Appendix F

FIELD MANAGEMENT PLAN

FOR

DEVERS-MIRAGE 115 KV SUBTRANSMISSION

SYSTEM SPLIT PROJECT

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I. EXECUTIVE SUMMARY

This document is Southern California Edison Company's (SCE) Field Management Plan (FMP) for the Proposed Devers-Mirage 115 kilovolt (kV) System Split Project (Proposed Project). The Proposed Project is needed for maintaining electric system reliability, enhance operational flexibility, and serving projected electrical demand in the in the cities of Palm Springs, Rancho Mirage, Indian Wells, Cathedral City, Palm Desert, and unincorporated areas of Riverside County, including the Thousand Palms community. SCE proposes to install the 220 kV loop-in of Devers-Coachella Valley Transmission Line into Mirage Substation, one 280 megavolt amperes (MVA) 220/115 kV transformer, two new 115 kV subtransmission line segments, rearrange and modify subtransmission line connections, replace 115 kV circuit breakers, and construct other substation modifications in the cities of Palm Springs, Rancho Mirage, Indian Wells, Cathedral City, Palm Desert, and unincorporated areas of Riverside County, including the Thousand Palms community. The Proposed Project is scheduled to be operational by mid-2010, with construction scheduled to begin the second-quarter 2009.

SCE provides this FMP in order to inform the public, the California Public Utilities Commission (CPUC), and other interested parties of its evaluation of no-cost and low-cost magnetic field reduction measures for this project, and SCE's proposed plan to apply these measures to this project. This FMP has been prepared in accordance with CPUC Decision No. 93-11-013 and Decision No. 06-01-042 relating to extremely low frequency[1] electric and magnetic fields (EMF). This FMP also provides background on the current status of scientific research related to possible health effects of EMF, and a description of the CPUC's EMF policy.

The "no-cost and low-cost" magnetic field reduction measures that are incorporated into the design of the Proposed Project are:

- Using taller poles for the proposed new 115 kV subtransmission line segments;

[1] The extreme low frequency is defined as the frequency range from 3 Hz to 3,000 Hz.

- Using a "double-circuit" pole-head configuration for the double-circuit portion of the Proposed 115 kV Subtransmission Lines;
- Using a "triangle" type pole-head configuration for the single-circuit portion of the Proposed 115 kV Subtransmission Lines;
- Phasing the Proposed 115 kV Subtransmission Lines with respect to the adjacent existing subtransmission lines to reduce magnetic fields;
- Re-phasing existing 115 kV Subtransmission Lines to reduce magnetic fields;
- Placing major substation electric equipment (such as transformers) away from the existing substation property lines; and
- Phasing the Proposed loop-in 220 kV Transmission Line with respect to the adjacent existing transmission lines to reduce magnetic fields.

SCE's plan for applying the above no-cost and low-cost magnetic field reduction measures uniformly and equitably for the entire Proposed Subtransmission Line routes is consistent with CPUC's EMF policy and with the direction of leading national and international health agencies. Furthermore, the plan complies with SCE's EMF Design Guidelines[2], and with applicable national and state safety standards for new electric facilities.

[2] EMF Design Guidelines, August 2006.

II. BACKGROUND REGARDING EMF AND PUBLIC HEALTH RESEARCH ON EMF

There are many sources of power frequency[3] electric and magnetic fields, including internal household and building wiring, electrical appliances, and electric power transmission and distribution lines. There have been numerous scientific studies about the potential health effects of EMF. After many years of research, the scientific community has been unable to determine if exposures to EMF cause health hazards. State and federal public health regulatory agencies have determined that setting numeric exposure limits is not appropriate.[4]

Many of the questions about possible connections between EMF exposures and specific diseases have been successfully resolved due to an aggressive international research program. However, potentially important public health questions remain about whether there is a link between EMF exposures and certain diseases, including childhood leukemia and a variety of adult diseases (e.g., adult cancers and miscarriages). As a result, some health authorities have identified magnetic field exposures as a possible human carcinogen. As summarized in greater detail below, these conclusions are consistent with the following published reports: the National Institute of Environmental Health Sciences (NIEHS) 1999[5], the National Radiation Protection Board (NRPB) 2001[6], the International Commission on non-Ionizing Radiation Protection (ICNIRP) 2001, the California Department of Health Services (CDHS) 2002[7], and the International Agency for Research on Cancer (IARC) 2002[8].

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[3] In U.S., it is 60 Hertz (Hz).

[4] CPUC Decision 06-01-042, p. 6, footnote 10

[5] National Institute of Environmental Health Sciences' Report on Health Effects from Exposures to Power-Line frequency Electric and Magnetic Fields, NIH Publication No. 99-4493, June 1999.

[6] National Radiological Protection Board, Electromagnetic Fields and the Risk of Cancer, Report of an Advisory Group on Non-ionizing Radiation, Chilton, U.K. 2001

[7] California Department of Health Services, An Evaluation of the Possible Risks from Electric and Magnetic Fields from Power Lines, Internal Wiring, Electrical Occupations, and Appliances, June 2002.

[8] World Health Organization / International Agency for Research on Cancer, IARC Monographs on the evaluation of carcinogenic risks to humans (2002), Non-ionizing radiation, Part 1: Static and extremely low-frequency (ELF) electric and magnetic fields, IARCPress, Lyon, France: International Agency for Research on Cancer, Monograph, vol. 80, p. 338, 2002

The federal government conducted EMF research as a part of a $45-million research program managed by the NIEHS. This program, known as the EMF RAPID (Research and Public Information Dissemination), submitted its final report to the U.S. Congress on June 15, 1999. The report concluded that:

- "The scientific evidence suggesting that ELF-EMF exposures pose any health risk is weak."[9]
- "The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard."[10]
- "The NIEHS suggests that the level and strength of evidence supporting ELF-EMF exposure as a human health hazard are insufficient to warrant aggressive regulatory actions; thus, we do not recommend actions such as stringent standards on electric appliances and a national program to bury all transmission and distribution lines. Instead, the evidence suggests passive measures such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. NIEHS suggests that the power industry continue its current practice of siting power lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards."[11]

In 2001, Britain's NRPB arrived at a similar conclusion:

> "After a wide-ranging and thorough review of scientific research, an independent Advisory Group to the Board of NRPB has concluded that the power frequency electromagnetic fields that exist in the vast majority of homes are not a cause of cancer in general. However, some epidemiological studies do indicate a possible small risk of childhood leukemia associated with exposures to unusually high levels of power frequency magnetic fields."[12]

In 2002, three scientists for CDHS concluded:

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[9] National Institute of Environmental Health Sciences, NIEHS Report on Health Effects from Exposures to Power-Frequency Electric and Magnetic Fields, p. ii, NIH Publication No. 99-4493, 1999

[10] *ibid.*, p. iii

[11] *ibid.*, p. 37 - 38

[12] NRPB, NRPB Advisory Group on Non-ionizing Radiation Power Frequency Electromagnetic Fields and the Risk of Cancer, NRPB Press Release May 2001

> "To one degree or another, all three of the [C]DHS scientists are inclined to believe that EMFs can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's Disease, and miscarriage.
>
> They [CDHS] strongly believe that EMFs do not increase the risk of birth defects, or low birth weight.
>
> They [CDHS] strongly believe that EMFs are not universal carcinogens, since there are a number of cancer types that are not associated with EMF exposure.
>
> To one degree or another they [CDHS] are inclined to believe that EMFs do not cause an increased risk of breast cancer, heart disease, Alzheimer's disease, depression, or symptoms attributed by some to a sensitivity to EMFs. However, all three scientists had judgments that were "close to the dividing line between believing and not believing" that EMFs cause some degree of increased risk of suicide, or
>
> For adult leukemia, two of the scientists are 'close to the dividing line between believing or not believing' and one was 'prone to believe' that EMFs cause some degree of increased risk."[13]

Also in 2002, the World Health Organization's IARC concluded:

> "ELF magnetic fields are possibly carcinogenic to humans"[14], based on consistent statistical associations of high-level residential magnetic fields with a doubling of risk of childhood leukemia...Children who are exposed to residential ELF magnetic fields less than 0.4 microTesla (4.0 milliGauss) have no increased risk for leukemia.... In contrast, "no consistent relationship has been seen in studies of childhood brain tumors or cancers at other sites and residential ELF electric and magnetic fields."[15]

III. APPLICATION OF THE CPUC'S NO-COST AND LOW-COST EMF POLICY TO THIS PROJECT

Recognizing the scientific uncertainty over the connection between EMF exposures and health effects, the CPUC adopted a policy that addresses public concern over EMF with a combination of education, information, and precaution-based approaches. Specifically, Decision

[13] CDHS, An Evaluation of the Possible Risks From Electric and Magnetic Fields (EMFs) From Power Lines, Internal Wiring, Electrical Occupations and Appliances, p. 3, 2002

[14] IARC, Monographs, Part I, Vol. 80, p. 338

[15] *ibid.*, p. 332 - 334

93-11-013 established a precautionary based no-cost and low-cost EMF policy for California's regulated electric utilities based on recognition that scientific research had not demonstrated that exposures to EMF cause health hazards and that it was inappropriate to set numeric standards that would limit exposure.

In 2006, the CPUC completed its review and update of its EMF Policy in Decision 06-01-042. This decision reaffirmed the finding that state and federal public health regulatory agencies have not established a direct link between exposure to EMF and human health effects,[16] and the policy direction that (1) use of numeric exposure limits was not appropriate in setting utility design guidelines to address EMF,[17] and (2) existing no-cost and low-cost precautionary-based EMF policy should be continued for proposed electrical facilities. The decision also reaffirmed that EMF concerns brought up during Certificate of Public Convenience and Necessity (CPCN) and Permit to Construct (PTC) proceedings for electric and transmission and substation facilities should be limited to the utility's compliance with the CPUC's low-cost/no-cost policies.[18]

The decision directed regulated utilities to hold a workshop to develop standard approaches for EMF Design Guidelines and such a workshop was held on February 21, 2006. Consistent design guidelines have been developed that describe the routine magnetic field reduction measures that regulated California electric utilities consider for new and upgraded transmission line and transmission substation projects. SCE filed its revised EMF Design Guidelines with the CPUC on July 26, 2006.

No-cost and low-cost measures to reduce magnetic fields would be implemented for this project in accordance with SCE's EMF Design Guidelines. In summary, the process of

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[16] CPUC Decision 06-01-042, Conclusion of Law No. 5, mimeo. p. 19 ("As discussed in the rulemaking, a direct link between exposure to EMF and human health effects has yet to be proven despite numerous studies including a study ordered by this Commission and conducted by DHS.").

[17] CPUC Decision 06-01-042, mimeo. p. 17 - 18 ("Furthermore, we do not request that utilities include non-routine mitigation measures, or other mitigation measures that are based on numeric values of EMF exposure, in revised design guidelines or apply mitigation measures to reconfigurations or relocations of less than 2,000 feet, the distance under which exemptions apply under GO 131-D. Non-routine mitigation measures should only be considered under unique circumstances.").

[18] CPUC Decision 06-01-042, Conclusion of Law No. 2, ("EMF concerns in future CPCN and PTC proceedings for electric and transmission and substation facilities should be limited to the utility's compliance with the Commission's low-cost/no-cost policies.").

evaluating no-cost and low-cost magnetic field reduction measures and prioritizing within and between land usage classes considers the following:

1. SCE's priority in the design of any electrical facility is public and employee safety. Without exception, design and construction of an electric power system must comply with all applicable federal, state, and local regulations, applicable safety codes, and each electric utility's construction standards. Furthermore, transmission and subtransmission lines and substations must be constructed so that they can operate reliably at their design capacity. Their design must be compatible with other facilities in the area and the cost to operate and maintain the facilities must be reasonable.

2. As a supplement to Step 1, SCE follows the CPUC's direction to undertake no-cost and low-cost magnetic field reduction measures for new and upgraded electrical facilities. Any proposed no-cost and low-cost magnetic field measures, must, however, meet the requirements described in Step 1 above. The CPUC defines no-cost and low-cost measures as follows:

- Low-cost measures, in aggregate, would:
  - Cost in the range of 4 percent of the total project cost.
  - For low cost mitigation, the "EMF reductions will be 15% or greater at the utility ROW [right-of-way]..."[19]

The CPUC Decision stated,

> "We direct the utilities to use 4 percent as a benchmark in developing their EMF mitigation guidelines. We will not establish 4 percent as an absolute cap at this time because we do not want to arbitrarily eliminate a potential measure that might be available but costs

[19] CPUC Decision 06-01-042, p. 10

more than the 4 percent figure. Conversely, the utilities are encouraged to use effective measures that cost less than 4 percent."[20]

3. The CPUC provided further policy direction in Decision 06-01-042, stating that, "[a]lthough equal mitigation for an entire class is a desirable goal, we will not limit the spending of EMF mitigation to zero on the basis that not all class members can benefit."[21] While Decision 06-01-042 directs the utilities to favor schools, day-care facilities and hospitals over residential areas when applying low-cost magnetic field reduction measures, prioritization within a class can be difficult on a project case-by-case basis because schools, day-care facilities, and hospitals are often integrated into residential areas, and many licensed day-care facilities are housed in private homes, and can be easily moved from one location to another. Therefore, it may be practical for public schools, licensed day-care centers, hospitals, and residential land uses to be grouped together to receive highest prioritization for low-cost magnetic field reduction measures. Commercial and industrial areas may be grouped as a second priority group, followed by recreational and agricultural areas as the third group. Low-cost magnetic field reduction measures will not be considered for undeveloped land, such as open space, state and national parks, and Bureau of Land Management and U.S. Forest Service lands. When spending for low-cost measures would otherwise disallow equitable magnetic field reduction for all areas within a single land-use class, prioritization can be achieved by considering location and/or density of permanently occupied structures on lands adjacent to the projects, as appropriate.

