

Delaware and qualified to do business in Utah. Andalex Resources has a permit to operate it's coal loading and storage facility known as Wildcat Loadout, in accordance with the appropriate regulations. This coal loadout facility is located on land owned by the United States of America in Carbon County, Utah.

Andalex was granted the right-of-way in January, 1982, by the Bureau of Land Management of the United States Department of the Interior. Andalex Resources, the designated operator, along with AMCA Coal Leasing, Inc., its' land acquisition and development branch, control all lands within the proposed coal loadout facility area. Andalex Resources, Inc., has therefore prepared this coal loadout facility permit application rewritten under the R645 Coal Mining Rules format, for submission to the appropriate regulatory authorities for review and approval.

B. Overview and Summary of Project

Coal storage and loading activities at Wildcat started officially on April 2, 1985, when the first coal was brought there for storage and eventual loadout, under a permit issued to Andalex Resources by the Bureau of Land Management, U.S. Department of the Interior. This coal loadout facility is located approximately three miles west of U.S. Highway 6, Consumer's Road, Helper, Utah, in Carbon County and can be more accurately described as parts of Section 33, Township 13 South, Range 9 East, S.L.B. & M. (please see Figure 1). The property contains approximately 100.19 acres, of which 12.5 acres are under lease to the Utah Railway by the Bureau of Land Management. The serial number for this right-of-way is U-48027.

There are no perennial streams or bodies of water on the property. Water for culinary purposes is supplied by Price Municipal Corporation and hauled down to the facility using approved culinary tank trucks. The water is in turn stored in an approved culinary tank at the loadout.

Historically, coal loading activities had been the sole use for this permit area, even prior to being leased to Andalex Resources. This is evidenced by the fact that the soil survey of the area revealed that of the eight test holes, two completely lacked topsoil and one located

available phosphorous, available water capacity, and percent rock fragments. The results can be found in Appendix N. Once any of the areas of substitute material have been determined suitable for reclamation, all or part of these areas will be carefully outlined on Plate 1 and the volumes necessary to make up the current topsoil deficit, will be included in the Topsoil Pile Summary. This will require approximately 31,954 additional cubic yards of material.

Prior to final reclamation, samples will be taken of the stored topsoil to determine any deficiencies which would affect the growth of newly revegetated areas. Any deficiencies will be corrected by adding to the soil chemical fertilizers, organic mulch, or any other substances recommended by the regulatory authority. Preparation techniques such as discing will be incorporated.

Species and Amounts of Seeds and Seedlings

A reference area has been established by Andalex and DOGM. The sagebrush/grass reference area was used in combination with a vegetation inventory to determine the final seed mixture and amounts of seed to be used for final reclamation.

The following seed mixture, was developed by Mt. Nebo Scientific in conjunction with the vegetation inventory and UDOGM comments.

Planting and Seeding Methods

All reclaimed areas will be stabilized by gouging prior to reseeding. The gouging will be done with a backhoe or trackhoe, and will consist of gouges at least 18" deep by 24" - 36" wide, spaced 6' - 10' apart. All areas will then be hydroseeded and hydromulched.

Mulching Techniques

Vegetative cover will be promptly re-established following cessation of mining activities to stabilize erosion. Re-seeding

- R645-301-322. FISH AND WILDLIFE INFORMATION**
Appendix F; R645-301-310.
- R645-301-322.100. PROTECTION AND ENHANCEMENT PLAN**
Appendix E & F
- R645-301-322.200. SITE-SPECIFIC RESOURCE INFORMATION**
Appendix F
- R645-301-322.210. THREATENED OR ENDANGERED SPECIES**
See R645-301-310.
- R645-301-322.220. HABITATS OF UNUSUALLY HIGH VALUE FOR FISH AND WILDLIFE**
See R645-301-310.
- R645-301-322.230. OTHER SPECIES OR HABITATS REQUIRING SPECIAL PROTECTION**
N/A
- R645-301-322.300. FISH AND WILDLIFE SERVICE REVIEW**
Appendix B - Item 22 (Powerline Approval)
- R645-301-323. MAPS AND AERIAL PHOTOGRAPHS**
N/A
- R645-301-323.100. REFERENCE AREAS**
See Plate 1.
- R645-301-323.200. MONITORING STATIONS**
N/A
- R645-301-323.300. ENHANCEMENT FACILITIES**
N/A

R645-301-323.400. PLANT COMMUNITIES

See R645-301-310.

R645-301-330. OPERATION PLAN

Maps and Plans

The lands affected by this operation (surface only) are clearly shown on Plate 1. Plate 1 depicts all buildings, utilities, and facilities. All of the land within this permit area which is to be affected already has been. This is a surface facility only and involves no underground workings. The bond required by the Division is for the entire affected area including all the surface facilities.

Coal storage, topsoil storage, loading areas, coal preparation waste areas are all depicted on the surface facilities map. Additional detail on topsoil, diversions, and ponds can be found in Volume II on Plates 13, 2, and 3 through 7 respectively.

There is no storage of explosives at the Wildcat Loadout.

The final surface configurations will be similar to the surface prior to Andalex's involvement at Wildcat. Cross sections and a surface configuration plate are included in Volume II as 10 and 9 respectively.

Surface water monitoring locations are shown on Plate 15.

After the completion of activities at this facility, no structures will remain with the exception of the railroad grade, the tracks, and it's associated drainage structures.

All maps requiring certifications by a registered person have been done so. Included are stamps from experts in related fields such as surveying.

R645-301-331. MINIMIZING IMPACT AND SURFACE EROSION

Protection measures are described in Appendix F. Revegetation and erosion control are described in Section R645-301-340 and R645-301-512.240, respectively

R645-301-332. IMPACTS OF SUBSIDENCE ON RENEWABLE RESOURCE LANDS

N/A

R645-301-333. USING THE BEST TECHNOLOGY CURRENTLY AVAILABLE TO MINIMIZE DISTURBANCE AND IMPACT

See R645-301-310.

R645-301-333.100. PROTECTION OF THREATENED AND ENDANGERED SPECIES

There have been no known threatened or endangered species within the permit area. See R645-301-310.

R645-301-333.200. SITE-SPECIFIC PROTECTION OF THREATENED AND ENDANGERED SPECIES

See R645-301-310.

R645-301-333.300. PROTECTIVE MEASURES DURING ACTIVE PHASES OF MINING OPERATIONS

Appendix F

R645-301-340. RECLAMATION PLAN

The complete reclamation plan is described under R645-301-240.

R645-301-341. REVEGETATION

Revegetation

Revegetation will be accomplished by Andalex or under Andalex's direct supervision and under the recommendations of the regulatory authority. A seed mixture has been developed and can be found in this chapter. This mixture was developed by estimating vegetative types in the sagebrush/grass reference area established by DOGM and Andalex. Please refer to Appendix I and Plate 1.

Schedule of Revegetation

The seeding of native flora (consisting where possible of deer browse species), will commence as soon as is practical following regrading and topsoil replacement. This revegetation will help stabilize the soil and the fill quickly. Revegetation will be accomplished by Andalex or under Andalex's direct supervision and under the recommendations of the regulatory authorities. Revegetation will occur during the first fall planting season following the regrading and topsoil redistribution. Please refer to Revegetation Schedule.

Andalex Resources' Revegetation Schedule

TASK	MONTH:											
	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
Review reveg. plan	XX	X										
Order seed			X									
Regrading				XXXX	XXXX	XXXX						
Spread topsoil							XXX					
Seedbed Prep.							XX	X				
Apply fertilizer			XX*						XX			
Seeding									XX	X		
Mulching									XX	X		
Tasks to be done in subsequent years: (years 2, 3, and 5, 9, and 10, following planting, minimum)**												

- * May need application of N the spring following seeding.
- ** Productivity will be sampled only during years 9 and 10. Also, the reference area will be sampled during the years 9 and 10.

Andalex Resources' Revegetation Monitoring Schedule

QUALITATIVE OBSERVATIONS:

<u>Reclamation type</u>	<u>YEAR</u>									
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
Permanent Reclamation	X	X	X	X	X	X	X	X	X	X
Trial Plantings	X	X	X	X	X	X	X	X	X	X
Test Plots	X	X	X	X	X	X	X	X	X	X
Interim Stabilization	X	X	X	X	X	X	X	X	X	X

QUANTITATIVE OBSERVATIONS:

<u>Parameter</u>	<u>YEAR</u>									
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
Cover		X	X		X				X	X
Frequency		X	X		X				X	X
Woody Plant Density		X	X		X				X	X
Transplant Survival	X*	X	X							
Productivity:										
Test plots			X		X				X	X
All Other Revegetation									X	X

* Sampling will take place in the fall of the year.

Soil Testing Plan and Soil Preparation

Where possible the soil will be distributed along the contour. Soil will be redistributed using dump trucks and graders. The thickness of the re-established soil will be consistent with the pre-mining conditions. As this facility was previously impacted by other loading operations, Andalex was unable to gather topsoil on these areas. This will require the use of topsoil substitute material for final reclamation. Andalex has chosen potential topsoil substitute material and is currently in the process of performing the necessary tests and monitoring to demonstrate that it is suitable (page 51). Twenty samples of potential substitute topsoil material have been sent to the Utah State University Soils Lab. There are four test plot locations, A through D (Plate 1), and samples at each location have been taken from 0-6", 6-12", 1-2', 2-3', & 3-4'. Samples will be taken from the new test area west of the railroad tracks at these same depths. All test plots, including the newest plot will be analyzed for: soil color, texture, pH, organic carbon, saturation percentage, alkalinity, electrical conductivity, calcium carbonate percentage, sodium absorption ratio, soluble potassium, magnesium, calcium, sodium, total nitrogen, available phosphorous, available water capacity, and percent rock fragments. The results can be found in Appendix D. Once any of the areas of substitute material have been determined suitable for reclamation, all or part of these areas will be carefully outlined on Plate 1 and the volumes necessary to make up the current topsoil deficit, will be included in the Topsoil Pile Summary. This will require approximately 29,000 additional cubic yards of material.

Prior to final reclamation, samples will be taken of the stored topsoil to determine any deficiencies which would affect the growth of newly revegetated areas. Any deficiencies will be corrected by adding to the soil chemical fertilizers, organic mulch, or any other substances recommended by the regulatory authority. Preparation techniques such as discing will be incorporated.

**SPECIES AND AMOUNTS PER ACRE OF
SEEDS AND/OR SEEDLINGS USED**

A reference area has been established by Andalex and DOGM. The sagebrush/grass reference area was used in combination with a vegetation inventory to determine the final seed mixture and amounts of seed to be used for final reclamation.

The following seed mixture, was developed by UDOGM in conjunction with the vegetation inventory.

