2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

The "Proposed Action" is for BLM to approve a right-of-way (ROW) application filed by Sierra Pacific Power Company (SPPC) on December 17, 1998, to construct, operate, and maintain a new 345 kV transmission line on federal public land in north central Nevada. The transmission line would provide a new connection between the existing Falcon and Gonder substations. While the transmission line would be located primarily on public land managed by the BLM, it would also cross some private land. BLM's authority is limited to the portion that would cross federal public land. The BLM right-of-way grant would be for a term of 30 years and would be renewable. The Proposed Action also involves amendments to related BLM Resource Management Plans, which are discussed further in Chapter 5.

Five route alternatives are being considered as possible locations for the new 345 kV transmission line connecting the Falcon and Gonder substations.

- Crescent Valley (a) route alternative
- Crescent Valley (b) route alternative
- Pine Valley (a) route alternative
- Pine Valley (b) route alternative
- Buck Mountain route alternative

As described in detail in Section 2.2, these alternatives are made of different combinations of potential route segments (i.e., Segments A-J), as well as two re-route options being considered to avoid sensitive resources along Segment B (i.e., K and L re-routes).

Construction of this transmission line would also require expansion and upgrading of the existing Falcon and Gonder substations. The Falcon substation is located on land owned by SPPC. The Gonder substation is located on federal public land developed through an existing right-of-way grant issued to Mt. Wheeler Power, which would be amended to authorize the substation improvements. However, the existing right-of-way property boundary would not change, as it is sufficient to accommodate the Gonder substation expansion. Thus, the Mt. Wheeler right-of-way grant amendment would be for the additional facilities, but not for any additional land.

The BLM would be issuing a new right-of-way grant for those portions of the transmission line that cross federal public land (see Table 2-1 for the right-of-way length and acreage to be authorized by the BLM). However, this EIS analyzes the environmental consequences of the entire project (i.e., the transmission line and the substation improvements). It also examines the implications of the amendments to the related BLM Resource Management Plans in Chapter 5, as well as the No Action Alternative described below.

The end of this chapter provides a brief discussion of alternatives that were considered early in the planning process but were eliminated from further review.

TABLE 2-1: EXTENT OF RIGHT-OF-WAY ON FEDERAL PUBLIC LAND TO BE AUTHORIZED BY BLM

Route Alternative	Total BLM ROW Length (miles)	Total BLM ROW Area (acres)	ROW in BLM Battle Mtn Field Office (Shoshone-Eureka Planning Area)		ROW in BLM Elko Field Office (Elko Planning Area)		ROW in BLM Ely Field Office (Egan Planning Area)	
			miles	acres	miles	acres	miles	acres
Crescent Valley (a)	155.06	3,007	95.04	1,843	4.62	90	55.40	1,074
Crescent Valley (b)	155.52	3,016	95.50	1,852	4.62	90	55.40	1,074
Pine Valley (a)	145.75	2,827	53.89	1,045	36.46	707	55.40	1,074
Pine Valley (b)	146.21	2,836	54.35	1,054	36.46	707	55.40	1,074
Buck Mountain	135.96	2,637	2.21	43	44.13	856	89.61	1,738

The right-of-way (ROW) would be 160 feet wide in all cases. Note: A 12-foot wide, two-track, centerline travel route would be used for annual inspections and as-needed maintenance. Generally, it would be located next to the transmission line and within the right-of-way. Some exceptions could occur in steep and rough terrain; this would be clarified and mitigated appropriately through the COM Plan.

2.1 PROPOSED ACTION

2.1.1 OVERVIEW OF THE PROJECT

Sierra Pacific Power Company (SPPC) is proposing to construct a new 345 kV electric transmission line in north central Nevada. It would extend approximately 165-185 miles between the Falcon substation near Dunphy to the Gonder substation near Ely, as shown in Figure 2-1 and Figure ES-1 in the Executive Summary. The transmission line would be supported by approximately 725 to 820 tubular steel towers that would vary from 75 to 130 feet above ground level, depending on terrain (see Figure 2-2).

The project also involves expanding and installing additional equipment at the existing Falcon and Gonder substations. Figures 2-3, 2-4 & 2-5 show the substations as they currently exist, and Figures 2-6 and 2-7 show the proposed expansions. The Falcon substation would be expanded by approximately 3.2 acres and the Gonder substation by about 6.2 acres. SPPC owns the Falcon substation and the surrounding 40 acres of property. The Gonder substation is on federal public land that was previously developed by way of a right-of-way grant issued to Mt. Wheeler Power. It is expected that the existing right-of-way property boundary is large enough to accommodate the substation expansion. The Gonder substation facilities are owned and operated by Mt. Wheeler Power and SPPC in accordance with transmission service and operating agreements signed by both parties.

BLM would issue a right-of-way grant authorizing SPPC to construct, operate, and maintain the transmission line across federal public lands administered by the BLM. The new transmission line, towers, and substation facilities would be owned and maintained by SPPC, but the actual ownership of the land would not change. Approximately 80% of the transmission line would cross public lands, while 20% would cross privately owned lands. SPPC would pay BLM annual rental fees for use of the right-of-way on these public lands.

On private property, SPPC's necessity to obtain rights-of-way for this project would be granted by the State of Nevada Public Utilities Commission (PUC). Land ownership would not change, and private property owners would receive compensation for use of the right-of-way based on the market value of the land in the right-of-way and, potentially, on the loss of surrounding property value. SPPC would hire an independent real estate appraiser to estimate the market value of the property within the right-of-way and loss of surrounding property value, if any. After the appraisal, SPPC would present a written offer to the property owner and negotiate to reach a mutually agreeable and fair settlement.

If a mutual agreement cannot be achieved, SPPC and/or the property owner could seek resolution through the legal system. SPPC would have the right provided to public utilities under Nevada Revised

Statute (NRS) 37.010 to seek condemnation of private property in the right-of-way. Financial compensation and property tax issues are discussed further in Section 3.15, Social and Economic Values.

Table 2-2 provides a summary of project components. These components, as well as construction, operation, and maintenance practices, are explained in more detail on the following pages. Table 2-3 provides a summary of the mitigation measures that SPPC has developed and committed to in order to minimize environmental effects associated with the project.

TABLE 2-2: SUMMARY OF PROJECT COMPONENTS

RIGHT-OF-WAY	
North termination point	Falcon substation, approximately 8 miles north of Dunphy, NV
South termination point	Gonder substation, approximately 8 miles north of Ely, NV
Right-of-way length*	165 to 185 miles long (depending on selected route)
Right-of-way width	160 feet wide
Right-of-way acreage*	3,200 - 3,590 acres (depending on selected route)
Centerline travel route*	A 12-foot wide, two-track, dirt travel route next to the centerline would be used for annual inspections and for maintenance.
TRANSMISSION LINE FACILITIES	
Voltage	345 kV AC (alternating current)
Conductors	Double-bundled 954 kcmil aluminum conductor steel reinforced; approximate diameter per conductor is 1.2 inches.
Minimum conductor distance from ground	26 feet at the maximum operating temperature.
Tower structures	Two-pole tubular steel H-frame tangent towers and three-pole guyed angle/ transposition towers. Natural-weathered steel or rust-color finish.
Area required for towers	Two 3-foot diameter poles 22 feet apart for a tangent tower, and three 3-foot diameter poles 30 feet apart for angle and transposition towers. Angle and transposition towers also have 10 to 12 buried anchors spaced 50 to 100 feet from the towers.
Average distance between towers	1,200 feet
Total number of towers	725 to 820 (approximately 680 to 795 H-frame towers and 25 to 45 angle / transposition towers), depending on route alternative.
SUBSTATION EQUIPMENT ADDITIONS	
Falcon substation*	Proposed expansion: approximately 3.2 additional acres. Proposed equipment: transmission line switching equipment consisting of three 345 kV circuit breakers and two 345 kV reactors to control line voltage.
Gonder substation*	Proposed expansion: approximately 6.2 additional acres. Proposed equipment: two 230 kV power circuit breakers, two 345/230 kV, 300 MVA transformers, two 345 kV power circuit breakers, two 345 kV reactors to control line voltage, and a new control building.

**Approximately 80% of the right-of-way and centerline travel route would be on federal public land managed by the BLM, while the remaining 20% would be on privately-owned lands. The Falcon substation and surrounding 40 acres are owned by SPPC. The Gonder substation is on federal public land developed by way of an existing right-of-way grant issued to Mt. Wheeler Power, which would be amended separately to authorize the equipment upgrades. However, the existing Mt. Wheeler right-of-way property boundary would not need to change, as it is sufficient to accommodate the Gonder substation expansion.*

TRANSMISSION LINES AND TOWERS

SPPC proposes using mainly tubular steel H-frame tangent towers to support the proposed transmission lines (see Figure 2-2). The tower structures would consist of two steel poles embedded in the ground and connected by a horizontal cross beams (creating the "H" shape) and diagonal cross braces. The horizontal cross beam supports the insulators and conductors. The towers would vary in height from 75 to 130 feet, depending on terrain. On flat terrain, a typical span between towers would be approximately

1,200 feet. In mountainous terrain, spans could range from 200 to over 2,000 feet. The H-frame tangent towers are used in areas where the transmission line follows a straight alignment.

Where the transmission line changes direction, three-pole guyed angle towers would be used instead of H-frame towers. Also, to reduce electrical loss over this long line, three transposition towers would be required to rotate phases every 40 to 50 miles. Transposition towers are angle towers with cross phasing connections that are created by changing the orientation of the conductors. Approximately 25 to 45 three-pole angle towers and 680 to 795 H-frame towers would be needed. The exact number of towers would depend on the route alternative selected and terrain conditions.

The steel poles would be bare metal that would naturally weather to form a protective rust-colored coating. This finish was chosen to blend with the colors of existing wood and steel lines and areas with dark vegetation, such as pinyon pine and juniper woodlands.