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[20] CPUC Decision 93-11-013, § 3.3.2, p.10.

[21] CPUC Decision 06-01-042, p. 10

This FMP contains descriptions of various magnetic field models and the calculated results of magnetic field levels based on those models. These calculated results are provided only for purposes of identifying the relative differences in magnetic field levels among various transmission or subtransmission line design alternatives under a specific set of modeling assumptions and determining whether particular design alternatives can achieve magnetic field level reductions of 15 percent or more. The calculated results are not intended to be predictors of the actual magnetic field levels at any given time or at any specific location if and when the project is constructed. This is because magnetic field levels depend upon a variety of variables, including load growth, customer electricity usage, and other factors beyond SCE's control. The CPUC affirmed this in D. 06-01-042 stating:

> "Our [CPUC] review of the modeling methodology provided in the utility [EMF] design guidelines indicates that it accomplishes its purpose, which is to measure the relative differences between alternative mitigation measures. Thus, the modeling indicates relative differences in magnetic field reductions between different transmission line construction methods, but does not measure actual environmental magnetic fields."[22]

IV. PROJECT DESCRIPTION

SCE proposes to construct the Devers-Mirage 115 kV System Split Project to maintain electric system reliability, enhance operational flexibility, and serve projected electrical demand in the in the cities of Palm Springs, Rancho Mirage, Indian Wells, Cathedral City, Palm Desert, and unincorporated areas of Riverside County, including the Thousand Palms community. SCE proposes to install the 220 kV loop-in of Devers-Coachella Valley Transmission Line into Mirage Substation, one 280 megavolt amperes (MVA) 220/115 kV transformer, two new 115 kV subtransmission line segments, rearrange and modify subtransmission line connections, replace 115 kV circuit breakers, and construct other substation modifications in the cities of Palm Springs, Rancho Mirage, Indian Wells, Cathedral City, Palm Desert, and unincorporated areas of

[22] CPUC Decision 06-01-042, p. 11

Riverside County, including the Thousand Palms community. The Proposed Project is scheduled to be operational by mid-2010, with construction scheduled to begin the second-quarter 2009.

For the purpose of evaluating no-cost and low-cost magnetic field reduction measures, the Proposed Project is divided into three parts as described below:

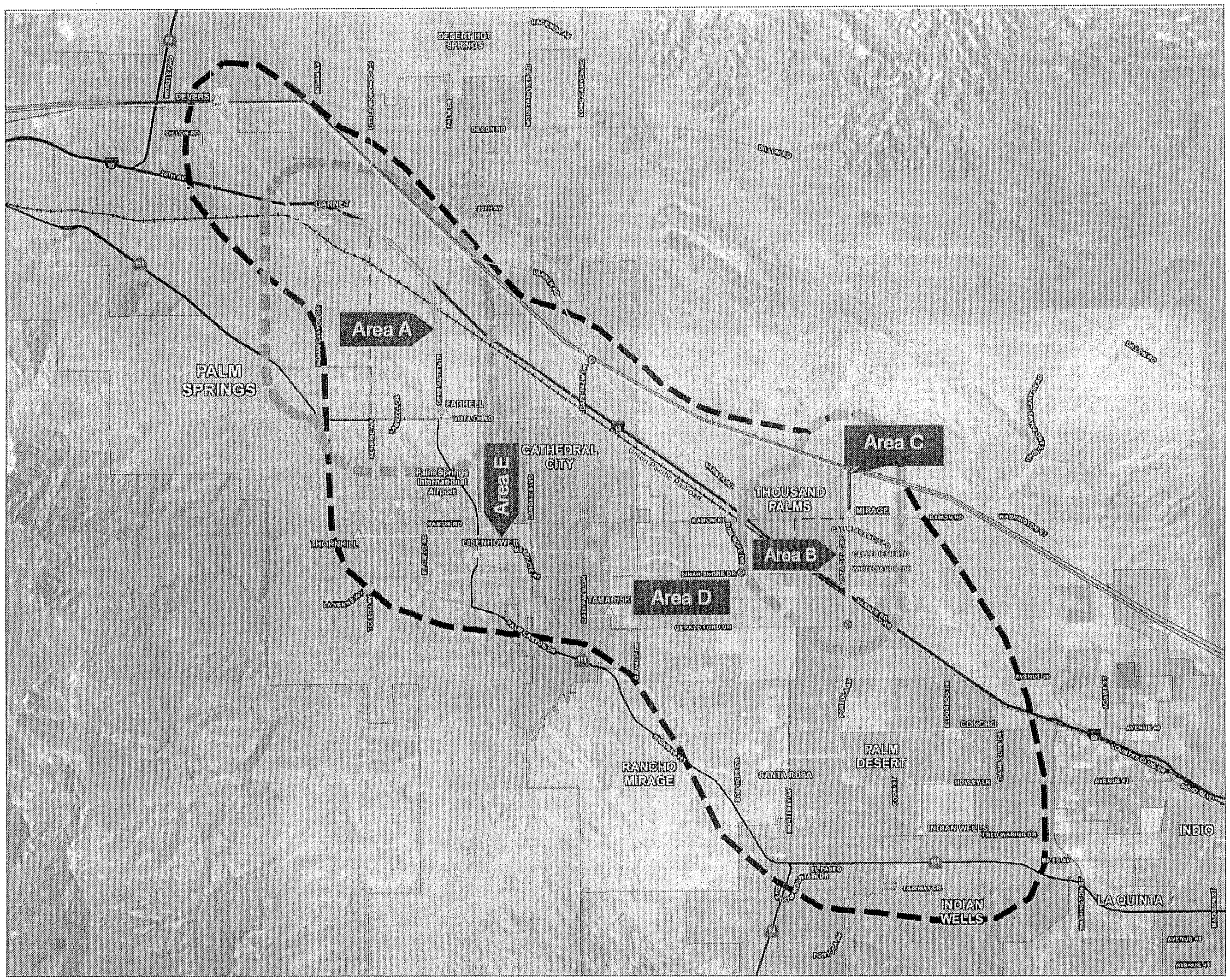
1. Project Part 1: Construct new Farrell-Garnet 115 kV and Mirage-Santa Rosa 115 kV subtransmission line segments
2. Project Part 2: Reconfigure existing 115 kV subtransmission lines
3. Project Part 3: Install the 220 kV loop-in of Devers-Coachella Valley Transmission Line into Mirage Substation
4. Project Part 4: Construct limited improvements at existing substations to accommodate Part 1 and 2 above.

The total cost of the Proposed Project is approximately $33.3 million dollars[23]. Four percent of the Proposed Project cost is about $1.33 million dollars. SCE engineers added magnetic field reduction measures early in the design phase for this project. The total project cost, therefore, includes "low-cost" magnetic field reduction measures in the proposed designs.

Figure 1 below shows the overall project areas.

[23] This estimated total project cost does not include telecommunications.

Figure 1. Project Area A through E



Currently, there are no schools along the Proposed Transmission and Subtransmission Line routes (Area A through Area C) as shown on Figure 1 above. There are, however, existing schools[24] in Area D where SCE proposes limited works of reconfiguring existing 115 kV subtransmission lines.

V. EVALUATION OF NO-COST AND LOW-COST MAGNETIC FIELD REDUCTION MEASURES

Project Part 1 - Constructing new Farrell-Garnet 115 kV and Mirage-Santa Rosa 115 kV subtransmission lines

New Farrell-Garnet 115 kV Subtransmission Line Route

- Replace approximately 5.3 miles of the existing Devers-Farrell-Windland single-circuit 115 kV subtransmission line with a new higher capacity double-circuit 115 kV subtransmission line and replace support structures within existing SCE rights-of-way and franchise locations between Farrell and Garnet substations in the City of Palm Springs.
- Install a new 115 kV subtransmission line position at Farrell Substation and upgrade an existing 115 kV subtransmission line position at Garnet Substation.
- Install a new circuit breaker at Farrell Substation.

Figure 2 below shows the "Area A" where the Proposed Subtransmission Line would be located.

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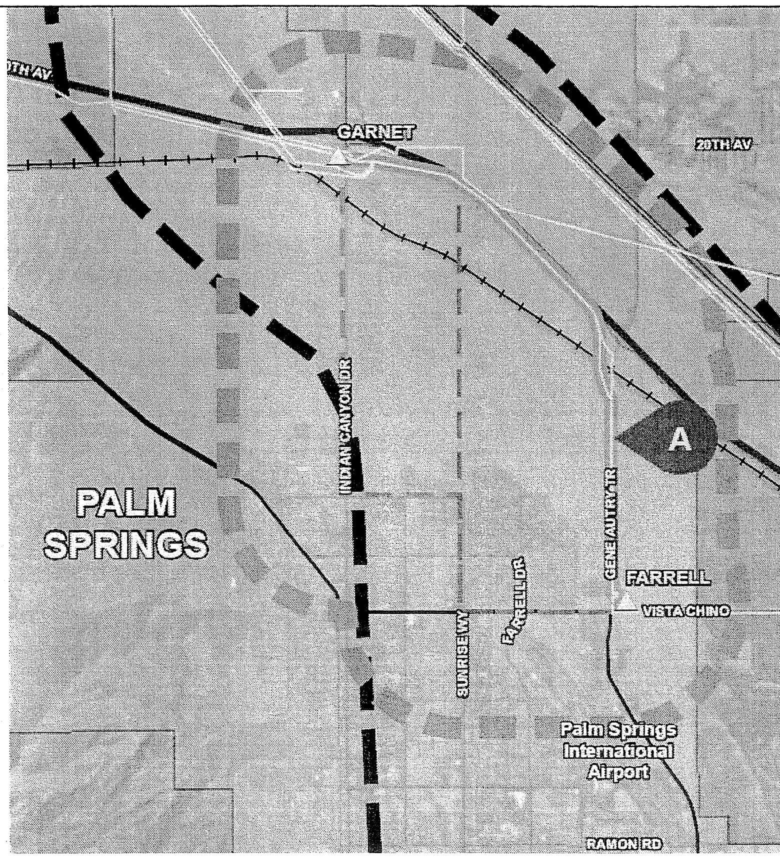
[24] Nellie Coffman Middle School on Plumley Road, Cathedral City and Cathedral City High School on Dinah Shore Drive in Cathedral City.

Figure 2. Proposed Farrell – Garnet 115 kV Subtransmission Line in Area A



New **Mirage-Santa Rosa 115 kV Subtransmission Line Route**[25]

- Replace approximately 1,783 feet of the existing Mirage-Tamarisk single-circuit 115 kV subtransmission line with a new, higher capacity double-circuit 115 kV subtransmission line and replace support structures within existing SCE rights-of-way from Mirage Substation to Calle Francisco, in the community of Thousand Palms.
- Build a new single-circuit 115 kV subtransmission line on the west side of the existing SCE right-of-way from Calle Francisco to Calle Desierto (approximately 2,447 feet) on new support structures.

[25] Adjacent subtransmission lines are 1) Mirage-Santa Rosa-Tamarisk and Mirage-Concho 115 kV.

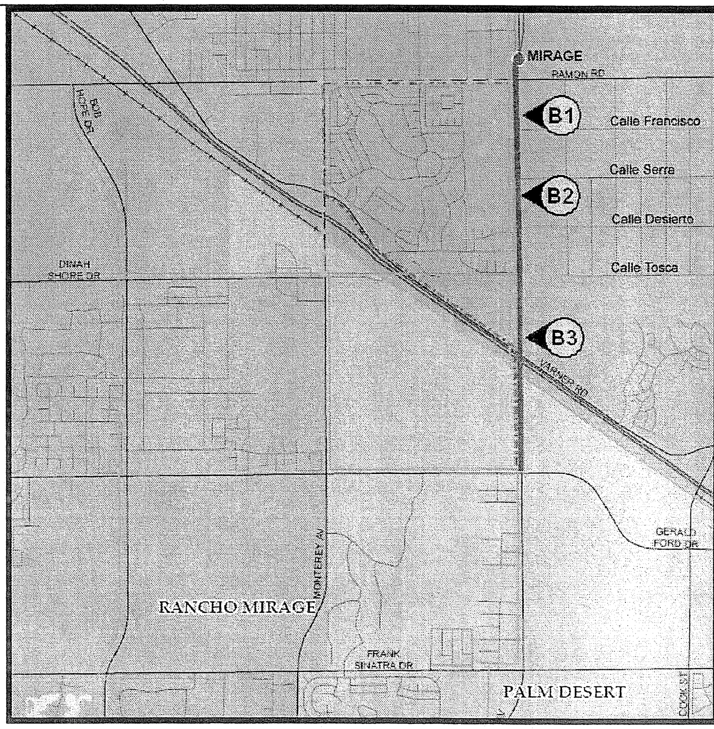
- Build a new single-circuit 115 kV subtransmission line on the east side of the existing SCE right-of-way, from Calle Desierto through the Tri-Palms Country Club golf course (approximately 1,293 feet) on new wood poles.
- Replace approximately 2,130 feet of the existing Devers-Capwind-Concho-Mirage 115 kV subtransmission line with a new, higher capacity double-circuit 115 kV subtransmission line and replace support structures within existing SCE rights-of-way from the Tri-Palms Country Club golf course, to I-10.
- Replace an existing single-circuit 115 kV subtransmission wood pole on the northwest corner of Portola Avenue and Gerald Ford Drive, with a new double-circuit TSP, located south of I-10, approximately 50 feet north of the existing wood pole at the intersection of Portola Avenue and Gerald Ford Drive in the City of Palm Desert.
- Install two new 115 kV subtransmission line positions at Mirage Substation; upgrade two existing 115 kV subtransmission line positions at Santa Rosa Substation; upgrade two existing 115 kV subtransmission line positions at Tamarisk Substation; and upgrade two existing 115 kV subtransmission line positions at Devers Substation.
- Replace one 115kV circuit breaker at Tamarisk Substation and replace two 115 kV circuit breakers at Devers Substation.

