

EXHIBIT C

(SCE 2018 GRC APPLICATION)

2016 Service-life and Net Salvage Study



SOUTHERN CALIFORNIA
EDISON

An *EDISON INTERNATIONAL* Company

www.sce.com



DISTRIBUTION PLANT

ACCOUNT: 361.00 – STRUCTURES AND IMPROVEMENTS

DESCRIPTION

This account includes the cost in place of structures and improvements used in connection with distribution operations. The account comprises mainly control houses and related structures at distributions substations. Account statistics and current and proposed parameters are shown in Table 1 below.

	Current	Proposed
Plife-Curve	42-R2.5	50-L0.5
Future NS Rate	-25.0%	-30.0%
Realized NS	-33.1%	
Average Age (yrs.)	13.8	
Derived Additions	\$632,396,471	
Plant Retirements	\$55,690,492	
Percent Retired	9.7%	
Plant Balance	\$576,705,979	

Table 1. Account Parameters and Statistics

LIFE ANALYSIS

Major forces of retirement for this account include system upgrades, severe storms and earthquakes, traffic and fire accidents, rodent damage, automation, revisions in policy, code, and criteria, and wear and tear related to aging.

Statistical service life indications for this account range from the low-40s to low-60s for bands with lower censoring and conformance indexes. The majority of second and third-degree polynomial indications are considered less reliable than first-degree polynomial indications. Graduated hazard rates in these instances are unrealistically declining and may be zeroed to remove negative hazard rates implied by the fitted polynomials.

The composition of major categories (or subpopulations) of plant classified in this account at December 31, 2015 and the service life indications obtained from a full-band statistical analysis of each category are shown in Table 2 below.

Category	Investment		Full Band PLife-Curve	Censoring (%)
	Amount (\$)	%		
Foundation etc.	112,919,451	20	28-S4	76.6
MEER Building	102,746,634	18	38-S1.5	80.8
Water Supply	50,908,790	9	41-S1.5	74.6
Power Lighting	45,421,111	8	39-S3	92.0
HVAC	33,804,236	6	35-R2	72.5
Alarm & Monitoring	16,557,229	3	29-S3	84.1
Non-unitized	39,863,694	7		
Other	174,484,836	30	60-O3	29.4
Total	576,705,980	100	43	

Table 2. Major Structural Components

An analysis of the subpopulations indicates average service lives ranging between 29 and 60 years, various dispersions, and a dollar-weighted mean of 43 years.

LIFE ESTIMATION

Based on these observations and ignoring origin-modal dispersions in which chance is a more pervasive force of retirement, a 50-L0.5 projection life-curve is recommended for this account.

Service-life indications derived from a statistical analysis of the combined subpopulations are well within a zone of reasonableness when compared to the subpopulation indications. The analysis of subpopulations does not indicate forces of retirement that would significantly bias the observed indications for a combined, nonhomogeneous plant category. Company operations personnel do not expect policy or procedural changes or technological advances that would introduce significantly different forces of retirement from those observed in the past.

NET SALVAGE ANALYSIS

The historical net salvage analysis for this account indicates an adjusted overall net salvage rate of -33.1 percent realized from \$55,690,492 of retirement activity over the period 2002-2015. Five-year rolling band rates have not been less negative than -21.3 percent during that period and the five-year band ending in 2015 shows a -44.2 percent net salvage rate.

NET SALVAGE ESTIMATION

Based on these observations and considerations, a -30 percent future net salvage rate is recommended for consideration by SCE. It is considered unlikely that the upward trend in cost of removal will reverse in the near future.

DISTRIBUTION PLANT
ACCOUNT: 362.00 – STATION EQUIPMENT

DESCRIPTION

This account includes the installed cost of station equipment, including transformer banks, used for the purpose of changing the characteristics of electricity in connection with its distribution. Account statistics and current and proposed parameters are shown in Table 1 below.

	Current	Proposed
Plife-Curve	45-R1.5	65-L0.5
Future NS Rate	-25.0%	-50.0%
Realized NS	-46.5%	
Average Age (yrs.)	13.1	
Derived Additions	\$2,382,404,227	
Plant Retirements	\$138,133,698	
Percent Retired	6.2%	
Plant Balance	\$2,244,270,529	

Table 1. Account Parameters and Statistics

LIFE ANALYSIS

The statistical service life analysis for this account indicates average service lives within a narrow range between the mid-50s and mid-60s for bands with lower censoring and conformance indexes.

The composition of major categories (or subpopulations) of plant classified in this account at December 31, 2015 and the service life indications obtained from a full-band statistical analysis of each category are shown in Table 2 below.

