Southern California Edison
San Joaquin Cross Valley Loop Project A.08-05-039

DATA REQUEST SET SJXVL CPUC-ED-03

To: ENERGY DIVISION
Prepared by: Tracy Tate
Title: Engineer
Dated: 08/07/2008

Question 01:

Proposed Project

Provide the type of structure (e.g., lattice tower) and heights above ground associated with the existing structures that would be moved and replac4 along the 1.1 mile segment from Rector Substation to the north.

Response to Question 01:

Existing Big Creek 1 and Big Creek 3 – Rector 220 kV Transmission Line Structures - 1.1 miles north of Rector Substation to be removed

Existing Structure Number	Existing Structure Number	Existing Structure Description	Height
Big Creek 3-Rector 220 kV	**Big Creek 1-Rector 220 kV**		
Structure 1	Structure 1	Lattice Tower	Towers typically are in the 63 foot height range as shown on Figure 3.1 in the PEA
Structure 2	Structure 2	Lattice Tower	
Structure 3	Structure 3	Lattice Tower	
Structure 4	Structure 4	Lattice Tower	
Structure 5	Structure 5	Lattice Tower	
Structure 6	Structure 6	Lattice Tower	
Structure 7	Structure 7	Lattice Tower	
Structure 8	Structure 8	Lattice Tower	
Structure 9	Structure 9	Lattice Tower	
Structure 10	Structure 10	Lattice Tower	
Structure 11	Structure 11	Lattice Tower	
Structure 12	Structure 12	Lattice Tower	

For replacement structures, see Appendix D in PEA.

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To: ENERGY DIVISION
Prepared by: Steven K. Alford
Title: Project Manager-TPD
Dated: 08/07/2008

Question 02:

Proposed Project

Provide a description of the activities that would be allowed within the SCE ROW (e.g., under the transmission line) after project completion. If crops are allowed, please specify any cmps that would be restricted.

Response to Question 02:

SCE plans on acquiring new ROW through easement Activities that would typically be allowed within SCE's ROW after project completion are:

1. Agricultural and landscaping:
    a. Must maintain standard clearances from structures.
    b. Shrubs and trees must be maintained not to exceed a 15-foot maximum height.
    c. Some trees (i.e., walnut) and shrubs will be subject to species limitations specified by SCE.
2. Underground facilities, such as utility services and irrigation systems:
    a. A minimum of 36 inches of cover, measured from the top of the conduit or pipe to the surface of the ground must be maintained.
    b. Be able to withstand a gross load of 40 tons on three axles.
    c. No valves or controllers of any type allowed within the ROW.
    d. No parallel or longitudinal encroachments will be permitted.
    e. All underground improvements crossing in the ROW must do so perpendicularly to the centerline of the ROW.
3. Biking and hiking trails
4. Automotive vehicle parking is reviewed on a case-by-case basis.

Note: Any proposed uses must be compatible low-intensity uses that do not impose additional constraints on SCE’s ability to maintain and operate its facilities. All proposed uses within SCE’s ROW are subject to review by SCE, and must be approved by SCE in writing prior to the start of any construction.

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To: ENERGY DIVISION
Prepared by: Steven K. Alford
Title: Project Manager - TPD
Dated: 08/07/2008

Question 03:

Proposed Project

What area and/or radius around each pole and/or lattice tower would be required by SCE to remain clear of vegetation and/or agricultural crops in perpetuity?

Response to Question 03:

The permanent clearance areas around the structures for the proposed San Joaquin Cross Valley Loop Project are as follows.

Suspension Type Structures (1) =a 50' clearance around each structure, measured from the structure footing, will be required to the extent permitted by the width of the proposed 100' right-of-way.

Dead-end Type Structures (2) = a 100' clearance around each structure, measured from the structure footing, will be required to the extent permitted by the width of the proposed 100' right-of-way.

Notes:
1 - Suspension structures are those types of structures which support the vertical loading of the conductor.
2 – Dead-end structures are those types of structures which require additional strength to support the horizontal and lateral loading of the conductor, in addition to the vertical loading of the conductor (i.e.: used at major turning points, grade “A” crossings, and situations requiring long conductor spans).

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To: ENERGY DIVISION
Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 04:

Alternatives

SCE's San Joaquin Valley Comprehensive Study, dated 4/29/2004 (Study) includes, as part of system alternative 2 in the Study, a 175 MVAR SVC at Rector. Review of substation work contained in the PEA for the proposed project and alternative routings did not mention the installation of the SVC device. Has the need for the SVC been eliminated?

a) Has a SVC device been installed at Reactor Substation since the 2004 Comprehensive Report was prepared?

b) If so, what is its MVAR rating?

c) If not, will a SVC device need to be added the system in near future?

d) If an SVC device has not been installed and will not be required in near future, explain why the need has changed since 2004.

Response to Question 04:

a. Yes, the Rector SVC was installed in the spring of 2007 (see PEA, footnote 1 on page 1-2).
b. The Rector SVC has a +200/-120 MVAR rating.
c. n/a
d. n/a

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To: ENERGY DIVISION
Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 05 a-c:

Alternatives

Regarding reconductoring of the existing system and towers:

a) Would reconductoring both BC - Rector lines and both Vestal - Magunden lines with 666.6 kcmil ACSS/TW conductors as described in the 2004 Comprehensive Report be a viable project alternative meeting the forecasted electrical loads of Rector and Vestal Substations?

b) Would SVCs or other devices be needed in addition to reconductoring to ensure system stability?

c) What would be the approximate cost of the reconductoring alternative?

Response to Question 05 a-c:

a. The answer to this question is provided in the PEA, Section 2.1.2 System Alternatives Considered (Page 2-3). In addition reconductoring was addressed further in SCE's previously submitted response to CPUC Data Request #1, question 33.

b. Reconductoring is not a viable project alternative. Adding SVCs or other devices would not make reconductoring a viable project alternative.

c. Since reconductoring is not a viable project alternative, the potential cost of reconductoring has not been investigated.

To: ENERGY DIVISION
Prepared by: Tracy Tate
Title: Engineer
Dated: 08/07/2008

Question 05 d:

Alternatives

Regarding reconductoring of the existing system and towers:

d) When were the present conductors of the Big Creek – Springville - Magunden and Big Creek - Rector - Vestal - Magunden 220 kV Transmission lines installed? (Address each line segment.)

