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DESCRIPTION

Ltr trans the following:

PLANT NAME: Palo Verde 1-3

ENCLOSURE

Ecological monitoring program including a description an location of addl soil & biotic sampling stations.....(13 cys encl rec'd)

DO NOT REMOVE

ACKNOWLEDGED

SAFETY — FOR ACTION/INFORMATION — ENVIRO 4-7-76 enf

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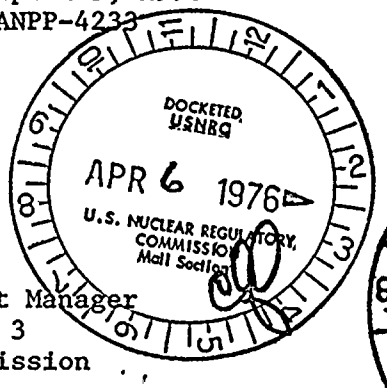
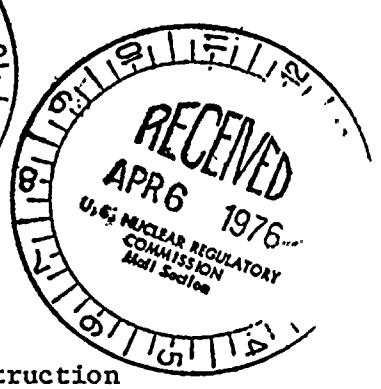
April 5, 1976
ANPP-4233




Mr. Robert A. Gilbert, Project Manager
Environmental Projects Branch 3
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Docket Nos. STN 50-528/529/530
Final Environmental Statement related to Construction of Palo Verde Nuclear Generating Station

Dear Mr. Gilbert:

In accordance with the requirements stated in paragraphs 6.1.1.2, 6.1.3.1 and 6.1.3.2 of the subject Final Environmental Statement, we are submitting programs for construction-phase groundwater and ecological monitoring. The ecological monitoring program includes a description and the location of additional soil and biotic sampling stations.

Attached are three (3) signed originals and ten (10) additional copies of this letter and the programs.

Very truly yours,

Edwin E. Van Brunt

E. E. Van Brunt, Jr.
Vice President, Nuclear Services
ANPP Project Director

EEVBJr/JRM/pk

Subscribed and sworn to before
me this 5th day of April, 1976.

Nancy Logan
Notary Public
My Commission Expires April 11, 1976

3487

# CONSTRUCTION-PHASE GROUNDWATER MONITORING PROGRAM

This construction-phase groundwater monitoring program has been developed pursuant to the requirement stated in Section 6.1.1.2 of the Final Environmental Statement (FES) related to the construction of the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2 and 3.

## INTRODUCTION

The Palo Verde Nuclear Generating Station is designed to minimize the disturbance to the natural resources at the site. In the arid southwest water resources are severely limited; thus, attention has been focused on the protection of water resources. There are no perennial surface flows near the site; however, there are two groundwater regimes close to the land surface, the regional aquifer and the perched mound.

The regional aquifer (over 400 square miles) extends beyond the site area and is bounded by the mountain masses which encompass the Lower Hassayampa Centennial area; at the site the aquifer is confined below the Palo Verde clay layer. Anisotropic conditions prevail within the aquifer, as highly permeable volcanic conglomerate layers are interbedded with low-permeable tuffaceous sands and clays, and basalt flows. The quality of the regional aquifer is generally good (TDS less than 1000 mg/l) and is the source of domestic and irrigation water. The depth to water in the area ranges from about 100 to 250 feet below the ground.

Infiltration of irrigation water has built a perched water mound on the Palo Verde clay; the boundaries of the perched water are essentially conterminous with the boundaries of the irrigated area. The depths from ground surface to the perched water presently range from 10 feet to 70 feet. Water quality of the perched mound is poor (TDS of approximately 6000 mg/l). It is not a significant source of water for either domestic or agricultural use.

The plant facilities and construction procedures are designed to minimize groundwater degradation. The groundwater monitoring program herein described has been designed to make timely detection of deviations from the predicted conditions during construction so that corrective action can be taken. It is expected that any contamination would be detected first in the perched mound.