Figure 3 shows the Area B where the Proposed Subtransmission Line would be located. This "Area B" is further is divided into three segments by considering changes in characteristics of subtransmission line corridors (i.e., changes in the number of subtransmission lines within the corridor, changes to tower type for the Proposed Line) as indicated on the Figure 3 as "B1", "B2", and "B3".

- Area B - Segment 1 ("B1"): From Mirage Substation to Calle Francisco
- Area B - Segment 2 ("B2"): From Calle Francisco to near Calle Tosca

- Area B - Segment 3 ("B3:"): From Calle Tosca to south of I-10 Freeway

Figure 3. Proposed Mirage-Santa Rosa 115 kV Subtransmission Line in Area B



The following magnetic field reduction methods are applicable for an overhead subtransmission line design such as SCE's Proposed Subtransmission Lines:

1. Selecting taller poles;
2. Selecting pole-head configurations with less phase-to-phase distance and/or circuit-to-circuit distance;
3. Phasing proposed 115 kV circuits with respect to the adjacent transmission or subtransmission line(s).

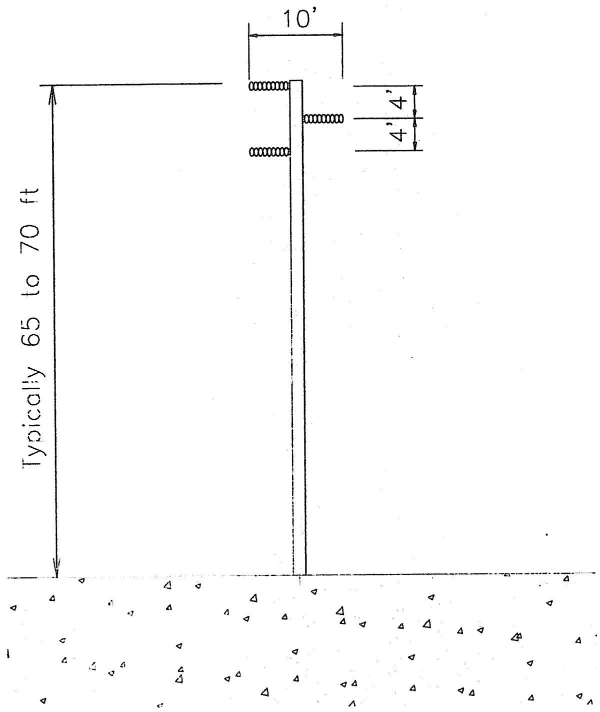
After ten years of evaluating and implementing no-cost and low-cost magnetic field reduction measures for subtransmission line designs, SCE established preferred overhead 66 kV and 115 kV subtransmission line designs in 2004. These preferred designs incorporate the most effective no-cost and low-cost magnetic field reduction measures (such as pole-head configurations and taller poles). For overhead 115 kV subtransmission lines, SCE's preferred designs[26] are as follows:

Table 1. Preferred Overhead 115 kV Subtransmission Line Designs with Most Effective Magnetic Field Reduction Options Incorporated		
	115 kV Overhead Construction	
	Single Circuit Design	Double Circuit Design
Base Pole Height	61 feet (above the ground)	65 feet (above the ground)
Base Pole-head Configuration	"Triangle" or equivalent	"Double-Circuit"
Minimum Clearance	35 feet	35 feet

The typical proposed overhead design for the single-circuit portions of the Proposed Subtransmission Line (Single-Circuit Design) with no-cost and low-cost magnetic field reduction measures is shown on Figure 4. This is the proposed design for Area B – Segment 2 where there are some existing homes. Five foot taller poles were considered as an additional low-cost measure, but not recommended due to lack of an additional 15% magnetic field reduction for existing homes. Typical pole height would be approximately 65 to 70 feet above the ground for this segment. This design, therefore, meets or exceeds the preferred single-circuit design as listed on Table 1.

[26] Exceptions to the "preferred design" are recommended by the primary designer based on engineering & safety requirements.

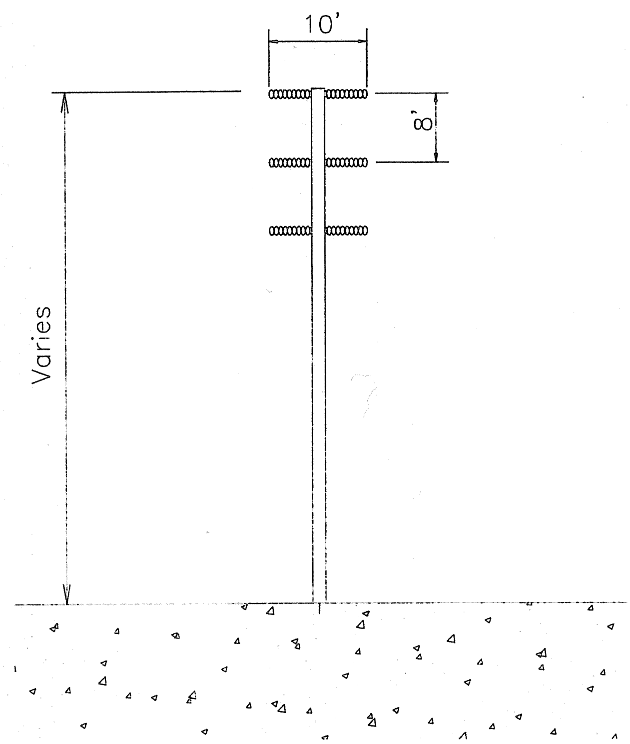
Figure 4. Proposed 115 kV Single-Circuit Design



The typical proposed overhead design for the double-circuit portion of the Proposed Subtransmission Line (Double-Circuit Design) is shown on Figure 5 below. The Double-Circuit Design is the proposed design for Area A, Area B-Segment 1 and 3. The proposed pole is typically 65 to 75[27] feet above the ground for Area A and 65 to 70 feet above the ground for Area B-Segment 1 and 3. This design also meets or exceeds the preferred double-circuit design as listed on Table 1.

27 75 feet above ground poles would be used near the existing Farrell Substation for engineering requirements

Figure 5. Proposed 115 kV Double-Circuit Design

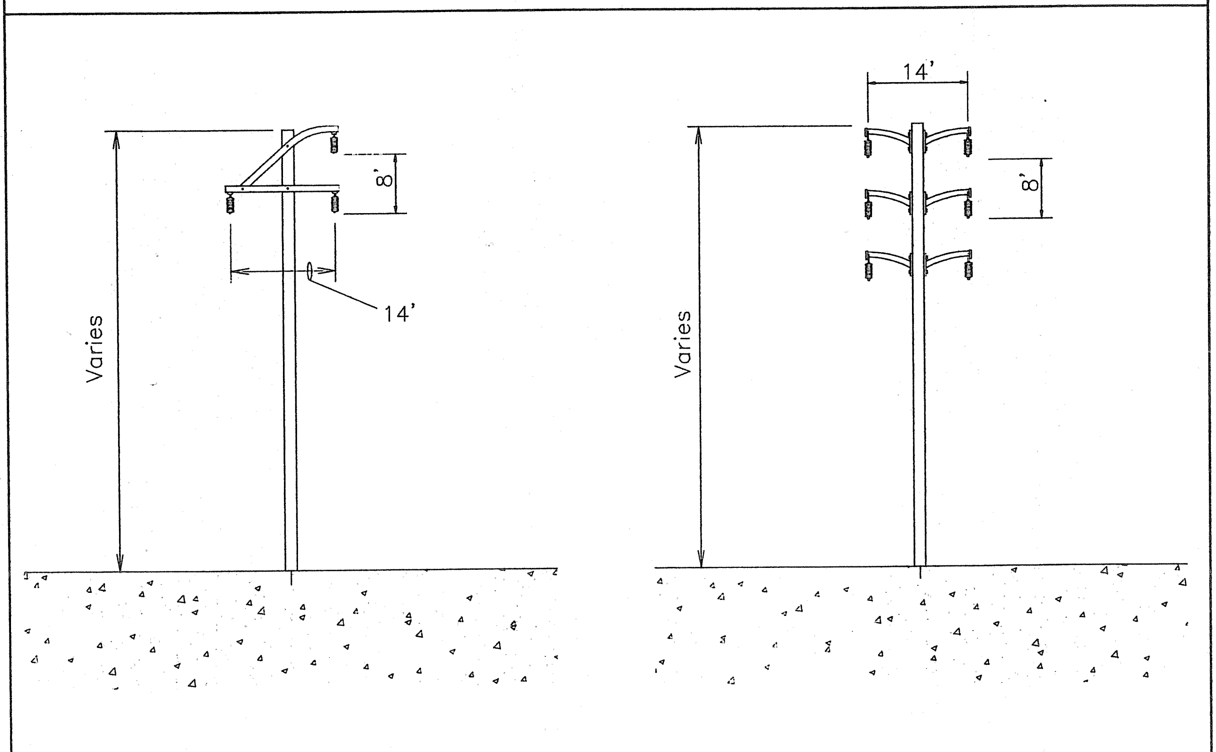


Both the proposed Single-Circuit and Double-Circuit designs meet or exceed SCE's preferred overhead 115 kV designs as listed on Table 1. These designs[28] would be uniformly and equitably applied to the entire Proposed Subtransmission Line routes (i.e. no-cost and low-cost magnetic field reduction measures can be applied to the entire route); therefore, the proposed overhead designs for the Proposed Subtransmission Lines incorporate no-cost and low-cost magnetic field reduction measures.

As a comparison, Figure 6 below shows typical existing 115 kV designs for Area A and B.

[28] Depending upon locations, the proposed poles would be either light weight steel (LWS) or tubular steel poles (TSP).

Figure 6. Existing 115 kV Overhead Designs for Area A and B



The existing overhead designs have about 4 feet wider circuit-to-circuit distances compared to the proposed Single-Circuit and Double-Circuit designs as shown on Figure 4 and Figure 5 above. The existing single-circuit design has wider phase-to-phase distance compared to the proposed Single-Circuit Design. The existing overhead designs also have suspended insulators, typically 4 foot long. Using post type insulators for the proposed designs would result in placing the bottom conductor 4 feet higher than existing designs even if the same length of poles are used for constructing new ones. Therefore, as an illustration of comparing designs, both proposed Single-Circuit and Double-Circuit designs are better than existing designs in the context of no-cost and low-cost magnetic field reductions. Figure 7 to Figure 10 show existing designs vs. proposed designs with proposed 115 kV circuit rearrangements in Area A and B.