Response to Question 05 d:

The Big Creek- Springville-Magunden conductors, west circuit (1033 ACSR), were installed between 1921 and 1923. The Big Creek- Springville-Magunden conductors, east circuit (605 ACSR), were installed between 1949 and 1951. The Big Creek-Rector-Vestal-Magunden conductors, east and west circuits (605 and 666 ACSR), were installed between 1913 and 1918.

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Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 05 e-f:

Alternatives

Regarding reconductoring of the existing system and towers:

e) What is the expected remaining service life for the conductors of each of the 220 kV transmission line segments identified in Question a) above? (Or: When would replacement of the conductors become necessary due to normal degradation?)

f) What would be the cost difference for reconductoring with 666 kcmil ACSS/TW versus using 605 kcmil ACSR, should reconductoring be necessary as a result of degradation?

Response to Question 05 e-f:

e. The expected remaining service life for the conductors referenced above is not known. Currently there are no signs that the lines are exhibiting "normal degradation" that would require replacement.

f. Since reconductoring is not a viable project alternative, the cost difference for reconductoring with 666 kcmil ACSS/TW versus 605 kcmil ACSR has not been investigated.

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To: ENERGY DIVISION
Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 05 g:

Alternatives

Regarding reconductoring of the existing system and towers:

g) Can the existing towers be reinforced or otherwise modified to carry larger conductors (say 1033 kcmil) for significantly less cost than for replacement with new structures?

Response to Question 05 g:

Based on SCE experience with other towers of similar vintage and type, SCE anticipates that the existing towers cannot be modified to accommodate 1033 kcmil conductors. To accommodate 1033 kcmil, the existing towers would need to be removed and replaced.

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San Joaquin Cross Valley Loop Project A.08-05-039

DATA REQUEST SET SJXVL CPUC-ED-03

To: ENERGY DIVISION
Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 06:

Alternatives

Regarding reconstruction of both BC 1 & BC 3 - Rector lines:

a. Would upgrading the BC1& BC 3 - Rector Lines to 1033 kcmil conductors solve the capacity issues at Rector without inducing system instability?

b. If instability is a problem with such a line upgrade, could the addition of reactors or other devices to the system correct the instability?

c. Considering constraints limiting reconstruction work to low load demand seasons when lines can be taken out of service, how long would it take to complete the project?

d. What would the estimated cost of a line reconstruction project be as described above?

Response to Question 06:

Reconstruction of both BC1 and BC3-Rector lines is not a viable project alternative due to system reliability requirements under line outage (N-1 and N-2) conditions. Even if reconstruction of these lines met reliability requirements, system operating constraints including outage requirements for construction would also make this a non-viable alternative. In order to reconstruct these existing lines, new transmission line construction on new ROW serving the Electric Needs Area would be required to allow for the extended outages needed for reconstruction.

a. Upgrading the BC1-Rector and BC3-Rector lines to 1033 kcmil conductors would not solve capacity issues at Rector under line outage (N-1 and N-2) conditions. Note that system instability is, in general, "induced" by operational conditions such as system disturbances (i.e. faults) and/or equipment outages (i.e. transmission line N-1 or N-2 conditions).

b. Reconstruction is not a viable project alternative. Adding reactors or other devices would not make reconstruction with 1033 kcmil conductors a viable project alternative.

c. A construction plan has not been developed for this suggestion because it is not a viable project alternative. In general, the length of time between the beginning of October and the end of March is sometimes referred to by SCE as the "outage availability window" for the Big Creek Corridor because it does not overlap with spring runoff conditions (typically April-June) or summer load conditions (typically June-September). However, approval of all transmission line outages must be obtained by the California Independent System Operator (CAISO) which has a statutory obligation to maintain the transmission system in a safe operating mode **at all times**. Transmission line outages - even if requested by SCE for constructing system upgrades - will be denied by CAISO whenever real-time operating conditions (i.e. higher than anticipated load levels, local area generation unavailability, system stability needs, system generation resource needs, substation equipment failures, scheduled or unforeseen maintenance needs, etc...) are such that system operational integrity could be compromised. Note that SJXVL as proposed would involve tear-down-and-rebuild of a relatively minor amount of the existing corridor (approximately 1.1 miles), but the suggested alternative would in contrast involve tear-down-and-rebuild of over 70 miles of the existing corridor. Outages for approximately 64 miles of the existing BC3-Rector line and approximately 75 miles of the existing BC1-Rector line would compromise system operational integrity.

d. Cost estimates for this suggestion have not been developed because it is not a viable project alternative.

DATA REQUEST SET SJXVL CPUC-ED-03

To: ENERGY DIVISION
Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 07:

Alternatives

With respect to a new system alternative that would consist of reconstructing the two existing Big Creek – Rector – Vestal – Magunden 220kV lines with a new double circuit 220kV line, with bundled 1033 ACSR conductor, please address the following questions:

a. Would such a project afford sufficient voltage support at Rector during outage of the Rector-Big Creek section?

b. At approximately what load level (coincident Rector and Vestal loads) would such system need reinforcement?

c. How would this load level compare to the load level at which the proposed project would required reinforcement?

d. How many miles of the line would be located within National Parks or Forrest lands, thereby requiring additional permitting?

Response to Question 07:

a-c. SCE has not performed any studies of a new system alternative that would consist of reconstructing the two existing Big Creek-Rector-Vestal-Magunden 220 kV lines with a new double circuit 220 kV line with bundled 1033 ACSR conductor. Even if reconstruction of these lines met reliability requirements, system operating constraints including outage requirements for construction would make this a non-viable project alternative. In order to reconstruct these existing lines, new transmission line construction on new ROW serving the Electric Needs Area would be required to allow for the extended outages needed for reconstruction. (See response to Data Request #3, question 6.)

d. Approximately 19 miles of existing corridor is located within the Sierra National Forest. This includes approximately 10.5 miles of corridor containing both the Big Creek 1-Rector 220-kV and Big Creek 3-Rector 220-kV lines, and approximately 8.5 miles of corridor containing only the Big Creek 1-Rector 220-kV line.