Each tower would support three double bundles (a total of six) non-specular (non-reflecting), stranded aluminum, steel reinforced conductors. Each conductor would be 954 kcmil (cable cross section area in thousand circular mils) with an approximate diameter of 1.2 inches. Minimum conductor ground clearance would be 26 feet at the maximum operating temperature. Two shield wires would be installed at the top of the towers. These are stranded steel wires 3/8 inches in diameter that protect the conductors from lightning strikes. Every structure would be electrically grounded with copper wire and buried ground rods. The line would meet or exceed the requirements of the latest version of the National Electric Safety Code.

Table 2-3 identifies mitigation measures that SPPC has committed to as part of the proposed project in order to reduce environmental impacts. Other mitigation measures described in subsequent chapters were identified during the environmental review process and would be recommended or required in addition to the following measures.

SUBSTATION FACILITIES

Prior to connecting and energizing the transmission line, the Falcon and Gonder substation fence boundaries would be expanded and new equipment installed. The new equipment at the Falcon substation would include line switching equipment and two reactors to control voltage. The new equipment at the Gonder substation would include two 345/230 kV 300 MVA transformers, line switching equipment, and two reactors to control voltage.

CONSTRUCTION METHODS

Access Roads

Project construction would require the use of a number of existing access roads to transport materials and equipment to and from the transmission line corridor, substations, and material yards. In some areas, existing dirt roads would require widening or other improvements to accommodate the construction equipment. SPPC would coordinate with responsible agencies and property owners to acquire the appropriate approvals (e.g., temporary use permits) to use and, in some cases, to improve these access roads.

TABLE 2-3: APPLICANT-COMMITTED MITIGATION MEASURES

SPPC-COMMITTED MITIGATION MEASURES TO REDUCE ENVIRONMENTAL IMPACTS	
Tower design	The H-frame tower was selected instead of a lattice frame tower-type to minimize impacts to sensitive wildlife because this type of tower provides fewer opportunities for perching and nesting by raptors and corvids. This tower also closely matches the design of existing lower voltage power lines in the area, which should reduce the visual contrast when located near these other existing lines. Also, this type of tower minimizes ground disturbance and land area required, has a better public safety record (i.e., discourages climbing), and has fewer maintenance requirements compared to the lattice tower type.
Tower material/color	Tower components would be made of steel, which would weather naturally to a rust color to blend in with the landscape and existing wood pole lines, thereby minimizing visual impact.
Tower placement	To the extent practical, towers would be strategically located during design to avoid sensitive environmental areas and minimize visual impacts.
Conductors	Aluminum conductors would be blasted to provide a non-specular finish to reduce reflectivity.
Use of existing access roads	To the extent feasible, existing access roads would be used by construction vehicles and equipment to access the transmission line ROW and substations.
Vegetation clearance	Hydro-axing or mowing, instead of grading, would be the primary technique used to clear vegetation where needed to provide access for construction vehicles and equipment. This reduces surface disturbance and preserves much of the stem and root systems, which allows vegetation to grow back.
Tree removal	In forested areas, tree removal would be selective and not include every tree in the ROW. Generally, trees over 15 feet in height within 55 feet of the centerline would be removed to provide the required electrical line clearance.
Use of helicopters	Helicopters would be used to string conductor sock line during construction. This helps reduce disturbance to environmental resources associated with ground-based stringing equipment. In some environmentally sensitive or difficult to access areas, helicopters would also be used to fly in and set the transmission line towers. This helps reduce disturbance associated with bringing some of the long material transport trucks and large equipment into these areas. However, some equipment will still need to be transported to every tower site for excavation and backfill and wire clipping. What is eliminated with helicopter construction is the material transport trucks, up to 130' long, and the 100-ton cranes required to set the structures. Bucket trucks and track hoes will still need to access sites for construction.
Post-construction reclamation	After construction, SPPC would reclaim and revegetate the centerline travel route, spur roads and other construction areas as described in this chapter and in the Reclamation Plan in Appendix E. SPPC would restore existing access roads to a pre-construction condition unless an upgraded road is requested by the property owners or the responsible agency.
Annual line inspections	About once a year, two SPPC line inspectors would ride ATVs along the centerline travel route to inspect the transmission line. Use of ATVs would help reduce vegetation disturbance and limit the long-term centerline travel route disturbance area to approximately a maximum 12-foot wide two-track path.

Figure 2-1: Project Vicinity Map

FIGURE 2-2: TOWER STRUCTURES

FIGURE 2-3: PHOTOS OF FALCON AND GONDER SUBSTATIONS

FIGURE 2-4: SITE PLAN OF EXISTING FALCON SUBSTATION

FIGURE 2-5: SITE PLAN OF EXISTING GONDER SUBSTATION

FIGURE 2-6: SITE PLAN OF PROPOSED FALCON SUBSTATION

FIGURE 2-7: SITE PLAN OF PROPOSED GONDER SUBSTATION

In this document, "access roads" are defined as any existing road that might be used to access the construction sites from the nearest state highway. The point of access would be where such roads join a numbered state highway. There are three types of existing access roads that would be used to construct the project:

- **Paved roads:** Paved roads see frequent use by local communities and, with a hard surface, should be accessible under any conditions by construction equipment.

- **Dirt roads that would not require improvements:** These are typically well-maintained county roads that see frequent use and should be accessible under most weather conditions. Under adverse weather conditions, some of these roads could require maintenance, typically grading, to keep the road in an acceptable condition for both construction and non-construction users, or after construction to restore the road to a pre-construction condition.

- **Dirt roads that may require improvements:** The types of improvements that may be required on some dirt roads (e.g., narrow, two-track roads) to provide construction vehicle and equipment access may include one or more of the following:

    - ***Curve widening*** – To accommodate the turning radius of 130-foot long trucks.
    - ***Road widening*** – To accommodate trucks and equipment, access roads requiring improvements would be widened to 12 to 15 feet wide in most areas. In some places, the roads would need to be widened to 30 feet to allow for truck passing areas, turnouts, curve widening, and room for cut-and-fill slopes in steep terrain. Except in forested areas or steep terrain, the preferred method of vegetation removal would most likely be mowing. A lawnmower-type machine would be used to cut brush and other vegetation down to about 3 to 6 inches above grade, leaving the stems and root systems intact to allow for regrowth of vegetation. Therefore, surface disturbance would be mainly from pneumatic tire pressure. Subsurface disturbance usually does not occur with this process. In areas with rough terrain and steep slopes, grading of topsoil may be required to widen access roads and for cut-and-fill activities. Blading, which involves use of a bulldozer to move large rocks and soil, usually would be used only in steep terrain as needed, as it involves increased time, costs, and reclamation efforts.
    - ***Cut-and-fill on side slopes*** – To provide a safe minimum width for equipment access on steep slopes, a balanced cut-and-fill procedure would be used. This would avoid the need to import or export material and simplify post-construction recontouring.
    - ***Surface improvements*** – Some of the existing access roads are in poor shape and will not allow access by construction equipment without surface improvements. Generally, the problem areas have rocky, loose, or saturated surface soils. In rocky areas, the road surfaces would need to be graded and the rocks pushed to the side of the road. In loose soil, the surface is unable to support heavy construction equipment, and these areas would require grading, moisture conditioning, and compaction. In saturated soil areas, grading, compaction, and bridging with imported material (< 6-inch rock) may be required to promote drainage and provide a solid surface.
    - ***Natural drainage crossings*** – Depending on the time of year and weather conditions, various methods would be used to cross the drainages. Smaller drainages would be rock armored and graded to provide vehicle access. Larger drainages may require culverts or bridges.

- ***Tree removal and trimming*** – In forested areas, trees that have fallen onto or encroach into the minimum road width of approximately 12 to 15 feet would need to be trimmed or removed to allow access. This effort also would support curve and road widening improvements.

Table 2-4 estimates the types and lengths of existing access roads that would be used during construction. Estimates of the extent of temporary disturbance associated with the access road improvements are based on two assumptions: (1) the access roads would require improvements along their entire length, and (2) they would be widened to 30 feet. This reflects a worst-case estimate for purposes of this EIS. However, in most areas, the access roads would be widened to only 12 to 15 feet. Thus, the actual area of disturbance is expected to be far less. More detailed analysis of the access road improvements would be completed as part of the Construction, Operation, and Maintenance (COM) Plan.

Spur Roads

In areas where an existing access road closely parallels the transmission line route, SPPC could use it to avoid clearing a new centerline travel route (see Figure 2-8). However, new 30-foot wide "spur roads" would be needed temporarily to transport construction equipment from the existing access road to the tower locations. The length of new spur roads needed is estimated in Tables 2-5 and 2-6. Spur roads would be contained largely within the 500-foot transmission line study corridor and would be reclaimed by SPPC after construction.

TABLE 2-4: EXISTING ACCESS ROADS TO BE USED DURING CONSTRUCTION

EXISTING ACCESS ROADS BY SEGMENT					
Segment	Road Type (miles)			Total miles of access roads	Maximum Area of Temporary Disturbance from Access Road Improvements* (acres)
	Paved Roads	Dirt Roads (no improvements)	Dirt Roads (that may require improvements)		
A	2.34	5.59	31.93	39.86	116.1
B**	4.25	66.62	67.01	137.88	243.7
C		32.57	30.89	63.45	112.3
D		11.28		11.28	0
E	35.68	167.82	87.95	291.45	319.8
F		3.43	17.02	20.46	61.9
G		31.12	18.79	49.91	68.3
H	3.00	7.85	21.08	31.93	76.6
I	2.30	25.37	52.19	79.86	189.8
J	17.92	6.63	93.51	118.06	340.0
Route Alternatives					
Crescent Valley					
(a)	26.82	138.76	280.45	446.03	1019.8
(b)	29.81	115.49	282.74	428.05	1028.1
Pine Valley					
(a)	22.56	115.98	244.33	382.88	888.5
(b)	25.56	92.72	246.62	364.89	896.8
Buck Mountain					
	55.95	212.60	244.28	512.82	888.3

* *Estimated area of temporary disturbance is based on a worst-case assumption that dirt access roads that may require improvements would be widened to 30 ft. However, in most areas, widening to 12 to 15 feet would be sufficient to provide access for construction trucks and equipment. Thus, actual disturbance is expected to be far less.*

** *Assumes Segment B would follow the L re-route.*

Segments and route alternatives are described in Section 2.2

Source: EDAW GIS analysis of SPPC access road data (2000).

