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ACT/007/012
#2



**U. S. Steel
Mining Co., Inc.**

a Subsidiary of United States Steel Corporation

WESTERN DISTRICT

P.O. BOX AE
PAONIA, COLORADO 81428
303/527-4816

October 29, 1984

Dianne Nielson
Director
State of Utah
Division of Oil, Gas & Mining
4241 State Office Building
Salt Lake City, UT 84114

Re: Wellington Coal Cleaning Plant
Vegetation Study of Topsoil
Borrow Area
ACT/007/012

Dear Dianne:

As required by the subject permit, I am enclosing eight copies of a vegetation study of the topsoil borrow area at the Wellington Coal Cleaning Plant. Please insert the enclosed papers in Appendix H of the Operation and Reclamation Plan.

Sincerely,

Glenn H Sides (UKW)

Glenn H. Sides
General Superintendent

GHS:fs
cc: V.R. Watts(3)
B.A. Filas
B.L. Kirkwood
EC file w/o enc

RECEIVED

NOV 01 1984

DIVISION OF OIL
GAS & MINING

VEGETATIVE SAMPLING OF THE
TOPSOIL BORROW AREA OF THE
WELLINGTON COAL CLEANING PLANT

Prepared by

MT. NEBO SCIENTIFIC RESEARCH AND CONSULTING
290 East 1230 North
Springville, Utah 84663
(801) 489-6937

for

U.S. STEEL MINING CO., INC.
P.O. Box AE
Paonia, Colorado 81428

by

Patrick D. Collins, Ph.D.

October 1984

INTRODUCTION

The purpose of this report is to provide ecological descriptions and sampling data for the topsoil borrow area of the Wellington Coal Cleaning Plant, Carbon County, Utah.

Previous Studies

Previous studies of the vegetative communities associated with the activities of the Wellington Coal Cleaning Plant have been prepared by *MT. NEBO SCIENTIFIC* and submitted by U.S. Steel Mining Company. The first study was entitled "Reclamation and Revegetation of the Wellington Coal Cleaning Plant". The final report of this study provided ecological sampling results for each community type that has been disturbed by the activities of the coal cleaning process. The report also provided results from soil sampling in the native and disturbed areas of each community type. Furthermore, the final report outlined the major disturbance types including some potentials and limitations of several reclamation techniques that could be used upon termination of the cleaning plant. The study also recommended implementation of reclamation test plots to explore the success of several reclamation techniques and to provide data to insure more successful final reclamation of the area.

A subsequent report was prepared that outlined the problems of the area that could adversely affect success of final reclamation. Also included in the report were detailed test plot designs proposed to explore the success of several techniques specific to the disturbed areas.

It is proposed in the final reclamation plan to remove topsoil from the valley bottoms as an aid to restore adequate growing media for revegetation. Adequate depth for successful plant establishment required for revegetation is unknown for each disturbance type. Therefore, this will be one of the variables to be tested in the reclamation test plots.

As briefly mentioned above, the purpose of this report is to provide the results from ecological sampling of the vegetation from the "topsoil borrow area" that will be used for the test plots and for final reclamation. Soil samples have also been taken of the area and reported previously.

METHODS

Quantitative and qualitative data were taken on the vegetative communities of the topsoil borrow area. Transect lines were randomly placed in the plant communities. Following line placement bi-directional random placement of the

sampling plots were designed to provide unbiased accuracy of the data compiled. Ocular methods using square meter quadrats were employed to estimate the cover of the communities. Relative frequency, composition, percent slope, exposure, grazing use, animal disturbance and other appropriate notes were taken at each sample location.

Sample adequacy was met for total living cover of the plant communities. Parameters to achieve sample adequacy were based on those recommended by the State of Utah, Division of Oil, Gas and Mining for grassland communities ($90\% \pm .10$).

Production and range class were estimated on the site by the U.S. Department of Agriculture, Soil Conservation Service.

SAMPLING RESULTS

Much of the topsoil borrow area is presently under cultivation and being used to pasture livestock. Prior to an attempt to cultivate the area with desirable forage species, the native vegetative communities of the borrow area were probably dominated by greasewood (*Sarcobatus vermiculatus*) and saltbrush (*Distichlis spicata*). Described below are the two vegetative types located in the proposed borrow area of the Wellington Coal Cleaning Plant.

Hordeum-Poa Community

The majority of the borrow area consists of an irrigated field that is dominated by foxtail barley (*Hordeum jubatum*) and poverty weed (*Iva axillaris*). Total living cover of this community was 44.10% of which 60.50% were grasses and 38.25% were forbs (Table 18). Percent cover and relative frequency by species of this community are shown on Table 19.

Range condition was rated as fair with an estimated production of 2,500 lbs/acre (see attached S.C.S. letter).

Distichlis Community

The other community that lies within the boundaries of the topsoil borrow area is an unirrigated *Distichlis* (saltgrass) community. This community lies east of the irrigated pasture and west of the Price River. The area has a mean total living cover of 85.60%. Composition by lifeform is 74.47% forbs and 28.36% grasses (Table 20). The area is dominated by a number of weedy species i.e. smotherweed (*Bassia hyssopifolia*) and overtly weed (*Iva axillaris*). The dominate native plant species is saltgrass (*Distichlis spicata*). For a list of mean cover values by species refer to Table 21.