Southern California Edison
San Joaquin Cross Valley Loop Project A.08-05-039

DATA REQUEST SET SJXVL CPUC-ED-03

To: ENERGY DIVISION
Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 08:

Alternatives

It was discussed with SCE on the July 9 and 10, 2008 site meeting and field trip that route Alternative 4 would locate the loop connection point 7 miles to the southeast compared to Alternative 1 lengthening the BC3-Rector segment, increasing line impedance, and significantly reducing electrical performance compared to the other routing options. The diminished electrical performance was given as a reason for rejecting Alternative Route 4. With respect to Routing Alternative 4 contained in the PEA, please respond to the following questions:

a. Does this alternative meet NERC, WECC and CAISO reliability criteria? If not please identify what criteria is violated and under what conditions.

b. Is this alternative electrically feasible? If not please identify all reasons why it is not. (Note: this question focuses only on electrical feasibility and not economics).

c. It is understood that this alternative may result in the need for future system upgrades earlier than routing alternatives 1, 2, & 3. Please identify the load level (as measured by the coincident load at Rector and Vestal substations) at which each of the four routing alternatives contained in the PEA would require additional system upgrades? (Note: As a minimum, data for Alt 1 and 4 should be supplied, data for alt 3 would be helpful; given it is the shortest of the routing alternatives).

d. Please provide studies and associated data that was relied upon in reaching the decision in the PEA that "…the Alternative 4 route is the least effective at meeting the project objectives of increasing transmission line capacity between Big Creek..."(PEA, pg 2-9).

e. For peak loading condition at Rector Substation, what is the peak power that would need to be transmitted over the Rector - Springville segment of the proposed Big Creek 3 loop line to Rector (Rector Springville line) for preventing line overloads and maintaining the capacity and stability of Rector Substation in the event of an outage on the Big Creek 3 - Rector segment alone or in conjunction with any of the other 220 kV lines of the Big Creek to Magunden transmission system? Would line impedance for line lengths ranging from 29 to 55 miles, depending on the route alternative chosen, be a critical factor limiting the needed capacity of the Rector - Springville line? Four scenarios should be addressed:

1. Outage of Big Creek 3 - Rector 2 line
2. Outage of Big Creek 3 - Rector 2 line and Big Creek 3 - Rector line
3. Outage of Big Creek 3 - Rector 2 line and Big Creek 1 - Rector line
4. Outage of Big Creek 3 - Rector 2 line and Big Creek 4 - Springville line

f. Would 7 miles of increased length (and impedance) for the Big Creek 3 - Rector portion, of the Big Creek-Rector-Springville loop, have as much detrimental effect on the system and Rector Substation performance as would a similar increase in length of the Rector-Springville segment? Explain why.

g. Could the differences in system electrical performance of Route 1 vs. Routes 2, 3, or 4 operating normally or during critical outages be considered a wash? If not please explain.

Response to Question 08:

a. Yes, the SJXVL project with conceptual routing alternative 4 would meet NERC/WECC and CAISO reliability criteria but was dismissed from further consideration in the PEA because it under performed the other alternatives.

b. Yes, the SJXVL project with conceptual routing alternative 4 would be electrically feasible but was dismissed from further consideration in the PEA because it under performed the other alternatives.

c. Studies have not been conducted to assess the load level in MW at which each of the four routing alternatives would require additional system upgrades. In general, planning studies performed on an annual basis look at a 10-year planning horizon. The most recent 10-year studies have shown that SJXVL as proposed (Route Alternative 1) will continue to be sufficient to mitigate north of Rector transmission line overload problems through and beyond the current planning horizon (2009-2018).

d. The conclusion in the PEA that "…the alternative 4 route is the least effective at meeting the project objectives…" (PEA, page 2-9) was based on base-case and single-contingency power flow analysis which compared the relative electrical performance of the SJXVL project under various routing alternatives. This analysis was performed in 2005 and the findings were summarized in a document titled "San Joaquin Cross-Valley Rector Loop Project: Power Flow Analysis of Routing Options" dated 12/12/2005 and attached below. The results of this analysis illustrate that the southernmost SJXVL project route (corresponding to "Route Alternative 4" in the PEA) would be the least effective in meeting the electrical objectives of the project and would under-perform relative to more northern route alternatives.

In reference to the attached document, please note that the document was prepared in late 2005, approximately a year before the SJXVL open houses and over two years prior to finalization of the SJXVL PEA. As such, route names in this document are **inconsistent** with route names presented in either the SJXVL fact sheets or the SJXVL PEA. This document - and this document only - identifies three route alternatives by numbers in increasing order from north to south. The route referred to in this document as route #1 actually corresponds to "Route Alternative 2" in the PEA. Likewise, the route referred to in this document as route #2 actually corresponds to "Route Alternative 1" (the Proposed Project) in the PEA, and the route referred to in this document as route #3 actually corresponds to "Route Alternative 4" in the PEA. This document does not address electrical performance of the northernmost "Route Alternative 3" because this route was not under consideration in 2005. As stated in the PEA (see Appendix E), Route Alternative 3 was developed based on the questions, comments and suggestions received from the public during the November 2006 and January 2007 open houses. Finally, route descriptions in this document (including lengths and impedances) were based on conceptual routes and information available at the time the document was prepared (i.e. December 2005). Therefore route descriptions in this document are approximately equivalent but not necessarily an exact match to the route descriptions in the SJXVL PEA, the SJXVL fact sheets, or information provided in responses to previous CPUC data requests.

e. SCE interprets this question as asking about the relationship between capacity on the Rector-Springville line segment and system capacity/stability requirements in the Electric Needs Area.
Such system capacity/stability requirements are a function of the overall distribution of power flows throughout the interconnected 220-kV transmission network, not the isolated electrical performance or capacity of a single transmission line. Because system performance under outage condition is a function of numerous factors (load demand, generation dispatch, operating restrictions, etc.) there is no single value that can be identified as the "Peak Power" that would need to be transmitted over the Rector-Springville line to prevent overloads and maintain capacity/stability of Rector Substation. This is true under base case and the four outage scenarios identified.

f. As stated in the PEA, in chapter 1.3, one of the project objectives is to increase transmission capacity between Big Creek and Rector to mitigate overload conditions north of Rector Substation. Constructing the proposed project in a manner that minimizes total distance between Rector and Big Creek best satisfies this project objective. Consequently, increased distances between Big Creek and Rector with corresponding decreased distances between Rector and Springville would be less effective in meeting the project objective.

g. The differences in system electrical performance of Route 1 vs. Routes 2, 3, or 4 are not “a wash” for the reasons stated above. Route 4 would be the least effective route at meeting the project electrical objectives.

