

Attachment 12

Ginna Station PSA Review of Radiation Monitoring Circuitry

GINNA STATION PSA EVALUATION REQUEST (PSAER)

PSAER No. 2002-0017	Rev. # 0
Records Category 4.63.4.1 Reviewed:	

Part 1 - Issue Identification

Describe Activity/issue:

A reliability analysis is needed to determine the probability that the control room radiation monitor circuitry fails to perform its intended function (to send a signal to isolate the control room HVAC system), given that a high radiation condition exists.

Originator/Date: Paul Swift / 2-14-02 Need Date: 2-27-02

Related Records: PCR 99-004

Part 2A - Initial Evaluation

<input type="checkbox"/> Qualitative <input checked="" type="checkbox"/> Quantitative <input checked="" type="checkbox"/> Not Applicable Basis: <u>This is not a CDF or LERF evaluation.</u>	<table style="width: 100%;"> <tr> <th style="text-align: left;">PSA Impacted?</th> <th style="text-align: left;">Basis:</th> </tr> <tr> <td>Level 1 (all) (a) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>_____</td> </tr> <tr> <td>Int. Events <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>_____</td> </tr> <tr> <td>Fire <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>_____</td> </tr> <tr> <td>Flood <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>_____</td> </tr> <tr> <td>Shutdown <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>_____</td> </tr> <tr> <td>Level 2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>_____</td> </tr> </table>	PSA Impacted?	Basis:	Level 1 (all) (a) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____	Int. Events <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____	Fire <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____	Flood <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____	Shutdown <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____	Level 2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____
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Shutdown <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____														
Level 2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	_____														

Part 2B - Detailed Evaluation

Describe Analysis Performed:

Based on the attached, the resultant probability of failure of the control room radiation monitor circuitry to perform its intended function, given a demand for that function, is 1.93E-4. No single failure mode exists, and the failure probability is dominated by common cause failure of the RE-45 and RE-46 radiation elements, as well as by their independent failures. These contribute 96% to the overall failure probability. The remaining failure contributions arise from failures of one of these elements combined with failures of another component within the system (4%), and two independent failures of other components (<1%). The results are consistent with the circuitry design in that failure of some components (e.g., radiation elements, processor in the ratemeter, relay in the ratemeter) will affect both trains, but not completely fail them both (i.e., at least one more failure must occur in each train to fail that train), while failure of the other components (e.g., R81A, R81B, or a short circuit across the R-45 and R-46 relay contacts) can completely fail a single train. However, there are no components whose failure will completely fail both trains.

GINNA STATION PSA EVALUATION REQUEST (PSAER)

PSAER No. 2002-0017	Rev. # 0
Records Category 4.63.4.1 Reviewed:	

Part 3 - Results

		A	B	C	D	E
<u>PSA Category</u>	<u>Rev. #</u>	<u>Baseline (1/yr)</u>	<u>Adjusted (1/yr)</u>	<u>Delta (1/yr)</u>	<u>Delta %</u>	<u>Max Delta for Perm Change (%)</u>
Internal Events	_____	_____	_____	_____	_____	_____
Fire	_____	_____	_____	_____	_____	_____
Flood	_____	_____	_____	_____	_____	_____
Shutdown	_____	_____	_____	_____	_____	_____

(If the Total is calculated from the above rather than separately, only Columns A through C should be summed)

Total Level 1 (a) _____

Permanent Change is Acceptable if (Step 3.5.2):
(1) Column B Total < 1.0E-4 AND (2) Column D < Column E FOR EACH CATEGORY

Temporary Change is Acceptable if (Step 3.5.3):
(1) Column B Total < 1.0E-3 AND (2) Duration (yr) x Column C Total < 1.0E-6
Maximum Allowed Duration of Temporary Change (1.0E-6 / Column C): _____

Level 2 _____

Permanent Change is Acceptable if (Step 3.5.4):
(1) Column B < 1.0E-5 AND (2) Column D < Column E

Temporary Change is Acceptable if (Step 3.5.5):
(1) Column B < 1.0E-4 AND (2) Duration (yr) x Column C < 1.0E-7
Maximum Allowed Duration of Temporary Change (1.0E-7 / Column C): _____

10 CFR 50.59 Evaluation

	UFSAR		Frequency (1/yr) or Probability		Increase (include % or factor)
	Category		Original	New	
Accident	_____	_____	_____	_____	_____
SSC Malfunction	_____	_____	_____	_____	_____

(Acceptable if accident frequency increase < 10% or < 1.0E-06/yr or SSC Malfunction Prob increase <= factor of 2)

OVERALL ACCEPTABILITY? Yes No

Additional Comments:
The PSAER format is being used to provide a record of this reliability analysis. No judgment of acceptability is made since the results are not in terms of CDF or LERF.

Part 4 - Closeout

Associated Record Information: PCR 99-004
 Associated EINs/Systems: Multiple EINs / 43D (Rad Monitoring)
 PSA Analyst/Date: Ray Gallucci & Steve Kimbrough *Ray Gallucci* / 2-27-02

(a) If all four categories of the Level 1 PSA are impacted (i.e., internal events, fire, flood, and shutdown), only the Total Level 1 CDF need be evaluated.