There are three activities during construction of the Palo Verde Nuclear Generating Station which are expected to affect the groundwater; these are identified and discussed below:

1. Dewatering of excavations (perched mound).
2. Construction Water Production: Water for various construction purposes will be obtained from two existing wells which extend into the regional aquifer.
3. Wastewater Disposal: Sanitary sewage and industrial wastes will be transported offsite and/or lost to evaporation. This water is originally produced from the wells and will not be returned to the groundwater system.

## MONITORING PROGRAM FOR PERCHED MOUND

Because contaminants will be observed first in the perched mound, the density of monitoring points will be greater in this aquifer than for the regional aquifer. Measurements proposed for the monitoring stations in the perched mound (shown in Figure 1) are described below.

### Water Levels

Table 1 lists the boreholes that will be used to monitor perched water elevation and the frequency at which they will be monitored. These data will be plotted graphically and trends followed to discover anomalous changes.

Water Quality

Boreholes to be used for water quality sampling are shown in Table 1. Table 2 lists the analyses to be done. This list was developed after careful consideration of the major chemical constituents related to perched and regional groundwater, construction materials, construction activities likely to affect the water, the U. S. Public Health Service Drinking Water Standards and the EPA National Interim Primary Drinking Water Standards. The analyses will be done for those parameters listed in Table 2; however, if the TDS value varies by 15 percent or more from one measurement to the next at any well, a more complete analysis will be conducted to identify the source of the variation.

MONITORING PROGRAM FOR REGIONAL AQUIFER

While chemical and water level changes are expected to appear first in the perched mound, in order to maintain continuity of measured data, the regional aquifer will be monitored as well. The proposed monitoring program will survey the regional aquifer water levels and water quality at the locations shown in Figure 2.

Water Levels

The wells to be used for water level measurement and the frequency of sampling are listed in Table 1.

Water Quality

A testing program for the two wells which will be sampled on-site was established in June, 1975. Samples were analyzed in September, 1975, to establish the water quality baseline. Additional samples are to be analyzed prior to construction. The wells and sampling frequence are listed in Table 1. Table 2 lists the parameters to be measured. This list was developed after careful consideration of the major chemical content of the existing perched and regional aquifers. The analyses

will be done for those parameters listed in Table 2; however, if the TDS concentration changes by more than 15 percent from one measurement to the next at any well, a more complete analysis will be performed to identify the source of the change.

PROCEDURE

Protection from construction activities will be provided as required for wells identified in Table 1. Selection of monitoring wells was based on the following criteria; use of existing wells with established histories where possible, nearness to construction activities expected to affect groundwater, penetration to the groundwater system, proximity to major cones of groundwater depression, and location with respect to plant and construction facilities.

The depth to the water will be measured using a field scale accurate to $\pm$0.1 foot. Riser pipe elevations will be determined by surveying. The water table elevation measurements will be recorded and compiled in tabular form and plotted as hydrographs and groundwater contours to aid visual interpretation of water table variations.

The effects of construction water use will be distinguished from effects of nearby irrigation by comparing the onsite regional aquifer water levels with the water levels surrounding the site. Changes in the regional aquifer water level on the order of two feet per year at the onsite wells will be considered significant enough to justify further evaluation as to the cause of the change. This evaluation will be based on the relative changes between the onsite and offsite wells.

Water quality samples will be collected at a frequency defined in Table 1. Water quality parameters are provided in Table 2. Specific conductance and temperature data of samples will be compiled in tabular form for each monitor well. These data will be compared with past data in order to ensure that changes in water quality are detected.