FIGURE 2-8: CONSTRUCTION METHODS

TABLE 2-5: TEMPORARY DISTURBANCE AREA ESTIMATE

Segment	Total (miles)	Existing Access Roads [1] (miles)	Temporary Centerline Travel Route [2] (miles)	Temporary New Spur Road [3] (est. miles)	Towers [4]		Estimated Total Temporary Disturbance [5] (acres)
					Angle (3-pole) (est. #)	H-frame (2-pole) (est. #)	
A	16.71	31.93	1.78	4.36	9	65	197.1
B*	62.11	67.01	30.30	6.63	19	254	584.5
C	35.73	30.89	35.73		4	153	355.5
D	19.52		19.52		2	84	132.7
E	74.76	87.95	74.76		7	322	827.5
F	16.81	17.02	16.81		4	70	178.0
G	19.90	18.79	19.90		2	86	203.6
H	20.36	21.08	20.36		3	87	215.8
I	30.32	52.19	23.32	2.92	3	130	381.0
J	40.08	93.51	40.08		6	170	614.0
Route Alternatives							
Crescent Valley							
(a)	185.93	280.45	132.18	13.90	43	775	2268.5
(b)	186.39	282.74	132.64	13.90	44	776	2280.7
Pine Valley							
(a)	179.06	244.33	157.12	7.27	30	758	2172.2
(b)	179.52	246.62	157.58	7.27	31	759	2184.4
Buck Mountain							
	167.28	244.28	152.34	4.36	26	710	2104.5

* *Assumes Segment B follows the l-re-route*

1 *Estimates length of existing dirt access roads that may require improvements (including parallel access roads). Assumes maximum 30 ft width as worst case-scenario.*

2 *Estimates maximum 30-foot wide temporary centerline travel route for construction along entire route except where parallel access roads would be used.*

3 *Temporary spur roads (maximum 30-foot width) would be constructed from parallel access roads to tower locations at an average 1200-foot intervals along centerline travel route. (Estimated spur lengths: Seg A = 350 ft / Seg B = 250 ft / Seg I = 500 ft.) Maximum temporary disturbance calculated as 30 ft corridor width for each spur road.*

4 *Towers estimated at an average of 1200-foot intervals along route. Estimated construction disturbance for H-frame towers = 0.7 acre/tower; Angle towers = 1.5 acre/tower.*

5 *Estimated maximum total area of temporary construction disturbance includes all of the above, plus 5 material yards (average size of 20 acres/yard), plus 3.7-acre Falcon substation expansion and 6.7-acre Gonder substation expansion. (Substation area includes 0.5 acres for temporary stockpiling of top soil and organic materials at each site.)*

Source: EDAW GIS using Stantec (2000) database

Right-of-Way (ROW) Preparation

In areas where an existing parallel access road is not available (i.e., all segments except for parts of A, B, and I), a "centerline travel route" would be needed to construct the transmission line (see Figure 2-8). The average width of the centerline travel route would be 12 to 15 feet. However, in some places, it would need to be widened to 30 feet to allow for construction vehicle passing areas. In most instances, the centerline travel route would be alongside the transmission line. However, in some locations, hillsides, rough terrain, and avoidance of sensitive environmental resources may require that the travel route extend outside of the 160-foot right-of-way. This would be authorized by BLM through a temporary use permit or through ingress and egress provisions in the right-of-way grant.

TABLE 2-6: LONG-TERM DISTURBANCE AREA ESTIMATE (OVER LIFE OF THE PROJECT)

Segment	Total Length (miles)	Centerline Travel Route [1] (miles)	Towers [2]		Estimated Total Long-Term Disturbance [3] (acres)
			Angle (3-pole) (est. #)	H-frame (2-pole) (est. #)	
A	16.71	16.71	9	65	24.3
B*	62.11	62.11	19	254	90.4
C	35.73	35.73	4	153	52.0
D	19.52	19.52	2	84	28.4
E	74.76	74.76	7	322	108.9
F	16.81	16.81	4	70	24.5
G	19.90	19.90	2	86	29.0
H	20.36	20.36	3	87	29.6
I	30.32	30.32	3	130	44.1
J	40.08	40.08	6	170	58.4
Route Alternatives					
Crescent Valley					
(a)	185.93	185.93	43	775	280.1
(b)	186.39	186.39	44	776	280.8
Pine Valley					
(a)	179.06	179.06	30	758	270.1
(b)	179.52	179.52	31	759	270.8
Buck Mountain					
	167.28	167.28	26	710	253.0

* *Assumes Segment B follows the L re-route.*

1 *Assumes a 12-foot wide two-track dirt travel route along centerline of entire alignment for the purpose on conducting routine inspections.*

2 *Towers estimated at 1200 foot intervals (on average) along the route. Estimated long-term disturbance calculated for 3-foot diameter poles. Total disturbance per H-frame tower = 14.12 square feet; per Angle tower = 21.21square feet.*

3 *Estimated maximum total long-term disturbance includes all of the above, plus 3.2 acres for the Falcon substation expansion and 6.2 acres for the Gonder substation expansion.*

Source: EDAW GIS using Stantec (2000) database

Where necessary, vegetation within the centerline travel route would be cleared primarily by hydro-axing (using a type of mowing machine). In rough terrain, side slopes would be cut and filled using grading equipment, and rocks and other obstructions would be bladed to allow for passage of rubber-tired vehicles. If rocks cannot be removed with heavy equipment, they may need to be blasted with explosives. Explosives would be used mainly for tower hole excavation.

In forested areas, trees would be removed within the centerline travel route to allow construction vehicles access and as needed for electrical clearance under and around the transmission lines and towers. Tree removal would be selective and would not include every tree in the 160-foot wide right-of-way. Generally, all trees over 15 feet in height within 55 feet of the centerline would be removed to provide the required line clearance. Tree trimming would be conducted to allow for a ten-year growth envelope.

Tables 2-5 and 2-6 provide estimates of the amount of temporary and long-term disturbance, respectively, that would be associated with the project. The temporary disturbance estimates reflect a worst-case assumption that a 30-foot wide centerline travel route would need to be cleared for construction purposes (although as explained above, the average width would be 12 to 15 feet in most places). After construction, SPPC would reclaim and revegetate the spur roads and centerline travel route, as described in Appendix E, Reclamation Plan.

However, about once a year, two SPPC inspectors on small all-terrain vehicles (ATVs) would use a part of the centerline travel route to inspect the transmission line. Over time, this ATV activity is expected to create a 12-foot wide two-track path next to the transmission line. Table 2-6 estimates the amount of acreage that would be disturbed over the life of the project from this 12-foot wide travel route and other features. Access to this travel route by larger vehicles would not normally be required, unless problems are encountered. Maintenance and emergency access procedures would be defined in the COM Plan.

500-foot Wide Study Corridor

Since some construction activities cannot be contained within the 160-foot wide right-of-way, BLM and SPPC delineated a 500-foot wide study corridor to ensure that potentially impacted wildlife, vegetation, cultural resources, and other features would be identified during field surveys and considered in this EIS analysis. The 500-foot study corridor is also intended to provide the flexibility needed to allow contractors room to maneuver around sensitive resources while constructing the transmission line. The majority of construction activities would occur within the 500-foot study corridor and on existing access roads. These construction activities are part of the Proposed Action and their impacts are analyzed in Chapter 3.

In a few extremely rugged locations, the terrain may force travel outside the 500-foot wide study corridor to get around impassable features. If this situation occurs, proper approvals would be acquired to work outside the 500-foot wide study corridor. Detailed information on these areas and approval protocols would be provided in the COM Plan.

Tower Foundation Excavation

The tubular steel H-framed tangent towers require two excavations approximately 4 to 6 feet in diameter and 10 to 15 feet deep. The excavations would be placed 22 feet apart. The three-pole angle and transposition towers require three excavations, roughly the same size, but 30 feet apart. Angle and transposition towers also have 10 to 12 buried anchors that require 12- to 15-foot deep excavations spaced 50 to 100 feet out from the towers. Excavation hole diameters would be larger in loose or rocky soils. Excavations would be augured wherever possible. Drilling, blasting, and excavation with backhoes is an alternative excavation method in rocky soils that cannot be efficiently augured.

In steep terrain (over a 5% slope), grading would be required to create level pads for excavation equipment and tower installation. The amount of grading would depend on the degree of slope and type and height of tower. To provide correct excavation depths at each tower site, a level pad may remain around some structures located on cross slopes.

Tower Assembly and Erection

The disturbance area required around each tower site for the equipment pads, excavations, tower assembly, and erection activities should not exceed 0.7 acre for each H-frame tower and 1.5 acres for each three-pole angle tower and transposition tower. Most of this disturbance for tower construction would be kept within the 500-foot wide study corridor. Construction activities outside of the 160-foot wide ROW would be authorized by BLM through a temporary use permit or other approval.

Tower components would be delivered from material yards and assembled into a complete structure for erection at each tower site. Erection crews would follow the assembly crews and set the completed H-frame tower in the excavated holes using a large mobile crane. Depending on soil conditions, compacted native soil, imported backfill, or concrete would be used to fill the space between the tower poles and sides of the excavations.

In places where the soil is poor or where helicopters are used for tower installation, concrete backfill may be required. In these cases, H-frame structures would require two temporary above-ground anchors for approximately 24 hours to keep the structure aligned and plumb while the concrete sets. Although the contractor would determine the exact method, the temporary anchorage method could involve attaching four wires between the top of the structures to two concrete blocks set on the ground on either side of the structure. To provide the proper angle on the temporary guy wires, the concrete blocks would be set about 300 feet either side of the structure, which falls outside the 0.7 acre disturbance area. The only ground disturbance associated with the concrete blocks would be the travel out and back to set and remove the blocks. After the concrete backfill hardens, the concrete blocks and wires would be removed.