A reliability analysis was conducted using a fault tree model, and component failure rates from the Ginna Station Probabilistic Safety Assessment (PSA), to determine the probability that the control room radiation monitor circuitry fails to perform its intended function (i.e. to send a signal to isolate the control room HVAC system), given that a high radiation condition exists. The resultant probability of failure to perform the intended safety function, given a demand for that function, is $1.93E-04$. A review of the cutsets produced from the quantification of the fault tree model indicates that no single failure modes exist. The failure probability is dominated by the common cause failure of the radiation elements, RE-45 and RE-46, as well as independent failure of both elements. These two failure modes contribute 96% to the overall failure probability. The remaining failure probability is from failures of one radiation element combined with a failure of another component within the system (4%) and two independent failures of other components (<1%). These results are consistent with the design of the circuitry in that the failure of some components (e.g. the radiation elements, the processor in the ratemeter, or the relay in the ratemeter) will affect both trains, but not completely fail both trains (i.e., at least one more failure must occur in each train to fail that train), while the failure of other components (e.g. R81A, R81B, or a short circuit across the R-45 and R-46 relay contacts) can completely fail a single train. However, there are no components whose failure will completely fail both trains.

Cutsets with Descriptions Report

OD1000 = 1.93E-04

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
1	OD_HIGHRAD ODCCR45/46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING MAXIMUM PROB CCF BETWEEN CKT A & B (CC FAILURE OF RE-45 AND RE-46)		1.00	1.00E+00	1.49E-04
2	OD_HIGHRAD ODRAFRE_45 ODRAFRE_46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING RE-45 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL RE-46 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL		1.00 1095.00 1095.00	1.49E-04 1.00E+00 5.95E-03	3.54E-05
3	OD_HIGHRAD ODLYD00R45 ODRAFRE_46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING PROCESSOR FOR R-45 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL RE-46 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL		1.00 1095.00 1095.00	1.00E+00 5.45E-04 5.95E-03	3.24E-06
4	OD_HIGHRAD ODLYD00R46 ODRAFRE_45	HIGH RADIATION IS PRESENT IN CONTROL BUILDING PROCESSOR FOR R-46 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL RE-45 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL		1.00 1095.00 1095.00	1.00E+00 5.45E-04 5.95E-03	3.24E-06
5	OD_HIGHRAD ODCTKHS88V ODRAFRE_46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING CONTACTS FOR 1/HS-88V BYPASS HAVE TRANSFERRED CLOSED RE-46 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL		1.00 1095.00 1095.00	1.00E+00 7.72E-05 5.95E-03	4.59E-07
6	OD_HIGHRAD ODCTKHS88W ODRAFRE_45	HIGH RADIATION IS PRESENT IN CONTROL BUILDING CONTACTS FOR 1/HS-88W BYPASS HAVE TRANSFERRED CLOSED RE-45 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL		1.00 1095.00 1095.00	1.00E+00 7.72E-05 5.95E-03	4.59E-07
7	OD_HIGHRAD ODLYD00R45 ODLYD00R46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING PROCESSOR FOR R-45 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL PROCESSOR FOR R-46 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL		1.00 1095.00 1095.00	1.00E+00 5.45E-04 5.45E-04	2.97E-07
8	OD_HIGHRAD ODRAFRE_45 ODREB00R46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING RE-45 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL R-46 INTERNAL RELAY FAILS TO DE-ENERGIZE		1.00 1095.00 1.00	1.00E+00 5.95E-03 3.93E-05	2.34E-07
9	OD_HIGHRAD ODRAFRE_46 ODREB00R45	HIGH RADIATION IS PRESENT IN CONTROL BUILDING RE-46 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL R-45 INTERNAL RELAY FAILS TO DE-ENERGIZE		1.00 1095.00 1.00	1.00E+00 5.95E-03 3.93E-05	2.34E-07
10	OD_HIGHRAD ODCTKHS88V ODLYD00R46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING CONTACTS FOR 1/HS-88V BYPASS HAVE TRANSFERRED CLOSED PROCESSOR FOR R-46 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL		1.00 1095.00 1095.00	1.00E+00 7.72E-05 5.45E-04	4.21E-08
11	OD_HIGHRAD ODCTKHS88W ODLYD00R45	HIGH RADIATION IS PRESENT IN CONTROL BUILDING CONTACTS FOR 1/HS-88W BYPASS HAVE TRANSFERRED CLOSED PROCESSOR FOR R-45 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL		1.00 1095.00 1095.00	1.00E+00 7.72E-05 5.45E-04	4.21E-08
12	OD_HIGHRAD ODLYD00R45 ODREB00R46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING PROCESSOR FOR R-45 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL R-46 INTERNAL RELAY FAILS TO DE-ENERGIZE		1.00 1095.00 1.00	1.00E+00 5.45E-04 3.93E-05	2.14E-08
13	OD_HIGHRAD ODLYD00R46 ODREB00R45	HIGH RADIATION IS PRESENT IN CONTROL BUILDING PROCESSOR FOR R-46 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL R-45 INTERNAL RELAY FAILS TO DE-ENERGIZE		1.00 1095.00 1.00	1.00E+00 5.45E-04 3.93E-05	2.14E-08
14	OD_HIGHRAD ODCTNR45_B ODRAFRE_46	HIGH RADIATION IS PRESENT IN CONTROL BUILDING CONTACTS FOR R-45 EXPERIENCE HARDWARE FAILURE TO OPEN RE-46 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL		1.00 1.00 1095.00	1.00E+00 2.27E-06 5.95E-03	1.35E-08

