## FOR INFORMATION ONLY

and the second second	FURI	NLOUM	Allon			THE OTHER ADD STREET, S
BUBJECT CODE	SOUTH CAR	OLINA & EL CALCULA	ECTRIC AI	ND GAS COMP ORD	ANY	PAGE 1 OF 4
GEBZASMCEA	CKtS DGE4 A for TSI Fire	A, DGEHA	CALCNO. DCO8	490-008	REV	STAT A
MRF 21372	SY	dg DG	SAFETY CL NN	QR SR	CALC CLA	NI IV V VI
DRIGINATOR MC. LYNN	disc EE	ORGANIZ	SG	DATE 11/20/92	XREF NO.	19-00 <b>8</b> MCf
AFFECTED COMP	PONENTS / ANALYSIS	a L br	fire b	amier (TS	SI YOR CO	onduit
	GRAM USED: (ES, VALIDATION NO (ES, VALIDATED (ES	NO DT REQ'D (RE-412)	EF. 3.5]	YES, VALID PROGRAM	ATED (OTHER VALIDATION	5] CALCULATION
B. VERIFICATION	N SCOPE: Verify the context	that 4 is of	he class the ra	E CONTIN Straticus Culaticus	ald HH	MENT 0
VERIFIER: ASSIGN BY:	K. Rogers S. G. Canoll			Allan	C. Lom	10 11/20/92 SIGNEEI/DATE
VERIFIER/DATE	L.B	23 NOV	192 APPR	OVALIDATE By Ester	11/30/93	
C. RECORDS TO PRU 960402 2DR A P ISTRIBUTION: C	ALC FILE [ORIGINAL	5		REEL RIGINAL MAINTA _SCE&G DE _SCE&G	FRAME	ENDOR

