideal cond.	31 25 14.16 0070	0.81	/SY					1531						SY		1531	SY	1240
	Reach B-3																			
	Riprap Area	Machine placed rip-rap slope protection	31 37 13 10 0100	58.85	LCY						51					CY	1.3	66	CY	3884
	Filter Fabric Area	Fabric, in trench, poly, ideal cond.	31 25 14.16 0070	0.81	/SY					102						SY		102	SY	83
	Subtotal																			63822
	West Collector Channel																			
	Reaches A-1, A-2																			
	Riprap Area	Machine placed rip-rap slope protection	31 37 13 10 0100	58.85	LCY						766					CY	1.3	996	CY	58615
	Filter Fabric Area	Fabric, in trench, poly, ideal cond.	31 25 14.16 0070	0.81	/SY					1531						SY		1531	SY	1240
	Reach A-3, A-4, A-5																			
	Riprap Area	Machine placed rip-rap slope protection	31 37 13 10 0100	58.85	LCY						51					CY	1.3	66	CY	3884
	Filter Fabric Area	Fabric, in trench, poly, ideal cond.	31 25 14.16 0070	0.81	/SY					102						SY		102	SY	83
	Subtotal																			63822
	Total																			**391150**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Rock Dust Bin																			
	Structure's Demolition Cost	Masonry Building	02 41 16 13 0080	0.39	/CF						9982					CF		9982	CF	3893
	Subtract 30% No Interior Walls		02 41 16 13 0750												1168					
	Structure's Vol. Demolished																0.35	129	CY	
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	On site disposal	02 41 16 17 4200	11.1	/CY													129	CY	1432
	Disposal Cost Steel																			
	Subtotal																			5325
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						24							24	CY	330
	Concrete's Vol. Demolished																1.3	31	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													31	CY	41
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													31	CY	110
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													31	CY	344
	Subtotal																			825
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			4982

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	ROM Coal Storage																			
	Structure's Demolition Cost	Masonry Building	02 41 16 13 0080	0.39	/CF						1870					CF		1870	CF	729
	Subtract 30% No Interior Walls		02 41 16 13 0750												219					
	Structure's Vol. Demolished																0.35	24	CY	
	Disposal Cost Non Steel	On site disposal	02 41 16 17 4200	11.1	/CY													24	CY	266
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			995
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						22					CY		22	CY	303
	Concrete's Vol. Demolished																1.3	29	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													29	CY	39
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													29	CY	103
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													29	CY	322
	Subtotal																			767
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**1543**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	ROM MCC Building																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	280	5.5	3.5								FT		5390	CF	1940
	Subtract 30% No Interior Walls		02 41 16 13 0750												582					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	345	5.5	3.5								FT		6641	CF	2391
	Subtract 30% No Interior Walls		02 41 16 13 0750												717					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						7238					CF		7238	CF	2606
	Subtract 30% No Interior Walls		02 41 16 13 0750												782					
	Structure's Vol. Demolished																0.1	71	CY	
	Truck's Capacity										12					CY		6	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	2	DAY	
	Transportation Cost Steel Truck Drive																	16	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															1520
	Subtotal																			8457
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						11					CY		11	CY	151
	Concrete's Vol. Demolished																1.3	14	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													14	CY	19
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													14	CY	50
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													14	CY	155
	Subtotal																			375
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						24					CY		24	CY	330
	Concrete's Vol. Demolished																1.3	31	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													31	CY	41
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													31	CY	110
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													31	CY	344
	Subtotal																			825
	Excavation**																			
	Excavate Binwall																			
	Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.8	/CY						249					CY		249	CY	448
	Loader	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													249	CY	331
	Subtotal																			779
	Excavation**																			
	Excavate Binwall																			
	Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.8	/CY						5513					CY		5513	CY	9923
	Loader	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													5513	CY	7332
	Subtotal																			17255
	Total																			25610

** Excavated Material will be placed as fill during reclamation

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Sampler Building																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						1675					CF		1675	CF	603
	Subtract 30% No Interior Walls		02 41 16 13 0750												181					
	Structure's Vol. Demolished																0.1	6	CY	
	Truck's Capacity										12					CY		0	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0	DAY	
	Transportation Cost Steel Truck Drive																	0	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															
	Subtotal																			603
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						14.25					CY		14	CY	193
	Concrete's Vol. Demolished																1.3	19	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													19	CY	25
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													19	CY	67
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													19	CY	211
	Subtotal																			496
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**918**