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
15	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.35E-08
	ODCTNR46_B	CONTACTS FOR R-46 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
	ODRAFRE_45	RE-45 EXPERIENCES HARDWARE FAILURE TO DETECT HIGH RAD LEVEL	5.43E-06	1095.00	5.95E-03	
16	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	5.96E-09
	ODCTKHS88V	CONTACTS FOR 1/HS-88V BYPASS HAVE TRANSFERRED CLOSED	7.05E-08	1095.00	7.72E-05	
	ODCTKHS88W	CONTACTS FOR 1/HS-88W BYPASS HAVE TRANSFERRED CLOSED	7.05E-08	1095.00	7.72E-05	
17	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	3.03E-09
	ODCTKHS88V	CONTACTS FOR 1/HS-88V BYPASS HAVE TRANSFERRED CLOSED	7.05E-08	1095.00	7.72E-05	
	ODREB00R46	R-46 INTERNAL RELAY FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
18	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	3.03E-09
	ODCTKHS88W	CONTACTS FOR 1/HS-88W BYPASS HAVE TRANSFERRED CLOSED	7.05E-08	1095.00	7.72E-05	
	ODREB00R45	R-45 INTERNAL RELAY FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
19	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.54E-09
	ODREB00R45	R-45 INTERNAL RELAY FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
	ODREB00R46	R-46 INTERNAL RELAY FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
20	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.54E-09
	ODREBR81_A	RELAY R81A FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
	ODREBR81_B	RELAY R81B FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
21	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.24E-09
	ODCTNR45_B	CONTACTS FOR R-45 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
	ODLYD00R46	PROCESSOR FOR R-46 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL	4.98E-07	1095.00	5.45E-04	
22	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.24E-09
	ODCTNR46_B	CONTACTS FOR R-46 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
	ODLYD00R45	PROCESSOR FOR R-45 EXPERIENCES LOGIC FAILURE TO PROCESS SIGNAL	4.98E-07	1095.00	5.45E-04	
23	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	4.30E-10
	ODREBR81_A	RELAY R81A FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
	ODRESR45/6B	AUTO SIGNAL TO DE-E DOES NOT ARRIVE DUE TO SHORT ACROSS R-45 & R-46 (CKT1.00E-08	1.00E-08	1095.00	1.09E-05	
24	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	4.30E-10
	ODREBR81_B	RELAY R81B FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
	ODRESR45/6A	AUTO SIGNAL TO DE-E DOES NOT ARRIVE DUE TO SHORT ACROSS R-45 & R-46 (CKT1.00E-08	1.00E-08	1095.00	1.09E-05	
25	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.75E-10
	ODCTKHS88V	CONTACTS FOR 1/HS-88V BYPASS HAVE TRANSFERRED CLOSED	7.05E-08	1095.00	7.72E-05	
	ODCTNR46_B	CONTACTS FOR R-46 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
26	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.75E-10
	ODCTKHS88W	CONTACTS FOR 1/HS-88W BYPASS HAVE TRANSFERRED CLOSED	7.05E-08	1095.00	7.72E-05	
	ODCTNR45_B	CONTACTS FOR R-45 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
27	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	1.20E-10
	ODRESR45/6A	AUTO SIGNAL TO DE-E DOES NOT ARRIVE DUE TO SHORT ACROSS R-45 & R-46 (CKT1.00E-08	1.00E-08	1095.00	1.09E-05	
	ODRESR45/6B	AUTO SIGNAL TO DE-E DOES NOT ARRIVE DUE TO SHORT ACROSS R-45 & R-46 (CKT1.00E-08	1.00E-08	1095.00	1.09E-05	
28	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	8.92E-11
	ODCTNR45_B	CONTACTS FOR R-45 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
	ODREB00R46	R-46 INTERNAL RELAY FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
29	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	8.92E-11
	ODCTNR46_B	CONTACTS FOR R-46 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
	ODREB00R45	R-45 INTERNAL RELAY FAILS TO DE-ENERGIZE	3.93E-05	1.00	3.93E-05	
30	OD_HIGHRAD	HIGH RADIATION IS PRESENT IN CONTROL BUILDING		1.00	1.00E+00	5.15E-12
	ODCTNR45_B	CONTACTS FOR R-45 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	
	ODCTNR46_B	CONTACTS FOR R-46 EXPERIENCE HARDWARE FAILURE TO OPEN	2.27E-06	1.00	2.27E-06	

MODELING ASSUMPTIONS

- 1) Assume that if the relay contained within the ratemeter (R-45 or R-46) successfully de-energizes, but any contacts fail to open, all contacts fail to open. This will affect contacts in both the A and B trains of CR isolation. This is a conservative assumption, since it is possible that a single contact could fail to open, while another contact on the same card successfully opens.
- 2) Assume that if the manual isolation pushbutton (PB/CRIA and PB/CRIB) fails, all contacts within the switch fail to open. This will affect contacts in both the A and B trains of CR isolation. This is a conservative assumption, since it is possible that a single contact could fail to open, while another contact on the same switch successfully opens.
- 3) Assume that if any contacts in the bypass handswitch (1/HS-88V and 1/HS-88W) transfer closed, all contacts in the handswitch transfer closed. This will affect contacts in both the A and B trains of CR isolation. This is a conservative assumption, since it is possible that a single contact could transfer closed, while another contact on the same switch could remain open.
- 4) No credit was taken for operators pressing either of the manual isolation pushbuttons in the event that the automatic isolation signal fails. Thus, failure of these switches is not modeled since the only remaining failure mode is for the contacts to fail open, which cause CR isolation.

