Ford Ranger Fleet Evaluation Report

January - December 1999





An EDISON INTERNATION 4L Company

ELECTRIC TRANSPORTATION DIVISION with TRANSPORTATION SERVICES DEPARTMENT

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PURPOSE

The purpose of SCE's evaluation of electric vehicles (EVs), EV chargers, batteries, and related items is to support their safe and efficient use and to minimize potential utility system impacts. The following facts support this purpose:

- As a fleet operator and an electric utility, SCE uses EVs to conduct its business.
- SCE must evaluate EVs, batteries, and charging equipment in order to make informed purchase decisions.
- SCE must determine if there is any safety issues with EV equipment and their usage.
- SCE has a responsibility to educate and advise its customers about the efficient and safe operation of EVs.

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I. INTRODUCTION

Southern California Edison (SCE) operates one of the largest electric vehicle fleets in the nation. The fleet is composed of EVs from all major auto manufacturers. Currently the fleet has a total of 315 EVs and has accumulated over 3.2 million miles. By far the Toyota RAV4 makes up the majority of the vehicles in the fleet, at 245 vehicles. Although the RAV4 satisfies a great deal of missions, there are still some missions that are more properly met with a pick up truck. To satisfy this need, SCE, in cooperation with the Department of Energy, acquired a total of seven Nickel/Metal-Hydride powered Ford Rangers.

When the vehicles were originally acquired, there were three main missions they were intended to meet. Vehicle 23642 was used for SCE's Fleet Trials Program, which makes various models of EVs available for periods of one to two months to SCE customers who are also fleet operators. Vehicle 23643 was used for SCE's communications program, which involves taking various EVs to internal and external public relations programs. The remaining five EVs were intended for meter reading applications. See Table 1-1 below for additional details.

Vehicle #	In Service Date	Initial Range	Application
23639	12/98	78 (1/99)	Fleet Testing
23640	12/98	68 (1/99)	Fleet Testing
23641	12/98	77 (1/99)	Fleet Testing
23642	12/98	85 (1/99)	Fleet Testing
23643	12/98	83 (1/99)	Fleet Testing
24470	12/98	84 (1/99)	Fleet Testing
24471	12/98	78 (1/99)	Fleet Testing

Table 1.1Vehicle History

II. FLEET OPERATION

The following tables and figures summarize the performance of the seven NiMH equipped Ford Rangers in 1999.

	1 st Qtr. '99	2 nd Qtr. '99	3 rd Qtr. '99	4 th Qtr. '99
Active EVs	7	7	7	7
Miles Driven	6260	7041	7576	8225
Miles/EV	894	1006	1082	1175
Miles/EV/Week	69	77	83	90





Figure 2.1 Cumulative mileage of the Ranger fleet during the evaluation period

Mileage For	the Month of:	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Vehicle#	Model				•	•	
23639	Ranger	176	441	488	473	95	465
23640	Ranger	190	202	604	975	206	79
23641	Ranger	303	586	649	151	177	0
23642	Rander	201	126	293	576	291	385
23643	Ranger	208	63	135	399	301	277
24470	Ranger	206	539	140	419	576	302
24471	Ranger	140	155	415	246	524	124

 Table 2-2
 Monthly Mileage Report

Mileage For	the Month of:	Jul-99	Aua-99	Sep-99	Oct-99	Nov-99	Dec-99
Vehicle#	Model		-	-			
23639	Rander	31	592	33	0	1.579	2.127
23640	Ranger	108	154	120	197	188	70
23641	Ranger	427	92	1,624	337	3	11
23642	Rander	106	173	179	206	253	373
23643	Ranger	703	468	552	51	126	99
24470	Rander	1.306	285	216	237	0	458
24471	Ranger	220	7	180	202	637	1,071



Figure 2.2 Total mileage by vehicle number



Figure 2-3 Monthly mileage summary



Figure 2.4 Average miles per charge by vehicle number

III. VEHICLE MAINTENANCE AND RELIABILTY

First Quarter 1999

Veh. No.	Vehicle Model	Component Name	Odometer Reading	Reported Problem	Date Reported	Date Repaired	Downtime (Days)*	Man Hours	Corrective Action
23639	RANGER	POWER STEERING CONTROLLER	296	AIR IN POWER STEERING SYSTEM	02/02/99	02/08/99	4	1.5	CYCLE STEERING LOCK TO LOCK 15 TIMES
23639	RANGER	TRACTION BATTERY	175	VEHICLE DOES NOT CHARGE. CHARGER STOPS WHEN PLUGGED IN AND PACK DISCHARGES.	01/26/99	02/04/99	7	15.5	R&R BATTERY PACK
23640	RANGER	BATTERY MODULE	192	LOW RANGE ~ 25 MILES	02/02/99	02/11/99	7	8	R&R BATTERY MODULE #1
23640	RANGER	AUXILIARY BATTERY	63	VEHICLE WILL NOT START -	01/18/99	01/18/99	0	1	CHARGED AUXILIARY BATT. &
				AUXILIARY BATTERY LOW					PLACED VEH. ON CHARGE
23640	RANGER	BATTERY MODULE	392	VEHICLE SOC DROPPED TO 25% FROM 50%	02/22/99	03/10/99	12	24.5	R&R TWO BATTERY MODULES
23641	RANGER	AUXILIARY BATTERY	145	VEHICLE WILL NOT START - AUXILIARY BATTERY LOW	01/18/99	01/18/99	0	1	CHARGED AUXILIARY BATT. & PLACED VEH. ON CHARGE
23642	RANGER	AUXILIARY BATTERY	62	VEHICLE WILL NOT START - AUXILIARY BATTERY LOW	01/19/99	01/19/99	0	1	CHARGED AUXILIARY BATT. & PLACED VEH. ON CHARGE
23643	RANGER	AUXILIARY BATTERY	59	VEHICLE WILL NOT START - AUXILIARY BATTERY LOW	01/19/99	01/19/99	0	1	CHARGED AUXILIARY BATT. & PLACED VEH. ON CHARGE
24470	RANGER	AUXILIARY BATTERY	63	VEHICLE WILL NOT START - AUXILIARY	01/18/99	01/18/99	0	1	CHARGED AUXILIARY BATT. &
				BATTERY LOW					PLACED VEH. ON CHARGE

Second Quarter 1999

Veh.	Vehicle	Component Name	Odometer	Reported Problem	Date	Date	Downtime	Man	Corrective Action
No.	Model	-	Reading		Reported	Repaired	(Days)*	Hours	
23639	RANGER	BATTERY	1,335	VEH. WILL NOT CHARGE, SOC VERY	05/14/99	05/19/99	4	10	R&R BATTERY CONTROL MODULE
		MANAGEMENT		LOW, WRENCH LIGHT ON					
		SYSTEM							
23641	RANGER	BATTERY SYSTEMS	1,866	VEHICLE DIED IN YARD, WRENCH	05/27/99	06/18/99	16	19	R&R CONTACTOR BOX
				LIGHT ON					
24470	RANGER	AUXILIARY BATTERY	1,768	REMOVE AUX. BATT. NEGATIVE TO	05/27/99	05/27/99	1	1	REMOVED NEGATIVE POWER
				CLEAR POWER LOSS LIGHT					CABLE FROM AUX. BATT.