* Now know as transformer building

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Sand and Salt Storage																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						102					CY		102	CY	1403
	Concrete's Vol. Demolished																1.3	133	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													133	CY	177
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													133	CY	471
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													133	CY	1476
	Subtotal																			3527
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**3527**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Seal Portals																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Seal Portals																			
	Main Mine Area	Seal Portals	JennChem Bid	5014	EA.										2	EA		2	EA	10028
	Quitchupah Portals	Seal Portals	JennChem Bid	5014	EA.										2	EA		2	EA	10028
	Three East Portals	Seal Portals	JennChem Bid	5014	EA.										2	EA		2	EA	10028
	South Portals	Seal Portals	JennChem Bid	5014	EA.										1	EA		1	EA	5014
	Transport Costs	Seal Portals	JennChem Bid	5014	EA.										2	EA		2	EA	10028
	Disposal Costs	**Seal Portals**	**JennChem Bid**	5014	EA.										3	EA		3	EA	15042
	Subtotal																			60168
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**60168**

JennChem Bid per Justin Etchel, DOGM March 2020, email to Bryant Bunnell

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Sediment Trap																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						76					CY		76	CY	1045
	Concrete's Vol. Demolished																1.3	99	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													99	CY	132
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													99	CY	350
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													99	CY	1099
	Subtotal																			2626
	Total																			**2626**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Septic Tanks																			
	Item disposal	Septic Tank 1000 gal	02 41 13 44 0100	270	EA										1	EA		1	EA	270
	Item disposal	Septic Tank 2500 gal	02 41 13 44 0300	435	EA										1	EA		1	EA	435
	Item disposal	Septic Tank 10,000-20,000 Gal	02 41 13 44 0600	2850	EA										1	EA		1	EA	2850
	Tank sludge removal	Sufco 2500 gall valley tank service		450	EA										1	EA		1	EA	450
	Tank sludge removal	Sufco 10000 gall valley tank service		350	EA										1	EA		1	EA	350
	Disposal of Sludge off site	Sufco 10000 gall valley tank service		120	hr										16	hr		16	hr	1920
	Disposal of Sludge off site	Sufco 10000 gall valley tank service		120	hr										1	hr		1	hr	120
	Item Excavation	Excavate, pull , load and backfill	02 65 10.30 1233	3175	EA										3	EA		3	EA	9525
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			15650
	Equipment 's Disposal Cost	Manhole precast	02 41 13.42 0400	246	EA										3	EA		3	EA	738
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			738
	Total																			**16388**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Shelves																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	8.5	37	12							3	FT		11322	CY	4076
	Subtract 30% No Interior Walls		02 41 16 13 0750												1223					
	Structure's Vol. Demolished																0.1	42	CY	
	Truck's Capacity										12					CY		4	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	1.3	DAY	
	Transportation Cost Steel Truck Drive																	10.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															1520
	Subtotal																			5596
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY	3	3	9							12	FT		36	CY	495
	Concrete's Vol. Demolished														36	CY	1.3	47	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													47	CY	63
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													47	CY	166
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													47	CY	522
	Subtotal																			1246
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**5619**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Shop and Warehouse																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						269360					CF		269360	CF	96967
	Subtract 30% No Interior Walls		02 41 16 13 0750												29091					
	Structure's Vol. Demolished																0.1	998	CY	
	Truck's Capacity										12					CY		83.17	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	27.7	DAY	
	Transportation Cost Steel Truck Drive																	221.6	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															21280
	Subtotal																			118247
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
123	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						505							505	CY	6944
	Concrete's Vol. Demolished																1.3	657	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													657	CY	874
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													657	CY	2326
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													657	CY	7293
	Subtotal																			17437
	Total																			**106593**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Shop Garage																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	60	40	14								FT		33600	CF	12096
	Subtract 30% No Interior Walls		02 41 16 13 0750												3629					
	Structure's Vol. Demolished																0.1	124	CY	
	Truck's Capacity										12					CY		10.33	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	3.4	DAY	
	Transportation Cost Steel Truck Drive																	27.2	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															3040
	Subtotal																			15136
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						55.5					CY		56	CY	770
	Concrete's Vol. Demolished																1.3	72	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													72	CY	96
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													72	CY	255
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													72	CY	799
	Subtotal																			1920
	Total																			**13427**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Shop Office																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						8910					CF		8910	CF	3208
	Subtract 30% No Interior Walls		02 41 16 13 0750												962					
	Structure's Vol. Demolished																0.1	33	CY	
	Truck's Capacity										12					CY		2.75	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.9	DAY	
	Transportation Cost Steel Truck Drive																	7.2	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			3968
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			**3006**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Side Release Tank																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	16			8							FT		804	CF	289
	Subtract 30% No Interior Walls		02 41 16 13 0750												87					
	Structure's Demolition Cost	Tank removal	02 65 10.30 1026	960	EA										1	EA		1	EA	960
	Structure's Vol. Demolished																0.1	3	CY	
	Truck's Capacity										12					CY		0.25	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.1	DAY	
	Transportation Cost Steel Truck Drive																	0.8	HR	
	Transportation Cost Truck/Driver																			
	Subtotal																			1249
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			1162

