ARIZONA PUBLIC SERVICE COMPANY
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February 20, 1979
PVNGS-231-JMA/DBK

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. William H. Regan, Chief
Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis

Subject: Palo Verde Nuclear Generating Station
Units 4 & 5
Docket Nos. STN-50-592/593
File: FF-79-056-026

Dear Sir:

Enclosed please find five (5) copies of information regarding alternative transmission line routes for the Palo Verde Nuclear Generating Station Units 4 and 5. This information was requested by letter dated December 11, 1978, from W. H. Regan, USNRC to E. E. Van Brunt, Jr., Arizona Public Service Company.

Respectfully submitted,

ARIZONA PUBLIC SERVICE COMPANY

By: A. C. Rabb for
Edwin E. Van Brunt, Jr.
APS Vice President
Nuclear Projects
ANPP Project Director

On its own behalf and as agent for all other joint applicants.

State of Arizona)
) ss.
County of Maricopa)

Subscribed and sworn to before me this 20th day of February 1979.

John M. Allen
Notary Public

My Commission Expires:

My Commission Expires Jan. 23, 1983

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OTHER ALTERNATIVES

A. CONSOLIDATION

A possible alternative considered was consolidation of existing and proposed facilities on existing rights of way. Consolidation of Southern California Edison Company's existing and proposed transmission facilities across the Morongo Indian Reservation north of Interstate Highway 10 would require the acquisition of new rights of way since the Company's presently owned land rights do not provide for additional facilities.

The existing electric transmission line corridors north of Interstate Highway 10 traverse inhabited areas of the reservation while there are few, if any, tribal members living south of the Highway. Because of this and in light of discussions with various members of the tribe who live on the reservation, it is our opinion that they would be more agreeable to the granting of rights of way along the preferred 500 kV transmission line route south of the Highway than to the granting of the necessary rights for the expansion of electric transmission facilities north of Interstate Highway 10.

Based on our evaluation of the consolidation alternative, we believe the route south of the Highway to be preferable.

B. DEVERS TO LUGO 500 kV ALTERNATIVE

A possible alternative considered by the Applicants to deliver the Western Participants power west of Devers Substation, would be to construct an 81 mile long transmission line from Devers to Lugo Substation. Lugo is an existing 500 kV substation located approximately three miles southwest of Hesperia.

A Devers to Lugo line will not perform as well electrically as the proposed plan. Lugo is a switching station, with very little load requirements. Its major function is to transfer incoming power to other EHV lines which then distribute that power to major load serving substations in the Los Angeles area, including SCE's Mira Loma Substation. The preferred path from Devers via Valley to Mira Loma provides a thirty four (34) mile shorter electrical path (112 miles vs. 78 miles) to this large load center thereby affording greater support to the existing 230 kV system between these locations than would be provided by the Devers-Lugo alternative. A Devers-Lugo line would not load as heavily as the preferred line and for this reason can be expected to result in less transfer capacity and higher system losses.

C. MARTINEZ CANYON ALTERNATE ROUTES

In order to avoid potential sensitivities in the San Gorgonio Pass, the Applicants have identified two alternatives to that portion of the proposed route which traverses the Pass. These alternatives are - 1) the Salt Creek-Martinez Canyon Alternate, and 2) the Coachella Valley-Martinez Canyon Alternate. The Martinez Canyon to Valley segment is common to both alternatives, as shown on the enclosed map. The discussion which follows includes a route description, a description of the existing environment and a sensitivity analysis of the environment based on anticipated impacts if these alternatives are utilized.

1.0 ROUTE DESCRIPTION

1.1 Salt Creek-Martinez Canyon Alternate

The Salt Creek-Martinez Canyon alternative route leaves the proposed route at the northwest end of the Chuckwalla Mountains and proceeds southerly for approximately 4 miles parallel to the Eagle Mountain Railroad. At the angle point, the route continues southwesterly, still parallel to the railroad in the Salt Creek area for a distance of 10.5 miles.

From this point, the route turns westerly around the south side of the Orocopia Mountains parallel to and north of the Coachella Canal for approximately 40 miles, to a point 4 miles north of the Salton Sea. At this angle point, the route crosses the canal and proceeds generally southwesterly

for 5 miles to a crossing of State Highway 111. It continues southwesterly for 3.5 miles, crossing the Whitewater River.

