0002

Native Plants

MAW
file coal
ACT/007/026

December 12, 1980

Mr. Rocky Beavers
United States Department of the Interior
Office of Surface Mining
Reclamation and Enforcement
Brooks Towers
1020 15th St.
Denver, Colorado 80202

Dear Rocky:

We have recently been asked by our client, Plateau Mining Company, to respond to a communication between Dr. Robert I. Starr and Ms. Mary Ann Wright of the Utah Division of Oil, Gas, and Mining regarding clarification of our proposed and partially implemented experimental design for revegetating steep slopes on permit holdings near Waddis, Utah. The letter was dated November 18, 1980 (see enclosure).

The first point of clarification is regarding the use of small plots ranging in size from 10 feet square to 12 feet square. Concern was expressed by Dr. Starr regarding the small size of the plots. We similarly feel confined by such small plot sizes, however, spoil variability and slope and aspect differences limit plot size and the number of treatments that can be used. Based on the number of treatments and replicas proposed, the area needed to conduct the experiment is approximately 144 feet by 80 feet. Areas larger than this would mean placing some treatments on different spoil materials (e.g. mancos shale) as the roadbed cuts through several geological formations as it drops in elevation. We feel placing the plot treatments on several spoil materials would result in data that do not have adequate controls, which would make interpretation difficult, if not impossible.

The barrow area is essentially filled by the experimental plots; no additional area with comparable conditions occurs at that site. Hence, we are restricted from expanding plot size without reducing the number of treatments which are already minimal. Similarly, the coal refuse pile had to be specially constructed to provide an area that would not be subject to disturbance due to active disposal of coal refuse. It is, therefore, limited in size.

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In summary, experiments to be conducted require a rather large area that is homogenous as to spoil or overburden material. Plot size was as large as possible without introducing variations in vegetative response due to different substrate conditions. We, therefore, feel justified in using the smaller plot size given the alternatives which would tremendously limit information that could be achieved if either the number of treatments were reduced, replicas eliminated, or treatments placed on different substrates without proper experimental controls.

The second point of clarification requests that the use and amount of seed be stated. Approximately 30 PLS pounds of seed per acre were broadcast by hand because of the harsh site conditions which included rocky soils with predominantly steep, southfacing slopes.

Plant species used and their proportions are shown in the enclosed tables together with information on purity, germination, origin, etc. Selection of species to be used was based on species observed in adjacent undisturbed communities, species colonizing disturbed sites, and species known for successfully colonizing similar disturbed sites. Species from drier, more saline plant communities (e.g., Atriplex spp) were included because of the higher salinity levels reported for the coal refuse piles and the fact that disturbance has resulted in drier and warmer (south facing slopes) site conditions that existed prior to disturbance. Species selection was also based on seed availability (e.g., snowberry was not available this year due to a poor crop) and likelihood of establishment by seed as compared to transplants. Container-grown plants to be used include those that are more difficult to establish from seed. The species to be used were described in the original study design outline.

The third point of clarification requests that the quantity and type of fertilizer to be used be stated. The proposed fertilizer mixture for the treatments will hsve a ratio of 16-16-8 (N-P-K). Fertilizer will be applied by hand in late spring after germination and emergence. to prevent encouraging weedy species known to take advantage of fall or winter fertilization. Application rates will be 500 pounds of mixture per acre (i.e., 80 lbs/acre N, 80 lbs/acre P, and 40 lbs/acre K). Because of limitations in surface areas having uniform spoil materials, only one fertilizer application rate will be used with an appropriate non-fertilized control.

If you have other questions, or require further clarification, please feel free to contact me.

Sincerely,

Dennis J. Hansen

Dennis J. Hansen, Ph.D.
Manager
Reclamation Services

DJH:brg

Enclosures

cc: Mr. Ben A. Grimes
Ms. Mary Ann Wright

6 Lbs. Total % of Mix	High Grass/Low Forb and Shrub Mix	
84%		
14	Western wheatgrass (Agropyron smithii)	
14	Indian ricegrass (Oryzopsis hymenoides)	
14	Pubescent wheatgrass (Agropyron trichophorum)	
14	Streambank wheatgrass (Agropyron riparium) "Sodar"	
14	Russian wildrye (Elymus junceus)	
14	Mountain brome (Bromus marginatus)"Bromar" treated if available	
16%		
4	Northern sweetvetch (Hedysarum boreale)	
4	Sanfoin (Onobrychis viciaefolia) "Onar"	
4	Alfalfa "Ranger" (Medicago sativa) inoculated	
4	Yellow sweetclover (Melilotus officinalis)	
100%		

6 Lbs. Total % of Mix	Low Grass/High Forb and Shrub Mix	
15%		
2.5	Russian wildrye (Elymus junceus)	
2.5	Western wheatgrass (Agropyron smithii)	
2.5	Streambank wheatgrass (Agropyron riparium) "Sodar"	
2.5	Pubescent wheatgrass (Agropyron trichophorum)	
2.5	Mountain brome (Bromus marginatus)	
2.5	Indian ricegrass (Oryzopsis hymenoides)	
85%		
12	Northern sweetvetch (Hedysarum boreale)	
2	Sainfoin (Onobrychis viciaefolia)	
8	Big sagebrush (Artemisia tridentata)	
3	Pacific aster (Aster chilensis)	
10	Rubber rabbitbrush (Chrysothamnus nauseosus)	
3	Rocky mtn. penstemon (Penstemon strictus)	
2	White yarrow (Achillea millefolium)	
10	Fourwing saltbush (Atriplex canescens)	
9	Shadscale (Atriplex confertifolia)	
7	Gardner saltbush (Atriplex gardneri)	
4	Prairie sage (Artemisia ludoviciana)	
3	True mtn. mahogany (Cercocarpus montanus)	
3	Green mormon tea (Ephedra viridis)	
3	Curlleaf mtn. mahogany (Cercocarpus ledifolius)	
3	Utah serviceberry (Amelanchier utahensis)	
100%		