Category	Investment		Full Band PLife-Curve	Censoring (%)
	Amount (\$)	%		
Transformers	359,814,116	16	56-L1	81.9
Monitoring Devices	275,879,081	12	34-R2	61.6
Circuit Breakers	270,107,330	12	45-S0.5	81.3
Bus Support	182,345,026	8	75-L0.5	90.1
Power Control Cable	115,539,624	5	42-L1	75.7
Switches	95,098,077	4	52-L1	81.7
Non-unitized	394,553,141	18		
Other	550,934,134	25	64-L0.5	19.7
Total	2,244,270,528	100	54	

Table 2. Major Structural Components

An analysis of the subpopulations indicates average service lives between 34 and 75 years with lower modal dispersions and a dollar-weighted mean of 54 years.

Service-life indications derived from a statistical analysis of the combined sub-populations are well within a zone of reasonableness when compared to the sub-population indications. The analysis of subpopulations does not indicate forces of retirement that would significantly bias the observed indications for a combined, nonhomogeneous plant category.

LIFE ESTIMATION

Based on these observations and considerations, a 65-L0.5 projection life-curve is recommended for this account. This recommendation is within the range of both full account and subpopulation service life indications. Foster Associates was informed that Company engineers do not anticipate that future forces of retirement will be significantly different from those observed in the past for this plant category.

Although not equivalent to dollar-years of service, SCE engineers estimate a mean time to wear-out of about 37 years for A-Bank (200 kV) transformers and about 57 years for B-Bank (115 or 66 kV) transformers. The number of transformers in service at year-end 2015 was 158 A-Bank and 2,226 B-Bank. Company engineers also estimate that the mean time to wear-out of mainline and radial oil switches is about 35 years and about 49 years for circuit breakers. The average age of transformers measured in unit-years is about 26 years whereas the average age measured in dollar-years is about 10 years. Similarly, the average age of circuit breakers measured in unit-years is about 32 years whereas the average age measured in dollar-years is about 10 years.

NET SALVAGE ANALYSIS

The adjusted historical net salvage analysis for this account indicates an overall net salvage rate of -46.5 percent, realized from \$138,133,698 of retirement activity and 5.8 percent of derived addition over the period 2002-2015. Most recent 5-year rolling bands ending in 2013, 2014, and 2015 exhibit net salvage rates of -47.2, -65.6 and -81.4 percent respectively.

NET SALVAGE ESTIMATION

Based on these observations and the expectation of continuing negative net salvage, a -50 percent future net salvage rate is recommended for consideration by SCE.

1 While SCE is not proposing decommissioning at this time, it is not unreasonable to expect that if
2 circumstances change, there will be future costs to retire these plants.

3 (8) Energy Storage Net Salvage

4 SCE is proposing to install lithium-ion battery units in a rack
5 configuration. Engineers indicate that the removal activities to retire these assets include driving to the
6 facility, removing the battery modules the rack, and shipping to recycling centers for disposal. Engineers
7 also indicate that there may be a small amount of gross salvage associated with the recycling of the
8 units. Although it is not unreasonable to assume that there may be increasing costs to retire these assets
9 in the future (*e.g.*, if recycling salvage becomes disposal fees) SCE is not proposing decommissioning
10 costs for energy storage assets at this time.

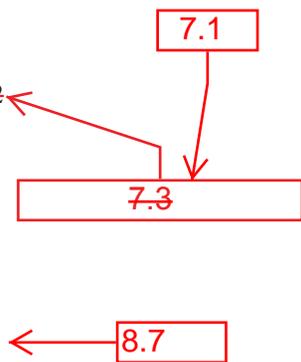
11 **3. Forecast Service Lives for G&I Assets**

12 Some categories of plant do not lend themselves to statistical analysis, but do not belong
13 in the life span category. These plant assets include most general plant (*i.e.*, FERC Accounts 391-397),
14 intangible plant (*e.g.*, software, radio frequencies, etc.), and easements. SCE determined average service
15 lives through conducting discussions with SCE engineers familiar with the assets, considering prior
16 company procedure, and being familiar with industry practice.

17 Table III-24, below, shows the forecast depreciation service lives for general and
18 intangible plant accounts. The table compares SCE's proposed depreciation rates to authorized service
19 lives from D.15-11-021 (the 2015 GRC Decision). As discussed in the sections below, because Power
20 Management Systems (Account 391.4) and Telecommunications Equipment (Account 397) consist of
21 sub-accounts of fairly disparate service lives, the subaccounts have been categorized based upon the
22 equipment lives. For example, in the case of Telecommunication Equipment, SCE grouped Telephone
23 Systems with Videoconferencing Equipment in a 7-year category separate from the infrastructure
24 equipment such as open wire communication conductor and antenna support structures that belong in a
25 40-year category.