The route continues westerly for 5 miles, crossing State Highway 195, then turns southwest for 8 miles entering the Martinez Canyon area in the Santa Rosa Mountains. It then continues westerly, parallel with and about 3 1/2 miles north of the Riverside-San Diego County line which is also the present north boundary of the Anza Borrego Desert State Park. In this approximately 30-mile section, the route would cross Nicholias, Alder, Horse, Tule, Terwilliger, and Nance Canyons. Continuing west, this section passes through Rogers Canyon and crosses Tule Valley to the Dry Ranch area.

At this point, the route turns northerly for 6 miles, crosses State Highway 71 and Wilson Valley, and then angles northwesterly, crossing Weber Valley, Tocalota Creek, Highway 79, Crown Valley, and then Domenigoni Valley southeast of the city of Winchester for a distance of approximately 15 miles. From this point, the route angles west to north through several angle points, and rejoins the proposed route at Valley Substation.

Compared to the proposed route, this alternate would add approximately 8 miles to the overall distance from the plant site to Valley Substation and would bypass Devers Substation.

1.2 Coachella Valley - Martinez Canyon Alternate

The Coachella Valley-Martinez Canyon alternative route leaves the proposed route at an angle point located on the

north edge of the Mecca Hills, and one mile south of Interstate 10 (I-10). From this point, the alternative parallels I-10 for a distance of 4 miles, then turns southwesterly around the north end of the Mecca Hills and continues 2.3 miles to a point near the Coachella Canal.

The route continues southeast for 1.4 miles and then turns south, crossing the Coachella Canal and then paralleling Buchanan Street. This 10-mile north-south segment crosses the Southern Pacific Railroad, the Coachella Valley Storm-water Channel and the Whitewater River, and then enters the Martinez Canyon area in the Santa Rosa Mountains and continues westerly to Valley along the routing described for the Salt Creek-Martinez Canyon Alternative Route (Section 1.1).

Compared to the proposed route, this alternative would add approximately 12 miles to the overall distance from the plant site to Valley Substation, and would bypass Devers Substation.

2.0 EXISTING ENVIRONMENT

2.1 Salt Creek-Martinez Canyon Alternate

2.1.1 Cultural Resources

The Salt Creek area contains a relatively large number of archaeological sites, which have not been evaluated for significance. Most sites could be avoided and the impact on others mitigated, and helicopter reconnaissance indicates significant existing damage to desert pavement surfaces by off-road vehicles. The western portion of this route segment near the Torres Martinez Indian Reservation to Martinez Canyon, passes through farm

lands where the potential for intact archaeological remains is low.

No archaeological survey of the area from Martinez Canyon to Valley Substation has been done for this project. It is known, however, that significant archaeological sites exist in the area. Martinez Canyon proper contains 34 known archaeological sites. Helicopter reconnaissance has located a large area of potential bedrock mortar food-processing sites near the route due west of Cahuilla Mountain. There are high probabilities of historic and proto-historic Cahuilla settlement sites throughout the area south of the Cahuilla and Santa Rosa Reservations. The most significant archaeological site presently known in the area is that of Old Santa Rosa, located about one mile south of the proposed alternate route.

The extent to which traditional resources in the Salt Creek area may be used is unknown. The potential concerns of the Torres-Martinez Indians along the western portion of the Salt Creek segment are largely unknown throughout the route although in a study done by Cultural Systems Research, Incorporated, 54% of the respondents indicated they expected negative impacts to their emotional well-being or physical health if a high voltage transmission line were constructed near their residence.

In the vicinity of Martinez Canyon, although the extent to which traditional resource use areas occur along this route is unknown, the proximity of the Cahuilla and Santa Rosa Reservations and the abundance of plant and animal

resources known to be of traditional importance to the Mountain Cahuilla people indicates high probability of such use.

2.1.2 Biological Resources

Vegetative communities traversed by the Salt Creek-Martinez Canyon Alternate include desert microphyll woodland, creosote bush scrub, agriculture, alkali sink scrub, pinon / juniper woodland, red shank chaparral, chamise chaparral, oak woodland, riparian and coastal sage scrub.