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Steam Cleaner Building																			
	Structure's Demolition Cost	Masonry Building	02 41 16 13 0080	0.39	/CF						18848					CF		18848	CF	7351
	Subtract 30% No Interior Walls		02 41 16 13 0750												2205					
	Structure's Vol. Demolished																0.35	244	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	On site disposal	02 41 16 17 4200	11.1	/CY													244	CY	2708
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			10059
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						96					CY		96	CY	1320
	Concrete's Vol. Demolished																1.3	125	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													125	CY	166
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													125	CY	443
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													125	CY	1388
	Subtotal																			3317
	Total																			**11171**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Stoker Belt																			
	Structure's Vol. Demolished	Steel Building	02 41 16 13 0020	0.36	/CF	4.6	140	4								FT		2576	CF	927
	Subtract 30% No Interior Walls		02 41 16 13 0750												278					
	Structure's Vol. Demolished																0.1	10	CY	
	Truck's Capacity										12					CY		1	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.3	DAY	
	Transportation Cost Steel Truck Drive																	2.4	HR	
	Transportation Cost Truck/Driver	Nielson Construction - 10 whl DT - 12 CY	Truck & Driver '14	760	Day															760
	Subtotal																			1687
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						17.7					CY		18	CY	248
	Concrete's Vol. Demolished																1.3	23	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													23	CY	31
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													23	CY	81
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													23	CY	255
	Subtotal																			615
	Total																			**2024**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Stoker Bin																			
	Steel Structure																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	20	32	35										22400	CF	8064
	Subtract 30% No Interior Walls		02 41 16 13 0750												2419					
	Structure's Vol. Demolished																0.1	83	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Belt Truss																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	45	3.5	3										473	CF	170
	Subtract 30% No Interior Walls		02 41 16 13 0750												51					
	Steel's Weight																	18	CY	
	Truck's Capacity										12					CY		6.92	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	2.3	DAY	
	Transportation Cost Steel Truck Drive																	18.4	HR	
	Disposal Cost Steel	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															2280
	Subtotal																			10514
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			12964
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						42.9					CY		43	CY	591
	Concrete's Vol. Demolished																1.3	56	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													56	CY	74
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													56	CY	198
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													56	CY	622
	Subtotal																			1485
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**16011**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Stoker Coal Storage																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						110					CY		110	CY	1513
	Concrete's Vol. Demolished																1.3	143	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													143	CY	190
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													143	CY	506
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													143	CY	1587
	Subtotal																			3796
	Total																			**3796**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Stoker Oil Tank																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	23.5			8.5							FT		1333	CF	480
	Subtract 30% No Interior Walls		02 41 16 13 0750												144					
	Structure's Demolition Cost	Tank removal	02 65 10.30 1029	1150	EA													1	EA	1150
	Belt Truss																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	19			6.5							FT		630	CF	287
	Subtract 30% No Interior Walls		02 41 16 13 0750												86					
	Structure's Vol. Demolished																0.1	5	CY	
	Truck's Capacity										12					CY		0.313	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.1	DAY	0
	Transportation Cost Steel Truck Drive																	0.8	HR	0
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															760
	Subtotal																			2677
	Structure's Vol. Demolished																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						57					CY		57	CY	784
	Concrete's Vol. Demolished																1.3	74	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													74	CY	98
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													74	CY	262
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													74	CY	821
	Subtotal																			1965
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**4412**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Storage Trailers																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	8	8	40							2	FT		5120	CF	1843
	Subtract 30% No Interior Walls		02 41 16 13 0750												553					
	Structure's Vol. Demolished																0.1	19	CY	
	Structure's Vol. Demolished																			
	Truck's Capacity										12					CY		1.58	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.5	DAY	
	Transportation Cost Steel Truck Drive																	4	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															760
	Subtotal																			2603
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			2050