Table III-24⁶⁷
General and Intangible Plant Service Life Proposals

Account No.	Account Description	2015-2017 Authorized (Years)	2018-2020 Proposed (Years)
<u>General Plant</u>			
391.1	Office Furniture	20	20
391.2	Personal Computers	5	5
391.3	Mainframe Computers	5	5
391.4	DDSMS-Power Management System	7.8	10.2
391.5	Office Equipment	5	5
391.6	Duplicating Equipment	5	5
391.7	PC Software	5	5
393	Stores Equipment	20	20
394	Tools & Work Equipment	10	10
395	Laboratory Equipment	15	15
397	Telecommunication Equipment	10.3	8.6
398	Misc Power Plant Equipment	20	20
<u>Intangibles</u>			
302.020	Hydro Relicensing	Various	Various
303.640	Radio Frequency	40	40
302.050	Miscellaneous Intangibles	20	20
303.105	Capitalized Software - 5 year	5	5
303.707	Capitalized Software - 7 year	7	7
303.210	Capitalized Software - 10 year	10	10
303.315	Capitalized Software - 15 year	15	15
<u>Easements</u>			
350	Transmission Easements	60	60
360	Distribution Easements	60	60
389	General Easements	60	60



⁶⁷ Refer to WP SCE-09 Vol. 03, Book A, pp. 5-12 (Rate Determination Schedule).

1 **4. Forecast Service Lives – Account-By-Account**

2 a) General Plant

3 Most general and intangible plant accounts contain many low value individual
4 items. Following FERC guidelines, non-structural items in these accounts are amortized by vintage
5 group over the specified service life and retired at the end of the life span.⁶⁸ For example, personal
6 computers are amortized over a 5-year period (*i.e.*, a 20 percent annual depreciation rate) and when a
7 vintage group reaches five years of age, the vintage group of computers will be fully depreciated and
8 retired off the books. Following this approach eliminates costly plant record keeping and continuous
9 physical tracking of the equipment. Over time, imbalances in the accumulated depreciation can occur if
10 there are depreciation life or rate changes and if net salvage is recorded to the books but not reflected in
11 the depreciation rate. These accumulated depreciation surpluses (deficits) are amortized over this GRC
12 cycle (2018-2020).

13 (1) Account 391.1 – Office Furniture

14 Account 391.1 contains all costs incurred to acquire office furniture. It
15 includes such items as modular furniture, desks, cabinets, and files used for general utility service that
16 are not permanently attached to buildings. A 20-year average service life is reasonable for both modular
17 and free standing furniture.

18 (2) Account 391.2 And 391.3 – Computer Equipment

19 The assets in Account 391.2 can include Central Processing Units and
20 associated components (*e.g.*, monitors, printers, etc.) when purchased as a bundled unit, or when any of
21 these items are purchased individually and meet the capitalization threshold. Account 391.3 is where
22 SCE records all investment related to mainframe computer and file server equipment. SCE information
23 technology personnel state that the average life for this equipment should be five years or less. Retention
24 of the five-year life is reasonable.

25 (3) Account 391.4 – Power Management System

26 Account 391.4 contains Supervisory Control and Data Acquisition
27 (SCADA) equipment for controlling and monitoring the SCE electrical system. Contained within this

⁶⁸ FERC Accounting Release Number AR15 provided for the vintage year accounting method allowing companies to amortize vintage groups of assets over their designated service life and subsequently retire them. The FERC accounting release states that “[a]doption- of vintage year accounting will relieve companies from maintaining extensive plant records and will generate efficiencies and costs savings without degrading the quality of plant records and the associated financial reporting.”

1 account are the components making up the Power Management System specifically, computer and data
 2 gathering equipment, man-machine interface, analog and digital telemetry devices, and data center
 3 facility infrastructure. The account consists of components with very different lives depending upon the
 4 technical sophistication and other retirement factors affecting the equipment. SCE's power management
 5 personnel have assessed this equipment as having service lives in categories of 5, 7, 10, 15 or 20 years.
 6 A dollar weighting of these equipment lives yields a combined average service life of about ~~10~~ years.
 7 Each of these equipment life categories are summarized in Table III-25 and addressed in the following
 8 discussions.