Each three-pole angle and transposition tower would require ten to twelve permanent buried anchors. Every tower would be electrically grounded by connecting the tower to ground wires and buried ground rods. In good soil, one 8-foot ground rod next to the tower is sufficient; in poor soil, additional ground rods and wire may need to be buried.

Helicopter Installation in Rough Terrain

Helicopters would likely be used to install towers in areas with rough terrain, such as in parts of Segments B, C, E, F, I, and J. In these areas, temporary helicopter fly yards would be located about every 8 miles in the right-of-way, or on an access road or spur road. These yards would also be restored or revegetated as described in Appendix E, Reclamation Plan.

Conductor and Shield Wire Installation

The installation of conductors and shield wires is a three-step process (see Figure 2-9):

1. Install sock line (wire pull ropes) by helicopter.
2. Pull conductors and shield wires with ground-based equipment.
3. Correctly sag and tension the conductors and shield wires and connect them to the towers.

This three-step process would be performed from wire setup sites spaced approximately every 4 miles to connect approximately 15 to 20 structures at a time. The number of wire setup sites would depend on terrain and equipment capacities. Most of these sites would be located within the 160-foot ROW and be approximately 500 feet in length. Wire setup sites located at line angle points would fall outside the 160-foot ROW, and may fall outside the 500-foot wide study corridor due to personnel and equipment safety requirements. These sites would be identified and evaluated in the COM Plan. Construction activities outside of the 160-foot wide ROW would be authorized by BLM through a temporary use permit or other approval.

Installation of the sock line (wire pull ropes) would be done by helicopter. The sock line is the first small pulling wire spooled out from a large motorized drum at a wire setup site and threaded through travelers or pulleys on each tower to another wire setup site called the pulling site. This small wire is then attached to a larger wire that is pulled back through the travelers by stationary ground-based equipment to the conductor and shield wire reels located at the first wire setup site. Then the conductors and shieldwires are pulled by the larger wire through each tower to the pulling site. When the conductors and shield wires reach the pulling site, they are correctly sagged and tensioned, then permanently clipped into the clamps at each tower.

Helicopter fly yards (i.e., places where the helicopters land to pick up sock line or other materials) would be needed about every 10 miles along the construction corridor. The locations of these fly yards and any associated impacts and mitigation measures would be identified in the COM Plan.

Material Yards

It is anticipated that four or five material yards would be needed to construct the project, ranging in size from 10 to 40 acres with an average size of 20 acres. Potential material yard sites are shown in Figure 2-

10. If the construction contractor requests additional material yards to improve efficiency, proper approvals would be acquired.

Material yards would serve as storage and handling sites, and maintenance yards. These yards would contain construction material, equipment, tools, fuel, service trucks, spare parts, vehicles owned by the construction labor, and possibly portable office space. Most equipment would be serviced at these locations, but damaged equipment may need to be repaired at the breakdown location.

Most of the potential material yard locations shown in Figure 2-10 are sites that are or have been used for agricultural or mining activities:

- **Yard #1**, near Dunphy, would be on an industrial site with a rail siding.
- **Yard #2** would be on mine property on one or both sides of Highway 306.
- **Yard #3** would be located on agricultural property along the northern part of Highway 278.

- **Yard #4** would be on agricultural land in Diamond Valley near the southern end of Highway 278.
- **Yard #5** is the only one on BLM land, but the yard would be located within a mining complex on previously disturbed ground.
- **Yard #6**, which is near the Gonder substation and has rail service, contains mostly rabbitbrush and sagebrush. The contractor would clear and reseed the site after construction.

The material yards would be restored to the condition they were in prior to the start of construction or as otherwise agreed upon by SPPC and the property owner. SPPC would not leave the sites in a condition that would cause nuisance dust or weed infestation. If unspecified by the owner, reclamation would be in accordance with the COM Plan.

Right-of-Way Cleanup

Crews would follow the conductor and shield wire installation to clean up all surplus material, equipment, construction debris, etc. Tree trimmings and removed vegetation would be shredded, chipped, and/or spread within the ROW as mulch/erosion control or disposed of off-site. Rocks excavated during the construction of access roads and foundation excavations would be used to recontour and reclaim disturbed areas, distributed within the ROW, and incorporated as backfill on roads and around the towers as needed.

Post-Construction Reclamation

Access Roads

After construction, SPPC would restore existing dirt roads that required improvements to a condition as good or better than they were in before construction. Erosion control would be performed on steep slopes. Depending on the landowner and agency preference, culverts and bridges could be left in place.

If needed, SPPC could mitigate adverse impacts by recontouring back to the original slope, decompacting surface soils, reseeding with approved seed mixed at pre-determined application rates, and other techniques. The precise level of reclamation needed would be determined by the BLM based on environmental impacts identified in this EIS, pre-construction survey findings, and landowner preference and included in the COM Plan.

FIGURE 2-9: STRINGING METHODS

FIGURE 2-10: MATERIAL YARDS

Spur Roads and Centerline Travel Route

As described in Appendix E, Reclamation Plan, SPPC would recontour, decompact, and reseed new spur roads and areas disturbed by construction inside the 500-foot study corridor that would not be required for project operation and maintenance. BLM-approved seed mixes would be used. The Reclamation Plan would ultimately become part of the COM Plan and provide detailed mitigation measures for affected special-status species, natural plant communities, and wetlands, as required.

Falcon Substation Equipment Additions

New switching equipment would include three 345 kV power circuit breakers and two 345 kV reactors to control voltage. One reactor would be a fixed reactor continuously connected to the line. The second reactor would be a switched reactor utilized during light loading conditions or during line switching. The existing substation pad and fenced area would be expanded approximately 3.2 acres to the south and east. Painted tubular steel structures would be used to support equipment, conductors, and switches at a safe height to permit personnel, vehicles, and equipment to operate and maintain the substation equipment. The new structures would be painted light tan to match existing structures.

Gonder Substation Equipment Additions

The Gonder substation is owned and operated by both SPPC and Mt. Wheeler Power. The substation pad and fenced area would require an approximate 6.2-acre expansion to the north. New 230 kV buswork would be required to connect to the existing 230 kV ring bus. New equipment includes two 230 kV power circuit breakers, two 345/230 kV 300 MVA transformers, two 345 kV power circuit breakers, and two 345 kV reactors to control voltage. One reactor would be a fixed reactor continuously connected to the line. The second reactor would be a switched reactor utilized during light loading conditions on the line or during line switching. A new control building would be erected. Galvanized or painted tubular steel structures would be used to support equipment and conductors, and switches at a safe height to permit personnel, vehicles, and equipment to operate and maintain the substation equipment. The new structures and control building would be galvanized or painted a light gray color to match existing structures.

Construction Activities at Substations

In the substation expansion areas, topsoil and organic material would be cleared and stockpiled; the site would then be graded and compacted to provide a construction surface for the proposed equipment. The surface would be sloped and other features, such as ditches and culverts, would be installed for adequate drainage. The stockpiled topsoil and organic material would be placed on cut-and-fill slopes. Fencing would be installed around the perimeter of the substation for security and to restrict unauthorized persons and wildlife from entering the substation.

Reinforced concrete footings and foundations would be constructed to support structures and equipment. A foundation is also required for the new control building at the Gonder substation. Buried conduit and/or a covered concrete trench system would be installed throughout the substation for electrical control cables. After trenches are dug, conduit would be placed on a bed of sand, covered with sand, and then backfilled with soil to match the adjacent grade.

The existing ground grid would be expanded into the construction area to ensure that all equipment, structures, and fence additions are properly grounded. The ground grid would be buried approximately 12 inches below grade. Trenches would be dug in both directions across the station and copper conductors installed to create a grid. The conductors would be thermally welded at intersections, and conductor tails brought up next to footings for use in grounding equipment and structures. The trenches would be backfilled with soil to match adjacent grade.

Gravel would be installed over the substation pad to a depth of approximately 3 inches. The gravel particles would be angular and approximately 1 inch in size. A layer of gravel over the substation pad provides electrical isolation for workers. It also reduces fugitive dust, improves access during inclement weather, and inhibits weed growth.

At the Falcon substation, the existing control building has adequate space to accommodate the proposed facilities; at the Gonder substation, a new control building is required. SPPC normally uses pre-fabricated steel buildings for control buildings. Major equipment to be installed inside the control building consists of relay and control panels, AC and DC load centers to provide power to equipment inside and outside the control building, a battery bank to provide a back-up power supply, a heating/ cooling system to prevent equipment failure, and communications equipment for remote control and monitoring of essential equipment.

Steel structures would be erected on concrete footings to support switches, electrical buswork, instrument transformers, lightning arrestors, and other equipment, as well as termination structures for incoming and outgoing transmission lines. Structures would be fabricated from tubular steel and galvanized or painted to match the existing structures. Structures would be grounded by thermally welding one or more ground wires to each structure.

Major equipment would be set by crane and either bolted or welded to the foundations to resist seismic forces. Oil spill containment basins would be installed around all major oil-filled equipment. A containment basin usually consists of an impermeable flexible liner system with a clean water pump. The basins are usually filled with gravel for access and safety reasons. Smaller equipment including air switches, current and voltage instrument transformers, insulators, electrical buswork, and conductors would be mounted on the steel structures.

Control cables would be pulled from panels in the control building, through the underground conduits and concrete trench system to the appropriate equipment. After the cables are connected, the controls would be set to the proper settings, and all equipment would be tested before the transmission line is energized.