Table 1

CONSTRUCTION PHASE GROUNDWATER MONITORING

| Regime and Measurement | Existing Well Number | | New Wells | Frequency |
|---|---|---|---|---|
| Perched Groundwater Onsite Levels and Quality | PV-14H<br>PV-21H<br>PV-30H | PV-28H<br>PV-29H<br>PV-31H | Q1<br>Q5 | Semiannual |
| Regional Groundwater Onsite Levels and Quality | | 27 ddc<br>34 abb | | Semiannual |
| Regional Groundwater Offsite Levels and Quality | | 20 dbb*<br>26 baa<br>14 dbb<br>21 $cbb_2$<br>17 abb<br>PV-7 * | | Annual |

* levels only

Table 2

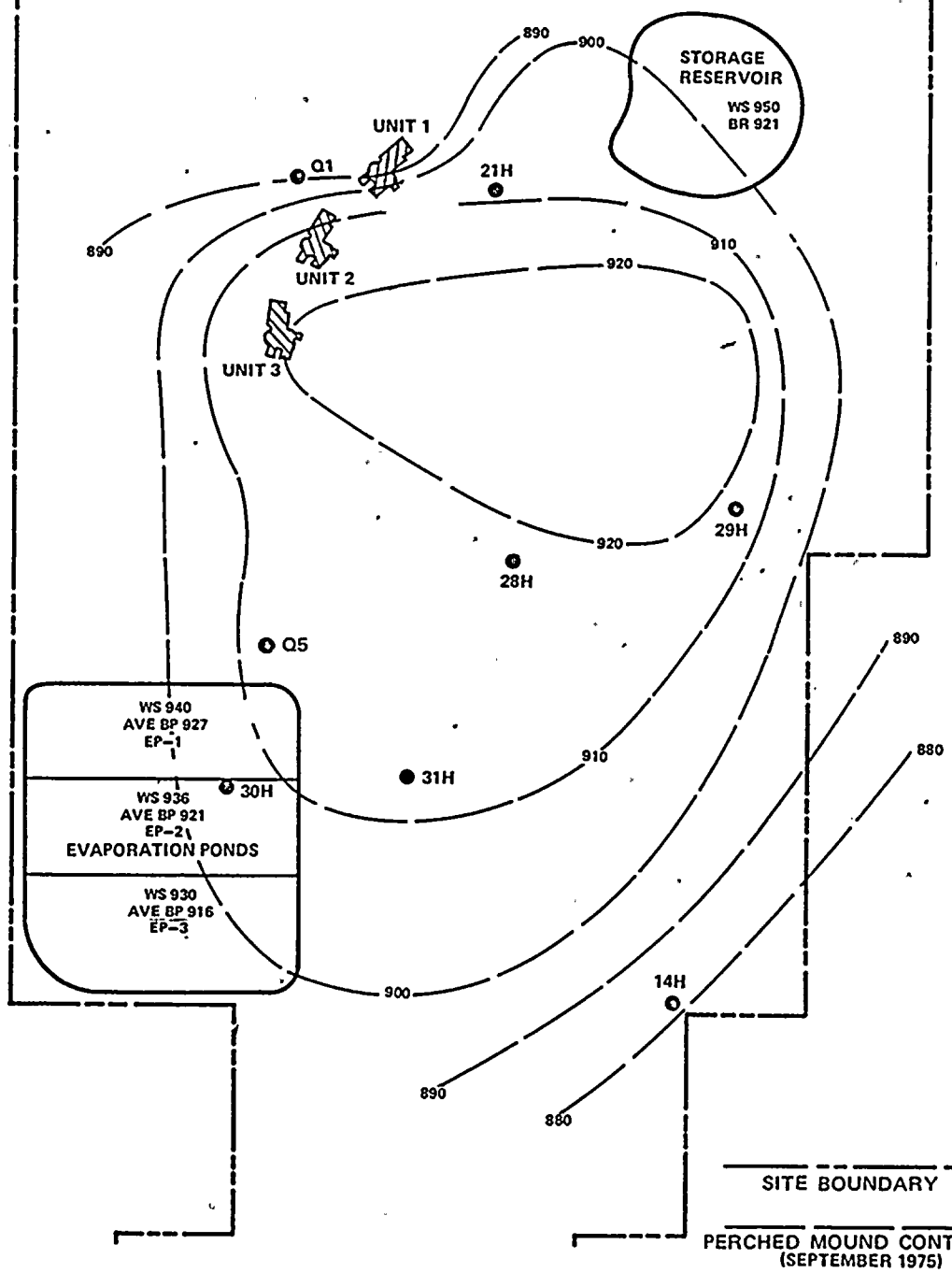
WATER QUALITY PARAMETERS

PARAMETER

Arsenic
Boron
Cadmium
Chloride
Total Cyanide
Fluoride
Phenol
Specific Conductance
TDS
Lead
Zinc
Sodium
Chromium (Hexavalent)
Nitrate ($NO_3$)
pH
Radioactivity