FAILURE PROBABILITY ASSUMPTIONS

- 1) Radiation element (RE-45 or RE-46) experiences hardware failure to detect high radiation level (i.e., fails low) = $5.43E-6/\text{hr} \times 1,095 \text{ hr} = 5.95E-3$ (based on generic PSA failure rate, RA F/H, and susceptibility to failure for half the quarterly inspection interval).
- 2) Processor for R-45 (or R-46) experiences logic failure to process signal = $4.98E-7/\text{hr} \times 1,095 \text{ hr} = 5.45E-4$ (based on generic PSA failure rate, LY D/L, and susceptibility to failure for half the quarterly inspection interval).
- 3) Internal relay for R-45 (or R-46) fails to de-energize due to hardware failure = $3.93E-5/\text{demand}$ (based on generic PSA failure rate, RE B/E).
- 4) Contacts for internal relay in R-45 (or R-46) experience hardware failure to open = $2.27E-6/\text{demand}$ (based on generic PSA failure rate, CT C/N)
- 5) Contacts for PB/CRIA (or PB/CRIB) fail to open when pushbutton is pushed = $6.30E-8/\text{demand}$ (based on generic PSA failure rate, PB D)
- 6) Contacts for 1/HS-88V (or 1/HS-88W) bypass have transferred closed = $7.05E-8/\text{hr} \times 1,095 \text{ hr} = 7.72E-5$ (based on generic PSA failure rate, CT K/R, and susceptibility to failure for half the quarterly inspection interval)
- 7) Automatic signal to de-energize does not arrive due to non-fire electrical short across R-45 and R-46 relay contacts (circuit A or B) = $1.00E-8/\text{hr} \times 1,095 \text{ hr} = 1.10E-5$ (based on generic failure rate for shorts across relay contacts and susceptibility to failure for half the quarterly inspection interval)

8) R81A (or R81B) experiences hardware failure to de-energize = $3.93E-5/\text{demand}$ (based on generic PSA failure rate, RE B/E)

9) Maximum probability common-cause failure (CCF) between circuit A and B = $5.95E-3 \times 0.025 = 1.49E-4$ (based on failure probability for radiation element and generic beta factor for CCF)

Attachment 13

**Isolator Information, includes:
Purchase Order to NUS
NUS Isolator Vendor Manual**



ROCHESTER GAS AND ELECTRIC CORPORATION
89 EAST AVE, ROCHESTER NY 14649-0001

N.Y. STATE SALES TAX PERMIT NO. DP000121; EMP IDENTIFICATION NO. 16-0612110
NOTICE: YOUR FEDERAL TAX I.D. NUMBER MUST APPEAR ON ALL INVOICES

ALL TO: P.O. BOX 40660
ROCHESTER, NY 14604

SCIENTECH INC.
NUS INSTRUMENTS
440 WEST BROADWAY
IDAHO FALLS ID 83402

Fax number: 208-524-9238

Your vendor number with us
7099

Please deliver to:
Ginna Station
1503 Lake Road
Ontario NY 14519

Deliv. terms: SFC-Shipping Point, Freight Collect
Payt. terms: Net due in 30 Days

Currency USD

Item	Material Order qty.	Unit	Description	Price per unit	Net value
00010	5004014	3 each	ISOLATOR CURRENT REPEATER 4 CHANNEL	6,690.00	20,070.00
Your material number FCA300-CUSTOM-08					
ISOLATOR, CURRENT REPEATER, MODEL NUMBER FCA300-CUSTOM-08, FCA300 4 CHANNEL ENCAPSULATED ANALOG ISOLATION AMPLIFIER, WITH TERMINAL BLOCK COVERS					
- INPUTS CHANNEL 1: 0-5 VDC CHANNEL 2: 4-20 mA CHANNEL 3: 4-20 mA CHANNEL 4: 1-5 VDC					

Nuclear Related Service order

PO number/date
5000004750 / 05/24/2002
Contact person/Telephone
Leo J. Fisher/716-771-3198
Fax number : 716-771-3907
Our reference :10011172 S
Your person responsible
Heath Buckland

Previously FAXED To
you on 5-28-02

Confirmation
Do Not Duplicate

Delivery date: Day 09/30/2002

Unless RGE receives notice, within 48 hours of [Vendor's] receipt of a facsimile of the Purchase Order, Terms and Conditions and other documents related to the product or service provided [collectively, "the Terms"], of [Vendor's] objection to the Terms, the facsimile shall be sufficient to bind the parties, and no further document shall be necessary to establish the relationship.

Your quotation / proposal is incorporated into this Purchase order only to the following extent price, quantity, work scope, specification, freight terms and payment terms. Supplier's performance hereunder shall be deemed acceptance of owner's terms and conditions

This purchase order is subject to the terms and conditions printed on the last page hereof and to any further instructions, specifications and other materials made a part hereof by the buyer

Approved by

Samuel P. B...

Department Manager
Strategic Supply



ROCHESTER GAS AND ELECTRIC CORPORATION
89 EAST AVE, ROCHESTER NY 14649-0001

N.Y. STATE SALES TAX PERMIT NO. DP000121; EMP IDENTIFICATION NO. 16-0612110
NOTICE: YOUR FEDERAL TAX I.D. NUMBER MUST APPEAR ON ALL INVOICES

BILL TO: P.O. BOX 40660
ROCHESTER, NY 14604

SCIENTECH INC.
440 WEST BROADWAY
IDAHO FALLS ID 83402

PO number/date
5000004750 / 05/24/2002

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Item	Material Order qty.	Unit	Description	Price per unit	Net value
-			OUTPUTS CHANNEL 1: 0-5 VDC CHANNEL 2: 4-20 mA CHANNEL 3: 0-5 VDC CHANNEL 4: 0-5 VDC		