2.1.2 WORKFORCE AND CONSTRUCTION SCHEDULE

WORKFORCE REQUIREMENTS

Construction of the project would require at least one prime contractor and multiple subcontractors. During peak construction periods, approximately 150 workers would be employed. The peak construction period is expected to last about 9 months of the 15-month project. The construction workforce would include:

- General contractor that specializes in transmission line construction
- ROW access subcontractor
- Logging subcontractor
- Drilling and blasting subcontractor
- Revegetation subcontractor
- Substation subcontractor
- Environmental compliance subcontractor
- Quality assurance subcontractor

The estimated number of workers per activity would include:

- Support equipment: 13
- Yard-haul material: 6
- Road improvement and restoration: 9
- Tower excavation and anchors: 50
- Tower assembly: 25
- Tower erection : 18
- Guard poles: 4
- Wire stringing: 48
- Environmental compliance: 8
- Quality assurance: 5

Because the construction work would be contracted, the geographic region of the work force is not yet known. Local unskilled labor and skilled out-of-town labor factors would depend on local labor market conditions, contractor's labor force availability, construction status, and time of year. Local unskilled labor could be between 30-40% of the total workforce, and skilled out-of-town labor would comprise the rest of the workforce. The contractor would have two options related to worker housing: (1) house the workforce in nearby urban areas and bus them to the jobsites, or (2) erect temporary camps at strategic locations along the selected route. Because the contractor has not yet been selected, it is unknown which housing option would be chosen. It is possible that 100% of the workforce, or 150 workers, would need temporary accommodations near the job site during peak construction periods. Some workers would perform more than one activity.

Construction of the project may progress either in an orderly fashion from one end of the project to the other, with each activity taking place sequentially, or, most likely, it would progress in a rather random pattern around numerous obstacles. Some of the factors that would determine the flow of the work include weather, soil conditions, access to private lands, seasonal environmental restrictions, avoidance of sensitive resources, and the contractor's available resources. Due to the scope of this project, the contractor may have similar activities going at multiple locations. The contractor would provide and maintain a detailed schedule throughout the construction period.

Construction Schedule

Construction of the project is expected to take 14 months or less and, if approved, would begin May 1, 2002 and be complete by June 30, 2003.

Construction Cost

The construction cost for the transmission line would be approximately $340,000 per mile. Depending on the route alternative selected, the cost could range from $57.1 million to $63.2 million. Costs of the substation improvements are estimated at $5.4 million for the Falcon substation and $10.2 million for the Gonder substation. The total cost for the project, including environmental review, permits, administration, lands and rights-of-way is estimated at $91,090,000 to $97,190,000 depending on which route is selected.

2.1.3 OPERATION AND MAINTENANCE

Once the transmission line is operational, SPPC would conduct annual inspections of the line to check for maintenance needs. The annual inspections would be conducted by two SPPC workers on all terrain vehicles (ATVs) generally following the centerline travel route used for project construction. While the centerline travel route would be revegetated after construction, over time, it can be expected that these annual ATV inspections would create a 12-foot wide two-track path. This path also may be used for required maintenance or emergency repairs.

In environmentally sensitive areas and steep terrain, helicopters may be used to inspect the line. Ground access to the ROW would still be required in these areas for as-needed maintenance and emergency procedures. This access would be coordinated and reclaimed through the appropriate agency personnel. Trees that could interfere with the safe operation of the transmission line would be trimmed or removed as needed over the life of the project. A separate Construction, Operation and Maintenance (COM) Plan would be prepared to ensure that appropriate procedures and mitigation measures outlined in this EIS are implemented.

2.1.4 RIGHT-OF-WAY (ROW) TERM OF AUTHORIZATION

The BLM would issue the ROW grant for a term of 30 years, with the right of renewal.

2.1.5 ABANDONMENT PROCEDURE

Prior to the ultimate termination or expiration of the federal ROW grant, or any portion thereof, SPPC would contact the BLM Authorized Officer to arrange for a pre-termination meeting and joint inspection of the ROW. The meeting and inspection would be held to agree to an acceptable termination and rehabilitation plan. This plan would include, but not be limited to, removal of facilities and surface improvements, reclamation, reseeding, and monitoring. The Authorized Officer must approve the plan in writing prior to commencement of any termination activities. After completion of the termination activities and upon final inspection and approval by the BLM Authorized Officer, SPPC would relinquish all, or those specified portions, of the ROW.

2.2 ROUTE ALTERNATIVES

2.2.1 BACKGROUND

On March 9, 1999, BLM's Interdisciplinary (ID) Team began a series of meetings with SPPC and environmental consultants from EDAW, Inc. to identify a reasonable range of feasible alternative routes for the transmission line, which would then be subject to environmental review pursuant to the National Environmental Policy Act (NEPA). The goal was to identify route alternatives that would meet the project objectives and minimize adverse environmental impacts. The ID Team consisted of resource specialists from the BLM's Battle Mountain, Elko, and Ely Field Offices, the Nevada Division of Wildlife (NDOW) and the State Historic Preservation Office (SHPO) who shared their professional expertise and unique knowledge of the project area.

The discussion focused on three main routes for connecting the Falcon and Gonder substations:

1. a western route through Crescent Valley.
2. a central route through Pine Valley.
3. an eastern route through the Buck Mountain area.

These routes were identified based on consideration of a number of factors that included: achievement of project goals, maximizing use of designated utility corridors and/or co-locating the transmission line next to existing utilities, avoiding unsuitable terrain, minimizing impacts to private property owners, and avoiding Wilderness Study Areas (WSAs).

On March 18 and 19, the BLM ID Team, SPPC, and EDAW held a follow-up meeting to review resource data and evaluate and refine the route alternatives. The group discussed potential resource conflicts and alignments that would be the least detrimental to natural resources. Among the issues discussed were cultural resources, noxious weeds, sage grouse habitat, ferruginous hawk nesting areas, antelope habitat, and watershed values at McClusky Pass. The major outcome of these meetings was the decision to remove the eastern route through the Buck Mountain area and modify the central route through Pine Valley.

On April 5 and 6, the group met again to further discuss the route alternatives and potential resource conflicts. The major outcome of these meetings was the reintroduction of a modified version of the eastern route (Buck Mountain). This modification would help avoid ferruginous hawk nests, sage grouse leks and habitat, springs, historic districts, and mule deer habitat. It was also decided to remove a portion of the western route (Crescent Valley) through the Simpson Park and Roberts Mountains to avoid sage grouse habitat and WSAs. Additionally, one of two possible crossings of I-80 was removed to avoid a pristine area of the historic Emigrant Trail.

After these meetings, the route alignments were further refined based on new field survey information about cultural sites and sage grouse lek locations. In addition, two different options were identified for routing the line around Whistler Mountain. This resulted in the creation of the Crescent Valley (a) and (b) route alternatives and Pine Valley (a) and (b) route alternatives, for a total of five final route alternatives. These five route alternatives, which are analyzed this EIS, are shown in Figure ES-1 and described in Table 2-7. To facilitate the analysis and discussion of site-specific resources and conditions, the route alternatives are broken down into individual segments (A through J).

2.2.2 CRESCENT VALLEY ROUTE ALTERNATIVES

As shown in Table 2-7, the Crescent Valley (a) and (b) route alternatives would be about 186 miles long. The Crescent Valley route alternatives are illustrated in Figure ES-1. The Crescent Valley (a) route would parallel an existing 120 kV and 60 kV transmission line from the Falcon substation for all of Segment A and most of Segment B, before turning east in Grass Valley. Segment F would then turn south, parallel with Highway 278 between Roberts Mountains and the Sulphur Spring Range. Segment G would run west of Whistler Mountain until it crosses Highway 50 and turns east. At this point, the route would parallel an existing 230 kV transmission line to the Gonder substation.

Segment I would cross Highway 50 again north of Eureka at the southern end of Diamond Valley and turn southwest crossing the Diamond Mountains near Simpson Creek then into White Pine County. From here the line would run due east, crossing Newark Valley north of the Pancake Range. Segment J would cross the Antelope and Butte Mountains north of Humboldt National Forest and turn southeast. From here the route would cross the northern extent of Jakes Valley, crossing and re-crossing Highway 50, the Egan Range, and the Steptoe Valley to terminate at Gonder substation north of Ely.

The Crescent Valley (b) route alternative would follow the same alignment as Crescent Valley (a), except Segment H would run south on the east side of Whistler Mountain paralleling Highway 278, crossing Highway 50, and turning east parallel to the existing 230 kV line.

TABLE 2-7: ROUTE ALTERNATIVES

SEGMENT	DESCRIPTION	LENGTH
Crescent Valley Alternative (a) – West of Whistler Mountain – 185.9 miles:		
A	From Falcon substation heads south. Crosses I-80, Humboldt River, and Union Pacific Railroad tracks near Dunphy. Turns southwest paralleling Shoshone Range.	16.7 mi.
B	Continues southwest paralleling Shoshone Range, crossing from Eureka to Lander County. Turns due south and crosses Crescent Valley. Crosses Cortez Mountains west of Mt. Tenabo and then turns east across Grass Valley, crossing back to Eureka County. Continues eastward paralleling Pine Creek north of the Simpson Park Mountains. Turns southeast crossing Denay and Garden Valleys and ends near Highway 278. Within Segment B, there are two potential re-routes (i.e., the K and L re-routes), which could be used to avoid sensitive sites.	62.1 mi.
F	Runs south along west side of Garden Valley between Roberts Mountains and Sulphur Spring Range.	16.8 mi.
G	Runs southeasterly on the west side of Whistler Mountain. Crosses Highway 50 and turns east.	19.9 mi.
I	Runs east crossing Highway 50 north of Eureka at the southern end of Diamond Valley and turns southeast. Crosses Diamond Mountains parallel with Simpson Creek before entering White Pine County. Runs east, crossing Newark Valley to the north of the Pancake Range.	30.3 mi.
J	Continues east crossing Antelope Mountains to the north of Humboldt National Forest and then turns southeastward crossing the Butte Mountains. Crosses northern extent of Jakes Valley, crossing and re-crossing Highway 50. Crosses the Egan Range, continuing along Smith Valley, and passing just south of Hercules Gap before crossing the Steptoe Valley to terminate at Gonder Substation north of Ely, adjacent to Highway 93.	40.1 mi.
Crescent Valley Alternative (b) – East of Whistler Mountain – 186.4 miles: **(same as (a), except replace Segment G with H)**		
H	Runs southeast, then south along the east side of Whistler Mountain paralleling Highway 278 before crossing Highway 50.	20.4 mi.
Pine Valley (a) – West of Whistler Mountain – 179.1 miles: **(same as Crescent Valley (a), except replace Segment B with Segments C and D)**		
C	Turns southeast across Crescent Valley, crosses the Cortez Mountains and turns south along Pine Valley, parallel to Highway 278.	35.7 mi.
D	Runs along the eastern side of Pine Valley parallel to Highway 278.	19.5 mi.
Pine Valley (b) – East of Whistler Mountain – 179.5 miles: **(same as Crescent Valley (b), except replace Segment B with Segments C and D, described above)**		
Buck Mountain – 167.3 miles: **(same as Pine Valley (a) except replace Segments D, F, G, I with Segment E)**		
E	Turns southeast and crosses Highway 278 and the Sulphur Spring Range, crossing into Elko County north of Black Mountain. Crosses the north end of Diamond Valley, briefly traversing a corner of Eureka County , before entering White Pine County at the north end of the Diamond Mountains. Crosses Huntington Valley then turns south. Turns east and then south through Buck Pass between Bald Mountain to the north and Buck Mountain to the south. Continues south, first along the east side of Buck Mountain, then along the west side of Dry Mountain.	74.8 mi.