Wildcat Loadout Final Seed Mixture			
Scientific Name	Common Name	PLS/Ac	Seeds Per/ft²
<i>Amelanchier utahensis</i>	Utah serviceberry	7.00	4.15
<i>Artemisia tridentata</i>	Big sagebrush	0.06	3.44
<i>Ceratoides lanata</i>	Winterfat	5.00	6.31
<i>Chrysothamnus nauseosus</i>	Rubber rabbitbrush	0.30	2.75
<i>Purshia tridentata</i>	Bitterbrush	12.00	4.13
<i>Archillea millefolium</i>	Yarrow	0.05	3.18
<i>Hedysatum boreale</i>	Northern sweetvetch	8.00	6.17
<i>Linum lewisii</i>	Lewis flax	1.00	6.38
<i>Penstemon palmeri</i>	Palmer penstemon	0.50	7.00
<i>Viguiera multiflora</i>	Showy goldeneye	0.20	4.84
<i>Bouteloua gracilis</i>	Blue grama	0.60	9.79
<i>Elymus spicatus</i>	Bluebunch wheatgrass	2.50	8.03
<i>Elymus trachycaulus</i>	Slender wheatgrass	2.50	9.18
<i>Hilaria jamesii</i>	Galleta	2.50	9.13
<i>Stipa comata</i>	Needle-and-thread grass	3.00	7.92
<i>Stipa hymenoides</i>	Indian ricegrass	2.00	8.63
TOTALS		47.21	101.06

Wildcat Loadout Interim Seed Mixture			
Scientific Name	Common Name	PLS/Ac	Seeds Per/ft²
<i>Archillea millefolium</i>	Yarrow	0.30	19.08
<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	8.00	28.28
<i>Elymus smithii</i>	Western Wheatgrass	9.00	26.03
<i>Elymus stachycaulus</i>	Slender Wheatgrass	8.00	29.38
TOTALS		26.30	102.78

**R645-301-341.220. METHODS USED IN PLANTING AND
 SEEDING**

All reclaimed areas will be stabilized by gouging prior to reseeded. The gouging will be done with a backhoe or trackhoe, and will consist of gouges at least 18" deep by 14" - 36" wide, spaced approximately 6' - 10' apart. All areas will then be hydroseeded and hydromulched due to the roughening.

R645-301-341.230. MULCHING TECHNIQUES

Vegetative cover will be promptly re-established following cessation of mining activities to stabilize erosion. Re-seeding will occur during the first normal period for favorable growth following regrading. Mulch will be applied to all reseeded areas. Areas which are hydromulched will be done so using an organic type mulch at the rate of one ton per acre. Where hydroseeding and hydromulching occur, a tackifier will be added to both the seed and the mulch.

Mulch will be used wherever seeds are planted. These areas are shown on Plate 9 and constitute 60.94 acres.

**R645-301-341.240. IRRIGATION AND PEST CONTROL
 MEASURES**

Management Practices, e.g., Irrigation, Pest, and Disease Control

No mechanical irrigation will be used because of the lack of water in the area. Vegetative growth will be subject to normal rainfall and winter snowfall. Vegetation will be protected from both wildlife and livestock by drift-fences until the reclaimed areas have been adequately re-established. Upon approval, the fences will be removed. Fences are already standing surrounding the permit area. Pesticides and herbicides will be issued as necessary. Should any persistent pesticides be needed, the Division's approval will be obtained prior to their use.

To date, Andalex has had no use for poisons for rodent control or any other persistent pesticide.

Also see R645-301-240

**R645-301-341.250. METHODS USED TO DETERMINE
 REVEGETATION SUCCESS**

Revegetation will be closely monitored. Areas which fail to support sufficient growth to stabilize conditions will be tested and reseeded until a proper cover is established. Physical examinations will be conducted to note any species which are not thriving or regenerating. If this occurs, species will be substituted at the recommendation of the regulatory authority. Any other species will be added at the time of reclamation upon recommendation of the regulatory authority. All reclaimed areas will be monitored and maintained by the constant observation of Andalex until the surety release is granted. This will include slope staking on any sloped areas.

Revegetation monitoring parameters to be measured are growth rate, plant density and percent cover. We would expect to monitor or supervise monitoring at least monthly during the first two growing seasons. From experience with interim revegetation at the minesite, we have learned that two growing seasons are needed to establish any success. After this we would know whether reclamation was progressing successfully.

Andalex is committed to quantitative sampling of reclamation cover, frequency and woody plant density during years 2, 3, 5, 9, and 10. Productivity will be sampled only during years 9 and 10. The reference area will be sampled during years 9 and 10.

**R645-301-341.300. STUDIES AND TESTING TO DEMONSTRATE
 FEASIBILITY OF REVEGETATION PLAN**

See R645-301-240.

R645-301-342. FISH AND WILDLIFE

See R645-301-310.

R645-301-342.100.

ENHANCEMENT MEASURES

Appendix F. Andalex will endeavor to use the best technology current available to enhance wildlife habitat during the reclamation phase of its operation. This will include, but not be limited to water sources (if available), thermal cover, escapeways, hiding and loafing places, and travelways. ANDALEX will consult with the Division of Wildlife Resources, at the time of final reclamation, to determine exactly what reclamation designs, planting arrangements, and artificial structures would best enhance a wildlife habitat.

R645-301-342.200.

PLANT SPECIES SELECTION

See R645-301-310.

R645-301-342.210.

NUTRITIONAL VALUE

Appendix E

R645-301-342.220.

COVER AND PROTECTION

Appendix F

R645-301-342.230.

**ABILITY TO SUPPORT AND ENHANCE
HABITAT**

Appendix F

R645-301-342.300.

CROPLAND

N/A

R645-301-342.400.

**RESIDENTIAL, PUBLIC SERVICE OR
INDUSTRIAL LAND USE**

N/A - The post mining land use does not include residential, public service or industrial use.

R645-301-350.

PERFORMANCE STANDARDS

R645-301-351.

GENERAL REQUIREMENTS

All loadout and reclamation operations will be carried out according to plans provided under R645-301-330 through R645-301-340.

R645-301-352.

CONTEMPORANEOUS RECLAMATION

Contemporaneous revegetation at the Wildcat Loadout will occur on topsoil piles and sediment pond embankments. The vast majority of the site will remain disturbed to facilitate the operation, until final reclamation.

R645-301-353.

REVEGETATION: GENERAL REQUIREMENTS

R645-301-353.100.

VEGETATIVE COVER

The vegetative cover will be as stated in the following categories.

R645-301-353.110.

DIVERSITY, EFFECTIVENESS AND PERMANENCE (Also R645-301-356 and 357)

The vegetative cover will be diverse, effective and permanent. Standards for reclamation success will be evaluated accordance with DOGM's "Vegetation Information and Monitoring Guidelines", Appendix A. The success of final reclamation will be judged on the effectiveness of the vegetation for the postmining land use and the extent of cover compared to the extent of cover for the reference area. Ground cover, production or stocking will be considered equal to the approved success standard when it reaches 90% of the success standard. Statistical adequacy of all statistical sampling will be determined using the following formula:

$$N_{\min} = \frac{t^2 S^2}{(dx)^2}$$

where: t = the value from appropriate t-table*, (2-tail test for pre-mine studies, 1-tail test for success studies)
s = the sample standard deviation,
d = the desired change in the mean,
x = the sample mean of the parameter in question
* = All parameters are to be tested at the 90% confidence level with a 10% change in the mean (d = .1).

Ground cover will be estimated by using one of the methods listed in "Vegetation Information Guidelines" Appendix A.

Andalex does not propose to stock shrubs or trees during interim or final revegetation.

Production measurements will be made in accordance with DOGM's "Vegetation Information Guidelines" Appendix A. Estimates may be made by the methodology which the vegetation consultant feels is the most suitable method to used for the work being performed.

An evaluation of species composition will be made, including species present, form and diversity.

For a postmining land use of grazing and wildlife habitat, the ground cover and production will be equal to or greater that a reference area. The Division's "Vegetation Information Guidelines", Appendix A will be utilized for the evaluation of the success of revegetation. Appendix B will be references for calculating diversity.

Siltation structures will be maintained until the disturbed area is revegetated and stabilized. They will remain in place at least two years after the last augmented seeding. Siltation structures may include straw bales, silt fences or filter baskets. Removal will be contingent upon revegetation and stabilization of the area as well as DOGM concurrence. Following removal, the area will be revegetated in accordance with the reclamation plan.

R645-301-353.120. NATIVE OR DESIRABLE INTRODUCED SPECIES

The vegetative cover will be comprised of species native to the area, or of introduced species where desirable and necessary to achieve the approved postmining land use and approved by the Division.
(See R645-301-240)

R645-301-353.130. EXTENT OF COVER

The vegetative cover will be at least equal in extent of cover to the reference area.

R645-301-353.140. STABILIZING SOIL FROM SURFACE EROSION

The vegetative cover will be capable of stabilizing the soil surface from erosion. (See R645-301-240)

R645-301-353.200. REESTABLISHED PLANT SPECIES

The reestablished plant species will:

R645-301-353.210. COMPATIBILITY WITH APPROVED POST-MINING LAND USE

The reestablished plant species will be compatible with the approved postmining land use. (See R645-301-240)

R645-301-353.220. SEASONAL CHARACTERISTICS OF GROWTH

The reestablished plant species will have the same seasonal characteristics of growth as the original vegetation. (See R645-301-240)

R645-301-353.230. SELF-REGENERATION AND PLANT SUCCESSION

The reestablished plant species will be capable of self-regeneration and plant succession. (See R645-301-240)

R645-301-353.240. COMPATIBILITY WITH AREA PLANT AND ANIMAL SPECIES

The reestablished plant species will be compatible with the plant and animal species of the area. (See R645-301-240)

R645-301-353.250. COMPLIANCE WITH OTHER APPLICABLE LAWS OR REGULATIONS

The reestablished plant species will meet the requirements of applicable Utah and federal seed, poisonous and noxious plant; and introduced species laws or regulations. The seed tag will be provided to the Division, as requested.

R645-301-356.220. CROPLAND

N/A

R645-301-356.230. FISH AND WILDLIFE

See R645-301-353.110 and R645-301-331.

R645-301-356.231. STOCKING AND PLANTING

See R645-301-331

R645-301-356.232. TREES AND SHRUBS

See R645-301-331

**R645-301-356.240. INDUSTRIAL, COMMERCIAL OR
RESIDENTIAL**

N/A

R645-301-356.250. PREVIOUSLY DISTURBED AREAS

See R645-301-240 and R645-301-331

R645-301-356.300. SILTATION STRUCTURES

See R645-301-240 and R645-301-310.

R645-301-356.400. REMOVAL OF SILTATION STRUCTURES

See R645-301-240 and R645-301-310.

**R645-301-357. REVEGETATION: EXTENDED
RESPONSIBILITY PERIOD**

**R645-301-357.100. BEGINNING OF EXTENDED
RESPONSIBILITY PERIOD**

See R645-301-240

R645-301-357.200. VEGETATION PARAMETERS FOR SUCCESS

See R645-301-240 and R645-301-341.250

**R645-301-357.210. GREATER THAN 26.0 INCHES ANNUAL
PRECIPITATION**

N/A

**R645-301-357.220. LESS THAN 26.0 INCHES ANNUAL
PRECIPIATION**

See R645-301-240 and R645-301-331

**R645-301-357.300. HUSBANDRY PRACTICES - GENERAL
INFORMATION**

R645-301-357.301. SELECTIVE HUSBANDRY PRACTICES

N/A - There are no selective husbandry practices requested at this time. Such selective practices cannot be determined until the property is reclaimed and reclamation success is evaluated.

R645-301-357.302. DEMONSTRATION OF PRACTICES

N/A

R645-301-357.303. BONDED AREA

N/A

**R645-301-357.304. EXTENDED RESPONSIBILITY FOR
RESEDED AREAS**

Per Division

R645-301-357.310. REESTABLISHING TREES AND SHRUBS

See R645-301-240.

R645-301-357.311. RATE OF REPLANTING

See R645-301-241.210.

R645-301-357.312. ESTABLISHMENT BY SEED

See R645-301-331.

R645-301-357.320. WEED CONTROL AND ASSOCIATED REVEGETATION

Management Practices, e.g., Irrigation, Pest, and Disease Control

No mechanical irrigation will be used because of the lack of water in the area. Vegetative growth will be subject to normal rainfall and winter snowfall. Vegetation will be protected from both wildlife and livestock by drift-fences until the reclaimed areas have been adequately re-established. Upon approval, the fences will be removed. Fences are already standing surrounding the permit area. Pesticides and herbicides will be issued as necessary. Should any persistent pesticides be needed, the Division's approval will be obtained prior to their use.

To date, Andalex has had no use for poisons for rodent control or any other persistent pesticide.