Third Quarter 1999

Veh.	Vehicle	Component Name	Odometer	Reported Problem	Date	Date	Downtime	Man	Corrective Action		
No.	Model		Reading		Reported	Repaired	(Days)*	Hours			
23641	RANGER	AUXILIARY BATTERY	2,293	AUXILIARY BATTERY DEAD	08/09/99	08/09/99	1	1	RECHARGED AUXILIARY BATTERY		
23641	RANGER	NON EV RELATED	2,371	CHARGE DOOR BROKEN	08/20/99	08/23/99	2	2	R&R CHARGE DOOR		
24471	RANGER	ONBOARD	1,613	VEHICLE WILL NOT CHARGE	07/09/99	07/15/99	5	8	R&R ONBOARD CHARGER		
		CHARGING	1								

Fourth Quarter 1999

Veh.	Vehicle	Component Name	Odometer	Reported Problem	Date	Date	Downtime	Man	Corrective Action
No.	Model		Reading		Reported	Repaired	(Days)**	Hours	
23639	RANGER	TIRE	5,703	LEFT REAR TIRE FLAT	12/23/99	12/23/99	1	1.5	REPAIRED TIRE
23642	RANGER	CHARGE PORT	2,648	CHARGE PORT NOT CLOSING	10/20/99	10/28/99	7	2.5	R&R CHARGE PORT
22642			2 104		12/12/00	12/12/00	1	2.5	
23043	RANGER	BACKUF ALARIVI	3,104		12/13/99	12/13/99	1	2.0	INSTALLED BACKUP ALARIVI
24471	RANGER	ABB METER	2,212	INSTALL ABB METER	10/29/99	10/29/99	1	1.5	INSTALLED ABB METER FROM
									24078



Figure 3.1 Servicing Man-hours



Figure 3.2 Service downtime by vehicle number



Figure 3.3 Vehicle system or component reliability



Figure 3.4 Total "Out of Service" fleet summary

IV. BATTERY REPORT

SCE	Manufacturer	Model	Chemistry	Battery	In	Manuf.	Last lab	Total	Total Module
Batt.				Туре	Service	Rated	Certified	Miles	Replacements
Nbr.					Date	Capacity	Capacity		in 1999
	Ford Ranger								
23639	Panasonic	MHB-100	NiMH	Sealed VR	Dec-98	100Ah C/3	na	6,500	0
23640	Panasonic	MHB-100	NiMH	Sealed VR	Dec-98	100Ah C/3	na	3,093	3
23641	Panasonic	MHB-100	NiMH	Sealed VR	Dec-98	100Ah C/3	na	4,360	0
23642	Panasonic	MHB-100	NiMH	Sealed VR	Dec-98	100Ah C/3	na	3,162	0
23643	Panasonic	MHB-100	NiMH	Sealed VR	Dec-98	100Ah C/3	na	3,382	0
24470	Panasonic	MHB-100	NiMH	Sealed VR	Dec-98	100Ah C/3	na	4,684	0
24471	Panasonic	MHB-100	NiMH	Sealed VR	Dec-98	100Ah C/3	na	3,921	0

VRLA = Valve Regulated Lead Acid

VRLA (AE) = VRLA Absorbed Electrolyte

VRLA (Gel) = VRLA Gelled Electrolyte

kWh = kilowatt hours

Ah = amp hours

C/rate = Ah capacity at an established current over time in hours discharge.

An alphabet notation following a battery number indicates the number of battery pack changeouts. i.e. 1742b is the 2nd pack installed since it was new.

Cycles = the number of times the vehicle has been taken off charge, driven and put back on charge.

V. DISCUSSION AND CONCLUSION

Vehicle 23642, which was used for fleet loans, was able to meet the requirements of the mission that it was assigned to. A total of three loans were made to local entities. A sample report for a trial with a local city is included in Appendix A, page 13. Vehicle 23643 worked well for the communications group. The mission requirements in this application were not very demanding. The remaining five vehicles were intended for SCE fleet applications. Full deployment of the NiMH Ford Ranger into the SCE Fleet has not been achieved to date. These vehicles were evaluated in Pomona before being sent out to regular fleet users.

Experience to date has shown that a vehicle in the SCE fleet needs a minimum range of 65 miles on the Pomona Loop at full payload and A/C on maximum in order to be accepted favorably by the users. The vehicle must also be highly reliable. Unfortunately the Ranger did not perform well in at least three different field locations. For example, in the first quarter the Rangers were in service for a combined thirty days (see Table 3-4, page 10). Problems included charging anomalies, quit-on-road incidents, and lower than expected range (40 miles approx. in some cases). Once this information was relayed to other field locations, placing the Rangers became a nearly impossible task. Therefore, for most of 1999, these five Rangers were based out of Pomona and were used for relatively undemanding tasks. As a result there were months when the vehicles were driven very few miles (see Table 2-2, page 6).

Vehicle acceptance can be very subjective and although the Ranger didn't meet SCE's range and reliability requirements, 50% of surveyed drivers preferred the electric Ford Ranger to a gasoline-fueled truck for their work. As seen in the enclosed driver questionnaires, Appendix B, page 14, features that fared well with drivers were the ease of operation, quick acceleration and refueling at home or work rather than at a service station. But drivers also noted a need for longer range between charging.

Ford has made great efforts in remedying the problems with the Rangers. Software and hardware upgrades have been made on the vehicles and as of the time this report was being

written the changes made seem extremely promising - SCE is willing to give the Ranger "a second chance" and deploy it in its fleet in 2000 and beyond.