SAN JOAQUIN CROSS-VALLEY RECTOR LOOP PROJECT:
POWER FLOW ANALYSIS OF ROUTING OPTIONS

Robert J. Tucker
Transmission & Interconnection Planning
12/12/2005

Introduction

The scope of the San Joaquin Valley Rector Loop Project ("Rector Loop") involves looping the existing Big Creek 3-Springville 230-kV line into Rector Substation. This project will mitigate thermal- and post-transient problems that have been identified in the San Joaquin Valley area under high load conditions. Three routing options for the Rector Loop have been identified in the project development process.

Transmission & Interconnection Planning has performed sensitivity studies comparing these three options from a power flow perspective. These sensitivity studies compared the power flow characteristics of the Big Creek Corridor under heavy summer conditions with maximum Big Creek generation and high levels of San Joaquin Valley (SJV) load. Analysis was performed for both base case conditions (all facilities in service) as well as under N-1 outage conditions of the Big Creek 3-Rector No. 1 230-kV line. This single contingency is the most critical N-1 contingency in the SJV 230-kV transmission system.

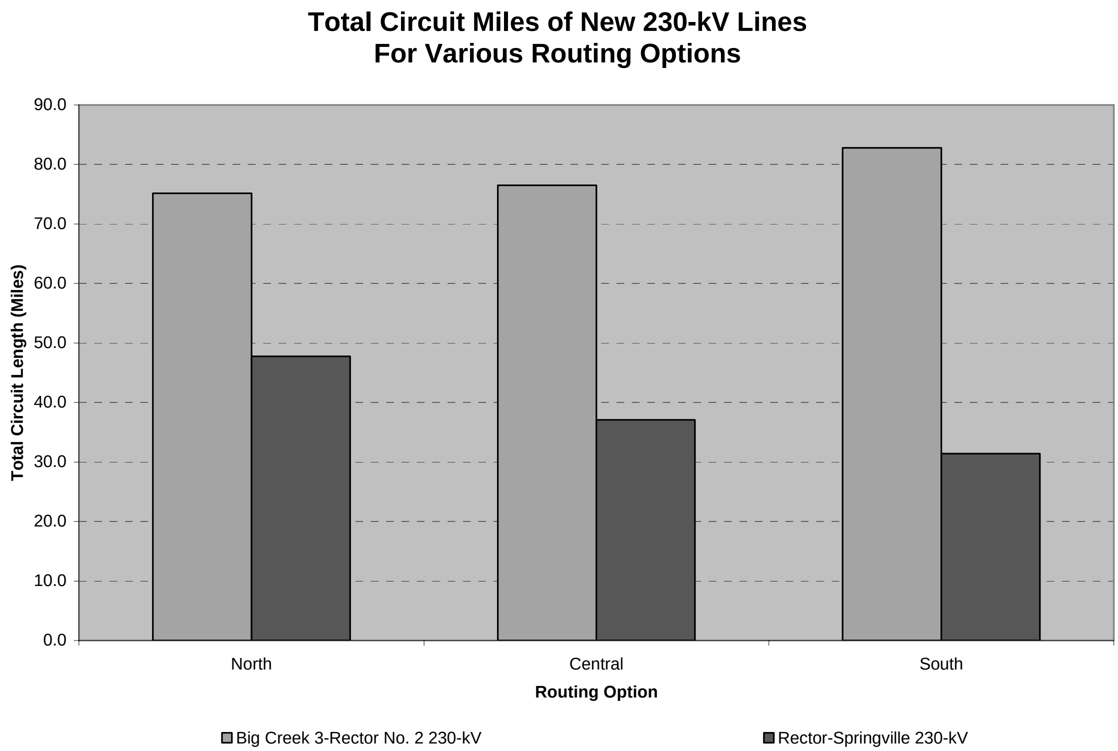
Rector Loop Routing Alternatives

The three routing options have been identified by the SCE Rector Loop project team through extensive analysis of the SJV area. The following analysis is based on the most recent data on the routing alternatives as of December 12, 2005.

There are two significant differences between these routes from a transmission planning perspective. The first difference is the location of the "tap point" where the new transmission construction will meet with the existing Big Creek 3-Springville line. These locations range from 12.6 miles north of Springville (the "southern" route) to 24.6 miles north of Springville (the "northern" route).

			Distance (circuit miles) from tap point to:		
Route	Description	Segments	Springville	Rector	Big Creek 3
1	North	1, 2, 14, 15, 5	24.6	23.2	52.0
2	Central	1, 6, 16, 17, 18	18.6	18.5	58.0
3	South	10, 19, 20, 13	12.6	18.8	64.0

The Rector Loop project will result in two new transmission lines, a new Big Creek 3-Rector No. 2 230-kV line and a new Rector-Springville 230-kV line. The southern route results in the longest circuit length from Rector to Big Creek 3 and the shortest circuit length from Rector to Springville. In contrast, the northern route results in the shortest distance to Big Creek 3 and the longest distance to Springville.



The second significant difference between the routing options is in terms of impacts to the existing Big Creek 1-Rector and Big Creek 3-Rector 230-kV transmission lines. The northern and central routes both involve a portion of tear-down-and-rebuild of these two existing 230-kV lines. Due to this, the northern route will result in the replacement of approximately 10.8 miles (segments 1 and 2) of existing 1B-605 ACSR lines from Rector to Big Creek with new 1B-1033 lines. Likewise, the central route will result in the replacement of approximately 1.1 miles (segment 1 only) of the existing 1B-605 ACSR lines from Rector to Big Creek with new 1B-1033 lines. The southern route has no impact on existing 230-kV transmission lines connected to Rector substation.