- 1.000 ITEMS AND/OR SERVICES CONTAINED IN THIS PURCHASE ORDER SHALL BE FURNISHED TO A QUALITY ASSURANCE PROGRAM IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF ANSI N45.2-1971 OR EQUIVALENT, THAT SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS OF 10CFR50 APPENDIX B. ALL APPROPRIATE TECHNICAL AND QUALITY ASSURANCE REQUIREMENTS SHALL BE CONVEYED TO LOWER TIER SUBCONTRACTORS AND/OR SUPPLIERS.
- 1.004 RG and E SHALL HAVE RIGHTS OF ACCESS TO THE SUPPLIER'S FACILITIES AND RECORDS FOR INSPECTION OR AUDIT BY RG and E OR OUR AUTHORIZED REPRESENTATIVE. THIS SHALL BE TO THE EXTENT THAT RG and E DEEMS NECESSARY TO ASSURE THAT WORK IS BEING PERFORMED IN ACCORDANCE WITH ALL PRODUCT DESIGN AND MANUFACTURING REQUIREMENTS. RG and E SHALL PROVIDE TO THE SUPPLIER APPROPRIATE NOTIFICATION OF INSPECTION OR AUDIT.
- 1.005 ALL NONCONFORMING CONDITIONS SHALL BE IDENTIFIED AND DISPOSITIONED BY THE VENDOR IN ACCORDANCE WITH THE VENDOR'S QA PROGRAM REQUIREMENTS. ALL NONCONFORMANCES TO THE TECHNICAL OR QUALITY REQUIREMENTS OF THIS PURCHASE ORDER WHICH ARE DISPOSITIONED "USE AS IS" OR "REPAIR" SHALL BE SUBMITTED TO RG and E PROCUREMENT ENGINEERING FOR RESOLUTION PRIOR TO SHIPMENT.
- 1.006 A CERTIFICATE OF CONFORMANCE SHALL ACCOMPANY EACH SHIPMENT. THE CERTIFICATE SHALL, AS A MINIMUM:

Unless RG&E receives notice, within 48 hours of [Vendor's] receipt of a facsimile of the Purchase Order, Terms and Conditions and other documents related to the product or service provided (collectively, "the Terms"), of [Vendor's] objection to the Terms, the facsimile shall be sufficient to bind the parties, and no further document shall be necessary to establish the relationship.

Your quotation / proposal is incorporated into this Purchase order only to the following extent: price, quantity, work scope, specification, freight terms and payment terms. Supplier's performance hereunder shall be deemed acceptance of owner's terms and conditions

This purchase order is subject to the terms and conditions printed on the last page hereof and to any further instructions, specifications and other materials made a part hereof by the buyer.



ROCHESTER GAS AND ELECTRIC CORPORATION
89 EAST AVE, ROCHESTER NY 14649-0001

N.Y. STATE SALES TAX PERMIT NO. DP000121; EMP IDENTIFICATION NO. 16-0612110
NOTICE: YOUR FEDERAL TAX I.D. NUMBER MUST APPEAR ON ALL INVOICES

BILL TO: P.O. BOX 40660
ROCHESTER, NY 14604

SCIENTECH INC.
440 WEST BROADWAY
IDAHO FALLS ID 83402

PO number/date
5000004750 / 05/24/2002

Page
3

Item	Material	Unit	Description	Price per unit	Net value
	Order qty.				

1. IDENTIFY THE APPLICABLE ITEMS OR SERVICES. THIS SHALL BE ACCOMPLISHED BY REFERENCE TO THE RG and E PURCHASE ORDER NUMBER AND ONE OR MORE OF THE FOLLOWING:
 - A) RG and E PURCHASE ORDER ITEM NUMBER
 - B) BATCH/LOT NUMBER
 - C) PART/CATALOG/MODEL NUMBER
2. CERTIFY CONFORMANCE/COMPLIANCE TO ALL PURCHASE ORDER REQUIREMENTS INCLUDING REVISIONS OR SUPPLEMENTS.
- 3) BE SIGNED BY AN INDIVIDUAL RESPONSIBLE FOR THE QUALITY FUNCTION IN THE ORGANIZATION. THE CERTIFICATION SHALL BE DATED AND SHOULD INCLUDE THE INDIVIDUAL'S TITLE.
- 4) CERTIFY MATERIAL AND/OR SERVICES WERE PRODUCED AND CONTROLLED IN ACCORDANCE WITH THE VENDOR'S DOCUMENTED QUALITY PROGRAM.

1.009 ALL DOCUMENTATION REQUIRED BY THIS PURCHASE ORDER SHALL ACCOMPANY SHIPMENT. IF REQUIRED DOCUMENTATION IS TO BE SHIPPED SEPARATELY FROM THE MATERIAL, THIS DOCUMENTATION SHALL BE FORWARDED TO THE FOLLOWING ADDRESS:

QUALITY CONTROL DEPARTMENT
ROCHESTER GAS AND ELECTRIC CORP
GINNA STATION
1503 LAKE ROAD
ONTARIO N.Y. 14519

1.034 THE REQUIREMENTS OF 10CFR21 APPLY TO THIS PURCHASE ORDER.

Unless RG&E receives notice, within 48 hours of [Vendor's] receipt of a facsimile of the Purchase Order, Terms and Conditions and other documents related to the product or service provided (collectively, "the Terms"), of [Vendor's] objection to the Terms, the facsimile shall be sufficient to bind the parties, and no further document shall be necessary to establish the relationship.

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5000004750 / 05/24/2002

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Item	Material	Unit	Description	Price per unit	Net value
	Order qty.				

