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October 3, 1979

RECEIVED
OCT 4 1979
MINING AND
EXPLORATION

Mr. Ralph Jerman
Utah Power & Light
P.O. Box 899
Salt Lake City, Utah 84110

RE: Revegetation Plans
Church Mine - ACT/015/017
Deer Creek Mine - ACT/015/018A

Dear Mr. Jerman:

Mr. Mike Thompson of the Division has asked me to review the revegetation plans submitted for compliance with violation #2 for the Church Mine and violation #4 for the Deer Creek Mine.

I have reviewed the plans and have the following comments and recommendations to offer for the revegetation of the estimated 5.5 disturbed acres at the two mines.

1. Seed mixture composition - The seed species proposed are acceptable only if native seed is not available at this time. The incorporation of some native species is strongly recommended. However, many seed collectors in Utah work strictly on contract and do not collect seed species which are not known to be in demand. For future reseedings a seed source should be contracted for well in advance.

Native species appropriate for the Church and Deer Creek Mines are:

Bearded or beardless bluebunch wheatgrass
Great Basin wildrye
Indian ricegrass
Big bluestem
Bottlebrush squirreltail
Blue grama
Bluebunch wheatgrass
Buffalo grass
Slender wheatgrass
Streambank wheatgrass
Thickspike wheatgrass

It is felt that due to the steepness of the slopes, the seeding as planned, of only grasses and forbs, is acceptable to the Division. The primary aim at this time is to establish a stabilizing vegetative cover. If stabilization is achieved, native shrubs will seed themselves into these harsh sites or they may be seeded in or planted several seasons later.

2. Seeding rate - The rate per acre must be increased to at least 20 pounds. These sites are disturbed, steep and in some instances, chemically harsh. This rate per acre or higher is standardly used for areas disturbed by mining in order to achieve any degree of success.

3. Time of planting - Seeding should take place in the late fall-winter period, not the late summer-early autumn period. Please refer to the enclosure entitled "Excerpts from Publication No. 68-3" for further information on this matter.

4. Soil amendments - It was noted that no testing of soils was done at the sites and yet the "Description of Existing Environment" on page 2 and 3 indicated the existence of various soil conditions. Utah State University provides a soil testing service and can make recommendations for needed soil amendments. The Division would advise Utah Power and Light Company to collect several representative composite soil samples (surface to 12" in depth) from each of the disturbed areas for chemical and physical analysis. The analysis should include the standard fertility test (pH, salinity, phosphorous, potassium, texture, lime, recommendations) and a sodium adsorption ratio, as a minimum.

5. Seed bed preparation - The Division agrees with the revegetation plans in that the "seed bed should be roughered by hand raking, where possible." Where this is not possible, the use of a chain or other mechanical device should be employed. Raking or roughing on the contour is highly preferable. However, it is acknowledged that the sites at these mines may only lend themselves to roughing from top to bottom of the slope.

6. Method of seeding - Utah Power and Light may use the method of their choice for seeding. However, experience with lack of success with hydro-seeding at other mines has led the Division to strongly caution against this method in areas which are not irrigated. For the small acreage involved, hand broadcasting has had the best success and therefore is the method of choice.

7. Mulch - The use of mulch is required for the revegetation of these sites. A soil-anchored straw mulch is commonly a successful method of mulching. Erosional control fabric which disintegrates as the seedlings grow or jute netting used alone or with straw mulch have been used with very good success on fill and cut slopes along highways. Please consult the enclosure on mulches for further information.

Should you have questions concerning this response to Utah Power and Light's revegetation plan, please do not hesitate to contact me. The Division is continually available for technical assistance at the operator's request.

Sincerely,

MARY ANN WRIGHT
RECLAMATION BIOLOGIST

MAW/te

cc: Carl Gurr, U.P.& L.
Chris Shingleton, U.P. & L.
Don Crane, O.S.M.