4

ES-412 ATTACHMENT I PAGE 1 OF 2 REVISION 1

ES-412 ATTACHMENTI PAGE 2 OF 2 REVISION 0

	SOUTH CAR	REVISION SUM	C & GAS COMPANY MARY	PAGE 2 OF 4
CALCULATIO	N NO.			
REV NO. 3		SUMMARY		
_	DEVELOPMENT	OF NEW	CALCULATION	NUMBER
	ONLY IN ACCO	ORDAVLE	WITH ES-412	REVO
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	POWER AND	INDUSTRIAL SYSTEM	S DIVISION - READIN	NG	PAGE	× 2205 × A
	0001007	CALCULATI	ON		1000	50 - COF 2 4
	V. C. Summer Nu	uclear Station			DC-84	9-008
Commonwealth	SUBJECT:	DGE4A, DGE14A	AND DGE32A	supplier of the problem of the second second second	CLASSIFI	CATION
Comparises	SECTION NAME AND NU	MBER	MRI	-21372	W.04-56	50-422
EVISION	Electrical Eng	ineering / 0421	MRF 1	-21369	1 04-56	50-418
TENIS DEVISED			Sections 1.2.	Section	5	3
TEM(5) REVISED		A HIL IA	and 5	Pages 2	283	
DRIGINATOR		Kimmellerges	Himme Berges	Himme	lberger	
DATE		01-26-88	02-19-88	04-28-	-88	
REVIEWER/VERIF	IER	1.6. Strongo	C. 2.Honnauh	S. Cis	SEK AL	
DATE		1-28-88	2/23/88	4-28	-88	
APPROVAL		Altanna	Allenman	Alterhum		
DATE		1-28-88	2-23-88	4-28	-88	
ASSUMPTIONS/PR	ELIMINARY DATA	YES; No Confirm- ation required	Yes; He Confirm	YES	AN	
PAGES REFEREN	CE	2	2 40	2	141	
THIS CALCULATI	ON REQUIRES	REVIEW PER E-1 NO RESULTS ARE NOTE REMARKS	D. 9 ED BELOW. REMARKS	VERIFI	CATION PI	ER DCP 2.05 REMARKS
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/	r	SUBJECT Derate Circuits M	CE4A, DGE4A, DGE14A,	DC-849-008	PAGE N
5	Gilbert Associates, Inc.	and DGE32A for	1 1 2		OF -
	Keading, Pennsylvania	MICROFILMED	F F	M)P	PACIES
	CALCULATION	ORIGINATOR CHIMMelbe	rger CUA	childe /	
		DATE 01-26-88	02-19-88 2	-28-88	
	PURPOSE				
	To determine the new an DGE32A because a section barrier material in fire zon	npacity for the 125Vdc n of conduit, through v e CB-2 room 12-04.	'A' train power circ which the circuits are	uits MCE4A, DGE4A, G routed, was wrapped	DGE14A, and with TSI fire
	DESIGN INPUTS				
	DI-832-011 and DI-832-012				
		0			
	None				
	None				
	ASSUMPTIONS				
	• The following identif	ies circuits and respectiv	e circuit parameters f	for 'A' train circuits rout	ed through
	XX-7177A - 3.0"G.	Conduit No. 8 Size	R/M No	0.0	
	CITCUTINO.	1.2.1/0.010/6	A 26	1.22"	
	DCE4A	1.2.6 AWG	BZB	0.82" 0 87	
	DGE4A	1-2-0 AVVG	A30	1.00"	
	DGET4A	1-2-2 AVVG	A30	0.61"	
	DGE3ZA	1-2-10 AVVG	A30	U.OI	
	Circuit parameters an	e as provided by Gre dra	iwing No. 5-200-912,	aforementioned sircuit	te and are
	provided by V. C. Su power (SLP) tray in 4 in SLP tray).	or ambient air (cable in	riteria Section 4.10, n conduit is conservat	for 600 Volt rated cabl sively assumed to be the	e in single la same as cabi
		-Conduit Size	Ampacity		
		#1/0 AWG	130 amps		
		#2 AWG	96 amps		
		#6 AWG	55 amps		
		#10 AWG	28 amps		
	<ul> <li>The following are ma DC-832-010, Table 3/</li> </ul>	aximum short term full I A-1:	oad amps for 'A' train	n feeder cable, per G/C C	alculation No
	Circuit	Number Time F	ollowing LOOP	Maximum Current	

Circuit Number.Time Following LOOPMaximum CurreDGE4A (was DGE1A)0 to 2.25 seconds3.877 ampsDGE14A (was DGE11A)6 to 10.25 seconds10.554 ampsDGE32A (was DGE25A)6 to 10.25 seconds2.69 amps

