DATE: 10/02/97
TIME: 09:05:14

UNION ELECTRIC COMPANY
CALLAWAY RECORDS INFORMATION SYSTEM
CALC COVER SHEET

PAGE: 0
REPORT: ARCP7301

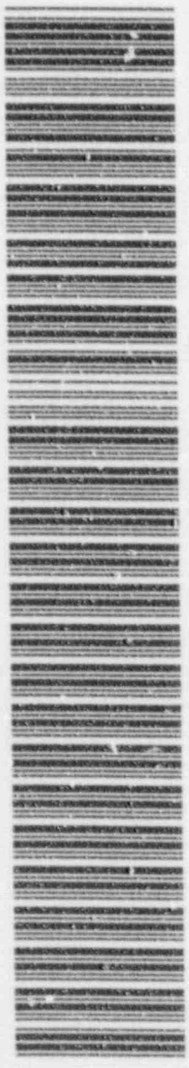
RECORD NUMBER: KJ-08

REVISION: 000

A170.0166/C090
CALCULATIONS - UNION ELECTRIC

VENDOR: U050-UNION ELECTRIC COMPANY

CALC TITLE AND DESCRIPTION:
RECALCULATION OF ANTICIPATED RUNNING TIME TO ACCOUNT FOR THE USE OF 139 DEGREES F. IN PLACE OF THE ORIGINALLY REPORTED 137 DEGREES F. THIS CALCULATION WILL DOCUMENT THAT THE DIESEL GENERATOR EQUIPMENT CAN BE EXPECTED TO SUCESSFJLLY RUN FOR 720 HOURS (30 DAYS) IN AN AMBIENT TEMPERATURE OF 139 DEGREES F. WITHOUT ENVIRONMENTALLY INDUCED FAILURE.



RESP ENGR: Robert R Haan DATE: 10/2/97

REVIEWED BY: Gregory D. Gillmore DATE: 10-2-97

APPROVED BY: Dan Walsh DATE: 10/2/97

TOTAL PAGES: _____
(COMPLETED BY: ADMIN DEPT)

UNION ELECTRIC COMPANY
CALLAWAY RECORDS INFORMATION SYSTEM
KJ-08 DATA SHEET

UPDATE INFO: SL24737 19971002 09:04:51:9
RECORD TYPE: C090 RETENTION: PURGE DATE: 0 GENERATION PERIOD: OP
II-NUMBER: A170.0166/C090 BARCODE: C090KJ08/000
STATUS: 50-DEPT INITIATED

(R) FILE NUMBER : A170.0166

(R) RECORD NUMBER : KJ-08

(R) REVISION NUMBER : 000

(R) FROM RECORD DATE
19971002

(F) DATE TYPE CODE
I-INITIATED DATE

(R) PLANT PROGRAM : DB

(R) KEYWORD : QUALIFICATION

(R) DISCIPLINE : E

(R) SITE APPLICABILITY : 2-CALLAWAY

(R) DESCRIPTION

RECALCULATION OF ANTICIPATED RUNNING TIME TO ACCOUNT FOR THE USE OF 139 DEGREES F. IN PLACE OF THE ORIGINALLY REPORTED 137 DEGREES F. THIS CALCULATION WILL DOCUMENT THAT THE DIESEL GENERATOR EQUIPMENT CAN BE EXPECTED TO SUCESSFULLY RUN FOR 720 HOURS (30 DAYS) IN AN AMBIENT TEMPERATURE OF 139 DEGREES F. WITHOUT ENVIRONMENTALLY INDUCED FAILURE.

(R) MEDIA LOCATION : DEPT (R) MEDIA : N-NUMBERING LOG

COMPONENT NUMBER : KKJ01A KKJ01B
NE01 NE02
NE106 NE107
KJ121 KJ122

(R) SYSTEM : KJ NE

COMPUTER CODE :

REFERENCE TYPE		REFERENCE NUMBER	REF REV	REFERENCE ATTACHED
DRAW	D350	M-018-00821	001	
DRAW	D350	M-018-00822	003	
DRAW	D350	M-018-00823	002	
DRAW	D350	M-018-00824	003	
DRAW	D350	M-018-00825	003	

(R) NAME
HAINES ROBERT G

(R) ORG/VENDOR CODE : U050 UNION ELECTRIC

BLDG/ELEV/ROOM-GRID : DG 2000

SUPERSEDES :

SUPERSEDED BY :

= = = = = = = = = = = = = = =

****
** TOTAL RECORDS: 1 **
****

Recalculated running time using 139°F.