Figure 7. Existing vs. Proposed 115 kV Designs for Area A

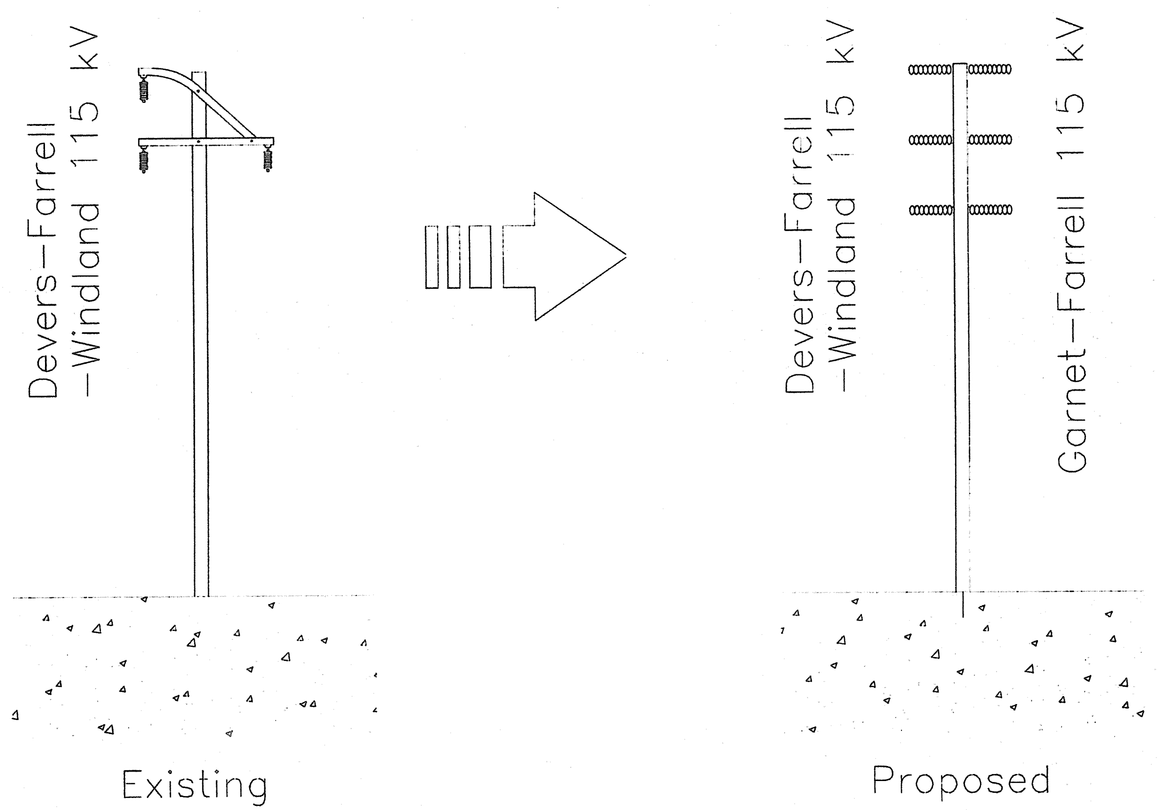
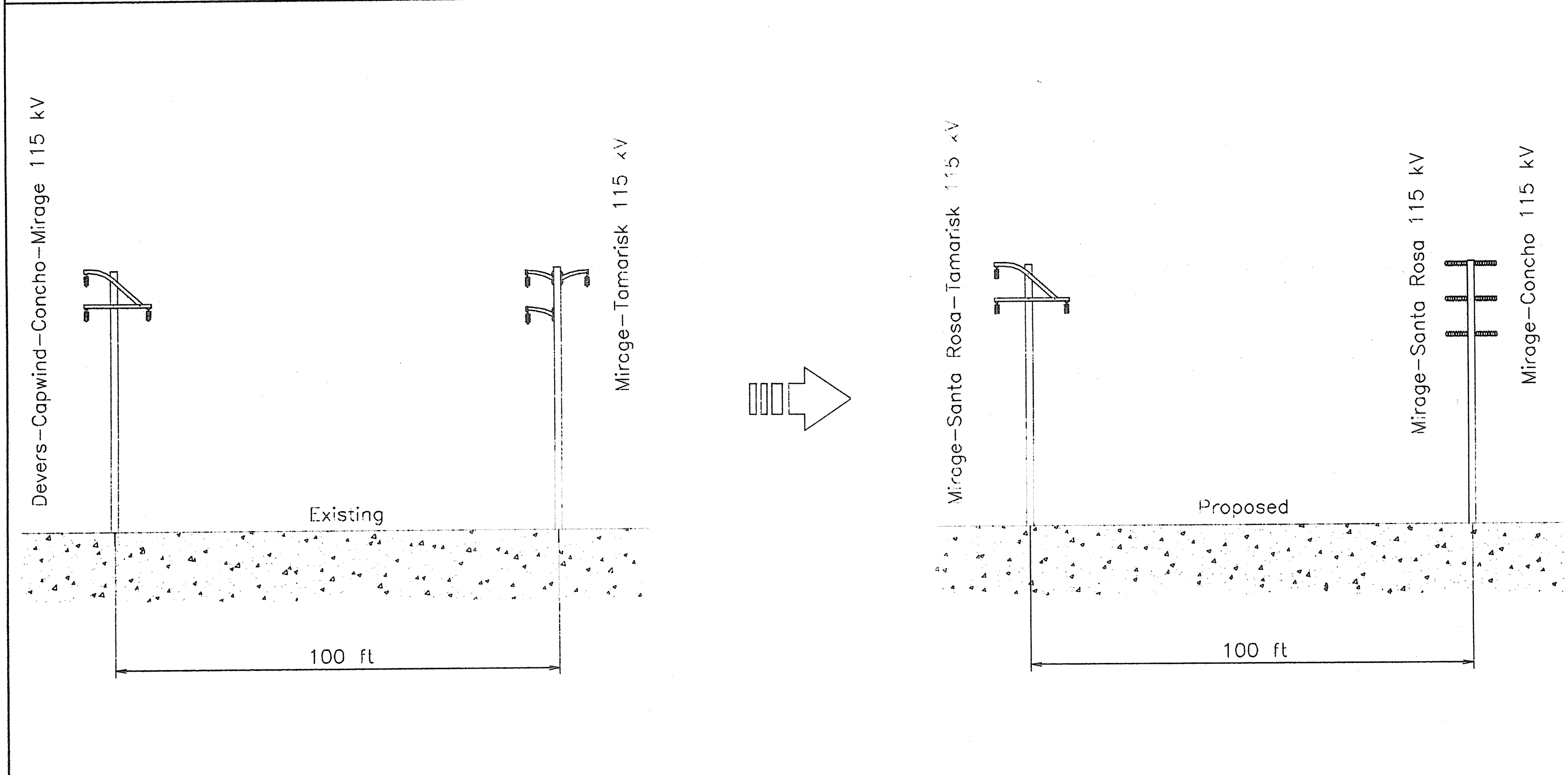


Figure 8. Existing vs. Proposed 115 kV Designs for Area B-Segment 1[29]



[29] In addition to constructing Proposed Subtransmission Lines, SCE would rearrange existing 115 kV subtransmission lines in Area B eliminating any crossovers.

Figure 9. Existing vs. Proposed 115 kV Designs for Area B-Segment 2

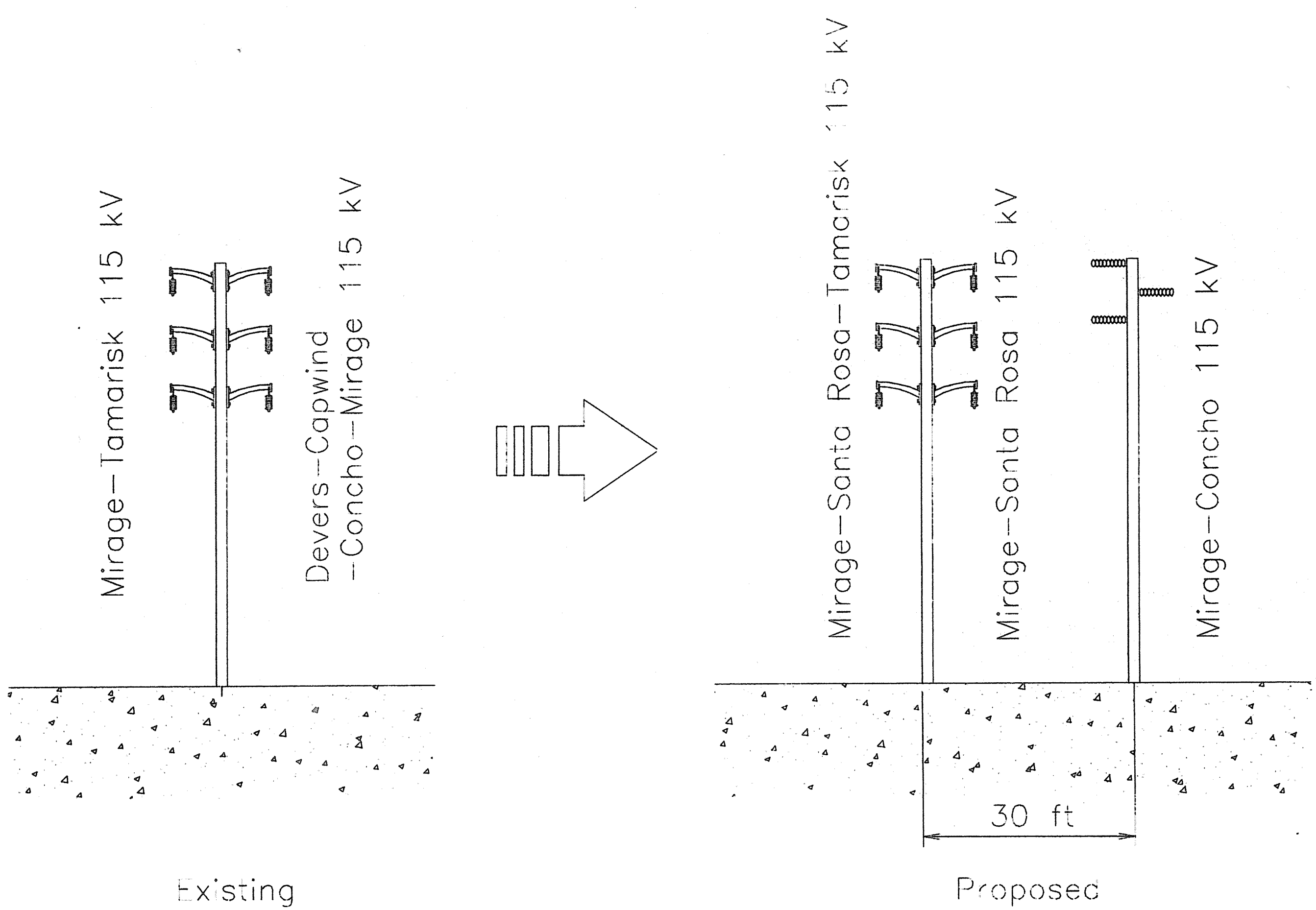
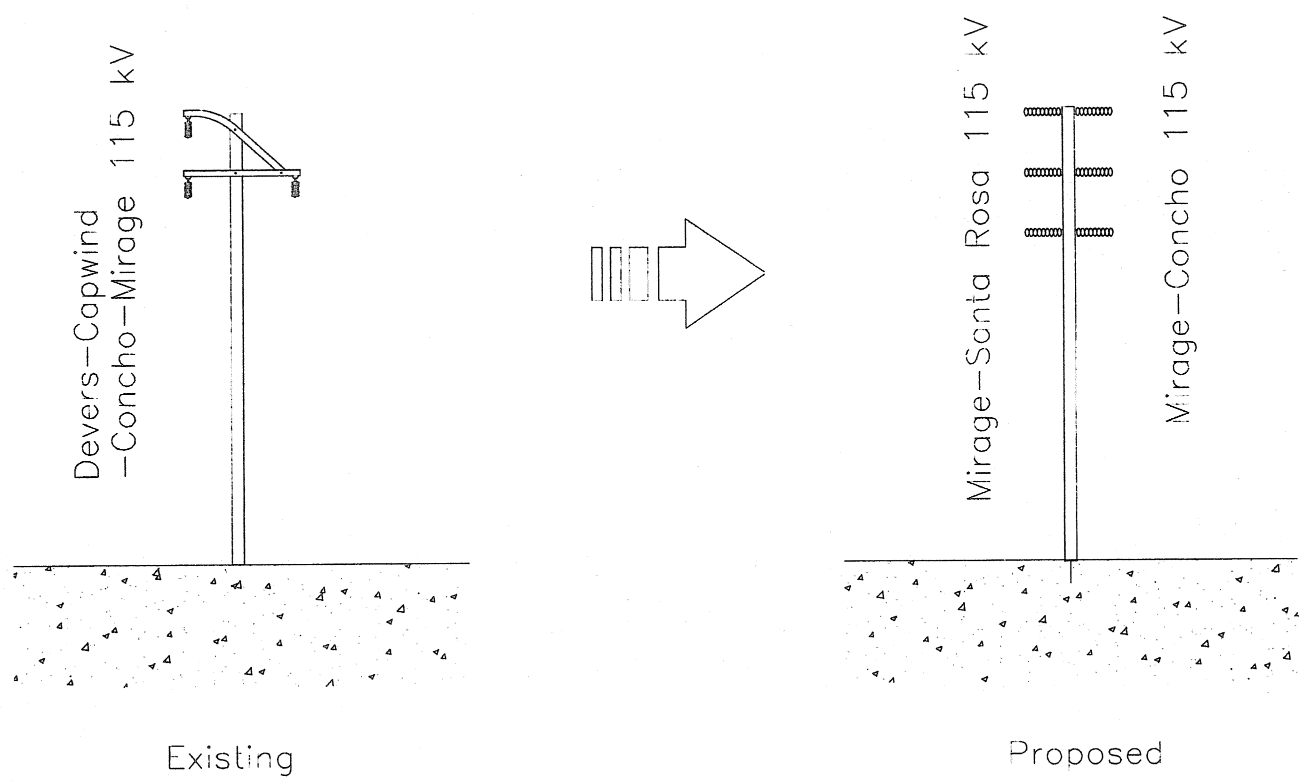