Laboratory analyses will be performed according to appropriate techniques described in the following publications:

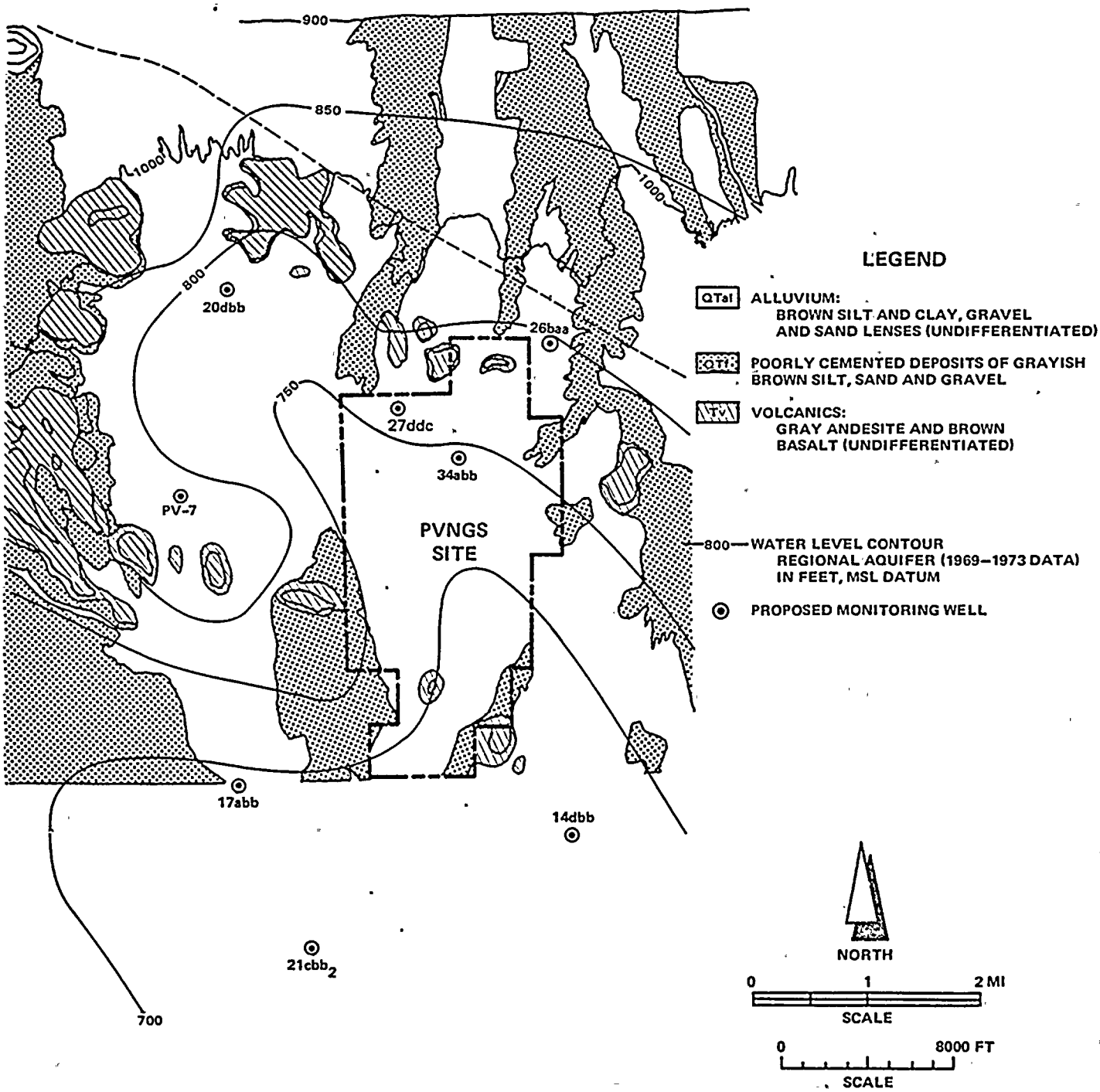
- American Public Health Association (APHA), Standard Methods for Examination of Water and Wastewater, 13th ed. APHA, New York 1971.
- American Petroleum Institute (API), undated, Manual on disposal of refinery wastes; Methods for sampling and analysis.
- American Society for Testing and Materials (ASTM), Annual book of American Society for Testing Materials Standards, Part 23, ASTM, Baltimore, Maryland 1972.
- Environmental Protection Agency (EPA), Methods for the Chemical Analysis of Water and Wastes, Water Quality Control Office, Analytical Quality Control Laboratory, Cincinnati, Ohio 1971.