Desert Microphyll Woodland

In the Salt Creek area along the foothills east of the Orocopia Mountains, desert microphyll woodland occurs in major canyons and washes. Woodland species include palo verde (Cercidium floridum), smoke tree (Dalea spinosa), desert willow (Chilopsis linearis), cat's claw (Acacia greggii) and iron wood (Olneya tesota). Understory species are typical of the creosote bush scrub described below.

Desert microphyll woodland also occurs in the drainages, disecting the alluvial fan at the mouth of Martinez Canyon. Characteristic species include palo verde, desert lavender (Hyptis emoryi) and pigmy cedar (Peucephyllum schottii).

In Nicholias Canyon, creosote bush scrub community of the Martinez Canyon is transitional with pinon/juniper woodland. A very high diversity and density of plants occurs in this canyon.

Creosote Bush Scrub

Creosote bush scrub occurs from the Coachella Canal to the agricultural area northeast of Martinez Canyon. South of the Orocopia Mountains, the species composition is dominated by creosote bush (Larrea tridentata) and ocotillo (Fouquieria splendens). In the vicinity of Salt Creek, creosote bush scrub becomes transitional with desert microphyll woodland. Near the Chuckawalla Mountains, creosote bush scrub and desert microphyll woodland grade with stem succulent scrub.

Creosote bush scrub also occurs in Martinez Canyon. More xeric species are found in this area such as creosote bush and palo verde.

Agriculture

Agriculture occurs along two portions of this alternate. The first portion occurs in the Coachella Valley from west of the Orocopia Mountains to approximately one-quarter mile east of Martinez Canyon. Major crops include citrus, dates, and grapes. From Domenigoni Valley to the Valley Substation, both active and fallow farmfields occur. Alfalfa is the primary cultivated crop.

Alkali Sink Scrub

Alkali sink scrub occurs along this alternate from the agricultural area to Martinez Canyon. Members of the family Chenopodiaceae dominate.

Pinon-Juniper Woodland

As the Martinez Canyon route segment approaches Buck Ridge, conditions become more xeric. Elevations range between 3,000 and 4,600 feet. Pinon/juniper woodland occurs in these areas, particularly on north facing slopes. Pinon pine (Pinus quadrifolia) and juniper (Juniperus sp.) are the dominate plant species.

Red-Shank Chaparral

Red-shank (Adenostoma sparsifolium) is the dominate species and occupies the hilltops and hillsides. As the Martinez Canyon route segment approaches Tule Valley, a gradual transition between red-shank chaparral and chamise chaparral occurs.

Chamise Chaparral

Chamise chaparral occurs on hilltops and hillsides south of Domenigoni Valley. This is the dominant community type for approximately the next 19 miles of the Martinez Canyon route segment. Chamise (Adenostoma fasciculatum) is the dominate species.

Oak Woodland

Oak Woodland occurs in the valleys and flatlands coincident with chamise chaparral. Coast live oak (Quercus agrifolia) is the dominate species.

Riparian Woodland

Riparian woodland occurs in most major canyons between Valley Substation and Terwilliger Valley. This woodland

is usually confined to epheimeral or perennial stream beds. The typical species are willow (Salix spp.) and cottonwood (Polulus fremontii).

Coastal Sage Scrub

Isolated pockets of coastal sage scrub, generally confined to the hilltops, occur from Domenigoni Valley to the Valley Substation. Typical plant species include California sagebrush (Artemisia californica), California buckwheat (Eriogonum fasciculatum) and introduced brome grasses (Bromus spp.).

2.1.3 Land Use

The Salt Creek area is generally vacant with some off-road vehicle (ORV) use and the Eagle Mountain Railroad. The Coachella Canal separates the Orocopia Mountains and desert areas to the east from the Coachella Valley farming area. Approximately three miles of farmland in the Coachella Valley are in the corridor. The surrounding area is also in agriculture including associated farm residences and buildings. Grazing, some irrigated fields and a few dwelling units are in the vicinity of the corridor west of Martinez Canyon to the Valley Substation.