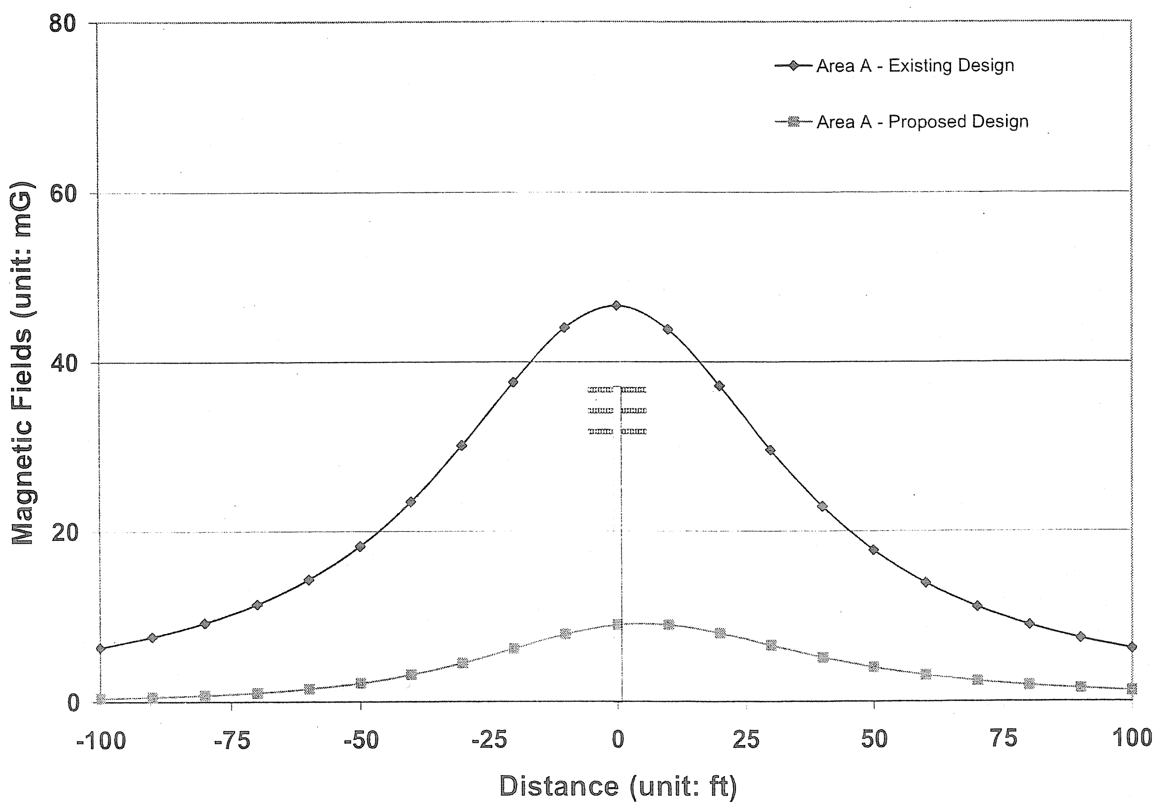
Figure 10. Existing vs. Proposed 115 kV Designs for Area B-Segment 3



The proposed overhead designs for the Proposed Subtransmission Lines can further reduce magnetic field levels by incorporating phasing options relative to the adjacent existing subtransmission lines. For Area A, as show on Figure 7 above, the proposed Garnet-Farrell 115 kV Subtransmission Line would be placed on the same poles with the existing Devers-Farrell-Windland 115 kV Subtransmission Line. Thus, the Proposed Subtransmission Line can be phased, with respect to the existing 115 kV subtransmission line, to further reduce the magnetic field levels for Area A. Figure 11 below shows a comparison between the magnetic field levels of the existing design (i.e. without the Proposed Subtransmission Line) vs. the proposed design (i.e. once the Proposed Subtransmission Line is operational). The model is based upon the forecasted peak loading conditions for 2010 (see §VII-Appendix A for more detailed information about the calculation assumptions and loading conditions). As Figure 11 illustrates, the Proposed Double-Circuit Design (with optimal phasing measures added) would produce lower magnetic fields as compared to the existing design. Near the existing Farrell Substation, there are homes across Gene Autry Trail (left side of Figure 11) and it is surrounded by commercial area. Using additional 5 foot taller poles would not reduce the magnetic fields levels by 15% or more for these homes across Gene Autry Trail; however, 75 feet (above ground) poles would be used near the existing Farrell Substation for engineering requirements; it would reduce the magnetic fields for adjacent commercial area. The rest of the proposed route is undeveloped area where no low-cost magnetic field reduction measures are considered as directed by the CPUC[30].

[30] CPUC Decision 06-01-042, Findings of Fact No. 18, p. 20

Figure 11. A Design Comparison of Magnetic Field Levels for Area A
(Existing Design vs. Proposed Design)



SCE would re-arrange existing 115 kV subtransmission lines in Area B for eliminating any crossovers, and build the Proposed Subtransmission Line (Mirage-Santa Rosa 115 kV) which would parallel the existing 115 kV subtransmission lines as show on Figure 8 to Figure 10 above. Therefore, the Proposed Subtransmission Line can also be phased with existing 115 kV subtransmission lines to further reduce magnetic field levels. Figure 12 to Figure 14 show comparisons between the magnetic field levels of the existing design (i.e. without the Proposed Subtransmission Line) vs. the proposed design (i.e. once the Proposed Subtransmission Line is operational with circuit rearrangements and optimal phasing measures added) for Area B Segment 1 to 3. As Figure 12 to Figure 14 illustrate, the proposed Double-Circuit Design (with optimal phasing measures added) would produce lower magnetic fields as compared to the existing designs. There are few homes in Area B-Segment 1 (left side of Figure 12) and homes in Area B-Segment 2 (also left side of Figure 14). For these areas, using additional 5 foot taller poles were considered as a low-cost magnetic field reduction measure. However, using 5 foot taller poles would not reduce the magnetic field levels by additional 15% for Area B-Segment 1 and 2. Therefore, using 5 foot taller poles were not recommended.

Figure 12. A Design Comparison of Magnetic Field Levels for Area B-Segment 1 (Existing Design vs. Proposed Design)

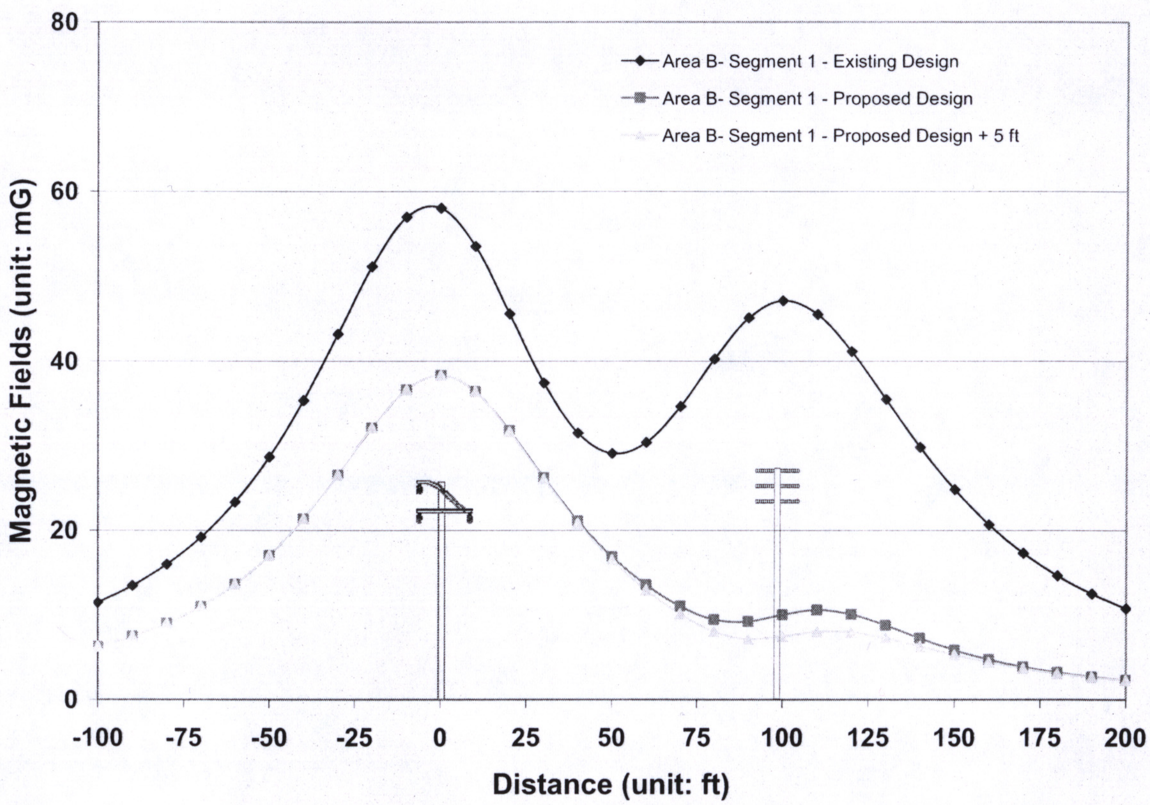


Figure 13. A Design Comparison of Magnetic Field Levels for Area B-Segment 2
(Existing Design vs. Proposed Design)

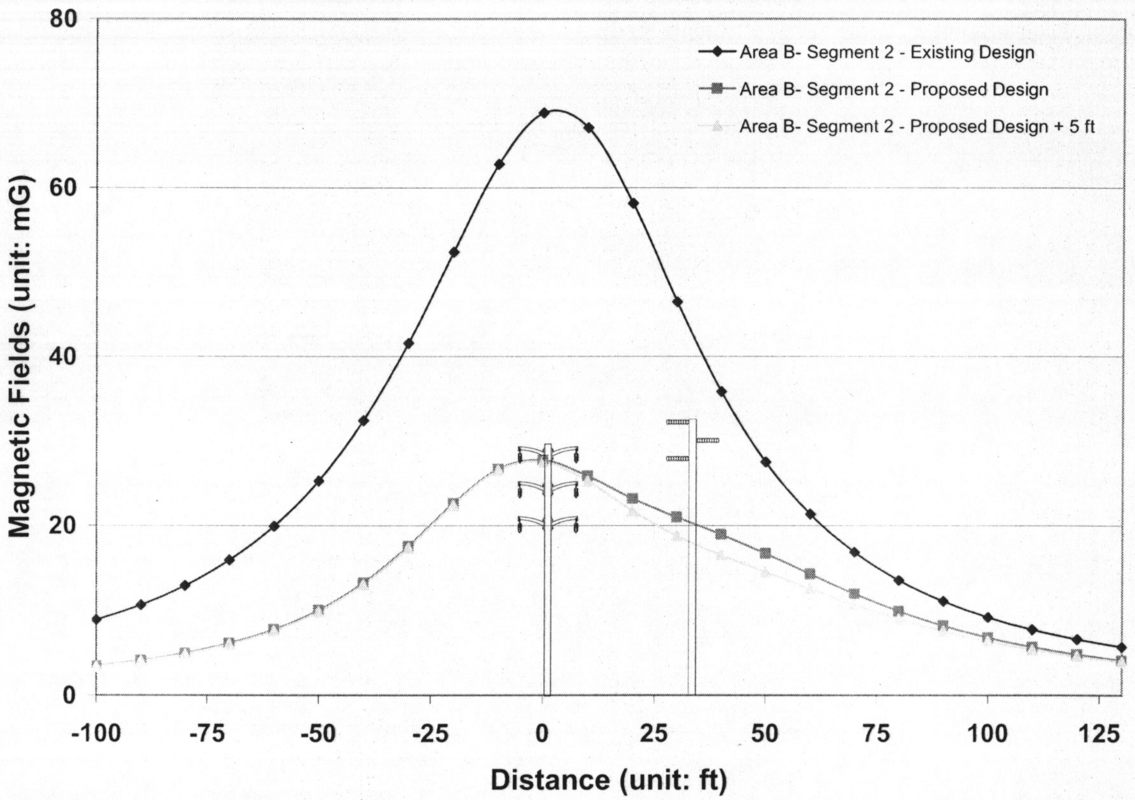
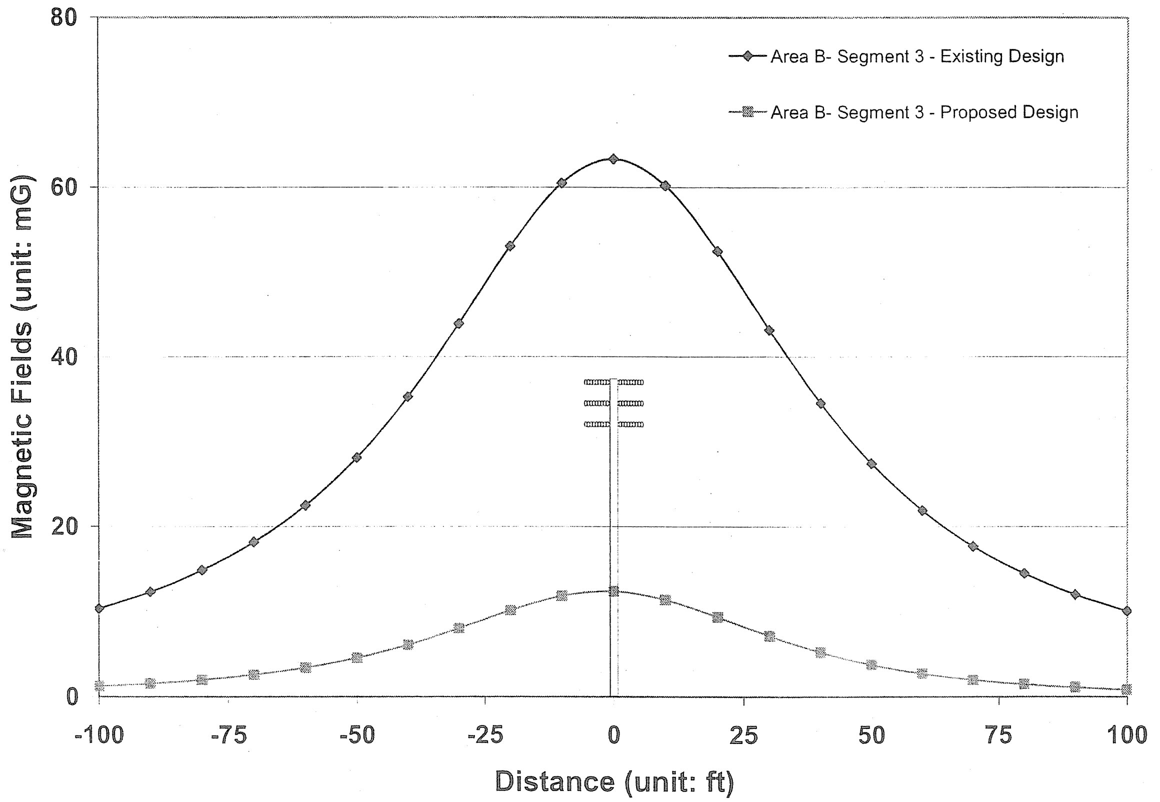