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Substation Lower																			
	Structure's Demolition Cost	Mechanical equipment heavy	23 05 05.10 3600	1250	TON							61				ton		61	ton	76250
	Structure's Vol. Demolished																			
	Truck's Capacity											20				ton		3	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	1	DAY	
	Transportation Cost Steel Truck Drive																	8	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															760
	Subtotal																			77010
	Demolition Cost	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.8	/CY						61					CY		61	CY	110
	Concrete's Vol. Demolished																1.3	79	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													79	CY	105
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													79	CY	280
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													79	CY	877
	Subtotal																			1372
	Excavation																			
	Excavate Binwall																			
	Excavate	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.8	/CY						11846					CY		11846	CY	21323
	Vol. To be Disposed										299					CY		299	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													299	CY	398
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													299	CY	1058
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													299	CY	3319
	Subtotal																			26098
	Concrete Demolition-Retaining Wall																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						60.5					CY		61	CY	839
	Concrete's Vol. Demolished																1.3	79	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													79	CY	105
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													79	CY	280
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													79	CY	877
	Subtotal																			2101
	Concrete Demolition-Generator Building																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						134					CY		134	CY	1843
	Concrete's Vol. Demolished																1.3	174	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													174	CY	231
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													174	CY	616
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													174	CY	1931
	Subtotal																			4621
	Total																			**111202**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Tipple Building																		
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF					105056					CF		105056	CF	37820
	Subtract 30% No Interior Walls		02 41 16 13 0750											11346					
	Structure's Vol. Demolished															0.1	389	CY	
	Truck's Capacity									12					CY		32	Trips	
	Haulage												3		Trip/Day				
	Transportation Cost Steel Truck																10.7	DAY	
	Transportation Cost Steel Truck Drive																85.6	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day														8360
	Subtotal																		46180
	Steel Disposal	Rock Chute																	
	Dismantling Cost	Remove Whole or Cut up-500-1000 lbs	05 05 05.10 0390	84	EA						147407				LB		147	EA	12382
	Dismantling Cost										67				tons		67	tons	
	Equipment 's Vol. Demolished																3.35	trips	
	Ticket Printers																		
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	1.8	3	3.3									18	CF	6
	Transport Costs													3	trips		1.1	DAY	
	Disposal Costs																8.8	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day														1520
	Subtotal																		12388
	Concrete Demolition																		
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY					93					CY		93	CY	1279
	Concrete's Vol. Demolished															1.3	121	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY												121	CY	161
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY												121	CY	428
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY												121	CY	1343
	Subtotal																		3211
	Concrete Demolition - Sump																		
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY					39.2					CY		39	CY	536
	Concrete's Vol. Demolished															1.3	51	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY												51	CY	68
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY												51	CY	181
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY												51	CY	566
	Subtotal																		1351
	Concrete Demolition		RockBunk2015																
	Demolition Cost	Precast Block removal	Sufco Invoice	92	EA					170						EA	170	EA	15640
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY	4	5	2		96.5							97	CY	
	Concrete's Vol. Demolished															1.3	125	CY	1719
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY												125	CY	166
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY												125	CY	443
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY												125	CY	1388
	Subtotal																		19356