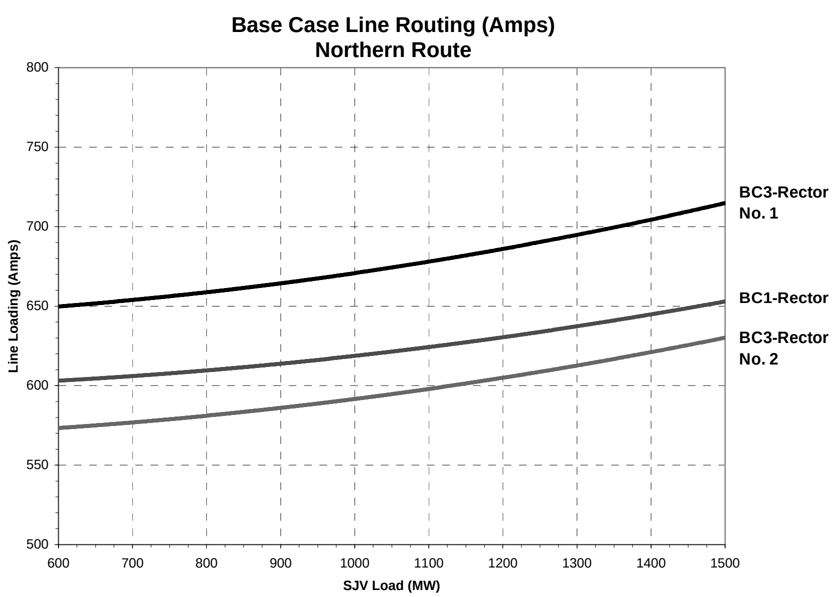
Based on this tear-down-and-rebuild, the northern and central routes will also change the impedance of the existing 230-kV lines currently between Rector and Big Creek. The following tables summarize those impedance differences.

230-kV Line	Circuit Miles	Route	Line Impedance[1] R	X	B	Comments
BC1-Rector 230-kV	74.5	Existing	0.02176	0.11120	0.21078	Existing lines
		North	0.02045	0.11076	0.21170	10.8 miles tear-down-and-rebuild
		Central	0.02163	0.11115	0.21087	1.1 miles tear-down-and-rebuild
		South	0.02176	0.11120	0.21078	Same as existing
BC3-Rector 230-kV	64.3	Existing	0.01891	0.09604	0.18176	Existing lines
		North	0.01760	0.09560	0.18268	10.8 miles tear-down-and-rebuild
		Central	0.01878	0.09599	0.18185	1.1 miles tear-down-and-rebuild
		South	0.01891	0.09604	0.18176	Same as existing

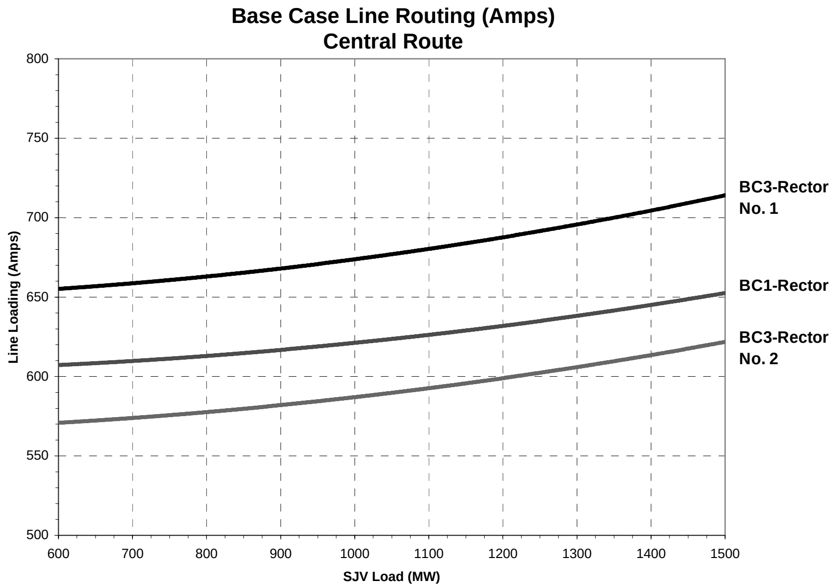
Base Case Analysis

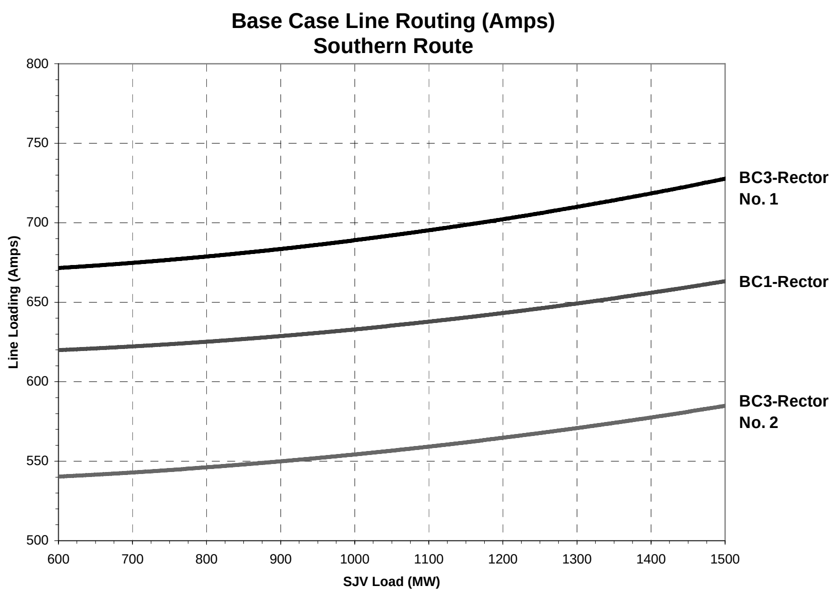
The three routes described above were compared under base case conditions. Study conditions assumed 1000 MW of Big Creek hydro generation and various levels of San Joaquin Valley load up to 1500 MW. The results indicate that the northern route results in the most effective utilization of the new transmission capacity created by the Rector Loop, and the southern route results in the least effective utilization of that new capacity.