Also see R645-301-240

R645-301-357.321. CHEMICAL WEED CONTROL

See R645-301-240 and R645-301-357.320.

R645-301-357.322. MECHANICAL WEED CONTROL

See R645-301-240

R645-301-357.323. BIOLOGICAL WEED CONTROL

See R645-301-240

R645-301-357.324. RESEEDING DAMAGED AREAS

See R645-301-240

R645-301-357.330. CONTROL OF OTHER PESTS

See R645-301-357.320

R645-301-357.331. CONTROL OF BIG GAME

See R645-301-240

R645-301-357.332. CONTROL OF SMALL MAMMALS AND INSECTS

See R645-301-240

R645-301-357.341. AREA OF RESEEDING: NATURAL DISASTERS

See R645-301-240

R645-301-357.342. SUCCESS STANDARDS FOLLOWING A DISASTER

See R645-301-331

R645-301-357.343. TIMING OF RESEEDING FOLLOWING A DISASTER

See R645-301-240

R645-301-357.350. IRRIGATION

N/A - Not Planned

R645-301-357.360. RILL AND GULLEY REPAIR

See R645-301-212

R645-301-357.361. GREATER THAN 3% OF AREA

See R645-301-240

R645-301-357.362. EXTENT OF AFFECTED AREA

See R645-301-240

R645-301-357.363. AREA DEFINED BY RESEEDING

See R645-301-240

R645-301-357.364. RESULT OF DEFICIENT PLANS

See R645-301-240

R645-301-357.365. DEMONSTRATION OF METHOD

See R645-301-240

**R645-301-358. PROTECTION OF FISH, WILDLIFE AND
RELATED ENVIRONMENTAL VALUES**

See R645-301-310

R645-301-358.100. ENDANGERED OR THREATENED SPECIES

See R645-301-310

R645-301-358.200. BALD OR GOLDEN EAGLES

See R645-301-310

R645-301-358.300. ENDANGERED SPECIES ACT

See R645-301-310

R645-301-358.400. WETLANDS/RIPARIAN VEGETATION

See R645-301-310

**R645-301-358.500. BEST TECHNOLOGY CURRENTLY
AVAILABLE**

See R645-301-310

R645-301-358.510. MINIMIZE ELECTRICAL HAZARDS

See R645-301-310

R645-301-358.520. PASSAGE FOR LARGE MAMMALS

See R645-301-310

**R645-301-358.530. PONDS CONTAINING HAZARDOUS OR
TOXIC MATERIALS**

See R645-301-310

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PAGE RELOCATED TO CONFIDENTIAL BINDER

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PAGE RELOCATED TO CONFIDENTIAL BINDER

APPENDIX A

**APPENDIX A RELOCATED TO
CONFIDENTIAL BINDER**

Replace A.O.
in
Appendix B



State of Utah

Department of
Environmental Quality

Dianne R. Nielson, Ph.D.
Executive Director

DIVISION OF AIR QUALITY
Richard W. Spratt
Director

OLENE S. WALKER
Governor

GAYLE F. McKEACHNIE
Lieutenant Governor

DAQE-AN0113007-04

December 3, 2004

Michael W. Glasson
Manager of Operations
Andalex Resources Inc.
P.O. Box 902
Price, Utah 54501

Dear Mr. Glasson:

Re: Approval Order: Modification to Increase Coal Storage Area, Throughput, and Diesel Fuel Usage at Wildcat Loadout, Carbon County – CDS B; ATT; NSPS, TITLE V MINOR
Project Code: N0113-007

The attached document is the Approval Order (AO) for the above-referenced project.

Future correspondence on this Approval Order should include the engineer's name as well as the DAQE number as shown on the upper right-hand corner of this letter. Please direct any technical questions you may have on this project to Mr. Jon Black. He may be reached at (801) 536-4047.

Sincerely,

Richard W. Spratt, Executive Secretary
Utah Air Quality Board

RWS:JB:re

cc: Southeastern Utah District Health Department

STATE OF UTAH

Department of Environmental Quality

Division of Air Quality

**APPROVAL ORDER: Modification to Increase Coal Storage
Area, Coal Throughput, and Diesel Fuel Usage at Wildcat
Loadout**

**Prepared By: Jon Black, Engineer
(801) 536-4047
jlblack@utah.gov**

APPROVAL ORDER NUMBER

DAQE-AN0113007-04

Date: December 3, 2004

Andalex Resources Incorporated

**Source Contact
Michael W. Glasson
(435) 637-5385**

**Richard W. Sprott
Executive Secretary
Utah Air Quality Board**

Abstract

Andalex Resources, Inc. (Andalex) submitted a Notice of Intent for a proposed increase in coal stockpile area, coal through put, and diesel consumption at the Wildcat Loadout. Andalex currently operates this facility under Approval Order DAQE-005-00. This plant is located in Carbon County, which is an attainment area of the National Ambient Air Quality Standards (NAAQS) for all pollutants. New Source Performance Standards (NSPS) Subpart Y (Standards of Performance for Coal Preparation Plants) applies to this source. National Emission Standards for Hazardous Air Pollutants (NESHAP) and Maximum Available Control Technology (MACT) regulations do not apply to this source. Title V of the 1990 Clean Air Act applies to this source.

The emissions, in tons per year, will increase as follows: PM_{10} (+) 3.76, NO_x (+) 3.68, SO_2 (+) 0.32, CO (+) 1.54, VOC (+) 0.34, Aldehydes (+) 0.07. The changes in emissions will result in the following, in tons per year, controlled potential to emit totals: $PM_{10} = 25.77$, $NO_x = 18.40$, $SO_2 = 1.56$, $CO = 7.68$, $VOC = 1.69$, and Aldehydes = 0.34.

The project has been evaluated and found to be consistent with the requirements of the Utah Administrative Code Rule 307 (UAC R307). A public comment period was held in accordance with UAC R307-401-4 and no comments were received. This air quality Approval Order (AO) authorizes the project with the following conditions, and failure to comply with any of the conditions may constitute a violation of this order

General Conditions:

1. This Approval Order (AO) applies to the following company:

<u>Site Office</u>	<u>Corporate Office Location</u>
Andalex Resources, Inc. 5496 West 3550 North Spring Glen, Utah 84526	Andalex Resources, Inc. P.O. Box 902 Price, Utah 84501
Phone Number	(435) 637-5385
Fax Number	(435) 637-8860

The equipment listed in this AO shall be operated at the following location:

The site is located approximately 10 miles north-northwest of Price, Utah. Travel on Highway 6 south from Helper 2.5 miles and turn right on to Consumers Road.

Universal Transverse Mercator (UTM) Coordinate System: UTM Datum NAD27
4,389 kilometers Northing; 507 kilometers Easting; Zone 12

2. All definitions, terms, abbreviations, and references used in this AO conform to those used in the Utah Administrative Code (UAC) Rule 307 (R307) and Title 40 of the Code of Federal Regulations (40 CFR). Unless noted otherwise, references cited in these AO conditions refer to those rules.

3. The limits set forth in this AO shall not be exceeded without prior approval in accordance with R307-401.
4. Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved in accordance with R307-401-1.
5. All records referenced in this AO or in applicable NSPS and/or NESHAP and/or MACT standards, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or Executive Secretary's representative upon request, and the records shall include the two-year period prior to the date of the request. Records shall be kept for the following minimum periods:
 - A. Emission inventories Five years from the due date of each emission statement or until the next inventory is due, whichever is longer.
 - B. All other records Two years
6. Andalex Resources, Inc. (Andalex) shall conduct and operate its operations of the Wildcat coal loadout facility in accordance with the terms and conditions of this AO, which was written pursuant to Andalex's Notice of Intent submitted to the Division of Air Quality (DAQ) on September 28, 2004.
7. This AO shall replace the AO (DAQE-005-00) dated January 5, 2000.
8. The approved installations shall consist of the following equipment or equivalent*:
 - A. Four (4) truck unloading facilities with below ground receiving hoppers and equipped with water sprays
 - B. Two coal crushers, each with a rated capacity of 250 tons per hour
 - C. Three sets of screeners, each set of screens with a rated capacity of 500 tons per hour
 - D. Four (4) radial stackers
 - E. Underpile reclaim system
 - F. Railcar loadout consisting of a tower and an extendable chute for loading railcars
 - G. Associated stockpiles, conveyors, and mobile equipment

* Equivalency shall be determined by the Executive Secretary.

Limitations and Tests Procedures

9. Visible emissions from any stationary point or fugitive emission source associated with the source or with the control facilities shall not exceed 20% opacity. Opacity observations of emissions from stationary sources shall be conducted in accordance with 40 CFR 60, Appendix A, Method 9.

For sources that are subject to New Source Performance Standards (NSPS), opacity shall be determined by conducting observations in accordance with 40 CFR 60.11(b) and 40 CFR 60, Appendix A, Method 9.

10. Visible fugitive dust emissions from haul-road traffic and mobile equipment in operational areas shall not exceed 20% opacity. Visible emissions determinations for traffic sources shall use procedures similar to Method 9. The normal requirement for observations to be made at 15-second intervals over a six-minute period, however, shall not apply. Six points, distributed along the length of the haul road or in the operational area, shall be chosen by the Executive Secretary or the Executive Secretary's representative. An opacity reading shall be made at each point when a vehicle passes the selected points. Opacity readings shall be made 1/2 vehicle length or greater behind the vehicle and at approximately 1/2 the height of the vehicle or greater. The accumulated six readings shall be averaged for the compliance value.
11. The following production and consumption limit shall not be exceeded:
 - A. 5,500,000 tons coal throughput per rolling 12-month period
 - B. 100,000 gallons fuel consumption for on-site diesel equipment per rolling 12-month period

To determine compliance with a rolling 12-month total the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. Records of consumption/production shall be kept for all periods when the plant is in operation. Production shall be determined by records of coal received and fuel consumption shall be determined by fuel purchase invoices. The records of production shall be kept on a daily basis.

Roads and Fugitive Dust

12. The facility shall abide by all applicable requirements of R307-205 for Fugitive Emission and Fugitive Dust sources. The full text of R307-205, Emission Standards: Fugitive Emissions and Fugitive Dust is included as Appendix A. However, to be in compliance, this facility must operate in accordance with the most current version of R307-205.
13. All radial stackers shall stack at the highest point of the stockpile to minimize drop distances.
14. All conveyors shall be covered and all crushers shall be enclosed.
15. All unpaved roads and other unpaved operational areas that are used by mobile equipment shall be water sprayed and/or chemically treated to control fugitive dust. The application of water or chemical treatment shall be used. Treatment shall be of sufficient frequency and quantity to maintain the surface material in a damp/moist condition or unless it is below freezing. The opacity shall not exceed 20% during all times the areas are in use. If chemical treatment is to be used, the plan must be approved by the Executive Secretary. Records of water and/or chemical treatment shall be kept for all periods when the plant is in operation. The records shall include the following items:
 - A. Date
 - B. Number of treatments made, dilution ratio, and quantity

- C. Rainfall received, if any, and approximate amount
- D. Time of day treatments were made

16. The haul road limitations shall be:

- A. 0.21 miles in length
- B. 5 miles per hour

These limitations shall not be exceeded without prior approval in accordance with R307-401, UAC. The haul road speed shall be posted, at a minimum, on site at the beginning of the haul road so that it is clearly visible from the haul road.

17. Water sprays or chemical dust suppression sprays shall be installed at the following points to control fugitive emissions:

- A. All truck unloading stations
- B. All screens

The sprays shall operate whenever dry conditions warrant or as determined necessary by the Executive Secretary.

18. The moisture content of the material passing a #40 U.S. Standard Sieve shall be maintained at a minimum of 4.0% by weight. The moisture content shall be tested if directed by the Executive Secretary using the appropriate American Society of Testing and Methods (ASTM) method.