	Total																		**71900**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Tipple MCC Buidling																			
	Structure's Demolition Cost	Masonry Building	02 41 16 13 0080	0.39	/CF						10260					CF		10260	CF	4001
	Subtract 30% No Interior Walls		02 41 16 13 0750												1200					
	Structure's Vol. Demolished																0.35	133	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	On site disposal	02 41 16 17 4200	11.1	/CY													133	CY	1476
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			5477
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY	21.3	32	0.5								FT		13	CY	179
	Concrete's Vol. Demolished														13	CY	1.3	17	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													17	CY	23
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													17	CY	60
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													17	CY	189
	Subtotal																			451
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY	106.6	5.5	0.8								FT		17	CY	234
	Concrete's Vol. Demolished														17	CY	1.3	22	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													22	CY	29
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													22	CY	78
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													22	CY	244
	Subtotal																			585
	Concrete Demolition																			
	Demolition Cost	Foundations <15"																		
	Concrete's Vol. Demolished																			
	Loading Cost	Front end loader 3 CY																		
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip																		
	Disposal Costs	On site disposal																		
	Subtotal																			
	Total																			**5313**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Tipple Office Building																			
	Structure's Demolition Cost	Masonry Building	02 41 16 13 0080	0.39	/CF						7900					CF		7900	CF	3081
	Subtract 30% No Interior Walls		02 41 16 13 0750												924					
	Structure's Vol. Demolished																0.35	102	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	On site disposal	02 41 16 17 4200	11.1	/CY													102	CY	1132
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			4213
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	**Foundations <15"**	Nielson '14	13.75	CY						36					CY		36	CY	495
	Concrete's Vol. Demolished																1.3	47	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													47	CY	63
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													47	CY	166
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													47	CY	522
	Subtotal																			1246
	Concrete **Demolition**																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**4535**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Trash Pit																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						26.5					CY		27	CY	371
	Concrete's Vol. Demolished																1.3	34	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													34	CY	45
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trip	31 23 23 20 1014	3.54	/CY													34	CY	120
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													34	CY	377
	Subtotal																			913
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**913**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Transfer Building																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						15641					CF		15641	CF	5631
	Subtract 30% No Interior Walls		02 41 16 13 0750												1689					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	81	10	20								FT		16200	CF	5832
	Subtract 30% No Interior Walls		02 41 16 13 0750												1750					
	Yard Hoist																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						225					FT		225	CF	81
	Subtract 30% No Interior Walls		02 41 16 13 0750												24					
	Structure's Vol. Demolished																0.1	119	CY	
	Truck's Capacity										12					CY		10	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	3.3	DAY	
	Transportation Cost Steel Truck Drive																	26.4	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															3040
	Subtotal																			14584
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						4					CY		4	CY	55
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													5	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													5	CY	18
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													5	CY	56
	Subtotal																			136
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						26					CY		26	CY	358
	Concrete's Vol. Demolished																1.3	34	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													34	CY	45
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													34	CY	120
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													34	CY	377
	Disposal Costs																			
	Subtotal																			900
	Total																			**12157**