The northern route results in the highest base case loading of the new Big Creek 3-Rector No. 2 230-kV line and the lowest loading of the two existing lines from Big Creek to Rector. These two existing lines represent the most "limiting components" of the San Joaquin Valley transmission network as it exists today. Furthermore, as the Rector Loop routing is moved further south, loading on the existing lines increases and loading on the new Big Creek 3-Rector No. 2 230-kV line decreases.



[1] Impedance expressed in per-unit on 230-kV, 100 MVA base.

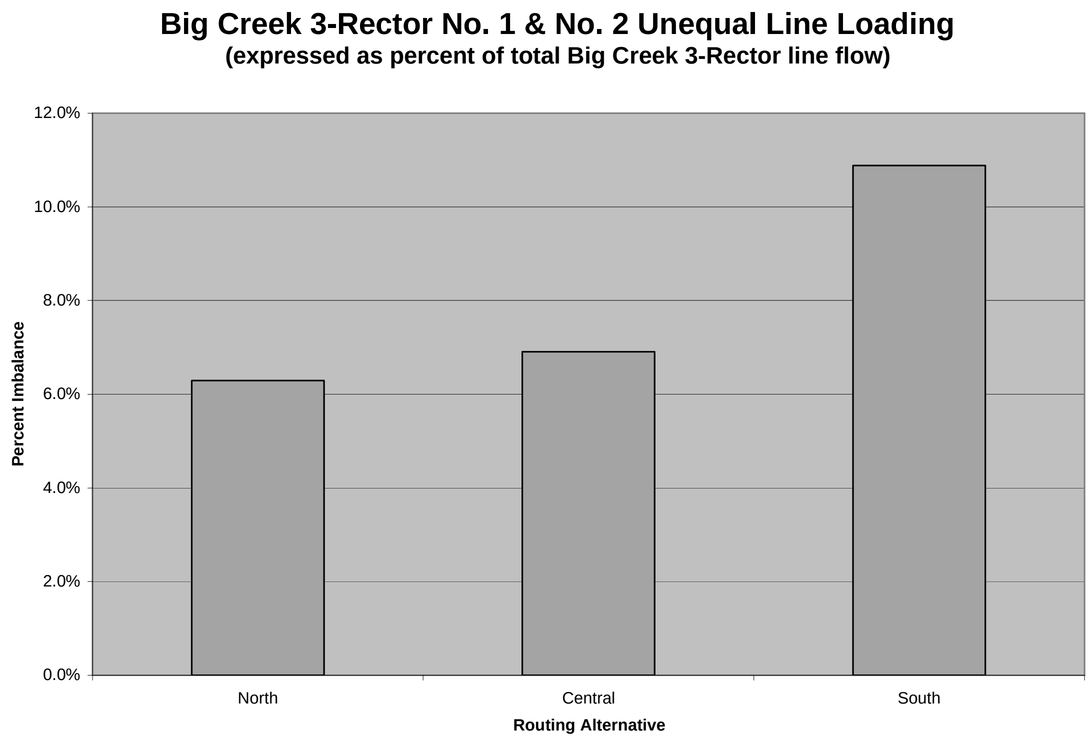




The three graphs above show that the southern route results in the most unequal loading on the three lines serving Rector load from Big Creek, particularly between the (existing) Big Creek 3-Rector line and the (new) Big Creek 3-Rector No. 2 line. In other words, the existing lines load significantly higher than the new line. One way to quantify the amount of unequal line loading between the two Big Creek 3-Rector lines is to use the following formula:

$$\text{Unequal Line Loading} = \frac{(\text{BC3 - Rector No.1 line flow}) - (\text{BC3 - Rector No. 2 line flow})}{\text{Sum of both BC3 - Rector line flows}}$$

This formula expresses the unequal loading between the Big Creek 3-Rector lines as a percentage of the total flow on these lines. Applying this formula to the above data and assuming 1500 MW of San Joaquin Valley load results in the following unequal loading results.



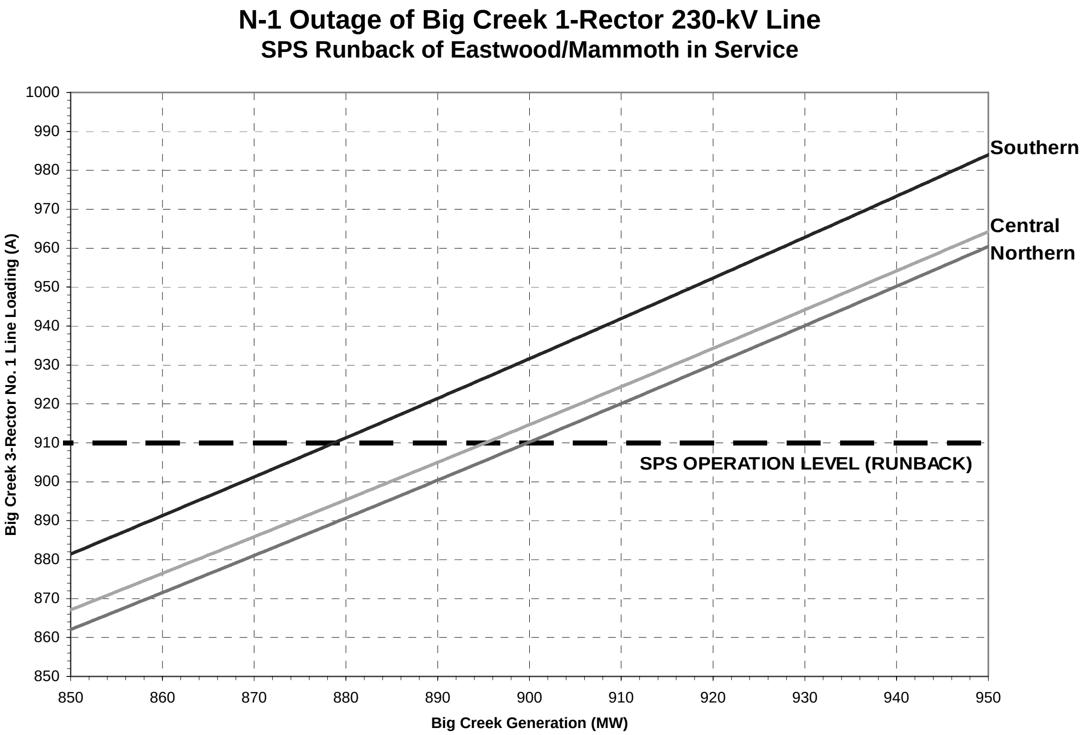
In terms of most efficient use of transmission facilities to serve SJV load, the northern and central routes are comparable to each other under base case conditions, with the northern route resulting in the maximum utilization of the new transmission capacity created by the project. Furthermore, unequal line loading increases significantly as the line route options continue south, with the southern route resulting in approximately 1.75 times the unequal line loading of the northern route.