Arizona Nuclear Power Project
Palo Verde Nuclear Generating Station
Units 1, 2 & 3

LOCATION OF MONITORING WELLS-
PERCHED MOUND

Figure 1

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LOCATION OF MONITORING WELLS-
REGIONAL AQUIFER

Figure 2

# CONSTRUCTION-PHASE ECOLOGICAL MONITORING PROGRAM

This construction-phase ecological monitoring program has been developed pursuant to the requirement stated in Section 6.1.3.2 of the Final Environmental Statement (FES) related to the construction of the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2 and 3.

## INTRODUCTION

Construction activities are highly visible and can potentially cause environmental impacts. The predicted ecological impacts from the construction of PVNGS have been detailed in Sections 4.1 and 4.3 of the PVNGS ER and several mitigation measures, or controls, to lessen the potential construction impacts have been listed in the PVNGS ER and FES. These environmental controls directly relate to the major causal links between construction activities and potential ecological degradation including habitat alteration, noise, dust, and chemical pollution of the air, land, drainage areas and water. Since the likelihood of any substantial adverse damage to the stability and structure of the biotic communities in the region of the PVNGS site due to construction activities, other than direct habitat alteration is low, this program has been directed towards an overall field and aerial reconnaissance of habitat alteration and environmental education of construction personnel. It has been designed with the intent of:

- Increasing environmental awareness among construction personnel.
- Providing the opportunity of early detection of previously unforeseen adverse environmental impacts.
- Allowing for mitigation measures to be considered promptly once an adverse impact is noted.
- Documenting environmental changes which actually occur during plant construction and the mitigation measures taken to lessen these impacts.

ENVIRONMENTAL AWARENESS PRESENTATIONS

The cumulative effect of minor and major decisions made by construction personnel will probably be the most important factor determining the ecological condition of the site after construction. Consequently, an integral part of the pre-construction conferences to be held with the various subcontractors under the general supervision of the Field Construction Manager will be a session on environmental awareness. The objectives of these conferences will be to (1) indicate to construction personnel how their work affects the environment and (2) provide guidelines to minimize the adverse environmental impacts where practical. The presentations have been designed to include:

- A 12-15 minute videotape describing the ecologically sensitive habitats and other areas of specific ecological concern at the PVNGS site.
- An explanation and distribution of an illustrated Environmental Construction Handbook prepared for construction personnel.

The Handbook will be prepared for distribution to field supervisors and foremen and will present suggestions about environmental practices that can be applied by individuals during construction at PVNGS. The Handbook will provide a mechanism to aid in explaining the "how" and "why" of the environmental controls found in the contract specifications. Pertinent ecological information will be presented in terms of the kinds of construction activity at PVNGS which significantly impact the environment. Information concerning the natural history of important plants and animals at and near the site will be discussed in the context of practical suggestions as to how to reduce to a minimum the adverse impact of the construction activities. The Handbook will be written using unsophisticated terminology and will be amply illustrated.