Figure 14. A Design Comparison of Magnetic Field Levels for Area B-Segment 3 (Existing Design vs. Proposed Design)



Project Part 2: Reconfiguring existing 115 kV subtransmission lines

In addition to constructing Proposed Subtransmission Lines, SCE would reconfigure existing 115 kV subtransmission lines to create new ones in Area D and E on Figure 1 as follows:

- Create the Mirage-Capwind-Devers-Tamarisk and Mirage-Santa Rosa-Tamarisk 115 kV subtransmission lines in accordance with the following scope of work:

- Replace two TSPs, one LWS pole, and one wood pole at the intersection of Dinah Shore Drive and Bob Hope Drive with four TSPs, and three LWS poles with three 115 kV pole switches:
- At the northwest corner of Bob Hope Drive and Dinah Shore Drive, replace one TSP with one new LWS pole to obtain the required vertical rise of the existing conductors that would connect to one new TSP.
- At the southwest corner of Bob Hope Drive and Dinah Shore Drive, replace one wood pole with one new LWS pole to obtain the required vertical rise of the existing conductors that would connect to one new TSP.
- At the southeast corner of Bob Hope Drive and Dinah Shore Drive, replace one TSP with one new LWS pole to obtain the required vertical rise of the existing conductors that would connect to one new TSP.
- At the northeast corner of Bob Hope Drive and Dinah Shore Drive, replace one TSP with one new TSP pole to obtain the required vertical rise.
- Split the existing Garnet-Santa Rosa 115 kV subtransmission line at the intersection of Bob Hope Drive and Dinah Shore Drive by removing the span of wire that connects the southwest and northeast corner poles
- Split the Santa Rosa-Tamarisk at the same intersection by dead ending and grounding the Santa Rosa leg at the northwest corner pole.
- Connect the open Tamarisk leg of the former Santa Rosa-Tamarisk 115 kV subtransmission line to the open Garnet leg of the former Garnet-Santa Rosa 115 kV subtransmission line at the northeast corner pole of Bob Hope Drive and Dinah Shore Drive.
- Create the Mirage-Santa Rosa-Tamarisk 115 kV subtransmission line by tapping the former southern segment of the Garnet-Santa Rosa 115 kV

subtransmission line to the Mirage-Tamarisk 115 kV subtransmission line at the northwest corner pole.

  - Create the Mirage-Capwind-Devers-Tamarisk 115 kV subtransmission line by installing a span of conductor between the former north segment of the Garnet-Santa Rosa 115 kV subtransmission line and the former west segment of the Santa Rosa-Tamarisk 115 kV subtransmission line at the northwest corner of Bob Hope Drive and Dinah Shore Drive.
  - Split the existing Garnet-Santa Rosa 115 kV subtransmission line by dead-ending and grounding the Garnet leg to the new TSP installed east of Date Palm Drive and south of Varner Road.
  - Connect the existing Devers-Capwind-Mirage 115 kV subtransmission line to the former Santa Rosa leg of the former Garnet-Santa Rosa 115 kV subtransmission line at the new TSP installed east of Date Palm Drive and south of Varner Road to form the new Mirage-Capwind-Devers-Tamarisk 115 kV subtransmission line.

- Create the new Devers-Eisenhower-Thornhill and the Eisenhower-Tamarisk 115 kV subtransmission lines by rearranging and modifying the existing Tamarisk-Thornhill and Devers-Eisenhower 115 kV subtransmission line in accordance with the following scope of work:
  - Install two TSPs inside Eisenhower Substation.
  - Rearrange the existing Tamarisk-Thornhill 115 kV subtransmission line and attach the Tamarisk tap to the switchrack at Eisenhower Substation to create the Eisenhower-Tamarisk 115 kV subtransmission line.
  - Attach the Thornhill tap of the existing Tamarisk-Thornhill 115 kV subtransmission line to the existing Devers-Eisenhower 115 kV

subtransmission line to create the Devers-Eisenhower-Thornhill 115 kV subtransmission line.

- Upgrade one existing 115 kV subtransmission line position at Devers Substation, upgrade one existing 115 kV subtransmission line at Thornhill Substation, upgrade three existing 115 kV subtransmission lines at Eisenhower Substation, and upgrade one existing 115 kV subtransmission line at Tamarisk substation.
- Replace two 115 kV circuit breakers at Devers Substation and replace three 115kV circuit breakers at Eisenhower Substation.

All proposed reconfiguration activities described above are limited in scope[31] and does not provide significant opportunities to implement magnetic field reduction measures, except for phasing newly created 115 kV subtransmission lines with adjacent subtransmission lines.

Newly created Mirage-Capwind-Devers-Tamarisk 115 kV Subtransmission Line would parallel the newly created Mirage-Tamarisk-Santa Rosa 115 kV Subtransmission Line along Plumley Road and then along Dinah Shore Drive from the existing Tamarisk Substation to the corner of Dinah Shore Drive and Bob Hope Drive in the City of Rancho Mirage; see Figure 1 (Area D) above. Therefore, two circuits can be phased to reduce the magnetic fields as a "low-cost" magnetic field reduction measure.

Newly created Devers-Eisenhower-Thornhill 115 kV Subtransmission Line would parallel the existing Farrell-Eisenhower 115 kV Subtransmission Line along Dinah Shore Drive from Eisenhower Substation to Whitewater River in the City of Palm Springs; Figure 1 (Area E) above. Therefore, two circuits can also be phased to reduce magnetic fields as a "low-cost" magnetic field reduction measure.

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[31] The reconfiguration activity involves significantly less than 2,000 ft of circuit length.

Project Part 3: Install the 220 kV loop-in of Devers-Coachella Valley Transmission Line into Mirage Substation

The Proposed Devers-Coachella Valley 220 kV Loop In at Mirage Substation would include the following work:

- Loop the existing Devers-Coachella Valley 220 kV transmission line into the Mirage Substation along the existing right-of-way, for approximately 0.8 mile, on double-circuit lattice towers, forming the new Devers-Mirage and Coachella Valley-Mirage 220 kV transmission lines in accordance with the following scope of work:
    - Install approximately 7,240 feet of single-circuit 220 kV transmission line on eight new, double-circuit (LSTs. The new towers would be strung with single 1033 kcmil ACSR conductors on new polymer insulators.
    - Remove 4 LSTs and 3,770 feet of existing single-circuit 220 kV transmission line in or near the existing east-west 220 kV right-of-way north of the Mirage Substation.
    - Install one new TSP and 1,000 feet of single-circuit 220 kV transmission line at Mirage Substation and rearrange the Julian Hinds 220 kV transmission line from the existing LSTs on the westside of the 0.81-mile right-of-way to existing LSTs on the eastside of the 0.81-mile right-of-way.
    - Install 1,540 feet of single-circuit 220 kV transmission line and remove 820 feet of single-circuit 220 kV transmission line between the 220 kV switchrack located inside Mirage Substation and the three LSTs and one TSP adjacent to the north fence of Mirage Substation.
- Install two new 220 kV transmission line positions at Mirage Substation.
- Install three new 220 kV circuit breakers at Mirage Substation.

Figure 15. Existing vs. Proposed 220 kV Designs for Area C

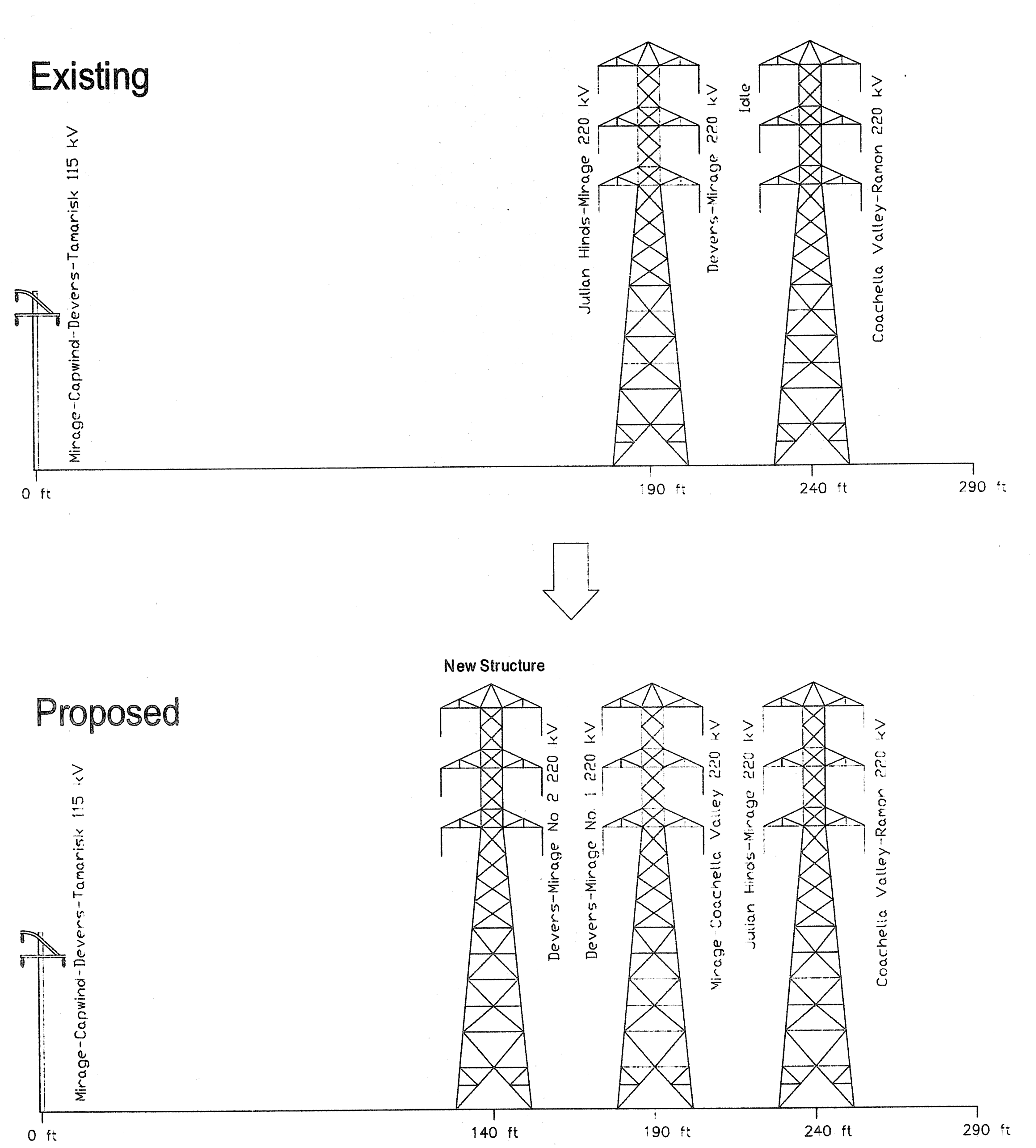


Figure 16. A Design Comparison of Magnetic Field Levels for Area C

(Existing Design vs. Proposed Design)