Appendix A

Vehicle Trial Report

October 4, 1999

Dear Program Participant:

Thank you for participating in Southern California Edison's *EV Trials* program. We hope that the program was a positive experience for your organization. In addition to exposing you to new vehicles and opportunities to be in the forefront of future transportation technologies, this program is very important to SCE. The data collected from your trial will help us evaluate load management scenarios, customer power quality, and the effects of EV charging on the overall power supply system. Information collected about your EV use and the opinions of your drivers will also be instrumental to our plans for meeting future charging infrastructure needs.

The information presented in this report was compiled from on-site metering and surveys of your drivers. In this report you will find summaries of energy use and cost, graphs illustrating your site's load profile, and results from the driver survey.

We believe electric transportation can benefit your organization financially as well as through positive public relations. We encourage you to contact us any time in the future if you have questions about this particular program or electric transportation in general—including questions about vehicles, costs, infrastructure needs, and project financing opportunities. In particular, we can show you how to take advantage of "Subvention" funds which are available to some cities. Further, we offer special time-of-use (TOU) Electric Vehicle Rates so that you can take maximum advantage of off-peak charging.

Again, thank you for helping us promote a cleaner future through electric transportation.

Sincerely,

Cecilia Mushinskie Technical Specialist Southern California Edison Electric Transportation 626.302.3934

Summary

The following illustration highlights your organization's experience with an EV. The information summarizes key facets of EV use and charging, as well as user benefits. This information, collected during the EV Trials program, provides insights into how the EV was actually used by your drivers and how EVs may eventually fit in as an integral part of your fleet.

Key Findings

USE: Vehicle range (mfg. specification): 65 miles Average daily miles: 17 miles Total miles driven: 353 miles Trial duration: 71 days (Vehicle used 27 days)	65 miles 17 miles
DRIVING CHARACTERISTICS:45% of driving with charge above 50%55% of driving with charge below 50%	45%
CHARGING: 36% occurred off-peak 64% occurred on-peak	THE UTITED STATES OF AMERICA 36% 0 JSTRE 0 THE UTITED STATES OF AMERICA 0 15120 0 15120 0 151200 0 15120 0 15120 0 15120 0 15120 0 15120 0 15120 0 1512
ENERGY USE: Total kWh consumed during Trials: 271 kWh Average kWh per mile: 0.77	kwh
ENERGY COST:* Electric: \$12.21 if 100% of charging was off- peak Gasoline equivalent: \$53.19 Driving 10000 miles you would save \$636.78	\$12.21 \$53.19
EMISSIONS BENEFITS: While driving your EV 353 miles, you reduced air pollution by over 84 lbs. If you drove 10000 miles a year, you would reduce pollution by 2,381 lbs.	2,381 lbs. 84 lbs.

* Energy Costs—reflect current SCE TOU EV rates.

Trial Results and Analysis

This section provides detailed information about your use of the EV during the Trials Program.

Trial Duration

The trial period was July 21, 1999 to September 30, 1999 (71 days), during which the EV was operated 27 days.

Vehicle Use Characteristics

During the Trials, your organization drove the EV a total of 353 miles. The average driving distance was 17 miles a day, with an average trip of 16 miles. 45% of the driving occurred when the vehicle was over 50% state-of-charge. This is not unusual during a trial period because of operator concerns over range. Once drivers are more familiar with the vehicle, they are more comfortable driving further, increasing average daily mileage, and the depth of charge between charges.

Vehicle Charging

A critical advantage of EVs is their low "fuel" costs due to their ability to be charged during off-peak hours (9:00 PM to 12 PM) when electricity rates are lowest. EV owners receive a further advantage through SCE's special EV time-of-use (TOU) rate, which costs even less than standard off-peak rates during these off-peak hours.

During the Trials period, 36% of your EV charging occurred during off-peak hours, the best time to charge. The remaining 64% occurred on-peak at a higher electricity rate. Your driver indicated that the charging process was acceptable and that the EV was adequately charged in the morning and ready for use. When operating an EV for 17 miles per day it is not necessary to "top-off" the vehicle charge. Ultimately, the most cost-effective approach to EV charging is to—whenever possible—charge your EV during off-peak hours when the lowest TOU rate is in effect.

Energy Use

SCE installed separate electricity meters at your facility to monitor EV charging during the Trials period. This enabled us to determine how much electricity was used and what time of the day charging occurred. The figure on the following page graphically depicts electricity consumption for EV charging by hour intervals during the Trials period. This information can be used to analyze individual charging patterns and optimize charging for off-peak periods.

Energy Costs

Based on your driving patterns, and applying SCE's TOU-EV3 rate, your energy cost for operating the EV was \$12.21 for the entire trial. This assumes that all charging occurred off-peak. If you were operating a gasoline vehicle that got 15 mpg at \$2.26 per gallon, your energy cost would be \$53.19 for the same number of miles driven. Therefore, your net savings came to \$40.98. Over 10,000 miles, total fuel savings would be \$637.

Emissions Benefits

A major benefit of EV use is a reduction in harmful emissions. Even when power plant emissions in the Los Angeles basin are taken into consideration, your use of an EV during the trial program reduced emissions by 84 lbs. If you operated this vehicle for one year, assuming 10,000 miles per year, the emissions reduction would be 2,381 lbs. The composition of the emissions reductions are shown in Table 1:

Table 1. Emissions Reductions

Emission	Trials Reduction (lbs.)	Annual Reduction (Ibs.)
Carbon Monoxide (CO)	68.6	1943.1
Reactive Organic Gases (ROG)	8.6	244.5
Nitrogen Oxides (NO _X)	5.5	155.0
Sulfur Oxides (SO _X)	1.0	27.6
Particulates (PM ₁₀)	0.4	10.6
Total	84	2381

User Response

A critical issue tied to future EV use is what drivers think about operating the EV. The figure on the following page graphically depicts your drivers' opinions on 21 attributes related to their experience with the vehicle. Drivers were most pleased with the drivability. In general, drivers were favorably impressed with the performance and amenities provided by the vehicle.

In addition to the tabulated data, written comments were submitted by drivers. While opinions vary, rapid acceleration is what your drivers liked best and the limited range is what they liked least.