AERIAL RECONNAISSANCE SURVEYS

In order to help document ecological impacts of construction and to obtain information useful in making mitigation suggestions, aerial photography (1" = 2000') will be flown and interpreted before and after major construction activities, at least once per year. The aerial reconnaissance surveys will provide a regional overview of the impacts of construction activities on and near the PVNGS site.

The photography will be interpreted immediately after it is developed and printed in order to aid in developing mitigation plans which will be responsive to actual environmental conditions at the site. The number of acres disturbed and levels of disturbance will be identified and evaluated.

FIELD SURVEYS

A general ecological field survey will be conducted in order to (1) provide gound verification of photo-interpretation studies, (2) identify, from ground-level, ecological impacts which are imminent or which have occurred and can be mitigated and (3) document the actual ecological impacts of construction activity.

The general ecological observations will be made by trained plant and animal ecologists. Included in the survey will be a check on the salt monitoring study plots which have already been established. These fenced plots will remain as undisturbed as possible during construction activity and will serve a dual purpose of operational experimental plots and "control" construction monitoring plots.

CONSTRUCTION-PHASE ENVIRONMENTAL CONTROL PROGRAM

As required by the FES, Summary and Conclusions Paragraph 7.b, a control program including written procedures and instructions to control all

construction activities has been developed. It provides for periodic management audits to determine the adequacy of implementation of environmental requirements. Sufficient records to furnish evidence of compliance with all FES commitments will be maintained.

SALT MONITORING STUDY PLOTS

The FES requires the establishment of additional soil and biotic sampling stations which will not be disturbed by construction activities. These plots "are to be used as reference plots for future studies concerned with cooling-tower drift salt deposition", (page 6-5). Six plots have been established (see Figure 1). Descriptions of these plots are as follows:

Plot #1 - 100 meters x 100 meters. Creosotebush Cacti Hill and Bajada. Contains Barrel and Hedgehog Cacti.

Plot #2 - 200 meters x 100 meters. Saltbush Plain merging into Creosotebush Plain. Contains a small wash.

Plot #3 - 100 meters x 100 meters. Creosotebush Plain with Cholla and scattered Mesquite trees along a small wash.

Plot #4 - 100 meters x 100 meters. Creosotebush Plain-Bajada with many Cacti including Cholla, Barrel and Hedgehog.

Plot #5 - 100 meters x 100 meters. Mesquite Wash with Saltbush. Very dense, although recent fire has cleared out some undergrowth. Part of plot goes into adjacent old field.

Plot #6 - 100 meters x 100 meters. Creosotebush Cacti Hill with Hedgehog and Cholla.