The Soil Conservation Service estimated the entire borrow area as in fair range condition with approximately 2,500 lbs/acre production (see attached S.C.S. letter).

TABLE 18: Total living cover and composition of the irrigated *Hordeum-Poa* pastures of the Wellington Coal Cleaning Plant area. The table shows means, standard deviations and sample sizes.

<u>TOTAL COVER</u>	<u>% MEAN COVER</u>	<u>STANDARD DEVIATION</u>	<u>SAMPLE SIZE</u>
Total Living Cover*	44.10	7.74	20
Litter	1.25	2.07	20
Bareground	53.45	7.96	20
Rock	--	--	20
 <u>COMPOSITION</u>			
Shrubs	--	--	20
Forbs	38.25	13.59	20
Grasses	60.50	12.18	20

* Sample size insures 90% accuracy within 10% of the true mean (see formula below).

$$n_{\text{MIN}} = \left| \frac{s(1.65)}{\bar{x}(.1)} \right|^2 = 8.39 \text{ samples}$$

where s = standard deviation

\bar{x} = mean

TABLE 19: Mean percent cover, standard deviation, sample size and relative frequency by species of the irrigated Horeum-Poa pastures of the Wellington Coal Cleaning Plant area.

<u>SPECIES</u>	<u>% MEAN COVER</u>	<u>STANDARD DEVIATION</u>	<u>SAMPLE SIZE</u>	<u>RELATIVE FREQUENCY</u>
<i>Convolvulus arvensis</i>	1.00	2.62	20	15.00
<i>Iva axillaris</i>	14.60	6.12	20	95.00
<i>Lactuca serriola</i>	1.00	2.49	20	20.00
<i>Oenothera flava</i>	.25	1.12	20	5.00
<i>Hordeum jubatum</i>	12.25	12.82	20	70.00
<i>Festuca sp.</i>	1.25	3.19	20	15.00
<i>Poa secunda</i>	13.75	9.98	20	80.00

TABLE 20: Total living cover and composition of the unirrigated Distichlis pastures of the Wellington Coal Cleaning Plant area. The table shows means, standard deviations and sample sizes.

<u>TOTAL COVER</u>	<u>% MEAN COVER</u>	<u>STANDARD DEVIATION</u>	<u>SAMPLE SIZE</u>
Total Living Cover*	85.60	6.89	20
Litter	7.10	3.34	20
Bareground	7.30	5.99	20
Rock	--	--	20
<u>COMPOSITION</u>			
Shrubs	--	--	20
Forbs	74.47	28.36	20
Grasses	28.36	31.40	20

* Sample size insures 90% accuracy within 10% of the true mean (see formula below).

$$n_{\text{MIN}} = \left| \frac{s(1.65)}{\bar{x}(.1)} \right|^2 = 1.76 \text{ samples}$$

where s = standard deviation

\bar{x} = mean

TABLE 21: Mean percent cover, standard deviation, sample size and relative frequency by species of the unirrigated *Distichlis* pastures of the Wellington Coal Cleaning Plant area.

<u>SPECIES</u>	<u>% MEAN COVER</u>	<u>STANDARD DEVIATION</u>	<u>SAMPLE SIZE</u>	<u>RELATIVE FREQUENCY</u>
<i>Bassia hyssopifolia</i>	41.25	26.15	20	100.00
<i>Convolvulus arvensis</i>	8.25	11.27	20	50.00
<i>Descurainia pinnata</i>	1.95	5.89	20	20.00
<i>Iva axillaris</i>	8.35	3.84	20	100.00
<i>Lactuca serriola</i>	.35	1.18	20	10.00
<i>Plantago patigonia</i>	.05	.22	20	5.00
<i>Bromus tectorum</i>	.45	1.23	20	15.00
<i>Distichlis spicata</i>	23.90	28.74	20	60.00
<i>Poa secunda</i>	1.00	4.47	20	5.00

TABLE 22: Plant species of the proposed topsoil borrow area of the Wellington Coal Cleaning Plant area.

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>
<u>Forbs</u>	
<i>Bassia hyssopifolia</i>	Smotherweed
<i>Convolvulus arvensis</i>	Bindweed
<i>Descurainia pinnata</i>	Tansy mustard
<i>Iva axillaris</i>	Povertyweed
<i>Lactuca serriola</i>	Wild lettuce
<i>Oenothera flava</i>	Evening primrose
<i>Plantago patigonia</i>	Desert plantain
<u>Grasses</u>	
<i>Bromus tectorum</i>	Cheatgrass
<i>Distichlis spicata</i>	Saltgrass
<i>Festuca sp.</i>	Fescue
<i>Hordeum jubatum</i>	Foxtail barley
<i>Poa secunda</i>	Sandberg bluegrass



United States
Department of
Agriculture

Soil
Conservation
Service

350 North 4th East
Price, Utah 84501

June 25, 1984

Mt. Nebo Scientific
290 East 1230 North
Springville, Utah 84663

Dear Pat:

On June 19th, Barb Filas and I visited the sites that you requested production estimates on.