Electricity Consumption by Hour



Hour of Day

Driver Questionnaire Responses



Average response: 1= strongly disagree, 5 = strongly agree

Appendix B

Driver Questionnaires

Electric venicle priver questionnaire

E	HICLE NUMBER	VEHICLE MAKE			2121)	KANG-	ER
	HICLE ADDI ICATION:		D	ATE:	17 5	ent	1011
DF	IVEABILITY	SA	A	NS	D	SD	NA
1.	The vehicle feels stable and safe	×/			_	_	_
2.	The vehicle steering is responsive					_	
3.	The vehicle acceleration is adequate	· _ ,					
1.	The vehicle braking is responsive and safe	<u> </u>					_
DF	IVING CONTROL'S AND GAUGES	1					
1.	The cabin temperature controls are easy to operate	<u> </u>					
2.	The "state-of-charge" gauge is neipful and easy to n	ead					
з.	The "range remaining" gauge is helpful and easy to	read /					
Ch	ARGING CONTROLS AND GAUGES	1					
1.	The charging controls are easy to operate	11		_			
2.	The charging connector (plug) is easy to use	V.	_				
3.	The charging cord is easy to manage	\sim	_/			_	
4.	The vehicle charges adequately (full in the morning))	~			_	
5.	The charger is reasonably quiet	<u></u>	1			4-	
5. 5.	The charger is reasonably quiet Do you know the differences between Inductive and	Conductive cha	arging?		es _	/No	_
5.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? Inductive /	Conductive chi	arging?	o prefer	'es	Ź No	
5.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? Inductive Did you have any problems charging?Yes	Conductive cha	arging?	o prefer	/es	ŹN0	
5.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? Inductive Did you have any problems charging?Yes If yes, please describe*G +226 CA	Conductive cha <u>Conductive</u> <u>No</u> LC 24 H	arging?		es	ZNO	-
5.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? Inductive Did you have any problems charging? Yes If yes, please describe" USE ANCE ON CA FEASABLE TO HAVE A VEHICLE	Conductive chi <u>Conductive</u> <u>No</u> <u>LC</u> <u>24 m</u> ON <u>CHA</u>	nrs a	o prefer	res ence	<u> Νο</u>	:7
5. 5. 7.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? <u>Inductive</u> Did you have any problems charging? <u>Yes</u> If yes, please describe* <u>WE ARE ON CA</u> <u>FEASPALE</u> TO HAVE A VEHICLE TERIOR	Conductive cha Conductive No LC 24 H ON CHA	nce	o prefer	res ence	<u>Νο</u>	T
5. 5. 7.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? <u>Inductive</u> Did you have any problems charging? <u>Yes</u> If yes, please describe* <u>WE ARE ON CA</u> <u>FEASPALE</u> TO HAVE A VEHICLE The beater provides adequate heat	Conductive cha Conductive No LC 24 H ON CHA	marging? N N M M M M M M M M M M M M M	o prefer	/es ence	<u>Νο</u>	T
N.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? <u>Inductive</u> Did you have any problems charging? <u>Yes</u> If yes, please describe* <u>US ANS ON CA</u> FEASPALE TO HAVE A VEHICLE TERIOR The heater provides adequate heat The air conditioner provides adequate cooling	Conductive cha Conductive No LC 24 H ON CHA	ns a	o prefer	/es	<u> Νο</u>	·T
5. 5. 7. 1. 2.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? <u>Inductive</u> Did you have any problems charging? <u>Yes</u> If yes, please describe* <u>WE ARE</u> ON CA <u>FEASPRE</u> TO HAVE A VEHICLE TERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet	Conductive cha Conductive No LC 24 H ON CHA	ms a	o prefer	/es	<u>/ No</u>	
5. 5. 7. 1. 2. 3.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? <u>Inductive</u> Did you have any problems charging? <u>Yes</u> If yes, please describe* <u>WE ARE ON CA</u> <u>FEASPALE</u> <u>TO HAVE A VEHICLE</u> The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio	Conductive cha Conductive No LC 24 H ON CHA	Marging? N M M M M M M M M M M M M M	-,>.+y	/es	/ No	
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5. 6. 7. IN 1. 2. 3. 4. 5. 6.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? <u>Inductive</u> Did you have any problems charging? <u>Yes</u> If yes, please describe* <u>USE ANE ON CA</u> <u>FEASPALE</u> TO HAVE A VEHICLE TERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- <u>INERAL</u> The vehicle has adequate payload The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations If you had to choose between this vehicle or a similar mould you elect? (Clarle Orac) Electric Vehicle or a similar The vehicle or a similar	A conductive char Conductive No LC 24 H ON CHA , etc.) inside the oblems encount A r gasoline vehicle	Arging?	o prefer			
5. 6. 7. IN 1. 2. 3. 4. 5. 6. 5.	The charger is reasonably quiet Do you know the differences between Inductive and If yes, which do you prefer? <u>Inductive</u> Did you have any problems charging? <u>Yes</u> If yes, please describe' <u>WE ARE ON CA</u> <u>FEASPALE</u> TO <u>HAVE A</u> <u>VEHICLE</u> The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- <u>INERAL</u> The vehicle has adequate payload The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations If you had to choose between this vehicle or a similar would you select? (Circle One) Electric Vehicle	Conductive cha <u>Conductive</u> <u>No</u> <u>LC</u> <u>2.4 m</u> <u>on</u> <u>C.Hm</u> <u>i</u> <u>on</u> <u>on</u> <u>c.Hm</u> <u>i</u> <u>on</u> <u>on</u> <u>on</u> <u>on</u> <u>on</u> <u>on</u> <u>on</u> <u>on</u>	Arging? N N N N N N N N N N N N N	o prefer		/ No // No // // // // // // // // // // // // //	
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A PASSENCER OR A LOAD SA: Strongly Agree; A: Agree; NS: Not Sure; D: Disagree; SD: Strongly Disagree; NA: Not Applicable

* Please use the back of this form if you need additional space.