19. The storage piles shall be watered to minimize generation of fugitive dusts, as dry conditions warrant or as determined necessary by the Executive Secretary. Records of water and/or chemical treatment shall be kept for all periods when the plant is in operation. The total combined area of all storage piles shall not exceed 20.0 acres.

Fuels

20. The owner/operator shall use #1, #2 or a combination of #1 and #2 diesel fuel in the on-site equipment.

Federal Limitations and Requirements

21. In addition to the requirements of this AO, all applicable provisions of 40 CFR 60, New Source Performance Standards (NSPS) Subpart A, 40 CFR 60.1 to 60.18 (General Provisions) and Subpart Y, 40 CFR 60.250 to 60.254 (Standards of Performance for Coal Preparation Plants) apply to this installation (See Appendix B).

Records & Miscellaneous

22. At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this Approval Order including associated air pollution control equipment in a

manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Executive Secretary which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded.

- 23. The owner/operator shall comply with R307-150 Series. Inventories, Testing and Monitoring.
- 24. The owner/operator shall comply with R307-107. General Requirements: Unavoidable Breakdowns.

The Executive Secretary shall be notified in writing if the company is sold or changes its name.

This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including R307.

A copy of the rules, regulations and/or attachments addressed in this AO may be obtained by contacting the Division of Air Quality. The Utah Administrative Code R307 rules used by DAQ, the Notice of Intent (NOI) guide, and other air quality documents and forms may also be obtained on the Internet at the following web site:

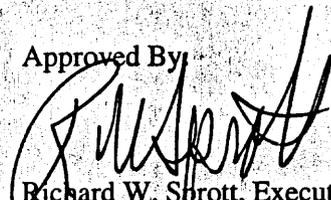
<http://www.airquality.utah.gov/>

The annual emissions estimations below include point source, fugitive emissions, fugitive dust, road dust, and tail pipe emissions. These emissions are for the purpose of determining the applicability of Prevention of Significant Deterioration, non-attainment area, maintenance area, and Title V source requirements of the R307. They are not to be used for determining compliance.

The controlled Potential To Emit (PTE) emissions for this source (the entire plant) are currently calculated at the following values:

	<u>Pollutant</u>	<u>Tons/yr</u>
A.	PM ₁₀	25.77
B.	SO ₂	1.56
C.	NO _x	18.40
D.	CO	7.68
E.	VOC	1.69
F.	Aldehydes.....	0.34

Approved By



Richard W. Sprott, Executive Secretary
Utah Air Quality Board

Appendix A

Andalex Resources - Wildcat Loadout

R307. Environmental Quality, Air Quality.

R307-205. Emission Standards: Fugitive Emissions and Fugitive Dust.

R307-205-1. Applicability.

(1) Except where otherwise specified, R307-205 applies statewide.

(2) The provisions of R307-205 shall not apply to any sources for which limitations for fugitive dust or fugitive emissions are assigned pursuant to R307-401, R307-305, or R307-307 nor shall they apply to agricultural or horticultural activities.

(3) The following definitions apply throughout R307-205:

"Material" means sand, gravel, soil, minerals or other matter which may create fugitive dust.

"Road" means any public or private road.

R307-205-2. Fugitive Emissions.

Fugitive emissions from sources in areas outside Davis, Salt Lake and Utah Counties, Ogden City and any nonattainment area for PM10 and which were constructed before April 25, 1971, shall not exceed 40% opacity. Fugitive emissions from sources constructed after April 25, 1971, shall not exceed 20% opacity.

R307-205-3. Fugitive Dust.

(1) Storage and Handling of Aggregate Materials. Any person owning, operating or maintaining a new or existing material storage, handling or hauling operation shall minimize fugitive dust from such an operation. Such control may include the use of enclosures, covers, stabilization or other equivalent methods or techniques as approved by the Executive Secretary.

(2) Construction and Demolition Activities.

(a) Any person engaging in clearing or leveling of land greater than one-quarter acre in size, earthmoving, excavation, or movement of trucks or construction equipment over cleared land greater than one-quarter acre in size or access haul roads shall take steps to minimize fugitive dust from such activities. Such control may include watering and chemical stabilization of potential fugitive dust sources or other equivalent methods or techniques approved by the Executive Secretary.

(b) The owner or operator of any land area greater than one-quarter acre in size that has been cleared or excavated shall take measures to prevent fugitive particulate matter from becoming airborne. Such measures may include:

(i) planting vegetative cover,

(ii) providing synthetic cover,

(iii) watering,

(iv) chemical stabilization,

(v) wind breaks, or

(vi) other equivalent methods or techniques approved by the Executive Secretary.

(c) Any person engaging in demolition activities including razing homes, buildings, or other structures or removing paving material from roads or parking areas shall take steps to minimize fugitive dust from such activities. Such control may include watering and chemical stabilization or other equivalent methods or techniques approved by the Executive Secretary.

R307-205-4. Roads.

(1) Any person planning to construct or operate a new unpaved road which is anticipated to have an average daily traffic volume of 150 vehicle trips per day or greater, averaged over a consecutive five day period, shall submit a notice of intent to construct or operate such a road to the Executive Secretary pursuant to R307-401. Such notice shall include proposed action to minimize fugitive dust emissions from the road.

(2) The Executive Secretary may require persons owning, operating or maintaining any new or existing road, or having right-of-way easement or possessory right to use the same to supply traffic count information as determined necessary to ascertain whether or not control techniques are adequate or additional controls are necessary.

(3) Any person who deposits materials which may create fugitive dust on a public or private paved road shall clean the road promptly.

R307-205-5. Mining Activities. (1) Fugitive dust, construction activities, and roadways associated with mining activities are regulated under the provisions of R307-205-5 and not by R307-205-3 and 4.

(2) Any person who owns or operates a mining operation shall minimize fugitive dust as an integral part of site preparation, mining activities, and reclamation operations.

(3) The fugitive dust control measures to be used may include:

(a) periodic watering of unpaved roads,

- (b) chemical stabilization of unpaved roads,
- (c) paving of roads,
- (d) prompt removal of coal, rock minerals, soil, and other dust-forming debris from roads and frequent scraping and compaction of unpaved roads to stabilize the road surface,
- (e) restricting the speed of vehicles in and around the mining operation,
- (f) revegetating, mulching, or otherwise stabilizing the surface of all areas adjoining roads that are a source of fugitive dust,
- (g) restricting the travel of vehicles on other than established roads,
- (h) enclosing, covering, watering, or otherwise treating loaded haul trucks and railroad cars, to minimize loss of material to wind and spillage,
- (i) substitution of conveyor systems for haul trucks and covering of conveyor systems when conveyed loads are subject to wind erosion,
- (j) minimizing the area of disturbed land,
- (k) prompt revegetation of regraded lands,
- (l) planting of special windbreak vegetation at critical points in the permit area,
- (m) control of dust from drilling, using water sprays, hoods, dust collectors or other controls approved by the

Executive Secretary.

- (n) restricting the areas to be blasted at any one time,
 - (o) reducing the period of time between initially disturbing the soil and revegetating or other surface stabilization,
 - (p) restricting fugitive dust at spoil and coal transfer and loading points,
 - (q) control of dust from storage piles through use of enclosures, covers, or stabilization and other equivalent methods or techniques as approved by the Executive Secretary, or
 - (r) other techniques as determined necessary by the Executive Secretary.
- (4) Any person owning or operating an existing mining operation in an actual area of nonattainment for particulate or an existing mining operation outside an actual area of nonattainment from which fugitive dust impacts an actual area of nonattainment for particulate shall submit plans for control of fugitive dust from such operations to the Executive Secretary for approval no later than September 29, 1981, 180 days after the effective date of this regulation.

R307-205-6. Tailings Piles and Ponds.

- (1) Fugitive dust, construction activities, and roadways associated with tailings piles and ponds are regulated under the provisions of R307-205-6 and not by R307-205-3 and 4.
- (2) Any person owning or operating an existing tailings operation where fugitive dust results from grading, excavating, depositing, or natural erosion or other causes in association with such operation shall take steps to minimize fugitive dust from such activities. Such controls may include:
 - (a) watering,
 - (b) chemical stabilization,
 - (c) synthetic covers,
 - (d) vegetative covers,
 - (e) wind breaks,
 - (f) minimizing the area of disturbed tailings,
 - (g) restricting the speed of vehicles in and around the tailings operation, or
 - (h) other equivalent methods or techniques which may be approvable by the Executive Secretary.
- (3) Any person owning or operating an existing tailings operation in a nonattainment area for particulate or an existing mining operation outside an actual area of nonattainment from which fugitive dust impacts an actual area of nonattainment for particulate shall submit plans for control of fugitive dust from such operations to the Executive Secretary for approval no later than September 29, 1981, 180 days after the effective date of this regulation.

Appendix B

40 CFR 60 Subpart Y - Standards of Performance for Coal Preparation Plants

§ 60.250 Applicability and designation of affected facility.

(a) The provisions of this subpart are applicable to any of the following affected facilities in coal preparation plants which process more than 200 tons per day: Thermal dryers, pneumatic coal-cleaning equipment (air tables), coal processing and conveying equipment (including breakers and crushers), coal storage systems, and coal transfer and loading systems.

(b) Any facility under paragraph (a) of this section that commences construction or modification after October 24, 1974, is subject to the requirements of this subpart.

[42 FR 37938, July 25, 1977; 42 FR 44812, Sept. 7, 1977]

§ 60.251 Definitions.

As used in this subpart, all terms not defined herein have the meaning given them in the Act and in subpart A of this part.

(a) Coal preparation plant means any facility (excluding underground mining operations) which prepares coal by one or more of the following processes: breaking, crushing, screening, wet or dry cleaning, and thermal drying.

(b) Bituminous coal means solid fossil fuel classified as bituminous coal by ASTM Designation D388-77 (incorporated by reference-see § 60.17).

(c) Coal means all solid fossil fuels classified as anthracite, bituminous, subbituminous, or lignite by ASTM Designation D388-77 (incorporated by reference-see § 60.17).

(d) Cyclonic flow means a spiraling movement of exhaust gases within a duct or stack.

(e) Thermal dryer means any facility in which the moisture content of bituminous coal is reduced by contact with a heated gas stream which is exhausted to the atmosphere.

(f) Pneumatic coal-cleaning equipment means any facility which classifies bituminous coal by size or separates bituminous coal from refuse by application of air stream(s).

(g) Coal processing and conveying equipment means any machinery used to reduce the size of coal or to separate coal from refuse, and the equipment used to convey coal to or remove coal and refuse from the machinery. This includes, but is not limited to, breakers, crushers, screens, and conveyor belts.

(h) Coal storage system means any facility used to store coal except for open storage piles.

(i) Transfer and loading system means any facility used to transfer and load coal for shipment.

[41 FR 2234, Jan. 15, 1976, as amended at 48 FR 3738, Jan. 27, 1983]

§ 60.252 Standards for particulate matter.

(a) On and after the date on which the performance test required to be conducted by § 60.8 is completed, an owner or operator subject to the provisions of this subpart shall not cause to be discharged into the atmosphere from any thermal dryer gases which:

(1) Contain particulate matter in excess of 0.070 g/dscm (0.031 gr/dscf).

(2) Exhibit 20 percent opacity or greater.

(b) On and after the date on which the performance test required to be conducted by § 60.8 is completed, an owner or operator subject to the provisions of this subpart shall not cause to be discharged into the atmosphere from any pneumatic coal cleaning equipment, gases which:

(1) Contain particulate matter in excess of 0.040 g/dscm (0.018 gr/dscf).

(2) Exhibit 10 percent opacity or greater.

(c) On and after the date on which the performance test required to be conducted by § 60.8 is completed, an owner or operator subject to the provisions of this subpart shall not cause to be discharged into the atmosphere from any coal processing and conveying equipment, coal storage system, or coal transfer and loading system processing coal, gases which exhibit 20 percent opacity or greater.