ANY NOTIFICATIONS REQUIRED BY 10CFR21 SHALL BE SUBMITTED TO:

MANAGER, QUALITY ASSURANCE
ROCHESTER GAS AND ELECTRIC CORPORATION
1503 LAKE ROAD
ONTARIO, NEW YORK 14519

- 2.002 PACKAGING, SHIPPING AND HANDLING SHALL MEET LEVEL B REQUIREMENTS OF ANSI N45.2.2-1972, OR OTHER NRC ENDORSED STANDARD.
- 2.022 THE SUPPLIER SHALL PROVIDE ALL ITEMS SPECIFIED IN THIS PURCHASE ORDER IN A NEW, UNUSED CONDITION. NO REFURBISHED, REBUILT OR REPAIRED ITEMS SHALL BE SUPPLIED TO RG&E WITHOUT PRIOR, WRITTEN AUTHORIZATION IN THE FORM OF A PURCHASE ORDER SUPPLEMENT.
- 2.025 THE SUPPLIER SHALL MARK OR TAG EACH ITEM OR GROUP OF IDENTICAL ITEMS WITH THE RGE PURCHASE ORDER NUMBER AND ONE OR MORE OF THE FOLLOWING:
 - 1) RGE PURCHASE ORDER ITEM NUMBER
 - 2) BATCH/LOT NUMBER
 - 3) PART/CATALOG/MODEL NUMBER
- 2.027 NO SUBSTITUTIONS AUTHORIZED. IF THE SUPPLIER CANNOT FURNISH ALL ITEMS EXACTLY AS SPECIFIED IN THIS PURCHASE ORDER AND IN COMPLIANCE WITH THE REFERENCED SPECIFICATIONS, CODES AND DRAWINGS, THE SUPPLIER SHALL NOTIFY THE RGE BUYER AT GINNA STATION PRIOR TO PROCESSING THE ITEM(S). THE NOTIFICATION SHALL INCLUDE A DESCRIPTION OF THE SUGGESTED CHANGES AND JUSTIFICATION ATTESTING TO THE FUNCTIONAL EQUIVALENCY OF THE ITEM AS ORIGINALLY ORDERED. CHANGES TO THIS PURCHASE ORDER CAN ONLY BE AUTHORIZED BY A WRITTEN CHANGE ORDER ISSUED BY RGE.

ADDITIONALLY, SCIENTECH/NUS SHALL PROVIDE CERTIFICATION THAT

Unless RG&E receives notice, within 48 hours of [Vendor's] receipt of a facsimile of the Purchase Order, Terms and Conditions and other documents related to the product or service provided (collectively, "the Terms"), of [Vendor's] objection to the Terms, the facsimile shall be sufficient to bind the parties, and no further document shall be necessary to establish the relationship

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ROCHESTER GAS AND ELECTRIC CORPORATION
89 EAST AVE, ROCHESTER NY 14649-0001

N.Y. STATE SALES TAX PERMIT NO. DP000121; EMP IDENTIFICATION NO. 16-0612110
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Item	Material	Unit	Description	Price per unit	Net value
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THE ITEM SUPPLIED MEETS THE REQUIREMENTS OF THE APPLICABLE QUALIFICATION REPORT. THIS CERTIFICATION SHALL INCLUDE THE REPORT NUMBER AND REVISION LEVEL WITH REFERENCE TO IEEE STDS 323-1983 AND 344-1987. THE CERTIFICATION SHALL BE PROVIDED IN ACCORDANCE WITH PARA. 1.009 OF THIS PURCHASE ORDER.

ALL MATERIAL, ITEMS AND SERVICES PROCURED AS SAFETY RELATED SHALL BE PROCURED FROM SUB TIER SUPPLIERS WHICH HAVE BEEN AUDITED BY NUSI.

00020		1 each	CUSTOM FEE	2,500.00	2,500.00
-------	--	--------	------------	----------	----------

2.996 PLEASE NOTE:

IF THE ABOVE MATERIALS OR SERVICES ARE NOT RECEIVED IN ACCORDANCE WITH THE ABOVE TECHNICAL REQUIREMENTS, PAYMENT OF YOUR INVOICE WILL BE DELAYED OR PLACED ON HOLD.

2.998 PLEASE NOTE:

TO INSURE TIMELY PAYMENT OF YOUR INVOICE, PLEASE REFERENCE THE ABOVE PURCHASE ORDER NUMBER, ANY RG and E MATERIAL I.D. NUMBER(S), AND THE FOLLOWING END USER'S NAME ON ALL PACKING SLIPS AND INVOICES.

END USER = GINNA STATION / WO 20201200

Tot. net item val. excl. tax USD	22,570.00
----------------------------------	-----------

AS PER YOUR QUOTE TO GERRY BISCHOPING DATED MAY 2, 2002.

Unless RG&E receives notice, within 48 hours of [Vendor's] receipt of a facsimile of the Purchase Order, Terms and Conditions and other documents related to the product or service provided (collectively, "the Terms"), or [Vendor's] objection to the Terms, the facsimiles shall be sufficient to bind the parties, and no further document shall be necessary to establish the relationship

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PO number/date
5000004750 / 05/24/2002

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Please reference the routing instructions below for all shipments pertaining to this purchase order.

FREIGHT ROUTING INSTRUCTIONS

ROUTING: For every shipment that can not be shipped via UPS/FEDEX GROUND, where Rochester Gas and Electric is responsible for the freight charges, call or fax information, **WEIGHT, ORIGIN & DESTINATION** (include street address, city, state and zip code) & **FREIGHT CLASS TO:**

(800)-822-9440 Fax: 717-227-5656

For shipments 150 lbs or less but no more than 130 inches combination of length, width and depth, utilize UPS/FEDEX GROUND. SHIP CONSIGNEE BILLING.