Revised: 03/03/99

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Electric Vehicle Driver Questionnaire Participant <u>SCE</u>

DR	IVER NAME: SUZAN BOUER	OCATION:	Rose	mead			
VE	HICLE NUMBER: 23643	EHICLE MAK	E & MOD	EL: FO	ord R	ange	r
VE	HICLE APPLICATION: Fleet Testing		D	ATE:	5/21/	ĩ9 J	
		54	4	NS	D	SD	NA
1	The vehicle feels stable and safe	v	~		~	00	114
2	The vehicle steering is responsive	V					
3	The vehicle acceleration is adequate	V					
4	The vehicle braking is responsive and safe	V					
 DB	IVING CONTROLS AND GALIGES						
1	The cabin temperature controls are easy to operate	2					
2	The "state-of-charge" gauge is beloful and easy to re						
3	The "rance remaining" gauge is helpful and easy to r	read		2			_
CH	ARGING CONTROLS AND GALIGES				7		
1	The charring controls are easy to operate	v				-	4
2	The charging connector (olug) is easy to use	V					
2	The charging connector (plug) is easy to use	<u>.</u>					
J.	The vehicle chames adequately (full in the moming)	v			-		
4. 5	The charger is reasonably quiet	V					
5. 6	Do you know the differences between inductive and	Conductive ch	araina?	Vv		No	
0.	bo you know the differences between muddlive and	Conductive Cite	nging:	nrefere	Co _	NO	
-	If yes, which do you prefer? inductive	Conductive	NO	preiere	nce		
1.	Did you have any problems charging? res	- 110					
	If yes, please describe						
INT	TERIOR						
1.	The heater provides adequate heat			V			
2.	The air conditioner provides adequate cooling			<u>v</u>			
3.	The vehicle is quiet	<u> </u>					
4.	Did you use electronic equipment (cell phone, radio,	etc.) inside the	EV?	Yes	V	No	
	If yes, please list equipment(s) and describe any pro	blems encount	ered*				
				4			
GE	NERAL						
1.	The vehicle has adequate payload	<u> </u>					
2.	The vehicle has adequate range	V					
з.	The vehicle is easy to operate	<u>\</u>					
4.	The vehicle is suited for your job application	<u>\</u>					
5.	The vehicle meets your expectations	<u>\</u>		_			
6.	If you had to choose between this vehicle or a similar	r gasoline vehic	le for us	se in you	r work,	which o	ne
	would you select? (Circle One) Electric Vehi	icle Gas	oline Ve	hicle	Ei	ther	
co	MMENTS*						
Wh	at did you like best? No GAS STATION USU	15					
					_		
Wh	at did you like least?						
				3			

SA: Strongly Agree; A: Agree; NS: Not Sure; D: Disagree; SD: Strongly Disagree; NA: Not Applicable

RI	VER NAME: Cecilia Mushinskie LOCAT	ION:	USCI	-	1.0		
/EH	ICLE NUMBER: 23642 VEHICI	E MAKE	& MOE	DEL: 17	ord K	angli	<u> </u>
/EH	ICLE APPLICATION: Fleet Testing		D	ATE:	5/21	199	
DRI	VEABILITY	SA	А	NS	D	SD	NA
1.	The vehicle feels stable and safe	X					
2	The vehicle steering is responsive	\times					
3.	The vehicle acceleration is adequate	X					
4	The vehicle braking is responsive and safe	\mathbf{X}					_
DRI	VING CONTROLS AND GAUGES	43. 33					
1	The cabin temperature controls are easy to operate	\times					
2	The "state-of-charge" gauge is helpful and easy to read	$\underline{\times}$				<u> </u>	
2	The "rance remaining" gauge is helpful and easy to read	X					
0.	ARGING CONTROLS AND GAUGES	2000 - DA				e	
1	The charging controls are easy to operate	X					_
1.	The charging connector (olug) is easy to use	X					
2.	The charging conflicted (plag) is easy to manage	X					
3.	The unbials sharpes adequately (full in the morning)	$\overline{\times}$					
4.	The vehicle charges adequately (iun in the moning)	D.A					
-	The electronic reaconably quiet	X		10000			
5.	The charger is reasonably quiet	L uctive cha	araina?	$\overline{\times}$	Yes	No	
5. 6.	The charger is reasonably quiet Do you know the differences between Inductive and Cond	uctive cha	arging?		Yes _	No	
5. 6.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? Inductive Con	uctive cha ductive	arging?		Yes _ ence	No	-
5. 6. 7.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? <u>Inductive</u> <u>Con</u> Did you have any problems charging? <u>Yes</u>	uctive cha ductive No	arging?	io prefer	Yes _ ence	No	
5. 6. 7.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? <u>Inductive</u> <u>Con</u> Did you have any problems charging? <u>Yes</u> If yes, please describe*	uctive cha ductive No	arging? N	io prefer	Yes _ ence	No	
5. 6. 7.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? <u>Inductive</u> <u>Con</u> Did you have any problems charging? <u>Yes</u> If yes, please describe*	Luctive cha ductive No	arging?	Jo prefer	Yes _ ence	No	
5. 6. 7.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? <u>Inductive</u> <u>Con</u> Did you have any problems charging? <u>Yes</u> If yes, please describe*	Luctive cha ductive No	arging?	Jo prefer	Yes _ ence	No	
5. 6. 7. <u>INT</u> 1.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? InductiveCon Did you have any problems charging?Yes If yes, please describe* The heater provides adequate heat The eigeneditioner provides adequate cooling	Luctive cha ductive No	arging? N		Yes ence	No	
5. 6. 7. <u>INT</u> 1. 2.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? InductiveCon Did you have any problems charging?Yes If yes, please describe* FERIOR The heater provides adequate heat The air conditioner provides adequate cooling The usehicle is quiet	Luctive cha ductive No			Yes ence	No	
5. 6. 7. <u>INT</u> 1. 2. 3.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? InductiveCon Did you have any problems charging?Yes If yes, please describe* <i>TeRIOR</i> The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet	Luctive cha ductive No			Yes ence	No	
5. 6. 7. <u>INT</u> 1. 2. 3. 4.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? Inductive Com Did you have any problems charging? Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.)	Luctive cha ductive No	EV?	lo prefer	Yes ence	No	
5. 6. 7. <u>INT</u> 1. 2. 3. 4.	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? InductiveCond Did you have any problems charging?Yes If yes, please describe* ERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems	Luctive char ductive No	arging? N N N N EV? ered*	lo prefer	Yes ence	No	
5. 6. 7. <u>INT</u> 1. 2. 3. 4. GE	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? InductiveCond Did you have any problems charging?Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems ENERAL	Luctive char ductive No	arging?	lo prefer	Yes ence	No	
5. 6. 7. <u>INT</u> 1. 2. 3. 4. <u>GE</u> 1.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? InductiveCon Did you have any problems charging?Yes If yes, please describe* ERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems INERAL The vehicle has adequate payload	Luctive char ductive No	EV?	lo prefer	Yes ence	No	
5. 6. 7. <u>INI</u> 1. 2. 3. 4. <u>GE</u> 1. 2.	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? Inductive Com Did you have any problems charging? Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems <u>NERAL The vehicle has adequate payload The vehicle has adequate range </u>	inside the	ered*	Ves	Yes ence	No	
5. 6. 7. 1. 2. 3. 4. <u>GE</u> 1. 2. 3.	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? InductiveCondi Did you have any problems charging?Yes If yes, please describe* ERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems ENERAL The vehicle has adequate payload The vehicle has adequate range The vehicle is easy to operate	inside the	EV?		Yes ence	No	
5. 6. 7. 1. 2. 3. 4. <u>GE</u> 1. 2. 3. 4.	The charger is reasonably quiet Do you know the differences between Inductive and Cond If yes, which do you prefer? Inductive Con Did you have any problems charging? Yes If yes, please describe* TeRIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems ENERAL The vehicle has adequate payload The vehicle is easy to operate The vehicle is suited for your job application	inside the	EV?		Yes ence	No	
5. 6. 7. 1. 2. 3. 4. <u>GE</u> 1. 2. 3. 4. 5	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? InductiveCom Did you have any problems charging?Yes If yes, please describe* Ternor The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems MERAL The vehicle has adequate range The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations	inside the	EV?	Ve:	Yes ence	No	
5. 6. 7. 1. 2. 3. 4. <u>GE</u> 1. 2. 3. 4. 5. 6	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? Inductive Com Did you have any problems charging? Yes If yes, please describe* ERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems ENERAL The vehicle has adequate range The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations If you had to choose between this vehicle or a similar dass	inside the sencount	ered*	Ves Use in you	Yes ence	No	
5. 6. 7. 1. 2. 3. 4. 5. 6.	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? InductiveCond Did you have any problems charging?Yes If yes, please describe* ERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems EXERAL The vehicle has adequate payload The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations If you had to choose between this vehicle or a similar gas mould you select? (Circle One) Electric Vehicle	inside the sencount	ered*	Io prefer	Yes ence	No	
5. 6. 7. INT 1. 2. 3. 4. GE 1. 2. 3. 4. 5. 6.	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? InductiveCond Did you have any problems charging?Yes	inside the sencount	EV? ered*	Io prefer	Yes ence	No No	
5. 6. 7. INT 1. 2. 3. 4. GE 1. 2. 3. 4. 5. 6. CC	The charger is reasonably quiet Do you know the differences between Inductive and Condi If yes, which do you prefer? InductiveCom Did you have any problems charging?Yes If yes, please describe* ERIOR The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio, etc.) If yes, please list equipment(s) and describe any problems ENERAL The vehicle has adequate payload The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations If you had to choose between this vehicle or a similar gas would you select? (Circle One) Electric Vehicle ENTERS*	inside the sencount	EV? ered*	Vehicle	Yes ence	No	