Single Contingency Analysis – Big Creek 1-Rector 230-kV Outage

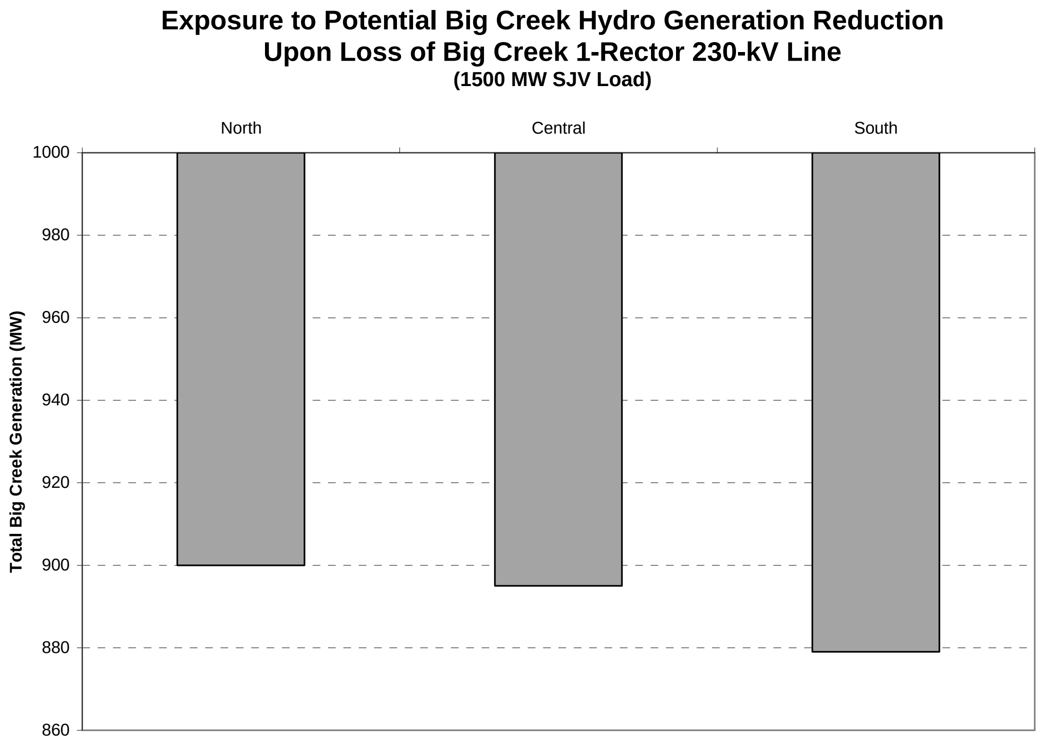
A critical outage during Heavy Summer conditions with maximum generation and maximum load is outage of the existing Big Creek 1-Rector 230-kV line. This outage will result in a thermal overload of the existing Big Creek 3-Rector No. 1 230-kV line. The Big Creek Remedial Action Scheme (RAS) will be required to act during such conditions to reduce Big Creek generation in order to mitigate this thermal overload.

Power flow analysis was performed assuming approximately 1500 MW and varying the total amount of Big Creek hydro generation. Under these conditions, the Big Creek 1-Rector line was removed from service and the loading on both Big Creek 3-Rector lines was monitored. This analysis was performed to quantify the level of exposure to potential reduction of Big Creek generation via the Big Creek RAS during summer peak load conditions.

The results indicate that the northern route will result in the least amount of exposure to potential generation reduction for the N-1 contingency outage in question and that the southern route will result in the greatest amount of exposure. The graph below summarizes the loading on the Big Creek 3-Rector No. 1 line upon the Big Creek 1-Rector N-1 outage assuming approximately 1500 MW of SJV load.



Upon the N-1 outage of the Big Creek 1-Rector 230-kV line, the northern route results show the lowest exposure to potential reduction of Big Creek generation for thermal overload reasons. In contrast, the southern route results show the greatest exposure to potential generation reduction under the same outage condition. A chart summarizing the amount of exposure under these conditions is presented below.



In terms of minimizing SPS requirements for Big Creek generation reduction upon N-1 outages, the northern and central routes are comparable to each other, with the northern route resulting in the least SPS generation reduction requirements. The southern route resulting in approximately 21 MW of additional SPS generation reduction exposure compared to the northern route.

<u>Conclusions</u>

In terms of the three routing options currently under consideration for the Rector Loop project, Transmission & Interconnection Planning makes the following recommendations:

1. The currently proposed southern route (i.e. segments 10, 19, 20 and 13) should be considered the "southern limit" of all possible routing options for the Rector Loop project. In other words, any conceptual routing option located further *south* beyond this southern route should be considered not viable because:

    a. It would result in a significant under-utilization of the new transmission capacity into Rector under base-case conditions as compared to the current three proposed routing options

    b. It would result in a significant increase in exposure to potential generation reduction under N-1 conditions as compared to the current three proposed routing options

2. The northern route (i.e. segments 1, 2, 14, 15 and 5) and central route (i.e. segments 1, 6, 16, 17 and 18) result in comparable system performance in terms of effective and efficient utilization of the new transmission capacity created by the project. Between these two routes, the northern route results in marginally better system performance in terms of base case and single contingency power flows.

3. The southern route (i.e. segments 10, 19, 20 and 13) results in the least effective and efficient utilization of the new transmission capacity created by the project. Because of this, the southern route is the least preferred routing option for meeting the project purpose and need.