IF YOU ARE NOT SET UP FOR THE FEDEX GROUND CONSIGNEE BILLING PROGRAM YOU MUST CALL REPS FOR INFORMATION AT 800-762-3725.

If at any time, you have a problem coordinating a pick up or if you would like our traffic department to arrange for the pick up, call (800) 822-9440

BILL TO INFORMATION: On every Bill of Lading where Rochester Gas and Electric Company is responsible for the freight charges, the following Third Party Bill to Information must be clearly stated:

For Audit Purposes send freight bill to:
Rochester Gas and Electric Company Acct. No.408
802 Far Hills Drive
New Freedom, PA 17349.

P.O. NUMBER: Each P.O. Number **MUST** be included on every bill of lading with instructions that the carrier transpose it to the freight bill. Should you have multiple POs ready on the same day consigned to the same destination, they must be combined on one bill of lading. If shipment is under 500lbs you must call our traffic department for a possible alternative routing.

Special Instructions: Shipments 6,000lbs and over or low density shipments that take up 625 cubic fee or more, where the density is 6lbs per cubic foot or less you **MUST** call out traffic department at (800) 822-9440. After 5:30 p.m. eastern time, dial 410-494-7539 or fax 717-227-5656.

Unless RGE receives notice, within 48 hours of [Vendor's] receipt of a facsimile of the Purchase Order, Terms and Conditions and other documents related to the product or service provided (collectively, "the Terms"), of [Vendor's] objection to the Terms, the facsimile shall be sufficient to bind the parties, and no further document shall be necessary to establish the relationship

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5000004750 / 05/24/2002

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FAILURE TO ADHERE TO THESE INSTRUCTIONS MAY RESULT IN A CHARGE BACK
FOR EXCESS FREIGHT EXPENSE.

Unless RG&E receives notice, within 48 hours of [Vendor's] receipt of a facsimile of the Purchase Order, Terms and Conditions and other documents related to the product or service provided (collectively, "the Terms"), or [Vendor's] objection to the Terms, the facsimile shall be sufficient to bind the parties, and no further document shall be necessary to establish the relationship

Your quotation / proposal is incorporated into this Purchase order only to the following extent: price, quantity, work scope, specification, freight terms and payment terms. Supplier's performance hereunder shall be deemed acceptance of owner's terms and conditions

This purchase order is subject to the terms and conditions printed on the last page hereof and to any further instructions, specifications and other materials made a part hereof by the buyer.

ROCHESTER GAS AND ELECTRIC CORPORATION TERMS AND CONDITIONS OF PURCHASE

1. ACCEPTANCE

Any acceptance of this Order must be limited to the terms hereof and objection is hereby made to any different or additional terms. Seller shall not modify or waive the terms and conditions set forth herein without the express written consent of Buyer. Any quotation of Seller is incorporated in and made a part of the Order only to the extent of specifying the nature and description of goods or services ordered, and then only to the extent that such quotation is consistent with the terms of this Order. Supplier's performance hereunder shall be deemed acceptance of owner's terms and conditions.

2. TIME IS OF THE ESSENCE

Time is of the essence for this Order. Buyer reserves the right, without liability, to terminate this Order at any time as to any goods not delivered or services not performed in accordance with the terms of this Order. Any provisions herein for delivery of goods or services by installments shall not be construed as making the obligations of Seller severable. Unless otherwise provided, the prices quoted in this Order include delivery of goods f o b destination.

3. WARRANTY

Seller warrants that all goods supplied or services performed under this Order will conform to the specifications contained herein and will be free from defects in design, material or workmanship. Unless otherwise specified, all goods will be new and of best quality. To the extent that Seller knows or has reason to know of the purpose for which the goods or services are intended, Seller warrants that said goods or services shall be fit for such purpose. Any services performed under this Order shall be rendered by qualified personnel in accordance with the best accepted practices.

If the goods or services of Seller are or become defective at any time within one year from delivery or completion, and Buyer so notifies Seller within a reasonable time after discovery of the defect (though such discovery may be after said one year period), Seller shall thereupon correct such defect at its sole expense. Corrective work shall be performed in the most expeditious manner consistent with Buyer's requirements and in a manner concurred in by it. Goods or services used in correcting defects shall be warranted for the remainder of said one year period.

4. INSPECTION AND REJECTION

All goods furnished or services performed under this Order shall be subject to inspection by Buyer upon delivery or performance and for a reasonable time thereafter, and Buyer reserves the right to reject any defective or non-conforming goods or services. Payment for all or any of the goods supplied or services performed hereunder shall not constitute acceptance by Buyer.

5. TITLE AND RISK OF LOSS

Unless otherwise provided in this Order, title and risk of loss shall pass to Buyer only at the time and place of delivery at Buyer's address as specified in this Order.

6. ASSIGNMENTS

Any assignment of this Order or of any interest in this Order or of any payments due hereunder, without Buyer's prior written approval, shall be void.

7. PRESENCE ON BUYER'S PREMISES

When Seller's employees or agents are on Buyer's premises for any reason, their presence and that of Seller shall be as an independent contractor. Seller shall maintain (i) adequate coverage for worker's compensation or employers' liability, public liability, and property damage, or (ii) the insurance and limits specified in the attachment to this Order. Upon request, Seller will furnish Buyer certificates of insurance satisfactory to Buyer evidencing such insurance coverage. The provision of any insurance hereunder shall not be construed to limit or alter any liability of Seller to Buyer arising out of this Order. Seller will also furnish, if requested, adequate waivers of lien with respect to goods and services supplied hereunder, in form satisfactory to Buyer.

