

0027

ACT/007/009

File
SU

EUREKA ENERGY COMPANY

A SUBSIDIARY OF PACIFIC GAS AND ELECTRIC COMPANY

1010 KEARNS BUILDING • 136 SOUTH MAIN STREET • SALT LAKE CITY, UTAH 84101 • (801) 359-3811

RECEIVED

SEP 09 1981

DIVISION OF
OIL, GAS & MINING

September 8, 1981

Susan Linner
Utah Division of Oil, Gas, and Mining
1588 West North Temple
Salt Lake City, Utah

Re: Sage Point-Dugout Canyon Project

Dear Susan:

Nicolas Temnikov and I recently completed our sampling for shrub density. The sampling was done pursuant to the Division's Apparent Completeness Review of Eureka's Surface Mining Control and Reclamation Act permit application, which requested shrub density information for the greasewood-sagebrush and shrub-grass-juniper communities.

The results of our field sampling are enclosed. I have incorporated these data into Eureka's addendum to its permit application; I sent the amended pages to Jim Smith for inclusion in the application.

If you have any questions or comments, please call Nicolas Temnikov. Thanks for your help.

Very truly yours,

Christopher A. Slaboszewicz
C. A. Slaboszewicz

CAS:hy

Enclosure

cc: NKT (w/enc.)

Results of Shrub Density Sampling
at the Sage Point-Dugout Canyon Project

On August 11, 12, and 13, 1981, Chris Slaboszewicz and Nicolas Temnikov sampled the greasewood-sagebrush and shrub-grass-juniper vegetation communities to determine overall shrub density in areas to be disturbed by the proposed project. The density, in terms of total number of stems per acre, was estimated using the point-quarter sampling method.

Sampling was performed along 300-foot transects. The location of the beginning of each transect was chosen randomly using the 1" = 400' vegetation maps enclosed in Eureka's Surface Mining Control and Reclamation Act permit application.

In determining the transect beginning points, all of the areas to be disturbed were marked on the maps, including a 400-foot buffer zone around the areas. Then all quarter sections lying either partially or totally within the areas to be disturbed were assigned a number in sequence from one to 119 (the total number of such quarter sections in the permit area). Superimposed on each quarter section was a grid of seven by seven, or 49, squares. Numbers selected from two random number tables, the first between one and 119 and the second between one and 49, were used to identify the transect locations. The first number identified the quarter section and the second, the square within that quarter section. Any locations not lying within either the greasewood-sagebrush or shrub-grass-juniper communities were removed from further consideration.

In the field, a random number between one and nine was used to determine transect direction along a compass angle

between 0 and 360. For example, the number '2' indicated a compass angle of $360/9 \times 2$, or 80 degrees from magnetic north.

Ten sample locations were selected along each 300-foot transect line, using random numbers between one and 100 (each number corresponded to three feet, or one yard). At each sample point, four quadrants were visualized using a compass: northeast, northwest, southwest, and southeast. In each quadrant, the distance to the nearest shrub, including seedlings greater than one inch tall, was measured to the nearest tenth of a foot. In the greasewood-sagebrush community, 110 points were sampled; 90 were sampled in the shrub-grass-juniper community.

The following plant species were encountered during the distance measurements:

Greasewood-sagebrush community

Artemisia tridentata
Chrysothamnus viscidiflorus
Xanthocephalum sarothrae
Atriplex confertifolia
Sarcobatus vermiculatus
Juniperus osteosperma
Pinus edulis

Shrub-grass-juniper community

Artemisia tridentata
Artemisia nova
Pinus edulis
Juniperus osteosperma
Atriplex confertifolia

Xanthocephalum sarothrae
Eriogonum corymbosum var. dauidsei
Glossopetalon meionandra

The mean of the four measured distances for each sample point is listed in Table IV-F.7½. Statistical adequacy was determined with a t-test using the following equation:

$$n_{\min} = \frac{(t_a^2 s^2)}{(\Delta \bar{x})^2}$$

where

- t = value from t table (two-tailed) for a given probability level with n-1 degrees of freedom
a = desired probability level (80%)
s² = sample variance
Δ = percent change in the sample mean desired to be detected (10%)
 \bar{x} = sample mean
n_{min} = minimum number of samples necessary to satisfy statistical requirements

(Larson, L.L. 1980. A statistical evaluation of revegetation success on coal lands in the West. Office of Surface Mining - Region V. 19 pp.)

This equation was applied to the sample data with the result that n_{min} for greasewood-sagebrush was 29 (110 were actually taken); for shrub-grass-juniper this figure was 57 (90 were actually taken). Table IV-F.7½ presents the calculations.

Based on the two significant digits obtained during the field measurements, the following shrub densities were estimated:

Greasewood-sagebrush community: 4300 plants per acre
Shrub-grass-juniper community: 1800 plants per acre

thickets were not clipped pursuant to UDOGM guidelines (1979). Cacti and cushion plants were also left unclipped as their productivity is low and difficult to determine.

Tree densities were measured using the point quarter method. From the randomly placed sample point, the distance to the nearest tree in each of four quadrants was measured. To determine the number of trees per acre in a given community type, the following equation was used:

$$\text{Trees per acre} = d(43,560)$$

where

$$d = \frac{3(11 \text{ for deciduous streambank})}{(\pi/4) \left(\sum_{j=1}^4 y_j^2 \right)}$$

43,560 = square feet per acre

$$\pi = 3.14$$

Y_j = point-to-tree distance (feet)

Basal stem circumference of trees was measured rather than diameter at breast height (dbh), because basal stem circumference is more meaningful for trees such as pinyon and juniper which branch strongly near the stem base. Basal stem circumference was measured for all tree species in the study, except in the deciduous streambank community, where dbh was used.

Shrub density was also estimated using the point quarter method. In August 1981, the greasewood-sagebrush and shrub-grass-juniper communities were sampled to determine overall

shrub density in areas to be disturbed by the project.

Sampling was performed along 300-foot transects, which began at randomly selected points chosen from the vegetation maps located in this application. First all of the areas to be disturbed were marked on the maps, including a 400-foot buffer zone around the areas. Random numbers were then used to select the transect beginning points from a grid of squares approximately 200 feet wide. Any such locations not lying within either the greasewood-sagebrush or shrub-grass-juniper communities were removed from further consideration. In the field, a random number was used to select the transect direction. Ten points, selected from a random numbers table, were sampled along each transect.

At each sample point, four quadrants were visualized using a compass. In each quadrant, the distance to the nearest shrub, including seedlings greater than one inch tall, was measured to the nearest tenth of a foot. Density was determined using the following formula (similar to that for the tree density):

$$\text{Plants per acre} = \frac{43,560}{\bar{x}^2}$$

where

\bar{x} = mean point-to-shrub distance

43560 = square feet per acre