[41 FR 2234, Jan. 15, 1976]

§ 60.253 Monitoring of operations.

(a) The owner or operator of any thermal dryer shall install, calibrate, maintain, and continuously operate monitoring devices as follows:

(1) A monitoring device for the measurement of the temperature of the gas stream at the exit of the thermal dryer on a continuous basis. The monitoring device is to be certified by the manufacturer to be accurate within $\pm 3^{\circ}$ Fahrenheit.

(2) For affected facilities that use venturi scrubber emission control equipment:

(i) A monitoring device for the continuous measurement of the pressure loss through the venturi constriction of the control equipment. The monitoring device is to be certified by the manufacturer to be accurate within ± 1 inch water gage.

(ii) A monitoring device for the continuous measurement of the water supply pressure to the control equipment. The monitoring device is to be certified by the manufacturer to be accurate within ± 5 percent of design water supply pressure. The pressure sensor or tap must be located close to the water discharge point. The Administrator may be consulted for approval of alternative locations.

(b) All monitoring devices under paragraph (a) of this section are to be recalibrated annually in accordance with procedures under § 60.13(b).

[41 FR 2234, Jan. 15, 1976, as amended at 54 FR 6671, Feb. 14, 1989]

§ 60.254 Test methods and procedures.

(a) In conducting the performance tests required in § 60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures as specified in this section, except as provided in § 60.8(b).

(b) The owner or operator shall determine compliance with the particular matter standards in § 60.252 as follows:

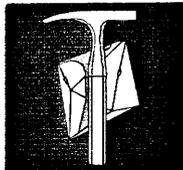
(1) Method 5 shall be used to determine the particulate matter concentration. The sampling time and sample volume for each run shall be at least 60 minutes and 0.85 dscm (30 dscf). Sampling shall begin no less than 30 minutes after startup and shall terminate before shutdown procedures begin.

(2) Method 9 and the procedures in § 60.11 shall be used to determine opacity.

[54 FR 6671, Feb. 14, 1989]

Supplement
to
Appendix D

**SOIL SURVEY FOR THE
TWELVE-ACRE EXPANSION AREA
AT THE
WILDCAT LOADOUT**



Prepared by

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(ARCPACS #2753)

for

ANDALEX RESOURCES, INC

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July 2003



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INTRODUCTION

Andalex Resources needs to expand their coal storage area at the Wildcat Loadout facility located just south of Consumers Road about four miles west of Helper in Carbon County. The site is located in a portion of Section 33, T.14S., R.9E. as shown on the Standardville 7.5 minute USGS topographic quadrangle. A detailed Order 1-2 soil survey was conducted in March 2003 on approximately 12 acres of land immediately adjacent to the east of the current coal storage piles. A one acre site within the current Wildcat permit area but not part of the original to-be-affected disturbance area was previously mapped, sampled, and reported in April, 2003. The current report includes the one acre but expands to include a total of approximately 12 acres all located immediately adjacent to the east of the current coal piles.

Andalex wants to utilize the one acre site for coal storage immediately and the additional eleven acres at a later time. The identification and proper management of topsoil resources on the study area is essential for the success of future reclamation and the achievement of the post-disturbance land use. The information presented in this report is designed to aid in formulating a practical and successful reclamation plan.

METHODS

Standard soil survey methods were used throughout the project. Andalex provided a site photo-map to Patrick Collins. Dr. Collins conducted field work at the site on March 5 and designated three locations as representative of the soil on the one acre study area. A backhoe pit was dug at each of the three sites. Dr. Collins examined the three soil profiles and sampled two of them, WC1 and WC2. Samples were subsequently delivered to Brigham Young University's soil testing laboratory for standard analysis as described in the "Guidelines for Management of Topsoil and Overburden" (State of Utah, 2002). Dr. Collins also investigated the extent of coal fines deposition on the one acre site by means of numerous spade holes dug on a grid transect basis.

The site was then visited on March 11 by Patrick Collins and Jim Nyenhuis, a Certified Professional Soil Scientist. Dr. Collins described his sampling rationale and Mr. Nyenhuis concurred that it was appropriate for the Hernandez soil. The next day, March 12, seven additional backhoe pits were sited and dug on the larger twelve acre study area. Ms. Priscilla Burton (UDOGM soil scientist and reclamation specialist) was present for the day and observed all ten backhoe pits and assisted in the description and sampling of several soil profiles. She observed all three pits on the primary one acre study area. Mr. Nyenhuis concluded the soils description and sampling of the larger area on the following day, March 13, 2003.

The twenty-three soil samples collected from the additional seven soil backhoe pits were delivered to Colorado State University's Soil Testing Laboratory for analysis. The following parameters

were analyzed: pH; electrical conductivity (EC); saturation percent; percent calcium carbonate equivalent; organic matter percent; texture (sand, silt, clay, and very fine sand as a part of total sand); meq/L of Ca, Mg, Na, and K; SAR; and AB-DTPA extractable nitrate nitrogen (NO₃-N), P, K, Zn, Fe, Mn, and Cu.

RESULTS

Ten backhoe pits were dug in representative locations across the 12 acre study area (see "Soil Survey Map" included with this report). Soils were described at each of the pits, and eight of the ten pits were sampled for laboratory analysis. Sample sites WC1 and WC2 were sampled as part of the one acre study, and samples sites WC4, WC6, WC7, WC8, WC9, and WC10 were sampled as part of the larger 12 acre study. The soil laboratory data is attached to this report. Three soil map units were delineated across the 12 acre study area: (A) Hernandez loam, 1 to 6 percent slopes, (B) Haverdad loam, 2 to 8% slopes, and (C) Strych Variant, shallow to moderately deep, 2 to 6% slopes.

Average elevation of the study area is about 6,100 to 6,155 feet MSL. Average annual precipitation is about 10 to 12 inches (ustic-aridic soil moisture regime). Average annual air temperature is about 47 to 49 degrees F. (mesic soil temperature regime). The average freeze-free period is 110 to 135 days per year (Jansen and Borchert, 1988).

Map Unit A: Hernandez loam, 1 to 6% slopes

Hernandez loam was described and sampled at five representative locations (WC1, WC2, WC6, WC7, and WC10). Hernandez was also described but not sampled at WC3. Although there are some differences among the six sites, each soil classifies as the Hernandez series. The Hernandez family, Map Unit 52, was also mapped for the area by NRCS on Sheet 8 of its Soil Survey of Carbon Area, Utah (Jansen and Borchert, 1988).

Hernandez family is a very deep, well drained soil mapped on uplands in the general area. The soil is developing in local alluvium derived dominantly from sandstone and shale. Site vegetation includes Wyoming big sagebrush and mixed grasses. Based on NRCS data, Hernandez has moderate permeability, high available water capacity (9.0 to 10.5 inches), slow runoff, and water supplying capacity of 5.5 to 6.5 inches. Effective rooting depth is 60 inches or more, the organic matter content of the surface layer is generally 1 to 3 percent, and the hazard of wind and water erosion is moderate (Jansen and Borchert, 1988). The Range Site for Hernandez is Semidesert Loam (Wyoming Big Sagebrush).

Hernandez is classified as a "Fine-loamy, mixed, superactive, mesic Ustic Haplocalcid".

Hernandez is an established soil series of moderate extent. The most recent NRCS official soil series description, dated October 2002, is on file at Mt. Nebo Scientific. Hernandez sites WC1, WC2, and WC3 were previously described in the one acre study area report, and are also included in the current report.

Hernandez Pedon WC1 Site and Profile Description:

Map Unit A; 3% slope, east-southeast aspect; Wyoming big sagebrush and mixed grasses vegetation; local alluvium; fan uplands; no erosion; soil slightly moist to 8 inches; 3 inches of coal fines deposition from the adjacent Wildcat Loadout facility; sampled for laboratory characterization.

Coal Fines – 3 to 0 inches (3 inches thick)

A horizon – 0 to 3 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium granular structure; soft dry consistence, very friable moist consistence, slightly sticky and slightly plastic wet consistence; common coarse, medium and many fine and very fine roots to 13 inches; moderately effervescent, slightly alkaline (pH 7.7); gradual smooth boundary.

Bw (cambic) horizon – 3 to 13 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent, slightly alkaline (pH 7.7); clear wavy boundary.

Bk (calcic) horizon – 13 to 23 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive structure; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; few coarse, medium, fine and very fine roots; violently effervescent, slightly alkaline (pH 7.8); gradual wavy boundary.

Ck horizon – 23 to 60 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive structure; very hard dry consistence, firm moist consistence, sticky and slightly plastic wet consistence; strongly effervescent, moderately alkaline (pH 8.2); did not hit bedrock.

Hernandez Pedon WC2 Site and Profile Description:

Map Unit A; 4% slope; east-southeast aspect; Wyoming big sagebrush and mixed grasses vegetation; local alluvium; fan uplands; no erosion; soil slightly moist to 3 inches; 3 inches of coal fines deposition from adjacent Wildcat Loadout facility; sampled for laboratory characterization.

Coal Fines – 3 to 0 inches (3 inches thick)

A horizon – 0 to 3 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; strong, medium platy structure (mechanically compacted); hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; few to common coarse and medium and many fine and very fine roots to 10 inches; strongly effervescent, moderately alkaline (pH 7.8); gradual smooth boundary.

Bw (cambic) horizon – 3 to 10 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium platy structure (mechanically compacted); hard dry consistence, firm moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent, moderately alkaline (pH 7.8); clear wavy boundary.

Bk (calcic) horizon – 10 to 32 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; massive structure; extremely hard dry consistence; very firm moist consistence; sticky and slightly plastic wet consistence; few medium, fine, and very fine roots; violently effervescent, moderately alkaline (pH 7.8); gradual wavy boundary.

Ck horizon – 32 to 60 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; massive structure; very hard dry consistence, firm moist consistence, sticky and slightly plastic wet consistence; violently effervescent, strongly alkaline (pH 8.5); did not hit bedrock.

Hernandez Pedon WC3 Site and Profile Description:

Map Unit A; 3% slope' east-southeast aspect; Wyoming big sagebrush and mixed grasses vegetation; local alluvium; fan uplands; soil slightly moist to 9 inches; no erosion; 3 inches of coal fines deposition from adjacent wildcat Loadout facility; not sampled for laboratory characterization.

Coal Fines – 3 to 0 inches (3 inches thick).

A horizon – 0 to 3 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium granular structure; soft dry consistence, very friable moist consistence, slightly sticky and slightly plastic wet consistence; common medium, fine, and very fine and few coarse roots to 9 inches; strongly effervescent; gradual smooth boundary.

Bw horizon – 3 to 9 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent; clear wavy boundary.

Bk1 horizon – 9 to 18 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive structure parting to moderate medium subangular blocky; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; common fine and very fine and few coarse and medium roots; strongly effervescent; gradual wavy boundary.

Bk2 horizon – 18 to 32 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3)

moist; massive structure; very hard dry consistence, firm moist consistence, sticky and slightly plastic wet consistence; few medium, fine, and very fine roots; violently effervescent; gradual wavy boundary.

Ck horizon – 32 to 52 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive structure; very hard dry consistence, very firm moist consistence, sticky and slightly plastic wet consistence; violently effervescent; gradual wavy boundary.

C horizon – 52 to 64 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive structure; hard dry consistence, firm moist consistence, slightly sticky and slightly plastic wet consistence; did not hit bedrock.

Hernandez Pedon WC6 Site and Profile Description:

Map Unit A; 4% slope; east aspect; mixed grasses, dead Wyoming big sagebrush vegetation; local alluvium; fan uplands; no erosion; soil slightly moist to 18 inches at time of sampling, 3-12-03; 3 inches of coal fines deposition from adjacent wildcat loadout facility; sampled for laboratory characterization.