Now know as transformer building

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Truck Loader Bin																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	13.8	22	18.5								FT		5617	CF	2022
	Subtract 30% No Interior Walls		02 41 16 13 0750												607					
	Structure's Vol. Demolished																0.1	21	CY	
	Truck's Capacity										12					CY		2	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.7	DAY	0
	Transportation Cost Steel Truck Drive																	5.6	HR	0
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															760
	Subtotal																			2782
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			2175

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Truck Scale																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						90200					CF		90200	CF	32472
	Subtract 30% No Interior Walls		02 41 16 13 0750												9742					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						3200					CF		3200	CF	1152
	Subtract 30% No Interior Walls		02 41 16 13 0750												346					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						38850					CF		38850	CF	13986
	Subtract 30% No Interior Walls		02 41 16 13 0750												4196					
	Structure's Vol. Demolished																0.1	490	CY	
	Truck's Capacity										12					CY		41	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	13.7	DAY	
	Transportation Cost Steel Truck Drive																	109.6	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															10640
	Subtotal																			58250
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						52					CY		52	CY	715
	Concrete's Vol. Demolished																1.3	68	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													68	CY	90
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													68	CY	241
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													68	CY	755
	Subtotal																			1801
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						27					CY		27	CY	371
	Concrete's Vol. Demolished																1.3	35	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													35	CY	47
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													35	CY	124
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													35	CY	389
	Subtotal																			931
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						18					CY		18	CY	248
	Concrete's Vol. Demolished																1.3	23	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													23	CY	31
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													23	CY	81
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													23	CY	255
	Subtotal																			615
	Total																			**47313**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Water Tank Lower																			
	Structure's Demolition Cost	Tank	02 65 10.30 1029	1150	EA										1	EA		1	EA	1150
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																	1	trip	
	Transportation Cost Steel Truck Drive																			
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															760
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			**1150**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Water Tank Upper																			
	Structure's Demolition Cost	Tank	02 65 10.30 1029	1150	EA										1	EA		1	EA	1150
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																	1	trip	
	Transportation Cost Steel Truck Drive																			
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															760
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			**1150**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	West Lease Tunnels & Belt																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	183	14	12								FT		30744	CF	11068
	Subtract 30% No Interior Walls		02 41 16 13 0750												3320					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	139	8.3	9								FT		10383	CF	3738
	Subtract 30% No Interior Walls		02 41 16 13 0750												1121					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	352	8.3	3.5								FT		10226	CF	3681
	Subtract 30% No Interior Walls		02 41 16 13 0750												1104					
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF	30	24.5	4								FT		2940	CF	1058
	Subtract 30% No Interior Walls		02 41 16 13 0750												318					
	Structure's Vol. Demolished	Total steel vol for all buildings															0.1	201.09	CY	
	Truck's Capacity										12					CY		17	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	5.7	DAY	
	Transportation Cost Steel Truck Drive																	45.6	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															4560
	Subtotal																			19545
	Asphalt Removal - Phase 2 Yard																			
	Asphalt 6-8 " Dismantling Cost	Pavement Removal 4-6"	02 41 13 17 5050	9.6	SY					1662.22						SY		1662	SY	15955
	Equipment 's Vol. Demolished																1.3	480	CY	
	Loading Costs	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													480	CY	638
	Transport Costs	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													480	CY	1699
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													480	CY	5328
	Subtotal																			23620
	Tunnels																			
	Equipment 's Disposal Cost																			
	Dismantling Cost	Foundations <15"	Nielson '14	13.75	CY						239					CY		239	CY	3286
	Equipment 's Vol. Demolished																1.3	311	CY	
	Loading Costs	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													311	CY	414
	Transport Costs	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													311	CY	1101
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													311	CY	3452
	Subtotal																			8253
	Belt																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						20					CY		20	CY	275
	Concrete's Vol. Demolished																1.3	26	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													26	CY	35
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													26	CY	92
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													26	CY	289
	Subtotal																			691
	Belt #1 Sump																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						7.06					CY		26	CY	358
	Concrete's Vol. Demolished										19.34						1.3	19	CY	0
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													34	CY	45
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													34	CY	120
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													34	CY	377