The areas where the Emergency Diesel Generators are installed are defined as "Mild Environment per the requirements of 10-CFR-50.49. Therefore, the individual pieces of equipment which makes up the Emergency Diesel Generator System are not included within the scope of "Harsh Environment" items covered by 10-CFR-50.49 and the qualified lives established by the vendor environmental qualification reports are not absolute. The qualified lives established by the vendor have been incorporated into the licencee's maintenance and surveillance programs to establish a defined 'working life'. The data contained within the vendor qualification report has been reviewed and the expected running time of 10,512 hours recalculated to account for the 1.2°C temperature difference between 137°F and 139°F. As documented below, for all devices that had a calculated life of less than 40 years, the recalculated running hours at the higher temperature ranged from 8989.1 to 9675.4 hours. This running time exceeds the required 720 hours (30 days) by a factor greater than 10.

The following formula was used to recalculate the resulting running hours.

$$\text{Recalculated Running Hours} = \frac{t_1}{e^{\frac{E}{k}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)}}$$

t_1 = Original Required Test Time
E = Activation Energy
k = Boltzmans constant
T_1 = New Running Temperature
T_2 = Original Test Temperature

Recalculated running time using 139°F.

Component Name Article Number	Recalculated Running Hours	t1	k	E	T1	T2	Percentage Change
Governor Actuator Solenoid I.A.1	9415.6	3042	8.617E-05	1.05	378	365.2	-10.4%
Governor Control Box I.A.2	9626.1	1370		0.77	378	349.2	-8.4%
Rocker Arm Lube Oil Level High Level Switch I.A.4.c	9670.9	1524		0.75	383	354.2	-8.0%
Engine Overspeed Limit Switch I.A.5.a	9572.3	433		0.75	378	333.2	-8.9%
Barring Device Upper Limit Switch I.A.5.b	9668.9	2058		0.75	378	354.2	-8.0%
Barring Device Lower Limit Switch I.A.5.c	9668.9	2058		0.75	378	354.2	-8.0%
Motor Operated Potentioneter I.A.6	9539.9	530		0.8	378	338.2	-9.2%
Crankcase ;-2" WC Pressure Switch I A.8.a	9452.8	297		0.86	378	334.2	-10.1%
Lube Oil Pressure Low Pressure Switch I.A.8.b	9549.9	1620		0.86	378	354.2	-9.2%
Lube Oil Pressure Low Pressure Switch I.A.8.c	9549.9	1620		0.86	378	354.2	-9.2%
Lube Oil Pressure Low Pressure Switch I.A.8.d	9549.9	1620		0.86	378	354.2	-9.2%

Recalculated running time using 139°F.

Lube Oil Pressure Low Pressure Switch I.A.8.e	9549.9	1620	0.86	378	354.2	-9.2%
Relay, Tachometer I.A.9	9675.4	2662	0.68	358	338.2	-8.0%
Signal Generator I.A.10	9543.9	591	0.86	393	354.2	-9.2%
Right Bank Air Start Solenoid Valve I.A.11.a	9552.3	7083	0.86	358	354.2	-9.1%
Left Bank Air Start Solenoid Valve I.A.11.b	9552.3	7083	0.86	358	354.2	-9.1%
Engine Shutdown Solenoid Valve I.A.11.c	9552.3	7083	0.86	358	354.2	-9.1%
Ratio 1500 o 5 Current Transformer I.A.14	9666.5	6492	0.9	393	387.2	-8.0%
Shielded 2 Conductor Wire I.B.10.a	9419.3	103	1.04	423	365.2	-10.4%
Shielded 3 Conductor Wire I.B.10.b	9419.3	103	1.04	423	365.2	-10.4%
#2 AWG 7 Strand Wire I.B.10.c	9419.3	103	1.04	423	365.2	-10.4%
#6 AWG 7 Strand Wire I.B.10.d	9419.3	103	1.04	423	365.2	-10.4%
#8 AWG 7 Strand Wire I.B.10.e	9419.3	103	1.04	423	365.2	-10.4%
#8 AWG Wire I.B.10.f	8989.1	23	1.13	438	365.2	-14.5%
#14 AWG 41 Strand Wire I.B.10.g	9419.3	103	1.04	423	365.2	-10.4%

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