Coal fines – 3 to 0 inches (3 inches thick)

A horizon- 0 to 3.5 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; weak medium granular structure; soft dry consistence, very friable moist, slightly sticky and slightly plastic wet consistence; common medium, fine, very fine, and few coarse roots to 13 inches; moderately effervescent, moderately alkaline (pH 7.9); gradual smooth boundary.

Bw horizon – 3.5 to 13 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/40) moist; moderate medium subangular blocky structure; slightly hard dry consistence, friable moist consistence, sticky and slightly plastic wet consistence; moderately effervescent, slightly alkaline (pH 7.8); gradual wavy boundary.

Bk horizon – 13 to 25 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive structure; hard dry consistence, friable moist consistence; slightly sticky and slightly plastic wet consistence; common fine and very fine, and few coarse and medium roots 13 to 18 inches, few coarse, medium, fine, and very fine roots 18 to 25 inches; strongly effervescent, moderately alkaline (pH 8.0); gradual wavy boundary.

Ck horizon – 25 to 38 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive structure; very hard to extremely hard dry consistence; firm moist consistence, sticky and slightly plastic wet consistence; strongly effervescent, moderately alkaline (pH 8.4); gradual wavy boundary.

C horizon – 38 to 64 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish

brown (10YR 4/4) moist; massive structure; hard dry consistence, firm moist consistence, sticky and slightly plastic wet consistence; moderately effervescent, strongly alkaline (pH 8.5); did not hit bedrock.

Hernandez Pedon WC7 Site and Profile Description:

Map Unit A; 4% slope; east aspect; Wyoming big sagebrush and mixed grasses vegetation; local alluvium; fan uplands; no erosion; soil slightly moist to 10 inches at time of sampling, 3-13-03; 2 inches of coal fines deposition from adjacent Wildcat Loadout facility; sampled for laboratory characterization.

Coal Fines – 2 to 0 inches (2 inches thick)

A horizon – 0 to 3 inches; brown (10YR 5/3) loam with some areas with coal fines mixed in, brown (10YR 4/3) moist; weak medium granular structure; soft dry consistence, very friable moist consistence, sticky and slightly plastic wet consistence; many fine and very fine, and few coarse and medium roots to 10 inches; moderately effervescent, moderately alkaline (pH 7.9); gradual smooth boundary.

Bw horizon – 3 to 10 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; moderate to strongly effervescent, slightly alkaline (pH 7.8); gradual wavy boundary.

Bk1 horizon – 10 to 22 inches; very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) moist; massive structure; hard-very hard dry consistence, firm moist consistence, sticky and slightly plastic wet consistence; common fine and very fine, and few medium and coarse roots 10 to 22 inches; strongly effervescent, moderately alkaline (pH 7.9); common krotovinas from 10 to 38 inches; gradual wavy boundary.

Bk2 horizon – 22 to 38 inches; very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) moist; massive structure; extremely hard dry consistence, very firm moist consistence, slightly sticky and nonplastic wet consistence; few fine and very fine roots 22 to 38 inches; violently effervescent, moderately alkaline (pH 8.3); gradual wavy boundary.

C horizon – 38 to 56 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive structure; hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent, strongly alkaline (pH 8.6); did not hit bedrock.

Hernandez Pedon WC10 Site and Profile Description:

Map Unit A; 6% slope; east aspect; rabbitbrush and mixed grasses vegetation; local alluvium; fan uplands; no erosion; soil slightly moist to 12 inches at time of sampling, 3-13-03; 1.5 inches of coal fines deposition from the adjacent Wildcat Loadout facility; sampled for laboratory characterization; sample site is just outside of the 12 acre study area but in an area for a future sedimentation pond.

Coal Fines – 1.5 to 0 inches (1.5 inches thick)

A horizon - 0 to 3 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) loam, weak medium granular structure; soft dry consistence, very friable moist consistence, slightly sticky and slightly plastic wet consistence; common few and very few, and few coarse and medium roots to 12 inches; strongly effervescent, moderately alkaline (pH 8.0); gradual smooth boundary.

Bw horizon – 3 to 12 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard dry consistence; friable moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent, moderately alkaline (pH 8.0); gradual wavy boundary.

Bky horizon – 12 to 30 inches; very pale brown (10YR 7/4) clay loam, light yellowish brown (10YR 6/4) moist; massive structure; very hard dry consistence, firm moist consistence, sticky and plastic wet consistence; few medium, fine, and very fine roots 12 to 24 inches; violently effervescent, moderately alkaline (pH 8.0); gradual wavy boundary.

C horizon – 30 to 62 inches; light yellowish brown (10YR 6/4) loam/sandy loam, pale brown (10YR 6/3) moist; massive structure; hard dry consistence, firm moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent, moderately alkaline (pH 8.0); did not hit bedrock.

Hernandez Range of Characteristics:

The described and sampled pedons WC-1, WC-2, WC-3, WC-6, WC-7, and WC-10 are typical of Hernandez, and are within the range of characteristics for the Hernandez official soil series description (NRCS, October 2002).

Hernandez Soil Suitability and Salvage Depth Recommendation:

Initial One-Acre Study Area

Based on an evaluation of the field and laboratory data (see Appendix), the Hernandez soil is entirely suitable throughout its profile depth to 54 inches or more. Soil textures are good with loam dominating the upper profile, and loam to clay loam in the lower profile. Soil salinity is low with electrical conductivity (EC) values less than 1 in the upper profile and 2 to 3 in the lower profile. Sodium Adsorption Ratio (SAR) is low throughout the profile with values less than 1 for all samples except the 32 to 54 inch depth interval of WC-2 (SAR=6.5). Soil reaction (pH) is slightly to moderately alkaline with values in the high 7's and low 8's (range of pH 7.7 to 8.5). Calcium carbonate content ranges from 9.7 to 18.7 percent and averages 13.9 percent across all samples. Organic matter content is somewhat high in the upper profile (2.8 to 3.6 percent) and generally low in the lower profile (0.5 to 0.9 percent).

If needed, the entire profile to 54 inches or more could be salvaged for use in reclamation activities. The better soil material is in the approximate upper 24 inches. Soil texture is loam and organic matter content is somewhat high in this upper 2 feet. EC and SAR values are low. Soil texture is good and the soil material can be easily handled. If a more limited amount of soil material is needed, the upper 24 inches can be salvaged as Topsoil. Additional underlying material could be salvaged, as needed, for use as Subsoil.

Larger Eleven-Acre Study Area

Soil description and sample sites WC6, WC7, and WC10 were evaluated for suitability and salvage depth recommendation for the remaining 11 acre study area. WC10 is located in a proposed sedimentation pond area just outside the 11 acre study area but was included in the evaluation of Hernandez. The upper 25 inches of WC6 is good rated. The depth between 25 and 38 inches is good rated except both EC (5.5) and SAR (9.1) are fair rated. The lower zone between 38 and 64 inches has poor EC (10.1) and unacceptable SAR (16.7). The upper 38 inches of WC7 is good rated; between 38 and 56 inches is good rated except for fair rated SAR (6.8). The upper 12 inches of WC10 is good rated; between 12 and 30 inches has fair to poor EC (8.5) and fair SAR (8.4). Both EC (12) and SAR (10.4) are poor rated for the zone between 30 and 62 inches. For laboratory reports, refer to the Appendix of this document.

Given that WC10 is located outside the 11 acre study area, it is recommended that the upper 38 inches of Map Unit A be salvaged as Topsoil. The underlying material has good to poor rated EC and fair to unacceptable SAR. If additional material is needed and can be somewhat mixed during salvage, it is possible to salvage this lower material between 38 and about 62 inches as Subsoil.

Map Unit B: Haverdad loam, 2 to 8% slopes

Haverdad loam was described and sampled at two representative locations, WC4 and WC8.

Haverdad loam was previously mapped by NRCS as a soil inclusion along drainageways in Map

Unit 52 of the Soil Survey of Carbon Area, Utah (Jansen and Borchert, 1988). Haverdad loam is a very deep, well drained soil mapped in small upland drainageways in the general area. The soil is developing in local alluvium derived dominantly from sandstone and shale. Site vegetation includes mixed grasses, sagebrush, and occasional scattered greasewood.

Permeability of Haverdad is moderate. Available water capacity is about 10 inches. Effective rooting depth is 40 inches or more. Runoff is slow, and the hazard of wind and water erosion is moderate (Jansen and Borchert, 1988). The Range Site for Borchert is Semidesert Loam (Wyoming Big Sagebrush).

Haverdad is classified as a "Fine-loamy, mixed, superactive, calcareous, mesic Ustic Torrifuvent". Haverdad is an established soil series of moderate extent. The most recent NRCS official soil series description, dated June 2002, is on file at Mt. Nebo Scientific. Haverdad site and profile descriptions for WC4 and WC8 follow.

Haverdad Pedon WC4 Site and Profile Description:

Map Unit B; 3% slope; east aspect; mixed grasses and few scattered greasewood vegetation; fine-loamy local alluvium with <1% coarse fragments; small fan on side of small upland drainage; no erosion; soil slightly moist to 14 inches at time of sampling, 3-12-03; 3 inches of coal fines deposition from adjacent Wildcat Loadout facility; sampled for laboratory characterization.

Coal Fines – 3 to 0 inches (3 inches thick)

A horizon – 0 to 4 inches; yellowish brown (10YR 5/6) loam, dark yellowish brown (10YR 4/6) moist; moderate medium granular structure; slightly hard dry consistence,

friable moist consistence, slightly sticky and slightly plastic wet consistence; many medium, fine, and very fine, and few coarse roots to 14 inches; strongly effervescent, moderately alkaline (pH 8.3); gradual smooth boundary.

Bw horizon – 4 to 14 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent, strongly alkaline (pH 8.5); gradual wavy boundary.

Bk horizon – 14 to 28 inches; light yellowish brown (10YR 6/4) loam, brown (10YR 4/3) moist; massive structure; hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; common fine and very fine and few medium roots; strongly effervescent, moderately alkaline (pH 8.3); gradual wavy boundary.

C horizon – 28 to 58 inches; yellowish brown (10YR 5/4) loam to sandy loam, brown (10YR 4/3) moist; massive structure; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; few fine and very fine roots 28 to 44 inches; strongly effervescent, moderately alkaline (pH 8.0); gradual wavy boundary.

2C “red” horizon – 58 to 70+ inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 4/4) moist; massive structure; slightly hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; slightly effervescent; this horizon not sampled.

Haverdad Pedon WC8 Site and Profile Description:

Map Unit B; 2% slope; east aspect; big sagebrush and mixed grasses (mostly dead) vegetation; fine-loamy local alluvium with < 2% sandstone gravels; small upland drainage; no erosion; 3 inches of coal fines deposition from adjacent Wildcat Loadout facility; soil slightly moist to 26 inches at time of sampling, 3-13-03; sampled for laboratory characterization.

Coal Fines – 3 to 0 inches (3 inches thick)

A horizon – 0 to 4 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium platy structure; soft dry consistence, very friable moist consistence, slightly sticky and slightly plastic wet consistence; common coarse, medium, fine, and very fine roots to 12 inches; moderately effervescent, slightly alkaline (pH 7.7); gradual smooth boundary.

Bw horizon – 4 to 12 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard dry consistence, very friable moist consistence, slightly sticky and slightly plastic wet

consistence; moderately effervescent, slightly alkaline (pH 7.8); gradual wavy boundary.

Bk horizon – 12 to 26 inches; light yellowish brown (10YR 6/4) loam, brown (10YR 4/3) moist; massive structure; hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; common fine and very fine, and few coarse and medium roots; strongly effervescent, slightly alkaline (pH 7.8); gradual wavy boundary.