	Subtotal																			900
	Junction Boxes																			
	Concrete Demolition																			
	Demolition Cost	junciation box precast	02 41 13.42 0400	246	EA						14				7	EA		7	SF	1722
	Concrete's Vol. Demolished																1.3	18	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													18	CY	24
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													18	CY	64
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													18	CY	200
	Subtotal																			2010
	CMP Pipe Removal																			
	Pipe Removal																			
	Demolition Cost	CMP Aluminum 6-10" pipe	02 41 13.40 0020	1.98	LF	246.6										LF		247	LF	489
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													5	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 20 1014	3.54	/CY													5	CY	18
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													5	CY	56
	Subtotal																			570
	Total																			**52006**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Link Canyon Substation																			
	Substation																			
	Structure's Demolition Cost	Mechanical equipment heavy	23 05 05.10 3600	1250	TON							30				TON		30	TON	37500
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity											20				TON		20	TON	
	Haulage																	1.5	Trips	
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day													1	day	760
	Subtotal																			38260
	Power Poles	See Link Canyon Portals																		
	Silt Fence	Fence	31 25 14.16 1000	1.93	LF	330									330	LF		330	LF	637
	Wire	3' wide	32 31 26.20 0700	0.53	CSF	300									3	CSF		3	CSF	2
	Subtotal																			639
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**38899**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Link Canyon Portals																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Seal Portals																			
	Seal Portal	Portals	Jennchem bid	5014	EA.													1	EA	5014
	Subtotal																			
	Silt Fence	Fence	31 25 14.16 1000	1.93	LF	330									330	LF		330	LF	637
	Wire	3' wide	32 31 26.20 0700	0.53	CSF	330									3	CSF		3	CSF	2
	Subtotal																			639
	Power Lines																			
	Power Lines	Dugout Powerline	Dugout 1	0.23	/FT	455										FT		455	FT	
	Power Poles	Dugout Power Poles	02 41 13.80 0100	320	/EA										7	EA		7	EA	2240
	Subtotal																			2240
	Total																			**5386**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Fan Generator Building																			
	Structure's Demolition Cost	Steel Building	02 41 16 13 0020	0.36	/CF						6395					CF		6395	CF	2302
	Subtract 30% No Interior Walls		02 41 16 13 0750												691					
	Structure's Vol. Demolished																0.1	24	CY	
	Truck's Capacity										12					CY		2	Trips	
	Haulage													3		Trip/Day				
	Transportation Cost Steel Truck																	0.7	DAY	
	Transportation Cost Steel Truck Drive																	5.6	HR	
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day															760
	Subtotal																			3062
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			2371

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Four East Fan																			
	Structure's Demolition Cost	Fan Removal	23 05 05.10 3600	1250	TON										2	TONS		2	TONS	2500
	Seal Portals		Jennchem bid	5014	EA										2	EA		2	EA	10028
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Transportation Cost Steel Truck & Driver	Nielson Construction, 12 CY dump truck	Truck and driver	760	day													1	day	760
	Subtotal																			13288
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						36					CY		36	CY	495
	Concrete's Vol. Demolished																1.3	47	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													47	CY	63
	Transportation Cost	F.E loader 80HP 50' haul	31 23 23 20 1014	3.54	LCY													47	CY	166
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													47	CY	522
	Subtotal																			1246
	Concrete Demolition																			
	Demolition Cost	Backfill Trench Min haul 2 1/4 CY	31 23 16.13 3080	2.49	CY						150					CY		150	CY	374
	Concrete's Vol. Demolished																1.3	195	CY	
	Loading Cost																	195	CY	0
	Transportation Cost																	195	CY	0
	Disposal Costs																	195	CY	0
	Subtotal																			374
	Concrete Demolition	Foundations <15"	Nielson '14	13.75	CY						115					CY		115	CY	1581
	Demolition Cost																1.3	150	CY	
	Concrete's Vol. Demolished	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													150	CY	200
	Loading Cost	F.E loader 80HP 50' haul	31 23 23 20 1014	3.54	LCY													150	CY	531
	Transportation Cost	On site disposal	02 41 16 17 4200	11.1	/CY													150	CY	1665
	Disposal Costs																			4351
	Subtotal																			
	Total																			**19072**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost 2019
	Northwater Mitigation																			
	Structure's Demolition Cost	Pipe Removal	02 41 13.38 1600	2.81	LF	10269			0.15							FT		10269	LF	28856
	Structure's Vol. Demolished																0.1	38.03	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck	F.E loader 80HP 50' haul	31 23.23.14 2000	1.3	LCY													38.03	CY	49
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			28905
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Foundations <15"	Nielson '14	13.75	CY						5					CY		270	SF	3713
	Concrete's Vol. Demolished																1.3	7	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1601	1.33	/CY													7	CY	9
	Transportation Cost	F.E loader 80HP 50' haul	31 23 23 20 1014	3.54	LCY													7	CY	25
	Disposal Costs	On site disposal	02 41 16 17 4200	11.1	/CY													7	CY	78
	Subtotal																			3825
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**32730**

WASTE ROCK DISPOSAL SITE

Topsoil and Subsoil Storage Piles at Waste Rock Disposal Site (Pre-Expansion - Historic)