During the field surveys conducted along Segment B, two areas were identified as containing sensitive resources that should be avoided if possible. In response, the "L and K re-routes" were delineated as ways to avoid these areas. As shown in Figure ES-1, the L re-route is in Whirlwind Valley, parallels an existing transmission line, and could be used to avoid visual impacts to cultural resources. The K re-route is at the northern end of Grass Valley, crosses over a portion of the Cortez Mountains, and could be used as a way to avoid impacts to sensitive resources. The benefits and constraints of these re-routes along Segment B are discussed further in Chapter 3.

2.2.3 PINE VALLEY ROUTE ALTERNATIVES

The Pine Valley (a) and (b) route alternatives would be 179 or 180 miles long, depending on the alignment around Whistler Mountain. The Pine Valley (a) and (b) route alternatives are the same as the Crescent Valley (a) and (b) route alternatives, except that Segment B would be replaced by Segments C and D (see Figure ES-1). Segment C would turn southeast across Crescent Valley, cross the Cortez Mountains, and turn south along Pine Valley, paralleling Highway 278 to the west. Segment D would continue along the eastern side of Pine Valley parallel to Highway 278.

THE PREFERRED ALTERNATIVE

The Pine Valley (a) route has been identified as the environmentally-preferred alternative and the agency's preferred alternative (i.e., the BLM is the Lead Agency). The methodology for selecting the preferred alternative is summarized in Chapter 3, Section 3.20, and detailed in Appendix C.

2.2.4 BUCK MOUNTAIN ROUTE ALTERNATIVE

The Buck Mountain route alternative would be 167 miles long. This alternative would follow the same path as the Pine Valley (a) route alternative, except Segments D, F, G, and I would be replaced with Segment E (see Figure ES-1). Segment E would turn southeast and cross Highway 278 and the Sulphur Spring Range north of Black Mountain, crossing into Elko County. It would then cross the north end of Diamond Valley, briefly crossing into Eureka County before entering White Pine County. The route would then cross the north end of the Diamond Mountains and run into Huntington Valley. The route would turn east and then south crossing Buck Pass between Bald Mountain to the north and Buck Mountain to the south. The route traverses the west side of Dry Mountain. At this point, the line would follow Segment J and parallel the existing 230 kV line to Gonder substation.

2.2.5 NO ACTION ALTERNATIVE

NEPA requires that an EIS include analysis of the "No Action" Alternative, against which the effects of the "action" alternatives can be evaluated and compared. The No Action Alternative in this EIS would mean that no new transmission facilities would be constructed between the Falcon and Gonder substations. Under the No Action Alternative, SPPC would attempt to meet its rapidly growing customer needs with existing facilities, along with other measures to compensate for the anticipated shortfall in the supply of electrical power in the region. The No Action Alternative also would mean that the associated BLM Resource Management Plan amendments would not be required.

Under the No Action Alternative, the projected shortage of electric power in SPPC's control area will continue to grow as customers demand greater amounts of electricity. This shortage is forecast to occur during peak load conditions in the summer of 2003, and may result in the curtailment of some customers. Under this alternative, there will also be a continued shortage of recommended energy reserves during peak load conditions. This existing shortage could result in SPPC's inability to provide service to some customers during unscheduled outages of major transmission or generation facilities. Under the No Action Alternative, adverse environmental, socioeconomic, and electric service impacts could result from compensating actions taken by SPPC to ensure an adequate, affordable, and reliable energy supply to northern Nevada.

If the No Action Alternative is selected following the EIS and right-of-way application review process, SPPC would immediately notify the State of Nevada PUC that it cannot comply with the PUC's Electric Resource Planning Opinion and Order issued April 8, 1999, which found that the Falcon to Gonder 345 kV transmission project is in the public interest. Following notification, SPPC and the PUC would most likely initiate an emergency planning process to determine the best way to meet forecast customer energy requirements.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The BLM and SPPC considered numerous alternatives to the Proposed Action. This section presents an analysis of the various alternatives eliminated from detailed analysis. These include alternative transmission line route alignments; broader transmission alternatives; and other system, facility, and construction alternatives.

2.3.1 ALTERNATIVE TRANSMISSION LINE ROUTE ALIGNMENTS

Prior to selection of the five route alternatives described above, BLM and SPPC considered other possible routes for meeting the purpose and need of this project.

- McClusky Pass
- Highway 305 Planning Corridor
- Highway 305 Planning Corridor via Antelope Valley
- Southwest Intertie Project (SWIP) Utility Corridor
- Yucca Mountain Potential Rail Alignment

MCCLUSKY PASS

The preferred alignment in right-of-way application SPPC filed on December 17, 1998, included crossing McClusky Pass near the Lander/Eureka County boundary. However, as described in 2.2.1, there were concerns about impacts to multiple resources including cultural resources, noxious weeds, sage grouse habitat, ferruginous hawk nesting areas, antelope habitat, and watershed values. Therefore, the BLM interdisciplinary team recommended that the McClusky Pass alternative not be analyzed in detail because it would not have represented a true choice for the decision-maker.

HIGHWAY 305 PLANNING CORRIDOR

BLM's Shoshone-Eureka Resource Management Plan identifies a "planning corridor" that runs between I-80 and US 50, east of and more or less parallel to State Route 305, although in some places it is as much as 5 or 6 miles away from the highway. Since it was first delineated as a planning corridor in the 1980s, BLM has received no right-of-way grant applications for utilities in this corridor. Furthermore, it is now known that this planning corridor crosses wetlands for which protection is mandated under current policy. The wetlands are south of the "Narrows" in the vicinity of Iowa, Boone, and Bernd Creeks. For these reasons, BLM determined that it would not be an appropriate utility corridor and is proposing that it be deleted from BLM's Resource Management Plan utility corridor maps, as explained in Chapter 5, Resource Management Plan Amendments.

In addition, the length of this alignment (approximately 235 miles) would have exceeded the economic limits of the project as set by SPPC and the State of Nevada PUC (Berdrow 1999). Therefore, the Highway 305 planning corridor was eliminated from further consideration and from detailed analysis as an alternative route for the Falcon to Gonder transmission line.

HIGHWAY 305 PLANNING CORRIDOR VIA ANTELOPE VALLEY

Because of the wetlands now known to exist on a portion of the Highway 305 planning corridor, the possibility of routing the line (and corridor) further west, through Antelope Valley, was considered. The length of this alignment would have been approximately 265 miles and would have exceeded the economic limits of the project as set by SPPC and the State of Nevada PUC (Berdrow 1999). Therefore, this alignment was eliminated from detailed analysis.

SOUTHWEST INTERTIE PROJECT (SWIP) UTILITY CORRIDOR

Consideration was given to use of the Southwest Intertie Project (SWIP) utility corridor, which runs roughly parallel to State Route 93 (see Figure ES-2). This corridor was designated by the BLM in 1993 through a Resource Management Plan Amendment to accommodate Idaho Power Company's plan to build a 500 kV transmission line along Nevada's eastern border. The project has not been built and there is no certainty that it will be (personal communication with John Berdrow, SPPC, 2000). This uncertainty means that there is no guarantee of potential benefits from co-locating the two transmission lines together. Furthermore, the length of this alignment would have been approximately 319 miles and would have exceeded the economic limits of the Falcon to Gonder project as set by SPPC and the State of Nevada PUC (Berdrow 1999). For these reasons, this alternative was eliminated from further analysis and consideration. Please refer to page 2-37 for additional discussion of the SWIP utility corridor.

YUCCA MOUNTAIN POTENTIAL RAIL ALTERNATIVE

Plans for this rail corridor project were evolving at about the same time that SPPC and BLM were finalizing selection of the Falcon to Gonder route alternatives. Definitive information was not available in time for serious consideration of this alternative as an option. However, initial concerns were raised by BLM regarding the safety and compatibility of designating a utility alternative near a route for trains carrying spent nuclear fuel, as well as concerns about crossing Grass Valley, which is a prime area for sage grouse and their habitat. Furthermore, the rail corridor follows a different direction than the proposed Falcon to Gonder project (i.e., heading southwest while Falcon to Gonder heads in a southeast direction). Thus, this alternative was not a realistic option and was eliminated from further consideration.

2.3.2 OTHER SYSTEM, FACILITY, AND CONSTRUCTION ALTERNATIVES

In addition to transmission line routing alternatives, SPPC considered alternatives related to substation improvements, system enhancements, generation facilities, project combinations, transmission technologies, voltage levels, DC transmission, underground construction, tower types, and stringing methods. These are addressed below.

SUBSTATION ALTERNATIVES

The Falcon substation was chosen as a terminal for the project because of the voltage support it brings to the Carlin Trend mining area. The project could have been terminated at the Valmy substation, 15 miles northwest of Battle Mountain, next to SPPC's Valmy generating station. This option was not selected because it does not optimize the utilization of 36 miles of existing 345 kV line between the Falcon and Valmy substations. This option would also have increased project costs by approximately $10 million.