SA: Strongly Agree; A: Agree; NS: Not Sure; D: Disagree; SD: Strongly Disagree; NA: Not Applicable

* Please use the back of this form if you need additional space.

SCE Electric Vehicle Driver Questionnaire

DF	RIVER NAME: ROGER THORNTON	LOCATION:	LIEN	ERAL	OFFI	ie	1
VE	EHICLE #: 24471	VEHICLE M	AKE & I	MODEL: /	FORD	Ra	nger
VE	EHICLE APPLICATION: REACINFICIE	TEStin	t	DATE:	Dec é	29,9	9
DF	RIVEABILITY	S	A	A NS	D	SD	NA
1.	The vehicle feels stable and safe	-	_	×			
2.	The vehicle steering is responsive			<u> </u>	10000		
3.	The vehicle acceleration is adequate						
4.	The vehicle braking is responsive and safe	_	_	X			
DF	RIVING CONTROLS AND GAUGES		21 - C	1			
1.	The cabin temperature controls are easy to operat	e		<u> </u>	_	3	
2.	The "state-of-charge" gauge is helpful and easy to	read		<u> </u>			
3.	The "range remaining" gauge is helpful and easy to	o read		<hr/>	1		
Ch	ARGING CONTROLS AND GAUGES	5-250					
1.	The charging controls are easy to operate		X				
2.	The charging connector (plug) is easy to use		X				
3.	The charging cord is easy to manage	_		×			
4.	The vehicle charges adequately (full in the morning	g)	X				
5.	The charger is reasonably quiet			×			
6.	Do you know the differences between Inductive an	d Conductive	charging	1? X1	fes	No	S
INT	TERIOR						
1.	The heater provides adequate heat			X			
2.	The air conditioner provides adequate cooling		X	<u> </u>			
3.	The vehicle is quiet		X				
4.	Did you use electronic equipment (cell phone, radio	o, etc.) inside t	he EV?	X Yes	N	0	
	If yes, please list equipment(s) and describe any pr	roblems encou	intered*	CELLP	LONE,	PA	402
GE	NERAL	14	-	•			
1.	The vehicle has adequate payload	<u> </u>		۷			
2.	The vehicle has adequate range	_		_ <u>X</u>			
3.	The vehicle is easy to operate		X				
4.	The vehicle is suited for your job application		_ <u>×</u>	· ·			
5.	The vehicle meets your expectations			<u>X</u> _			
5.	If you had to choose between this vehicle or a simil	ar gasoline ve	hicle fo	r use in yo	ur work	which	one
	would you select? (Circle One) Electric Vel	nicle) G	asoline	Vehicle	Eithe	er	
co	MMENTS*		(t)				
Mha	at did you like best? I EN LOY the FASE	EOPO	InAll	ing a	+ HOL	1= :	ANCT
Ma	at did you like least? Range I Wou ETWIETN CHALGES.	ld lite	すわ	thank	1 fu	RTH	2

SA: Strongly Agree; A: Agree; NS: Not Sure; D: Disagree; SD: Strongly Disagree; NA: Not Applicable

* Please use the back of this form if you need additional space.