SPECIES	LOT	(W) WEIGHT#	(P) PURITY%	$\frac{P \cdot W}{100}$ PURITY#	$\frac{p \cdot w/100}{W} \cdot 100$	(C) CROP	(#C) C·W/100	(E) WEED	(#E) E·W/100	(I) INERT	(#I) I·W/100	GERM	ORIGIN	TESTED
AGSM	227	.84	91.5	.7686	12.81	.80	.00672	.20	.00168	7.50	.063	80	MT	12-79
ORHY	294	.84	95.0	.7980	13.3	.00		.00		5.00	.042	70	NM	2-80
AGTR	356	.84	96.05	.8068	13.447	.00		.00		3.95	.0033	85	ID	
AGRI	532	.84	98.28	.8256	13.759	.04	.00034	.15	.00126	1.53	.0129	96	WA	8-80
GLJO	388	.84	97.83	.8218	13.696	.68	.0057	.03	.00025	1.46	.0123	90	MT	4-80
BRCA	337	.84	99.52	.8360	13.933	.00		.01	.00008	.47	.0039	90	WA	2-80
HEBO	327	.24	97.25	.2334	3.89	.00		.00		2.75	.0066		UT	
ONVI	482	.24	99.40	.2386	3.976	.28	.00067	.00		.32	.00077	91	MT	2-80
MESA	14	.24	99.52	.2388	3.981	.15	.00036	.16	.00038	.17	.00041	70	SD	7-79
MEOF	135	.24	99.80	.2395	3.992	.06	.00014	.04	.0001	.10	.00024	77	Canada	7-79
	W=	6.1				T#C =	.01393	T#E=	.00375	T#I=	.14542			
						$\frac{T\#C}{W} \cdot 100$	.232	$\frac{T\#E}{W} \cdot 100$	.063	$\frac{T\#I}{W} \cdot 100$	2.424			

SPECIES	LOT	(W) WEIGHT	(P) PURITY%	$\frac{P \cdot W}{100}$ PURITY#	$\frac{p \cdot w/100}{W} \cdot 100$	(C) CROP	(#C) C·W/100	(E) WEED	(#E) E·W/100	(I) INERT	(#I) I·W/100	GERM	ORIGIN	TESTED
ELTU	388	.15	97.83	.1467	1.0371	.68	.0010	.03	.0001	1.46	.0022	90	MT	4-80
AGSM	227	.15	91.50	.1373	.9700	.80	.0012	.20	.0003	7.50	.0113	80	MT	12-79
AGRI	532	.15	98.28	.1474	1.0418	.04	.0001	.15	.0003	1.53	.0023	96	WA	8-80
AGTR	356	.15	96.05	.1441	1.0182	.00		.00		3.95	.0059	85	ID	
BRCA	337	.15	99.52	.1493	1.0550	.00		.01	.00002	.47	.00071	90	WA	2-80
DRHY	294	.15	95	.1425	1.0071	.00		.00		5.00	.0075	70	NM	2-80
HEBO	327	.72	97.25	.7002	4.9484	.00		.00		2.75	.0198			
ONVI	482	.12	99.40	.1193	.84297	.28	.0003	.00		.32	.0004	91	MT	2-80
ARTR	530	6.0	11.55	.693	4.8975	.00		.00		88.65	5.3190	71	CO	1-80
CHNA	310	2.0	45.09	.9018	6.3731	.00		.00		54.91	1.0982	67	UT	3-80
	W=					T#C =		T#E=		T#I=				
						$\frac{T\#C}{W} \cdot 100$		$\frac{T\#E}{W} \cdot 100$		$\frac{T\#I}{W} \cdot 100$				

SPECIES	LOT	(W) WEIGHT	(P) PURITY%	$\frac{P \cdot W}{100}$ PURITY#	$\frac{p \cdot w/100}{W} \cdot 100$	(C) CROP	(#C) C·W/100	(E) WEED	(#E) E·W/100	(I) INERT	(#I) I·W/100	GERM	ORIGIN	TESTED
PEST	465	.18	98	.1764	1.2466	.00		.00		2.0	.0036	88	CA	6-80
ACMI	16	.12	95	.114	.8057	.00		.00		5.0	.006	88		
ATCA	320	.60	96	.576	4.0707	.00		.00		4.0	.024	52	UT	
ATCO	422	1.15	95	1.0925	7.7208	.00		.00		5.0	.0575	50	UT	
ATGA	156	2.00												
ARLU	433	2.0	1.75	.035	.2473	.00		.00		98.25	1.965	64	CO	9-80
CEMO	19	.18												
EPVI	115	.18	98	.1764	1.2466	.00		.00		2.0	.0036	55	UT	6-80
CELE	431	.18	95	.171	1.2085	.00		.00		5.0	.009	92	UT	
AMAL	519	.18												
	W=	14.15				T#C =	.0026	T#E=	.00072	T#I=	8.536			
						$\frac{T\#C}{W} \cdot 100$	.0184	$\frac{T\#E}{W} \cdot 100$	.0051	$\frac{T\#I}{W} \cdot 100$	60.3252			

(W does not include ATGA, CEMO, or AMAL