Further, a connection at Valmy would not provide the benefits of voltage support and an additional 345 kV source to the Carlin Trend area. Selection of the Valmy termination option would also have ignored the fact that the Falcon substation was sited and designed to optimize the potential for future expansion. Alternatives to terminating the east end of the line at the Gonder substation were not considered, because it is at the eastern-most boundary of SPPC's control area where capacity is available from two existing 230 kV lines from Utah.

SYSTEM ENHANCEMENT ALTERNATIVES

System enhancement alternatives could indirectly satisfy some of the project objectives. SPPC modeled various reactive devices to test improvement in system performance. These included shunt compensation, series compensation, and static VAR compensators (SVCs). The high cost of SVCs and synchronous condensers is only justified if the problem is a transient occurrence. For the steady state voltage deviations SPPC is seeing as limiting constraints to increased system import capability, shunt compensation and series compensation are the preferred technologies.

SPPC improved the import benefit of several transmission alternatives using compensating devices, but the level of improvement would be less than constructing one of the 230 kV or 345 kV projects mentioned above. The import limit of the proposed Falcon to Gonder project would benefit from the installation of shunt capacitor banks. SPPC is currently undertaking measures to install four shunt capacitor banks in existing substations by June 2001 to capture the associated system import benefits both before and after construction of the Falcon to Gonder 345 kV project. Three of the proposed capacitor banks are in SPPC's system: one in the Hilltop substation near Alturas, California; one in the Humboldt substation north of Elko, Nevada; and one in the Austin substation near Austin, Nevada. The fourth shunt capacitor bank is proposed in PacifiCorp's Pavant substation in Utah.

GENERATION ALTERNATIVES

The State of Nevada PUC and the FERC conditioned the merger of SPPC and Nevada Power Company, completed in mid-1999, upon the timely divestiture of both utilities' generating facilities. The divestiture of SPPC's generating facilities is also consistent with SPPC's strategic focus on transmission and distribution, and electric utility restructuring. However, the Governor, the State of Nevada PUC, the Nevada Bureau of Consumer Protection, and the State Legislature are closely reviewing the current laws and proposed divestiture of both utilities' generating facilities, which may delay or prevent the sale of SPPC's generating assets.

For purposes of comparison to the project, SPPC's 1998–2017 Amended Electric Resource Plan considered a broad range of generation options (which could be pursued by SPPC, other utilities, or independent power producers, as generation costs should be consistent for all potential developers within this region). SPPC utilized a screening process to determine the best generation resources for further consideration, and four generation options were evaluated. The generation alternatives did not provide all of the benefits of the project, such as additional import capability, additional export capability, or new wheeling opportunities.

Generation additions could, however, provide improved reliability and free up some transmission capacity that would then be available for new system imports. Also, if the generation addition was an inexpensive source of power, costing less than importing outside generation, the transmission benefit of access to the external power market could be diminished. Because SPPC has been ordered to divest its power plants and would no longer be in the power generation business, the only alternative SPPC can legally pursue to provide additional capacity is the addition of new transmission facilities.

ALTERNATIVE COMBINATIONS

The primary objectives of the project could be met, at least partially, by combining two or more alternatives. However, combining alternatives would not provide all of the secondary benefits and would be more costly when compared to the proposed Falcon to Gonder project.

ALTERNATIVE TRANSMISSION TECHNOLOGIES

Voltages

The maximum voltage used for major AC transmission lines throughout the western United States is 500 kV. SPPC proposes a 345 kV transmission line because it is the most cost-effective while creating the least disturbance to the land it would traverse. Higher voltages would require more substantial facilities, typically creating greater adverse impacts to the environment. Lower transmission voltages would not provide the same level of import benefit. For the Falcon to Gonder project, the import improvement is approximately 30 MW, or 11.5% greater operating at 345 kV than at 230 kV. The voltage support to the Carlin Trend mining areas is also greater. In addition, SPPC has chosen the 345 kV voltage level as its preferred interconnection voltage with other utilities.

Direct Current Transmission

Direct current or DC transmission is rarely suitable for projects of this voltage or length. A 345 kV AC system was selected because it has a shorter construction schedule, substantially lower cost, and would allow more flexibility for future connections to other systems. Direct current or DC transmission lines would require a longer time to construct at a substantially higher cost because each DC terminal installation (i.e., stations that convert AC power to DC power and vise versa) is a unique and highly technical installation. Because of these unique and expensive DC terminal installations, there would also be considerable difficulty and expense to connect the DC system to any intermediate AC systems in the future. Therefore, this type of alternative was eliminated from further evaluation.

Underground Construction

Though very few in number, underground transmission systems have been constructed in the United States since the late 1920s. Underground lines are common for lower voltage distribution lines in urban areas. However, high voltage (115 kV or higher) underground installations have been constructed for short distances where overhead lines were not feasible, such as near airports or urban centers.

Underground high voltage transmission lines require extensive cooling systems to dissipate heat. For this reason, there are currently no underground transmission systems above 230 kV longer than approximately 25 miles in the United States. Cooling systems are complex, expensive, and often involve environmentally hazardous insulating materials. A 345 kV installation would consist of a 10- to 12-inch steel pipe filled with insulating oil pressurized to approximately 200 pounds per square inch (psi). If the pipe leaks or ruptures, usually due to corrosion or accidental excavation, there is the risk of soil and groundwater contamination. Underground systems are also vulnerable to failures caused by flooding, seismic events, and cooling system failures.

If an underground transmission line fails, it is much more difficult to repair. Due to the specialized technology, it can take weeks or even months to repair an underground transmission line compared to hours or days for an overhead line. This difference would have a large impact on the reliability of

SPPC's transmission system, since the project is such a critical supply facility. The cost of undergrounding a high voltage transmission line is also estimated to be over 10 times more expensive than traditional overhead construction. It is economically infeasible for SPPC to build the proposed line underground.

The environmental impacts of an underground transmission line would be similar to those for construction of a major pipeline. Typical construction would require a continuous trench between substations. Greater adverse environmental impacts would be expected because a greater amount of the ROW would be disturbed. Overhead transmission line construction typically results only in disturbances at individual tower sites, substations, and associated access to the ROW.

The principal environmental advantage of an underground transmission line would be the reduction of adverse visual impacts. However, an underground transmission line would still require enclosed cooling system facilities located above ground. Due to the technical complications, potentially greater environmental impacts, economic unfeasibility, and the time required for repairs, an underground alternative was eliminated from further consideration.

ALTERNATIVE TOWER TYPES

Guyed steel lattice towers were considered as an alternative to the tubular steel H-frame towers. The lattice tower is SPPC's predominant tower type for this voltage in northeastern Nevada, but they have used H-frame towers on other 345 kV projects. While the guyed steel lattice towers are 5-10% less expensive than the H-frames, they were not selected because they have greater surface area for raptor perching and nesting (considered a negative in this area by BLM wildlife biologists), create a more pronounced visual contrast with the surrounding landscape, require four anchors and guy wires, and usually need more frequent maintenance.

ALTERNATIVE STRINGING METHODS

The use of ground-based equipment for stringing conductors and shieldwires for this project was considered but eliminated in favor of using helicopters for this procedure. The ground-based equipment (usually a bulldozer) causes greater ground disturbance and environmental impacts and can be more time-consuming and expensive.

2.3.3 TRANSMISSION ALTERNATIVES PRESENTED TO PUBLIC UTILITIES COMMISSION

In the initial phases of the planning process, SPPC considered an extensive range of transmission options during the Electric Resource Planning process (as described in Chapter 1) to identify projects to be proposed to the State of Nevada PUC. Ten potential projects were initially identified as having the highest potential for meeting SPPC's goals:

- Falcon to Gonder 345 kV line (which was ultimately selected as the best option)
- Frenchman 230 kV Tap
- Hilltop to Captain Jack 345 kV line
- Hilltop to Malin 230 kV line
- Oxbow to Falcon 345 kV line
- Pacific DC Intertie 500 kV Tap
- Southwest Intertie Project (SWIP) 500 kV Line and Tap
- Falcon to Midpoint 345 kV line

- Falcon to Terminal 345 kV line
- PG&E 230 kV Intertie

A "fatal flaw" analysis was performed with the following parameters:

- **Feasibility of acquiring the necessary permits.** Projects with a low probability of acquiring the necessary permits were excluded from further investigation.
- **Interconnected utility's ability to deliver the source.** Projects that connected to utilities that have demonstrated problems delivering energy to the interconnection point were excluded from further investigation.
- **Schedule.** Projects with unacceptably late in-service dates were excluded from further consideration.

FALCON TO GONDER 345 KV LINE

The Falcon to Gonder project (i.e., the proposed project in this EIS, which was selected as the best option by the State of Nevada PUC) would be a 165-185 mile long, 345 kV transmission line connecting SPPC's Falcon substation to 230 kV facilities at Mt. Wheeler Power's Gonder substation. It would optimize the use of two existing 230 kV transmission lines from Utah. It would be located entirely within Nevada, which should simplify permitting. It would improve import and export capabilities and enable SPPC to provide transmission service between Nevada, Idaho, Utah, and the Northwest. Additional transmission capability into PacifiCorp's Utah system is desirable because of the electrical strength and the transmission service opportunities in that system. It also gives SPPC an additional strong interconnection point, which allows SPPC to be less dependent on any one transmission line. The estimated total construction cost is between $73.4 million and $80.4 million, depending on the route alignment selected, and the calculated system import improvement is 260 MW.