Participant _____ OF AVALON

VEHICLE NOMBER: VEHICLE APPLICATION: DRIVEABILITY 1. The vehicle feels stable 2. The vehicle steering is 3. The vehicle acceleration 4. The vehicle braking is r DRIVING CONTROL'S ANI 1. The cabin temperature 2. The "state-of-charge" g	e and safe responsive n is adequate esponsive and safe <u>D GAUGES</u>		A	NS	07 5 D	5D	1277 NA
DRIVEABILITY 1. The vehicle feels stable 2. The vehicle steering is 3. The vehicle acceleratio 4. The vehicle braking is r DRIVING CONTROL'S ANI 1. The cabin temperature 2. The "state-of-charge" gr	e and safe responsive n is adequate esponsive and safe <u>D GAUGES</u>	SA ·/···································	A 	NS	D	SD	NA
DRIVEABILITY 1. The vehicle feels stable 2. The vehicle steering is 3. The vehicle acceleratio 4. The vehicle braking is r DRIVING CONTROL'S ANI 1. The cabin temperature 2. The "state-of-charge" gr	and safe responsive n is adequate esponsive and safe <u>D GAUGES</u>		A 	NS		SD	NA
 The vehicle feels stable The vehicle steering is The vehicle acceleratio The vehicle braking is r DRIVING CONTROL'S ANII The cabin temperature The "state-of-charge" graduate 	and safe responsive n is adequate esponsive and safe <u>D GAUGES</u>	*	=	_	_		
 The vehicle steering is The vehicle acceleratio The vehicle braking is r DRIVING CONTROL'S AND The cabin temperature The 'state-of-charge' graded state-of-charge' graded state-of-ch	responsive n is adequate esponsive and safe <u>D GAUGES</u>						
 The vehicle acceleratio The vehicle braking is r DRIVING CONTROL'S AND The cabin temperature The "state-of-charge" graduate 	n is adequate esponsive and safe <u>D GAUGES</u>	1			-		
 The vehicle braking is r <u>DRIVING CONTROL'S ANI</u> The cabin temperature The "state-of-charge" graduate 	esponsive and safe O GAUGES	/			_	_	
DRIVING CONTROL'S AND 1. The cabin temperature 2. The *state-of-charge* gr	O GAUGES						_
 The cabin temperature The "state-of-charge" gives 	entrole are associate associate	. /		2.4			20
2. The "state-of-charge" g	controls are easy to operate	e					
	auge is helpful and easy to	iead					
3. The "range remaining"	gauge is helpful and easy to	read				_	
CHARGING CONTROLS A	ND GAUGES	1	φ.				
1. The charging controls a	re easy to operate						
2. The charging connector	(plug) is easy to use	1				_	
The charging cord is ea	sy to manage	<u></u>	-/	_	_	_	
4. The vehicle charges ad	equately (full in the morning	,)			_		
5. The charger is reasonal	bly quiet		1		_		
Do you know the difference	nces between Inductive and	d Conductive cha	arging?	Y	es _	_ No	
If yes, which do you pre	fer? Inductive/	_ Conductive	N	prefere	nce		
7. Did you have any proble	erns charging? Yes	No	<u>*</u> 2				
If yes, please describe	WE ARE ON CA	i on CHA	ns A noi	DAY	17	15 Nº0	T
INTERIOR							
1. The heater provides ad	equate heat						-
2. The air conditioner prov	ides adequate cooling						
3. The vehicle is quiet							
4. Did vou use electronic e	quipment (cell phone, radio	, etc.) inside the	EV?	Yes		No	
If ves, please list equipr	nent(s) and describe any pr	oblems encount	ered*				
	.,						
GENERAL .						- 3	/
1. The vehicle has adequa	te payload		_				<u> </u>
2. The vehicle has adequa	te range					/	
3. The vehicle is easy to o	perate .	~			-/		
4. The vehicle is suited for	your job application				<u> </u>		1
5. The vehicle meets your	expectations						V
5. If you had to choose be	ween this vehicle or a simil	ar gasoline vehic	le for us	e in you	r work,	which o	ne
would you select? (Circ	le One) Electric Vel	hicle Gas	oline Ve	hicle	Ei	ther	
COMMENTS*	•						
What did you like best?	ACCELERATE	IS RAP	IDL	Y			
				/			
What did you like least?	THE RANGE	DIMINI	SHEI) .4F	TER	- 77	1E.
AND THE CHA	NE WENT DO	WIN 12+1	PIDLY	1 W	HILL	E CA	nry

* Please use the back of this form if you need additional space.

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SCE Electric Vehicle Driver Questionnaire