2.1.4 Recreation

Extensive ORV tracks were observed in the Salt Creek dry waterway and on the bordering desert flats. No formal recreation areas in the Orocopia or Chuckwalla Mountains are in the vicinity of the corridor. In the Coachella Valley, recreation in the vicinity of the corridor is limited to

the duck ponds and wetlands north of the Salton Sea.

A portion of the area west of Martinez Canyon has been included by the BLM in their draft plan of wilderness study areas although private ownership is checkerboarded throughout. No ORV trails were observed in the area west of Martinez Canyon although the area is probably used informally for hunting and sightseeing. No formal parks or recreation areas are in the corridor.

2.1.5 Scenic/Visual

Landscape qualities of the Orocopia and Chuckawalla Mountains are high in the area of Salt Creek, however the landscape quality of Salt Creek itself is somewhat disrupted by the Eagle Mountain Railroad. Landscape qualities of the Orocopia Mountains are high but somewhat disrupted by the Coachella Canal and an existing transmission line. The corridor is at the base of these mountains and should not impact their scenic qualities.

The landscape quality of the Coachella Valley is representative of agricultural land and is considered low. West of Martinez Canyon, most of the area is high in scenic quality. The Santa Rosa Mountains represent the most significant landscape feature.

2.2 Coachella Valley-Martinez Canyon Alternate

2.2.1 Cultural Resources

The northern portion of the Coachella Valley segment parallels I-10 in the same corridor as the proposed route. In the vicinity of the Chuckwalla Mountains, there is a

moderate potential of occurrence of archaeological resources. Where the route segment runs east-west, parallel to I-10, desert pavement surfaces with some prehistoric foot trails, sleeping circles, and lithic scatter sites were noted from the air. However, most of this segment paralleling the highway has been heavily impacted by World War II tank maneuvers and off-road vehicles. A few old homesteads near where the alternate leaves the proposed route may be of historic significance. The north-south portion of the Coachella Valley route segment from I-10 to east of Martinez Canyon passes through farm lands where the potential for intact archaeological remains is low.

For the most part, the potential concerns of Torres Martinez residents are unknown. Essentially, the same reaction to a transmission line mentioned in the previous discussion of the Salt Creek route segment can be expected.

Discussion of the cultural resources for the remainder of the route (i.e.-the Martinez Canyon segment) is the same as that presented in Section 2.1.1.

2.2.2 Biological Resources

From the point of departure from the proposed route north of the Orocopia Mountains across the Coachella Valley to Martinez Canyon, the following vegetation types are traversed: desert microphyll woodland, creosote bush scrub, agriculture, and alkali sink scrub.

Desert Microphyll Woodland

Desert microphyll woodland occurs coincident with creosote bush scrub, but predominantly in the major canyons and washes. Species include palo verde, smoke tree, desert lavender and cheese bush (Hymenoclea salsola).

Creosote Bush Scrub

Creosote bush scrub occurs north of the Coachella Canal to the agricultural area. Primary species are creosote bush and ocotillo.

Agriculture

From the Coachella Valley storm water channel north to the Coachella Canal, this route segment traverses agriculture. Dates, citrus, grapes, and alfalfa are the primary cultivated crops.

Alkali Sink Scrub

Scattered patches of alkali sink scrub occur between man-made duck ponds and citrus orchards in the predominantly agricultural area. Members of the family Chenopodiaceae dominate this community type.

Description of biological resources for the remainder of the route (i.e.-the Martinez Canyon segment) is the same as that presented in Section 2.1.2.

2.2.3 Land Use

Land in the vicinity of the corridor from the Chuckwalla to Orocopia Mountains is vacant except for I-10. The segment from north of the Orocopia's to Martinez Canyon traverses

approximately 4 miles of irrigated farmland in the Coachella Valley. The surrounding area is also in agriculture and associated housing and farm buildings.

Discussion of land use for the remainder of the route (i.e.-from Martinez Canyon to Valley) is the same as presented in Section 2.1.3.

2.2.4 Recreation

The corridor crosses several ORV areas near I-10 in the area from the Chuckwalla's to the Orocopias. No formal recreation areas are near the corridor. Discussion of recreation for the remainder of the route (i.e.-from Martinez Canyon to Valley) is the same as presented in Section 2.1.4.

