

# EUREKA ENERGY COMPANY

A SUBSIDIARY OF PACIFIC GAS AND ELECTRIC COMPANY

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**RECEIVED**

JUL 10 1981

DIVISION OF  
OIL, GAS & MINING

July 8, 1981

Mary Ann Wright  
Utah Division of Oil, Gas, and Mining  
1588 West North Temple  
Salt Lake City, Utah 84116

Re: Sage Point-Dugout Canyon Project, Shrub Density Sampling

Dear Mary Ann:

In accordance with one of the requirements under 783.19 in the Apparent Completeness Review (ACR) issued to Eureka by the Division, Eureka has prepared a plan to sample shrub density in the shrub-grass-juniper and greasewood-sagebrush communities. The methodology, including the check of statistical adequacy, was developed using guidelines issued by Larry Larson of the Office of Surface Mining. Depending on field conditions, the statistical confidence level set by the Division (to detect a 10 percent change in the mean with 80 percent confidence) may be difficult to achieve. Following initial sampling, Eureka will contact the Division if that level appears impracticable. The results of the study will be submitted to the Division as soon as the study is completed. Please review the enclosed plan to see that it complies with the Division's guidelines.

Because a fair amount of time may be required to complete the sampling, Eureka requests that the Division accept this proposal and the assurance of Eureka providing the shrub density data as evidence of compliance with the aforementioned requirement of the ACR.

Please call me if you have any questions or comments.

Very truly yours,

*Chris*

C. A. Slaboszewicz  
Permit Analyst

*7-10-81  
Gue L, Lynn Kard I  
met w/ Chris S. and suggested  
point-gtr. sampling to him.  
He said he'd rework plan + resubmit.  
Mary Ann  
Wright*

CAS:hy

cc: NKT (w/enc.)

## SHRUB DENSITY SAMPLING FOR THE SAGE POINT-DUGOUT CANYON PROJECT

### INTRODUCTION

Shrub density data is needed for the shrub-grass-juniper and greasewood-sagebrush communities. These data are needed to set a standard for shrub stocking rates for revegetation. This study is designed to collect pre-mining vegetation information from the exact areas proposed for disturbance. 134 acres of the shrub-grass-juniper community will be disturbed, and 92 acres of the greasewood-sagebrush community will be affected.

### SAMPLING LOCATION SELECTION

Shrub density estimates will be derived from simple random samples chosen in an unbiased fashion. The proposed surface facilities (such as portals, conveyors, prep plant, and others) will be plotted against the shrub-grass-juniper and greasewood-sagebrush communities as shown on the 1: 4,800 vegetation maps enclosed in Eureka's permit application. A boundary will be defined around all the proposed facilities in these communities, including a 200-foot buffer zone.

Each quarter section (160 acres) partially or totally within this "study area" will be assigned a number in sequence. Numbering will start with one and proceed from west to east, and from north to south until all quarter sections have been numbered.

Superimposed over each quarter section will be a grid divided into 256 equal "cells" (approximately 0.625 acres each). These cells will also be numbered sequentially, starting with one and from west to east and then north to south.

Random numbers will be drawn from a random numbers table; initial digits will identify the quarter section and latter digits the cell. Cells so chosen will then be plotted on the vegetation map until enough have been identified within each community to satisfy statistical sampling criteria for shrub density.

The reference areas for the two communities will be divided into grids of an appropriate size, numbered sequentially, and random numbers taken to identify sample points.

Cells identified for study area sampling will be located in the field as accurately as possible from topographic features and pacing. At the approximate location, the exact sample point will be determined by pacing in a randomly chosen direction, a random distance between 0 and 82 feet (82 feet equals  $\frac{1}{2}$  the distance across a cell, which measures 165 feet x 165 feet).

Density of shrubs will be recorded at each sampling point through a count of stems per unit area (plot). Plot size will remain consistent within a community type; however, it may vary between types from 1 meter x 4 meters to 1 meter x 8 meters. Plots will be oriented parallel to the transect and all stems or groups (for multi-stemmed shrubs) within the plot will be recorded by species. These values will be used to calculate statistical adequacy. Sampling will continue until enough samples have been taken to meet the statistical requirements of the Division (detect 10% change in the mean with 80% confidence).

*Transects "will not be utilized as a sampling method. Referral is made here to the 0-8' line on P. 1. MAW 7-10-81*

SAMPLING ADEQUACY

To obtain an adequate estimate of shrub density, the following inequality must be met:

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$$n_{\min} \leq n$$


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(Larson, L. L. - A statistical evaluation of revegetation success on coal lands in the West. Office of Surface Mining - Region V. February 26, 1980. 19 pp.)

where: n = number of samples actually taken

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


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where:

t = value from t table (two-tailed) for a given probability level (80%) with n-1 degrees of freedom

a = desired probability level (80%)

s<sup>2</sup> = sample variance

Δ = percent change in the sample mean desired to be detected (10%)

$\bar{x}$  = sample mean

The sample mean ( $\bar{x}$ ) and sample variance (s<sup>2</sup>) for shrub density in terms of total stems per plot will be used for this determination.