Table III-25
Power Management System Service Life Proposals

CPR Account	Description	2015-2017 Authorized (Years)	2018-2020 Proposed (Years)
Five-Year Power Management System Equipment			
391.417	Firewall	7	5
391.422	TACACS/Sniffer	10	5
391.405	EMS Web Server	20	5
391.406	EMS Workstation	20	5
391.43	External Tape Drive	20	5
Seven-Year Power Management System Equipment			
391.401	Bulk Storage	7	7
391.416	USAT Hub	7	7
Ten-Year Power Management System Equipment			
391.402	Communications Network Processor	10	10
391.404	Server Cabinet	10	10
391.411	Large Screen Display System	10	10
391.419	Dynamic Map Board	25	10
391.42	Data Acquisition Controller	10	10
391.429	Digital Wall Chart Recorded	10	10
391.435	Dial-Up Remote Terminal Unit	10	10
Fifteen-Year Power Management System Equipment			
391.436	Uninterruptible Power Supply	15	15
391.438	Battery System	15	15
Twenty-Year Power Management System Equipment			
391.421	Remote Terminal Unit (RTU)	20	20

1 (a) Five-Year Power Management System Equipment

2 Equipment in the 5-year category is typically modern, digital
3 electronic computer and microprocessor-based equipment which is subject to discontinued support by
4 the manufacturer or replaced with newer equipment within a short period of time. Due to these changing
5 needs, the hardware asset portfolio will become obsolete if not actively refreshed, which can
6 significantly affect operations. Furthermore, these devices contain components like processors, memory,
7 and rotating disks that become obsolete and/or worn out after five years of continuous use.

8 (b) Seven-Year Power Management System Equipment

9 Equipment in the 7-year category is typically modern, digital
10 electronic computer and microprocessor-based equipment which is subject to discontinued support by
11 the manufacturer or replaced with newer equipment within a short period of time. Furthermore, these
12 devices contain rotating disk, printers and CRTs that become obsolete and/or worn out after seven years
13 of continuous use.

14 (c) Ten-Year Power Management System Equipment

15 SCE's power management personnel indicate that the ten-year
16 lived equipment is less sophisticated than the typical 7-year items. They contain digital electronics as
17 well as some electromechanical devices. Most of this equipment is specialized, proprietary and generally
18 supported by the vendor for 10 years. Past experience indicates this equipment will be replaced after
19 about 10 years.

20 (d) Fifteen-Year Power Management System Equipment

21 Telemetry equipment is analog devices with mostly repairable
22 parts. They do not contain a high degree of sophistication and with proper maintenance, these devices
23 should last approximately 15 years. The Uninterruptible Power System is an electromechanical device
24 with a rated life of about 15 years. Beyond 15 years both of these devices require high levels of
25 maintenance due to passive component failures and electromechanical malfunction.

26 (e) Twenty-Year Power Management System Equipment

27 Twenty-year power management system equipment contains
28 hardened substation field equipment used for data gathering. The equipment is highly fault-tolerant and
29 is typically supported by the vendor for approximately 20 years. Also included here are Wall Strip Chart
30 Recorders and Backup Control Systems. These are robust analog devices containing some passive
31 electronics typically rated for 20 years of service.

1 (4) Account 391.5 and 391.6 – Office Equipment; Duplicating Equipment

2 These accounts represent a \$7.4 million net investment in miscellaneous
3 office equipment such as video projection equipment, public address equipment, plotters, duplicating
4 equipment, and so forth. The current service life of five years is reasonable.

5 (5) Account 393 – Stores Equipment

6 Account 393 represents a \$7.6 million net investment in equipment used
7 for the receiving, shipping, handling, and storage of materials and supplies for warehouses. It includes
8 electric pallet jacks, lifting tables, stretch wrapping machine, racking rotobins/storage bins, battery
9 chargers, transformer trays, hand-held scanners, lockers, picking carts, awnings, barrel grabbers,
10 warehouse heaters, screen netting, cable cutting machines, and so forth. Based on historical Stores
11 Equipment usage and knowledge of warehouse equipment, the operational personnel state that this
12 equipment has a useful service life of 20 years or less. Retaining the current 20-year service life is
13 reasonable for this account.

14 (6) Account 394 – Tools & Work Equipment

15 Account 394 represents a \$49.2 million net investment in tools and
16 equipment for construction, repair, maintenance, general shop, and garage, but not specifically
17 includable in other accounts. SCE proposes retaining the current service life of 10 years.