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DATA REQUEST SET SJXVL CPUC-ED-03

To: ENERGY DIVISION
Prepared by: Robert J. Tucker
Title: Power System Planner
Dated: 08/07/2008

Question 09:

Alternatives

Routing alternatives 1, 2 and 3 all share common right-of-way with the existing two Big Creek-Rector lines. NERC/WECC criteria classify the simultaneous loss of all lines in an R/W as a Category D event requiring such events to be studied and evaluated. What evaluation of this event has been conducted and specifically how much load dropping would be required?

Response to Question 09:

The NERC/WECC planning criteria (TPL-004) does classify simultaneous loss of all lines in a transmission R/W as a Category D disturbance event. To be specific, NERC/WECC planning criteria states that a planning assessment shall "be performed and evaluated only for those Category D contingencies that would produce the more severe system results or impacts" (TPL-004 R1.3.1) and that "it is not expected that all possible facility outages under each listed contingency of Category D will be evaluated" (TPL-004, Table 1, footnote d).

SCE has not specifically studied simultaneous loss of all four transmission lines north of Rector Substation as a category D disturbance. SCE has recently studied a similar condition, the complete loss of Rector Substation, as a category D disturbance. The simulated loss of Rector Substation involved simultaneous loss of all four 220-kV lines north of Rector Substation (i.e. the outage scenario in question) plus the simultaneous loss of the two Rector-Vestal lines (and consequently all of Rector Substation load). These studies found non-convergence in post-transient simulations and instability in transient stability simulations. The studies concluded that this disturbance scenario could ultimately lead to electrical system separation at Magunden Substation, resulting in the islanding of the North of Magunden system from the rest of the interconnected network. This islanding would isolate system stability problems to the local area and prevent them from cascading into other portions of the grid.

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Question 10:

Alternatives

The recent draft C3ET Study Plan identifies the possible construction of a new 230 kV DCTL between Magunden and Rector Substations. This line is identified as part of eight of the 14 alternatives and variations noted for study by the CAISO. (See below).

Please identify the extent that earlier construction of this facility (Magunden-Rector 230 DCTL) would serve as an alternative to construction of the SJXVL.   Please identify, document and discuss all reasons why the new Magunden-Rector 230 DCTL may not serve as an alternative.

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2.5 Proposed Alternatives

In order to ensure a robust alternative analysis, numerous alternatives have been conceptually identified.

[The alternatives may be augmented as appropriate during this analysis, in order to meet reliability criteria and other study objectives for the 20 year reliability study horizon.]

Figure 4 lists proposed C3ET alternatives that are covered in the technical study.

DCTL = Double-Circuit Tower Line, SCTL = Single-Circuit Tower Line

Figure 4. List of Proposed Alternatives

Figure 7 through Figure 32 show the C3ET project alternatives in geographic diagrams. Note that the diagrams are approximate and shall not be used as a reference for transmission line routes and station locations.

1 Fresno 230 kV Reconductoring Magunden – Rector 230 kV DCTL ("SCE-1")

2 Midway – E2 500 kV DCTL Magunden – Rector 230 kV DCTL ("SCE-1")

2a Midway – E2 500 kV DCTL with S2 Loop-In

2b Midway – E2 500 kV DCTL with S2-S3 Loop-In, Whirlwind – S3 500 kV Line

2c Midway – E2 500 kV DCTL with S2 Loop-In, Midway – Vincent #3 Upgrade

2d Midway – Gregg 500 kV DCTL Magunden – Rector 230 kV DCTL ("SCE-1")

3 Midway – E2 500 kV SCTL with S2 Loop-In

4 Whirlwind – E2 500 kV DCTL with S2 Loop-In

5 Midway – E2 230 kV DCTL Magunden – Rector 230 kV DCTL ("SCE-1")

6 Fresno – Big Creek 230 kV inter-tie

7 Midway – McCall – E2 230 kV DCTL Magunden – Rector 230 kV DCTL ("SCE-1")

8 Gates – Gregg 230 kV DCTL Magunden – Rector 230 kV DCTL ("SCE-1")

9 Raisin 230 kV Switching Station Magunden – Rector 230 kV DCTL ("SCE-1")

10 New generation 1000 MW in Fresno Magunden – Rector 230 kV DCTL ("SCE-1")

Environmental Impact Assessment

Cultural Resources

Response to Question 10:

Ongoing C3ETP studies coordinated by CAISO are long-term, post-SJXVL planning studies. The Magunden-Rector 230-kV DCTL project is not an approved transmission project. It is instead a conceptual project under investigation by SCE and CAISO, and to date SCE has not asked for (nor has CAISO granted) approval of the Magunden-Rector 230-kV DCTL project.

The Magunden-Rector project has been suggested in the C3ETP studies as a possible option to address long-term anticipated transmission congestion issues north of Magunden Substation under conditions of low hydro generation availability. The Magunden-Rector 230-kV DCTL project would not increase transmission capacity between Big Creek and Rector Substation, and would not mitigate north of Rector constraints that occur under normal hydro conditions. Earlier construction of the Magunden-Rector project would still require construction of SJXVL, and therefore the Magunden-Rector project would not be viable as an alternative to SJXVL.

Question 11:

Alternatives

Please provide all archeological, paleontological, and historic technical reports with site forms.

Response to Question 11:

Section 6254.10 of the California State Government Code requires that archaeological site location data be kept confidential and is not to be disclosed in any public document. The report "Cultural Resources Inventory of the Southern California Edison Company Cross Valley Transmission Line Project, Tulare County, California" prepared by Pacific Legacy, Inc. (Armstrong et al. 2008) contains confidential archaeological site records and will be provided to the ESA Project Archeologist under separate cover. In addition, this report addresses all known archaeological, historical, and ethnographic data acquired by way of consultation with the Southern San Joaquin Valley Archaeological Information Center, the California Native American Heritage Commission, and archaeological field inventory on accessible portions of the project areas.

No technical report was prepared with regard to paleontological resources. Data on paleontology relative to the project areas was drawn from the Fresno Sheet of the Geologic Map of California, Olaf P. Jenkins Edition, compiled by Robert A. Matthews and John L. Burnett, 1965. It is contained in Geologic Atlas of California, prepared by the California Division of Mines and Geology, Department of Conservation, The Resources Agency (Charles W. Jennings, n.d.). This is a public document of oversized dimensions, and is not conducive to copy.