FRENCHMAN 230 KV TAP[1]

The Frenchman 230 kV Tap option would have involved connecting SPPC's existing 230 kV transmission line to Oxbow Geothermal's existing 230 kV transmission line. A connection could be constructed where the two 230 kV lines are close to each other, approximately 30 miles east of Fallon, Nevada. Oxbow's 230 kV line connects to Southern California Edison's system near Bishop, California. The connection between the SPPC and Oxbow 230 kV lines could be made through a phase shifting transformer, which would regulate the flow of energy. Although the import benefit of this alternative would be limited to just 30 MW, the project would be competitive and provide transmission service opportunities with the California Independent System Operator. Because this project requires very little transmission line construction, permitting was expected to be fairly straightforward. The estimated total cost would have been $14,500,000, and the calculated system import improvement is 30 MW.

HILLTOP - CAPTAIN JACK 345 KV LINE

This project would have reinforced the Alturas project, SPPC's existing 345 kV transmission line between Alturas, California, and Reno, Nevada, by reinforcing the line's source at Hilltop Substation.

[1] A tap project is similar to a substation project, and usually involves the minimal amount of transmission line facilities required to connect an existing facility to another utility's facility. The Frenchman 230 kV Tap project is simply an electrical connection between SPPC's existing 230 kV line and Oxbow's existing 230 kV line at a location where they are close to each other, and does not require more than a few spans of transmission line. Transmission line projects require miles of transmission line between two points to provide system benefits.

This project would have required a new phase shifting transformer at Bordertown, Nevada, a new 500/345 kV transformer at Captain Jack, and approximately 80 miles of new 345 kV transmission line from SPPC's Hilltop substation to the jointly owned 500 kV Captain Jack Substation in southern Oregon. The Northwest system has capability to supply this tie. The issues that arose with California utilities and Northwest energy rights during the Alturas project would likely have reappeared with this project. Permitting through the Modoc National Forest could be difficult. While this project would have increased SPPC's capability to and from the Northwest, it is reinforcement that would not increase system interconnection diversity. No export capability would have been provided by this project, because an outage on the existing Alturas to Reno 345 kV transmission line is still the critical contingency. The estimated total cost was $90,500,000, and the calculated system import improvement is 200 MW.

HILLTOP – MALIN 230 KV LINE

This project would also have reinforced SPPC's Alturas project with a second 230 kV transmission line from Hilltop Substation near Alturas, California, to Malin Substation in southeast Oregon. A second 500/230 kV transformer at Malin was not included. This project had unsatisfactory performance and was eliminated as a viable option because of the large amount of reactive support required to overcome high impedance along the transmission path. The estimated total cost was $67,700,000, and the calculated system import improvement is 100 MW.

OXBOW - FALCON 345 KV LINE

This project would have included a new 345 kV line running from Oxbow Geothermal's plant in Dixie Valley, Nevada, to SPPC's Falcon substation. It also would have required construction of the Frenchman 230 kV Tap project. Its cost and capability made it less competitive than other options. The main limitation of this option was that it relies on SPPC's already constrained 230 kV transmission line to Utah as its source, after loss of SPPC's 345 kV transmission line to Idaho. The estimated total cost was $63,400,000 in addition to the Frenchman 230 kV Tap costs, and the calculated system import improvement is 70 MW.

PACIFIC DC INTERTIE 500 KV TAP

A 500 kV DC Tap near Fernley, Nevada, of the existing Pacific DC Intertie between the Pacific Northwest and southern California would have created SPPC's most capable transmission interconnection. Studies completed by the BPA in 1992 showed a 400 MW import benefit to SPPC's system. The existing PG&E 120 kV transmission lines limited the import benefit. Completion of the Alturas project in 1998 relieved the stresses on those lines, and it is likely that a tap of the DC line would be capable of approximately 500 MW of import benefit. Preliminary power flow analysis confirmed SPPC's ability to utilize up to 500 MW of import benefit from this tap without violating reliability criteria. A 500 kV DC power connection is a unique and highly technical project, but it is proven technology.

However, because each application is a custom design, there is more financial risk and chance that the schedule would take longer. Also, the availability of capacity on the DC line (firm vs. non-firm) and the existing contractual rights and obligations were not known. The line is jointly owned by BPA, Los Angeles Department of Water and Power, Southern California Edison, and other California utilities, and could provide substantial wheeling capabilities throughout the West Coast for SPPC. The estimated 6-year schedule for this project eliminated it from consideration. The estimated total cost was $141,420,000, and the calculated system import improvement is 500 MW.

SOUTHWEST INTERTIE PROJECT 500 KV LINE AND TAP

The Southwest Intertie Project (SWIP) is a proposed 500 kV line running the length of Nevada's eastern border from Idaho Power Company's (IPC) Midpoint Substation to Nevada Power Company's Harry Allen or Crystal Substation. If the SWIP line were built, SPPC would then construct a tap project off of it. However, SPPC does not have confidence that SWIP will be built and available for SPPC's use before 2008. For that reason, it was not considered an option. The estimated total cost for just the tap project was $92,885,000, and the calculated system import improvement is 350 MW.

FALCON TO MIDPOINT 345 KV LINE

This project would have involved a new 224-mile, 345 kV transmission line running from SPPC's Falcon substation to IPC's Midpoint substation. The Falcon Midpoint line was an attractive option upon initial inspection. Its electrical performance and cost made it competitive with several other projects. However, further investigation revealed serious problems that would restrict SPPC's ability to use this line. IPC has documented an inability to source existing transmission requirements. The limitations demonstrated over the last 3 years, and the curtailment of transmission customers as recently as the summer of 1998, lead SPPC to believe that without IPC's commitment to system improvements in the Midpoint to Boise area, it would be unwise for SPPC to consider a second high capacity transmission line to the Midpoint location. The estimated total cost was $113,060,000, and the calculated system import improvement is 350 MW.

FALCON TO TERMINAL 345 KV LINE

This project would have involved a 316-mile long system of 345 kV lines running from SPPC's Falcon substation to a new substation near Wells, Nevada. From there, it would interconnect both with SPPC's existing 345 kV line to Idaho at a new substation located north of Wells, and with PacifiCorp's Terminal substation in Salt Lake City. The project had very good performance and cost/benefit characteristics; however, it was the most capital intensive of all the transmission projects examined. The potential for other utilities to participate in this project no longer exists due to other arrangements made between BPA and PacifiCorp. The benefits of a connection to Utah's transmission system apply to this project. Crossing the Utah salt flats could have either complicated the environmental permitting process or forced longer alternatives. Because of the requirement for urban construction near Salt Lake City and the more difficult construction across the salt flats, the cost of the line from Wells to Terminal was increased. The estimated in-service time of 5 years eliminated this project from meeting SPPC's current needs. The estimated total cost was $184,245,000, and the calculated system import improvement is 500 MW.

PACIFIC GAS & ELECTRIC 230 KV LINE

This project would have involved a new 230 kV line to replace the two existing 120 kV circuits connecting Reno to PG&E's system over Donner Summit. It would have connected to PG&E's Rio Oso or Gold Hill substations. SPPC's environmental group has advised that it may not be possible to permit a Trans-SPPC tie to PG&E. In addition to this potential fatal flaw, there could be a voltage collapse problem around Sacramento. Rio Oso and Goldhill are subject to voltage instability under high load conditions. Until this problem is fixed, PG&E's system is not capable of sourcing another 230 kV line. The California utilities have not expressed an interest in upgrading the existing 120 kV lines. For these reasons, the PG&E tie was not further investigated. The estimated total cost was $102,100,000, and the calculated system import improvement is 200 MW.

RESULTS OF THE SCREENING PROCESS

The results of this analysis identified five of the ten transmission options as fatally flawed. The fatal flaws are summarized below.

- Pacific DC Intertie 500 kV DC Tap - in service time of 5 years.
- Southwest Intertie 345 kV Line and Tap - in service time of 10 years.
- Falcon - Midpoint 345 kV Line – demonstrated need for improvement in IPC's source system prior to construction. The necessary reinforcements have not been planned, approved, or scheduled for construction.
- Falcon - Terminal 345 kV Line – in service time of 5 years due to permitting issues and scope of facilities required.
- Pacific Gas & Electric 230 kV Line – unlikely to be permitted across the SPPC Nevada Mountains without extreme difficulty, and documented voltage collapse potential at the western terminal of the project near Sacramento, California.

After these fatal flaw analyses were completed, a performance matrix was developed from the power flow, cost, schedule, environmental permitting, and external capability data gathered on each project. The resulting matrix clearly illustrated that three projects substantially outperformed the others both electrically and economically:

- Falcon to Gonder 345 kV line
- Frenchman 230 kV Tap
- Hilltop to Captain Jack 345 kV line

These projects were similar in complexity, and the estimated cost was within $100/kW for the import benefit. After these projects, a substantial gap in import benefit of over $200/kW occurred before the next best option (Hilltop to Malin 230 kV line). From the three best options, the third (the Hilltop to Captain Jack 345 kV line) was eliminated due to higher cost vs. benefit, more difficult permitting, and probable contention over northwest energy rights by California utilities at Captain Jack.

SPPC presented the results of this Energy Resource Planning screening process to the Public Utilities Commission of Nevada on December 15, 1998. After an evidentiary hearing in March 1999, the State of Nevada PUC made a unanimous decision, on April 8, 1999, that the Falcon to Gonder 345 kV line was the best resource option to meet the forecasted energy needs of SPPC's customers. The State of Nevada PUC found that SPPC's alternative plan, which includes the Falcon to Gonder 345 kV line and the Frenchman 230 kV Tap project, are superior to SPPC's preferred plan, which was only the Falcon to Gonder 345 kV line._

The State of Nevada PUC found that the alternative plan was superior to the preferred plan because it included the Frenchman Tap 230 kV project, which would provide for an additional 30 MW of import capability to be available by the summer of 2000 to help mitigate SPPC's WSCC reserve margin deficits until the Falcon to Gonder 345 kV line could be completed. Furthermore, the Frenchman Tap 230 kV project could provide up to 100 MW of import capability from southern California at a low cost per kW once the Falcon to Gonder 345 kV line is in service. At the time of the State of Nevada PUC's Opinion and Order, the expected in-service date of December 2001 for the Falcon to Gonder 345 kV line was found to be in the public interest. Since then, changes related to environmental permitting and longer construction timeframes have delayed the expected in-service date to June 2003.