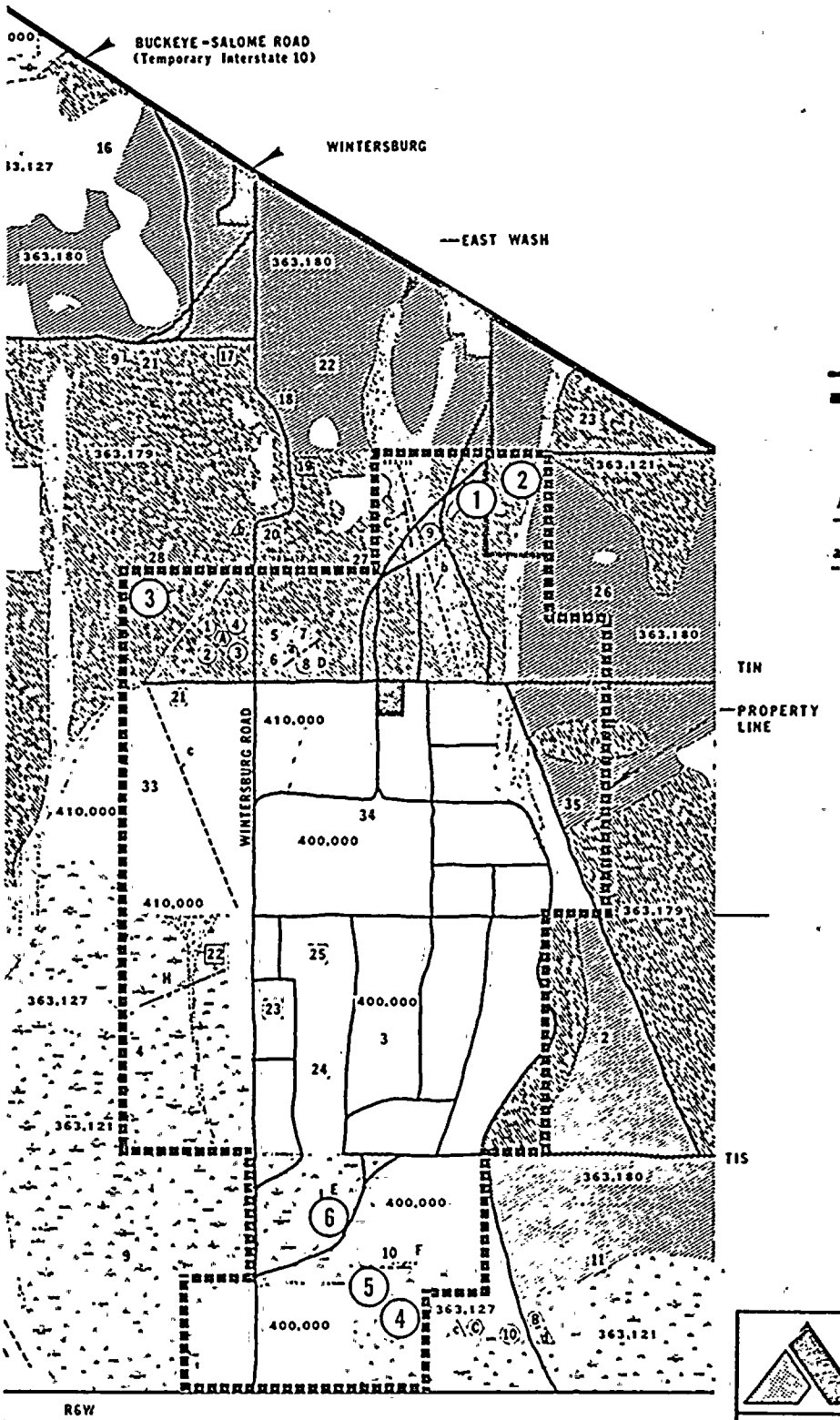
The criteria used in selection of these plots were:

a. Predicated salt isopleths of on-site solids ground deposition and total and annual mean airborne concentrations of dry salt particles from round multi-fan cooling towers, based on a 0.01% drift rate.

b. Existing vegetation types.

c. Construction plans.

A wide diversity of habitat types were selected which are not anticipated to be directly disturbed by construction activities. The three northern plots are expected to receive the heaviest salt deposition of up to 12 lbs/acre-year; and the three southern plots, only 2 lbs/acre-year.




## LEGEND

- CREOSOTEBUSH PLAIN 363.121
- SALTBUSH PLAIN 363.179
- CREOSOTEBUSH-SALTBUSH PLAIN 363.180
- MESQUITE WASH 333.111
- CREOSOTEBUSH-CACTI HILL 363.127
- CULTIVATED 400.000
- OLD FIELD 410.000
- BUILDING
- HIGHWAY
- ROAD, PATH
- PROPERTY LINE

- 23 SECTION NUMBERS
- [2] VEGETATIONAL SAMPLING STATIONS
- (1) SOIL SAMPLING STATIONS
- A — MAMMAL SAMPLING TRANSECTS
- (A) MAMMAL SAMPLING GRIDS
- a - - - BIRD SAMPLING TRANSECTS
- (A) REPTILE SAMPLING GRIDS
- (1) SALT MONITORING PLOTS

NORTH

1000 0 1000 2000 FT.

SCALE

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Palo Verde Nuclear Generating Station
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VEGETATIONAL AND LAND USE MAP
OF PVNGS REGION WITH
ECOLOGICAL SAMPLING LOCATIONS

Figure 1