TOPSOIL				
Description	Volume (cy)[a]	Area (acres)	Distribution Location	Location Post Expansion
1A	8.2	1.19*	Mine Site	~~##~~
1B	456.9	0*	Waste Rock	#
Topsoil Storage Combined Pile (2, 3 & Lift 5 Exp.)***	4,114	0.24	Waste Rock	#
Sediment Pond	634.9	0.293	Waste Rock	#
Lift # 4 Area**	1847	0.34	Waste Rock	#
TOTAL	7061	NA	NA	
SUBSOIL				
Subsoil	11,260	0*	Mine Site	##
Soil Nail Wall	487	0*	Mine Site	##

(a) Estimated Quantity

* The acreages for Piles 1A,1B and Subsoil are combined

** Topsoil stored in piles on top of Lift #4, estimated depth of stored topsoil - 3.5 feet

***Topsoil excavated for the Lift 5 Expansion was combined into a single pile with piles 2 and 3, Figure 2A shows dimensions and cross sections of this pile.

Used to reclaim Lift 5 or moved to large soil pile north of new sediment pond during the construction of Phase I.

~~Remain where located prior to WRDS expansion (2015-2016)~~ Stored in the WRDS soil storage piles north of southern sediment pond. When the waste rock site is expanded/filled in the future (post 2019) or reclaimed, this quantity of soils will be allocated and kept for use in the reclamation of the Sufco Mine site.

~~The 8.2 cubic yards of topsoil and the 11747 cubic yards of subsoil or the Sufco mine site is being stored at the Sufco waste rock site (WRS) (See Table on page 2-4). During the phase 1 and 2 expansion construction project at the waste rock site in 2015 this soil was added to the storage lies just north of the southern sediment ponds. During further expansion of the waste rock site and in the event that the WRS is filled and reclaimed this soil will be accounted for and kept for the reclamation of the Sufco mine site.~~

WRDS EXPANSION (2015-2016) TOPSOIL/SUBSOIL SALVAGE (Estimated*)

	Soil Type (Figure 5)	Topsoil Volume (CY)	Subsoil Volume (CY)	Year Salvaged and Stockpiled (Estimated)**
PHASE 1	1	3400	6460	2015 - 2017
	2	17100	2740	
	4	500	0	
	Rehandled***	3500	0	
PHASE 2	1	6600	15300	2015 - 2017
	3	3400	1600	
	5	2500	1300	
PHASE 3	1	2838	5392	2018 - 2020
	2	5818	5486	
	3	7299	3369	
	Rehandled***	2398	0	

LEGEND

- EXISTING GROUND MAJOR CONTOUR (10 FOOT)
- EXISTING GROUND MINOR CONTOUR (2 FOOT)
- EXISTING ROAD
- EXISTING PAVED ROAD
- EXISTING RIPRAP
- EXISTING DITCH
- PROPOSED ROAD
- PROPOSED ANCILLARY ROAD
- EXISTING CULVERT
- PROPOSED CULVERT
- EXISTING SIGN
- PROPOSED DRAINAGE BERM
- PROPOSED DITCH
- DISTURBED AREA BOUNDARY
- PROPERTY BOUNDARY
- TOPSOIL / SUBSOIL STORAGE BOUNDARY
- EXISTING TREELINE

NOTE:
TOPOGRAPHIC DATA BASED ON 2016 AERIAL SURVEY

REVISIONS

NO.	DATE	REQ. BY	DWG. BY	REMARKS
1	8/6/2014	VW	JA	PLATE UPDATES
2	9/4/2014	VW	JA	PLATE UPDATES
3	6/9/2015	VW	JA	PLATE UPDATES
4	6/18/2015a	VW	JA	PLATE UPDATES
5	10/18/2015	VW	JA	PLATE UPDATES
6	12/05/2017	BB	JA	DISTURBED AREA BOUNDARY UPDATE
7	1/08/2020	BB	BB	MRP - Midterm

PEN TBL: _1Stncrd-HPI1100.ctb
SHT SET: 1406-120
PROJECT NUMBER: 1406-120

Canyon Fuel Company, LLC
SUFCO Mine
567 South SR 24 Salina, UT 84654
(435) 286-4850 Phone
(435) 286-4499 Fax

WASTE ROCK PILE
OPERATIONAL PHASES OF PILE CONSTRUCTION

SCALE:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.
1" = 100'	1/08/2020	BB	BB		MAP 4D

FILE NAME: