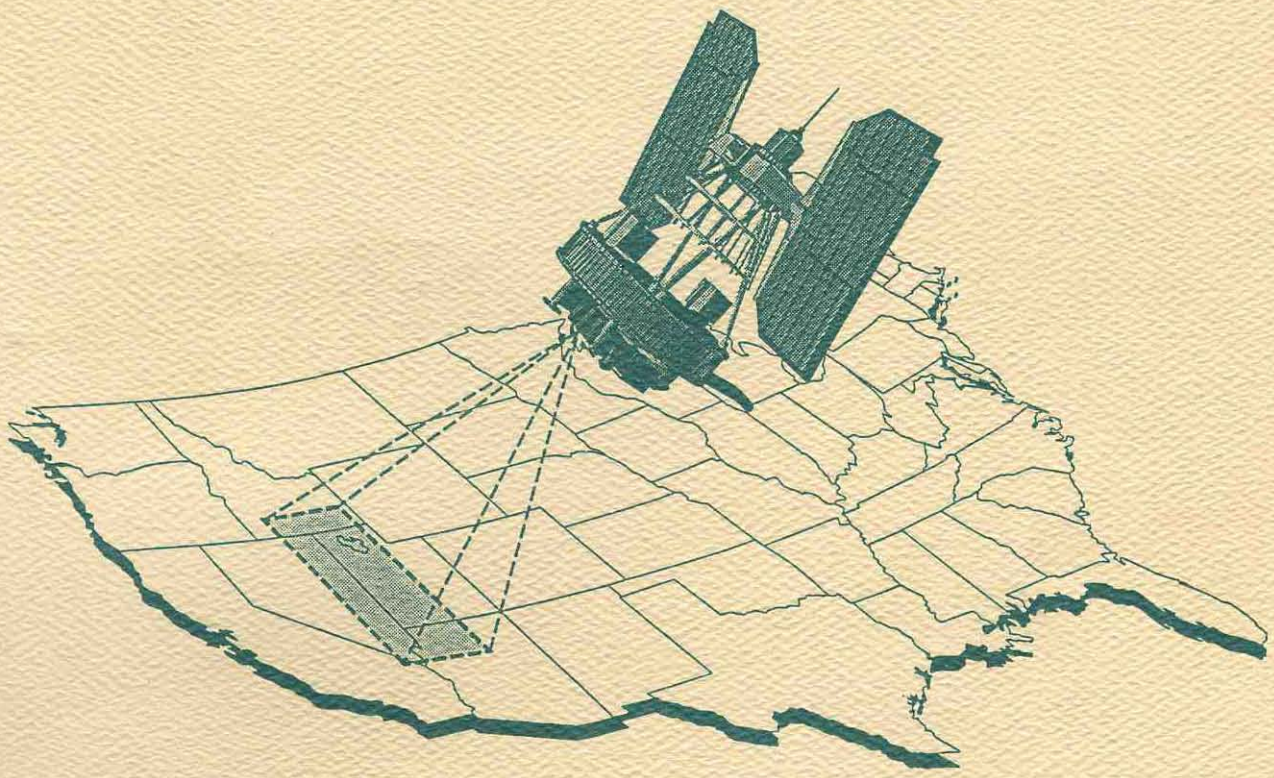
SOUTHWEST INTERTIE PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT
DRAFT PLAN AMENDMENT
DEIS/DPA



Prepared by the:

U.S. Department of the Interior
Bureau of Land Management
Burley, Shoshone, and Boise District Offices, Idaho
Elko, Ely, and Las Vegas District Offices, Nevada
Richfield District Office, Utah

In Cooperation with:

U.S. Department of Agriculture
Forest Service
Intermountain Region, R-4

U.S. Department of Interior
National Park Service
Pacific Northwest, Rocky Mountain, and Western Regions

U.S. Department of Interior
Bureau of Indian Affairs
Cedar City, Utah

U.S. Department of Interior
Bureau of Reclamation
Pacific Northwest, Upper Colorado and Lower Colorado Regions

June 1992

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
BURLEY DISTRICT OFFICE
ROUTE 3, BOX 1
BURLEY IDAHO 83318

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

June 12, 1992

Dear Reviewer:

This Draft Environmental Impact Statement/Draft Plan Amendment (DEIS/DPA) on the proposed Idaho Power Company 500kV Transmission Line, the Southwest Intertie Project, is submitted for your review and comment. The Final Environmental Impact Statement/Proposed Plan Amendment (FEIS/PPA) would be prepared considering comments received. Please retain the DEIS/DPA for future reference as the FEIS/PPA may be abbreviated. The environmentally preferred alternative identified in this document is Route A for the Midpoint to Dry Lake transmission system and the Cutoff Route for the Crosstie transmission system.

Comments on the DEIS/DPA may be submitted in writing or presented verbally at a formal public meeting. As indicated below, six formal public meetings will be held to receive oral comments:

Date	Time	Location
August 3, 1992	7-9 pm	Weston Plaza Twin Falls, Idaho
August 4, 1992	7-9 pm	Wells High School Wells, Nevada
August 5, 1992	7-9 pm	Bristlecome Convention Center Ely, Nevada
August 6, 1992	7-9 pm	City Council Chambers Delta, Utah
August 19, 1992	7-9 pm	Soil Conservation Service Office Caliente, Nevada
August 20, 1992	7-9 pm	BLM District Office

In order to be considered in the FEIS/PPA, all comments must be received or postmarked by September 18, 1992. Please make your comments as specific as possible. Comments providing only opinions or preferences will not have a formal response, but will be included as part of the decision-making process.

A copy of the FEIS/PPA will be sent to all persons, organizations, or agencies who provide comments on the DEIS/DPA,or to anyone requesting a copy. Please address written comments or requests for copies of the DEIS/DPA or FEIS/PPA to:

Karl Simonson
Bureau of Land Management
Burley District Office
Route 3 Box 1
Burley, Idaho 83318

Sincerely yours,

for Gerald L. Quinn
District Manager

COVER SHEET
Southwest Intertie Project
Draft Environmental Impact Statement/Draft Plan Amendment

(X) Draft
( ) Final

(X) Administrative
( ) Legislative

Lead Agency

U.S. Department of Interior
Bureau of Land Management

Cooperating Agencies

U.S. Department of Agriculture
Forest Service

U.S. Department of Interior
Bureau of Reclamation

U.S. Department of Interior
National Park Service

U.S. Department of Interior
Bureau of Indian Affairs

EIS/PA Contact

Comments on this DEIS/DPA Bureau of should be directed to:
Karl Simonson
Bureau of Land Management
Burley District Office
Route 3, Box 1
Burley, Idaho 83318

Copies of the draft have been sent to and comments requested from:
refer to Appendix G

Date DEIS/DPA Mailed to the Public:
June 2, 1992

Date by Which Comments Must Be Received or Postmarked By:
September 18, 1992

Abstract

Idaho Power Company proposes to construct and operate a 500kV transmission line from their Midpoint Substation near Shoshone, Idaho to a new proposed substation in the Dry Lake Valley northeast of Las Vegas. A crosstie route would also be constructed from the Ely, Nevada area to a point near Delta, Utah. New substations would be required near Ely, Las Vegas, and Delta, and series compensation stations would be needed midway between the Midpoint Substation and Ely, Nevada, and between Ely and Dry Lake. New microwave facilities would be required on the route from Midpoint to Dry Lake.

The facilities from Midpoint Substation and Dry Lake would increase the ability to conduct northwest-southwest power exchanges, would increase the capacity and reliability of the interconnected electrical grid in the western U.S., and would enhance competition and economic efficiency of the regional power market. The project would establish an "open-marketplace" for power transfers in the Las Vegas area. Because of the increased capacity to share regional resources, an additional benefit would be deferring new generation facilities and diversifying fuel resources. The crosstie route between Ely, Nevada, and Delta, Utah, would increase the reliability between the existing transmission systems in the Delta area and the planned north-south SWIP system.

Alternatives considered are the no-action, energy conservation, alternative generating sources, alternative transmission systems, alternative transmission technologies, and the proposed action and its eight routing alternatives from Midpoint to Dry Lake and four routing alternatives from Ely to Delta. Routing alternatives include:

Midpoint to Dry Lake Alternatives

- Route A - 345kV*-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Route
- Route B - 345kV*-Trout Creek-Wendover-Steptoe-Antone Pass-Dry Lake Route
- Route C - 345kV*-Trout Creek-Goshute Valley-Steptoe-Egan Range-Dry Lake Route
- Route D - 345kV*-Wells-Steptoe-Egan Range-Dry Lake Route
- Route E - 345kV*-Thousand Springs-Wendover-Steptoe-Egan Range-Dry Lake Route
- Route F - Hagerman-Trout Creek-Goshute Valley-Egan Range-Dry Lake Route
- Route G - 345kV*-Cottonwood Creek-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Route

345kV* parallels Midpoint to Valmy 345kV transmission line

Crosstie Alternatives

- Direct Route
- Cutoff Route
- 230kV Corridor Route
- Southern Route

This Draft Environmental Impact Statement/Draft Plan Amendment (DEIS/DPA) assesses the environmental consequences of the federal approval for the project. Impacts of the proposed action would result from the access roads, tower sites, and staging areas. Impacts are expected to soils, vegetation, wildlife, cultural resources, scenic resources, and land uses. Electric and magnetic effects have also been studied for this project.

State Director
BLM
Idaho

SUMMARY

SUMMARY

Southwest Intertie Project

Idaho Power Company (IPCo) is proposing to construct over 500 miles of single-circuit 500 kilovolt (kV) transmission line between the existing Midpoint Substation near Shoshone, Idaho, and a new proposed substation site in the Dry Lake Valley northeast of Las Vegas, Nevada. The transmission line project, known as the Southwest Intertie Project (SWIP), would be constructed generally using the following tower types:

- V-guyed (or other guyed) steel lattice or self-supporting steel lattice
- steel-pole H-frame in agricultural areas
- self-supporting steel lattice at specific intervals for lateral support

The towers could range from 90-160 feet in height, but would average 120-130 feet. The project would require equipment additions to the Midpoint Substation, a new substation near Ely, Nevada, and a new substation in Dry Lake Valley in southern Nevada. Series compensation stations would be needed to increase the electrical performance of the system northeast of Wells, Nevada, which is about halfway between the two northern substation sites. Another series compensation station may be required in the Delamar Valley in southern Nevada. A new microwave communication system to operate the system would also be required between Midpoint Substation and the proposed substation at Dry Lake.

In the Ely area, another transmission line segment would connect from the proposed substation in this area, east to a new substation near Delta, Utah. This nearly 200-mile portion of the project is referred to as the "Crosstie". This transmission segment would require a new substation near Delta, Utah. An existing communication system between Ely, Nevada, and Delta, Utah would be used with only minor upgrades. If the crosstie is approved, IPCo would transfer the right-of-way grant to the Los Angeles Department of Water and Power (LADWP). The crosstie would be constructed and operated by the LADWP.

Purpose and Need

Electrical utilities have a responsibility to provide adequate supplies of reliable and economical electricity to all classes of customers. Transmission line systems interconnect most states and regions of the West to meet this mandate and to meet increasing demands and seasonal variations in electrical power supply. There is a gap in this system through the inland West. Since 1964 there has been recognition of this shortfall by Congress and utilities throughout the West.

The proposed addition of the Southwest Intertie Project would allow IPCo and other utilities in the Northwest and Southwest to add capacity and reliability to the western electrical system at an economical price. Specifically, the proposed project from Midpoint Substation to Dry Lake would:

- allow for power exchanges from the Northwest to the Southwest
- increase the reliability and capacity of the transmission system in the western U.S.
- increase competition and economic efficiency by increasing transmission access
- allow for mutually beneficial transactions to northwest and southwest utilities at an open marketplace
- increase wheeling capacity for other utilities
- furnish access to the economy energy market
- provide access to long-term purchases and sales
- diversify fuel resources used to generate electrical power

The crosstie route would contribute toward satisfying regional reliability and enhance the electrical grid in the western U.S. by:

- creating a bidirectional transfer path between the Pacific Northwest and the intermountain regions of the West
- creating a bidirectional transfer path between the intermountain region and southern Nevada
- contribute to the reliability of the Utah-Nevada Transmission Project (UNTP) Phase I (Delta to Marketplace line) and the SWIP line from Midpoint Substation to Dry Lake
- allow for the bidirectional transfer of bulk power bought, sold, and/or exchanged in the marketplace between utilities in Utah, southern Nevada, and Idaho

Scoping and Project-Related Studies

Scoping Process

As required by the National Environmental Policy Act (NEPA) of 1969, the United States Department of the Interior (USDI), Bureau of Land Management (BLM), the USDA Forest Service (FS), the USDI Bureau of Reclamation (BOR), and the National Park Service (NPS)

completed numerous scoping activities. Scoping is an information-gathering process open to the public early in a project to identify the range or scope, of issues to address in the ensuing environmental studies. Scoping served to identify significant issues to be analyzed, determine the scope with which they were to be treated in the Draft Environmental Impact Statement/ Draft Plan Amendment (DEIS/DPA), and eliminate issues and alternatives from detailed study, where appropriate. Scoping information provided the basis for identifying alternative routes, and developing the work plan for environmental baseline, impact assessment, and mitigation planning for the project.

Scoping activities included:

- review of previous studies of transmission projects in the area
- completion of a regional siting study, including resource sensitivity analyses, agency contacts, and public scoping meetings
- identification of alternative transmission line routes

A Notice of Intent to prepare a DEIS/DPA for a transmission line project between Midpoint Substation, Ely, Nevada, and Delta, Utah, was published in the Federal Register on March 3, 1989 (Vol. 54, No. 41). Public scoping meetings were held in four communities during March 1989.

In April 1990, the project was expanded to include a route from the Ely, Nevada, area to the Dry Lake Valley area in southern Nevada. A Notice of Intent to expand the scope of the SWIP DEIS/DPA and to tier from the White Pine Power Project EIS was published in the Federal Register on June 4, 1990. Three additional public scoping meetings were held in Las Vegas, Ely, and Caliente, Nevada, during June 1990. A public information meeting was held in Moapa, Nevada, during December 1990 to discuss the ongoing studies in southern Nevada.

Corridor Studies

Alternative transmission line routes were identified based on previous studies, the regional siting study, and public and agency input. Subsequently the environment was inventoried and the data were compiled along all final alternative routes, a total of 21 data layers. This baseline was then used in assessing project-related impacts.

Six public workshops were held in January and April 1991 to report results of environmental studies, present preliminary alternatives, and gain public input regarding the acceptability of those alternatives.

Alternatives Including The Proposed Action

Six general alternatives were evaluated by IPCo to meet its system needs:

- energy conservation and load management
- new generation sources
- alternative transmission systems
- alternative transmission technologies
- proposed action
- no action

The first four of these alternatives were eliminated from further consideration because they did not meet the system requirements or meet the stated purpose and need.

IPCo has developed and implemented numerous energy conservation and load management programs. Conservation, although effective in reducing energy use, cannot be considered an alternative action that would meet the stated need for the project.

IPCo evaluated many alternative generation sources, including hydroelectric, thermal, solar, wind, cogeneration, solid waste, combustion turbine, fluidized bed, and nuclear fusion. These alternatives would not meet the goal of deferring new generation, providing for seasonal exchanges, diversifying fuel resources, and other stated purposes of the project, and therefore, this action was eliminated as an alternative.

IPCo evaluated the feasibility of increasing power purchases from other utilities and wheeling power over the existing transmission system. This alternative was not considered viable because the present system is operated at capacity whenever possible. Any increase in power brought into the system over existing facilities would greatly reduce the reliability of the entire system, reduce the stability of the system, and make outages more frequent and severe.

Alternative transmission technologies (e.g., voltages other than the proposed 500kV, direct current (DC) instead of alternating current (AC), underground construction, microwave, laser, super conductors, etc.) were evaluated. However, these technologies were not considered to be viable alternatives, due to their substantially higher costs, increased environmental impacts, and/or technological unfeasibility.

Advantages of no action would include preclusion of environmental impacts within the project study area and elimination of financial costs associated with construction and operation of a 500kV transmission line. The disadvantages would include environmental, socioeconomic, and electrical service impacts that would result due to other mitigating

actions taken to ensure adequate and affordable energy supplies within the western electrical system.

Proposed Action

IPCo proposes to construct, operate, and maintain a single-circuit, overhead 500kV transmission line between the existing Midpoint Substation near Shoshone, Idaho, and a new proposed substation site in the Dry Lake Valley northeast of Las Vegas, Nevada. The transmission line project would also connect about midway between these two connection points, near Ely, Nevada, east to a new substation near Delta, Utah. The line would be supported by V-guyed and self-supporting steel-lattice, and steel-pole H-frame structures placed an average of 1500 feet apart.

The proposed action would require equipment additions to the Midpoint Substation, one new substation (and possibly a second substation) near Ely, Nevada, a new substation in the Dry Lake Valley in southern Nevada, and a new substation near Delta, Utah. Series compensation stations would be needed to increase the electrical performance of the system northeast of Wells, Nevada, which is about halfway between the two northern substation sites. This series compensation station near Wells may be expanded to accommodate switching equipment (substation). Another series compensation station would be required in the Delamar Valley in southern Nevada.

A new microwave communication system to operate the system would also be required between Midpoint Substation and the proposed substation at Dry Lake. An existing communication system would be used on the transmission line system between Ely, Nevada, and Delta, Utah.

The project is scheduled to begin commercial operation by late 1997. Construction would begin in 1995.

Routing Alternatives

Final routing alternatives for the proposed line were determined through a process of documentation and elimination of alternatives with serious constraints. Alternative routes were eliminated for a number of reasons, including environmental conflicts, public and agency opposition, and system planning/performance criteria.

For routing options remaining, detailed environmental studies were conducted to form the basis for comparing those alternatives. Approximately 2000 miles of alternatives routes were studied in detail. To select routing preferences, the environmental consequences of each route were summarized, based on impact assessment results, environmental resource preferences, and agency and public comments. A network of routes was organized into two major routing alternatives:

- the north-south system from Midpoint Substation south to the Dry Lake Valley
- the "crosstie" routes from Ely, Nevada, to Delta, Utah

Each of these contained several routing options. The final routing alternatives are as follows:

Midpoint Substation to Dry Lake

- **Route A** - 345kV*-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative
- **Route B** - 345kV*-Trout Creek-Wendover-Steptoe-Antone Pass-Dry Lake Alternative
- **Route C** - 345kV*-Trout Creek-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative
- **Route D** - 345kV*-Wells-Steptoe-Egan Range-Dry Lake Alternative
- **Route E** - 345kV*-Thousand Springs-Wendover-Steptoe-Egan Range-Dry Lake Alternative
- **Route F** - Hagerman-Trout Creek-Goshute Valley-Egan Range-Dry Lake Alternative
- **Route G** - 345kV*-Cottonwood Creek-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative

* parallels the Midpoint to Valmy 345kV transmission line

Crosstie Routes from Ely, Nevada, to Delta, Utah

- Delta Direct Route
- Cutoff Route
- 230kV Corridor Route
- Southern Route

Affected Environment

The climate of eastern Nevada, southern Idaho, and western Utah is influenced largely by location, regional weather systems, and topographic orientation. The climate throughout

much of this area is characterized by hot, dry summers followed by cold, dry winters. Surface winds are channeled through valleys between generally north-south trending mountain ranges. Winds flow predominately in northeasterly or southwesterly directions. Annual precipitation depends largely on elevation. Precipitation occurs primarily in the form of snow at higher elevations during the winter months. The snows maintain high water tables and provide groundwater recharge. Some additional precipitation occurs from thunderstorms produced by daytime heating of air masses in valleys.

Northern segments of the SWIP, within southern Idaho and northeastern Nevada, are in the Snake River Plain section of the Columbia Plateau physiographic province. This section is a vast, relatively flat plain and young lava plateau, which is deeply dissected by the canyons of the Snake River and Salmon Falls Creek, the dominant landscape features within this area. Irrigated agricultural lands, this area's main land use, are found clustered north and south along the Snake River.

To the south, on the Snake River Plain, agricultural areas extend to bordering foothills and mountains in a transitional landscape between the Basin and Range and Columbia Plateau provinces. This transitional landscape includes foothills, plateaus, mesas, and buttes formed of eroded lava and sedimentary rock layers.

The majority of northeastern and southern Nevada and western Utah, falls within the Basin and Range physiographic provinces. Topographically, this landscape is distinguished by isolated, roughly parallel mountain ranges separated by closed (undrained) desert basins or playas. The mountain ranges often run 50 to 75 miles in length and are generally north-south trending. Surrounding the base of the mountains and extending into the basins, there are often distinctive alluvial areas.

Portions of western Utah also include a transition zone of the Basin and Range province into what is locally referred to as the "West Desert" landscape. This landscape includes portions of the Sevier Desert and Sevier Lake. The topography within this area is extremely flat and includes large playas or mud flat areas, that exhibit little landform diversity. Again, these areas are divided by rugged, rocky mountain ranges.

Earth resource features that have a high sensitivity are landslide hazard areas, areas of high paleontological sensitivity, soils with either a high wind erosion or high water erosion hazard, areas of active mining, perennial streams and lakes, springs, and wetland areas. Significant paleontological resources are found at the Hagerman Fossil Beds National Monument near Hagerman, Idaho.

Eleven vegetative communities have been identified in the SWIP study corridors, including shadscale, greasewood, samphire-iodine bush, Great Basin sagebrush, Mojave desert scrub, grassland, wetlands, riparian areas, piñon-juniper, alpine tundra, limber/bristlecone pine, and quaking aspen. These vegetation types support a large variety of mammals, birds, amphibians, and reptiles.

Approximately 560 species of vertebrates are likely to occur, over the course of a year in habitats traversed by the alternative routes.

Seventy species of fish are known to occur within aquatic habitats within the study corridors. Native and introduced game fish are present in warm and cold water lakes, ponds, and reservoirs, and in perennial streams and rivers. Others inhabit hot and cold springs and marshes. Approximately 31 percent of the fish fauna occupying waters within the study corridors are introduced.

Fifteen species of amphibians are expected to occur in aquatic, riparian, and wetland habitats in the study corridors. Sixty-two species of reptiles potentially occur in terrestrial habitats within study corridors.

A total of 111 species of mammals are expected to occur within habitats traversed by alternative routes. Small mammals including rodents, lagomorphs (rabbits and hares), bats, and shrews are the most numerous, although not readily observed. Over one half of the mammals that may occur within the study corridors are rodents (51 species). Large mammals include 19 species of carnivores (e.g., lynx, wolverine, etc.) and five species of native ungulates (e.g., antelope, mule deer, bighorn sheep).

Free roaming horses (Equus caballus) and burros (E. asinus) occur on public lands in the study corridors. These animals are descendants of horses and burros that escaped from man or were turned out onto the open range.

In recent years, dramatic declines in tortoise population numbers have been observed throughout much of its range, including southern Nevada. A number of factors have contributed to the observed decline, including loss of habitat to development, degradation of habitat from livestock grazing, disease, predation on juveniles by ravens attracted to areas where human refuse accumulates, illegal collection, and off-road vehicle (ORV) use. The Mojave population of the desert tortoise was formally listed as a federally threatened species by the U.S. Fish and Wildlife Service (FWS) in April 1990. Concern has been expressed for the maintenance of viable populations in Clark County, Nevada, and especially the Las Vegas Valley where rapid commercial and residential development is occurring.

Declines in sage grouse numbers are largely associated with destruction of sagebrush habitat. Conversion of sagebrush to agricultural lands, and attempts to convert sagebrush areas to grassland for livestock grazing are a few of the human developments contributing to the decrease in grouse numbers.

The majority of the lands crossed by the alternative routes are used for cattle grazing and are classified as rangeland. Other significant uses within the study corridors include agriculture, mining, airports and airstrips, utilities, commercial, governmental and other industrial facilities. Residences near urban areas and in remote locations, both occupied and unoccupied are located within the study corridors. Principal urban areas or residential concentrations in or near the study corridors include

- Hagerman, Eden, and Hansen in Idaho
- Wells, Ely, Curry, Jackpot, and McGill in Nevada
- Delta, Eskdale, and Hinckley in Utah

Several alternative routes in Utah and Nevada could potentially affect military aircraft operations at Hill Air Force Base in Utah and Nellis Air Force Base in southern Nevada.

Approximately half of the lands crossed by the study corridors in Idaho fall into the category of agriculture. The high-desert lands of the Snake River Valley are fertile and productive when irrigated. Many of the lands crossed in Idaho are classified as prime or important farmland by the Soil Conservation Service (SCS).

Dispersed recreation occurs throughout these areas in Nevada, Idaho, and Utah. Developed campsites and recreation areas are usually located along perennial streams or reservoirs. Great Basin National Park, near Baker, Nevada, is passed by several of the alternative crosstie routes. Several wilderness study areas (WSAs) inventoried within the study corridors include portions of Salmon Falls Creek WSA in Idaho and fourteen WSAs in Nevada including South Pequop, Bluebell, Goshute Peak, Goshute Canyon, Marble Canyon, Mt. Grafton, Fortification Range, Delamar Mountains, Evergreen, Meadow Valley Mountains, Fish and Wildlife 1, 2 & 3, and Arrow Canyon. WSAs within Utah include Howell Peak, King Top, Notch Peak, Fish Springs, and Swasey Mountain.

Cultural resources are historic and traditional cultural properties that reflect our nation's heritage. Federal regulations define such historic properties to include prehistoric and historic sites, buildings, structures, districts, and objects included in, or eligible for inclusion in the National Register of Historic Places (NRHP), as well as artifacts, records, and remains related to such properties. These regions of Nevada, Idaho, and Utah have been occupied for thousands of years. This section briefly summarizes what is known about this long history of human use of the region. More details are provided in this document and in the technical reports (Rogge 1991).

Prehistory - The project area overlaps portions of two culture areas, the Great Basin and the Colorado Plateau, but the vast majority of the project area is within the "cultural," if not the geographic, Great Basin. The extreme southern portion is along the western margin of the Colorado Plateau. Within the study area three prehistoric cultural stages, Paleo-Indian, Archaic, and Formative are represented and local phases or variations within each stage have been defined.

Ethnohistory - During the ethnohistoric era, these regions of Nevada, Idaho, and Utah were occupied by the Northern Shoshone, Bannock, Western Shoshone, Pahvant Ute, and Southern Paiute. Generally speaking, the Northern Shoshone and Bannock inhabited the study corridors in southern Idaho. The Western Shoshone ranged through eastern Nevada and Northwestern Utah. The central portion of Utah was occupied by the Pahvant Ute while the Southern Paiute inhabited southwestern Utah and southern Nevada.

History - After the arrival of Europeans in the New World, portions of the study corridors were claimed by Spain, Great Britain, France, Mexico, and Canada, as well as the United States. The earliest European exploration was led by Escalante who skirted the eastern margin of the study area in Utah. After the famous Lewis and Clark Expedition to the Pacific Coast in 1804-1806, fur trappers and mountain men were lured to the Rocky Mountains until the decline of fur trading in about 1840.

Environmental Consequences

The consequences, or impacts, to the environment caused by implementing the proposed project were assessed by considering the existing condition of the environment and the effects of the activities of the proposed project (construction, operation, and maintenance) on the environment. The "initial" impacts were evaluated to determine if mitigation measures would be effective in lessening the impacts. Those impacts remaining after mitigation measures were applied are referred to as "residual" impacts. Many of the identified impacts are considered to be adverse, direct, and long-term. Some impacts (e.g., visual, some cultural and biological impacts) are considered adverse, indirect, and long-term.

The principal type of impacts associated with earth resources is the potential for increased erosion hazards. Some short-term soil compaction impacts could occur in agricultural areas. Some stream sedimentation could also occur at the crossings of perennial streams.

Typical impacts to biological resources include effects on threatened, endangered, or protected species, rare or unique vegetation types, migration corridors for wildlife, areas of low revegetation potential, or highly productive wildlife habitat. The impacts are generally associated with the removal of vegetation and habitat cause by construction and operation activities, and from human activity from more access into remote areas. The presence of the transmission towers would increase the potential for long-term predation of sage grouse by golden eagles on adult and immature birds. Adding towers also would provide roost/hunting sites for ravens and magpies, thus increasing the long-term potential for predation on grouse nests.

Land use impacts include those that would displace, alter, or other physically affect any existing or planned residential, commercial, or industrial use or activity, any agricultural use, or any recreational, preservation, educational, or scientific facility or use. Few land use impacts would occur from the construction of the SWIP, although impacts would be long-term.

Potential socioeconomic effects could include construction-period impacts to area communities, social and economic impacts along the selected route, and fiscal impacts with local jurisdictions. These effects can be both adverse and beneficial.

Visual impacts are considered adverse, direct, and long-term. They include effects to the quality of any scenic resource, the view from any residential or other sensitive land use or travel route, or the view from any recreation, preservation, education, or scientific facility. Visual impacts to existing and proposed sensitive viewpoints for Great Basin National Park is a concern. Other visual impacts are generally associated with residential concentrations or dispersed homes, scenic roads and highways, and recreation viewpoints, including wilderness areas and WSAs.

Direct, adverse physical impacts can occur to cultural resources during construction, while indirect impacts can result after construction due to increased erosion or increased access to sites. Adverse visual effects may occur to sites with high aesthetic or interpretive values.

Potential electrical, biological, health and safety effects from the proposed action were assessed. These include corona effects, electric and magnetic field effects, and effects on cardiac pacemakers, agriculture, and public safety.

The Stateline Resource Area is currently preparing a Resource Management Plan (RMP) which will designate utility corridors. The RMP corridor studies and the SWIP EIS studies have been coordinated, and the preferred alternatives are similar. The Federal Land Policy and Management Act (FLPMA) of 1976 mandates to the extent practical, BLM will consolidate future utility projects within the corridor that is established.

Route Comparisons

The comparative environmental consequences are summarized below for each of the final alternative routes.

Midpoint to Dry Lake Routes

Route A:

- crosses 130 miles within Military Operating Areas (MOAs) of Nellis Air Force Base
- crosses 35.2 miles of sage grouse leks and wintering range
- crosses the most (32.8 miles) bald eagle nesting areas
- most number of residences within one mile
- crosses 52.1 miles of Category I desert tortoise habitat

Route B:

- crosses 182 miles within MOAs of Hill and Nellis Air Force Bases
- crosses 36.8 miles of sage grouse leks and wintering range
- crosses the least (7.2 miles) crucial pronghorn habitat
- impacts to peregrine falcon for 23.1 miles
- least number of residences within one mile
- crosses 52.1 miles of Category I desert tortoise habitat

Route C:

- crosses 130 miles within MOAs of Nellis Air Force Base
- crosses 30.7 miles of sage grouse leks and wintering range
- crosses least BLM-administered lands
- crosses least miles of Visual Resource Management (VRM) Class II landscapes
- crosses 52.1 miles of desert tortoise habitat

Route D:

- crosses 128.4 miles within MOAs of Nellis Air Force Base
- crosses 34.1 miles of sage grouse leks and wintering range
- crosses most miles of riparian areas
- crosses least (6.0 miles) bald eagle nesting areas
- crosses 52.1 miles of desert tortoise habitat

Route E:

- crosses 130 miles within MOAs of Nellis Air Force Base
- crosses 36.3 miles of sage grouse leks and wintering range
- crosses most miles of BLM-administered lands
- impacts to peregrine falcon for 23 miles
- crosses 52.1 miles of desert tortoise habitat

Route F:

- visual impacts to Fossil Bed National Monument
- impacts airstrip used by agricultural spraying operations
- crosses 130 miles within MOAs of Nellis Air Force Base
- crosses 32.8 miles of sage grouse leks and wintering range
- most agricultural lands crossed
- crosses most private land
- most miles within utility corridors
- most cultural sites within one mile
- crosses 52.1 miles of desert tortoise habitat

Route G:

- reduces visual impacts to U.S. Highway 93
- crosses 130 miles within MOAs of Nellis Air Force Base
- crosses 40.6 miles of sage grouse leks and wintering range
- crosses 39.7 miles of crucial pronghorn habitat
- crosses least private land
- crosses 52.1 miles of desert tortoise habitat

Utility:

- reduces visual impacts to U.S. Highway 93
- crosses 130 miles within MOAs of Nellis Air Force Base
- crosses 40.6 miles of sage grouse leks and wintering range
- crosses 39.7 miles of crucial pronghorn habitat
- crosses 52.1 miles of desert tortoise habitat

Agency :

- reduces visual impacts to U.S. Highway 93
- crosses 130 miles within MOAs of Nellis Air Force Base
- crosses 37.2 miles of sage grouse leks and wintering range
- crosses most (43.2 miles) crucial pronghorn habitat
- least prehistoric cultural sites within one mile
- crosses 52.1 miles of desert tortoise habitat

Ely to Delta Routes

Direct Route:

- shortest route and crosses least public and private land
- avoids visual impacts to Great Basin National Park
- crosses wetlands known as the Leland-Harris Spring Complex
- crosses 130 miles within restricted air space and MOAs of Utah Testing and Training Range (UTTR)
- crosses 7.9 miles of sage grouse leks and wintering range
- crosses least miles of crucial pronghorn habitat

Cutoff Route:	• avoids visual impacts to Great Basin National Park • crosses 104.2 miles within MOAs of UTTR • crosses 6.8 miles of sage grouse leks and wintering range
230kV Corridor Route	• utilizes existing 230kV corridor • crosses 102.5 miles within MOAs of UTTR • crosses 7.1 miles of sage grouse leks and wintering range • crosses most miles of high water erosion hazard • crosses most miles (17.8) of bald eagle nesting areas • highest number of residences within one mile • highest number of known cultural sites within one mile • crosses most private and national forest lands • most miles within utility corridors • crosses most miles of predicted high sensitivity cultural zones
Southern Route:	• longest route • highest overall environmental impacts • crosses least amount of MOAs of UTTR • crosses 11.8 miles of sage grouse leks and wintering range • most miles of construction in steep terrain • crosses most miles of BLM-administered lands • most miles (85.7) of crucial pronghorn habitat

Preferred Route Selection

Based upon review of potential impact characterizations, significant, unavoidable adverse effects, agency and public comments, and cumulative environmental consequences of the alternative routes, the preferred routes were identified (refer to Identification of Preferred Alternatives in Chapter 2).

Route A is the environmentally preferred route between Midpoint Substation to Dry Lake. The environmentally preferred crosstie route is the Cutoff Route, however, this would depend upon which Ely-area substation is selected. If the Robinson Summit site is chosen over the North Steptoe site, the 230kV Corridor Route would be environmentally preferred.

The agency preferred route between Midpoint Substation to Dry Lake is a combination of Route A and Route G. The agency preferred crosstie route is the 230kV Corridor Route.

IPCo prefers Route G from Midpoint Substation to Dry Lake with several modifications near Contact, Nevada. The utility preferred crosstie route is the 230kV Corridor Route.

The significant, unavoidable adverse effects of this route involve biological, visual, and cultural resources only, as summarized below:

Resource Category	Significant Unavoidable Adverse Impacts
Biological Resources	On the routes between Midpoint Substation and Dry Lake, Route A would potentially disturb 3.2 miles of riparian habitat, 52.1 miles of sensitive desert tortoise habitat, and 35.2 miles of sage grouse leks and wintering range. Route G would potentially disturb 4.8 miles of riparian habitat, a similar disturbance to desert tortoise, and 40.6 miles of sage grouse leks and wintering range. On the crosstie between Ely and Delta, the Cutoff Route would potentially disturb 1.2 miles of riparian habitat and 6.8 miles of sage grouse leks and wintering range. The 230kV Corridor Route would potentially disturb 0.9 miles of riparian habitat and 7.1 miles of sage grouse leks and wintering range. Although the impacts to riparian areas and desert tortoise can be largely mitigated, they are considered significant because of the sensitivity of the resources. The impacts to sage grouse are significant where habitats are crossed where there are no existing transmission lines.
Visual Resources	On the routes between Midpoint Substation and Dry Lake, Route A would potentially result in 13.5 miles of high impacts to the area's visual resources. Significant impacts could be predicted to 83 residences within one mile of the route, and to one scenic highway crossed. The route would cross 7.3 miles of BLM lands managed to retain visual quality (VRM Class II) and FS lands managed to retain visual quality (VQO Retention). Route G would potentially result in 14.7 miles of high impacts to the area's visual resources. Impacts could be predicted to 93 residences within one mile of the route, and to one scenic highway crossed. On the crosstie between Ely and Delta, the Cutoff Route would potentially result in 1.2 miles of high impacts to the area's visual resources. Significant impacts could be predicted to 5 residences within one mile of the route. The 230kV Corridor Route would potentially result in 7.3 miles of high impacts to the area's visual resources. Impacts could be predicted to 26 residences within one mile of the route.

Resource Category	Significant Unavoidable Adverse Impacts
Cultural Resources	On the routes between Midpoint Substation and Dry Lake, Route A would potentially result in 6.8 miles of high impacts to cultural resources. Among the 454 sites identified within one mile, 53 are historic, 13 are ethnohistoric, and 388 are prehistoric. Route G would potentially result in 7.3 miles of high impacts to cultural resources. Among the 474 sites identified within one mile, 61 are historic, 14 are ethnohistoric, and 399 are prehistoric. On the crosstie between Ely and Delta, the Cutoff Route would potentially result in 4.6 miles of high impacts to cultural resources. Among the 39 sites identified within one mile, 5 are historic, 8 are ethnohistoric, and 26 are prehistoric. The 230kV Corridor Route would potentially result in 5.5 miles of high impacts to cultural resources. Among the 100 sites identified within one mile, 12 are historic, 8 are ethnohistoric, and 80 are prehistoric.

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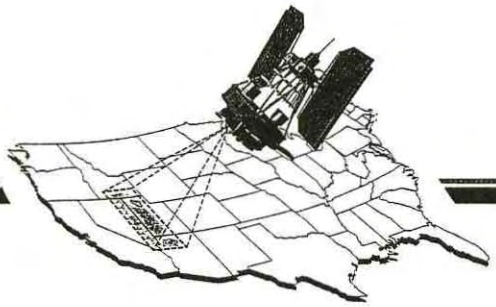


CHAPTER 1

PURPOSE AND NEED FOR ACTION

CHAPTER 1
PURPOSE AND NEED FOR ACTION

INTRODUCTION

High voltage transmission lines have interconnected the states and regions in the West to meet increasing demands and seasonal variations in electric power supply. Within the inland portion of the western United States (U.S.) there are sections of the high voltage transmission system that do not have surplus capacity for additional energy transactions. Congress passed legislation in 1964 that recognized the need for transmission interconnections between states in the Pacific Northwest and states in the Inland Southwest (P.L. 88-552). Later in 1985, the Western Area Power Administration (WAPA) suggested the proposed Southwest Intertie Project (SWIP) corridor as a possible route ("Completing the Pacific Northwest-Southwest Intertie"). In its conclusion, the report said utilities throughout the West recognize that a transmission line built in this corridor would "improve power coordination and overall system reliability, as well as possibilities for more energy transactions which would directly benefit consumers."

The purpose and need of the SWIP is to provide additional transmission capacity and reliability at an economical price between the Northwest and Southwest transmission systems in the western U.S. The seasonal load and resource diversity between electric systems in the North versus those in the South may allow power exchange contracts to replace or defer new resource construction. The additional capacity provided by the SWIP would allow utilities to take advantage of this regional diversity and would promote the efficient utilization of existing power resources.

The SWIP was originally proposed to connect from the existing Midpoint Substation near Shoshone, Idaho, south to a new substation site near Ely, Nevada, then crossing east to a new substation site near the Intermountain Generating Station near Delta, Utah. In early 1990 Idaho Power Company (IPCo) determined that the Utah-Nevada Transmission Project (UNTP) would be fully subscribed and would not be able to provide the transmission capacity for the SWIP to reach the new marketplace substation near Boulder City, Nevada. IPCo decided that the SWIP would have to be extended south from the Ely area in order to meet the purpose and need for the SWIP project to interconnect in the Las Vegas area. In June 1990 the SWIP studies were expanded to include routes from the Ely, Nevada, area to a new substation site northeast of Las Vegas in the Dry Lake Valley. Bureau of Land Management (BLM) determined at that time to retain the Ely, Nevada, to Delta, Utah route alternatives in this draft Environmental Impact Statement (EIS) even though this portion, referred to as the "crosstie", has a separate purpose and need to construct and is not required as part of the north-south transmission segment from Midpoint Substation to Ely, Nevada, to Dry Lake, Nevada.

The crosstie route from Ely, Nevada, to Delta, Utah, would interconnect two electrical utility systems in different geographic areas to establish strategic open marketplace substation

locations and enhance reliability of the interconnected electrical system in the western U.S. The crosstie route was included in this document with the Midpoint to Dry Lake route. Refer to pages 1-4 and 2-31 for additional information on the crosstie route.

The following is a brief description of the project (Chapter 2 provides further detail) followed by a discussion of factors involved in this purpose and need, and a review of planning requirements for the SWIP. All tables are located at the end of the chapter.

IPCo is proposing to construct and operate the SWIP, a high capacity 500,000-volt (500kV) alternating current (AC) transmission line with an initial capacity of 1200 megawatts (MW). The proposed line would extend from IPCo's Midpoint Substation near Shoshone, Idaho, south through Idaho and Nevada to a proposed new substation site approximately 25 miles northeast of Las Vegas, Nevada.

A direct current (DC) system can be an economical alternative to an AC system when a line exceeds 400-500 miles in length with no intermediate substations. The SWIP, however, would provide interconnections to other utilities at intermediate substations and would have the capability to integrate regional generation resources. Such interconnections for a DC system would require construction of expensive converter stations for local AC electricity use.

If approved, IPCo would offer participation, either in ownership rights or nonowner wheeling, to other utilities in the region. IPCo would be the permitting agent for the crosstie portion of the SWIP, but intends to transfer the right-of-way grant to the Los Angeles Department of Water and Power (LADWP), who would construct and operate the facility. This route of approximately 165 miles is also proposed to be constructed from the Ely, Nevada area to the Delta, Utah area. The crosstie route would be rated at 1100 MW.

Typical construction of the transmission line between the Midpoint Substation and Las Vegas would use self-supporting lattice steel structures, self-supporting tubular steel H-frame structures, and steel lattice towers stabilized with guy-wires (refer to Figure 2-2 in Chapter 2). Tower-to-tower spans are anticipated to be approximately 1,000 to 1,500 feet. The towers would range in height from 90 to 160 feet depending on terrain and military airspace considerations, but would average between 120 and 130 feet. IPCo is requesting a 200-foot-wide right-of-way along the route and a separation of 2000 feet between the SWIP and the adjacent high capacity lines that are found in some areas in order to comply with the Western System Coordinating Council (WSCC)[1] reliability and outage criteria (refer to page 2-18). Total mileage of the proposed transmission line is approximately 520 miles.

The proposed line would require an expansion of the Midpoint Substation, a series compensation/switching station near Wells, Nevada, a new substation (and possibly a

---

[1] The WSCC is an organization of utilities in the Western United States and Canada, and is one of nine regional councils that make up the North American Electric Reliability Council (NERC). The principal function of NERC is to promote the reliability of the North American electrical system, as well as to provide a forum for the exchange of information and knowledge. On the regional level, the WSCC provides the organizational basis for efficient design and operation of the existing electrical system, as well as a mechanism to insure the future system continues to be reliable and efficient.

second) near Ely, Nevada, a possible series compensation station near Delamar Valley (half-way between Ely and Las Vegas, Nevada), and a new substation near Las Vegas. Expansion of an existing substation, construction of new substations, and series compensation/switching stations would be needed to allow full line capacity and provide control of the transmission system. A microwave system would be constructed paralleling the transmission system to remotely transmit and receive data for protection of the transmission line, and to operate the substations and the switching stations. Of the possible microwave station alternatives, only one would require a new electrical distribution line (less than two miles).

PURPOSE AND NEED

Southwest Intertie Project - Midpoint Substation to Dry Lake

The need for increased power exchanges in the western U.S. is particularly evident between the Northwest and the Southwest. Two main avenues of transmission are now used, the Pacific Interties in the West and various smaller lines around the east side of the Great Salt Lake. The Pacific Interties connect the Pacific Northwest with California. The smaller lines on the east connect the electrical systems of Utah and Colorado to the Southwest states of Arizona and New Mexico. These major paths are presently unable to accommodate the full need for electric power transfers between the northern and southern portions of the western transmission system. Figure 1-1 illustrates the existing regional transmission line network in the western U.S.

Use of the Pacific Interties is governed by Bonneville Power Authority's (BPA) Long Term Intertie Access Policy. This policy allocates use of the interties when demand for those facilities exceeds their capacity. Temporary or short-term, nonfirm access to the interties is based on BPA's determination that capacity is available, and is allocated in proportion to demand. Electric power transmitted on the lines is generally consumed by California utilities with little extra available for transfer to inland southwest utilities.

Use of the eastern transmission path for north-south transfers has historically been difficult. Most of the lines were built to serve specific, localized needs rather than accommodate regional transfers of power. A good example is the Intermountain to Adelanto 500kV DC line that transmits power from the Intermountain Generating Station in Utah to electrical utilities in Southern California. Although stretching from Utah to California, capacity was planned to meet specific needs in Southern California and is limited for bulk north-south transfers of power.

The proposed addition of the SWIP would allow IPCo and other utilities to assist in meeting regional electricity needs by providing economic electricity to consumers and by increasing the overall capacity and reliability of the interconnected electric system between the Northwest and Southwest.

The SWIP would fulfill the major needs as outlined below with further explanation in the following pages.

- Provide for increased power transfer capability between the Northwest and Southwest
- Increase the capacity and reliability of the overall regional power system
- Enhance competition and economic efficiency of the power market
- Establish an "open-marketplace" power transfer location
- Provide power transfer services to nonowners through wheeling
- Allow for additional short-term or spot market purchases and sales of electric power
- Increase long-term, firm commitments for regional purchases and sales of electric power
- Defer new generation facilities and diversify fuel resources

Crosstie Route - Ely, Nevada, to Delta, Utah

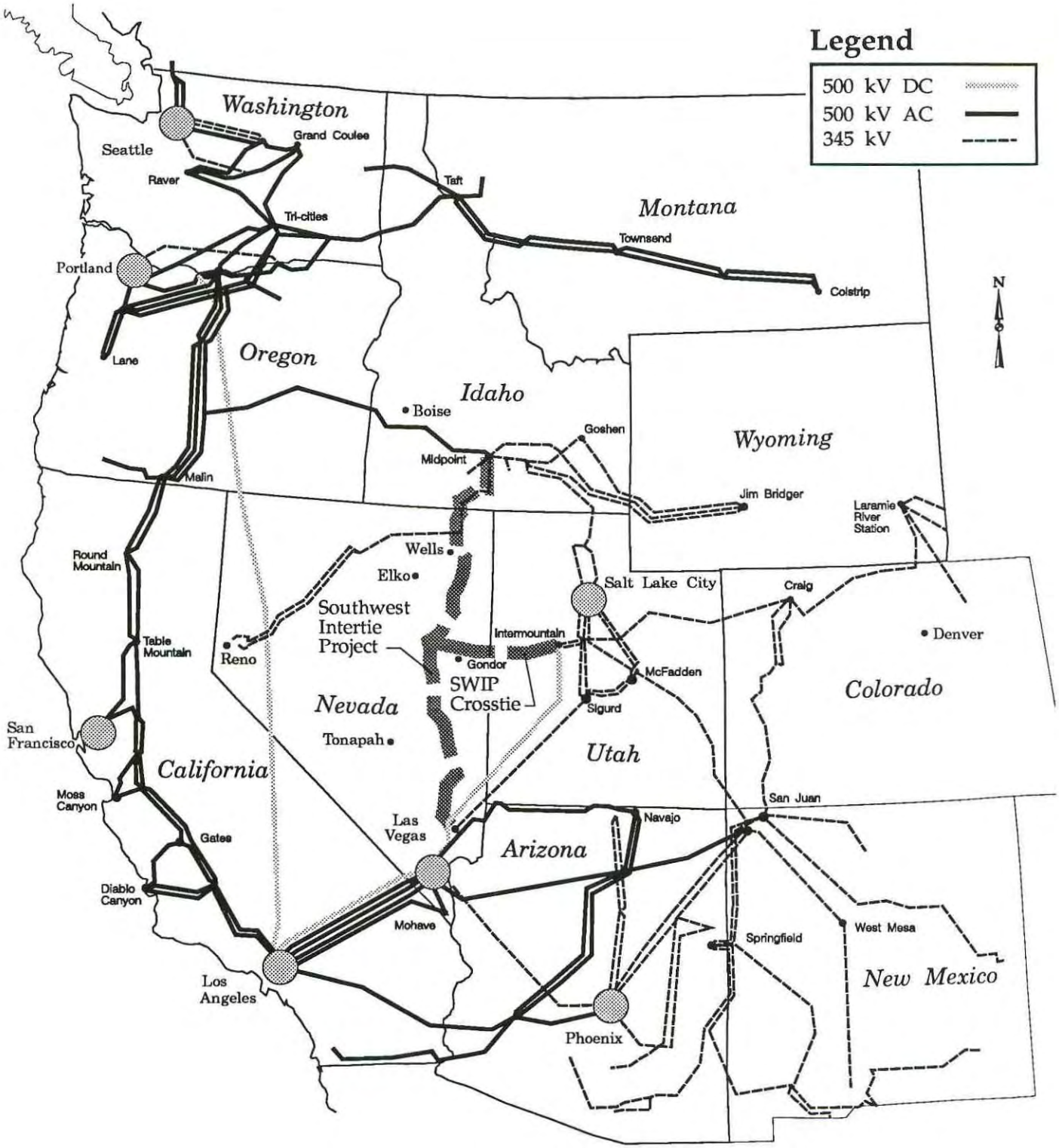
The proposed Utah Nevada Transmission Project (UNTP) would reinforce the interconnected system for Nevada, Utah, Arizona, and Southern California and would be fully subscribed through ownership shares upon completion. The UNTP would provide the initial transmission capacity for the proposed White Pine Power Project (WPPP), possibly support other generation projects, and meet the demand of the UNTP participants for 1100 MW of transferred electricity.

The crosstie route, when interconnected with the Delta-Marketplace portion of the UNTP, and the SWIP would significantly contribute toward satisfying a regional reliability need and enhancement of the electrical grid in the western U.S.

It would create an additional bidirectional transfer path between the Pacific Northwest and the intermountain regions of the West. Currently, these regions are interconnected only by lower voltage transmission lines with limited electric load-carrying capacity.

It would create an additional bidirectional transfer path between the intermountain region and southern Nevada. This is an area that is rapidly growing and is in need of additional energy and capacity resources to serve its native load.

The UNTP Phase I (Delta to Marketplace line) and SWIP (Midpoint to Ely to Las Vegas line), although separate and independent projects, can each improve the other's reliability if the crosstie (Delta to Ely line) is built. In the event of an unscheduled outage on the SWIP or the UNTP, the remaining in-service line would accommodate a portion of the pre-outage load. In addition, some of the power would also flow down other connected AC lines in the area.



Source: Western Systems Coordinating Council Map of Principle Transmission Lines, Jan. 1, 1992

Note: Not to scale

Regional Transmission Network

Figure 1-1

The remaining lines in the immediate area, however, are designed to operate at 345kV which has about 50 percent of the capacity of a 500kV line.

The crosstie route would allow for the bidirectional transfer of bulk power bought, sold, and/or exchanged in the marketplace between utilities situated in Utah, southern Nevada, and Idaho as regional demand and seasonal variations in electrical demand and supply occur.

The crosstie would improve the reliability of the existing Intermountain Generating Station and the interconnected electrical system by:

- increasing the electrical strength and capacity of the system
- reducing the potential for and the severity of the electrical disturbances that can be caused by a variety of events (e.g., storms, earthquakes, etc.).

Western Energy Demand

Electricity consumption in the Western Systems Coordinating Council (WSCC) area is expected to increase approximately 19 percent from 1990 to 2000 according to the North American Electric Reliability Council (NERC 1991). An increasing demand for power is indicated by the return of energy-intensive manufacturing in the Pacific Northwest (Egan 1989), and the setting of record peak demands in 1988 and 1989 in Arizona, Idaho, Nevada, Washington, Oregon, Montana, and Utah. The 1990-2000 annual peak demand growth rate for the entire western region is projected to be 1.5 percent with an annual net energy for load growth rate of 1.8 percent (WSCC 1991).

Northwest Demand Forecasts

Forecasted peak electrical demand in the Northwest Power Pool (power producers in northern Nevada, Utah, Oregon, Washington, Montana, Idaho, western Wyoming, and the Canadian provinces of British Columbia and Alberta) shows an average annual increase of 0.6 percent, and net energy requirement is forecasted to grow 1.7 percent from 1990 to 2000. These estimates are based on net annual electrical energy consumption including transmission and distribution losses (WSCC 1991). Forecast data for seven electrical utility companies in the Northwest of available electric supply versus annual electric demand show a power deficit occurring in 1994-95, with the deficit increasing every year through 1998 (Intercompany Pool 1990). The deficit projected in the Northwest is based on critical water planning.

Reports from individual utilities appear to substantiate this predicted deficit. Using existing resources, Portland General Electric's power surplus is expected to be exhausted by 1992 (PGE 1990) and Pacific Power & Light/Utah Power & Light predict the need for new power sources by 1997 (PPL/UPL 1989). IPCo may need additional resources by 2002 under its

strong economic and load growth scenario (IPCo Resource Plan 1991). Puget Sound Power and Light has issued requests for proposals (RFP) to supply new power capacity by 1993, while the BPA is requesting southern California utilities, who purchase power in the summer, to send power to the Northwest during the winter to meet anticipated shortages.

Some existing hydro resources in the northwest U.S. will be lost when the Canadian Entitlement Purchase Agreement expires. This agreement states that a portion of the power produced by the Northwest hydro facilities belongs to Canada. This share of Canadian energy (1400 MW of capacity) would revert back to British Columbia during the period, 1998-2003. BC Hydro of Western Canada has indicated a desire to "repatriate" the entitlement to meet Canada's future domestic loads. BC Hydro is seeking new sources of power that could be exported to the U.S., but these changes could significantly affect power supplies in the Northwest (Washington State Energy Office 1989).

In the Northwest, demand is generally winter peaking because of the cold weather, while the region's substantial hydro (water) power resources peak in the spring. Regional firm electricity loads are predicted to increase from 19,608 MW in 1991 to 24,254 MW in 2011. In addition, the region currently has 674 MW of short-term firm energy available for sale (Pacific Northwest Utility Coordinating Committee Regional Forecast, 1991). Thus, seasonal exchanges with summer peaking areas provide a market opportunity for the SWIP. Within the Northwest Power Pool (NPP), the winter peak load could exceed the summer peak load by almost 8500 MW in 1992 (NERC 1991). Currently the NPP uses critical water conditions for resource planning. This practice leaves significant surplus generating capacity available in median water years. Buying or exchanging resources from outside of the Northwest during low water years can help avoid or defer construction of new northwest resources, and selling surpluses during high water years can benefit regional utilities through increased revenues and less reliance on higher cost thermal plants. Achieving such benefits would require the sale and purchase of energy and capacity among the northwest utilities and other utilities with complimentary resource bases outside the Northwest.

In the northwest region, IPCo serves electrical consumers in southern Idaho, eastern Oregon and northern Nevada. IPCo currently has about 2500 MW of total peak electrical load and 2600 MW of maximum generation capacity, two thirds of which is hydropower, about one third of which is thermal, and one to three percent of which comes from cogeneration resources (IPCo 1991). The service area peak demand is approximately balanced between winter and summer use with a high summer energy load due to substantial irrigation pumping. During average to better water years, surplus nonfirm energy is typically available. The difference in timing between the hydro resource peak and the summer load peak means IPCo can benefit from exchanges with other areas, particularly southwestern utilities with different resource mixes.

Southwest Demand Forecasts

The Southwest utilities of California, Nevada, Arizona and New Mexico, have a summer peak demand and have the seasonal diversity in energy supply to export electricity to the

North. Southwest utilities also have a broader mix of nuclear, coal, and other energy sources that may help provide diversity to the Northwest.

In a 1990 report, the California Energy Commission projects annual electricity demand growth will be 2.7 percent statewide over the next twenty years. Population increases are expected to account for 75 percent or more of future increases, while increasing per capita energy use accounts for the remainder. The latter includes increased electrical use by the commercial sector that has outpaced recent expectations. Growth in this sector has included the use of more energy-intensive equipment in existing businesses and growth significant to varying building types (California Energy Commission 1990).

The California Energy Commission's analysis of system capacity and energy requirements indicates that statewide existing and committed resources are sufficient to meet electricity needs until 1994. The addition of planned, nondeferrable power supply resources (defined as future cost-effective resources that should be built and should not be replaced by other resource additions) and pending resource additions (supply resources that are planned but do not yet have local, state, or federal regulatory approval) extend the first year of the deficit to 2001. An additional 10,800 MW are necessary to meet needs in 2001 (California Energy Commission 1990).

Out-of-state power purchases have contributed significantly to California's energy supplies for many years and are expected to continue to do so. In 1987, 35 percent of the state's power was provided by imports from the Pacific Northwest, the Desert Southwest (Arizona and New Mexico), Canada, and Mexico. The California Energy Commission reports that the various types of electric power from out-of-state sources is supplied at reasonable cost, and the state's energy needs are compatible with other regions. For example, California's peak energy demands occur during the summer, while the Northwest region's peak period occurs during the winter, which allows California and the Northwest to exchange power at different times of the year without significantly affecting their respective generation capacities. Expansion of transmission capacity, (i.e. the SWIP), would encourage intra- and inter-state electric power competition (California Energy Commission 1990).

The LADWP resource plan is designed to provide an adequate power supply to meet projected electric load growth reliably and economically, provide a sufficient margin to maintain reliability, and to reduce dependence on oil and natural gas as fuels for the generation of electricity. LADWP's resource plan including requests for proposal (RFPs) in 1996 for 100 MW and 600 MW in 2000. A system deficit could be as large as 1500 MW by 2000 without additional resources (CEC 1990).

Nevada has experienced overall population and economic growth, with above-average growth spurts in some economic sectors since 1983-1984. Growth in demand within Sierra Pacific Power Company's (SPPC) service area is forecast by the utility to be 4.5 percent per year through 1994, and 1.6 percent per year from 1994 to 2008. Sharp increases in expected demand are associated with expansion in actual and planned construction of mines in northern Nevada (SPPC 2/1989). The Nevada Power Company (NPC) has experienced peak demand growth from 1983 to 1990 of 7.4 percent, and predicts a moderating 3.0 percent annual growth over the next 20 years depending of the application of demand site management programs. Recent growth in demand has been attributed largely to the rapid

expansion of the hotel-resort industry in southern Nevada, and business relocations to the Las Vegas area (NPC 1991).

Electricity resource plans are prepared by utilities in Nevada every three years. These plans include data on forecasted electric need and available or planned generation capacity. The plans (prior to being finalized) are reviewed by the Nevada Public Service Commission and the State Office of Consumer Advocacy. The resource plan for SPPC shows that power need would increase through 2008/2009, and would have to be met through imported power from other states and capacity additions (SPPC 1989). Under a base case, the 1991 Resource Plan for NPC indicates a total load requirement of just over 2500 MW in 1990, increasing steadily to approximately 5100 MW in 2010. To meet critical resource needs from 1994 to 1999, the system would rely primarily on peaking purchases (NPC 1991).

The Desert Southwest area of Arizona and New Mexico is projected by the WSCC to have a 10-year annual peak demand growth rate from 1990 through 2000 of 2.1 percent (WSCC 1991). Although load growth in the area has averaged 6 percent per year historically, the average annual growth rate for the next decade is projected to be almost 3 percent. This area's highest peak energy use occurs in the summer with an excellent fuel diversity of 22 percent gas- and oil-fired, 46 percent coal-fired, with the remaining percentage a mixture of nuclear, cogeneration, geothermal etc. This provides a good base for developing large exchange transactions with the winter peaking northern areas. Additionally, annual winter peak demand growth is expected to exceed summer peak demand growth in the region over the forecast horizon. This indicates more winter need (NERC 1991).

Capacity and Reliability

The capability for transmitting power to meet changes in electricity demand and supply on a regional or seasonal basis is presently limited by the capacity of available transmission facilities. The SWIP is needed to strengthen the existing transmission system by providing for additional capacity, and allowing for more efficient use of present generating resources between the Northwest and the Southwest on a regional scale. Efficiency would increase by using the different marketing requirements or characteristics of fuel mix, load diversity, and resource development potential discussed later in this document.

Other primary reasons to interconnect transmission systems through the SWIP are to improve system reliability and minimize the effects of generator and transmission failure. It is not unusual for operating units to break down or be out of service for maintenance. A transmission line can also experience outages and need to be disconnected from the rest of the system. It is also common for several transmission lines to be out of service for maintenance at the same time.

The total electrical strength of all ties between the northern and southern portions of the transmission system in the West would significantly increase with the construction of the SWIP. This would reduce the potential for and the severity of electrical disturbances during operating emergencies. Reliability would be increased by providing an additional transmission path between Idaho, Nevada, and Utah. The geographical and electrical

separation between existing north-south transmission facilities and the SWIP would be substantial. This separation would increase system reliability by reducing the portion of all major north-south ties that can be disrupted by a single event, such as an earthquake, storm or vandalism. For example, because both transmission lines would have a similar regional purpose (e.g., to transfer bulk regional power), a separation between the UNTP and the SWIP of 2000 feet is requested, where possible (refer to page 2-18). Separation requirements of these projects are set by the Western System Coordinating Council (WSCC), an organization of utilities throughout the western United States which establishes reliability criteria and the rating of the line (e.g., megawatts of transfer capability).

Reliability also relates to remedial action schemes that are used to minimize the impact of sudden and unexpected loss of critical transmission lines (due to lightning strikes, accidents, etc.). Utilities in the West rely heavily on these complex schemes because of the limited transfer capacity between the north and south subsystems. Unfortunately, because of their complexity and the difficulties associated with fully testing them, the reliability and security of these systems have been a problem. Remedial action schemes have failed on a number of occasions resulting in "black or brown outs" to the consumer, following the loss of heavily loaded transmission lines. In addition, inadvertent operation of some remedial action schemes has caused uncontrolled transmission line outages. Construction of the proposed project would reduce reliance on existing remedial action schemes and may even eliminate several of the more complex schemes. This would improve the overall reliability of the interconnected western transmission system.

Seasonal Exchanges

Firm power purchase and exchange agreements enable IPCo to use power produced by others to meet a portion of its seasonal power supply requirements. Under the provisions of a contract, which would expire in 1997, 108,000 megawatt-hours are exchanged annually with Montana Power Company, with power delivered by IPCo during November, December, January, and February, and received in return during July, August, and September. By a similar agreement ending in 1993, another 108,000 megawatt-hours are exchanged annually with Seattle City Power & Light.

Seasonal power exchanges, or the seasonal purchase and sale of power, are expected to continue beyond 1994 to maximize the annual load carrying capability of existing and future resources. A seasonal exchange, or equivalent purchase and sale, of approximately 370,000 megawatt-hours annually is included in IPCo's base case resource plan starting in 1994. Seasonal exchanges with the current electrical system are not sufficient to meet the stated purpose and need for the project.

Seasonal Diversity

Seasonal diversity is a measure of the seasonal difference in electrical use between two separate regions of the country. For example, electrical demand and consumption in the

inland Desert Southwest is greatest in the summer, as opposed to the Pacific Northwest, where it is greatest in the winter. Based on data published in the WSCC 1990 Summary of Estimated Loads and Resources Report, comparing the three-month average of winter and summer peak loads in the Northwest Power Pool and the Arizona-New Mexico area, almost 3000 MW of seasonal diversity exists. This means that if the two areas were strongly interconnected with transmission, the total resource required to serve the combined load would be almost 3000 MW less than the total resources required to serve the areas individually. However, these two regions of the West are not strongly interconnected, and the existing transmission system between them provides the capacity to exchange 500 to 1000 MW. As a result, there is a minimum of 2000 MW of seasonal exchange potential between the Desert Southwest and the Pacific Northwest that cannot be accommodated by the existing transmission system.

The SWIP, if constructed, would provide participating utilities with the opportunity to exchange both off-peak and peak energy. Exchanged power could flow north in the winter and south in the summer, and enable utilities to defer the construction of new capacity to meet peak demand. Preliminary studies have shown that, in order to serve new load, the cost of the SWIP is less than the cost of new capacity that seasonal exchanges can defer. Hence the SWIP provides a cost effective alternative to the construction of new generating facilities by improving the operational efficiency of the interconnected western electrical system.

Competition and Economic Efficiency

Increased transmission access would create a more competitive market for regional utilities and reduce costs for the eventual retail customer. Additional north-south bulk transmission capacity would relieve limitations and constraints in the existing transmission system as discussed earlier and foster a more active and economically efficient market for the sale and exchange of electric power.

Most state public utility commissions in the West (Nevada, California, Idaho, Utah, Washington, and Oregon) require public utilities to acquire needed resources at the lowest cost consistent with environmental constraints giving full consideration to all available resource options. Such least-cost planning will often lead utilities to purchase power instead of building new generation resources, making extensive use of transmission facilities necessary to carry least-cost power from distant production facilities to load centers.

Related to competition is the short-term and long-term access issues discussed in this purpose and need. The Federal Energy Regulatory Commission (FERC) encourages short-term transmission services at flexible prices to complement a competitive power market. It also maintains that any utility must be able to obtain long-term, firm transmission service for the power market to be competitive.

Open Marketplace

The SWIP would provide firm transmission access to and from an "open marketplace" substation near Las Vegas where northern and southern participants may conduct mutually beneficial commercial power transactions. This location would give individual utilities in the Northwest and Southwest access to an "open marketplace", where commerce can be conducted with fewer restraints of ownership. The open marketplace is a new concept where buyers, sellers, and wheeling utilities are part of a coordinated group that allows them to transact business with each other without burdensome wheeling charges, access policies or other barriers to trade. Power transactions could include energy and capacity purchases, sales, exchanges, reserve sharing, unit maintenance coordination, standby charges, and scheduling charges (FERC 1989).

The new substation in the Dry Lake area would be the southern terminus of the SWIP. In 1990 BLM asked IPCo to help coordinate the transmission needs of utility companies with new transmission facilities planned in southern Nevada, particularly those needing transmission access to the McCullough Substation area located south of Boulder City, Nevada. Subsequent discussions with NPC and other utilities resulted in the Marketplace-Allen Transmission Project (MAT) project being proposed by Nevada Power Company. This approximately 53 mile project would connect the new SWIP substation in the Dry Lake area to a new marketplace substation in the McCullough Substation area. Two high capacity 500kV transmission lines would connect the two substations of the "open marketplace". The combined capacity of over 3000 megawatts would allow utilities to interconnect at either substation and conduct transactions.

The SWIP also proposes to establish an "open marketplace" substation in the Ely, Nevada area to conduct similar power transactions as those described for the Las Vegas area. The crosstie route from the Ely, Nevada area to the Delta, Utah area would also interconnect into this "open marketplace" substation.

FERC is encouraging such innovative concepts as the open marketplace to meet the transmission access challenge without government interference. This approach is also likely to produce more flexibility in the government policies that are adopted (FERC 1989).

Wheeling

Wheeling is the transfer of power from a seller to a buyer over the transmission facilities of a third party. In most cases, wheeling requires a contract with a third party to allow the use of their transmission systems to transmit electricity from the buyer to the seller. Additional transmission capacity between the Northwest and the Southwest would allow participants in the SWIP to transmit power for other utilities, including nonparticipants, as well as enhancing system reliability. This can also provide economic benefits to participants and their retail customers in the form of transmission service revenues. FERC recommends flexible contractual agreements to deal with wheeling arrangements. The SWIP would provide wheeling access.

Economy Purchases and Sales

Economy purchases and sales are short-term, nonfirm transactions that allow the purchasing utility to substitute lower cost energy for displacement of its own higher cost fuel resources. These transactions are scheduled hourly, daily, weekly, or longer. For example, one utility may be generating electricity at a lower cost than its neighbor because it is burning coal instead of the higher priced oil its neighbor is using. Utilities buy and sell electricity in the short-term market to reduce their production costs, which is beneficial to both the utility and its rate-payers.

Utilities attempt to control production costs by reducing the risks of fuel uncertainty through diversification of fuels. Access to surplus northwest hydropower may reduce the risk of uncertain future oil and gas prices for southwest generation. Access to surplus southwest thermal generation could provide northwest utilities with additional resource flexibility during low water years.

Economy may also be gained by short-term transactions for seasonal or daily resource energy exchanges, required power for reserve capacity and emergency power, and flexibility provided in scheduling generator maintenance. California, for instance, must be able to purchase power on the short-term market to avoid dependency on more expensive oil and gas resources.

Long-term Purchases and Sales

In addition to the short-term market, there are long-term firm or stable energy interchange arrangements that may last for months or years. A firm purchase ensures the availability of electricity to meet a buyer's reliability needs. Such transactions serve to optimize or defer plant construction among utilities and further reduce or stabilize costs to customers. Development of new resources requires lengthy lead time periods and forces a utility to accept a set level of energy. A long-term contract allows a utility the flexibility of purchasing an amount of electricity that more closely meets the needs of a utility. Purchasing during the lead times or selling after the acquisition of new resources helps match resources to load and reduces overall cost.

Fuel Resource Diversity

Uncertain oil and gas prices are driving utilities, especially in California, to diversify their use of various fuel resources to generate electrical power. The Powerplant and Industrial Fuel Use Act (PIFUA) of 1978 discourages the use of fuel oil and gas for generating electricity. A significant portion of the approximately 4900 MW total oil- and gas-generated resources available to Southern California Public Power Authority (SCPPA) members could be supplemented by hydropower, coal, nuclear, and other generation resources.

Utilities are also required to produce periodic resource plans to meet future electricity demands. IPCo considers all available resource options and receives regular public input through a Technical Advisory Panel. It then selects reliable options that meet forecast demands at the lowest cost and least environmental impact. Transmission lines offer a feasible alternative to building new resources. A utility can avoid the financial risks associated with the large expense of building new generating facilities, keeping costs down by not constructing new plants and purchasing less expensive energy for its customers.

Lower-cost, nonfirm surplus energy from IPCo or other utilities in the Northwest could permit California and/or southwest utilities to:

- displace a portion of the high-priced oil and natural gas-fired generation
- supply a portion of the project peak load demand energy requirement
- provide for the retirement of obsolete, less efficient, oil-fired generating units
- defer construction of new generating facilities and diversify fuel resources

Access to surplus Southwest thermal generation could provide Northwest utilities with additional resource flexibility during low water years.

SUMMARY

Fulfilling the growing demand for adequate supplies of reliable economical electricity in the western regional system requires a strategy that uses a variety of energy resources that can function quickly and compatibly in a flexible transmission system. As electricity demands rise and costs of building new power plants increase, the ability to exchange power between regions in the West becomes more significant. The seasonal load and resource diversity between electric systems in the North versus those in the South may allow power exchange contracts to replace or defer new resource construction.

PLANNING REQUIREMENTS, ENVIRONMENTAL REVIEW AND LICENSING

Federal regulatory agencies have discretionary authority over the sale of power and the selection and design of new or upgraded transmission facilities. Their review considers the need for power, the pricing rate of power sales and transmission systems, and the environmental consequences of new transmission systems and corridors.

This document is being prepared in compliance with federal guidelines including National Environmental Policy Act (NEPA) and the Council of Environmental Quality Implementation Procedures 40 Code of Federal Regulations (CFR) 1500-1508, criteria developed to guide the plan amendment process in designating right-of-way corridors on Bureau of Land

Management (BLM) lands (43 CFR 2806.2), BLM planning and amendment regulations found in 43 CFR 1600, and the planning and amendment process outlined for Forest Service (FS) lands (36 CFR 219.10 and Forest Service Manual 1920 Interim Directive No. 12). These criteria help set the guidelines and standards for inventory of environmental resource data, assessment of project effects and impacts, selection of routing alternatives, and the BLM and FS plan amendment process. Additional legal guidance for BLM to consolidate utility corridors to the extent practicable is found in the Federal Land Policy and Management Act of 1976 (PL 94-579 Section 503).

BLM would have the most lands affected if the SWIP is constructed and was selected as the federal lead agency to prepare this Environmental Impact Statement. The Forest Service, Bureau of Reclamation, National Park Service, and the Bureau of Indian Affairs would have lands affected by various routing alternatives and are federal cooperating agencies during the EIS process. The federal lead agency, in consultation with the federal cooperating agencies, will select a preferred alternative as outlined in Chapter 2 of this document. After reviewing public comments on the DEIS/DPA, the Idaho State Director will file the FEIS and proposed plan amendment with the Environmental Protection Agency (EPA).

The environmental planning, consultation, and impact assessment processes have been integrated to comply with all applicable federal, state, and local regulations. Table 1-1 outlines the major authorizing actions required for the proposed transmission line to comply with existing law and regulation.

TABLES

TABLE 1-1

Summary of Potential Major Permits Required for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
FEDERAL				
National Environmental Policy Act (NEPA) Compliance	Granting of ROW Over Land Under Federal Jurisdiction for Implementation of Project	Lead Agencies - BLM; Cooperating Agencies	EIS and Record of Decision	NEPA, Council of Environmental Quality (CEQ). 40 CFR Parts 1500-1508
Right-of-Way (ROW) Over Land Under Federal Management	Construction, Operation, and Abandonment	Bureau of Land Management (BLM)	Grant of ROW and Temporary Use Permit	Federal Land Policy and Management Act of 1976 (P.L. 94-579) USC 1761-1771 and 43 CFR 2800
		Bureau of Indian Affairs	Grant of ROW over Indian Lands	25 CFR 169
		Forest Service (FS)	Special Use Authorization Permit, or Easement	36 CFR 251
		Army Corps of Engineers (COE)	General Easement Required for Installation on COE/Military Land	10 USC 2668, 2669 43 USC 961
		National Park Services (NPS) Lake Mead National Recreation Area (LMNRA)	Authorization to Cross LMNRA Lands	Title 18 USC, 36 CFR 14

Table 1-1 (continued)
Summary of Potential Major Permits Required for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
FEDERAL (cont.)				
		Fish and Wildlife Service (FWS)	Special Use Permit for Crossing a National Wildlife Refuge	50 CFR 25
		National Park Service	Review of Transmission Line Corridor, to Identify Conflicts with Recreational area Reserved with Monies from the Land and Water Conservation Fund Act	Land and Water Conservation Fund Act P.L. 88-578
	Construction, operation and abandonment of transmission lines across or within highway ROWs	Federal Highway Administration	Permits to cross Federal Aid Highway. Compliance with Section 4 (f) Department of Transportation Act	23 CFR 1.23 and 1.27 and 23 USC Sections 116, 123, 315; (23 CFR Part 645 Subpart B), 23 CFR 771
	Construction Across Water Resources	COE	General Easement	10 USC 2668, 2669
	Streams and Rivers			40 USC 961
	Discharge of Dredge and Fill Material	COE	404 Permit (Individual or Nationwide)	Clean Water Act
	Placement of Structures and Work in Navigable Waters	COE	Section 10 Permit	River and Harbors Act

Table 1-1 (continued)
Summary of Potential Major Permits Required for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
FEDERAL (cont.)				
	Protection to all Rivers Included in the National Wild and Scenic Rivers Systems	All Federal Agencies	Review by Permitting Agencies	Wild Scenic Rivers Act P.L. 90-542 43 CFR 83.50
Biological Resources	Grant of ROW by Federal Land Management Agency	FWS	Endangered Species Act Compliance by Federal Land Management Agency and Lead Agency	Endangered Species Act, Section 7
	Protection of Migratory Birds		Migratory Bird Treaty Act	16 USC 703-711 50 CFR Ch 1 FR Vol. 40, No. 231
	Grant of ROW by Federal Land Management Agency Involving Aquatic Habitats	Lead Federal Agency	Fish and Wildlife Coordination Act Compliance by Federal Land Management Agency and Lead Agency	Fish and Wildlife Coordination Act
Cultural Resources	Grant of Right-of-Way by Federal Land Management Agency	BLM, FS, State Historic Preservation Officers Advisory Council on Historic Preservation	National Historic Preservation Act Compliance by Federal Land Management Agency and Lead Agency	National Historic Preservation Act of 1966, 36 CFR Part 800 16 USC 47
		All	Protection and Preservation of Native American Religious and Cultural Rights and Practices	American Indian Religious Freedom Act 42 USC 1996

Table 1-1 (continued)
Summary of Potential Major Permits Required for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
FEDERAL (cont.)				
Cultural Resources (cont.)	Disturbance of graves and associated artifacts	All	Consultation with Native American groups	Native American Grave Protection Act of 1990
		All	Permit for study Historical, Archaeological and Paleontology resources	Antiquities Act of 1906 16 U.S. C. Section 432-433
			Permits to excavate and remove archaeological resources on public and Forest Service lands.	Archaeological Resources Protection Act of 1979 16 USC Sections 470aa-470ii (43 CFR Part 7)
	Protection to segments, sites, and features related to national trails		National Trails System Act	P.L. 90-543 16 USC 1241-1249
Air Traffic	Notice on Location of Towers May Be Required	Federal Aviation Administration	A "No-hazard Declaration" required if structure is more than 200 feet in height	49 USC 1501 14 CFR 77
			Air Space Permit for air space construction clearance	Section 1101 of FAA Act of 1958, 49 USC Section 1501 and (14 CFR Part 77)
Rate Regulation	Sales for Resale and Transmission Services	FERC	Federal Power Act Compliance by Power Seller	Federal Power Act Section 205

Table 1-1 (continued)
Summary of Potential Major Permits Required for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
State and Local				
NEVADA				
ROW Encroachment	Encroachment into State Roadway ROW	Nevada Department of Transportation	ROW Occupancy Permit	Nevada Revised Statutes (NRS) 408.423
Ground Surface Disturbance	Project Construction	Division of Environmental Protection (NDEP)	Registration Certificate	Nevada Administration Code (NAC) 445.704
	Construction of Electric Transmission	Public Service Commission	Authority to Construct and Certificate of Need	NRS 704.330, 704.820, 704,701
Natural and Cultural Resources	Crossing State Lands	Division of State Lands	Easement onto State Lands	NRS 321.001
Air Quality	Construction and Operation	NDEP	Authority to Construct Permit to Operate	NRS 445
Rare and Endangered Plant Species	Modification of Habitat	Division of Forestry	Identification of Plant Species	
Rare and Endangered Animal Species	Protection and Management of Rare and Endangered Species	Nevada Department of Wildlife	Authority to Protect and Manage	NRS 501 NAC 503
T & E Species	Modification of Habitat	Nevada Department of Wildlife	Special Permit	NAC 5-4.510-.550
Clark County	Construction and Operation	Clark County Planning	Conditional Use Permit (payment of impact fees for desert tortoise)	Clark County Zoning Ordinance

Table 1-1 (continued)
Summary of Potential Major Permits Required for Transmission Line Construction and Operation

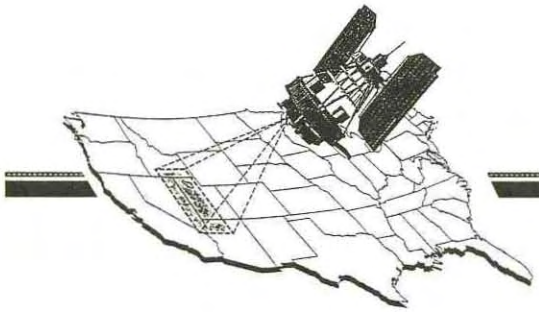
Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
State and Local (cont.)				
UTAH				
Permitting Process	Proposed Transmission Line Facility	Resource Development Coordinating Committee	Expedites Review of Permitting Process for all State Agencies	UCA 63-28a-5(4)
ROW Encroachment	Encroachment on, through or over State lands	Division of State Lands and Forestry	Application Approval	UCA 65-2-1 et.seq; State of Utah Rules and Regulations Governing the Issuance of Mineral Leases
Ground Surface Disturbance	Project Construction	Public Service Commission	Certificate of Public Convenience and Necessity	UCA 54-4-25
			Approve Construction Contracts	UCA 54-4-25 UAR 750-401
	Crossing State Lands	Division of State Lands and Forestry	Easement onto State Lands. Bond may be required.	UCA 65A-7-12, R632-40-1, 2, and 7
Cultural, Paleontological, and Biological Resources	Crossing State Lands	Division of State Lands and Forestry	Provide a cultural and/or paleontological and/or biological survey and submit procedures for reasonable mitigation actions	R 632-40-4

Table 1-1 (continued)
Summary of Potential Major Permits Required for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
State and Local (cont.)				
Historical and Cultural Review	Impact on Historical Sites	Division of State History	Notification of Planning Stage and before Construction	UCA 63-18-37
Encroachment on State Park Lands	Utility Easement on State Park Lands	Division of Parks and Recreation	Agreement for Granting and Maintenance of Easements or Rights-of-Way across Park Lands	UCA 63-11-10.3
Air Quality	Construction and Operation	Air Conservation Committee	Air Variance Request through Notice of Intent Letter	UCA 26-13-1
Water Resources	Construction and Operation	Water Pollution Committee	Permit to Operate	UCA 26-11-8 to 26-11-10 and 26-11-16; Code of Wastewater Disposal
Wildlife	Modification of Habitat	Division of Wildlife Resources	Easement for Use of State Wildlife Resource lands	UCA 23-14-1 and 3; 23-21-1
Millard County	Construction and Operation	County Planning, Building and Zoning Commission	Bond for Protection of Roads. Use Permit	Millard County Zoning Ordinances Section 18
Juab County	Construction and Operation	County Commissioners	Conditional Use Permit based on Application and Public Hearing	Juab County Zoning Ordinance
IDAHO				
ROW Encroachment	Encroachment on, through or over State Lands	Department of State Lands	Easement Across State Lands Easement for River Crossings. Temporary Construction Permit	IC Title 58 Chapter 6

Table 1-1 (continued)
Summary of Potential Major Permits Required for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit Approval, or Review	Relevant Legislation
State and Local (cont.)				
Ground Surface Disturbance	Construction of Electric Transmission	Public Utilities Commission	Amend Certificate of Public Convenience and Necessity	IC 61-5-26
Water Resources	Crossing Rivers or Streams	Department of Water Resources	Stream Channel Alternation Permit	IC Title 42 Chapter 38
Archaeological Paleontological and Historical Sites	Crossing State Lands	Idaho Historic Society	Permit if crossing archaeological or paleontological sites	IC 67-41-1
			Compliance with other State Laws on graves and caves	IC 27-50-1 IC 18-70-35
Rare and Endangered Animal Species	Protection and Management of Rare and Endangered Species	Idaho Department of Fish and Game	Consultation through other State Agencies	
State Parks and Recreation Land	Crossing such Lands	Idaho Department of Parks and Recreation	Permit Applicable to Specific Use	IC 67-42-12 IDAPA 26-65-43
Gooding Twin Falls Cassia Jerome	Crossing Lands within the County	County Planning and Zoning Departments	Possible conditional or special use permits	County Zoning Ordinances



CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

CHAPTER 2
ALTERNATIVES INCLUDING THE PROPOSED ACTION

INTRODUCTION

Six general alternatives were evaluated to meet the Southwest Intertie Project (SWIP) needs of providing economical energy to the west and increasing transmission system reliability. These alternatives were:

- energy conservation and load management
- generation
- transmission systems
- transmission technologies
- no action
- the proposed action and alternatives

The first four of these alternatives, discussed in the first nine pages of this chapter, were considered but eliminated because they do not meet the purpose and need for the proposed action. The remaining actions are the no-action alternative and the alternative to construct a transmission line. The no-action alternative, defined as doing nothing to fulfill the purpose and need for the project, is required under the National Environmental Policy Act (NEPA) and implementing Council of Environmental Quality (CEQ) regulation (40 CFR 1500-1508).

The no-action alternative and the proposed action to construct a transmission line are discussed in detail later in this chapter. Transmission lines typically have many alternative routes that can be used to connect into two or more points in the electrical system. Therefore, routing alternatives are identified and compared to determine which route best meets environmental, engineering, and other siting criteria. The following is included in this chapter on the proposed action to build the SWIP:

(1) a description of the proposed action
(2) the process used to evaluate the alternative transmission line corridors
(3) a description of each alternative route
(4) a comparison of the alternative routes
(5) the identification of preferred alternative routes

All tables are found at the end of the chapter.

Alternatives Considered But Eliminated

Energy Conservation and Load Management

Energy conservation is the more efficient use of electricity by customers. Conservation incentive programs are designed to reduce energy consumption per customer, providing an increase in energy resources for new loads. Load management refers to power supply system improvements by a utility. Load management programs allow customer demand to be moved away from peak load hours, freeing existing resources to serve additional peakloads. These resources are the first used to meet customer electricity demands before constructing new power plants or transmission lines.

Energy conservation and load management programs (including state-mandated programs in California) have the advantage of reducing energy consumption without any documented adverse environmental impacts. They have also lowered utility forecasts of electric energy sales and system peak demand.

The following examples of conservation and load management programs are typical of utilities within the Western System Coordination Council (WSCC).

Conservation and load management have been an important part of Idaho Power Company's (IPCo's) strategy for many years and would continue to be stressed in IPCo's resource management program. As much as 20 megawatts of conservation has been documented in previous conservation programs and is reflected in IPCo's current loads. IPCo's load forecast predicts saving 82 annual megawatts in the residential sector and 17 annual megawatts in commercial construction by the year 2010.

The residential sector is the largest single customer on IPCo's system, consuming 31 percent of the retail sales. The Good Cents Program provides builder incentives for new electrically-heated homes. IPCo is also participating in the Low Income Weatherization Program and the House Warming Program in conjunction with state and local agencies. These programs target the weatherizing of low-income homes and energy-use education of occupants. In addition, there are numerous other residential programs that IPCo is actively pursuing, including High Performance Showheads and several demonstration programs.

About 22 percent of IPCo's retail sales are to commercial customers. IPCo has installed over 12,000 water-heater jackets and made payments to customers to purchase over 300,000 energy efficient fluorescent lighting tubes. Since 1982 IPCo has been converting street lights from mercury vapor to the more efficient high pressure sodium. The company has offered computer modeling for energy efficiency in new buildings to architects and engineers through the Design Excellence Award Program. Participation in the program has increased dramatically since 1989. In addition, several other conservation and demonstration projects are in operation.

The industrial and irrigation customers of IPCo represent another 48 percent of the retail electrical sales. These customers are offered demonstration and other incentive programs,

including a low-pressure nozzle payment for irrigators. IPCo is also exploring many other efficiency programs, including conversion of hand/wheel lines to center pivot, water management, small pump, and assisting canal companies. One of the most promising programs is reduction in water use for irrigation, which indirectly would result in a reduction of electricity use.

Electrical generation efficiencies are also part of IPCo's program. At IPCo's Jim Bridger plant, other efforts include installation of new technology together with regularly scheduled maintenance which will increase IPCos' share of plant capacity by 33 MW by 1992. In addition, installation of a computer-based Energy Management System to optimize the dispatch of system hydroelectric and thermal resources is expected to produce an increase in system generation of approximately 17 MW when fully implemented in 1993.

The Los Angeles Department of Water and Power (LADWP) also has active conservation programs. LADWP is currently developing active energy conservation/energy efficiency (C/EE) programs as a means of deferring the need for new generation resources. The current Resource Plan contains preliminary planning estimates indicating that the C/EE programs would result in savings of approximately 600 MW by the year 2000. These estimated savings in LADWP's load forecast could reduce energy consumption by 11.4 percent by the year 2000.

The C/EE program consists of a series of pilot programs including:

- Residential Outreach Program
- Residential New Construction Program
- Existing Non-residential Program
- Commercial/Industrial New Construction Program
- Second Refrigerator Turn-in Program

These pilot programs would determine the economic and energy efficiency of:

- utilizing electric heat pumps and solar/electric systems in new residential construction
- commercial and industrial load management
- streetlight conversion
- voltage reductions
- time-of-use metering
- commercial and apartment surveys
- mastermeter conversion
- single residence and multi-family common-space audits
- water heating
- servicing pool-timer setbacks.

Originally, the Residential Outreach Program conservation service provided home energy audits and other services to residential customers. The auditing program was soon extended to include commerce and industry. LADWP is developing a new program to further extend energy audits and other conservation services to as many as 97,000 small commercial, non-government, and apartment customers.

Although conservation would help reduce LADWP's energy needs, the savings from these C/EE programs are insufficient to be an alternative to the project. The proposed project could be considered an oil-and gas-conservation effort. Firm power would be distributed by the transmission line capacity provided by the proposed project, thereby displacing oil and gas or other types of nonrenewable power generation.

The Salt River Project (SRP) in Phoenix, Arizona, has developed a program, referred to as the Balanced Strategy, which refers to efficient power production and customer-oriented energy conservation. The SRP is actively involved in many new types of energy development, including photovoltaic projects, solar-thermal generation, fuel cells, energy storage, and existing power plant efficiencies.

The customer energy programs are targeted toward cutting the energy costs of power users. Conservation programs are expected to meet about 40 percent of the SRP's projected load growth through the year 2000. The power saved would supply about 50,000 homes in the Phoenix area. These programs include:

- Climate Crafted Homes - energy efficient homes coupled with financial enhancement. This program goal is to have over 4,000 homes in the first year.

- Electric Savings Time - an incentive program that allows low residential and commercial customer rates during low-usage periods. This program expects to have 36,500 customers in four years. In two years each participant would be saving 0.9 kilowatts.

- Power Purchase - cash incentives for replacing old heating and cooling equipment with high-efficiency systems. This program has surpassed its goals, saving nearly 5,000 kilowatts by mid-1991.

- Kilowatch - a self-administered audit program in its pilot stage where homeowners are encouraged to audit their energy consumption and are given ideas on how to save energy and money.

- Direct Load Control - an incentive program where air conditioners and swimming pool pumps can be interrupted during peak demands.

- Energy Efficient Landscaping - low water usage trees placed to provide shade to a home can save significant energy and money.

- Thermal Energy Storage - cash incentives for reducing peak energy consumption during the summer cooling period by freezing special solutions on-site during off-peak hours. The program's 20 participants shift over 8,000 kilowatts from peak loading periods to off-peak hours.

- Energy Efficient Lighting - rebates for use of energy efficient lamps, ballasts, reflectors, and skylights. The goal of this program for the first year is a reduction of 3,500 kilowatts during the peak loading period.

- Energy Partnership - financial incentives for industry to shift power use and cut demand.

Though energy conservation and load management can somewhat reduce energy consumption, they affect energy use and system reliability on a local rather than a regional basis. Therefore, energy conservation plans cannot alone be considered an alternative action to meet the stated need for the project. For this reason energy conservation plans were eliminated from further consideration.

Generation

IPCo and LADWP evaluated a number of alternative generation sources available within the WSCC system (refer to page 2-6 for definition), and, like others in the WSCC, are pursuing the development of hydroelectric, thermal, solar, wind, cogeneration, and small power production. Other alternative generation such as solid waste, combustion turbine, fluidized bed, and nuclear fusion were also evaluated. However, as stated in the purpose and need, this alternative would not defer new generation facilities and diversify fuel resources.

In fact, because of high capital costs and environmental regulations, the lead time required to construct new generating facilities is a lengthy and very risky undertaking. New generation would also require additional transmission although not as lengthy as the proposed SWIP. Finally, generation would meet local but not regional needs for northwest and southwest access and transmission reliability, therefore generation was eliminated from further consideration.

The SWIP, by providing capacity for seasonal exchanges, would encourage the efficient use of existing generation sources by taking advantage of seasonal diversity between the Northwest and the Southwest (also refer to page 1-9).

Alternative Transmission Systems

Existing transmission from the Northwest to the southern markets in California and the Desert Southwest consists of two significant pathways. One is the Pacific AC and DC Interties and the other is on the east side of the WSCC region (refer to Figure 1-1), linking the states of Utah and Colorado with Arizona and New Mexico. The need to transfer power across these paths has often exceeded their capacities. Also, transmission access available to utilities who do not own these paths is quite restrictive.

The Pacific AC Intertie consists of two high-voltage AC lines connecting the northern border of Oregon on the Columbia River to central California. The Pacific DC Intertie consists of one DC line connecting the northern border of Oregon to southern California. In the northwest, Bonneville Power Association (BPA) owns about 85 percent of the Pacific AC and DC Intertie capacity and the rest is owned by Portland General Electric (PGE) and PacifiCorp.

In California, all investor owned utilities, Western Area Power Administration (WAPA), LADWP, and some of the other California public utilities share rights to the Intertie.

Since the Pacific Interties began operation, BPA allowed many Northwest utilities to have access. However, in the early 1980's, demand for access often exceeded capacity and hampered the northwest region's, including BPA's, ability to dispose of surplus power. To enhance its own marketing effort, BPA started developing a Long-Term Intertie Access Policy (LTIAP) in 1984 and adopted interim and near-term policies. In May 1988, BPA finally adopted the LTIAP. The LTIAP allows a very small amount of firm intertie access to the northwest utilities. IPCo's share of firm access is 87 MW, and uses an allocation method to limit other northwest utilities non-firm access to the Intertie. Moreover, LTIAP restricts use of a utility's firm access for nonfirm sales or firm contracts which BPA considers advance arrangements to sell nonfirm energy.

The path in the intermountain region, around the east side of the WSCC region consists of a number of low capacity lines. The WSCC is an organization of utilities in the western U.S. that work together to coordinate the region's electrical system (refer to page 1-2 for a description of the WSCC). The total capacity of the path is quite small compared to the Pacific Intertie and is further limited by a number of transmission "bottlenecks" along the path. A transaction from a northwest utility to the southern market must satisfy all the constraints of each transmission bottleneck it encounters. In addition, most transactions require transmission through several utilities' transmission systems, which often makes the transaction uneconomical.

Because of the reasons described above and intervening utilities' transmission policies, most northwest utilities in the past have not been able to gain firm or nonfirm access to the southern market through the eastern path. Conditions imposed by the Federal Energy Regulatory Commission (FERC), in October 1988 on the PacifiCorp and Utah Power and Light Company (UP&L) merger may improve firm access through the merged company system. However, PacifiCorp's recent filing with FERC shows that only 362 MW of transmission capacity is available between the Northwest and the UP&L system. A part of this capacity would be used by transmission-dependent utilities in the State of Utah, and the remainder could be used by PacifiCorp and other utilities.

A number of new transmission line projects have been discussed in recent years. Of all these proposals, there are only two that are relevant to northwest access to California and the Desert Southwest and are significantly advanced in the planning and permitting processes. These are the Utah-Nevada Transmission Project (UNTP), and the Third AC Intertie Project.

The UNTP is a 500kV transmission line from the existing Intermountain Generating Station, near Delta, Utah, to the McCullough Substation south of Las Vegas. The project is scheduled for completion in 1996. The capacity of the project has not been finalized but is expected to be in the 800 to 1200 MW range.

The UNTP adds new transmission capacity between central Utah and the Las Vegas area. Although the southern terminal of this project provides access to California and the Desert Southwest markets, access to the northern terminal by northwest utilities would remain restricted by less than 300 MW of existing transmission capacity available between the Northwest and the UP&L system.

The Third AC Intertie project is a 500kV project between northern Oregon and the California border. The project would add about 1600 MW of capacity to the Pacific AC Intertie. Like the existing Pacific AC and DC Interties, the project would provide meaningful access only to California, and not the Desert Southwest.

In Oregon, BPA would own and control access to about 85% of the Third AC Intertie capacity. PacifiCorp and PGE would own the remaining capacity. In California all the investor-owned utilities, WAPA, and a number of other utilities would share access on the Intertie.

The Third AC Intertie is presently scheduled for 1993 completion. However, regulatory approvals may delay or substantially change the project. Even if the project is built as it is presently planned, long-term access for northwest utilities (excluding BPA, PGE, and PacifiCorp) to the project is questionable. In December 1988, BPA issued a nonfederal participation in the Third AC Intertie proposal for public comment, but has not yet made a decision to implement it.

In summary, the existing transmission systems do not have adequate capacity to accommodate the transfers of bulk power between the Northwest and Southwest. Because of the insufficient capacity of existing systems, this alternative was not considered acceptable.

Alternative Transmission Technologies

Voltages

The maximum voltage used for major AC transmission lines throughout the western electrical system is 500kV. IPCo chose 500kV for this project because lower voltages would require additional circuits to satisfy the 1200 megawatt rating objective. For example, to achieve this rating for the distance between Midpoint and Dry Lake, three 345kV lines or six 230kV lines would probably be needed.

The use of a higher voltage, such as 765kV, is not practical because voltages higher than 500kV are not used within the western system. In addition, electrical system studies have shown that the electrical benefit of voltages higher than 500kV would not result in higher capacity without significant additional transmission reinforcement. This alternative is not considered acceptable.

Direct Current Transmission

An AC system was selected because it would allow IPCo more flexibility to connect to other systems. IPCo chose not to develop this project as a DC transmission line because the DC terminal installations (e.g., converter stations that convert AC to DC and DC to AC) are more expensive. In addition, there would be considerable difficulty and expense to connect the DC system to intermediate AC buses in the future.

The primary benefit of a DC transmission line system is greater control of power flows. However, this benefit does not justify the considerable increase in project cost (also refer to

page 1-2). The integration of regional resources (existing and future generation or transmission systems) through interconnection is one of the primary reasons for supporting the purpose of this project. A DC line would dictate only two terminals, one at Midpoint Substation and one at Dry Lake Valley northeast of Las Vegas, Nevada, with no intermediate interconnections.

Underground Construction

There has been underground construction of transmission systems in the United States since the late 1920s. Underground construction of transmission lines is commonly used for lower voltage distribution lines in urban areas. However, most high voltage (115kV or above) underground installations have been constructed under constraining circumstances for short distances where overhead lines were not feasible (e.g., in the vicinity of airports, urban centers).

High voltage underground transmission lines have markedly different technological requirements than lower voltage underground distribution lines. Underground high voltage transmission lines require extensive cooling systems to dissipate the heat generated by the transmission of bulk electricity. For this reason, there are currently no underground transmission systems in the U.S. above 230kV longer than approximately 25 miles. Cooling systems are complex and very expensive often employing potentially environmentally hazardous materials (e.g., chloroflourohydrocarbons) as coolant. The extremely high cost of large cooling systems and other special design requirements prohibits the application of underground transmission systems for long distance electric transmission.

In addition, the basic cost of undergrounding a high voltage transmission line would be several times more expensive than the cost of overhead construction. Underground systems would require a pipeline and above-ground ancillary facilities (e.g., oil-pressurizing and pumping stations, cooling stations) to transport cooling oil along the transmission line. Oil-pumping and cooling facilities would be required approximately every 7 to 10 miles along the transmission route and at the originating and terminating substations.

While underground transmission lines are relatively immune to weather conditions, they are vulnerable to washouts, seismic events, cooling system failures, and incidental excavation. Outages for underground lines could last days or weeks while the problem is being located, excavated, and repaired. Typically, failures in overhead lines can be located and repaired in a matter of hours. Long-term outages would be unacceptable for a circuit carrying bulk power. Further, a major cooling system failure could result in coolant spills of environmentally hazardous coolant materials as well as an outage.

During construction, the environmental impacts of an underground transmission line would be similar to those for major pipeline construction. Typical construction would require a continuous trench between terminal points. Potentially greater adverse environmental impacts could be expected because the majority of the right-of-way would be disturbed. Whereas, overhead transmission line construction typically would result only in disturbances at individual tower sites, and at the ancillary facilities, associated with access to the right-of-way.

The principal environmental advantage of undergrounding a transmission line would be the reduction of adverse visual impacts. However, an underground transmission line would still require above-ground ancillary facilities on or adjacent to the right-of-way and would disturb more land area.

In summary, the reduction of adverse visual impacts does not appear to outweigh the costs and potential adverse effects of undergrounding. Because of the technical complications, economic and environmental costs, and accessibility, an underground system was not considered a viable alternative, and was eliminated from further consideration.

New Methods of Transmission

Other methods that might be considered as an alternative for economical bulk-power transmission of electric energy from a generating source to load centers are microwave, laser, and superconductors. Current research and development shows some promising indications that this technology may eventually lead to some viable alternatives to overhead transmission systems. None of these technologies are available for commercial use. Therefore, new methods of transmission were eliminated from further consideration.

Routing Alternatives

This section describes major routing alternatives for the proposed transmission line project that were eliminated from further detailed study during regional scoping and analysis.

From June to December 1988, a regional study was conducted in southern Idaho, northeastern Nevada, and western Utah to determine all reasonable and feasible transmission line routes connecting from Midpoint Substation near Shoshone, Idaho to a new substation site in the Delta, Utah area (also refer to Regional Environmental Study/Scoping Process later in this Chapter and the Objectives, Procedures, and Results Technical Report).

Approximately 3,000 miles of preliminary alternative routes were identified during the regional study. Each of these alternative routes were examined for environmental issues, public acceptability, and engineering constraints. During the scoping process for the SWIP EIS several of these routes were eliminated from further consideration by:

- Environmental constraint analysis based on regional environmental data. The project Steering Committee (also refer to Chapter 5) reviewed environmental data and made recommendations for eliminating routing alternatives. These recommendations were presented to the public in agency review and public scoping meetings during March and April 1989.

- Input from public scoping meetings and public workshops. Public opposition based on acceptability of an alternative or environmental concerns identified by the regional environmental study and by recommendations of the Steering Committee.

In addition, IPCo evaluated the electrical performance of the routes identified in the regional environmental studies. IPCo recommended the routes identified along the Wasatch Front and the extreme eastern edge of the regional study area be eliminated because the route would not meet the project's system requirements of connecting into the Ely, Nevada area and due to the extensive costs associated with the land use conflicts in the Salt Lake City area (refer to SWIP Regional Environmental Study, April 1989).

Because of the length of these alternative corridors, the power expected to flow during normal operating conditions would not justify the line's expense. The extra length of this alternative would cause some of the power expected to flow on this line to use other lines not owned by IPCo. As electricity will always choose the path of least resistance, the length of this alternative would generate much resistance. Under emergency conditions (e.g., when major lines are out of service) the longer route's proportionate share of power typically would be lower than industry guidelines because of resistance.

Figure 2-1 illustrates the potential alternative corridors, including those which were eliminated from further consideration and those that were recommended for detailed evaluation in the DEIS.

ALTERNATIVES STUDIED IN DETAIL

No Action

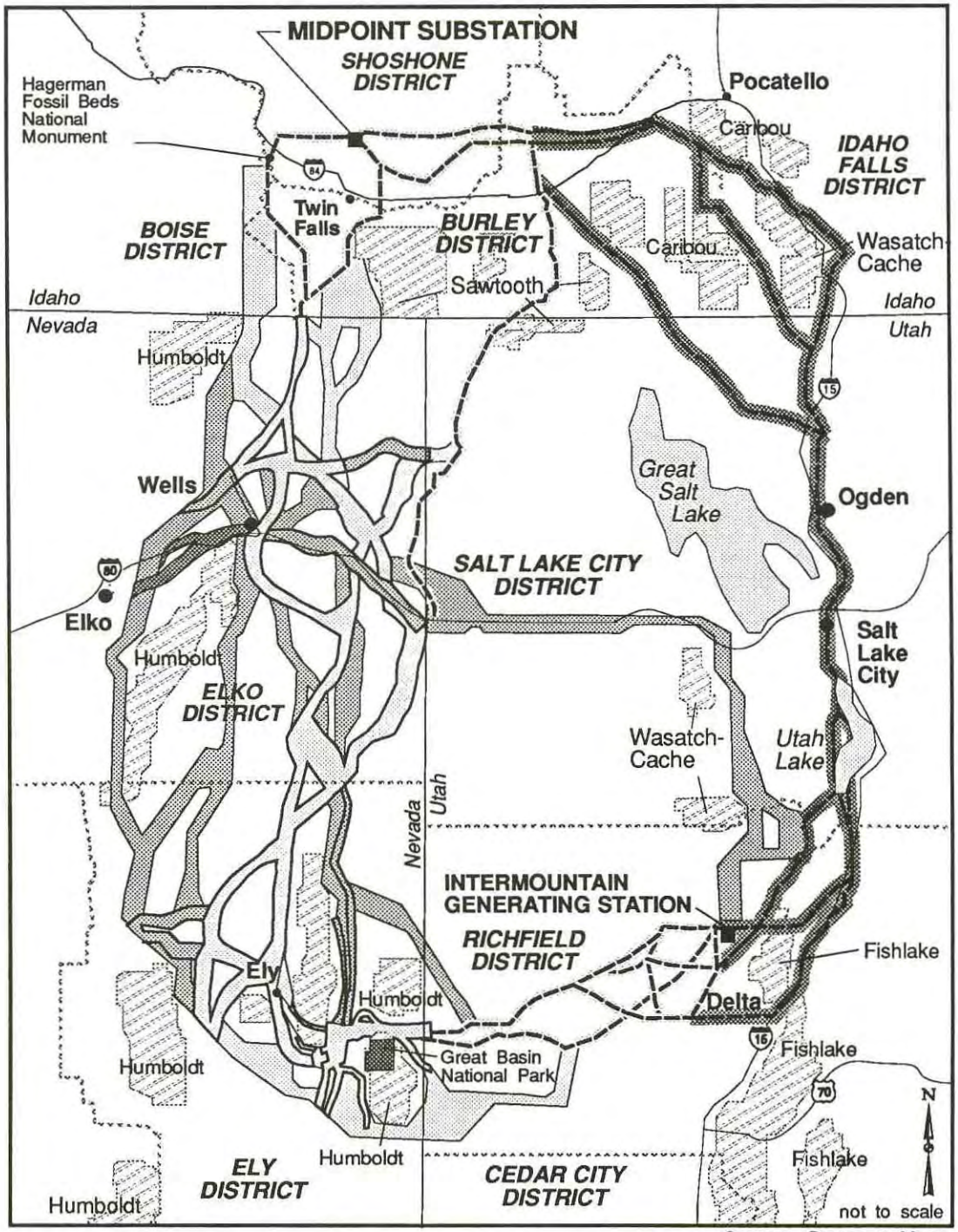
The no-action alternative required for consideration under NEPA regulations has been interpreted in this DEIS/DPA to mean that no new transmission facilities would be constructed by IPCo between the Midpoint Substation and the proposed substation at Dry Lake, nor between a new substation in the Ely area and a new substation near Delta. Under the no-action alternative, the project sponsors would attempt to meet the needs of providing economical energy or anticipated power requirements with existing facilities and fuel sources, along with other measures to compensate for the anticipated shortfall in the supply of electrical power for the region.

Advantages of the no-action alternative would include:

- no adverse environmental impacts from the construction and operation of the SWIP
- eliminating financial costs associated with construction and operation of a 500kV transmission line

However, any monetary savings could be lost through costs to meet the continuing energy needs of the West as outlined in Chapter 1, Purpose and Need.

In an effort to meet forecasted need without new transmission facilities, many western utilities would be forced to continue and likely increase baseload generation from existing oil



Source: Dames & Moore

Legend

- BLM District Boundary
- Forest Service
- Recommended for Elimination
  - BLM
  - Environmental
- Recommended for Study in EIS
- BLM/USFS Corridors
- Existing ROW
- Corridor Indentified In Regional Study

Regional Study Corridors

Figure 2-1

and gas-fired generation facilities, thereby maintaining oil and gas consumption at or above present levels.

The gas and oil used to generate this power historically has been much more expensive than the sources of fuel (e.g., coal or hydroelectric) available to generation facilities the SWIP. Oil and gas are not only more expensive fuel sources than coal for baseload generation, but the use of oil and gas as primary fuels by utilities is discouraged by federal energy policy, as outlined in the Powerplant and Industrial Fuel Use Act (PIFUA) of 1978.

The northwest-southwest power exchanges to take advantage of seasonal diversity, as outlined in the purpose and need (Chapter 1), would not occur under the no-action alternative. In addition, economy purchases and sales of power would not occur because nonpeak generation would not be available on the system. Overall, the reliability of the western electrical system that would be gained through the action alternatives would not be realized under the no-action alternative.

The intended effect of adding new transmission is to spread out among more lines the concentration of power flows, thereby reducing the largest single hazard required to be recovered by a reserve margin. The no-action alternative would tend to increase the loading on existing lines and likely increase the largest single hazard requiring more local generation to be on-line in reserve for an outage.

Under the no-action alternative there would be no marketplace substation in the Las Vegas area. It would eliminate the benefits of the proposed project to increase competition and economic efficiency in the power market.

Some significant disadvantages or adverse impacts would result from the shortage in electrical supply if the no-action alternative were selected. The northwest and southwest regional utilities would not be able to diversify fuel sources and, accordingly, reduce its oil or hydro dependency. An interruption to the oil supply or a low water year could seriously affect the sponsors' ability to provide electrical power in their service areas. It is possible that locally generated power may increase, which would lead to greater air quality problems in large urban areas.

The disadvantages of the no-action alternative include:

- the loss of potential tax revenues to local tax districts from project construction and Right-of-Way (ROW)
- adverse environmental, socioeconomic, and electric service impacts resulting from compensating actions taken to ensure an adequate, affordable, and reliable energy supply to the West
- potential shortage of electric power that could force increased locally-generated power in urban areas where compliance under the Clean Air Act is an issue
- seasonal exchange of power between the Northwest and Southwest would be limited by the capacity of existing transmission lines

Proposed Action and Alternatives

Description of Proposed Action

The proposed action for the SWIP is to construct a 500kV AC transmission line from the Midpoint Substation in southern Idaho to a new substation in the Ely, Nevada area and then connecting to a new substation northeast of Las Vegas, Nevada. This EIS evaluates the impacts of several alternative routes (Routes A through G), and compares them (refer to page 2-36 and Chapter 4 for additional information).

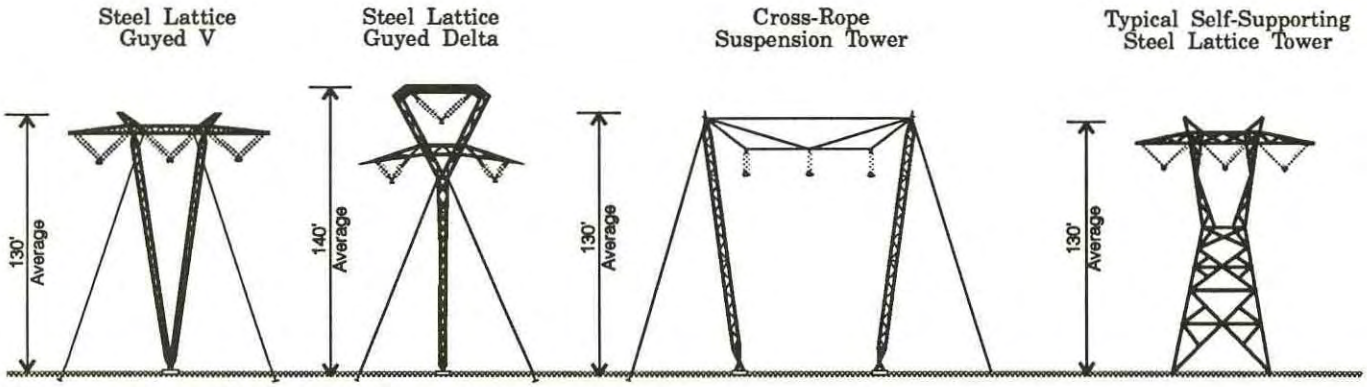
A crosstie 500kV transmission line is also proposed as part of the SWIP to be constructed from the Intermountain Generating Station near Delta, Utah, to the new substation in the Ely, Nevada area. The crosstie line would be constructed and operated by the LADWP (refer to page 2-17). This EIS also evaluates the impacts of several alternative routes for the crosstie (230kV Corridor, Southern, Cutoff, and Direct Routes), and compares them (refer to page 2-46 and Chapter 4 for additional information).

The design, construction, operation, and maintenance of the Southwest Intertie Project 500kV transmission line would meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor Occupational Safety and Health Standards, and IPCo's requirements for safety and protection of landowners and their property. Table 2-1 contains a list of the basic design characteristics of the proposed transmission facilities.

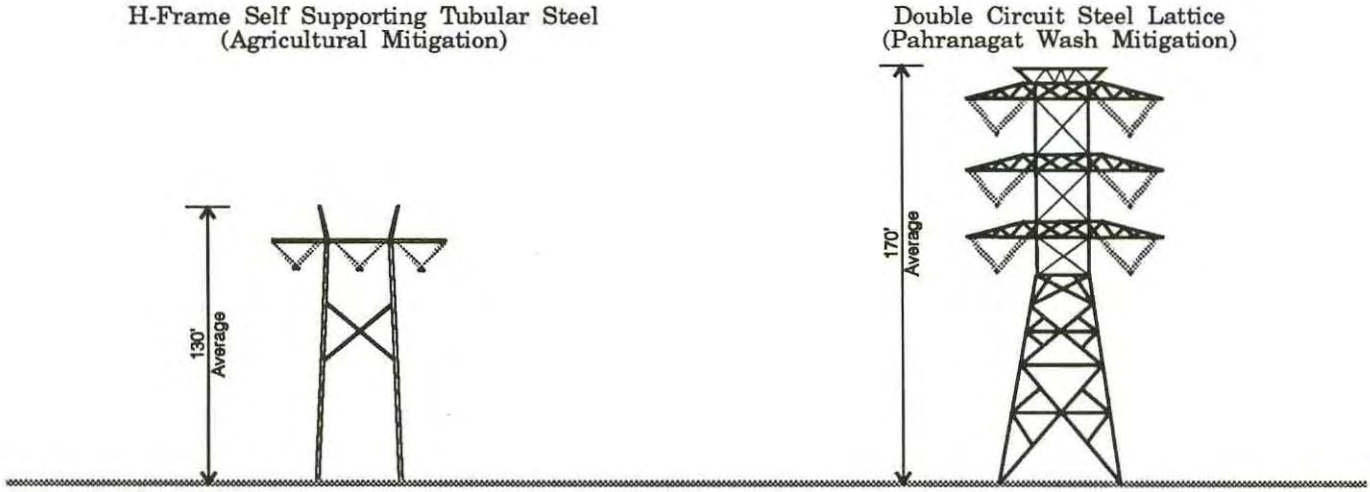
Transmission Line Design

Towers - The proposed 500kV transmission line would be an AC line interconnecting other regional AC facilities. Proposed tower structures for this transmission line are steel-lattice, self-supporting or guyed steel-lattice towers fabricated from unpainted galvanized steel (Figure 2-2). Self-supporting, tubular-steel structures would be used in agricultural lands to mitigate potential conflicts with cultivation (Figure 2-2). These towers would be fabricated from corten steel (dark, rust-like finish). Typical tower-to-tower spans would average 1,200 to 1,500 feet and tower heights would range between 90 and 160 feet, but would average 120 to 130 feet.

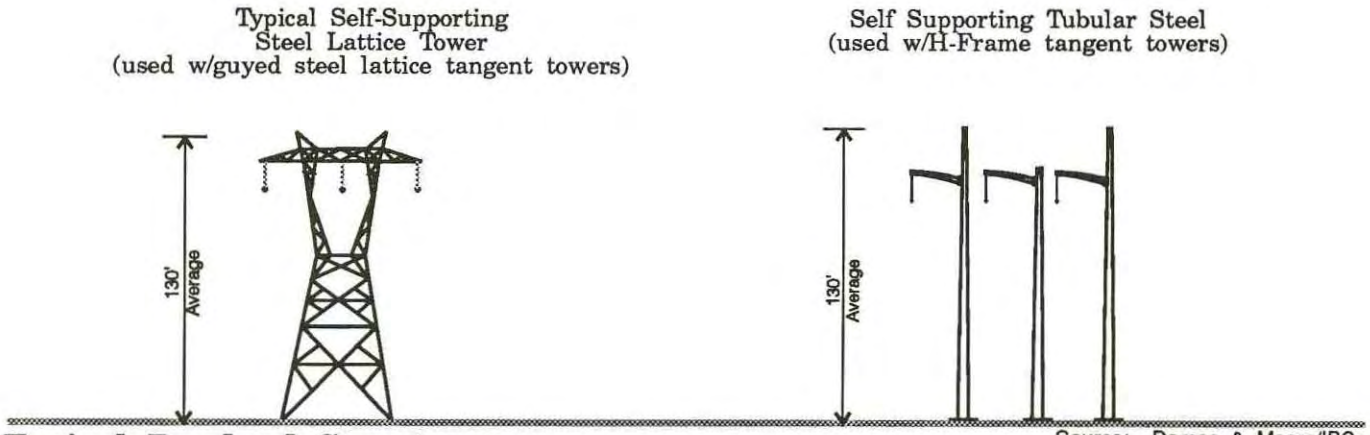
Dead-end towers of self-supporting, steel-lattice design would be required periodically to add longitudinal strength along the line (Figure 2-2). Dead-end towers are also used at many turn (angle) locations along the line, at heavily loaded tower locations, and at specific utility crossings (e.g., other transmission lines) for added safety. A three-pole, self-supporting, tubular-steel tower design is an alternative tower type for use as dead-ends (Figure 2-2). The remaining towers would be tangent suspension or angle suspension towers. Angle suspension towers are of the same basic configuration as tangent suspension towers, the difference being in the insulator systems and tower weights.



Alternative Tangent Structures



Mitigation Structures



Typical Deadend Structures

Source: Dames & Moore/IPCo
Note: Also refer to Table 2-1
Not to scale

Midpoint to Dry Lake Structures

Figure 2-2

Towers along the majority of the route between Midpoint to Dry Lake would be steel-lattice, guyed structures. A typical guyed tower would have four guy cables. Guy cables would be approximately one inch in diameter. Self-supporting, steel-lattice towers or three-pole, self-supporting, tubular-steel towers would be used for dead-end and angles towers.

Self-supporting, steel-lattice towers are proposed for all structures in the Ely to Delta segment (Figure 2-3). The reliability policies of LADWP, a SWIP participant for this segment of the line, precludes use of guyed, steel-lattice structures as proposed for the remainder of the SWIP (Midpoint to Dry Lake). In order to mitigate visual impacts along the crosstie, some of the structures may be an H-frame type. Also refer to the Right-of-Way Acquisition section of this volume.

Tubular-steel, H-frame towers are proposed as mitigation in agricultural lands to minimize impacts to cultivation practices. A guyed tower could interfere with the operation of machinery in the vicinity of the tower as well as with gravity flow and sprinkler irrigation systems. In addition, H-frame towers may be recommended as mitigation to reduce visual contrast where the SWIP would parallel other similar H-frame transmission lines towers (Figure 2-2).

Self-supporting towers would be used in areas of steep terrain where side slopes are greater than the guy slope. This decision was made because guy cables could extend far beyond the edge of the right-of-way. Self-supporting structures would be used to eliminate excessive right-of-way requirements as well as potential construction and operational problems. Reliability of the system would also be strengthened.

Foundations - Self-supporting, steel-lattice towers require four footings, while the steel-lattice, guyed towers require one footing for the tower base and four anchor rods for guy cables. The area disturbed by either of these tower foundations is a small portion of the total area of the tower site.

Some foundations and guy anchors would consist of pre-cast concrete footings approximately 4 feet in diameter and 6 feet deep. Due to site specific characteristics, some foundations and guy anchors (e.g., rock anchors) would require cast-in-place footings. Steel H-frame structures would have cast-in-place concrete footings 6 to 10 feet in diameter and 20 to 30 feet deep. Self-supporting lattice towers would have cast-in-place concrete footings 3 to 4 feet in diameter and 12 to 24 feet deep.

Conductors - The conductor would consist of three phases, with a two or three-conductor bundle for each phase. The configuration of the conductor bundle would be determined during the engineering design of the project. Spacing between subconductors in a bundle would be approximately 18 inches.

Aluminum-trapezoidal or aluminum-stranded conductors with a steel stranded reinforced core (ACSR) would be used. The aluminum carries the majority of the electrical current and the steel provides tensile strength to support the aluminum strands.

Minimum conductor height above the ground is 31 feet, based on National Electric Safety Code (NESC) and IPCo's own standards. Greater clearances may be required in areas

accessible to vehicles. Minimum conductor clearance would dictate the exact height of each tower based on topography and safety clearance requirements. Minimum conductor clearances in some instances may be greater based on specific NESC requirements.

Insulators and Associated Hardware - Three assemblies of insulators in the form of a "V" or an "I" would be used to position and support each of the conductor bundles relative to the tower while maintaining electrical design clearances between the conductors and the tower (refer to Figures 2-2 and 2-3). Each "I" string would consist of 26 to 30 insulators, while each leg of "V" strings would consist of 26 to 30 insulators. Insulator assemblies would be between 14 and 20 feet long.

Overhead Ground Wires (Shield Wires) - To protect conductors from direct lightning strikes, two overhead ground wires, 3/8 to 1/2 inch in diameter, would be installed on the top of the towers. Electrical current from lightning strikes would be transferred through the groundwires and structures into the ground. Ground wire having fiber optic capability may be installed rather than traditional groundwire in order to facilitate project communication needs or potentially to serve the needs of commercial communication companies.

Terminals and Communications

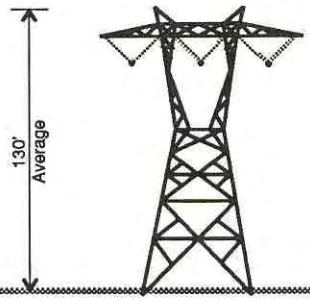
The transmission line originates at the Midpoint Substation in Idaho. New terminals, or substations, are proposed in the vicinity of Ely, Nevada, and northeast of Las Vegas, Nevada. A third terminal may also be needed north of Wells, Nevada for an interconnection with Sierra Pacific Power (SPP). In the past, Sierra (SPP) has expressed an interest in a connection in this location. A substation is also proposed on the crosstie route in the vicinity of Delta, Utah. Substations provide the point interconnection with other transmission lines of the same or different voltages. These terminals would also operate as switching stations where power flows can be controlled. Control of power flows and other operations at substations are generally directed remotely through a microwave communications system. This section describes the types of facilities that are proposed as part of the SWIP.

Substation and Series Compensation Stations

Three new substations would be required in Nevada, one north of Wells, one in the vicinity of Ely, and one northeast of Las Vegas. One new substation would also be required on the crosstie route in the vicinity of Delta, Utah. The land requirements for each substation site would be approximately 80 acres depending on layout of associated electrical equipment, and potential allowance for setbacks from or relocation of existing electric and gas transmission lines.

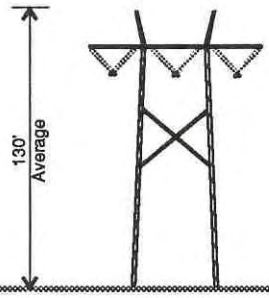
The electrical towers and rack structures would be similar in appearance and height to those at the existing substation site at Midpoint Substation in Idaho. The maximum height of structures in a substation would be approximately 125 feet. The electrical equipment yards would be open and would include transformers, circuit breakers, disconnect switches,

Typical Self Supporting
Steel Lattice Structure
Tangent Structure



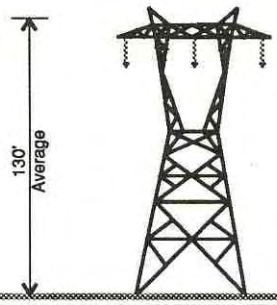
Tangent Structures

H-Frame Self Supporting Tubular Steel
(Visual Mitigation)



Mitigation Structure

Typical Self-Supporting
Steel Lattice Tower
Deadend Structure



Deadend Structure

Source: Dames & Moore/IPCo
Note: Also refer to Table 2-1
Not to scale

Ely to Delta Structures

Figure 2-3

lightning/surge arresters, reactors, capacitors, bus (conductor) structures, and microwave towers (refer to Table 2-2). The equipment yard control house (a structure approximately 50 feet wide by 100 feet long by 10 feet high and constructed of painted concrete block) and the internal access roads would be similar to what is now existing on the Midpoint site. The proposed facilities would be enclosed by chain-link fencing for security (also refer to Figure E-1 in Appendix E).

A series compensation station would be located northeast of Wells, Nevada, at a point approximately halfway between Midpoint Substation in Idaho and a proposed substation in the vicinity of Ely, Nevada. This facility would require 15 to 20 acres and consists of electrical towers, high-voltage series capacitor banks, switching equipment, bus conductor, and microwave. Series compensation is used in transmission system design to economically increase the capacity of a transmission line. Series compensation provides voltage support to the system that varies with line loadings. As the line loadings increase, so does the voltage support from the series compensation. This action improves the electrical characteristics of the transmission line thereby increasing the line capacity. In addition, a series compensation station may also be required halfway between the substation site near Ely, Nevada, and the proposed substation at Dry Lake (also refer to Figure E-1 in Appendix E). The series compensation station near Wells may be expanded to accommodate switching equipment (substation) if Sierra Pacific Power constructs a transmission interconnection from north central or northwest Nevada.

Site preparation work for substation or series compensation station facilities would involve the following.

- Cut-and-fill grading, placement, and compaction of structural fill would serve as a foundation for substation facilities. Sites would be graded to maintain current drainage patterns.

- A new construction entrance and construction fencing would be provided.

- Approximately 20-foot-wide gravel base road would be required. The yards would be covered with aggregate. A gravel parking area, approximately 100 feet by 100 feet, would be required. Where possible, native vegetation would be re-established.

Communications Facilities

The need for reliable, secure communication circuits for protective and control relaying for the SWIP line would require the construction of a microwave communications system between Hansen Butte, Idaho, and the proposed Dry Lake substation site in Nevada. In addition to protective relaying circuits, the microwave system would be used for voice communications, telemetering, and supervisory control and data acquisition (SCADA).

The communication system for the portion of the transmission line between Ely, Nevada, and Delta, Utah, would use existing microwave facilities, currently used to control the existing 230kV system. The existing facilities would require some modifications (e.g., new

equipment) at each site. However, these modifications are not expected to require any ground disturbing activities.

Ideally, sites chosen for microwave installations are proposed to be 35 to 40 miles apart, have line-of-sight between adjacent sites, have commercial power, and be accessible by road. Where feasible, developed communication sites would be used. In areas where no existing facilities are present and there is no existing access to a viable site, solar powered facilities would be placed and maintained by helicopter. These communications facilities would be unmanned and would operate automatically. The building would be locked and secured, with entry restricted to appropriate utility personnel.

The proposed microwave facilities would require a small site, approximately one-quarter acre in size. Each site would require clearing, and minor grading. Structures on each site would include a 10 feet by 12 feet building made of wood or concrete panels that would be painted an earth tone color to reduce visual contrast. In addition a triangular steel lattice tower ranging between 20 feet and 100 feet in height would be required. Figure F-1 in Appendix F illustrates a typical microwave facility.

These facilities are unmanned and operate by automatically responding to incoming signals. Communication signals are relayed using parabolic (bowl shaped) dishes mounted on the tower which capture signals from other microwave sites and relay them to other sites along the system. The signals are short wave length, high frequency radio beams that maintain good reliability under adverse conditions.

Where there are existing facilities, often only an additional parabolic dish would be needed. For undeveloped sites, the specific type of facility would be determined by the availability of access and proximity to a power supply. If the site is remote and no roads are present, a solar powered facility would be proposed (refer to Figure F-2 in Appendix F). Construction of remote sites would be completed using a helicopter. Where access is near an existing road and/or power supply, a standard facility would be constructed. Most sites would generally be accessible by gravel roads and could be patrolled periodically by IPCo representatives.

Maintenance of the communication facilities would consist of testing, repair, and replacement of electronic equipment located within the building at the communication site. Inspection and maintenance of the building, communication tower, and other physical equipment would occur periodically.

At the end of the proposed project life and if the facilities were no longer required for other existing or proposed projects, the microwave sites would be abandoned (also refer the discussion of site reclamation and abandonment on pages 2-23 and 2-24). Subsequently, the equipment would be dismantled and removed from the sites. Refer to Appendix F for additional information and the Map Volume for the mapped locations of the alternative communication sites.

It is possible that a fiber optic groundwire may be installed (on the towers in place of the shield wire) to facilitate communication needs for the transmission line, or capacity may be sold to commercial communication companies. If fiber access is allowed to commercial companies, they would be responsible for obtaining the necessary permits and right-of-way

needed for regeneration stations at intervals along the transmission line (also refer to Right-of-Way Acquisition).

Right-of-Way Acquisition

In general, new land rights would be required for the transmission line facilities, such as the transmission line corridor, substation/switching stations, series compensation stations, microwave facilities, and access roads (e.g., right-of-way grant, easements, and fee simple). IPCo would request a right-of-way grant from the BLM and a special use permit from the FS for transmission line facilities located on federal lands. Additional right-of-way may be required in isolated areas where the proposed transmission line turns sharply.

Rights-of-way for transmission line facilities on nonfederal lands would be obtained in perpetual easements. If necessary, private lands for substations would be purchased in fee simple. Every effort would be made to purchase all the land rights on private lands through reasonable negotiations with the present owners.

Land rights would be obtained in the name of IPCo. IPCo plans to construct the transmission segments from Midpoint Substation to the proposed substation at Dry Lake in southern Nevada. IPCo has entered into an agreement with LADWP to convey the portion of a right-of-way grant for the segment from the Ely area to Delta. This is referred to as the "Delta Grant" in the agreement. The agreement further states that IPCo would conduct the necessary environmental permitting for the Delta Grant and then assign it to LADWP for construction, operation, and maintenance.

If a route is selected that crosses the Moapa River Indian Reservation (Links 760 and 770), negotiations with the Tribal Council of the Moapa Band of the Paiute for a perpetual easement would be initiated.

If a fiber optic groundwire is installed and access is sold to a commercial company, they would be responsible for all permitting activities and obtaining right-of-way for the regeneration stations that would be needed at intervals along the transmission line right-of-way (also refer to Communication Facilities).

Right-of-Way Separation

Where the SWIP would parallel the proposed Utah-Nevada Transmission Project (UNTP) south of the Delamar Valley, the right-of-ways of the SWIP and UNTP would need sufficient separation to meet reliability and outage criteria of the WSCC (also refer to page 1-2). Without adequate separation, the criteria considers the simultaneous outage of the SWIP and UNTP to be a credible event, or an event that has a significant likelihood of occurring. The simultaneous loss of the SWIP and UNTP under heavy transfer conditions could precipitate a major electrical system disturbance resulting in a cascading failure of the western power

system. Building and operating the system in this manner would be inconsistent with the WSCC Reliability Criteria.

Therefore, the projects must (1) reduce capacity (which has the effect of rendering one project economically impractical), (2) provide measures to avert system breakup (considered technically and economically impractical), or (3) construct the projects so a simultaneous outage is not credible (use adequate circuit separation). While the latter course is preferable to the project participants, the specific amount of separation required to achieve this determination has not been defined in the criteria. However, based on the terrain and environmental considerations in the area of parallel right-of-way, it is believed that 2,000 feet would be adequate. Double circuit towers or a separation of less than 1000' would exist in isolated areas along the route due to terrain or land use conflicts. It is believed that by using a higher safety factor on the tower design in these physically constrained areas. the reliability would be sufficient to maintain the requested capacity rating. Also refer to Corridor Studies (page 2-28) and Capacity and Reliability (page 1-8).

The SWIP and UNTP would converge near Robber's Roost Hills (Link 675), and would travel parallel for approximately 140 miles (Links 690, 700, and 720) into Coyote Spring Valley in southern Nevada, where the UNTP would continue south and the SWIP would cross through the southern end of the Arrow Canyon Range into the Dry Lake Valley. Separation of 2,000 feet is needed for this entire distance except where it is not physically possible to maintain this separation.

In the Pahranagat Wash area, the SWIP and UNTP lines may need to be closer for two miles or more. Because the Delamar Mountains and Evergreen Wilderness Study Areas (WSAs) are within about 1/2 mile of each other and other linear features are present (e.g., U.S. Highway 93 and the Lincoln County Coop 69kV line), the SWIP and UNTP lines would be constructed on double circuit towers, each with an open circuit. The SWIP line is proposed to be on the west side and the UNTP on the east. The plan is for the two future WPPP lines to be placed on the open circuits of the SWIP and UNTP lines through this area. The proposed configuration of the planned lines through this area is shown schematically in the cross-sections included in the Map Volume. To help compensate for this lack of separation and to meet the WSCC criteria outlined above, the structures within this area would need to be engineered to a higher standard to better withstand potential physical disturbances (e.g., earthquakes, etc.). Also refer to Cumulative Effects section in Chapter 4.

If the Delamar and Evergreen WSAs are not designated as Wilderness by Congress by the time all of the lines are constructed, the involved utilities may pursue amending the right-of-way grants to allow all of the lines to be placed on separate circuits.

In the approximately 140 miles where the SWIP and UNTP lines can be separated by 2000 feet, the SWIP and UNTP lines would form the outside edges of the utility corridor that would include the two planned 500kV WPPP transmission lines. The cross-sections in the Map Volume schematically show the relationship of the four planned 500kV transmission facilities. Also refer to the Cumulative Effects section in Chapter 4.

In areas where the SWIP would parallel lower voltage overhead lines, a minimum separation of 200 feet, centerline to centerline, would be required. With this separation, if either the SWIP or the lower voltage line failed, neither would fall into the other.

Construction

Construction of a transmission line follows the sequence of surveying the centerline, access road identification and construction, right-of-way and tower sites clearing (including construction yards and batch plants), installing foundations, assembling and erecting the towers, clearing, pulling, tensioning, and splicing sites, installing ground wires and conductors, installing counterpoise/ground rods, and cleanup and site reclamation. Various phases of construction would occur at different locations throughout the construction process. This would require several contractors operating at the same time in different locations.

Surveying Activities - Before construction surveying begins, it would be necessary to obtain either a survey permit on federal and state lands, or rights-of-entry for private lands. Construction survey work would consist of locating the centerline, tower center hubs, right-of-way boundaries, and tower access roads. All of these activities would begin approximately two years prior to the start of construction. Cultural resources and threatened and endangered species intensive surveys can begin once the survey of the centerline and access roads is completed and clearly marked.

Access Road Construction - The construction, operation, and maintenance of the proposed transmission line would require that heavy vehicles access tower sites along the right-of-way. If new access roads are required, they would be constructed to support the weight of these vehicles. Where necessary, temporary roads would be typically 14 feet wide bladed roads, but would typically have no improved ditch drainage systems. Material and topsoil from the temporary roads would be bladed to one or both sides to facilitate rehabilitation. Following construction, bladed material can be respread across the disturbed road section. Seeds and roots contained within the respread topsoil layer normally provide a natural source for new growth. Some permanent roads may be constructed where necessary for operation or maintenance, or where the landowner or land managing agency requires. Road standards would be addressed specifically in the Construction, Operation, and Maintenance Plan during the engineering phase of this project.

Culverts or other drainage structures would be installed as necessary across drainages, but the roads would usually follow the natural grade. This type of temporary road would facilitate rehabilitation. Existing paved and unpaved highways and roads would be used where possible.

Roads along existing utility corridors would be used where possible to minimize new access road construction. Where existing roads can be used, only spur roads to the tower sites may be required. New access roads and spur roads may be constructed into the right-of-way where existing roads do not exist.

The approximate area of ground disturbance associated with the typical construction activities was estimated for five types or levels of access. These access levels describe the assumptions for the degree of disturbance expected to occur with each access level (refer to page 2-35, Routing Alternatives Evaluation Process). Further, the access levels consider areas of as much as five acres per mile that may be temporarily disturbed (e.g., grasses crushed) by tower construction sites, pulling, tensioning, and splicing sites, batch plants, and marshalling yards.

Wherever possible, roads would be built at right angles to streams and washes. Culverts would be installed where necessary. In addition, road construction would include dust-control and erosion control measures in sensitive areas. All existing roads would be left in a condition equal to or better than their condition prior to the construction of the transmission line.

All roads would be constructed in accordance with IPCo requirements for transmission line access roads (also refer to description above). In the event of a conflict between IPCo requirements and the requirements of the BLM and FS, the states of Idaho, Utah, Nevada, or other agencies, the governing agency requirements would take precedence. Private landowners along the proposed roads would be consulted before construction begins.

Tower Site Clearing - At each tower site, leveled areas (pads) would be needed to facilitate the safe operation of equipment, such as construction cranes. The leveled area required for the location and safe operation of large cranes would be approximately 30 by 40 feet. At each tower site, a work area of approximately 200 feet square would be required for the location of tower footings, assembly of the tower, and the necessary crane maneuvers. The work area would be cleared of vegetation only to the extent necessary. After line construction, all pads not needed for normal transmission line maintenance would be graded to blend as near as possible with the natural contours, and revegetated where required.

Clearing Right-of-Way - The clearing of some natural vegetation may be required. However, selective clearing would be performed only when necessary to provide for surveying, electrical safety clearances, line reliability, and maintenance. Topping or removal of mature vegetation, under or near the conductors, would be done to provide adequate electrical clearance as required by NESC standards (refer to Table 2-1).

Trees that could fall onto the lines or affect lines during wind-induced line swing would be removed. Normal clearing procedures are to top or remove large trees and not disturb smaller trees. Where there is a direct conflict between trees and clearance standards, the removal of trees would be jointly reviewed and agreed upon between IPCo (or LADWP for the crosstie) and the owners or managers of the property. Rights-of-way would not be chemically treated unless necessary to comply with requirements of a permitting agency.

Foundation Installation - Excavations for foundations would be made with power drilling equipment. Where the soil permits, a vehicle-mounted power auger or backhoe would be used. In rocky areas, the foundation holes may be excavated by drilling and blasting, or special rock anchors may be installed. Where required, conventional or plastic explosives would be used. Safeguards (e.g., blasting mats) would be employed when adjacent areas need to be protected.

In extremely sandy areas, soil stabilization by water or a gelling agent may be used prior to excavation. After excavations are completed, pre-cast or cast-in-place footings would be installed. Steel grillage foundations may be specified in mountainous areas.

The pre-cast footing would be lowered into the excavated foundation hole, positioned, and backfilled. The cast-in-place footing would be installed by placing reinforcing steel and a tower stub into the foundation hole, positioning the stub, and encasing it in concrete. Spoil material would be used for fill where suitable. The foundation excavation and installation would require access to the site by a power auger or drill, a crane, material trucks, and ready-mix trucks.

Construction Yards and Batch Plants - Temporary construction yards would be located near each end of the transmission line right-of-way, and approximately every 20 to 30 miles along the route. These would be located in previously disturbed sites or in areas of minimal vegetative cover where possible. All sites would be determined through discussions with land owners or the land management agencies.

Concrete for use in constructing foundations would be dispensed from a portable concrete batch plant located at approximately 20 to 30 mile intervals. A rubber-tired flatbed truck and tractor would be used to relocate each plant along the right-of-way. Commercial ready-mix concrete may be used when access to tower construction sites is economically feasible.

The construction yards and batch plants would serve as field offices, reporting locations for workers, parking space for vehicles and equipment, sites for material storage, and stations for equipment maintenance. Facilities would be fenced and their gates locked. Security guards would be stationed where needed.

Tower Assembly and Erection - Bundles of steel members and associated hardware would be shipped to each tower site by truck. Steel members would be assembled into subsections of convenient size and weight. The assembled subsections would be hoisted into place by a large crane and then fastened together to form a complete tower. Figure 2-4 illustrates typical construction activities.

Conductor Installation - After the towers are erected, insulators, hardware, and stringing sheaves would be delivered to each tower site. The towers would be rigged with insulator strings and stringing sheaves at each ground wire and conductor position.

For public protection during wire installation, guard structures would be erected over highways, railroads, power-lines, structures, and other obstacles. Guard structures would consist of H-frame poles placed on either side of an obstacle. These structures would prevent ground wire, conductor, or equipment from falling on an obstacle. Equipment for erecting guard structures would include augers, line trucks, pole trailers, and cranes. Guard structures may not be required for small roads. On such cases other safety measures such as barriers, flagmen, or other traffic control would be used.

Pilot lines would be pulled (strung) from tower to tower by a helicopter and threaded through the stringing sheaves at each tower. Following pilot lines, a larger diameter, stronger line would be attached to conductors to pull them onto towers. This is called the

pulling line. This process would be repeated until the ground wire or conductor is pulled through all sheaves.

Ground wire and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment as shown on Figure 2-5. Sites for tensioning equipment and pulling equipment would be approximately two miles apart. If a fiber optic groundwire is installed rather than conventional groundwire, the construction methods would be the same. The appearance of a fiber optic groundwire is the same as conventional groundwire.

The tensioning site would be an area approximately 200 feet by 200 feet. Tensioners, line trucks, wire trailers, and tractors needed for stringing and anchoring the ground wire or conductor would be located at this site. The tensioner in concert with the puller would maintain tension on the ground wire or conductor while they are fastened to the towers.

The pulling site would require approximately half the area of the tension site. A puller, line trucks, and tractors needed for pulling and temporarily anchoring the counterpoise/ground wire and conductor would be located at this site.

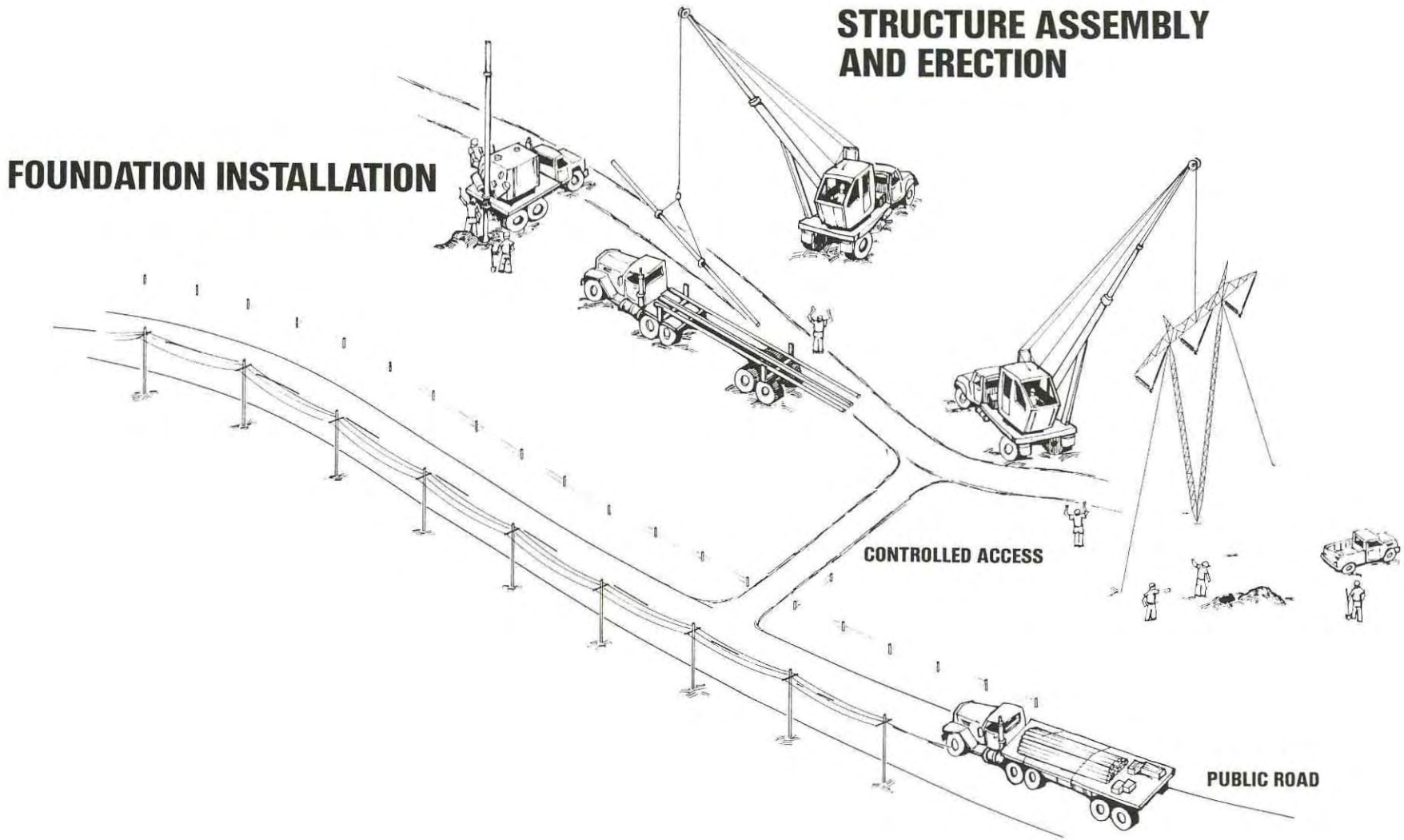
Ground Rod Installation - Part of standard construction practices prior to wire installation would involve measuring the resistance of tower footings. If the resistance to remote earth for each transmission tower is greater than 10 ohms, counterpoise (grounds) would be installed to lower the resistance to 10 ohms or less. Counterpoise would consist of a bare copper clad or galvanized steel cable buried a minimum of 12 inches deep, extending from one or more tower legs for approximately 200 feet.

Cleanup - Construction sites, material storage yards, and access roads would be kept in an orderly condition throughout the construction period. Refuse and trash would be removed from the sites and disposed of in an approved manner. Oils and fuels would not be dumped along the line. Oils or chemicals would be hauled to a disposal facility authorized to accept such materials. No open burning of construction trash would occur without agency approval.

Hazardous Materials Within Corridor - Petroleum products such as gasoline, diesel fuel, helicopter fuel, crankcase oil, lubricants, and cleaning solvents would be present within the transmission line corridor during construction. These products would be used to fuel, lubricate, and clean vehicles and equipment. These products would be containerized by fuel trucks or by approved containers. When not in use, hazardous materials would be properly stored to prevent drainage or accidents.

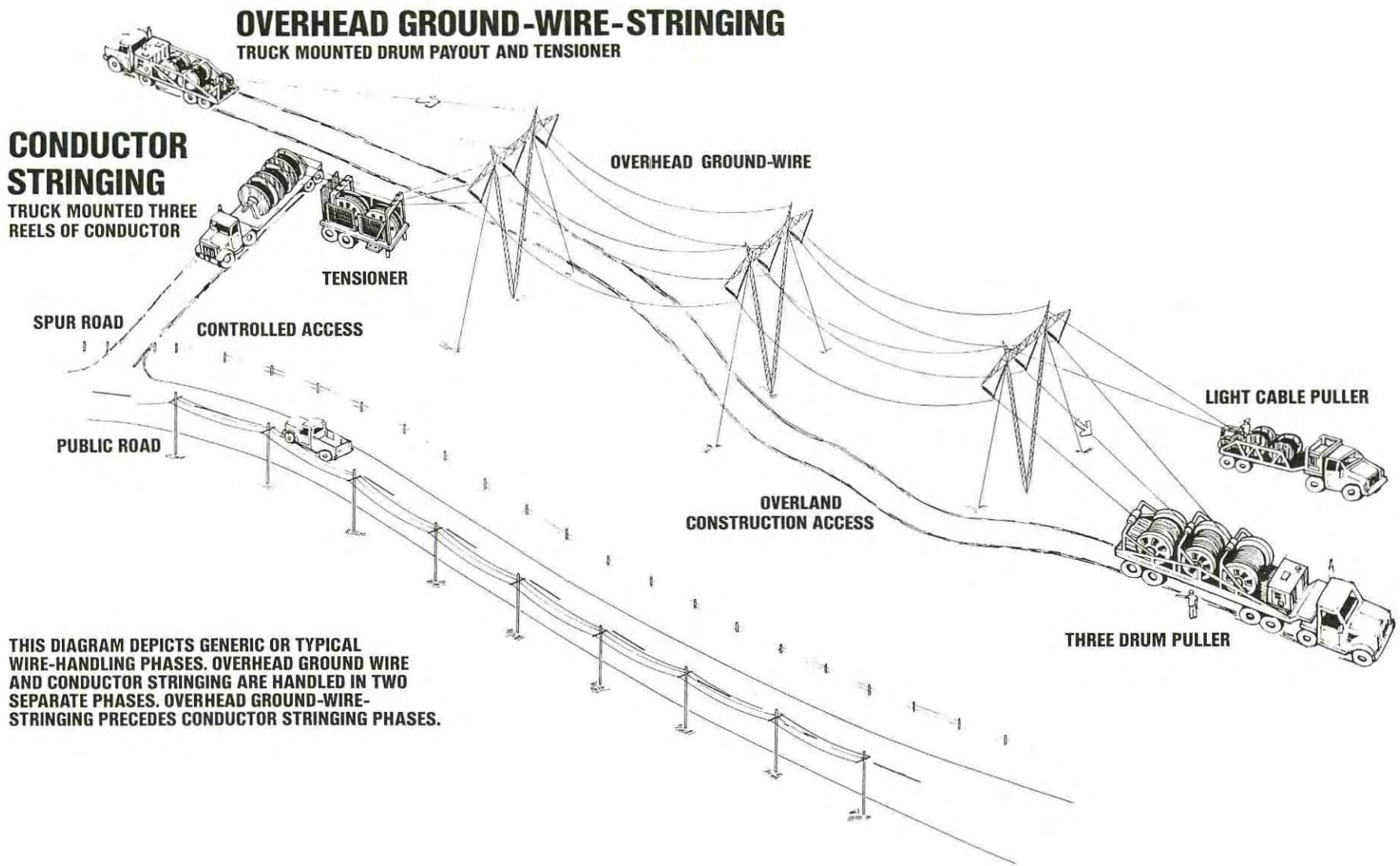
Hazardous materials would not be drained onto the ground or into streams or drainage areas. Totally enclosed containment shall be provided for all trash. All construction waste including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.

All construction, operation, and maintenance activities would comply with all applicable federal, state, and local laws and regulations regarding the use of hazardous substances.



Typical Construction Activities

Figure 2-4



Basic Wire Handling Equipment

Figure 2-5

The construction or maintenance crew foreman would insure that all applicable laws are obeyed. In addition, an on-site inspector would be present during construction to make sure that all hazardous materials are used and stored properly. A health and safety plan would be developed as part of the Construction, Operation, and Maintenance Plan during the engineering and preconstruction phase of the project.

Site Reclamation - The right-of-way would be restored as required by the property owner or land management agency. All practical means would be made to restore the land to its original contour and to restore natural drainage patterns along the right-of-way. Because revegetation would be difficult in many areas of the project where precipitation is minimal, it would be important to minimize disturbance during the construction. All practical means would be made to increase the chances of vegetation reestablishment in disturbed areas.

The total construction period would be approximately two years. The Construction, Operation, and Maintenance Plan that would be prepared during the engineering and preconstruction phase of the project would address site reclamation of disturbed areas.

Fire Protection - All applicable fire laws and regulations would be observed during the construction period. All personnel would be advised of their responsibilities under the applicable fire laws and regulations, including taking practical measures to report and suppress fires.

Operation, Maintenance, and Abandonment

Operational Characteristics - The nominal voltage for the SWIP transmission line would be 500kV AC. There may be minor variations of up to five percent above the nominal level depending upon load flow.

Permitted Uses - After the transmission line has been energized, land uses that are compatible with safety regulations would be permitted in and adjacent to the right-of-way. Existing land uses such as agriculture and grazing are generally permitted within the right-of-way. Incompatible land uses within the right-of-way include construction and maintenance of inhabited dwellings, and any use requiring changes in surface elevation that would affect electrical clearances of existing or planned facilities.

Land uses that comply with local regulations would be permitted adjacent to the right-of-way. Compatible uses of the right-of-way on public lands would have to be approved by the appropriate agency. Permission to use the right-of-way on private lands would have to be obtained from the utility owning the transmission line.

Safety - Safety is a primary concern in the design of this 500kV transmission line. An AC transmission line would be protected with power circuit breakers and related line relay protection equipment. If conductor failure occurs, power would be automatically removed from the line. Lightning protection would be provided by overhead ground wires along the line. Electrical equipment and fencing at the substation would be grounded. All fences, metal gates, pipelines, etc. that cross or are within the transmission line right-of-way would

be grounded to prevent electrical shock. If applicable, grounding outside of the right-of-way may also occur.

Maintenance - The 500kV transmission line would be inspected on a regular basis by both ground and air patrols. Maintenance would be performed as needed. When access is required for nonemergency maintenance and repairs, IPCo would adhere to the same precautions that were taken during the original construction.

Emergency maintenance would involve prompt movement of repair crews to repair or replace any damaged equipment. Crews would be instructed to protect crops, plants, wildlife, and other resources of significance. Restoration procedures following completion of repair work would be similar to those prescribed for normal construction. The comfort and safety of local residents would be provided for by limiting noise, dust, and the danger caused by maintenance vehicle traffic. Details would be provided in the Construction, Operation, and Maintenance (COM) Plan prior to line construction.

Abandonment - At the end of the useful life of the proposed project, if the facility were no longer required, the transmission line would be abandoned. Subsequently, conductors, insulators and hardware would be dismantled and removed from the right-of-way. Tower structures would be removed and foundations broken off below ground surface.

If the line and associated right-of-way are abandoned at some future date, the right-of-way would be available for the same uses that existed prior to construction of the project.

Following abandonment and removal of the transmission line from the right-of-way, any areas disturbed to dismantle the line would be restored and rehabilitated as near as possible to their original condition.

Construction Work Force and Schedule

The total work force required to complete the phases of construction described above would be 100 to 150 people. The initial work force would consist of about 65 people. This force would be added to at approximately two-week intervals until it reaches a maximum of 120 workers. Table 2-3 lists the personnel and equipment that would be needed for the construction work force.

From past experience, it is estimated that about 50 percent of this work force would be hired locally. Those who are not local people normally take up temporary housing in nearby communities and commute to and from the job site on a daily basis. Many have their own trailers and park them where connection facilities are available, others occupy rental houses and apartments.

The target date for commercial operation of the project is late 1997. Right-of-way procurement would begin in 1993, and construction is scheduled to commence in early 1995. The project may be built in phases or sections if the market or financial conditions warrant.

Regional Environmental Study/Scoping Process

In 1988 IPCo proposed to construct a transmission interconnection from their 500kV Midpoint Substation near Shoshone, Idaho to a new substation site in the Delta, Utah area. In the Delta area, IPCo could potentially interconnect with and obtain transmission capacity on the UNTP, a proposed 500kV transmission line from Delta to the a new substation site located approximately 13 miles southwest of Boulder City, Nevada. The UNTP is owned by a consortium of utilities including LADWP, NPC, Utah Associated Municipal Power Systems (UAMPS), and Deseret Generation and Transmission Cooperative. The new substation site would be a major interconnection point, or "marketplace" substation, for the Southwest.

A regional environmental study to identify routing alternatives was completed for the SWIP in late 1988. Because it was determined in 1989 that transmission capacity for the SWIP would not be available on the UNTP, the project description was revised to include a connection from the Ely, Nevada area to a new substation site to be located northeast of Las Vegas, Nevada (also refer to page 2-31). The purpose and need for the proposed Ely, Nevada to Delta, Utah segment was revised as well (refer to right-of-way acquisition on page 2-17). The following section describes how the alternatives compared in the EIS were identified and finalized.

Identification Of Alternatives

Through the 1988 regional environmental studies, approximately 2,000 miles of routing alternatives were identified as being reasonable and feasible between Midpoint and Delta. The regional environmental study of southern Idaho, northeastern Nevada, and western Utah was completed as part of the scoping process (also refer to Chapter 5 and the Objectives, Procedures, and Results Technical Report). Environmental analysis completed during the regional studies and the scoping process for the SWIP EIS determined which alternative routes were reasonable and feasible to construct and operate. These alternatives were then evaluated in detail to facilitate comparing alternatives in this document.

The regional study was begun in June 1988 and completed in December of the same year. The purpose of the study was to determine, as mandated by NEPA (1969) and the implementing CEQ regulations (1978), all reasonable and feasible transmission line routing alternatives connecting from Midpoint Substation to the Delta, Utah area (also refer to the Objectives, Procedures, and Results Technical Report and later in this chapter for more on the Alternatives Evaluation Process). The study area encompassed about 80,000 square miles in the three states. Satellite imagery enhanced the data collected from agencies throughout the study area. The major resource areas evaluated included:

Natural environment

- threatened and endangered plant and animal species
- wildlife habitat and use areas
- plant habitat

- soils and geology
- surface hydrology

Human environment
- existing, planned, and designated land uses
- parks, recreation, and preservation uses
- scenic and aesthetic resources

Cultural environment
- archaeology
- prehistory
- enthnohistory
- history

A sensitivity analysis was completed, and opportunities and constraints were determined to identify potential alternative routes for the SWIP. Sensitivity is the measure of the probable adverse response of each resource to direct and indirect impacts associated with the construction, operation, maintenance, and abandonment of the proposed transmission line. Criteria used in this determination included:

- **Resource Value**: A measure of rarity, high intrinsic value or worth, singularity or diversity of a resource within the study area or region.

- **Protective Status**: A measure of the formal concern expressed for a resource either through legal protection or by designation of special status.

- **Present or Future Uses**: A measure of the level of conflict based on policies of land management agencies and/or use.

- **Hazards**: A measure of the degree to which a resource represents a significant hazard to construction and/or operation of the proposed project.

These resources were then mapped according to their respective sensitivity level as follows:

- **Exclusion Area**: Areas determined to be unsuitable because of unique, highly valued, complex or legally protected resources, significant potential conflict with current or planned use, and areas posing substantial hazards to construction and operation of the line. For purposes of selection of corridors, exclusion areas were avoided.

- **Avoidance Area**: Areas of potentially high environmental impact because of important, valued resources, resources assigned special status, some conflict with current or planned use, and areas posing some hazard to construction and operation of the facility. In corridor selection these areas were avoided where possible or conflict with these areas was minimized if avoidance was difficult or impossible.

- **Low to Moderate Sensitivity**: Areas where the resource conflicts that have been identified through the regional environmental study process are minimal, or present little hazard to construction or operation of the facility.

After completing the sensitivity analysis for each resource, a composite sensitivity map was prepared through an overlay process of all the resource sensitivity maps. This composite was used to identify constraints and locational opportunities resulting from combinations of the three levels of environmental sensitivity for the five major resource areas: visual, land use, biology, earth, and cultural. Alternative corridor locations were then plotted taking into account the composite sensitivity, the locations of existing transportation and utility corridors, topographic constraints, and utilizing public lands. The corridor width varied somewhat to reflect the locations of constraining environmental features, yet allow sufficient margin for planning within each corridor. Corridors describe linear paths where:

- features or areas of exclusion were avoided (e.g. residences, airstrips, wells, and other sensitive land use features)
- crossing of features or areas of avoidance was minimized
- locations through steep or rugged topography were minimized
- proximity to existing roads that could be utilized for access was maximized
- locations parallel to existing transmission or existing utility corridors were maximized
- routing on private lands was minimized in favor of public lands

Several members of BLM, a FS representative, engineers from IPCo and LADWP, as well as project management from the consulting firm, Dames & Moore, were present during and participated in the identification of alternative corridors. Based upon the environmental data available for the regional studies, the selection participants determined that all reasonable alternatives had been identified. The resulting alternatives were presented to the SWIP Steering Committee for review (also refer to Chapter 5). The Steering Committee did not identify any additional alternatives.

About 3,000 miles of alternatives were initially identified in the regional study (refer to Figure 2-1). Through a joint effort involving IPCo, LADWP, BLM, FS, Bureau of Reclamation, NPS, and Dames & Moore, the initial alternatives identified in the regional study were reviewed through numerous field and aerial surveys. The objective of the field review was to refine the broad "corridors" of the alternatives, and to delineate assumed centerlines based on environmental and engineering input, and to further the familiarity of the study team with the environmental, physiographic, and engineering characteristics of the study corridors. These assumed centerlines formed the basis for the study area for each alternative route that was later studied in detail in the EIS. The field review and delineation of the assumed centerlines was completed in the period of April 1989 to July 1989. Following scoping, about 2,000 miles of these alternatives were identified as being reasonable and feasible for detailed study based on the regional environmental issues, public acceptability, and engineering constraints. The results of the route evaluation are documented in the SWIP project files and in the Southwest Intertie Project Regional Environmental Study report (Dames & Moore, April 1989).

Following completion of the regional studies, IPCo determined that an interconnection point would be needed in the Ely, Nevada area to best use projected regional resources (e.g., future WPPP in the Ely, Nevada area). Refer to page 2-31 for more information regarding the project expansion of the SWIP from Ely south to the Las Vegas area.

Develop Scope/Preparation Plan

A Scope/Preparation Plan was developed for the environmental documentation process (refer to Preparation Plan for the Southwest Intertie Project Environmental Studies - Phase II, Dames & Moore, July 1989). This plan considered the following:

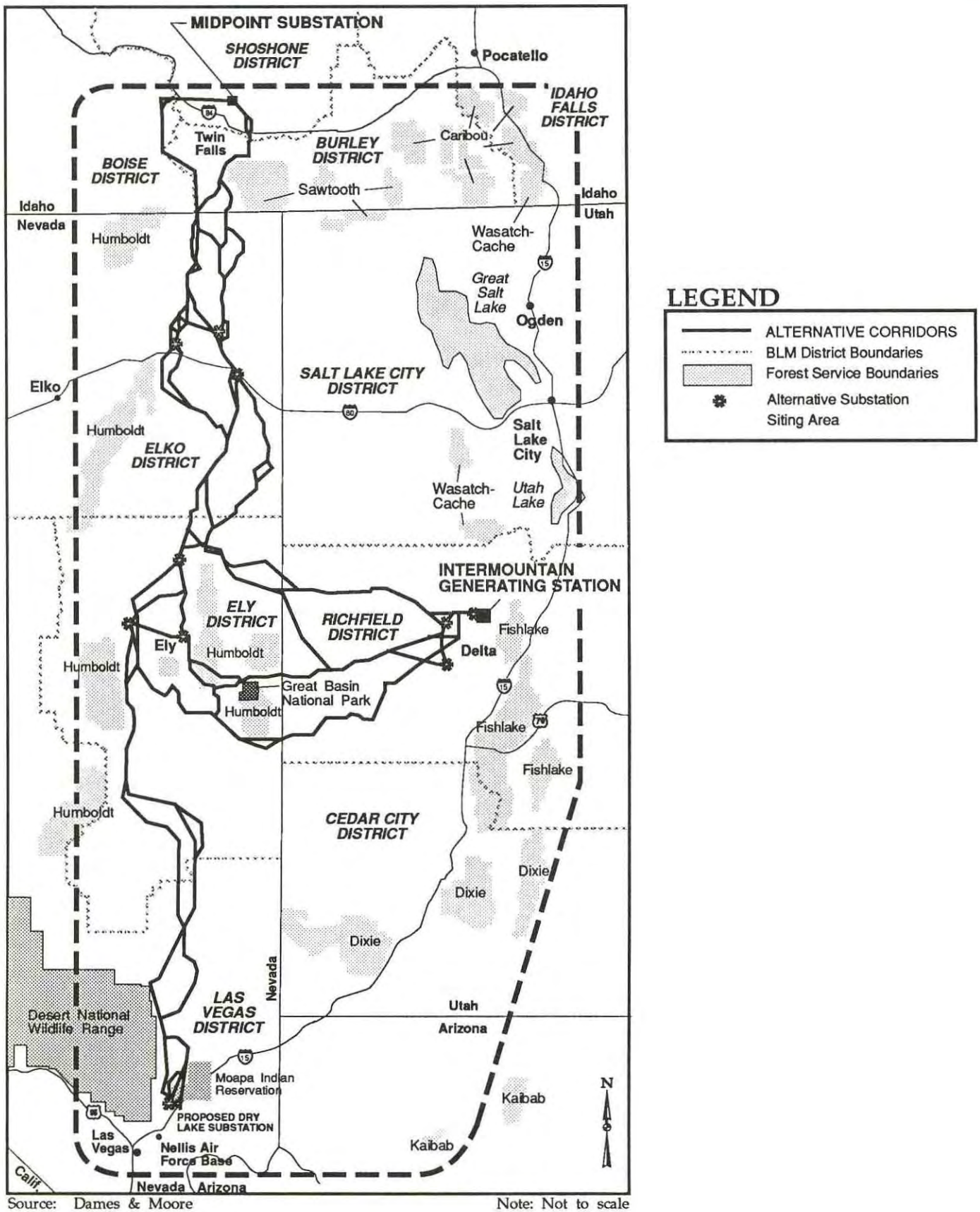
- previous environmental studies, reports, and EISs
- Draft and Final Humboldt National Forest Land and Resource Management Plan
- the Management Framework Plans (MFPs) of the Burley District and Shoshone in Idaho
- the Resource Management Plans (RMPs) of the BLM resource areas in the Boise and Shoshone Districts in Idaho, the Elko and Ely Districts in Nevada, and Richfield District in Utah
- issues and alternatives resulting from the regional environmental siting studies
- input from the agency contacts and public scoping meetings
- federal environmental reporting and compliance requirements as mandated by NEPA (1969) and the CEQ regulations (1978)

In addition when the project was extended to Dry Lake in May 1991, the MFPs of the Las Vegas District in Nevada were considered.

Corridor Studies

Following completion of the regional studies, scoping meetings, and agency input and review, approximately 2,000 miles of alternative corridors were initially studied in detail (refer to Figure 2-6). The study areas established along the assumed centerline of each alternative ranged in widths from two to six miles depending upon the needs of and concerns for each resource study (discussion in Chapter 4). Detailed environmental data were compiled on maps at a scale of 1:100,000 within these "study corridors".

Following the identification of final alternative routes, the environment was inventoried for nine resource categories to establish current environmental conditions. This baseline was



Source: Dames & Moore

Note: Not to scale

Southwest Intertie Project Alternative Corridors

Figure 2-6

then used to determine where and to what extent impacts from the project may occur. The nine inventoried resource categories were organized as follows:

Natural Environment

- Air and Meteorology: air quality, climate
- Earth Resources: geology, hydrology, springs inventory, water quality, soils, and paleontology
- Biological Resources: terrestrial vegetation, rare, threatened or endangered plant, wildlife, and aquatic species, floodplains, wetlands, and associated vegetation, sensitive plant and wildlife habitat

Human Environment

- Land Use: land jurisdiction, existing and future uses, park, recreation, preservation areas, range lands and improvements
- Visual Resources: scenic resources, visual sensitivity, BLM visual resource management (VRM) classes, FS visual quality objectives (VQO) classes
- Socioeconomics: demography, economy, employment, tax jurisdictions, community resources, and grazing effects

Cultural Environment

- Prehistory: known and expected/probable prehistoric resources including lithic scatters, antelope traps, dwelling sites, etc.
- History: historic sites, trails, structures
- Ethnology: Native American religious and ritual sites, and hunting and gathering sites

These data provided the baseline for identifying potential impacts and appropriate mitigation measures, both generic and specific. Further, these data form the basis for the comparison of routing alternatives. Specific mitigation measures, recommended on a case-by-case basis, determined the residual, or unavoidable adverse, impacts to the environment along each alternative corridor. Detailed results of the inventory, impact assessment, and mitigation planning are provided in the technical report.

The assessment of environmental impacts is based upon an assumed reference centerline for the proposed transmission line. Impacts identified in this document were assessed assuming maximum movement of one-quarter mile from the assumed centerline for the final engineered right-of-way.

The corridor studies were initiated in the summer of 1989. The collection of detailed environmental data for the resource areas is previously described. The inventory of resource data involved contacts with federal, state, and local agency resource specialists and land managers. The data, collected, mapped, and field verified by Dames & Moore resource investigators, were reviewed by agency resource specialists. In addition to the environmental resources, electrical and magnetic field (EMF) effects have been analyzed for the SWIP.

The planning process used for the SWIP applied advanced computer technology in the form of a geographic information system (GIS) to map, analyze, and manage the voluminous data collected for the inventory. The data collected by resource investigators were supplemented by "remotely sensed" data from another advanced technology, multi-spectral satellite data. GIS was also used during the impact assessment and mitigation planning process. The system applied a variety of models developed by resource investigators to evaluate and assess the potential impacts the proposed project.

These data provided the baseline for identifying impacts, appropriate mitigation measures, and comparing the routing alternatives. Detailed results of the inventory, impact assessment, and mitigation planning are provided in the supplemental resource technical reports (Volumes II, III, and IV of the supporting technical reports).

Several adjustments, modifications, and additions to the assumed study centerlines were made during the corridor studies. In July 1989, the Burley District of the BLM in Idaho requested that alternative centerlines be evaluated on both sides of the existing midpoint to Valmy 345kV line from just south of Cottonwood Creek in southern Idaho to the Idaho-Nevada border. In addition, discussions with the superintendent of the Fossil Beds National Monument near Hagerman, Idaho, in June 1989 resulted in the addition of Link 62 to potentially reduce visual impacts to the monument. Links 61 and 64 were also adjusted slightly to avoid potential conflicts with the boundary of this national monument. (Links are route segments that connect to others to form the network of routing alternatives being considered).

During June 1989, the superintendent of the Great Basin National Park requested that alternatives be developed to avoid visual impacts to Great Basin National Park. In response, alternatives that would cross through military operating areas (MOAs) of the Utah Training and Testing Range (UTTR) of Hill Air Force Base (Links 262, 263, 264, 266, 267, and 268) were included. In August 1989 the superintendent also requested that an additional alternative be developed that would cross the Restricted R-6405 Area of the UTTR. In response, the Links 61, 63, and 64 (Direct Route) were developed and included in the alternatives studied in detail. Both of these added alternative routes would avoid visual impacts to Great Basin National Park.

In July 1989, the Elko District of the BLM requested the addition of several alternatives to Links:

- Link 71 between Jackpot and Contact, Nevada to potentially reduce visual impacts to U.S. Highway 93 (shown as Link 70 on maps)

- Links 711, 713, 714, and 715 to provide an alternative crossing of U.S. Highway 93 near Contact, Nevada

- Link 83 along Shoshone Creek just south of the Idaho-Nevada state line to provide another alternative route into the Trout Creek area

- Link 211 crossing Interstate 80 northwest of Oasis, Nevada to potentially reduce visual impacts

- Link 224 near Ferguson Mountain to potentially reduce visual impacts to U.S. Highway 93A

- Link 1612 to provide an alternative that could connect with the proposed Thousand Springs Power Project (Thousand Springs has been canceled)

- Links 161, 163, 164, 165, 166, 167, and 168 north of Wells, Nevada, to potentially reduce visual impacts to U.S. Highway 93

The Ely District in Nevada also made several requests for additions or revisions to the assumed alternative centerlines. In mid 1989 the District requested that Link 293 be added because of concerns about wildlife watering holes in the Antone Pass area on Link 280. An alternative route consisting of Links 362 and 363 into the Robinson Summit substation siting area from the north was desirable to BLM.

In early 1990, IPCo determined that the UNTP would not be able to provide the transmission capacity for the SWIP to reach the new substation near Boulder City, Nevada. IPCo decided that the SWIP would have to be extended south from the Ely area in order to meet the purpose and need for the SWIP project to interconnect in the Las Vegas area. In June 1990 the SWIP studies were expanded to include routes from the Ely, Nevada, area to a new substation site northeast of Las Vegas in the Dry Lake Valley.

To accommodate this expansion, the BLM determined that the SWIP route should follow the preferred route approved in the 1985 Record of Decision for the White Pine Power Project (WPPP), and that the studies for the WPPP should be updated to the same level of detail as the SWIP studies from Midpoint to Ely and Ely to Delta. No regional studies were completed between Ely and Dry Lake to determine other alternative routes. If the SWIP is approved in a Record of Decision, the WPPP Record of Decision would be amended so that the SWIP and the two lines proposed for WPPP would be consolidated in the same corridor. If one of the alternative routes avoiding Link 720 (Coyote Spring Valley) is selected, the SWIP Record of Decision would not amend the WPPP Record of Decision to consolidate the corridors in this area. The decision to construct the WPPP transmission system through Coyote Spring Valley would remain.

The lead federal agency for the SWIP, the BLM, recommended that one portion of the UNTP be retained in the SWIP EIS/PA process, although technically not a part of the SWIP. This

approximately 150 mile transmission line segment would extend east from the vicinity of Ely, Nevada, to near Delta, Utah. The right-of-way for this segment would be granted to IPCo and then assigned to LADWP for construction and operation of this portion of the line and a new substation at the Intermountain Generating Station near Delta, Utah. The action was recommended because of the amount of work completed on the route already, and the likelihood it would be reproposed by LADWP as the only part of UNTP not having an existing record of decision or right-of-way grant.

Prior to being added to the SWIP, the additional alternatives described below were evaluated for environmental and engineering feasibility during overflights. Further, BLM requested that the assumed centerlines for these alternatives be located such that the resulting utility corridor would accommodate the two future WPPP transmission lines. Assumed centerlines for the additional alternatives were determined jointly by the SWIP project management, BLM, and IPCo engineers requests.

Scoping was reopened for the project expansion to determine the issues and concerns for the SWIP between Ely and the Las Vegas area (also refer to Chapter 5). During the scoping period, contacts were made with the Nellis Air Force Base (AFB) to inform the military of the proposed project. The air space manager for Nellis Air Force Base expressed concerns about the route passing through areas designated as MOAs. The Air Force conducts low-altitude aircraft operations in these areas to train combat pilots. Subsequent meetings with representatives from Nellis AFB in August 1990 helped identify several additional alternatives (Links 672, 673, 674, and 675) that should be evaluated. In addition, the Caliente Resource Area of the BLM also suggested the need to evaluate Link 675 because it would parallel an existing 69kV power line in a utility corridor designated in the Caliente Resource Area Management Framework Plan of the Las Vegas District of BLM.

In September 1990, the Ely District requested that Link 363 be added as an alternative to avoid known ferruginous hawk nests along Link 361. Similarly, because of additional concerns for visual impacts and impacts to sage grouse leks and nesting areas in the vicinity of Jackpot and Contact, Nevada, two additional alternatives (Links 714 and 715) were requested in January 1991 by the Elko District of the BLM.

In September 1990 BLM requested that the SWIP studies evaluate the engineering and environmental feasibility of routing the SWIP roughly parallel to Nevada State Highway 7 toward the community of Moapa, Nevada, through a pass at the northern tip of the Arrow Canyon Range (Link 730). The proposed alternative would then enter a major utility corridor through the Moapa Indian Reservation parallel to Interstate 15 to reach the Dry Lake area.

BLM made this request because of concerns for desert tortoise in the Coyote Spring Valley. This concern was of particular concern because of the ongoing Section 10 (of the Endangered Species Act) consultation being conducted for private lands slated for development in Clark County. Under the Habitat Conservation Plan (HCP) being prepared, a desert tortoise conservation area was being proposed on public lands in Coyote Spring Valley. Because they were cooperating on ongoing planning work for desert tortoise, the BLM requested that other routing alternatives be considered for the planned transmission lines through this area. BLM was also concerned about visual impacts to travelers of U.S. Highway 93.

The BLM initiated a Resource Management Plan (RMP) process for the Stateline Resource Area in January 1990. The draft plan and EIS are planned to be released for public review in mid 1992. Utility corridors are among the many issues addressed by the plan. The BLM has coordinated the SWIP EIS and RMP EIS processes, to the extent possible, in determining the locations of both transmission lines and utility corridors.

Reliability concerns if the SWIP were constructed in the major utility corridor across reservation lands would be similar to those discussed on page 2-17 (e.g., paralleling the UNTP). Other major regional transmission lines, as well as several smaller transmission lines, are already sited in this corridor (also refer to Reliability on page 1-8).

A feasibility report was prepared and completed in February 1991. The purpose of this study was to evaluate the feasibility of constructing future lines through the Moapa area because of the concern for further visual impacts and disturbance to desert tortoise habitat in Coyote Spring Valley (Figure 2-7). Several potential routes were evaluated to identify the environmental and technical/economic issues.

In June of 1991, based on the results of the feasibility report, BLM determined that several of the routes should be studied in detail for the EIS. The route that would roughly parallel Nevada State Highway 7 from the north end of the Arrow Canyon Range to a point near the community of Moapa and then southwest toward the Dry Lake Valley in the designated utility corridor was eliminated from further consideration because of many environmental, technical, and cost issues. Near the Reid-Gardner Generating Station the route would either have to cross the coal storage area on the east side of the generation station or the wetland areas on the west side of the generating station. The line could not be routed far enough east to avoid the coal storage area because of the major regional transmission lines (IPP-Adelanto 500kV DC transmission line and the Navajo-McCullough 500kV transmission line) located in this area, and the SWIP cannot feasibly cross these lines. Environmentally the route would likely result in many miles of visual impacts along Highway 7 and the residential concentrations in the Moapa and Glendale areas. Additionally, BLM determined that this route would not meet their planning criteria for locating utilities within corridors.

Another route, which crossed Aerojet lands outside of the designated utility corridor northwest of the Moapa River Indian Reservation, was eliminated from further consideration. The study determined that a utility corridor had already been established through the Aerojet lands by Congress in the Nevada-Florida Land Exchange Authorization Act of 1988 (PL 100-275). The legislation states under 102 Stat.55(b,1) that "Activities to construct, operate, and maintain electric transmission lines within the corridor shall be given priority over all other conflicting activities."

Several of the alternative route segments were determined to be reasonable and feasible and were studied in detail for the EIS (Figure 2-7). Two of the route segments would cross the Moapa Indian Reservation lands. During the fall of 1991 consultation with the Tribal Council determined that these routes could be considered through the EIS process. These were evaluated during November and December of 1991 (Links 730, 740, 750, 760, 780, and 790). A public information meeting was held in the Tribal Office of the Moapa Band of the Paiute on December 17, 1991. Also refer to discussion of Subroute Set 23 in Appendix D.

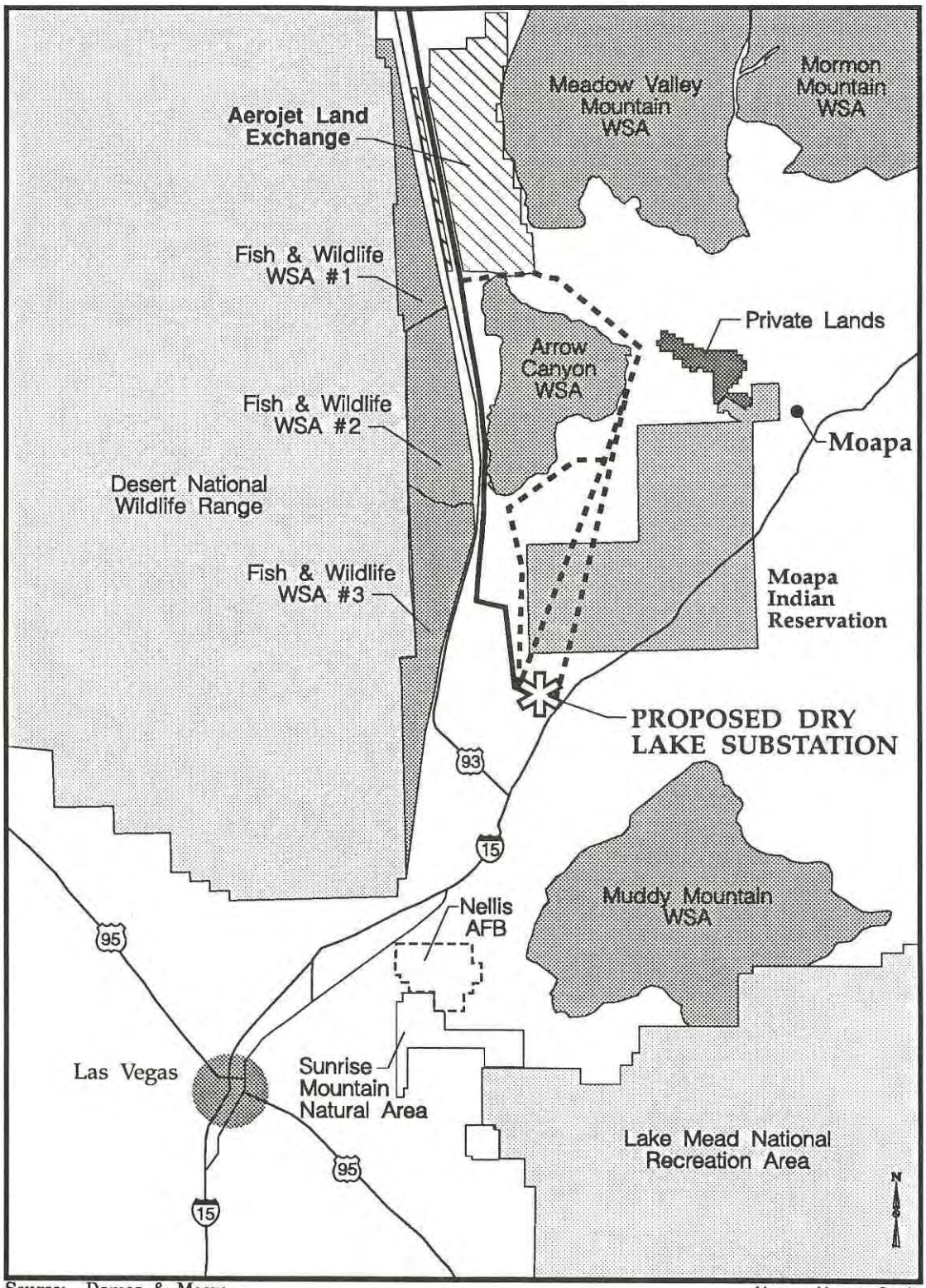
In 1985, the Record of Decision (ROD) for the WPPP stated that the two 500kV transmission lines would be constructed through the Coyote Spring Valley parallel to U.S. Highway 93. In addition, the BLM had previously granted a Right of Way for a second 500kV line from the Intermountain Generating Station. In 1990 this grant was transferred to LADWP for the UNTP. Therefore, the UNTP line would be constructed along the Coyote Spring Valley route (Link 720), and the WPPP lines are approved through the 1985 ROD for this same Coyote Spring Valley route.

Following the impact assessment and mitigation planning process, the Coyote Spring Valley route was determined to be environmentally preferred. This route would avoid significant impacts to cultural sites and visual impacts to high sensitivity recreation viewpoints. All of the routing alternatives evaluated on the east side of the Arrow Canyon Range and on or near the Moapa River Indian Reservation, would result in high visual impacts to recreationists on the east side of the Arrow Canyon WSA and to a proposed interpretative trail in the area. In addition, these routes would result in direct impacts to several important ethnohistoric and historic sites located in Arrow Canyon along Link 730. Desert tortoise impacts on routes both east and west of the Arrow Canyon Range are considered to be mitigable. Also refer to Appendix D for additional information.

Routing Alternatives Evaluation Process

A GIS was used to assist in the preparation of the required environmental impact statement/plan amendment (EIS/PA). The GIS was originally used to evaluate environmental issues and help identify alternative transmission line corridors in Phase I of the SWIP (refer to the SWIP Regional Environmental Report, April 1989). GIS processing was performed using Dames & Moore's Geographic Information Management System (GIMS). The following summarizes the sequence of GIS applications:

- digitizing of resource inventory data as collected and recorded on maps by resource principal investigators
- producing baseline resource inventory maps and data reports
- conversion of mapped resource data to a digital database format
- developing pre-assessment models to establish the level of potential ground disturbance associated with construction activities, the potential increase in public access into remote areas, and degree of visible change in the landscape
- developing of impact assessment models to evaluate how the construction and operation of the proposed project would effect resource values and features
- producing of impact maps (to scale) that graphically illustrate the locations and magnitudes of potential resource impacts



Source: Dames & Moore

Note: Not to Scale

Moapa Feasibility Study

Figure 2-7

- developing and producing tabular impact data reports that describe the location and magnitude of potential impacts along the assumed centerline of alternative transmission line routes

- developing and applying analysis for siting and selecting substation facility locations using engineering and environmental criteria

Substations, series compensation stations, and microwave communication facilities sites were also evaluated during the environmental studies (refer to Chapters 3 and 4, and appendices). Siting areas for substation and series compensation station facilities were inventoried by the same methods and for the same resource categories as the alternative routes.

Alternative sites were selected for substations and series compensation stations based on a set of environmental and engineering criteria. The GIS facilitated the selection of sites with opportunities and constraints mapping. The resource inventory for the siting areas was input into GIS, and the impact assessment used models adapted from those used for the corridor analysis. Refer to Appendix E at the end this document for additional discussion of the siting and assessment process.

Alternative microwave facilities sites were identified by IPCo representatives for the Midpoint to Dry Lake portion of the SWIP. The resource inventory and impact assessment for these sites were conducted manually without the assistance of the GIS. (Refer to Appendix F at the end of this document for a detailed discussion of the microwave facilities study). No additional microwave facilities would be required on the Ely to Delta portion of the SWIP. Existing communication facilities would be used (also refer to page 2-15).

The proposed project's purpose and need statement (refer to Chapter 1), public issues, and agency concerns guided identification and evaluation of alternatives. An environmental study process was developed and implemented to ensure a systematic framework for identifying, assessing, and comparing alternative routes for the proposed transmission line. Initial routing alternatives were identified through the Regional Environmental Study (refer to page 2-23).

The necessary information for each of the alternative routes was collected to predict the potential impacts of the project to the environment. The project team determined the impacts that could be caused by the construction, operation, and maintenance of the transmission line.

The access road requirements determine the amount of potential disturbance (e.g., constructing new roads, constructing spur roads to tower locations from existing roads, or upgrading existing roads). Vegetation removal was a major consideration during field review and identification of alternative routes. The following access levels are preliminary estimates of disturbed area for main and spur road construction, tower sites, and marshalling yards:

1. Agricultural areas, no new access roads needed.

2. No new access roads needed, use existing roads, build spur roads into tower sites. Less than 0.75 mile of new access road per mile of transmission line. Disturbed area is about 1.5 acres per mile for access roads and about 1.0 acre per mile for tower sites and marshalling yards.

3. New access roads in flat to gently rolling terrain. Slopes are 0-8 percent. Approximately 1.0 -1.25 mile of new access road per mile of transmission line. Disturbed area is about 2.0 acres per mile for access roads and about 1.0 acre per mile for tower sites and marshalling yards.

4. New access roads in moderately steep slopes. Slopes are 8-35 percent. Approximately 1.0 - 2.0 miles of new access road per mile of transmission line. Disturbed area is about 4.0 acres per mile for access roads and about 1.0 acre per mile for tower sites and marshalling yards.

5. New access in steep terrain. Slopes are 35-65 percent. Approximately 2.0 - 3.0 miles of new road per mile of transmission line. Disturbed area is about 6.0 acres per mile for access roads and about 1.0 acre per mile for tower sites and marshalling yards.

The levels of potential increases in public accessibility that could result if new roads are constructed in remote areas are described below:

0 - 20%	the line routes could generally be accessed by existing roads; only a few short spur roads may be required; little to no increase in public access is expected
20 - 40%	there are some existing roads in the area; some new road construction may be needed to access the line route in some areas
40 - 50%	some existing roads are in the vicinity; new roads would be needed to large portions of the line route
50 - 100%	remote areas with few, if any, existing roads; new roads would be needed to gain access to much of the line route

The resulting data were summarized into profiles of 0.1 mile increments for each alternative corridor. The alternative corridors were then compared, and an environmentally preferred route identified.

COMPARISON OF FINAL ROUTING ALTERNATIVES

Preferred route selection was based upon the comparison of alternative routes between the Midpoint Substation near Shoshone, Idaho, and the proposed substation at Dry Lake northeast of Las Vegas, Nevada, and alternative routes between the Ely, Nevada area and the Delta, Utah area. Seven final routing alternatives were identified for the Midpoint to Dry

Lake portion based on combinations of routing alternatives environmentally preferred by the five major resources. Four final routes were identified for the Ely to Delta portion. These routes are compared later in this chapter of this document and the environmentally, agency, and utility preferred route(s) are identified (Refer to Map Volume).

The final selection of substation and series compensation station sites were based on the selection of the environmentally preferred route. The impacts of the microwave facilities sites are also documented in Appendix F.

To assist in the determination of routing preferences, the environmental consequences for each route were summarized based on the residual impact assessment results (after mitigation measures applied), specific environmental resource preferences, and agency and public comments. A reasonable number of the best environmental routing alternatives were determined from combining individual links to make complete routes.

Subroutes sets are made up of localized alternatives that have common beginning and end points. Subroutes were evaluated in order to reduce the potential number of routes that could be derived from the link segments. Figure 2-8 illustrates the twenty-four sets of subroutes that were identified and evaluated to help derive the alternative routes compared in this document. The link segments where no local routing decisions were necessary, were termed connectors. The environmentally preferred subroute within each set of subroutes was selected and combined with the connector links to form alternative routes. The subroute selection process is described in Appendix D of this document, and is accompanied by maps and summaries of the resource impacts for each subroute set (also refer to the Objectives, Procedures, and Results Technical Report).

Midpoint to Dry Lake

Transmission Line Alternatives

The resulting network of routes was organized into eight major routing alternatives from Midpoint Substation in Idaho to the proposed substation at Dry Lake northeast of Las Vegas, Nevada:

- **Route A** - 345kV*-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative is comprised of link segments:

  10, 20, 41, 40, 50, 70, 72, 101, 102, 110, 130, 160, 161, 162, 1612, 152, 200, 211, 212, 230, 250, 259, 260, 261, 270, 291, 293, 310, 340, 362, 363, 669, 670, 672, 673, 675, 690, 700, 720

- **Route B** - 345kV*-Trout Creek-Wendover-Steptoe-Antone Pass-Dry Lake Alternative is comprised of link segments:

  10, 20, 41, 40, 50, 70, 72, 91, 92, 140, 141, 142, 144, 200, 221, 222, 224, 226, 259, 261, 270, 280, 310, 340, 362, 363, 669, 670, 672, 673, 675, 690, 700, 720

- **Route C** - 345kV*-Trout Creek-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative is comprised of link segments:

  10, 20, 41, 40, 50, 70, 72, 91, 92, 140, 141, 142, 144, 200, 211, 212, 230, 250, 259, 260, 261, 270, 291, 293, 310, 340, 362, 363, 669, 670, 672, 673, 675, 690, 700, 720

- **Route D** - 345kV*-Wells-Steptoe-Egan Range-Dry Lake Alternative is comprised of link segments:

  10, 20, 41, 40, 50, 70, 72, 101, 102, 110, 130, 160, 161, 162, 1611, 166, 167, 1613, 180, 190, 230, 241, 243, 245, 261, 270, 291, 293, 310, 340, 362, 363, 669, 670, 672, 673, 675, 690, 700, 720

- **Route E** - 345kV*-Thousand Springs-Wendover-Steptoe-Egan Range-Dry Lake Alternative is comprised of link segments:

  10, 20, 41, 40, 50, 70, 72, 101, 102, 110, 130, 160, 161, 162, 152, 200, 221, 222, 224, 226, 259, 261, 270, 291, 293, 310, 340, 362, 363, 669, 670, 672, 673, 675, 690, 700, 720

- **Route F** - Hagerman-Trout Creek-Goshute Valley-Egan Range-Dry Lake Alternative is comprised of link segments:

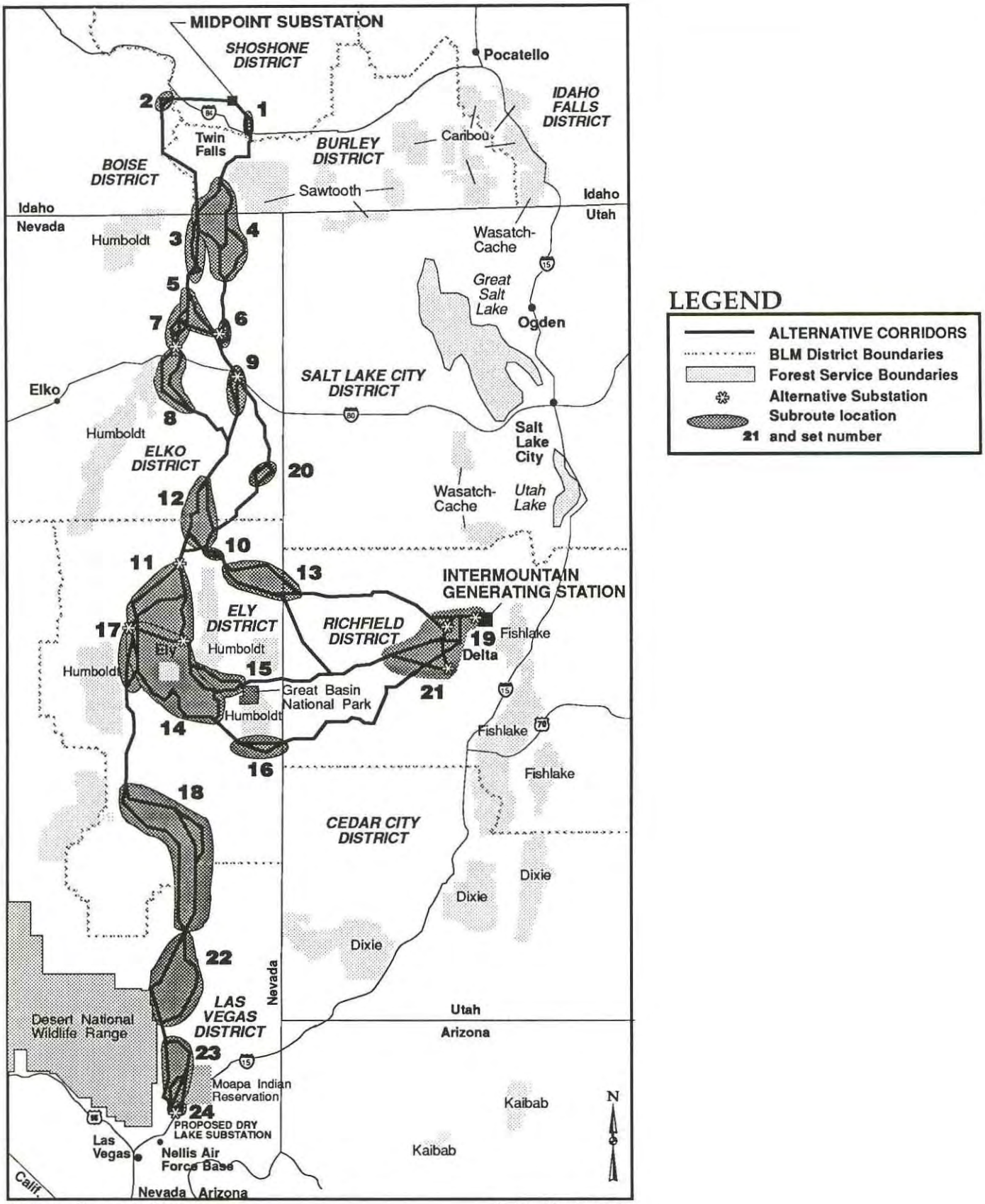
  61, 62, 64, 70, 72, 91, 92, 140, 141, 142, 144, 200, 211, 212, 230, 250, 259, 260, 261, 270, 291, 293, 310, 340, 362, 363, 669, 670, 672, 673, 675, 690, 700, 720

- **Route G** - 345kV*-Cottonwood Creek-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative is comprised of link segments:

  10, 20, 41, 40, 50, 70, 711, 714, 101, 715, 713, 110, 130, 150, 151, 152, 200, 211, 212, 230, 241, 243, 245, 261, 270, 280, 310, 340, 362, 363, 669, 670, 672, 673, 675, 690, 700, 720

  * - parallels Midpoint to Valmy 345kV transmission line

The following section describes various issues and resource preferences for each route compared. Environmental data are summarized in Table 2-4 and committed mitigation by alternative route is shown in Table 2-5.



Source: Dames & Moore

Note: Not to scale

Subroute Location Map

Figure 2-8

Route A: 345kV-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative Route A would parallel the Midpoint to Valmy 345kV transmission line to south of Contact, Nevada. Just south of the Midpoint Substation this route would also parallel the double-circuit line of Midpoint-Stateline 345kV and Midpoint-Hunt 230kV transmission line.

This route would cross open rangelands broken by small dispersed farm areas southeast from the Midpoint Substation to crossing the Snake River Canyon (Links 10, 20, 40, 41, 50, and 70). The Bureau of Reclamation is concerned about the visual impacts to the Minidoka Relocation Center (Link 20), a site on the National Register of Historic Places, the location where thousands of Americans of Japanese descent were interned during World War II. The site is also a designated park site for the Idaho Centennial. Other concerns in this area are visual impacts to rural residences and direct impacts to irrigated agricultural lands.

From the river canyon south to the toe of the foothills, the route (Link 41) would cross agricultural lands in the Snake River Valley. The route would turn west at the toe of the South Hills and follow them around to the southwest and south outside the Sawtooth National Forest boundary (Links 41, 40, and 50), primarily through rangelands. Throughout this area there are concerns about visual impacts to the scattered rural residences. A few miles north of the Idaho-Nevada state line, this route (Link 70) would meet and parallel the Upper Salmon to Wells 138kV transmission line. The route would continue south parallel to the existing 138kV and 345kV transmission lines passing just west of Jackpot, Nevada and would cross Salmon Falls Creek (Link 72) in the rolling terrain of the Browns Bench parallel to the 345kV transmission line.

The route would continue south parallel to U.S. Highway 93 (Link 101) to just north of Contact, Nevada, where the route would cross the highway parallel to the 345kV transmission line (Link 102). At Rocky Peak the 345kV transmission line turns southwest. Route A continues south parallel to the 138kV line crossing U.S. Highway 93 again (Link 160), then just north of the HD Summit (Link 162) the route would turn sharply east along the northern toe of the Windermere Hills (Link 1612) and cross U.S. Highway 93 a third time. As the route enters the Toano Draw, it would turn southeast (Link 152) along the western edge of the draw (Link 200) into the Goshute Valley. Along the eastern toe of the Pequop Mountains, the route (Link 211) would continue south passing just to the west of Oasis, Nevada before crossing Interstate 80. There were concerns expressed in the public workshops about visual impacts to a ranch headquarters in the Goshute Valley. In addition, the BLM has also expressed concerns about visual impacts at the Interstate 80 crossing, a designated "low visibility" corridor in the Wells Resource Management Plan.

The route would continue south through the Goshute Valley (Links 212, 230) parallel to an unused railroad bed past Shafter passing to the east of the South Pequop WSA. Northwest of the Dolly Varden Mountains, the route would turn south through the Currie Hills (Link 250) towards Lages Station, Nevada, in the northern portion of the Steptoe Valley. The BLM is concerned about the visual impacts to views in the North Steptoe Valley caused by the crossing of U.S. Highway 93A (Link 250) and the crossing of U.S. Highway 93 (Link 260). Routing around the northern tip of the Schell Creek Range (Links 259, 260) would introduce visually contrasting elements into foreground and middleground views from these highways where the Schell Creek Range and the Currie Hills (Link 250) would backdrop the proposed transmission line.

The route would continue to an alternative substation site located in the North Steptoe Valley over a mile west of U.S. Highway 93. From this substation site, the route would pass south along the western edge of Steptoe Valley (Links 270, 291) then cut southwest through Dry Canyon (Link 293) in the Egan Range. Once west of the Egan Range, the route would cross Butte Valley and enter the Robinson Summit area (Link 310), the location of a second alternative substation site in the Ely area, after crossing Nevada State Highway 50.

The route would continue on the east side of Jakes Valley (Links 340, 362, 363) into the White River Valley crossing the White River and Nevada State Highway 6 (Link 669). Just south of the Wayne Kirch National Wildlife Refuge it would cross the White River again, then turn southeast to a pass at the southern end of the Schell Creek Range (Link 672). Nellis Air Force Base has expressed concerns for low-altitude military aircraft operations where Route A would cross the Muleshoe Valley and into the north end of the Dry Lake Valley (Link 673). From the Black Canyon on the east edge of the Dry Lake Valley, the route would meet and parallel Lincoln Power's 69kV power line along the toe of the Burnt Springs Range (Link 675). The route would continuously parallel this 69kV line into Coyote Spring Valley, northeast of Las Vegas.

The route would continue into the Delamar Valley and past Delamar Lake to meet Pahranagat Wash adjacent to Maynard Lake (Link 690). From this point, the route would parallel Pahranagat Wash where several WSAs are of concern. The proximity of their boundaries cause significant routing constraints (pinch points) for several miles along Pahranagat Wash south of Maynard Lake. On the east side of Pahranagat Wash is the Delamar WSA, and on the west side is the Evergreen WSA. Although neither WSA is recommended by BLM to be designated as Wilderness, BLM is concerned about visual impacts from dispersed areas within the WSAs. The route would parallel the 69kV line, U.S. Highway 93, and the UNTP 500kV transmission line through this area. Because of these "pinch points," it may be necessary to build the SWIP and UNTP on double circuit towers for four to six miles along Pahranagat Wash and parallel to U.S. Highway 93 (from milepost 28 to milepost 34 on Link 690). If these lines were built on double circuit towers, the future White Pine Power Project (WPPP) lines would be placed on the open circuits of each line. From milepost 34 of Link 690, the SWIP and UNTP lines would be on separate single circuit structures. The SWIP route would cross U.S. Highway 93 at about milepost 38 of Link 690.

The route would then cross Coyote Spring Valley and enter a corridor established by Congress in March 1988 for the Aerojet Land Exchange (Link 700). A portion of the area east of the route in the Coyote Spring Valley was set aside by Congress in the land exchange legislation for the management of desert tortoise. There is a concern by BLM throughout this area and into Coyote Spring Valley and Hidden Valley for visual impacts to views from U.S. Highway 93. The Arrow Canyon WSA is on the east side of the route and encompasses the Arrow Canyon Range from Nevada State Highway 7 south for several miles. Along the same corridor, several Fish and Wildlife WSAs lie on the west side of the Arrow Canyon WSA (Link 700). They begin at the northern portion of the Coyote Springs Valley and continue several miles south to Hidden Valley. South of these WSAs the route would turn east through a small pass in the southern Arrow Canyon Range, just east of Hidden Valley, and into the proposed substation at Dry Lake.

Although none of the WSAs potentially affected by the route are recommended by BLM to be designated as Wilderness, BLM is concerned about the potential visual impacts to dispersed recreational users within these WSAs.

Route B: 345kV-Trout Creek-Wendover-Steptoe-Antone Pass-Dry Lake Alternative This route is the same as Route B (above) from the Midpoint Substation to south of Jackpot, Nevada (Link 72).

Just south of Salmon Falls Creek, Route B would turn sharply southeast crossing U.S. Highway 93 (Link 91) to roughly parallel Trout Creek west of the Granite Range (Link 92) and Knoll Mountain (Link 140), and then cross Thousand Springs Valley. The route would pass just west of the Ninemile Mountain (Link 141) and continue south through Toano Draw which joins the Goshute Valley west of the Pequop Mountains. The route then would cross the Goshute Valley approximately three miles northeast of Oasis, Nevada (Links 221, 222).

The route would cross Interstate 80 in Silver Zone Pass and traverse south along the eastern toe of the Goshute Mountains (Link 222). The route would also pass east of the Bluebell WSA (Link 222). Near Ferguson Mountain the route would cross U.S. Highway 93A (Link 224) then would parallel it to Lages Station, Nevada (Link 226). The BLM has expressed concerns for visual impacts from dispersed areas where this route would pass adjacent to the Goshute Peak WSA, an area recommended for Wilderness designation (Link 226).

From Lages Station south into north Steptoe Valley, the route would parallel U.S. Highway 93 then cross the highway to reach the alternative substation site at the north end of Steptoe Valley. The BLM is concerned that the route would introduce visually contrasting elements into foreground and middleground views from U.S. Highway 93 as the route passes around the northern tip of the Schell Creek Range (Links 259, 260). The Schell Creek Range would be a backdrop to the proposed transmission line in this location.

From the substation site, the route would cross the Steptoe Valley passing east of the community of Cherry Creek while parallel to a Nevada Northern Railroad right-of-way. The route then would turn southwest into Antone Pass between the Cocomongo Mountains and the Egan Range. West of this pass, the route would traverse Butte Valley and enter the Robinson Summit alternative substation site from the north.

From Robinson Summit south to its terminus in Dry Lake Valley, northeast of Las Vegas, Nevada, Route B is identical to Route A (above).

Route C: 345kV-Trout Creek-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative Route C is the same as Route A from Midpoint Substation to just south of Jackpot, Nevada.

From south of Jackpot to the vicinity of Oasis, Nevada (Link 200), Route C is the same as Route B. Then, from Oasis (Link 211), Route C is identical to Route A to the southern terminus in the Dry Lake Valley, northeast of Las Vegas, Nevada.

Route D: 345kV-Wells-Steptoe-Egan Range-Dry Lake Alternative Route D is the same as Route A from Midpoint Substation south to just north of HD Summit (end of Link 162) at southern end of Thousand Springs Valley.

From HD Summit, Route D would parallel the Upper Salmon to Wells 138kV transmission line in the narrow valley west of U.S. Highway 93 south into the northern end of the Town Creek Flats (Links 1611, 166, 167, 1613). The route would turn southeast crossing U.S. Highway 93 towards Wells Peak, cross the eastern half of the Town Creek Flats, and then pass along the northwestern toe of the Wood Hills several miles east of Wells, Nevada (Link 180). The BLM has expressed concern about visual impacts at the crossing of U.S. Highway 93 north of Wells, and the crossing of Interstate 80 about two miles west of Moor Summit.

From the Wood Hills, the route would cross the Independence Valley (Link 180) and begin paralleling a Union Pacific Railroad right-of-way (Link 190) near the center of the valley. The route would cross the Pequop Mountains over the Union Pacific railroad tunnel near Hogan and enter the Goshute Valley. The route then passes one mile east of the South Pequop WSA (Link 190), which has been recommended for Wilderness designation. A short distance after the WSA, the route would turn south-southwest and pass the town of Dolly Varden. Just south of Mizpah, the route would turn south away from the railroad and would cross U.S. Highway 93 several miles south of Currie, Nevada (Link 241). The route would pass to the east of the Goshute Canyon WSA and the adjacent Natural Area (junction of Links 241,242 & 243). Continuing south along the western edge of Goshute Lake, the route would then turn southeast to an alternative substation site located at the north end of the Steptoe Valley.

From the North Steptoe Valley (Link 270), Route D is identical to Route A south to the southern terminus in the Dry Lake Valley, northeast of Las Vegas, Nevada.

Route E: 345kV-Thousand Springs-Wendover-Steptoe-Egan Range-Dry Lake Alternative Route E is the same as Route A from Midpoint Substation to Oasis, Nevada near Interstate 80 (refer to Route A description above).

From Oasis to the alternative substation site in the North Steptoe Valley, Route E is identical to Route B (refer to Route B description above). Route E is the same as Route A from the north Steptoe Valley south to the southern terminus in the Dry Lake Valley, northeast of Las Vegas, Nevada.

Route F: Hagerman-Trout Creek-Goshute Valley-Egan Range-Dry Lake Alternative Route F would depart Midpoint Substation to the west towards the Hagerman area crossing rural agricultural lands broken by dispersed sage scrub range areas (Link 61). Visual impacts to the many residences in the area and land use conflicts with agriculture operations in the Snake River Valley were among the concerns expressed at public meetings in the area. The route would descend the bluff into the Hagerman area just south of Malad Gorge State Park and cross the Snake River (Link 61). On the west side of the Snake River, the route would climb the steep, eroded wall of the canyon and traverse parallel to the north and west boundaries of the Hagerman Fossil Beds National Monument (Links 62, 64). The National Park Service has expressed concerns about visual impacts to the visitors' center and interpretation facilities planned for the Hagerman Fossil Beds National Monument.

As the route would turn south (Link 64), agricultural lands are avoided because the route follows a long, narrow strip of BLM lands known as Dickey Bird Lane (Link 62). BLM is concerned about the route crossing this land because of its use for vegetation and upland game research by BLM and Idaho Department of Fish and Game. From the end of Dickey

Bird Lane, the route would traverse rural agricultural lands passing near several rural residences. There is concern that the route could impact a utility airstrip used by aerial spraying operations located near the southern boundary of the Hagerman Fossil Beds National Monument.

Just north of Balanced Rock State Park, the route would cross Salmon Falls Creek Canyon and parallel the Upper Salmon to Wells 138kV transmission line along the western rim of the canyon (Link 64). The route would continue south with the 138kV transmission line roughly paralleling this canyon. East of the Salmon Falls Reservoir, the route would cross the Idaho-Nevada state line near Jackpot, Nevada (Link 70).

Route F is the same as Route B from just south of Jackpot to near Oasis, Nevada. Then from Oasis to the southern terminus in Dry Lake Valley, Nevada, this route is identical to Route A.

Route G: 345kV-Cottonwood Creek-Thousand Springs-Goshute Valley-Steptoe-Egan Range-Dry Lake Alternative Route G is the same as Route A from Midpoint Substation south to the Idaho-Nevada state line (Link 70).

West of Jackpot, Nevada the route would cross Salmon Falls Creek (Link 711) a mile west of the Upper Salmon to Wells 138kV transmission line crossing. BLM representatives from the Elko District favor this crossing over the crossings used by other routes about two miles to the south.

Route G would then continue south parallelling the west side of the Midpoint to Valmy 345kV transmission line and the 138kV Upper Salmon to Wells transmission line. Sage grouse habitat between the transmission line corridor and Grassy Mountain is of concern along this area of the route. However, cumulative effects to the sage grouse are expected to be lower where the route parallels existing transmission lines (refer to Chapter 4).

Continuing south (Link 101, 715), the route would then turn southeast to cross U.S. Highway 93 and the two existing transmission lines (Link 713) just north of Contact, Nevada. The BLM has expressed concerns about visual impacts to views from U.S. Highway 93 and residences in the Contact area. The route would continue south paralleling the two transmission lines on the east side to Rocky Peak (Links 110, 130). Then, the route would turn southeast away from the existing transmission line corridor and cross Thousand Springs Valley east of the Wilkins Ranch (Link 150, 151), and southeast into the Toano Draw.

The route would traverse the western edge of the Toano Draw (Link 200) into Goshute Valley. Along the eastern toe of the Pequop Mountains, the route (Link 211) would continue south passing just to the west of Oasis, Nevada before crossing Interstate 80. There were concerns expressed in the public workshops about visual impacts to a ranch headquarters in the Goshute Valley. In addition, the BLM has also expressed concerns about visual impacts at the Interstate 80 crossing, a designated low visibility corridor in the Wells Resource Management Plan.

The route would continue south through the Goshute Valley (Links 212, 230) parallel to an unused railroad bed passing Shafter and Dolly Varden. A little south of Mizpah, the route

would turn south away from the railroad crossing U.S. Highway 93 several miles southeast of Currie, Nevada (Link 241). The route would then pass to the east of the Goshute Canyon WSA and the adjacent Natural Area (junction of Links 241, 242 and 243). Continuing south along the western edge of Goshute Lake, the route would turn southeast to an alternative substation site located at the north end of the Steptoe Valley.

Route G is the same as Route B from this substation site to the southern terminus in Dry Lake Valley, Nevada.

Substation and Series Compensation Sites

Three new facilities would be required between Midpoint Substation and the proposed terminus in the Dry Lake Valley. A series compensation facility would be required north of Wells, Nevada. The facility near Wells could be expanded to include switching equipment if an interconnection with Sierra Pacific Power is needed in the future. This site was formerly proposed as a potential interconnection with the Thousand Springs Power Project (TSPP), which was canceled in 1991. However, Sierra Pacific has expressed interest in a transmission interconnection at this site. The second new facility would be a new substation facility in the vicinity of Ely, Nevada, to provide an interconnection point for the Ely to Delta routes (Crosstie) and potentially the 230kV transmission system already in the area. The third new facility is a new substation in the Dry Lake Valley northeast of Las Vegas, the proposed termination point for the SWIP. A fourth facility, a series compensation station, may be required in the Delamar Valley, which would require a separate environmental assessment (EA) if constructed.

In the Ely area, only one substation site would be selected for the SWIP. If a substation is developed at the Robinson Summit site, a substation may also be developed at the North Steptoe site, if the WPPP is developed in the future. If the North Steptoe substation site is developed as part of the SWIP, the Robinson Summit substation site may also be developed in the future to provide an interconnection with the 230kV transmission system in the area. However, only one substation site would be developed as part of the SWIP.

Seven facility siting areas were identified and studied between Midpoint and Dry Lake. The North Steptoe, Robinson Summit, and Hercules Gap siting areas were identified to locate a new substation in the vicinity of Ely. The U.S. Highway 93, Thousand Springs, and Goshute Valley siting areas northeast of Wells, Nevada, were identified to locate a series compensation station between Midpoint and Ely. The seventh siting area in the Dry Lake Valley northeast of Las Vegas was identified for a new substation facility and the proposed southern terminus of the SWIP.

These siting areas are shown on the route map in the map volume that accompanies this document. Environmental resource data for each of these siting areas were collected and mapped during the inventory.

Alternative facilities sites within these seven siting areas were determined through a siting process which compiled environmental and engineering data using GIS. The analysis of

these data produced environmental and engineering constraints maps that were used by project planners to determine specific alternative facility sites within each of the siting areas. Potential resource impacts for alternative facilities sites were then determined using GIS models (modified versions of those used for the alternative transmission lines routes). The selection of the specific sites was determined by a review of the environmental impacts in conjunction with the transmission line route selection process.

Among the three substation siting areas in the vicinity of Ely, a total of six alternative substation sites were identified and assessed for impacts. Of these six alternative substation sites, only two were considered environmentally acceptable:

- North Steptoe - located in the North Steptoe Valley north of McGill, Nevada, adjacent to the proposed site of the White Pine Power Project
- Robinson Summit - located just south of U.S. Highway 50 west of Ely, Nevada

Among the three series compensation station siting areas north and east of Wells, a total of seven alternative sites were identified and assessed for impacts. Because the final selection of the series compensation station site would be determined by the route selection process, one site from each series compensation station siting area was selected.

Comparative resource impacts and further description of the substation siting and impact assessment process are found in Appendix E (also refer to the technical reports for additional detailed descriptions of resource data and impacts).

Communication Facilities

A total of 16 alternative microwave communication sites were identified and studied for the portion of the transmission line from Midpoint Substation to the proposed Dry Lake substation site. Two alternative microwave communication paths have been identified (refer to Map Volume). These alternative paths depend on where the substation near Ely is sited, the North Steptoe site or Robinson Summit site.

It is possible that a fiber optic groundwire may be installed (on the towers in place of the shield wire) to facilitate communication needs for the transmission line, or capacity may be sold to commercial communication companies. If fiber access is allowed to commercial companies, they would be responsible for obtaining the necessary permits and right-of-way needed for regeneration stations at intervals along the transmission line (also refer to Right-of-Way Acquisition).

The communications path from Midpoint Substation to the Robinson Summit substation site to the proposed substation at Dry Lake would require the development of new microwave facilities at ten (10) of the alternative microwave sites studied. Of these ten sites, eight sites would be developed at locations adjacent to existing electronic facilities and two of the sites would require new construction on previously undeveloped sites. The specific microwave sites required for each of the paths are listed below, from north to south:

Robinson Summit	**North Steptoe**
Path 1	Path 2
Hansen Butte	Hansen Butte
Cottonwood	Cottonwood
Ellen D	Ellen D
Rocky Point	Six-Mile
Proctor	Spruce Mountain
Bald Peak	Long Valley
Raiff	Copper
Squaw Peak	Cave Mountain
Cave Mountain	Mount Wilson
Mount Wilson	Highland Peak
Highland Peak	

The other path would link Midpoint Substation to the North Steptoe substation site at Dry Lake and would require the development of new microwave facilities at eleven of the alternative microwave sites studied. Of these eleven sites, eight sites would be developed adjacent to similar existing facilities. Three of the sites would require new development.

The alternative microwave sites were identified based on a set engineering criteria and consideration for environmental concerns. Alternative sites were located at existing facility developments wherever possible. The locations of microwave sites are not dependent on the location of the transmission line route. Rather, they are dependent on the locations of the substations that they would control (e.g., Robinson Summit or North Steptoe).

The importance of the microwave facilities is to provide a communications link between substation, series compensation station, and switching facilities in the transmission line system. The microwave system provides the transmission line with a highly reliable and secure communication circuit for protective relaying, voice communications, telemetering, and supervisory control and data acquisition (SCADA).

Potential resource impacts for each site and additional environmental data are summarized in Appendix F of this document. Also refer to the technical reports under each resource for additional information on data inventory and potential impacts.

Ely to Delta

Transmission Line Alternatives

Four major routing alternatives were developed on the crosstie portion of the SWIP (east-west segments) from the Ely area to the Delta area:

- **Direct Route** - is comprised of link segments:

  262, 263, 265, 266, 620, 621, 630, 640, 572, 580, 581, 582

- **Cutoff Route** - is comprised of link segments:

  262, 263, 265, 266, 267, 268, 462, 470, 540, 571, 572, 580, 581, 582

- **230kV Corridor Route** - is comprised of link segments:

  350, 351, 352, 370, 380, 460, 461, 462, 470, 540, 571, 572, 580, 581, 582

- **Southern Route** - is comprised of link segments:

  340, 362, 364, 420, 430, 450, 451, 490, 510, 560, 571, 572, 580, 581, 582

The following section describes various issues and resource preferences for each route. Comparative environmental data are summarized in Table 2-5.

Direct Route - The Direct Route would connect to the north-south SWIP transmission system at the North Steptoe substation. It would cross east of this area through the Schell Creek Range at the Dry Canyon, and into the Spring Valley. The route would cross the creek and continue southeast past Twelvemile Summit, Red Hills, and Mike Springs Wash, and then just north of the Little Hills.

The route would continue east through the Tin Springs Mountain, and would continue east parallelling the Juab-Millard County lines in Utah. The route would cross into the Snake Valley on the south end of the Deep Creek Range. In the middle of Snake Valley the route would cross the Leland-Harris Spring Complex, which is known to have several sensitive species of fish, the spotted frog, and a butterfly species. BLM is extremely concerned about the potential for increased public access into this area through road construction or upgrading. BLM would request emergency listing with Fish and Wildlife Service (FWS) of at least four species as threatened or endangered under the Endangered Species Act (1974) if this route is selected.

The route would continue east crossing through the Confusion Range and into Tule Valley south of the Middle Range. The route from the Nevada-Utah state line would be within the R-6405 Restricted Area of the Utah Training and Testing Range (UTTR) of Hill Air Force Base (AFB). Hill AFB is extremely concerned about their low-level flying missions through this entire area, and especially within the valleys. The high level of concern is amplified due to the current round of base closures throughout the U.S. Hill AFB is not scheduled to be closed. If the SWIP is constructed on this route, Hill AFB is requesting that it be designed and built at a height that is lower than would be technically feasible.

The route would then continue east, passing south of the Fish Springs WSA (Link 630) and north of the Swasey Mountain WSA near Swasey Point. It would then pass on the north end of the House Range and continue southeast between the Drum Mountains and Little Drum Mountains. The route would again turn straight east and passing south of the Drum

Mountains and just north of Greener Reservoir. The last twelve miles into the Intermountain substation site would parallel the IPP to Adelanto 500kV DC line.

Cutoff Route - The first segment of the Cutoff Route from the North Steptoe substation to just east of the Little Hills is the same as the Direct Route (refer to above section). From here the route would pass across the north and east sides of Government Peak in the Little Valley. At this point the line would turn south and cross through the edge of the restricted area of the UTTR. If the SWIP is constructed on this route, Hill AFB is requesting that shorter towers be constructed in specified areas to reduce the potential for conflict with low-level flying on the UTTR.

As the route proceeds southeast it would cross Snake Valley and into Coyote Pass in the Conger Range approximately three miles from the Marble Canyon WSA and Mount Moriah Wilderness area. BLM is concerned about the visual effects from dispersed areas within both of these areas.

At this point the route would join the route of the two existing 230kV transmission lines (Gondor-IPP, Gondor-Pavant) passing east through Sheepmens Little Valley and Payson Canyon. The route would cross Tule Valley as it continues east, then through Marjum Canyon between the Howell Peak and the Notch Peak WSAs. BLM is also concerned about the potential visual effects to these WSAs.

The 230kV corridor splits just east of Marjum Canyon. The SWIP route would follow the Gondor to IPP 230kV route northeast across the Whirlwind Valley to the south end of the Little Drum Mountains. It would continue along this corridor joined by the IPP to Adelanto 500kV DC line into the Intermountain Generating Station.

230kV Corridor Route - This route would begin at the Robinson Summit substation site and cross east into Smith Valley just south of the Hercules Gap. The route would continue east across U.S. Highway 93 before joining with the two existing 230kV transmission lines that make up this existing corridor. The corridor would cross east of Ely and enter the Humboldt National Forest in Cooper Canyon.

The corridor would continue east across Spring Creek and cross the Snake Range in Weaver Creek, just north of Great Basin National Park. There are concerns expressed by the National Park Service and the public about potential visual effects to Great Basin National Park. These concerns include background views from the proposed visitors' center and other proposed scenic vista sites. Outside the park boundaries there are also concerns for park visitors' views while driving to or away from the park along the major access routes and views from the proposed wayside stations near Sacramento Pass and near the Utah-Nevada border. The location of these wayside stations have been identified in Great Basin National Park's Draft General Management Plan, but have not been finalized. They are included for purposes of analysis in this EIS only.

The corridor would cross U.S. Highway 6/50 twice in this area, and then continues east across the Snake Valley. The route would cross south of Eskdale and into the Buckskin Hills. From here this route follows the 230kV corridor as described above for the Cutoff Route. If

the line is constructed along this route, Hill AFB is requesting that shorter towers be constructed to reduce the potential for conflict with low-level flying on the UTTR.

Southern Route - The route would head south from the Robinson Summit substation site along the east side of the Jakes Valley, south of Duck Peak, and across the White River Valley. It would cross the Egan Range in Water Canyon and Williams Creek, and then would cross Cattle Camp Wash in the south end of the Steptoe Valley, and north of the Cattle Camp Spring and the Burnt Knoll Spring.

It would then cross into the Spring Valley north of the Fortification Range. It would follow across the south end of the Snake Range south of Big Spring, then across the north end of the Mountain Home Range.

In the Antelope Valley Wash, the route would cross Utah State Highway 21 adjacent to the proposed site of a wayside interpretive site (location has not been finalized and is for SWIP analysis only) for the Great Basin National Park. The route would continue northeast through Cowboy Pass, then turning east across the Ferguson Desert north of the Wah Wah Mountains WSA and on through Snake Pass. The route would then pass just south of the King Top WSA and turn sharply north into the Tule Valley at a point south of the Barn Hills. The route would turn to the northeast in Tule Valley and pass south of the Notch Peak WSA near Skull Pass and would cross the Sevier Desert north of Sevier Lake to join the IPP to Adelanto 500kV DC transmission line to the Intermountain Generating Station. Hill AFB has expressed concerns about potential conflicts with low-level flying operations conducted in the UTTR. Shorter towers would be required along several portions of this route with the UTTR.

Substation and Series Compensation Station Areas

Two new substations would be required for the east-west transmission line from Ely to Delta. One of these substations would be located in the Ely, Nevada area (previously described under the Midpoint to Dry Lake section on page 2-44). The other substation site would be located near IPP. Three substation siting areas were identified in the vicinity of Delta, Utah:

- Sevier - this siting area is located at the north end of the Cricket Mountains near the Old Sevier River, northeast of Sevier Lake
- Smelter Hills - this siting area is located near the Smelter Hills about 15 miles west of Delta, Utah
- Intermountain - this siting area is located adjacent to the Intermountain Generating Station

These siting areas are shown on the route map in the map volume that accompanies this document. A total of four alternative substation sites were identified within these three siting areas. These alternative sites were determined through a siting process which compiled and analyzed environmental and engineering data using GIS, as described previously. Each of these alternative sites was assessed for potential impacts. The selection

of a preferred site was determined through an analysis of the potential environmental impacts in conjunction with the transmission line route selection process.

The siting process, inventory, and the impact assessment are described in Appendix E. In addition, potential resource impacts for each of the alternative substation sites are described in the supporting technical reports.

Communication Facilities

The Ely to Delta portion of the SWIP route would use an existing microwave communications system. LADWP currently operates a microwave system between Ely and Delta for the Gondor to IPP 230kV transmission line. Each of these existing microwave facilities would require some modifications (e.g., new equipment). However, these modifications are not expected to require any ground disturbing activities.

IDENTIFICATION OF PREFERRED ALTERNATIVES

Environmentally Preferred Alternatives

Midpoint to Dry Lake

Routes A and E would have the fewest miles of high visual impacts, however, both of these routes would have a large number of miles of moderate visual impacts. Route A also has the second lowest number of miles of high biological impacts. Route A is the environmentally preferred route. Refer to the Alternative Routes map in the Map Volume for Route A through G locations.

Routes B and E are two of the longer routes because they both pass east of the Goshute Mountains. As a result, Route B would have the most miles of high biological impacts, while Route E would have more mileage of moderate impacts to all resources than the other alternative routes.

Although Route C would have the fewest miles of high cultural impacts, this route and Route B would have large numbers of miles of high biological impacts. Both of these routes would disturb sage grouse habitat and leks in the area from Trout Creek to Thousand Springs Valley (Links 91, 92, 140, 141, 142, and 144), which cause the biological impacts for these routes to be somewhat higher than the other alternative routes.

Route G would have the largest mileage parallel to existing transmission lines and would also best use BLM utility corridors. Routes B, C, and F are outside BLM utility corridors where these routes pass through the Trout Creek area into the Thousand Springs Valley, while Routes A, C, D, E, and F are outside BLM utility corridors where they cross the Egan

Range through Dry Canyon. Routes C and F would have the greatest mileage outside BLM utility corridors.

Route F, the only route that uses the western links in Idaho, would be the longest of the alternative routes. Because Route F traverses more rural agricultural lands and passes adjacent to the new Hagerman Fossil Beds National Monument, this route has the greatest mileage of high visual impacts to sensitive viewpoints, and therefore would not be environmentally preferred.

Although Route G is the shortest route, it would have the second greatest mileage of high biological impacts. Construction in undisturbed sage grouse habitat in areas south of Jackpot and in Toano Draw contribute to these biological impacts. In addition, Route G has a large number of miles of high visual impacts. For these reasons, Route G also would not be environmentally preferred.

Route D does not pass through the area previously proposed as the Thousand Springs Power Project (TSPP) site, and therefore would not integrate potential regional resources with the SWIP as well as the other routes. The TSPP has been canceled. The final EIS on the project was not released. Should a project be proposed for this site in the future it would be important for regional integration with the SWIP.

Although impacts would not be particularly significant, the BLM has expressed considerable concern for Route D where it passes near Wells, Nevada and for the potential of wet soils and standing water occurring at certain times of the year in the Independence Valley.

In summary, Routes A, C, D, and E would have resource impacts that are very similar. Routes A and D both would better use existing BLM utility corridors. However, Route D would not adequately accommodate the integration of future resources if TSPP or another generation project is developed in the Toano Draw. Subsequently, Route A is the environmentally preferred route between Midpoint Substation and the proposed substation in Dry Lake followed closely by Routes C, D, and E.

The alternative substation sites at Robinson Summit (Sites #9 or #10) are very similar environmentally and there is no distinctive preference (also refer to Appendix E). Site #8 is the only substation site identified within the North Steptoe substation siting area, and therefore would be the preferred environmentally. The alternative substation sites within the Hercules Gap substation siting area is the least preferred substation area for the Midpoint to Dry Lake alternative routes due to potential wetland problems on Link 292 and visual impacts to residences for both Sites #11 and #12. The preference between the alternative substation siting areas is determined mainly by the environmental preference of the routing alternative in or out of the substation site. Therefore, the preferred substation site is either #8 (if Cutoff Route is selected) or #9 or #10 (if the 230kV Corridor Route is selected).

The environmental preference for the U.S. Highway 93 series compensation station siting area (used if Route D is selected) is Site #1, but is only slightly preferred over Site #2, mainly due to cultural resource concerns. The environmental preference for the Thousand Springs series compensation station siting area (could be used if Routes B, C, or F are selected) would be Site #5 due to fewer potential effects to sage grouse. There is a slight environmental

preference for Site #6 within the Goshute Valley series compensation station siting area (could be used if Routes A, B, C, E, F, or G are selected), due to lower cultural resource and flood zone concerns. Therefore, the preferred series compensation site is #6, followed closely by Site #5 (if Route C is selected) or site #1 (if Route D is selected)(also refer to Appendix E).

The final selection of a substation in the Dry Lake area would depend on the routing decision for the future Marketplace-Allen Transmission Project (MAT) proposed by Nevada Power Company (NPC) to connect from this area south to the area of the McCullough Substation. In 1990 BLM asked IPCo to coordinate the transmission needs through this area with the other regional utilities. Subsequent discussions with NPC and other utilities resulted in the MAT project being proposed.

Although the Mat would be operated by NPC, several other regional utilities would likely be participants in the project. Once completed the MAT would provide a major electrical interconnection point for the inland southwest, with connection points on its north end (Dry Lake substation) and south end (new marketplace substation near McCullough Substation). The approximately 53 mile MAT project would consist of two 500kV lines with a combined capacity of 3000-3500 megawatts. This high capacity rating is possible because of the relatively short distance between the two proposed marketplace substations. The high capacity of this system would allow the planned transmission lines to connect on either end, while minimizing the number of lines through this sensitive area. The MAT is proposed to be in service in 1997.

There are two major potential routing alternatives for this project. The first would run straight south through the Apex development parallel to the proposed Utah-Nevada Transmission Project 500kV line, then cutting southeast to the Gypsum Wash area, then south through Sunrise Mountain and Henderson areas. The second major routing alternative would cross Interstate-15 at the north end of the Dry Lake range and run straight south paralleling the IPP-Adelanto 500kV DC line and the Navajo-McCullough 500kV line to the Sunrise Mountain and Henderson areas.

In the proposed Dry Lake substation siting area, all of the potential substation sites are environmentally acceptable. Substation Sites 17 and 18 are the preferred sites if the route south to MAT travels on the east side and south of the Dry Lake range. Substation sites 18 and 20 are the preferred sites if the route south to MAT travels south through the Apex development (also refer to Appendix D and E).

There are also no distinctive environmental preferences for the communication path for the Midpoint to Dry Lake alternatives.

The mileage of selectively committed mitigation for the environmentally, agency, and utility preferred routes are documented Table 2-6.

Ely to Delta

The Direct Route (refer to the Map Volume) would be the shortest route for the crosstie routes from Ely to Delta. The major concern for this route, which crosses lands with restricted air space, has been expressed by Hill AFB. Hill AFB is opposed to any structures exceeding 35 feet high through the area of restricted air space along this route. Because this route crosses largely uninhabited public lands, there are fewer significant visual effects. However, both the public and the BLM have expressed serious concern for protecting the undisturbed landscape through which the route passes and other potentially unknown (e.g., cultural sites) or not understood resources (e.g., Leland Harris Spring complex). Because of these high concerns for the Leland Harris spring complex and military aircraft operations in the Hill AFB's R-6405 Restricted Area, the Direct Route is less preferred environmentally than the Cutoff Route.

The Cutoff Route (refer to the Map Volume) generally crosses public lands through areas that are mostly uninhabited. Visual impacts are slightly higher than the Direct Route, although the visual impacts are the same in the common portions of the two routes through Spring Valley and the Little Hills area. This route has a similar total mileage of biological resource impacts as the Direct Route. It would also use the existing 230kV corridor for about half of its length. Hill AFB has requested that towers crossing through specific areas of the military operating areas (MOAs) along this route be restricted to a maximum tower height of 105 feet above the ground level. To meet this request while maintaining ground-clearance requirements, the distance between towers would typically be less, and more towers would be required through these areas.

The 230kV Corridor Route (refer to the Map Volume) would have about the same mileage of significant visual impacts as the Cutoff Route. These significant visual impacts are generally associated with rural residences (e.g., Ely, Hercules Gap, and Sacramento Pass), U.S. Highway 6/50, and both existing and planned recreation viewpoints along the route. Because it follows existing transmission corridors for its entire length the 230kV Corridor Route best satisfies the Federal Land Policy Management Act of 1976 (FLPMA) mandate to "consolidate corridors" where possible. This route also crosses through MOAs of the UTTR of Hill AFB. The cumulative environmental effects of the future WPPP transmission system would not be significantly different regardless of whether the 230kV Corridor Route or the Cutoff Route is selected. Refer to Chapter 4 for a further discussion on cumulative effects.

The Southern Route (refer to the Map Volume), the longest crosstie route, has substantially more miles of high cultural and biological impacts than the other crosstie (Ely to Delta) routes. This route also has the second largest mileage of high visual impacts. Because of the Southern Route's greater length and significant impacts, it is the least environmentally preferred of the crosstie routes.

In summary, because of the concerns for the Leland-Harris Spring Complex and the restricted air space of the UTTR for the Direct Route, the Cutoff Route is the environmentally preferred route. However, the 230kV Corridor Route would also be an environmentally acceptable alternative, and is quite similar environmentally to the Cutoff Route. If the Robinson Summit substation site is developed, the 230kV alternative route would be considered

environmentally preferred because of the additional miles of transmission system needed to connect the North Steptoe substation site to the Robinson Summit substation site.

The environmentally preferred substation site (Site #14) in the Delta area is located in the Intermountain substation siting area, and is preferred primarily due to lower visual impacts from its proximity to the Intermountain Generating Station. The alternative substation sites at Robinson Summit (Sites #9 or 10) are very similar environmentally and there is no distinctive preference. Site #8 is the only substation site identified within the North Steptoe substation siting area, and therefore would be the preferred, environmentally. The substation site at Hercules Gap is the least preferred of the substation sites for the Ely to Delta alternative routes due to visual impacts to residences and travel routes. The preference between the alternative substation siting areas is determined mainly by the environmental preference of the routing alternative in or out of the substation site. Therefore, the preferred substation site is #14 in the Delta area and either #8 (if Cutoff Route is selected) or #9 or #10 (if the 230kV Corridor Route is selected). Refer to Appendix E for additional information on substations and series compensation stations.

There are no new communication facilities anticipated for the crosstie routes.

Mitigation commitments for the environmentally, agency, and utility preferred routes are documented in the Mitigation Summary in Table 2-6.

Utility Preferred Alternatives

Midpoint to Dry Lake

IPCo's preferred alternative route from Midpoint to Dry Lake is based primarily on economic considerations and transmission system reliability. IPCo agrees with most segments of the environmentally preferred alternative with one localized route variation.

This variation is the preference of Links 242 and 244 over Links 243, 245, and 261. Route G, as defined in this area, would result in unnecessary additional distance to provide an interconnection to the North Steptoe substation site. If Robinson Summit is developed, and WPPP is developed in the future, a short tap could be constructed to interconnect the two facilities. If the WPPP is not developed, the construction of additional miles of line now would be an unneeded cost and would cause additional environmental impacts. However, if North Steptoe substation site is developed, IPCo recognizes that constructing Links 243, 245, and 261 would be prudent over Links 242 and 244.

IPCo recognizes that the North Steptoe and Robinson Summit substation sites are both environmentally viable, and that the third substation site near Hercules Gap, would have significant environmental issues if developed. Of the two acceptable substation sites, IPCo prefers the Robinson Summit substation site.

The owners of an existing 230kV transmission system in the area have expressed interest in a future interconnection with the SWIP. This potential interconnection with a 230kV system at the Robinson Summit substation site would facilitate developing the Ely area into an open marketplace substation. The owners of the existing 230kV system would not likely choose to extend their 230kV system north to the North Steptoe substation site. Therefore, the construction of the substation at North Steptoe may not eliminate the need for a future substation at Robinson Summit. If Robinson Summit is developed the SWIP line would be designed to accommodate a possible future interconnection with the WPPP.

IPCo selects Route G as the preferred alternative route from Midpoint to North Steptoe with several important variations. The first variation is that Link 102 is selected over the combination of Links 715 and 713 in Route G just north of Contact, Nevada. The SWIP would cross over the Upper Salmon-Wells 138kV line on the northern end of Link 102. The route needs to stay on the west side of the existing 345kV line until the southern end of Link 102, where it would then cross. Using Links 715 and 713 would make it difficult and more costly to cross the two existing lines.

The second important variation from Route G would occur if the Robinson Summit substation site is developed over the North Steptoe site. This would be the selection of Links 242 and 244 over Links 243, 245, and 261. Route G would provide unnecessary additional distance to provide an interconnection to the North Steptoe substation site. If Robinson Summit is developed, and WPPP is developed in the future, a short SWIP line tap could be constructed to interconnect the two facilities. If WPPP is not developed the construction of additional miles of line now would be an unneeded cost and would cause additional environmental impacts. However, if the North Steptoe substation site is developed, IPCo recognizes that constructing Links 243, 245, and 261 would be prudent over Links 242 and 244.

Route G is selected as the utility preferred route by IPCo from Robinson Summit south to Dry Lake. Route G is the same as Route A (the environmentally preferred route) for this segment.

Additional documentation of IPCo's preferred route is in the SWIP project files.

Mileage of selectively committed mitigation for the environmentally, agency, and utility preferred routes are documented in Table 2-6.

Ely to Delta

LADWP, the constructing and operating agent for the crosstie routes from Ely to Delta selects the 230kV Corridor Route as the utility preferred alternative for the reasons stated in the discussion below. The main criteria used by LADWP for their selection of the utility preferred route was system reliability and construction and operation costs. They also considered environmental preferences and the political aspects of each route.

Engineering, material, and construction costs are directly related to the length of the transmission line. Although the Direct Route is nearly 24 miles shorter than the Cutoff Route, 30.7 miles shorter than the 230kV Corridor Route, and 80.9 miles shorter than the Southern Route, the military issues with the restricted air space and the uncertain environmental issues of the Direct Route cause this alternative to be the least desirable alternative.

The impacts to the MOAs have been discussed with the military and can be acceptably mitigated with the use of 105 feet maximum height towers in specified areas of concern. However, as pointed out above, the Direct Route crosses through restricted airspace as well. The military is opposed to any structures over 30 feet maximum height in the Restricted R-6405 Area. It would not be possible to meet the military's wishes and maintain economic or engineering feasibility, or NESC safety criteria.

LADWP preference to construct the proposed line along the 230kV Corridor Route best meets the mandate of the FLPMA to consolidate corridors to the degree possible, and also reflects LADWP's commitment to minimize environmental impacts whenever possible even at reasonable increased project costs. The reliability of the interconnected system would not be impacted by the operation of the proposed 230kV Corridor Route because of the substantial difference in capacity between the existing 230kV lines and the proposed SWIP crosstie line (Ely to Delta). In addition, this configuration would allow for routine line patrol and maintenance on both the 230kV system and the 500kV system simultaneously.

Also, because it is expected that the Midpoint to Dry Lake portion of the SWIP would be constructed before the WPPP or the Ely to Delta portion of the SWIP, and market access is closer to the existing 230kV lines, it is appropriate until the WPPP is built to locate a potential 500/230kV "marketplace" substation at Robinson Summit (also refer to page 2-49).

Additional documentation of LADWP's preferred route is in the SWIP project files.

Mileage of selectively committed mitigation for the environmentally, agency, and utility preferred routes are documented in Table 2-6.

Agency Preferred Routes

The various offices of BLM, representatives from the Humboldt National Forest, and Great Basin National Park met on June 18, 1991, to select a preferred routing alternative for the SWIP. Criteria considered and used to select the agencies' preference include:

- provide capacity for future utilities
- minimize new access roads needed for construction and operation
- consider public preferences expressed throughout the process
- avoid agricultural lands to the degree possible
- use existing utility and planning corridors
- minimize visual impacts

- minimize impacts to environmental resources (e.g., wildlife, cultural and historical resources)
- minimize conflicts with military airspace
- allow for good transmission system reliability

Midpoint to Dry Lake

The agency preferred route is a combination of Route A and Route G for the Midpoint to Dry Lake portion of the line. Following are the reasons for selecting these routes.

For the segment between Midpoint Substation and the Idaho-Nevada state line, Links 10, 20, 40, 41, 50, and 70 were selected. These link segments would parallel the Midpoint to Valmy 345kV transmission line to the Idaho - Nevada state line. Links 10, 20, 40, 41, and 70 would be on the west and north sides of the existing 345kV line. The assumed centerline of all these links could be easily accessed for construction and operation by existing roads, and would minimize impacts to agricultural uses. Link 20 would avoid direct conflicts with feed lots and several farm structures along Link 30.

From the Idaho-Nevada state line south to the proposed North Steptoe substation site, the agency preferred route would use Links 711, 714, 101, 715, 713, 110, 130, 150, 151, 200, 211, 212, 230, 241, and 242. Visual impacts would be reduced at the crossing of Salmon Falls Creek on Link 711. Link 101 would parallel the existing 138kV line to the west, and would minimize visual impacts from U.S. Highway 93. Links 713 and 110 cross U.S. Highway 93 in a location that would also minimize visual impacts. Link 130 parallels Upper Salmon to Wells the existing 138kV line, and would be the approximate location of the crossing of the existing 345kV line from the west side to the east side. Links 150 and 151 utilize the BLM "planning" corridor. Link 211 uses a better crossing of Interstate 80 than the existing designated BLM utility corridor. Links 212, 230, and 241 follow the BLM designated utility corridor from the Wells Resource Management Plan.

The remainder of the route south to Dry Lake is the same as the environmentally preferred route (refer to the previous section, Environmentally Preferred Alternative).

Mileage of selectively committed mitigation for the environmentally, agency, and utility preferred routes are documented in Table 2-6.

Ely to Delta

The agency preferred route for the Ely to Delta portion of the SWIP is the 230kV Corridor Route. Because the 230kV Corridor Route parallels two existing 230kV transmission lines for its entire length, this route best meets the agency criteria and Section 503 of FLPMA of utilizing existing utility corridors to the degree possible. The use of the existing utility corridor by the 230kV Corridor Route also complies with the direction in the BLM's House Range Resource Management Plan (RMP), the Warm Springs RMP, and the Schell

Management Framework Plan (MFP). Because the 230kV Corridor Route and the Cutoff Route have similar environmental impacts (refer to environmentally preferred route discussion above and Table 2-4) and this route best fulfills FLPMA's mandate to consolidate corridors where possible, the BLM favors the 230kV Corridor Route as the agencies' preferred routing alternative.

Also because of the comment letters received on the various SWIP newsletters and from comments received during the series of public meetings held during the EIS process (refer to Chapter 5), the BLM favors the placement of new lines in existing utility corridors to minimize adverse impacts and to maintain open space values in previously undeveloped areas. The Southern Route and Delta Direct Route were least favored by the public. The Cutoff Route was favored by some of the public because it would be in more remote areas and would not be seen by tourists and visitors to Great Basin National Park. However, the BLM favors avoiding the Cutoff Route, which would pass through areas that are largely undisturbed.

Concerns expressed about the Cutoff Route include resource impacts to biological, cultural, land uses, and visual resources. The public concerns about the 230kV Corridor Route include proximity to homes, health effects, land uses (e.g., agricultural lands near Silver Creek), property value impacts, and visual impacts from Great Basin National Park viewpoints. Because of concern for visual impacts to the park and to visitors driving to the park, Great Basin National Park favors the Cutoff Route (refer to Chapter 4).

Mileage of selectively committed mitigation for the environmentally, agency, and utility preferred routes are documented in the Mitigation Summary in Table 2-6.

CHAPTER 2

TABLES

TABLE 2-1

Design Characteristics of the 500kV Transmission Line

Line Length	
• Midpoint - Ely - Dry Lake	approximately 500-530 miles
• Ely - Delta	approximately 130-200 miles
Type of Structure	Steel-lattice, guyed towers Tubular-steel, H-frame towers Self-supporting, steel-lattice towers
Structure Height	Average 120 to 130 feet (range 90 to 160 feet)
Span Length	1,000 to 1,500 feet average ruling span
Number of Structures Per Mile	3 to 5
Right-of-Way Width	200 feet
Land Temporarily Disturbed:	
(1) Tower Base:	
• steel-lattice, guyed	200 X 200 feet (0.9 acre)
• tubular-steel, H-frame	200 X 200 feet (0.9 acre)
• self-supporting, steel-lattice	200 X 200 feet (0.9 acre)
(2) Wire-Pulling Sites	200 X 200 feet (0.9 acre) per 2 miles
(3) Wire-Splicing Sites	20 X 50 feet (0.02 acre) per 2 miles
(4) Construction Yards	400 X 540 feet (5 acres) per 20 to 30 miles
(5) Batch Plants	1 to 2 acres per 20 to 30 miles
Land Required Permanently:	
(1) Tower Base:	
• steel lattice guyed	125 X 125 feet approximate dimensions to guy anchors
• tubular steel H-frame	20 X 50 feet approximate dimension
• self-supporting steel lattice	50 X 50 feet approximate dimension
(2) Access Roads (average acres per mile of transmission line):	
• New Roads Required	2.0 acres
• Upgrade Existing Roads	1.5 acres
• Use Existing Roads	0.5 acre

Table 2-1 (continued)
Design Characteristics of the 500kV Transmission Line

Voltage	500,000 volts AC
Capacity	1200 MW
Circuit Configuration	Single circuit per structure, three-conductor bundle, (2 or 3 LADWP) per phase with three phases, horizontal configuration
Conductor Size	1781 kcmil (1.602 in. diameter) ACSR (Midpoint to Dry Lake) 2312 kcmil (1.802 in. diameter) ACSR (Ely to Delta)
Maximum Anticipated Electric Field at Edge of Right-of-Way	2.0kV/meter
Magnetic Field at Edge of Right-of-Way	200 milli-Gauss (mG)
NESC Standard for Ground Clearance of Conductor	31 feet minimum at 176° F
Tower Foundations	Drilled piers - cast-in-place concrete or pre-cast pads or inserts

TABLE 2-2

Design Characteristics of a Substation and Series Compensation Site

	SUBSTATIONS	SERIES COMPENSATION
Site Size (approx.)	80 acres	15-20 acres
Equipment	•transmission line takeoff structures •power circuit breakers •power transformers •switches equipment •buswork or bus conductor •control house	•electrical towers •series capacitor banks •switching equipment •bus conductors •control house
Access Road		
• right-of-way width	20′	20′
• road Surface	gravel	gravel
• grading	heavy road base to support larger equipment	
Power Source For Construction	Yes, 50 kilowatts	Yes, 50 kilowatts
Fire Protection Facilities	fire wall barriers for protection from transformers	
Building	2200 square feet	1500 square feet
Slopes/Drainage	0.5-1 percent	0.5-1 percent
Substation/Series Compensation Grounding	Use copper wire for personnel safety and grounding	Use copper wire for personnel safety and grounding

Table 2-2 (Continued)
Design Characteristics of a Substation and Series Compensation Site

	SUBSTATIONS	SERIES COMPENSATION
Land Temporarily Disturbed	Site specific, all work done within fenced area	Site specific, all work done within fenced area
Land Permanently Disturbed	Site specific grading and drainage, within enclosed area	Site specific grading and drainage, within enclosed area
Voltage	Multiple voltages, can change current from 500kV to 230kV	500kV single voltage

500kV Transmission Station
Electrical Requirements and Ratings

Transfer Capacity - 1500 MVA
Operating Voltage Range - 475-525kV, rms
Bus Capacity @ 525kV, 1650 Amps
Basic Insulation Levels (BIL) - 1500kV for bus support insulation
1800kV for bushings and switch gaps
Phase-to-phase clearances (metal-to-metal) 20-28 feet
Phase-to-ground clearances (metal-to-metal) 10-12 feet
Phase-to-ground clearances (personal Safety) 23 feet minimum
Phase-to-ground clearances (station roadways) 40 Feet minimum

TABLE 2-3

Construction Work Force and Equipment

Road Construction - 10 people (including maintenance)

equipment:
- 2 bulldozers (D-6 or D-8)
- 2 motor graders
- 2 pickup trucks
- 2 water trucks (for construction and maintenance)

Footing Installation - 20 people

equipment:
- 2 hole diggers
- 1 bulldozer (D-6)
- 1 truck (2 ton)
- 6 concrete trucks
- 6 hydro crane (15 ton)
- 2 pickup trucks
- 2 carry alls
- 1 batch plant
- 2 dump trucks
- 2 wagon drills

Structure Steel Haul - 10 people

equipment:
- 6 steel haul trucks
- 1 yard crane (heavy duty)
- 2 pickup trucks

Structure Assembly - 20 people

equipment:
- 4 carry alls
- 4 pickup trucks
- 4 cranes (rubber tired)
- 4 trucks (2 ton)

Table 2-3 (continued)
Construction Work Force and Equipment

Survey - 6 people

equipment:	1 helicopter 2 pickups

Structure Erection - 10 people

equipment:	2 cranes (60 ton) 2 pickup trucks 2 trucks (2 ton)

Conductoring - 40 people

equipment:	1 helicopter and fly ropes 3 drum pullers (1 light, 1 medium, 1 heavy) 2 splicing trucks 2 double-wheeled tensioners (1 light, 1 heavy) 6 wire reel trailers 2 diesel tractors 1 crane (2-4 ton) 1 sagging equipment 4 trucks (5 ton) 6 pickup trucks

Clean-up - 12 people

equipment:	2 pickup trucks 2 trucks (2 ton)

Road Rehabilitation - 4 people

equipment:	1 bulldozer (D-8) 2 motor graders 1 pickup truck

TOTAL PERSONNEL REQUIRED - 150*

*more than 1 contractor may be used simultaneously on difference line segments

TABLE 2-4

Route Comparison Table - Midpoint to Dry Lake Routes

	Route A*	Route B	Route C	Route D	Route E	Route F	Route G	Utility	Agency
Construction Access Levels (miles crossed)									
Agricultural lands	16.8	16.8	16.8	16.8	16.8	22.0	16.8	16.8	16.8
Existing access with spur roads	211.0	215.1	208.1	212.6	213.1	210.7	207.0	206.8	201.9
New access roads in flat (0-8%) terrain	152.5	130.1	151.0	155.6	134.2	157.0	163.2	162.7	165.3
New access roads in rolling (8-35%) terrain	92.4	109.1	91.4	89.6	111.4	89.4	85.1	84.8	86.1
New access roads in steep (35-65%) terrain	40.3	45.0	39.6	38.9	48.2	36.9	32.6	30.5	33.0
NATURAL ENVIRONMENT									
WILDLIFE (miles crossed)									
Desert tortoise habitat	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Bald eagle nesting	15.3	32.8	16.3	5.8	18.2	16.3	19.6	19.6	6.0
Peregrine falcon	0	23.1	0	0	23	0	0	0	0
Ferruginous hawk nest	1.3	1.4	1.3	1.3	1.3	1.3	1.4	1.4	1.3
Sage grouse leks or winter range	35.2	36.8	30.7	34.1	36.3	32.8	40.6	42.2	37.2
Crucial Elk habitat	0	0	0	0	0	0	0	0	0
Bighorn sheep habitat and movement corridor	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Crucial pronghorn habitat	24.1	7.2	16.2	34.9	18.6	16.5	39.7	39.7	43.2
Crictical Mule deer habitat	22.8	27.4	24.4	25.1	25.8	24.4	22.7	22.7	22.7
VEGETATION (miles crossed)									
Rare plants	1.3	1.3	1.3	1.3	1.3	4.2	1.3	1.3	1.3
Grasslands	109.1	97.3	96.3	97.3	116.3	110.2	97.8	98.6	104.8
Sage scrub	314.3	331.2	320.6	319.8	320.0	317.4	312.4	308.8	303.9
Mojave desert scrub	55.8	55.8	55.8	55.8	55.8	55.8	55.8	55.8	55.8
Woodland/mountain shrub/grasses	3.6	4.1	3.7	3.6	3.6	1.9	4.1	4.1	3.7
Riparian	3.2	3.2	3.7	5.3	3.3	3.8	4.8	4.5	5.1
EARTH RESOURCES (miles crossed, except as noted**)									
Prime/Unique farmland	21.4	21.2	21.2	21.4	21.4	32	21.1	21.1	21.1
High water erosion potential soils	39.0	53.1	44.4	35.5	48.6	47.8	36.4	36.4	37.3
High wind erosion potential soils	58.8	58.9	58.8	52.1	64.3	73.3	46.7	44.1	49.5
Flood hazard areas	6.2	1.2	2.1	3.1	4.1	1.8	3.1	3.1	3.1
Landslide hazard areas	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0
High paleontological sensitivity areas	23.8	38.6	35.3	21.9	25.5	37.4	30.6	19.4	20.5
Number of springs within 1/2 mile of route**	42	20	20	45	17	17	45	45	45
Number of perrenial streams crossed**	26	27	23	22	22	8	27	20	20

* Environmentally Preferred Route

Note: Totals for the Utility and Agency preferred routes vary from Route G because several different alternative routes segments are used (refer to p. 2-54).

TABLE 2-4, Route Comparison Table - Midpoint to Dry Lake Routes (continued)

	Route A*	Route B	Route C	Route D	Route E	Route F	Route G	Utility	Agency
HUMAN ENVIRONMENT									
LAND JURISDICTION (miles crossed)									
Bureau of Land Management	412.5	413.6	397.1	409.6	430.0	406.1	414.5	409.4	409.9
Forest Service	0	0	0	0	0	0	0	0	0
State	5.2	5.2	5.2	5.2	5.2	2.3	5.2	5.2	5.2
Private	95.2	97.3	104.6	98.7	88.5	115.6	85.3	87.0	88.0
Bureau of Reclamation	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
LAND USE (miles crossed, except as noted**)									
Miles within 1 mile of wilderness study areas	32.8	50.6	32.6	47.3	50.6	42.3	32.8	32.8	32.8
Approximate number of residences within 1 mile**	83	78	80	83	83	94	93	92	96
Miles parallel to H-frame 69kV transmission line	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
Miles parallel to H-frame 138kV transmission line	30.0	5.9	5.9	50.8	39.9	5.9	14.2	14.2	14.2
Miles parallel to H-frame 230kV transmission line	0	0	0	0	0	25.0	0	0	0
Miles parallel to 345kV transmission line	96.5	73.0	73.0	80.0	96.5	33.5	96.5	96.5	96.5
Miles parallel to 500kV transmission line	0	0	0	0	0	27.5	0	0	0
Miles within designated or planning utility corridor	341.8	358.1	335.4	328.7	312.9	387.9	343.5	340.1	320.0
Miles outside designated or planning utility corridor	136.1	116.4	136.1	151.3	175.7	136.4	161.5	161.5	183.1
Miles within Military Operating Area/Restricted Area	130.0	182.0	130.0	128.4	182.0	130.0	130.0	130.0	130.0
Agricultural lands	16.8	16.8	16.8	16.8	16.8	22.0	16.8	16.8	16.8
Range allotments	491.9	493.0	485.8	492.4	502.6	507.3	473.2	472.1	470.4
Mining claims	38.0	65.2	39.5	48.3	61.0	32.5	36.8	36.6	35.9
Number of tanks and wells along centerline**	11	10	11	12	11	10	10	10	10
Number of corrals along centerline**	0	1	0	0	1	0	1	1	1
VISUAL RESOURCES (miles crossed, except as noted**)									
Number of scenic highways and roads crossings**	1	1	1	1	1	2	1	1	1
Route visible from residences within 1 mile	65.7	52.3	57.1	61.9	64.1	56.9	59.9	59.9	63.1
Scenic quality Class A landscapes	0.9	0.9	0.9	0.9	0.9	5.0	0.5	0.5	0.5
VRM Class II landscapes	7.3	17.8	5.6	10.0	19.5	7.5	8.1	8.1	8.1
CULTURAL ENVIRONMENT									
CULTURAL RESOURCES (miles crossed, except as noted**)									
Number of historic sites within 1 mile of route**	53	46	50	68	46	54	61	61	58
Number of ethnohistoric sites within 1 mile of route**	13	16	14	12	15	16	14	14	14
Number of prehistoric sites within 1 mile of route**	388	413	408	430	386	510	399	388	381
Number of other cultural sites within 1 mile of route**	9	8	7	12	11	6	9	10	9
Miles through predicted high cultural sensitivity zones	18.4	19.3	17.2	20.5	18.4	11	20.6	20.5	18.4
Oregon Trail crossings**	1	1	1	1	1	1	1	1	1
California Immigrant Trail crossings**	3	1	2	3	2	3	2	3	3
Pony Express Trail crossings**	1	2	1	1	1	1	1	1	2

* Environmentally Preferred Route

Note: Totals for the Utility and Agency preferred routes vary from Route G because several different alternative routes segments are used (refer to p. 2-54).

Table 2-4, Route Comparison Table - Midpoint to Dry Lake Routes (continued)

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

	Route A*			Route B			Route C			Route D			Route E			Route F			Route G			Utility			Agency		
Impact Value	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low	High	Mod	Low
VISUAL RESOURCES	13.5	72.7	427.0	14.5	62.6	439.2	14.5	66.8	425.8	13.5	68.5	431.4	13.5	71.7	438.7	19.5	71.0	433.7	14.7	65.4	424.9	14.9	67.5	419.5	14.9	70.7	417.8
BIOLOGICAL RESOURCES	15.0	36.5	200.3	26.2	24.2	204.2	20.4	25.6	181.7	13.5	48.4	214.6	17.8	34.8	221.2	17.8	27.2	177.7	24.8	41.0	191.7	25.6	45.0	206.4	22.6	42.5	206.9
CULTURAL RESOURCES	6.8	104.0	131.6	7.4	117.4	142.2	5.9	106.1	138.5	6.6	124.8	140.2	7.8	122.2	134.5	8.2	103.9	143.2	7.3	105.0	132.5	7.5	102.1	261.9	7.0	109.0	132.2
LAND USE RESOURCES	0	64.1	88.8	0	75.2	129.6	0	64.1	88.9	0	64.1	87.6	0	75.5	129.5	0	64.1	101.2	0	64.1	88.4	0	63.8	71.0	0	63.8	71.0
EARTH RESOURCES	0	46.7	454.3	0	50.6	453.5	0	45.0	449.9	0	46.9	452.4	0	54.6	455.3	0	45.4	465.4	0	40.9	456.4	0	23.3	473.7	0	25.5	471.2

COMMENTS

Route A
- least impacts to ferruginous hawks
- least miles of riparian habitat crossed
- most residences within one mile
- crosses most miles of sage grouse habitat

Agency Preferred Route
- reduces visual impacts to U.S. Highway 93
- crosses most miles of crucial pronghorn habitat
- crosses high mileage of sage grouse habitat

Utility Preferred Route
- crosses least steep terrain
- reduces visual impacts to U.S. Highway 93
- crosses most miles of sage grouse leks

Route B
- crosses least miles of riparian habitat
- crosses most miles of bald eagle nesting areas
- least mileage visible from residences
- most mileage in high erosion potential soils

Route C
- crosses least miles of sage grouse habitat
- crosses least miles of BLM-administered lands
- crosses least miles of VRM Class II landscapes

Route D
- crosses most miles of riparian habitat
- least mileage in high erosion potential soils
- crosses high mileage of sage grouse habitat

Route E
- crosses most BLM-administered lands
- crosses high mileage of sage grouse habitat
- most impacts to peregrine falcon

Route F
- visual impacts to Hagerman Fossil Beds National Monument
- crosses most agricultural land
- crosses most private lands
- most cultural sites within one mile

Route G
- reduces visual impacts to U.S. Highway 93
- crosses least miles of private land
- crosses high mileage of crucial pronghorn habitat

	Route A*	Route B	Route C	Route D	Route E	Route F	Route G	Utility	Agency
ESTIMATED COST									
Estimated cost (x millions)	248	251	245	248	254	253	244	242	243
ROUTE LENGTH									
Total Route Mileage	513.0	516.1	506.9	513.5	523.7	524.0	504.7	503.1	501.6
ENVIRONMENTALLY PREFERRED ROUTE									
Ranking	1	4	2	2	2	5	3	3	3

* Environmentally Preferred Route

Note: Totals for the Utility and Agency preferred routes vary from Route G because several different alternative routes segments are used (refer to p. 2-54).

TABLE 2-5

Route Comparison Table - Ely to Delta Routes

	Direct Route	Cutoff Route**	230kV Corridor Route***	Southern Route
Construction Access Levels (miles crossed)				
Agricultural lands	0	0	2.1	0
Existing access with spur roads	35.0	39.9	59.1	55.7
New access roads in flat (0-8%) terrain	38.5	50.2	49.1	73.3
New access roads in rolling (8-35%) terrain	44.8	46.4	34.9	60.8
New access roads in steep (35-65%) terrain	17.5	17.4	15.6	21.2
NATURAL ENVIRONMENT				
WILDLIFE (miles crossed)				
Desert tortoise habitat	0	0	0	0
Bald eagle nesting	7.0	8.4	17.8	0
Peregrine falcon	0	0	0	0
Ferruginous hawk nest	0	0	4.5	10.1
Sage grouse leks or winter range	7.9	6.8	7.1	11.8
Crucial Elk habitat	0	0	5.5	0
Bighorn sheep habitat and movement corridor	0	0	0	0
Crucial pronghorn habitat	56.5	70.1	71.5	85.7
Crictical Mule deer habitat	12.3	11.0	14.1	12.5
VEGETATION (miles crossed)				
Rare plants	0	0	0	3.0
Grasslands	27.3	33.2	36.0	27.0
Sage scrub	83.3	100.9	104.5	155.0
Woodland/mountain shrub/grasses	0.6	0.5	3.5	7.0
Riparian	1.6	1.2	0.9	0.1
EARTH RESOURCES (miles crossed, except as noted*)				
Miles of high water erosion hazard soils crossed	14.4	22.1	31.2	17.1
Miles of high wind erosion hazard soils crossed	8.6	12.6	19.2	40.1
Number of springs within 1/2 mile of route*	2	2	6	12
Number of perrenial streams crossed*	0	0	4	3
Miles of flood hazard areas crossed	0	0	0	0
Miles of landslide hazard areas crossed	0	0	0.6	0
Areas of high paleontological sensitivity	55.5	55.6	64.9	84.7

** Environmentally Preferred Route
*** Utility and Agency Preferred Routes

Table 2-5, Route Comparison Table - Ely to Delta Routes (continued)

	Direct Route	Cutoff Route*	230kV Corridor Route**	Southern Route
HUMAN ENVIRONMENT				
LAND JURISDICTION (miles crossed)				
Bureau of Land Management	125.7	143.4	131.0	197.4
Forest Service	0	0	9.0	0
State	7.2	10.5	9.0	12.0
Private	0	0	11.8	1.6
LAND USE (miles crossed)				
Miles within 1 mile of wilderness study areas	0	13.8	12.3	14.1
Number of residences within 1 mile	0	2	26	0
Miles parallel to H-frame 69kV transmission line	0	0	34.5	0
Miles parallel to H-frame 230kV transmission line	11.3	72.3	159.8	18.5
Miles parallel to 500kV transmission line	12.8	20.0	20.0	31.0
Miles within designated or planning utility corridor	26.7	78.0	163.0	213.5
Miles outside designated or planning utility corridor	102.9	78.1	0	0
Miles within military operating area/Restricted Area	104.2	123.0	79.0	102.5
Agricultural lands	0	0	2.1	0.1
Prime/Unique farmlands	0	0	1.2	0
Range allotments	135.1	153.9	151.9	211.0
Mining claims	7.8	6.9	28.7	1.9
Number of tanks and wells along route*	1	0	1	0
Number of corrals along route*	0	0	0	0
VISUAL RESOURCES (miles crossed, except as noted*)				
Number of scenic highway or road crossings*	0	0	0	1
Mileage of route visible from residences within 1 mile	3.3	5.1	23.9	4.8
Scenic quality Class A landscapes crossed	0	4.2	4.2	0
VRM Class II landscapes crossed	0	0	0	2.0
CULTURAL ENVIRONMENT				
CULTURAL RESOURCES (miles crossed, except as noted*)				
Number of historic sites within 1 mile of route*	4	5	12	8
Number of ethnohistoric sites within 1 mile of route*	8	8	8	10
Number of prehistoric sites within 1 mile of route*	21	26	80	66
Number of other cultural sites within 1 mile of route*	1	1	1	1
Miles through predicted high cultural sensitivity zones	0.8	0.8	8.0	6.0
Pony Express Trail crossings*	1	1	0	0

** Environmentally Preferred Route
*** Utility and Agency Preferred Routes

Table 2-5, Route Comparison Table - Ely to Delta Routes (continued)

	Direct Route			Cutoff Route**			230kV Corridor Route***			Southern Route		
SUMMARY OF ENVIRONMENTAL CONSEQUENCES												
Impact Value	*High*	*Mod*	*Low*	*High*	*Mod*	*Low*	*High*	*Mod*	*Low*	*High*	*Mod*	*Low*
VISUAL RESOURCES	0.6	6.4	128.1	1.2	13.7	139.0	7.3	31.6	121.8	4.1	22.5	183.1
BIOLOGICAL RESOURCES	4.7	5.1	82.2	5.8	7.7	94.1	0.4	12.4	117.3	10.3	17.7	120.8
CULTURAL RESOURCES	4.6	19.1	16.3	4.6	32.7	21.4	5.5	39.7	44.5	11.6	41.7	48.0
LAND USE RESOURCES	0.0	65.3	38.9	0.0	0.0	123.0	0.0	0.0	80.9	0.0	0.0	103.2
EARTH RESOURCES	0.0	8.4	125.9	0.0	7.8	144.0	0.0	6.9	152.7	0.0	2.4	200.2

COMMENTS

Direct Route
- shortest route
- avoids visual impacts to Great Basin National Park
- crosses Leland-Harris spring complex
- crosses through R-6405 Restricted Area of UTTR
- crosses least aricultural lands
- crosses least miles of crucial pronghorn habitat

Cutoff Route**
- crosses least aricultural lands
- avoids visual impacts to Great Basin National Park
- crosses least mileage of sage grouse habitat

****Environmentally Preferred Route**
(and preferred by National Park Service)

230kV Corridor Route***
- best utilizes the existing utility corridor
- crosses most miles of bald eagle nesting areas
- crosses high mileage of crucial pronghorn habitat
- most residences within 1 mile
- crosses most national forest lands and private lands

Southern Route
- longest route and most miles in steep terrain
- highest overall environmental impacts
- crosses most BLM-administered lands
- least miles in military operating areas of UTTR

*****Agency and Utility Preferred Route**

	Direct Route	Cutoff Route**	230kV Corridor Route***	Southern Route
ESTIMATED COST				
Estimated cost (x million)	**66**	**72**	**77**	**100**
ROUTE LENGTH				
Total Route Mileage	**132.9**	**153.9**	**160.8**	**211.0**
ENVIRONMENTALLY PREFERRED ROUTE				
Ranking	**3**	**1**	**2**	**3**

TABLE 2-6
Summary of Selectively Committed Mitigation

Midpoint to Dry Lake Routes

	Mitigation Measures (miles)*											
Alternative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Route A**	140.5	202.5	204.0	165.4	102.7	158.3	0	17.4	334.0	92.1	89.6	2.2
Route B	142.2	201.2	212.1	181.3	113.8	179.9	0	11.9	335.4	109.5	93.6	5.3
Route C	138.2	195.1	199.3	158.5	102.7	155.8	0	12.7	328.7	97.2	87.7	1.9
Route D	140.6	232.8	223.0	179.1	102.7	162.4	0	13.5	364.0	94.8	90.4	0.7
Route E	142.2	221.3	226.8	199.1	113.8	183.0	0	13.1	358.3	109.7	92.9	4.3
Route F	141.7	193.1	198.0	161.4	91.1	160.4	27.4	18.8	347.5	106.3	86.1	1.6
Route G	135.5	201.7	195.8	162.2	102.7	159.6	0	12.7	313.7	97.0	84.9	2.3
Utility	131.2	204.9	196.2	164.2	102.7	160.4	0	12.7	319.2	99.0	83.6	1.4
Agency	135.2	199.3	193.3	159.9	102.7	161.3	0	12.7	312.5	97.0	86.5	2.3

Ely to Delta Routes

	Mitigation Measures (miles)*											
Alternative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Delta Direct	13.2	59.8	75.8	75.0	67.8	17.1	9.0	3.3	57.3	4.2	19.6	2.9
Cutoff **	23.5	83.4	86.2	83.5	15.5	43.3	16.6	3.9	85.1	15.4	18.0	2.9
230kV Corridor***	48.9	87.0	78.0	64.8	11.8	82.4	16.6	6.9	117.4	19.3	30.6	0
Southern	37.0	124.9	118.6	99.6	7.3	62.2	27.8	5.5	127.2	31.0	43.6	4.9

* Numbers indicate Selectively Committed Mitigation Measures described in Table 4-2
** Environmentally Preferred Route
*** Agency and Utility Preferred Route