Ck horizon – 26 to 38 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive structure; hard dry consistence, firm moist consistence, slightly sticky and slightly plastic wet consistence; few coarse, medium, fine, and very fine roots; krotovinas present; moderately effervescent, moderately alkaline (pH 7.9); gradual wavy boundary.

C horizon – 38 to 64 inches; yellowish brown (10YR 5/4) loam-sandy loam, brown (10YR 4/3) moist; massive structure; hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; moderately effervescent, moderately alkaline (pH 7.9); did not hit bedrock.

Haverdad Range of Characteristics:

The described and sampled pedons WC4 and WC8 are typical of Haverdad and are within the range of characteristics for the Haverdad official soil series description (NRCS, June 2002).

Haverdad Soil Suitability and Salvage Depth Recommendations:

Based on an evaluation of the field and laboratory data (see Appendix), Haverdad loam is entirely suitable throughout its profile depth to 54 inches or more. Soil textures are good with loam dominating the upper profile to about 38 inches, and loam to sandy loam to gravelly loam present in the lower substratum. Soil salinity is low with electrical conductivity (EC) values about 0.5 to 2 in the upper profile, and about 0.5 to 4 in the lower "C" horizon. Sodium Adsorption Ratio (SAR) is generally less than 1.0 but can range up to about 4.5 to 6.0 below 14 inches in some

pedons. Soil reaction (pH) is slightly to strongly alkaline with values between 7.7 and 8.5. Calcium carbonate content ranges from about 6 to 11 percent. Organic matter content ranges from about 1.2 to 1.9 percent in the surface layer, to about 0.9 to 1.5 percent at depth in the profile.

If needed, the entire profile to 54 inches or more could be salvaged for use in reclamation activities. The better soil material is in the approximate upper 28 inches. Soil texture is loam and organic matter is about 1 to almost 2 percent. EC and SAR are generally low. Soil texture is good and the soil material can be easily handled. If a more limited amount of soil material is needed, the upper 28 inches can be salvaged as Topsoil. Additional underlying material could be salvaged, as needed, for use as Subsoil.

Map Unit C: Strych Variant, shallow to moderately deep, 2 to 6% slopes

Strych Variant was described and sampled at two representative locations (WC5 and WC9). Strych (deep) was previously mapped in the area as a 10% soil inclusion in NRCS Map Unit 52 (Jansen and Borchert, 1988). Although the official Strych soil series is deep to very deep, the site-specific Strych Variant soil on the Wildcat study area is shallow to moderately deep (10 inches to slightly greater than 20 inches to sandstone bedrock). Strych Variant is developing in thin slopewash alluvium and residuum from calcareous sandstone. Vegetation is open, scattered Pinyon-Juniper woodland with a mixed grass understory.

Strych Variant is shallow to moderately deep and well drained. Strych Variant typically has a pale brown to yellowish brown gravelly to very gravelly loam surface layer about 3 inches thick. The "Bw" cambic upper subsoil layer is a pale brown to light yellowish brown gravelly to very gravelly loam to a depth of about 8 or 9 inches. The underlying "Bk" calcic horizon is a pale to very pale brown very to extremely gravelly loam to sandy loam to a depth of about 15 or 16 inches. The substratum is a mixture of "C" horizon and paralithic "Cr" extremely gravelly loam to bedrock encountered at about 20 to 23 inches in depth.

Strych Variant has moderately rapid permeability, low available water capacity, and an effective rooting depth equal to the depth to bedrock. The organic matter content of the surface layer is about 1 to 3 percent. Runoff is medium, and the water erosion hazard is moderate. The Range Site is Semidesert Bouldery Loam (Jansen and Borchert, 1988). Strych Variant is classified as a "Loamy-skeletal, mixed, superactive, mesic, shallow Ustic Haplocalcid". The most recent NRCS official soil series description for Strych, dated October 2002, is on file at Mt. Nebo Scientific.

Strych Variant Pedon WC5 Site and Profile Description:

Map Unit C; 8% slope; south aspect; Pinyon-Juniper and scattered mixed grasses vegetation; thin residuum from sandstone; upland low ridge; slight erosion; 2 inches of coal fines deposition from adjacent Wildcat Loadout facility; soil slightly moist at time of sampling, 3-12-03; not sampled for laboratory analysis.

Coal Fines – 2 to 0 inches (2 inches thick, varies up to 6 inches thick)

A horizon – 0 to 3 inches; pale brown (10YR 6/3) gravelly loam with about 20% sandstone gravels, brown (10YR 5/3) moist; moderate medium granular structure; soft dry consistence, very friable moist consistence, slightly sticky and slightly plastic wet

consistence; many fine and very fine, common medium and coarse roots to 8 inches; strongly effervescent; gradual smooth boundary.

Bw horizon – 3 to 8 inches; pale brown (10YR 6/3) gravelly loam with about 25% sandstone gravels, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard dry consistence; friable moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent; gradual wavy boundary.

Bk horizon – 8 to 15 inches; very pale brown (10YR 7/30) very gravelly silt loam to light silty clay loam with about 45% sandstone gravels; massive structure; very hard dry consistence, firm moist consistence, sticky and slightly plastic wet consistence; few coarse, medium, fine, and very fine roots; violently effervescent; gradual wavy boundary.

C/Cr mixed horizon (weathered, fractured sandstone with calcium carbonate and soil fines in cracks and beneath rock fragments) – 15 to 20 inches; pale brown (10YR 6/3) extremely gravelly loam with about 65% sandstone gravels, brown (10YR 5/3) moist; massive structure; very hard dry consistence, firm moist consistence, slightly sticky and slightly plastic wet consistence; few roots in cracks and beneath rock fragments; violently effervescent.

Strych Variant Pedon WC9 Site and Profile Description:

Map Unit C; 8% slope; south aspect; Pinyon-Juniper and mixed grasses vegetation; thin eolian over thin residuum from sandstone; low weathered ridge; slight erosion; 1 inch of coal fines deposition from adjacent Wildcat Loadout facility; soil slightly moist to 9 inches at time of sampling, 3-12-03; sampled for laboratory analysis.

Coal Fines – 1 to 0 inches (1 inch thick)

A horizon – 0 to 3 inches; yellowish brown (10YR 5/4) very gravelly loam with about 25% gravel size sandstone chips, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; slightly hard dry consistence, friable moist consistence; slightly sticky and slightly plastic wet consistence; many medium, fine, and very fine roots to 9 inches; strongly effervescent, slightly alkaline (pH 7/6); clear smooth boundary.

Bw horizon – 3 to 9 inches; light yellowish brown (10YR 6/4) very gravelly loam with about 55% gravel size sandstone chips, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard-hard dry consistence, friable moist consistence, slightly sticky and slightly plastic wet consistence; strongly effervescent, slightly alkaline (pH 7.5); gradual wavy boundary.

Bk horizon – 9 to 16 inches; pale brown (10YR 6/3) extremely gravelly loam-sandy loam with about 75% gravel size sandstone chips, brown (10YR 5/3) moist; massive structure; hard-very hard dry consistence, friable moist consistence, slightly sticky and slightly plastic

wet consistence; common to few medium, fine and very fine roots; violently effervescent, slightly alkaline (pH 7.8); gradual wavy boundary.

C/Cr mixed horizon (weathered, fractured sandstone with calcium carbonate and soil fines in cracks and beneath rock fragments) – 16 to 23 inches; pale brown (10YR 6/3) extremely gravelly sandy loam with over 75% gravel and cobble size sandstone chips, brown (10YR 5/3) moist; massive structure; very hard dry consistence, firm moist consistence, slightly sticky and slightly plastic wet consistence; few roots in cracks and beneath rock fragments; violently effervescent; horizon not sampled for laboratory analysis.

Strych Variant Range of Characteristics:

Depth to the weathered sandstone contact ranges from about 15 to 16 inches. Coarse fragment content ranges from 20 to 25% for the surface layer, from 25 to 55% for the upper subsoil layer (Bw), from 45 to 75% for the lower subsoil layer (Bk), and over 65% for the weathered substratum. Reaction (pH) is typically slightly alkaline (pH from 7.5 to 7.8). Soil fines are typically loam to sandy loam.

Strych Variant Soil Suitability and Salvage Depth Recommendation:

Strych Variant is entirely suitable for salvage. EC and SAR are very low, organic matter content ranges from 2.6% in the surface layer, to 2.3% in the upper subsoil, to 0.9% in the lower subsoil. Calcium carbonate content is fair rated with values ranging from 21 to 27 percent. Soil texture (fines) are loam to sandy loam. Coarse fragment content can be moderate to very high. The upper 12 inches can be salvaged as Topsoil, with the underlying material left in place to aid reclamation after mining activities are completed. For laboratory reports, refer to the Appendix

of this document.

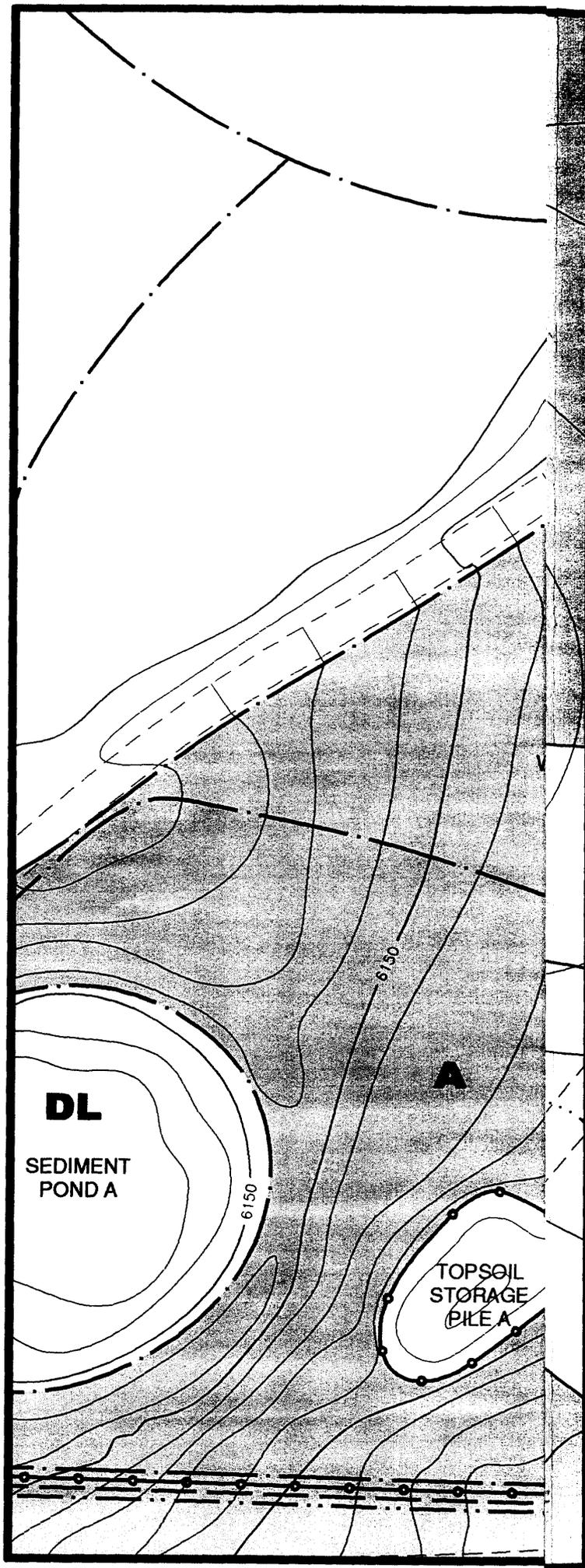
Map Unit DL: Disturbed Land

One sedimentation pond is present in the study area, and it is mapped as Disturbed Land. It is immediately adjacent to the current Wildcat Loadout facility. Soil salvage was not evaluated and is not recommended due to the amount of coal fines deposition in the pond. In addition, there is another Disturbed Land delineation in the study area – a recent oil and gas drilling pad. This bladed and highly compacted pad area is in the south-central to south-east portion of the study area, and has no soil available for salvage. It appears that topsoil was not salvaged during the construction of the pad because no soil stockpile was evident near the pad during the current soil survey.