2.2.5 Scenic/Visual

The line in the vicinity of the Chuckwalla and Orocopia Mountains would be visible in some places to motorists on I-10. However, the line is backdropped against the mountains, reducing visibility.

The line avoids the highly unique and scenically diverse Mecca Hills by staying to the north of Thermal Canyon. In so doing, the line parallels I-10 in this scenically interesting area along a stretch of highway currently parralleled by other lines to the north. As such, high visual impacts could result in this area.

The agricultural lands in the Coachella Valley are representative of the area and of low to moderate scenic interest. The alignment adjacent to the Whitewater River Channel and Buchanan Street minimizes visual problems.

3.0 SENSITIVITY ANALYSIS

In the discussion below, the sensitivity levels are defined as follows:

Maximum Conflict or Sensitivity

A transmission line (towers, conductors, access roads and construction activity) through these areas would result in an unacceptable conflict or level of impact. These areas are to be completely avoided.

Major (Relative) Conflict or Sensitivity

Expected high level of conflict, very sensitive to modification or change (physical, visual, or ecological) brought about by the introduction of a transmission line in these areas. It is preferable to avoid these areas or to minimize conflict where not avoidable or where mitigation is not possible.

Moderate (Relative) Conflict or Sensitivity

Expected medium level of conflict. Contact with these areas should be minimized although avoidance is not critical. Change or modification brought about by the introduction of a transmission line would not be severe.

Minimal (Relative) Conflict or Sensitivity

Expected low level of conflict or impact. These areas are least sensitive to the change or modification brought about by the introduction of a transmission line. As such, they are the most appropriate areas for a line resulting in the lowest potential impact.

3.1 Salt Creek-Martinez Canyon Alternate

3.1.1 Cultural Resources

The Salt Creek area contains a relatively large number of unevaluated archaeological resources. Impact by a transmission line would be expected to be moderate. Impact in the Martinez Canyon and Santa Rosa Mountain areas may be, subject to further study and evaluation, major to maximum due to a large number of known significant archaeological sites, including the "Old Santa Rosa" ruins near Mt. Cahuilla, about one mile south of the proposed route. The closest access to the Old Santa Rosa site is presently a jeep trail over two miles away.

The extent of the ethnographic sensitivities for this route are presently unknown but the proximity of the Torres Martinez, Cahuilla and Santa Rosa Indian Reservations, and the abundance of plant and animal resources of known traditional importance indicates a probability of major sensitivity, expecially in the Martinez Canyon-Santa Rosa Mountains.

3.1.2 Biological Resources

This alternate may impact a number of California State and federally listed protected, rare, threatened and endangered plant and animal species. The animal species include tne desert tortoise and the prairie falcon (Salt Creek area); and the golden eagle, peninsular bighorn sheep and Stephens kangaroo rat in various areas from Martinez Canyon to Valley.

Sensitive plant species include Ayenia compacta and Ditaxis california in various locations throughout the Salt Creek - Martinez Canyon corridor; Coryphantha vivipera alversonii, Macherantha cognata and Salvia greatai (Salt Creek area); and Penstemon californica, and Salvia eremostachya primarily in the Santa Rosa Mountains and Martinez Canyon.

The line route also passes north of the proposed Salt Creek natural area but construction of the line could impact the area by causing disturbances in the Creek bed upstream of the natural area and the Salton Sea into which it empties. The line would pass through the Orocopia Mountains, Mecca Hills and Martinez Canyon natural areas each containing sensitive biological resources as listed above. The northern boundary of the Anza Borrego State Park will be skirted in the Martinez Canyon area. Other sensitive biological habitats which may be impacted are man-made duck ponds east of the Salton Sea, which attract many bird species, and the area from Martinez Canyon west to Tule Canyon.

Overall sensitivity of this alternate is considered to be moderate from the preferred route to the Martinez Canyon and, subject to further study and evaluation, possibly major to maximum from the Martinez Canyon area west.

3.1.3 Land Use

The primary land use sensitivity associated with the line route is in the Coachella Valley where approximately three miles of farmland is traversed. Direct impact to farming operations would be minimized, however, since the

line would be routed parallel to section lines where feasible and existing roads are available for access in most areas.