The two areas involved have both been disturbed by farming of the area. This area has been plowed, seeded, and irrigated in the past. An attempt has been made to develop some irrigated pasture using alfalfa and tall fescue.

The two areas are dominated by weeds and undesirable species such as poverty weed, foxtail barley and morning glory.

The native range site is a salt meadow. The estimated production is 2,500 pounds per acre with a condition class of fair. The soils are mixed alluvial land that are generally slow to drain and mottled.

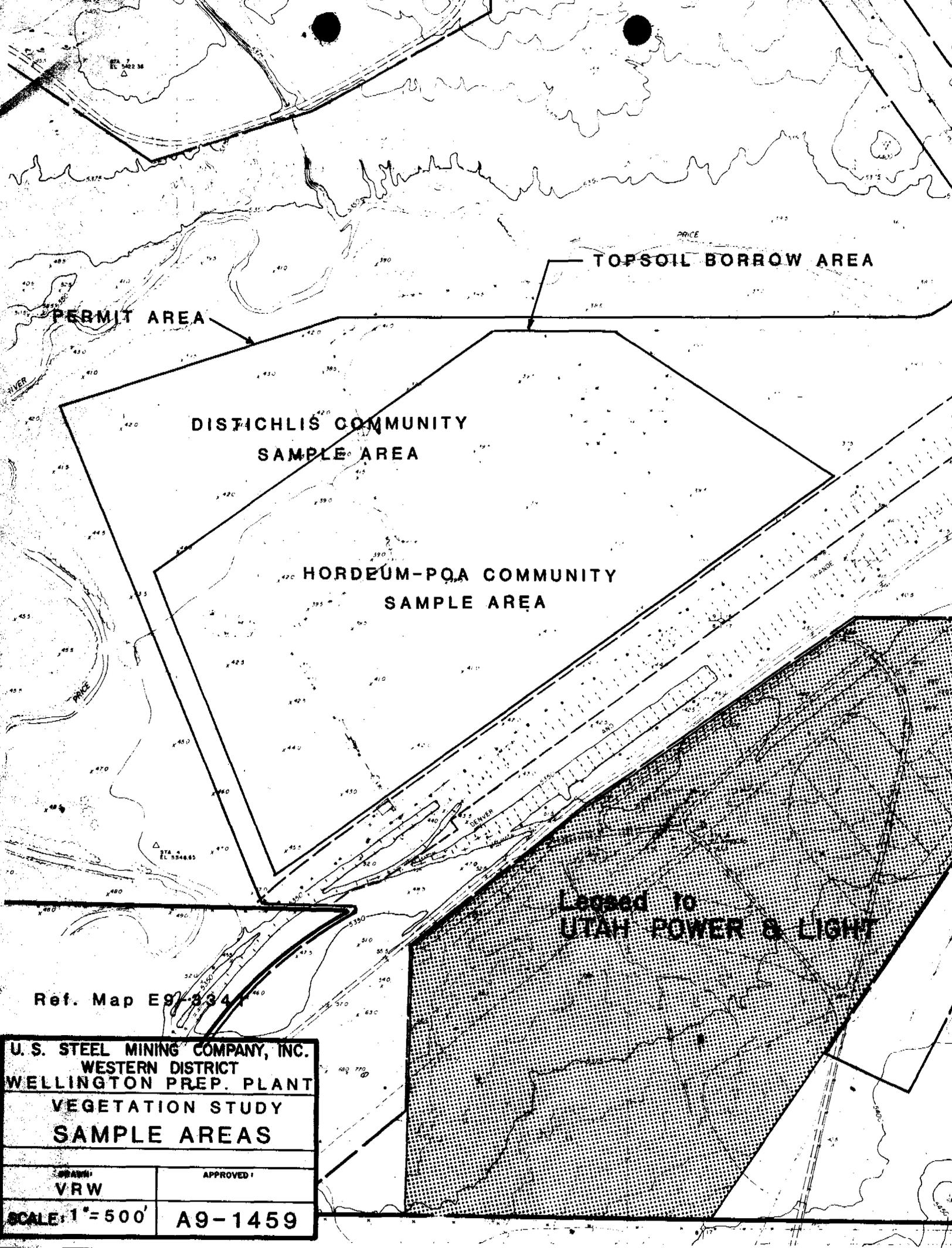
Copies of the transects can be obtained upon request. If there are any questions, I can be reached at 637-0041.

Don M. Andrews

Don M. Andrews
Range Conservationist

cc: Barb Filas





PERMIT AREA

TOPSOIL BORROW AREA

DISTICHLIS COMMUNITY
SAMPLE AREA

HORDEUM-POA COMMUNITY
SAMPLE AREA

Leased to
UTAH POWER & LIGHT

Ref. Map E9-234

U. S. STEEL MINING COMPANY, INC.	
WESTERN DISTRICT	
WELLINGTON PREP. PLANT	
VEGETATION STUDY	
SAMPLE AREAS	
DRAWN: VRW	APPROVED:
SCALE: 1" = 500'	A9-1459