							-
VE	HICLE #: 23641	VEHICLE MAK	E & MOD	DEL:	-an	zer	
VE	HICLE APPLICATION:		D	ATE:		5	_
Df	RIVEABILITY	SA	A	NS	D	SD	N
1.	The vehicle feels stable and safe		X				
2.	The vehicle steering is responsive		X	1000		97. L. C.	
3.	The vehicle acceleration is adequate		V				
ŧ.	The vehicle braking is responsive and safe		Y			_	
DF	IVING CONTROLS AND GAUGES			- 4	_	<u> </u>	
1.	The cabin temperature controls are easy to operate	•			X		
2.	The "state-of-charge" gauge is helpful and easy to	read		X	-		-
3.	The "range remaining" gauge is helpful and easy to	read	Y	-			
CH	ARGING CONTROLS AND GAUGES		1				
	The charging controls are easy to operate		Y				
2	The charging connector (plug) is easy to use				X		
3.	The charging cord is easy to manage		X		-		
1.	The vehicle charges adequately (full in the morning)	X		_		
5.	The charger is reasonably quiet		×				
	Do you know the differences between Inductive and	d Conductive cha	raina?	XY	as	No	1
	If yes which do you profe? Inductive						
	Did you have any problems charging? Yes	Conductive	<u>X</u> No	o prefere	ence		
	Did you have any problems charging?Yes If yes, please describe*	No	<u>X</u> No	o prefere	ence		
N	Did you have any problems charging? Yes If yes, please describe*	No	× No	o prefere	ence		
NT.	Did you have any problems charging? Yes If yes, please describe* <i>TERIOR</i> The heater provides adequate heat The size conditioner provides adequate heat	No	X No	prefere	ence		
NT	Did you have any problems charging? Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The unbido is quint	No		prefere	ence		
<u>N</u>	Did you have any problems charging? Yes If yes, please describe* <i>The heater provides adequate heat</i> The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell above profile	No					
NT	Did you have any problems charging? Yes If yes, please describe* <i>The heater provides adequate heat</i> The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro-	No		 Yes		 No	
	Did you have any problems charging? Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- NERAL	No	X No	 Yes		 No	
	Did you have any problems charging? Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- <u>NERAL</u> The vehicle has adequate payload	No	X No	Yes		 No	
	Did you have any problems charging? Yes If yes, please describe* <i>The heater provides adequate heat</i> The heater provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- <i>NERAL</i> The vehicle has adequate payload The vehicle has adequate range	No	X No X X X EV? Ev?	Yes		No	
	Did you have any problems charging? Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- <u>NERAL</u> The vehicle has adequate payload The vehicle has adequate range The vehicle is easy to operate	No		Yes		No	
	The vehicle has adequate payload The vehicle is easy to operate The vehicle is easy to operate	No	X No X X X X EV?	Yes		No	
	Did you have any problems charging?Yes If yes, please describe*Yes If yes, please describe*Yes The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- <u>NERAL</u> The vehicle has adequate payload The vehicle has adequate range The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations	No		Yes		No	
	Did you have any problems charging? Yes If yes, please describe* The heater provides adequate heat The air conditioner provides adequate cooling The vehicle is quiet Did you use electronic equipment (cell phone, radio If yes, please list equipment(s) and describe any pro- <u>NERAL</u> The vehicle has adequate payload The vehicle has adequate range The vehicle is easy to operate The vehicle is suited for your job application The vehicle meets your expectations If you had to choose between this uchicle are similar.	No		Yes			
	If yes, which do you preter? mducuve Did you have any problems charging? Yes If yes, please describe*	, etc.) inside the oblems encounter	X No	Yes		No No	
	If yes, which do you preter? mducuve Did you have any problems charging? Yes If yes, please describe*	No	X No X X X X EV? _ ered* He for us oline Ve	Yes		No No	
	If yes, which do you preter? mducuve Did you have any problems charging? Yes If yes, please describe*	Conductive No No , etc.) inside the oblems encounte ar gasoline vehic nicle Gas	X No X X X X EV? _ ered* ke for us oline Ve	Yes		No No	
7. 	If yes, which do you preter? mducuve Did you have any problems charging? Yes If yes, please describe*	, etc.) inside the oblems encounter ar gasoline vehic iicle Gas	X No	Yes		No No	
	If yes, which do you preter? mducuve Did you have any problems charging? Yes If yes, please describe*	No	X No	Yes		No No	

SA: Strongly Agree; A: Agree; NS: Not Sure; D: Disagree; SD: Strongly Disagree; NA: Not Applicable

Electric Vehicle Driver Questionnaire Participant SCE

VEHICLE NUMBER VEHICLE APPLICA DRIVEABILITY 1. The vehicle feels 2. The vehicle steel 3. The vehicle acce 4. The vehicle brack DRIVING CONTROL 1. The cabin tempe 2. The "state-of-cha 3. The "range rema CHARGING CONTROL 1. The charging cou 2. The state-of-cha 3. The "range rema CHARGING CONTROL 1. The charging cou 2. The charging cou 3. The charging cou 3. The charging cou 4. The vehicle char 5. The charging cou 4. The vehicle char 5. The charger is re 6. Do you know the 1 f yes, which do y 7. Did you have any 1 f yes, please des INTERIOR 1. The heater provid 2. The air condition 3. The vehicle is qu 4. Did you use elect 1 f yes, please list GENERAL 1. The vehicle has a 3. The vehicle is ea 4. The vehicle is ea 5. The vehicle is sui 5. The	NAME: V. J. Speedharan	LOCATION:		Pont	ona			
VEHICLE APPLICA DRIVEABILITY 1. The vehicle feels 2. The vehicle steel 3. The vehicle steel 3. The vehicle brack DRIVING CONTROM 1. The cabin tempe 2. The "state-of-cha 3. The "range rema CHARGING CONTR 1. The charging con 3. The charging con 3. The charging con 3. The charging con 3. The charging con 4. The vehicle char 5. The charging con 4. The vehicle char 5. The charger is re 6. Do you know the 1f yes, which do y 7. Did you have any 1f yes, please des INTERIOR 1. The heater provid 2. The air condition 3. The vehicle is qu 4. Did you use elect 1f yes, please list GENERAL 1. The vehicle has a 3. The vehicle is eai 4. The vehicle is eai 5. If you had to chool 6. Would you select 6. If you had to chool 6. Would you select 6. If you had to chool 6. No you have select 6. If you had to chool 6. Sound you select 6. If you had to chool 6. Sound you select 6. If you had to chool 6. Sound you select 6. If you had to chool 6. Sound you select 6. Sound you selec	ENUMBER: 23639	VEHICLE MAK	E & MOD	EL:	Ran	ger		
 DRIVEABILITY 1. The vehicle feels 2. The vehicle steel 3. The vehicle accord 4. The vehicle brack DRIVING CONTROL 1. The cabin temper 2. The "state-of-chains" 3. The "range remains" CHARGING CONTROL 2. The "state-of-chains" 3. The "range remains" CHARGING CONTROL 2. The charging control 3. The charging control 4. The charging control 5. The charger is reference 6. Do you know the figures, which do you have any figures, please deated INTERIOR 1. The heater provide 2. The air condition 3. The vehicle is quited. 4. Did you use election 3. The vehicle has a state. 4. The vehicle has a state. 4. The vehicle has a state. 5. The vehicle is suited. 6. The vehicle is suited. 7. The vehicle is suited. 7. The vehicle is suited. 8. The vehicle is suited. 9. The vehicle is suited. 9.	PPLICATION: DATE:				0			
 The vehicle feels The vehicle steels The vehicle steels The vehicle brack DRIVING CONTROM The cabin temper The "state-of-chains The "range remains" CHARGING CONTROM The charging control The charger is reformed to the charger is reformed. The charger is reformed to the charger is reformed. The charger is reformed to the charger is reformed. The heater provid The heater provid The heater provid The vehicle is quarker is the condition of the charger is reformed. The vehicle is quarker is the condition of the condition	BILITY	SA	А	NS	D	SD	N	
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SA: Strongly Agree; A: Agree; NS: Not Sure; D: Disagree; SD: Strongly Disagree; NA: Not Applicable