3.1.4 Recreation

The route would traverse an area west of Martinez Canyon that has been identified by the BLM as a potential wilderness area, although only 40% to 50% of the land is presently in the public domain. Most of the area does not have good existing access but is probably used informally for sightseeing. The primary sensitivity to recreation associated with this route is intrusion into the proposed wilderness area.

3.1.5 Scenic/Visual

The proposed line skirts proposed wilderness areas in the Chuckwalla and Orocopia Mountain areas where overall sensitivity is considered moderate. The line will be visible to residents in the Coachella Valley. From Martinez Canyon west to Tule Spring, the landscape has no existing impact. Overall, the proposed line could have major impact on scenic resources.

3.2 Coachella Valley-Martinez Canyon Alternate

3.2.1 Cultural Resources

Archaeological sensitivity of this alternate may be high in a few areas paralleling I-10 and minimal where the route passes through agricultural areas. Although the potential concerns of the Torres Martinez Indian Reservation are unknown at this time, ethnographic sensitivity may be major. Cultural resource sensitivities for the remainder

of the route (i.e.-from Martinez Canyon to Valley) is discussed in Section 3.1.1.

3.2.2 Biological Resources

Two plant species proposed as endangered by California, Ayenia compacta and Ditaxis california, could occur along the Coachella Valley portion of this line route. The proposed line route could impact habitat associated with several duck ponds west of the Salton Sea in the Coachella Valley. Biological sensitivities for the remainder of the route (i.e-from Martinez Canyon to Valley) is discussed in Section 3.1.2.

3.2.3 Land Use

The primary land use sensitivity associated with the line route is in the Coachella Valley where approximately 4 miles of farmland is traversed. Direct impact to farming operations would be minimized, however, since the line would be routed, where feasible, parallel to section lines and existing roads are available for access in most areas.

3.2.4 Recreation

No impacts to recreation are expected for the Coachella Valley segment of the route. The most sensitivie area is west of Martinez Canyon in the potential BLM wilderness area as discussed in Section 3.1.4.

3.2.5 Scenic/Visual

The Coachella Valley portion of the route parallels I-10 and would be visible to motorists in some areas. The line would also be visible to residents in the Coachella

Valley. Overall sensitivity rating for this segment is moderate. From Martinez Canyon west to Tule Spring, the landscape has no existing impact. This portion of the line segment could have a major impact on scenic resources.

4.0 MARTINEZ CANYON ALTERNATE ROUTES-SENSITIVITY ANALYSIS SUMMARY

Although both the Salt Creek-Martinez Canyon and Coachella Valley-Martinez Canyon Alternate routes are considered to be feasible alternates to the preferred Devers-Valley-Mira Loma route, disadvantages exist, as summarized and discussed below, compared to the preferred route:

1. The alternates are longer (8 miles for the Salt Creek alternate and 12 miles for the Coachella Valley alternate) and pass through some unimpacted sensitive areas with little or no existing access. Twelve more miles of new access roads would be needed for the Salt Creek-Martinez Canyon route and seven more miles for the Coachella Valley-Martinez Canyon alternate compared to the preferred route.
2. Construction along the alternates, especially from Martinez Canyon west would be more difficult and costly due to the more mountainous terrain than the preferred route. Erosion may be increased due to construction of new access roads.
3. The alternates pass through sensitive archaeological areas, particularly in Martinez Canyon and the vicinity of the Santa Rosa Mountains. This most sensitive portion of the alternates is common to both the Salt Creek and Coachella

Valley segments and while impacts can be mitigated, they may not be totally avoidable. Ethnological sensitivity through the same area could be great, subject to further evaluation, due to the close proximity of the Torres Martinez, Cahuilla and Santa Rosa Indian Reservations.

4. Biological resource sensitivity in the common segment of the Martinez Canyon west through the Santa Rosa Mountains may be major to maximum, subject to further study and evaluation, due to the presence of bighorn sheep in the mountains and other protected species occurring along this segment to the Valley Substation.

5. Four potential wilderness areas may be impacted by the line route. These occur in the Chuckwalla and Orocopia Mountains, Mecca Hills and the Martinez Canyon area.

6. Visual impact to various unimpacted scenic areas, including the potential wilderness areas just listed is expected to be moderate or possibly major, subject to further study and evaluation.