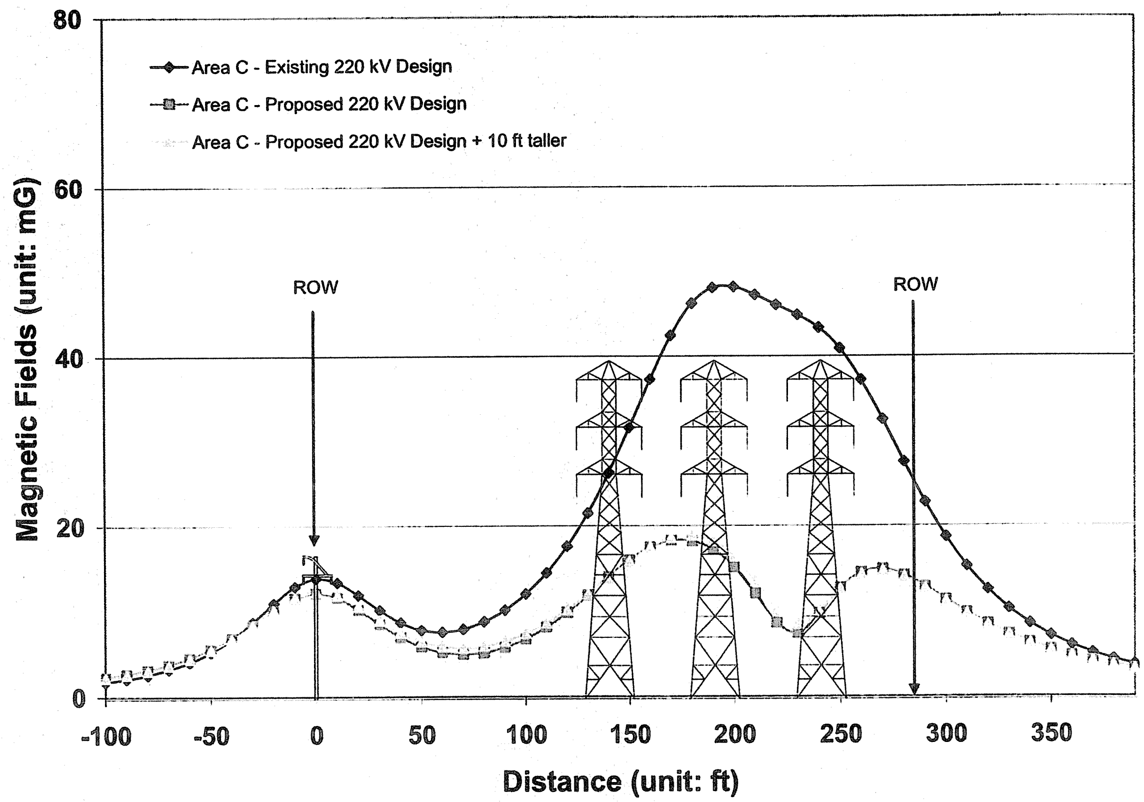


Table 2. A Comparison of Magnetic Fields at Edges of ROW for Area-C				
Design Options	**Left ROW (mG)**	**% Reduction**	**Right ROW (mG)**	**% Reduction**
Area C - Existing 220 kV Design	13.8	Base	22.8	Base
Area C - Proposed 220 kV Design	12.1	12.3	12.9	43.4
Area C - Proposed 220 kV Design + 10 ft taller	12.3	Less than 15% Increase	12.7	1.6

As illustrated on Figure 15, the proposed 220 kV tower would be the same type as the existing 220 kV towers. Residential homes are located on the left-side of Figure 15. Following magnetic field reduction design options were considered.

- Phasing 220 kV transmission lines to reduce the magnetic fields; and
- Using taller 220 kV transmission towers.

As illustrated on Table 2, phasing 220 kV transmission lines would meet the 15% magnetic field reduction requirement. This design option can be applied in to the project as a "low-cost" magnetic field reduction measures. Using taller towers, however, would not meet the 15% magnetic field reduction requirement. Moreover, using taller towers may decrease magnetic field cancellation effects. Thus, using taller towers were considered, but not recommended.

Project Part 4: Constructing limited improvements at existing substations to accommodate Part 1 and 2 above

In order to accommodate all work described in Project Part 1 and 2 above, SCE proposed to construct limited improvements at existing substations. These limited improvements area also limited in scope (i.e. using existing empty circuit positions at substations) and does not provide significant opportunities to implement magnetic field reduction measures. Only applicable activity for considering "no-cost and low-cost" magnetic field measures is installing a 220/115 kV transformer at the existing Mirage Substation according to SCE's EMF Design Guidelines.

The proposed location of the transformer within the substation is more than 50 feet from the substation property line; therefore, the proposed transformer location meets the setback distance specified in the EMF Design Guidelines

Table 3 on page 39 summarizes no-cost and low-cost magnetic field reduction measures that SCE considered for each segment of the Proposed Project:

Table 3. No-cost and Low-cost Magnetic Field Reduction Measures for Area A through E

Area No.	Location[32]	Adjacent Land Use[33]	MF Reduction Measures Considered	Estimated Cost to Adopt	Measure(s) Adopted? (Yes/No)	Reason(s) if not adopted
Area A	From Garnet Substation to Farrell Substation	2, 3, 6	• Taller poles • Pole-head configuration • Phase Circuit	• Low-Cost • No-Cost • Low-Cost[34]	• Yes • Yes • Yes	
Area B – Segment 1	From Mirage Substation to Vista De Oro & Calle Francisco	2, 6	• Taller poles, • Pole-head configuration • Phase Circuit	• Low-Cost • No-Cost • No-Cost	• Yes • Yes • Yes	
Area B – Segment 2	From Area B-Segment 1 to Vista De Oro & Calle Tosca	2	• Taller poles, • Pole-head configuration • Phase Circuit	• Low-Cost • No-Cost • No-Cost	• Yes • Yes • Yes	
Area B – Segment 3	From Area 3-Segment 1 to Vista De Oro & Adjacent to I-10 Freeway	6	• Taller poles, • Pole-head configuration • Phase Circuit	• Low-Cost • No-Cost • No-Cost	• Yes • Yes • Yes	
Area C	0.8 mile north of Mirage Substation to Mirage Substation	2, 6	• Phase Circuit • Taller Structures	• Low-Cost • Low-Cost	• Yes • No	Less than 15% Reduction
Area D	From Tamarisk Substation to the corner of Dinah Shore Drive and Bob Hope Drive along Dinah Shore Drive	1, 2, 3	• Phase Circuits	• Low-Cost	• Yes	
Area E	From Eisenhower Substation to Whitewater River along Dinah Shore Drive	2, 3	• Phase Circuits	• Low-Cost	• Yes	
Mirage Sub	Within the existing substation	2	• 50 ft or more setback distance of the proposed transformer from the substation property line	• No-Cost	• Yes	

32 This column shows the nearest cross streets or substation names as reference points.

33 Land usage codes are as follows: 1) schools, licensed day-cares, and hospitals, 2) residential, 3) commercial/industrial, 4) recreational, 5) agricultural, and 6) undeveloped land.

34 SCE may need to rephrase (or transpose) existing 115 kV subtransmission lines.

This FMP includes only no-cost and low-cost magnetic field reduction measures for SCE's Proposed Subtransmission Line routes. SCE's Proponent's Environmental Assessment (PEA) contains various project alternatives, including various alternative line routes. If any alternative route is chosen for this project, a supplemental FMP will be prepared, along with an engineering design.

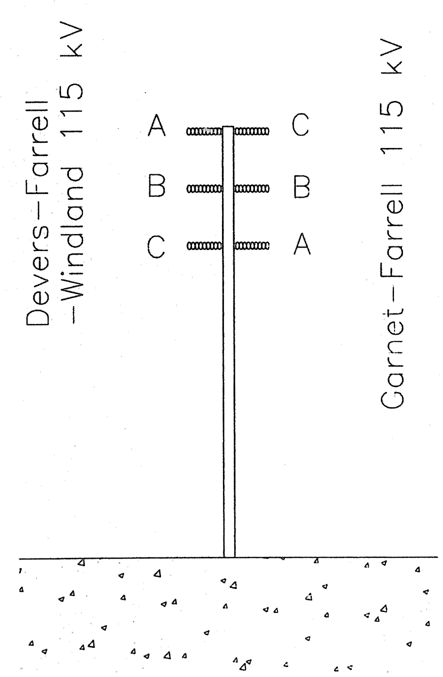
VI. FINAL RECOMMENDATIONS FOR IMPLEMENTING NO-COST AND LOW-COST MAGNETIC FIELD REDUCTION MEASURES

In accordance with the "EMF Design Guidelines", filed with the CPUC in compliance with CPUC Decisions 93-11-013 and 06-01-042, SCE would implement the following no-cost and low-cost magnetic field reduction measures for this project. These recommended magnetic field reduction measures would be uniformly and equitably applied to the entire Proposed Subtransmission Line route:

For Area A:

- Using taller poles (typically 65 to 70 feet above the ground, except in areas near the Farell Substation, it would be about 75 feet above ground);
- Using a double-circuit pole-head configuration (or similar) as shown on Figure 5
- Phasing the Proposed Subtransmission Line with respect to the existing 115 kV subtransmission line as shown on Figure 17 below:

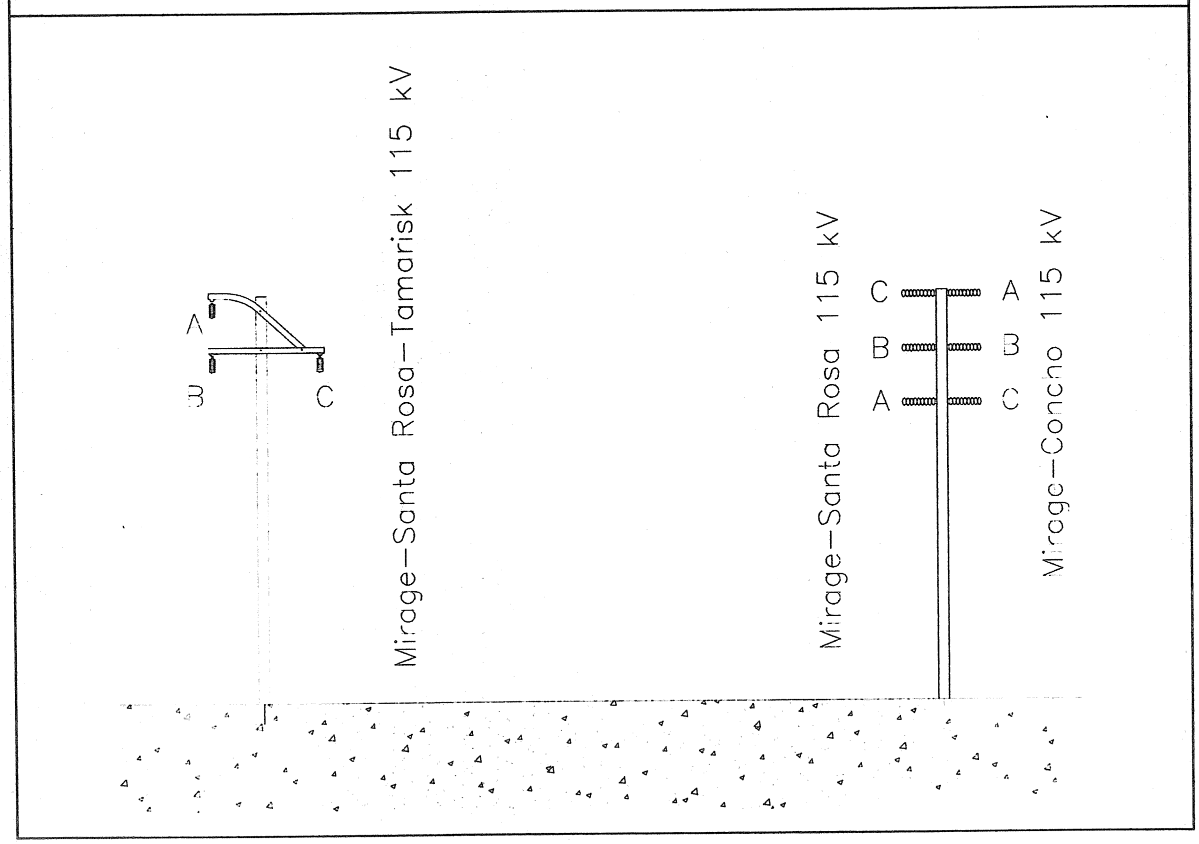
Figure 17. Proposed 115 kV Phasing Arrangement for Area A



For Area B – Segment 1:

- Using taller poles (typically 65 to 70 feet above the ground);
- Using a double-circuit pole-head configuration as shown on Figure 5
- Phasing the Proposed Subtransmission Line with respect to the existing 115 kV subtransmission line as shown on Figure 18 below:

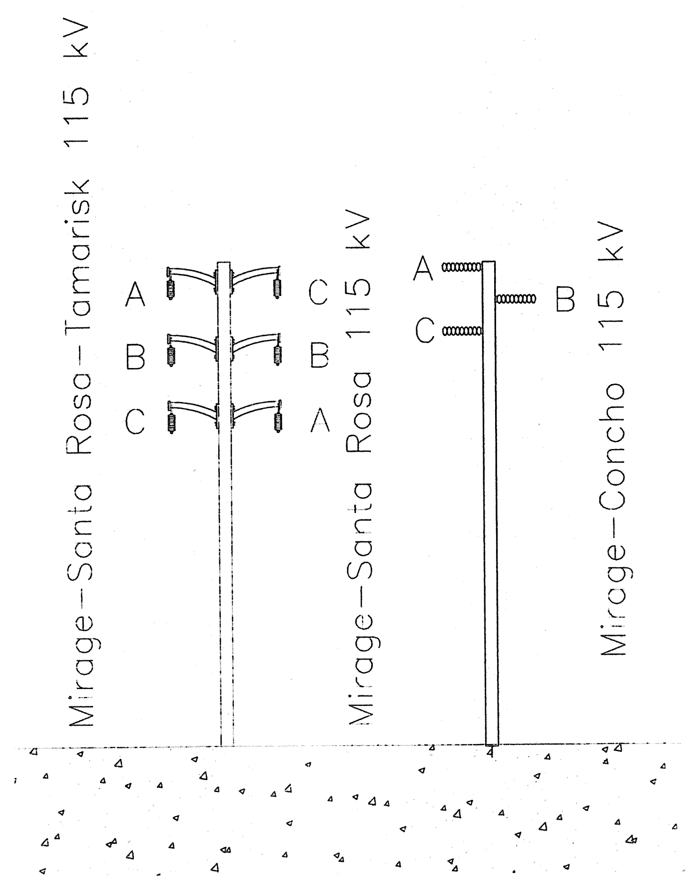
Figure 18. Proposed 115 kV Phasing Arrangements for Area B – Segment 1