Enclosure: Seed Source List
Mulch Information
Seeding Methods Information

EXCERPTS FROM PUBLICATION NO. 68-3

"Restoring Big-Game Range in Utah"

- Dormancy of most seeds is broken by stratification-subjecting them to temperatures between 32° and 40° F. for a period of 6 to 20 weeks in moist sand, peat moss, or moist newspaper. Subjecting seeds to outside wintertime temperatures for similar periods also overcomes dormancy. Of course, fall and winter plantings take advantage of the cool temperatures and thus break dormancy naturally.

- Seeds must have a light covering of soil-usually one-fourth to one-half inch. Very small seeds (e.g., rubber rabbitbrush, big sagebrush, and sand dropseed) need no more than one-fourth inch of cover. Chaining and pipe harrowing are not likely to cover broadcast seed too deeply, and bolting depth rings to the disks prevents too deep covering in drilling. Covering seeds by more than one-half inch of soil generally reduces emergence. Deep planting is seldom desireable. Likewise, leaving seed uncovered after broadcasting is unsatisfactory except when moisture at planting time is unusually abundant.

When slopes are too steep for use of heavy machinery, planting must be done by hand. On such areas, corn planters or specially built Schussler[6] bitterbrush planters can be used advantageously to gage the depth and number of seeds planted of most species. Other similarly designed planters are available and can speed up hand-seeding on slopes.

Some compaction helps to improve stands, especially when seeds are planted in the spring. Packer wheels that follow the planting units on drills are particularly useful. Culti-packing or compaction by similar implements improves stands on soils that dry rapidly. The area where soil-packing equipment can be used to advantage is small, but it is worthwhile to use it when needed.

- Planting should be done in a season that gives promise of optimum conditions for establishment. Planting for range restoration may be either seeding or transplanting. Seeding is the usual means of establishing grasses, forbs, and a few shrubs; some shrubs can be propagated more satisfactorily by transplanting, and best success has come from transplanting in the spring.

Direct seeding in late fall and throughout the winter (mid-October through mid-February) gives good stands of most species. Although spring seeding of a few species (notably alfalfa, small burnet, fourwing saltbush, and winterfat) has sometimes been successful, it cannot be generally recommended. Winter seeding (late January and early February) on 5,000 acres of Daggett and Duchesne Counties successfully established alfalfa and fourwing saltbush. Wherever climate permits, winter seeding is preferred because it avoids the inherent dangers of precocious germination resulting from unseasonably warm temperatures for short periods in the fall.

Four major advantages of fall or winter seeding over spring seeding are:

1. It overcomes inherent dormancy.

2. Cold winter temperatures stimulate seedlings into more rapid growth.

3. The longer period of available adequate moisture produces larger seedlings, which can better withstand heat and drought in summer.

4. Loss of seed to seed-collecting animals is reduced because many of these animals hibernate.

When shrubs that have dormant seed must be seeded directly in the spring, seeds should be treated with a 3-percent solution of thiourea for 3 to 15 minutes to overcome some of this dormancy and to improve both emergence and establishment. This is particularly true for antelope bitterbrush. Planting of stratified seed is generally more successful for a greater number of species. However, care must be taken that stratified seeds do not dry out. Spring planting should be done as soon as the soil is dry enough to get necessary equipment on the land. This is usually before April 15 on Utah ranges. In the warmer blackbrush type in southwestern Utah, spring seeding should be completed before March 1. The suitable period for successful spring seeding (2 to 6 weeks) is short, contrasted with the 4-month suitable period through late fall and winter.

Transplanting of nursery stock, seedlings, and wildlings is usually most successful when completed while the ground is still moist from snowmelt. Spring transplanting should be done as soon as it is possible to get equipment on the land. Fall transplanting frequently fails because the ground has become so dry that the roots dry out and die. Bud sagebrush and common iris can be planted either in the spring or in the fall; both grow well after fall transplanting despite dry soil. Late fall planting of wildlings of these two plants, even into dry soil, survived nearly 100 percent; whereas a similar planting of big sagebrush and rubber rabbitbrush failed completely.

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[6]This bitterbrush seed planter was designed by Mr. Howard Schussler of Caldwell, Idaho.