18 (7) Account 395 – Laboratory Equipment

19 Account 395 represents a \$63.8 million net investment in laboratory and
20 field test equipment. The account has a wide variety of equipment. It includes, for example, calibrators,
21 baths, furnaces, current shunts, dew point meters, gauge calibrators, insulation testers, gas leak detectors,
22 mass comparator, micrometers, multimeters, oscilloscopes, phase meters, watt-hour meter testing power
23 source, power system analyzers, self-contained portable calibration carts, sound meters, metrology
24 standards, thermometer, vibration analysis data pack, and volt meters. The expected average service life
25 of lab and test equipment is impacted by two major retirement factors: technological obsolescence and
26 normal “wear and tear” from usage in both the field and lab environments. SCE proposes to retain the
27 currently authorized 15-year average service life for this account.

28 (8) Account 397 – Telecommunication Equipment

29 Account 397 represents SCE’s investment in communication equipment
30 for the company’s system. Contained within this account are the electronic and computer-based
31 equipment (such as transmission equipment, dynamic network multiplexers, data network

1 interconnection system, and radio equipment), as well as communication infrastructure (such as the
2 copper and fiber optic cable, conduit, microwave equipment, and the electrical power generator system).
3 SCE telecommunication engineers have assessed this equipment as having service lives of 5, 7, 10, 15,
4 25, or 40 years depending on the type of equipment.⁶⁹ These are the same service lives the Commission
5 authorized in the prior rate case. The equipment lives are addressed in the following discussions.

6 (a) Five-Year Communication Equipment

7 Equipment falling into the 5-year category experiences shorter
8 lives from lack of vendor support, facility relocations, and insufficient capacity to meet current demand.

9 (b) Seven-Year Communication Equipment

10 Equipment in the 7-year category is typically modern, state-of-the
11 art, electronic and/or computer-based equipment which is subject to being discontinued by manufacturer
12 or replaced with newer equipment within a short period of years.

13 (c) Ten-Year Communication Equipment

14 NetComm radio equipment is not as sophisticated as the other
15 electronic equipment and warrants a 10-year service life. SCE is replacing NetComm radios after about
16 10 years.

17 (d) Fifteen-Year Communication Equipment

18 Equipment in this group of assets is typically subject to
19 environmental wear and has an average life of about 15 years. The equipment fails or is replaced as a
20 result of unreliability and/or high maintenance due to failure of passive components or
21 electromechanical failure. In the case of electronic components included in this category, the
22 telecommunication engineers state that these are relatively basic and not the state-of-the art- electronics
23 reflected in the seven-year life category.

24 (e) Twenty-Five Year Communication Equipment

25 Although SCE has not yet had fiber optic cable as long as 25 years,
26 SCE telecommunication engineers believe that it may be subject to greater level of degradation than the
27 copper cable. They estimate that 25 years is a reasonable life for the fiber optic cable.

⁶⁹ Refer to WP SCE-09 Vol. 03, Book A, pp. 314-318 (Telecomm. Engineering Data).

1 (f) Forty-Year Communication Equipment

2 The balance of the communication infrastructure includes such
3 equipment as overhead and underground communication cable, the communication conduit system, and
4 antenna support structures. This equipment has an average 40-year service life. The items are subject to
5 physical or mechanical deterioration since they are subject to outdoor environments.

6 (9) Account 398 – Miscellaneous

7 Account 398 represents a \$21.8 million net investment in miscellaneous
8 utility equipment that does not fit other plant accounts. Examples can include such diverse items as
9 kitchen and infirmary equipment. The current service life of 20 years is a reasonable depreciation period
10 for this account.

11 b) Intangibles

12 SCE has investments in a number of intangible assets, including hydro
13 relicensing, radio frequencies, long term franchise fees, capitalized software, and land easements and
14 rights-of-way. As previously discussed, the hydro relicensing costs are amortized over the remaining life
15 of the FERC project license period. SCE proposes to continue amortizing the radio frequency
16 investments over the 40-year service life and land easements and rights-of-way over the 60 year service
17 life determined in prior rate case proceedings. The other categories are discussed below.

18 (1) Miscellaneous Intangibles

19 The year-end 2015 net investment for miscellaneous intangibles is
20 approximately \$431 thousand, which is largely made up of long-term franchise costs (~\$300 thousand).
21 SCE proposes to allocate these costs over 20 years.

22 (2) Capitalized Software

23 The depreciable life of capitalized software reflects the estimated life prior
24 to investments required to replace or optimize the software as a result of technology, vendor, or business
25 obsolescence. SCE proposes to continue the four existing service life categories of five, seven, ten, and
26 fifteen years determined in prior proceedings.

27 (3) Easements

28 SCE proposes to retain the authorized amortization period of 60 years for
29 its easements and rights-of-way.