For Area B – Segment 2:

- Using taller poles (65 to 70 feet above the ground);
- Using a triangle configuration as shown on Figure 4;
- Phasing the Proposed Subtransmission Line with respect to the existing 115 kV subtransmission lines as shown on Figure 19 below:

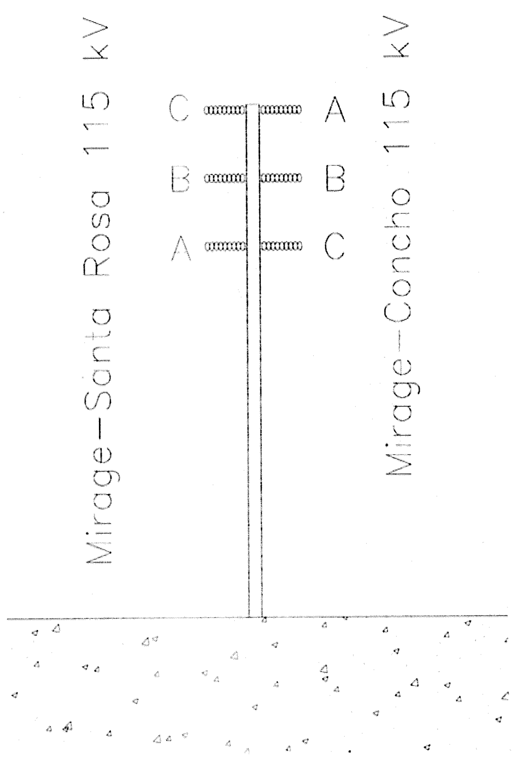
Figure 19. Proposed 115 kV Phasing Arrangements for Area B – Segment 2



For Area B – Segment 3:

- Using taller poles (typically 65 to 70 feet above the ground)
- Using a double-circuit pole-head configuration as shown on Figure 5;
- Phasing the Proposed Subtransmission Line with respect to the existing 115 kV subtransmission line as shown on Figure 20 below:

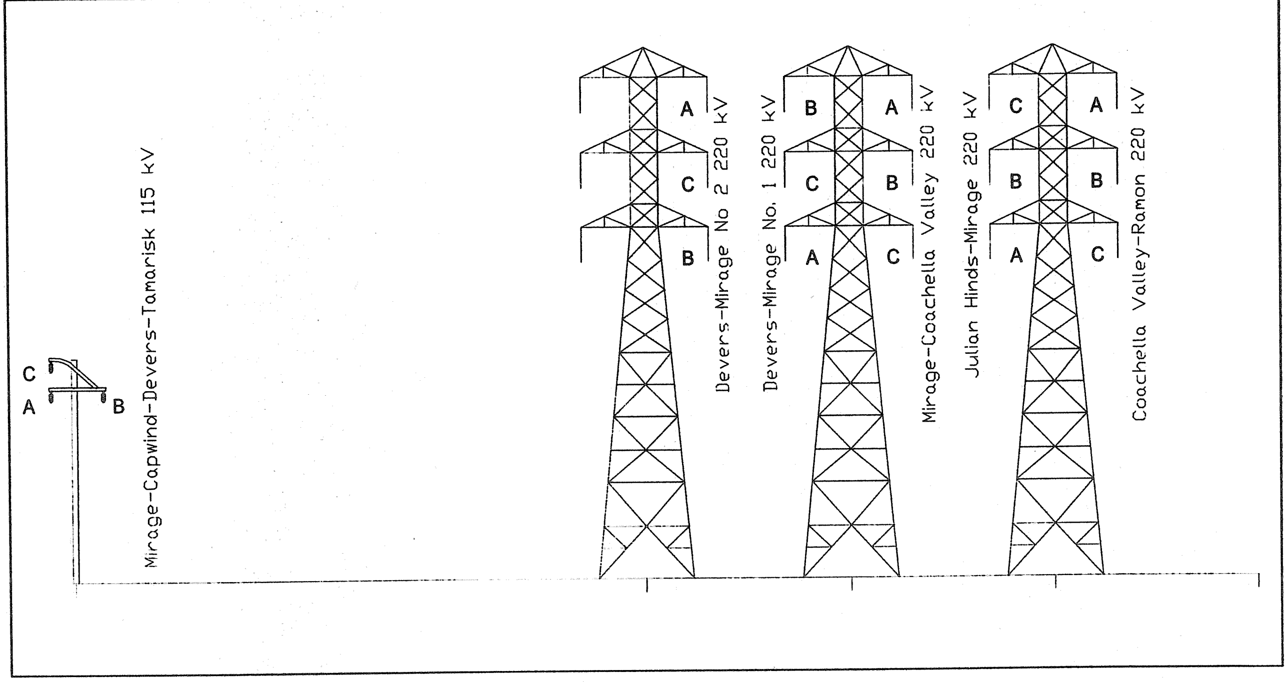
Figure 20. Proposed 115 kV Phasing Arrangements for Area B – Segment 3



For Area C:

- Phasing the newly created transmission line with respect to the existing 220 kV transmission lines as shown on Figure 21.

Figure 21. Proposed 220 kV Phasing Arrangements for Area C

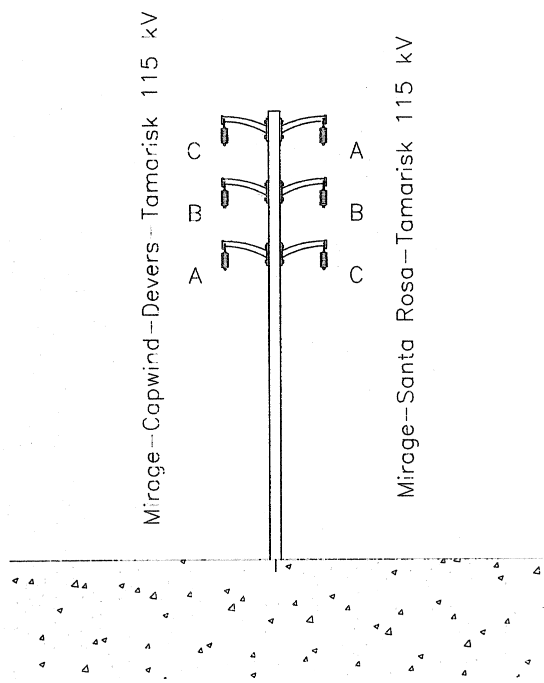


Note: All phasing sequences would be remained the same, except Devers-Mirage 220 kV and Julian Hinds-Mirage 220 kV transmission lines.

For Area D:

- Phasing the newly created subtransmission line with respect to the existing 115 kV subtransmission line as shown on Figure 22 below.

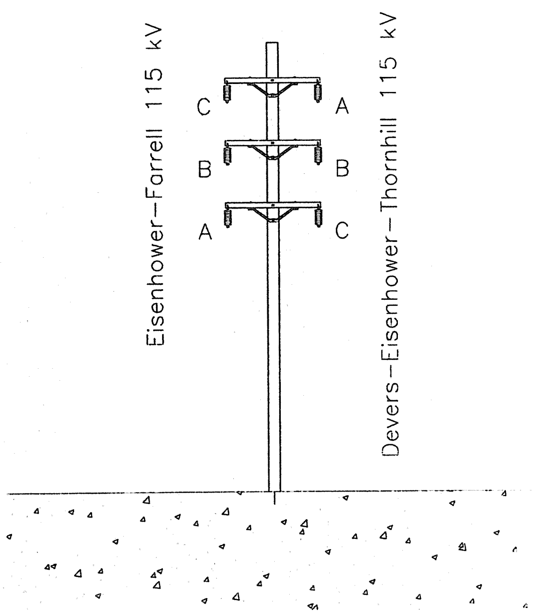
Figure 22. Proposed 115 kV Phasing Arrangements for Area D



For Area E:

- Phasing the newly created subtransmission line with respect to the existing 115 kV subtransmission line as shown on Figure 23 below.

Figure 23. Proposed 115 kV Phasing Arrangements for Area E



For existing Mirage Substation:

- Placing the proposed 220/115 kV transformer 50 feet (or more) distance from the substation property line.

SCE's plan for applying the above no-cost and low-cost magnetic field reduction measures equitably and uniformly for the Proposed Subtransmission Line is consistent with the CPUC's EMF Decisions No. 93-11-013 and No. 06-01-042, and also with recommendations made by the U.S. National Institute of Environmental Health Sciences. Furthermore, the recommendations above meet the CPUC approved EMF Design Guidelines as well as all applicable national and state safety standards for new electric facilities.

VII. APPENDIX A: TWO-DIMENTIONAL MODEL ASSUMPTIONS AND YEAR 2010 FORECASTED LOADING CONDITIONS

Magnetic Field Assumptions:

SCE' uses a computer program titled "MFields"[35] to model the magnetic field characteristics of various transmission and subtransmission line designs and magnetic field reduction measures. Typical two-dimensional magnetic field modeling assumptions include:

- All transmission and subtransmission lines would be considered operating at forecasted loads (see Table 4 and Table 5 below) and all conductors are straight and infinitely long;
- Five feet of sagging for all 115 kV overhead subtransmission line designs;
- Typical 40 ft minimum ground clearance for all 220 kV overhead transmission designs;
- Average sagging for all 220 kV overhead transmission designs (average sagging is approximately equal to 1/3 of sagging plus minimum clearance to the ground);
- All poles and towers are located next to each other;
- Magnetic field strength is calculated at a height of three feet above ground;
- Resultant magnetic fields are being used;
- All line currents are balanced (i.e. neutral or ground currents are not considered);
- Terrain is flat; and
- Dominant power flow directions are being used.

Table 4. Year 2010 Forecasted Loading Conditions 115 kV Subtransmission Lines

Circuit Name	Without Proposed Project (Amp)	With Proposed Project (Amp)
Devers-Capwind-Concho-Mirage 115 kV	1146	N/A
Mirage-Concho 115 kV	N/A	694
Mirage-Tamarisk 115 kV	1111	N/A
Mirage-Santa Rosa-Tamarisk 115 kV	N/A	704

35 Kim, C, MFields for Excel, Version 2.0, 2007.

Table 4. Year 2010 Forecasted Loading Conditions 115 kV Subtransmission Lines		
Circuit Name	**Without Proposed Project (Amp)**	**With Proposed Project (Amp)**
Devers-Farrell-Windland 115 kV	680	448
Garnet-Farrell 115 kV	N/A	528
Mirage-Santa Rosa 115 kV	N/A	727

Notes:

1. Forecasting data shown above are applicable to subtransmission line segments for magnetic field models for Area A and B.
2. The power flow direction is from Mirage Substation to other substations connected, and Farrell Substation receives power from other substations connected as they are listed above.
3. Forecasted loading data is based upon scenarios representing load forecasts for the year 2010. The forecasting data is subject to change depending upon availability of generations, load increase, changes in load demand, and by many other factors.
4. "Without Proposed Project" indicates the year 2010 forecasted loading conditions if the Proposed Project is not operational.

Table 5. Year 2010 Forecasted Loading Conditions for 220 kV and 115 kV Transmission and Subtransmission Lines near Mirage Substation		
Circuit Name	**Without Proposed Loop-In (Amp)**	**With Proposed Loop-In (Amp)**
(Coachella Valley)-Ramon 220 kV	681	585
Mirage-(Julian Hinds) 220 kV	839	826
Devers-(Mirage) No. 1 220 kV[36]	270	372
Devers-(Mirage) No. 2 220 kV	N/A	373
Devers-(Coachella Valley) 220 kV	497	N/A
(Coachella Valley)-Mirage 220 kV	N/A	608
(Mirage)-(Capwind)-(Devers)-Tamarisk	219	219

Notes:

1. Names in parenthesis indicate that the power is flowing from them to others (names without parenthesis)
2. Forecasting data shown above are applicable to transmission and subtransmission line segments for magnetic field models for Area C only

[36] The existing transmission name is "Devers-Mirage 220 kV."

CERTIFICATE OF SERVICE

I hereby certify that, pursuant to the Commission's Rules of Practice and Procedure, I have this day served a true copy of the **APPLICATION OF SOUTHERN CALIFORNIA EDISON COMPANY (U 338-E) FOR A PERMIT TO CONSTRUCT ELECTRICAL FACILITIES WITH VOLTAGES BETWEEN 50KV AND 200KV: DEVERS-MIRAGE 115 KILOVOLT SUBTRANSMISSION SYSTEM SPLIT PROJECT** on the parties identified below. Service was effected by placing the copies in properly addressed sealed envelopes and depositing such envelopes in the United States mail with first-class postage prepaid (Via First Class Mail).

Mr. B.B. Blevins
Executive Director
California Energy Commission
1516 9th Street, MS3-39
Sacramento, CA 95814-5512
(3 copies)

Mr. Kenneth Lewis
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
(2 copies)

Ms. Dana Appling
Division of Ratepayer Advocates
505 Van Ness Ave.
San Francisco, CA 94102

Executed January 31, 2008, at Rosemead, California.

Alejandra Arzola
Project Analyst
SOUTHERN CALIFORNIA EDISON COMPANY

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