SOURCES OF SEED,
SEEDLINGS, & SEEDING SERVICES IN UTAH

1. Kyle Christensen
4485 Ebony Avenue
Salt Lake City, Utah 84107

2. Michael Alder
(Seeds & seedlings)
Native Plants, Inc.
2842 South West Temple
Salt Lake City, Utah 84115
486-8154

3. Porter-Walton Company
250 West 400 South
Centerville, Utah 84014
295-4782 or 295-4124

4. Roy Grosbeck
3522 West Cambridge
Granger, Utah 84119

5. Steve Regan Company
451 South 400 West
Salt Lake City, Utah 84101

6. John C. Cook
387 North 800 East
American Fork, Utah 84003

7. Boyd E. Goble and Sons
Gunnison, Utah 84634

8. C and S Intermountain Seed Enterprises
Box 74
Ephraim, Utah 84627

9. Kent Jorgenson
130 East Second North
Ephraim, Utah 84627

10. Mark Plummer
190 North Second West
Ephraim, Utah 84627

11. Ron Stevenson
Ephraim, Utah 84627

12. Stevens Brothers Wildlands Seed and Nursery
Box 496
Ephraim, Utah 84627

13. William Roger Steward and Sons
Box 124
Ephraim, Utah 84627

14. S.M. Clark
Box 606
Cedar City, Utah 84720

15. Steve Ellis
Provo, Utah 84601
373-8320
(Asphalt Spraying, Strawblowing, Hydro-seeding)

16. Russel Wardel
Micro-Mulch Hydro-Seeding
5450 Green
Murray, Utah 84107
255-0586

## MULCHES

Mulches are particularly important in obtaining a satisfactory stand of seeded plants on harsh sites. They conserve soil moisture by reducing evaporation from the soil surface, and help minimize erosion.

Where annual precipitation is between ten and 18 inches, mulches are highly conducive to seedling establishment. This is particularly true on south and west facing slopes. In areas where annual precipitation is between 18 and 25 inches, mulches are not generally needed except perhaps on some extended south or west facing slopes. On arid areas where annual precipitation is between eight and ten inches, seeding success is variable even if mulches are used. Seedings in areas receiving less than eight inches of annual precipitation are subject to failure unless environmental conditions are considerably better than average during the establishment period or supplemental water is added.

Trials show that desert areas are almost impossible to seed artificially unless seeded in pits or basins along with mulches and added water. In arid areas where annual precipitation is less than eight inches, native vegetation will regenerate itself in disturbed areas if slopes are gentle. This may require from ten to 30 years unless supplemental water is added as needed.

Mulches conserve substantial soil moisture to a depth of 12 inches or more, resulting in a greater number of established seedlings and a more dense herbage cover than areas seeded without mulches. Therefore, most mulches, when properly applied, give added benefits in obtaining a stand of vegetation on disturbed areas.

### Types of Mulches

Many mulches are applied uniformly on the soil surface by mechanical means. Such mulches are universally adapted to most soil and slope conditions.

Wood Fiber - Wood fiber at 1,500 pounds per acre gives consistently favorable results under all conditions except in areas where frost heaving or excessive surface water flow exists. If wood fiber is applied at rates less than 1,000 pounds per acre or on steep unstable slopes, little benefit will be obtained.

Straw-asphalt: Straw at 3,000 pounds per acre, bound with asphalt at 300 gallons per acre, gives beneficial results but this mulch is expensive and is susceptible to being carried away by wind and water. Straw is often contaminated with grain and weed seed that produces excessive competition with newly planted grass seedlings. Straw-asphalt mulch establishes better stands than wood fiber where winter and early frost heaving is a serious problem.

Soil-anchored Mulch: Either straw or hay can be distributed uniformly over the soil surface after broadcast seeding and held in place by punching it into the surface soil with either a mulch tiller, a modified sheeps-foot roller, or a weighted agricultural type disc. These methods for anchoring the mulch adequately cover the seed, so it is not necessary to cover the seed prior to adding mulch.

*Adapted from Revegetation Guidelines for Surface Mined Areas, Range Science Series #16.