REFERENCES

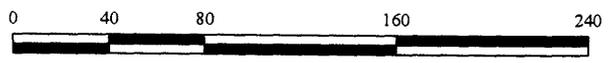
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LEGEND

- A** MAP UNIT A
HERNANDEZ LOAM, 1 TO 6% SLOPES
- B** MAP UNIT B
HAVERDAD LOAM, 2 TO 8% SLOPES
- C** MAP UNIT C
STRYCH VARIANT, SHALLOW TO
MODERATELY DEEP, 2 TO 6% SLOPES
- DL** MAP UNIT D
DISTURBED LAND
- SOIL SAMPLE LOCATIONS



SCALE: 1" = 80'

SOIL SURVEY MAP
12 ACRE STUDY AREA



ANDALEX RESOURCES, INC.
WILDCAT LOADOUT



MT. NEBO SCIENTIFIC, INC.
RESEARCH & CONSULTING

FIELD MAPPED: J. NYENHUIS	CHECKED: P. COLLINS
DRAWN: G. BARTON	DATE: JULY 08, 2003
FILE: MAP/MT NEBO/ANDALEX-WILDCAT/12 ACRE SOIL V01.DWG	

APPENDIX
(Laboratory Data)

Soil and Plant Analysis Lab
255 WIDB
Brigham Young University
Provo, Utah 84602
801-378-2147

Name: Rick Collins/Mt. Nebo
Address: P.O. Box 337
City, ST, ZIP: Springville, UT 84663
Date: 3/14/03

SOIL ID: Wildcat

Customer Sample ID	ppm P	ppm NO3-N	%OM	pH	EC dSM	%Sand	%Clay
Wildcat 1 East 0-13"	4.52	4.39	2.79	7.68	0.65	43.84	24.72
Wildcat 1 East 13-23"	0.03	5.32	0.56	7.83	0.58	47.84	16.72
Wildcat 1 East 23-54"	1.51	2.07	0.67	8.18	2.00	26.56	29.72
Wildcat 2 North 0-12"	3.77	4.13	3.64	7.81	0.62	38.56	24.72
Wildcat 2 North 12-32"	0.79	2.67	0.90	7.83	0.60	32.20	25.72
Wildcat 2 North 32-54"	4.99	1.23	0.48	8.46	3.00	32.56	23.72

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Name: Rick Collins/Mt. Nebo
Address: P.O. Box 337
City, ST, ZIP: Springville, UT 84666
Date: 3/14/03

SOIL ID: Wildcat

Customer Sample ID	%Silt	ppm Ca-SAR	ppm Mg-SAR	ppm K-SAR	ppm Na-SAR	SAR
Wildcat 1 East 0-13"	31.44	129.20	29.44	40.65	13.51	0.28
Wildcat 1 East 13-23"	35.44	97.56	36.75	6.90	17.34	0.38
Wildcat 1 East 23-54"	43.72	49.15	142.00	6.10	60.82	0.99
Wildcat 2 North 0-12"	36.72	115.10	21.62	10.87	16.31	0.36
Wildcat 2 North 12-32"	42.08	92.96	30.80	9.29	21.07	0.48
Wildcat 2 North 32-54"	43.72	32.78	220.40	22.23	469.70	6.46

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Name: Rick Collins/Mt. Nebo
Address: P.O. Box 337
City, ST, ZIP: Springville, UT 84666
Date: 3/14/03

SOIL ID: Wildcat

Customer Sample ID	%Moisture Sat.	%CaCO ₃	ppm HCO ₃
Wildcat 1 East 0-13"	35.17	9.66	270.25
Wildcat 1 East 13-23"	33.50	18.68	181.90
Wildcat 1 East 23-54"	39.56	15.55	161.11
Wildcat 2 North 0-12"	36.60	10.77	187.10
Wildcat 2 North 12-32"	37.29	13.75	174.11
Wildcat 2 North 32-54"	34.70	15.11	166.31



Colorado State University
Soil, Water and Plant Testing Laboratory
Natural & Environmental Sciences Bldg - A319
Fort Collins, CO 80523-1120

James Nyenhuis, Certified Soil Scientist

Mr Patrick Collins/Mt Nebo Scientific Inc
330 East 400 South Suite 6
P O Box 337
Springville UT 84663

(970) 491-5061 FAX: 491-2930
BILLING: 5319592

DATE RECEIVED: 03-17-2003
DATE REPORTED: 04-15-2003

RESEARCH SOIL ANALYSIS
ANDALEX RESOURCES, WILDCAT LOADOUT, HELPER, UTAH

Lab #	Sample ID #	pH	paste-EC mmhos/cm	% saturation	Lime Estimate	% OM	NO ₃ -N	P	K	AB-DTPA Extract			
										Zn	Fe	Mn	Cu
R3518	WC4 0-4	8.3	0.9	37.2	High	1.2	1.4	5.2	176	<0.01	4.49	1.05	0.63
R3519	WC4 4-14	8.5	0.7	36.7	High	1.0	1.5	4.5	147	<0.01	3.52	0.83	0.57
R3520	WC4 14-28	8.3	1.7	33.4	High	1.0	1.2	2.6	141	<0.01	4.11	0.72	0.87
R3521	WC4 28-58	8.0	4.2	36.2	High	0.9	0.9	3.4	117	<0.01	2.52	0.56	0.71
R3522	WC6 0-3/2	7.9	0.6	36.4	High	2.1	3.0	11.0	360	0.16	4.06	2.10	1.50
R3523	WC6 3/2-13	7.8	0.5	41.3	High	1.6	3.2	0.5	192	<0.01	3.81	0.97	0.93
R3524	WC6 13-25	8.0	0.5	37.7	High	1.2	2.3	0.5	84.9	<0.01	6.19	0.97	0.95
R3525	WC6 25-38	8.4	5.5	39.8	High	1.2	1.4	1.4	97.9	<0.01	7.03	0.83	0.77
R3526	WC6 38-64	8.5	10.1	45.6	High	1.7	1.6	4.5	174	0.07	6.12	0.77	1.14
R3527	WC7 0-3	7.9	0.5	35.1	High	2.6	1.8	7.5	274	0.29	4.62	1.78	1.54
R3528	WC7 3-10	7.8	0.5	36.5	High	2.1	2.2	0.5	273	0.05	4.27	0.95	1.29
R3529	WC7 10-22	7.9	0.4	41.1	High	1.9	3.0	0.4	103	<0.01	4.72	1.03	1.14
R3530	WC7 22-38	8.3	1.7	47.2	High	1.8	1.7	1.4	116	<0.01	4.77	1.10	0.91
R3531	WC7 38-56	8.6	2.4	36.5	High	1.2	1.4	4.0	106	<0.01	4.42	0.77	0.64
R3532	WC8 0-12	7.7	0.9	36.1	High	1.9	18.9	3.3	207	0.23	4.34	1.14	1.44
R3533	WC8 12-26	7.8	0.6	37.1	High	1.7	7.5	0.5	159	<0.01	3.51	0.74	0.93
R3534	WC8 26-54	7.9	0.4	33.5	High	1.5	2.6	0.6	81.5	<0.01	4.68	0.81	1.06
R3535	WC9 0-3	7.6	0.6	42.5	High	2.6	6.1	2.5	171	0.18	6.91	1.80	1.38
R3536	WC9 3-9	7.5	1.0	45.9	High	2.3	11.5	0.6	104	<0.01	5.51	1.28	1.04
R3537	WC9 9-16	7.8	0.5	43.4	High	0.9	6.1	0.6	55.3	0.01	3.18	0.86	1.03
R3538	WC10 0-12	8.0	1.7	38.1	High	1.5	1.2	1.7	91.5	<0.01	4.36	0.72	0.64
R3539	WC10 12-30	8.0	8.5	42.5	High	1.9	0.9	4.4	115	0.04	5.14	0.81	0.63
R3540	WC10 30-62	8.0	12.0	35.0	High	1.2	0.9	3.8	84.7	0.08	2.49	0.67	0.35

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Copy to James Nyenhuis, Certified Soil Scientist

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RESEARCH SOIL ANALYSIS
 ANDALEX RESOURCES, WILDCAT LOADOUT, HELPER, UTAH

Lab #	Sample ID #	% Sand Silt Clay			Texture	very fine sand from hydrometer	% CaCO ₃ equiv	meq/L				SAR
		Sand	Silt	Clay				Ca	Mg	Na	K	
R3518	WC4 0-4	42	35	23	Loam	38	11.8	2.0	6.8	2.2	0.6	1.0
R3519	WC4 4-14	42	38	20	Loam	42	12.8	0.9	5.9	1.4	0.6	0.7
R3520	WC4 14-28	40	40	20	Loam	38	13.6	2.7	5.4	11.3	0.6	5.6
R3521	WC4 28-58	48	36	16	Loam/Sandy Loam	46	11.3	15.4	17.9	18.8	<0.1	4.6
R3522	WC6 0-3 1/2	36	36	28	Clay Loam	31	10.5	3.5	1.5	1.7	0.9	1.1
R3523	WC6 3 1/2-13	30	40	30	Clay Loam	30	14.2	2.9	1.4	0.8	0.4	0.5
R3524	WC6 13-25	38	39	23	Loam	38	11.6	1.8	2.3	1.3	0.2	0.9
R3525	WC6 25-38	38	41	21	Loam	38	11.8	4.1	21.5	32.5	0.1	9.1
R3526	WC6 38-64	28	40	32	Clay Loam	24	11.8	4.8	29.8	69.3	0.2	16.7
R3527	WC7 0-3	40	34	26	Loam	38	6.40	3.8	1.2	0.7	0.3	0.5
R3528	WC7 3-10	38	46	16	Loam	38	7.10	2.9	1.1	0.7	0.4	0.5
R3529	WC7 10-22	30	42	28	Clay Loam	29	14.2	1.6	1.7	0.8	0.1	0.6
R3530	WC7 22-38	21	48	31	Clay Loam	18	16.6	1.8	9.4	6.8	0.2	2.9
R3531	WC7 38-56	40	41	19	Loam	40	12.3	1.0	8.6	14.9	0.5	6.8
R3532	WC8 0-12	36	45	19	Loam	36	6.17	6.3	1.6	0.5	0.2	0.3
R3533	WC8 12-26	39	39	22	Loam	39	9.43	3.4	1.1	0.7	0.3	0.4
R3534	WC8 26-54	42	39	19	Loam	42	8.15	1.7	1.2	0.7	0.1	0.6
R3535	WC9 0-3	48	29	23	Loam	37	27.1	3.6	1.1	0.5	0.3	0.3
R3536	WC9 3-9	49	30	21	Loam	47	21.7	4.5	2.0	0.5	1.6	0.3
R3537	WC9 9-16	52	30	18	Loam/Sandy Loam	51	21.8	2.8	1.4	0.4	0.1	0.3
R3538	WC10 0-12	34	44	22	Loam	33	14.4	7.2	7.8	1.3	<0.1	0.5
R3539	WC10 12-30	22	50	28	Clay Loam	17	10.7	17.4	25.7	38.9	<0.1	8.4
R3540	WC10 30-62	43	39	18	Loam/Sandy Loam	43	8.04	18.0	28.6	50.4	<0.1	10.4

APPROVED
 TITLE

James R. Lohf
 Extension Soil Testing Specialist

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