PROPRIETARY INFORMATION OF GILBERT ASSOCIATES INC. FOR INTERNAL USE ONLY

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7	Cilbert Associatos Inc.	SUBJECT	Derate Cir and DGE3	cuits MCE4	A, DGE4A, DGE144	Α,	Deivin	C-849-	008	3
2	Reading, Pennsylvania	REV	0		1	2	NA	3		OF 4
	CALCULATION	MICROFIL	MED				LAN	1		PAGES
	CALCOLATION	DATE	TOR C+	immelberger	02-19-88	10	28-88			-
	CALCULATION (continued)	:			L'E	11				
	• 3" Ø conduit I.D. is ap	proxima	tely 3.068	B".						
	Maximum short term (0 to 2.25 seconds following LOOP) full load amps for the 'A' train main contriboard feeder cable MCE4A is 42.375 amps, per G/C calculation No. DC-832-010, Table 1A, Circuit 8A.									
	<ul> <li>Derating factor for assumption).</li> </ul>	cable in	conduit	with 4(	)% conduit fi	II for	1 hou	r barrie	er is 28	% (refer
	Required Circuit Ampacity									
	Required Ampacity for	MCE4A	= (42.3)	75 amps)	(1.10 load unce	ertain	tv) (1.0	5 future	load or	owth)
	and a second		= 48.94	3 amps o	r 49 amps				<u>y</u> .	
	Required Ampacity for	DGE4A	= (3.87)	7 amps) (	1.10 load uncer	taint	()			
			= 4.264	7 amps o	r 4.3 amps					
	Required Ampacity for	DGE14A	= (10.5	54 amps)	(1.10 load unce	ertain	ty)			
			= 11.60	94 amps	or 11.6 amps					
	Required Ampacity for	DGE32A	= (2.69	amps) (1	10 load uncert	ainty				
			= 2.95	9 amps o	r 3 amps					
	Conduit Fill		0.87							
	Conduit Fill = 3 1417 [(1	1.22/2)2 +	(0.82/2)	2 + (1.09	9/2)2 + (0.61/2)	2]÷3	.1417 (	3.068/2)	2	
	= 3.1417 [0.3721 + 0.1681 + 0.2970 + 0.0930] ÷ 7.3927									
	= 0.3953  or  40% 0.1892									
	Percent fill is equal to or less than 40%; therefore, the conduit fill is in accordance with the TSI catalog data									
	Derated Circuit Ampacity									
	Derated Circuit Ampa	city for M	ICE4A	= (130 a	mps) (1 - 0.28 d	lerate	per TS	) ÷ 1.10	safety	margin
				= (130 a	mps) ( 0.72) ÷	1.10				
				= 85.09	0909 amps or 8	5 amp	95 			
	<ul> <li>Derated Circuit Ampai</li> </ul>	city for D	GE4A	= (55 an	nps) (1 - 0.28 de	arate	per (SI)	+ 1.10	safety m	hargin
				= (55 an	nps) ( 0.72) ÷ 1	.10				
	Decated Circuit Amos	city for D	GEIAA	= 30 an	1ps (1 - 0.28 d	arato	nor TSI)	+ 1 10	afotu m	argin
	<ul> <li>Derated Circuit Ampa</li> </ul>	city for D	OE 14A	= (96 ar	nps (1 - 0.2000)	10	Jeriji	÷ 1.10	saletyn	largin
				= 62.82	6364 amps or 6	3 am	15			
	Derated Circuit Amna	city for D	GE32A	= (28.ar	nps) (1 - 0 28 d	erate	per TSI)	÷ 1.10	safety n	nargin
	<ul> <li>Derated Circuit Ampacity for DC</li> </ul>		JEJEM	- (28 at	nnc)(0.72) = 1	10	per (31)		Junety II	Jung III
				ALC: 1 2.2.2.2 2.4.1						

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Gilbert Associates, Inc.	SUBJECT De	rate Circuits MCE44 d DGE32A for TSI Fi	A, DGE4A, DGE1	DC-849-008	PAGE 4	
Reading, Pennsylvania	REV. MICROFILME	D	HW)	2	3	4 PAGES
CALCULATION	ORIGINATOR	C.Himmelberger 01-26-88	02-19-8	8		_

## Conclusion

Although the derating factor provided by TSI may not be exact; the 85 amps calculated ampacity of the #1/0 AWG cable exceeds the required 49 amps ampacity by a margin of 73% (i.e., 85 - 49  $\div$  49), the 36 amps calculated ampacity of the #6 AWG cable exceeds the required 4.3 amps ampacity by a margin of 737% (i.e., 36 - 4.3  $\div$  4.3), the 63 amps calculated ampacity of the #2 AWG cable exceeds the required 11.6 amps ampacity by a margin of 443% (i.e., 63 - 11.6  $\div$  11.6), the 18 amps calculated ampacity of the #10 AWG cable exceeds the required 3 amps ampacity by a margin of 500% (i.e., 18 - 3  $\div$  3). These margins are in addition to the 10% safety margin and extremely conservative derating factor included in the calculation. Therefore, the circuit ampacity is acceptable after placement of a one hour TSI fire barrier on the conduit.