8. INDEMNITY

Seller agrees to defend, indemnify and save harmless Buyer from any and all claims, damages, costs, liability or expense (including attorneys' fees) of any kind occurring or asserted against Buyer, its employees or agents in connection with work being performed or goods delivered by Seller or its agents or contracts under this Order; except that nothing herein shall be construed to require indemnification of Buyer to the extent of its negligence.

9. PRICE PAYMENT

Buyer may by written change order make any changes, including additions to or deletions from the quantities originally ordered, or in the specifications or drawings to be followed by Seller. If any such change affects the amount due or the time of performance hereunder, an equitable adjustment shall be made. Any change orders issued by Buyer to this Order shall be effective at the same prices applicable to this Order. Seller represents that its price to Buyer for goods or services hereunder shall be as low as the lowest price charged by Seller to others for comparable goods or services in comparable quantity. Unless otherwise specified, all payments shall be net, 30 days after the later of (i) receipt of goods or rendering of services, or (ii) presentation of a proper invoice.

10. AUDIT AND RECORDS

For goods and/or services ordered by and billed to Buyer on a cost reimbursable basis, Seller shall keep accurate records and accounts for all direct and indirect charges, disbursements, costs or expenses incurred by Seller or its subcontractors in the performance of the work. Upon reasonable prior notice at Seller's place of business, Buyer shall have the right to audit such records and accounts up to two (2) years after payment of the final invoice for the work.

11. TERMINATION

In addition to any remedy for default by Seller, Buyer shall have the right to terminate this Order in whole or in part, at any time upon written or telegraphic notice to Seller. In the event of such termination, Buyer will make an equitable termination payment to Seller for work or materials in progress to date of termination. No amounts shall be paid for anticipated profits, unabsorbed overhead, lost shop space or the like. Buyer's payment to Seller shall in no event exceed the total price of this Order.

12. MODIFICATION OF CONDITIONS

The terms and conditions set forth in this Order shall not be modified or waived without the express written consent of Buyer.

13. GOVERNING LAW

The contract arising from this Order and the parties' performance hereunder shall be governed by and construed in accordance with the laws of the State of New York.

14. Supplier agrees to comply with all laws, rules, regulations and executive orders that apply to the goods or services to be provided.

SERIES 300
ENCAPSULATED ANALOG
ISOLATION AMPLIFIER

OPERATIONS AND MAINTENANCE
MANUAL

EIP-M-300

Revision 5

**Image Not
Available**

Idaho Falls, Idaho 83402 (208) 529-1000

NUS INSTRUMENTS, INC. PROPRIETARY INFORMATION

This is a NUS Instruments, Inc. Operations and Maintenance Manual. Information contained herein is proprietary to NUS and it is not to be released without written permission from NUS. This information is not to be reproduced, copied or used in any way detrimental to the interests of NUS Instruments, Inc.

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FIGURES

Figure 1: Mounting Details 16
Figure 1: Mounting Details 16

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GLOSSARY

1E	(Class 1E) Nuclear Safety Related, IEEE Definition
DMM	Digital Voltmeter (Digital Multi-Meter)
NUS	NUS Instruments, Inc.
span	Maximum minus minimum
TID	Total Integrated Dose, Gamma, over 40 years

1.0 INTRODUCTION

The NUS series 300 multi-channel encapsulated analog isolator is designed and fabricated to provide isolation of Class 1E circuits from non-Class 1E circuits. The isolator can be used where only a few channels of Class 1E isolation are required.

1.1 DESCRIPTION

The Series 300 isolator is a one to four channel encapsulated surface mount analog isolation device designed to provide simplicity in installation, calibration, and operation. A variety of input and output ranges are available to meet different requirements. The isolators have capabilities for current or voltage input signals and provide current or voltage output signals.

Model Number and Ranges:

The model number of the encapsulated analog isolator is wCA300-xx-yy-zz. The w indicates the number of channels (O = one, D = dual, T = three, F = four), xx is the code number for the input range, yy is the code number for the output range, zz is the code number for the power source. See Table 1 for the code numbers.

Several different input and output ranges and power sources are available. The design is such that almost any combination of input and output ranges and power sources can be provided. The input, output, and power source code numbers are identified by Table 1, "SERIES 300 ANALOG ISOLATOR INPUT, OUTPUT, AND POWER MATRIX."

Two examples of the model number code are provided below.

- (1) Model FCA300-01-03-01 is a four channel analog encapsulated isolator with an input range of 0 to 100 mVdc on all channels and an output range of 0 to 1 Vdc on all channels, and requires a ± 15 Vdc power source.

Table 1: SERIES 350 ANALOG ISOLATOR INPUT, OUTPUT AND POWER MATRIX

INPUT			OUTPUT			POWER SOURCE	
RANGE CODE XX	RANGE	IMPEDANCE	RANGE CODE YY	RANGE	IMPEDANCE	POWER CODE	POWER ZZ
00	Not Loaded		00	Not Loaded		00	Not Loaded
01	0 to 100 mVdc	100M ohms	01	0 to 100 mVdc	3.16k ohms	01	$\pm 15 \pm 1$ Vdc
02	0 to 51 mVdc	100M ohms	02	0 to 51 mVdc	3.4k ohms	02	28 ± 2 Vdc
03	0 to 1 Vdc	100M ohms	03	0 to 1 Vdc	2.67k ohms	03	5 ± 0.25 Vdc
04	0 to 5 Vdc	100M ohms	04	0 to 5 Vdc	1.65k ohms	04	12 ± 1 Vdc
05	1 to 5 Vdc	2.1M ohms	05	1 to 5 Vdc	1.65k ohms	05	15 ± 1 Vdc
06	0 to 10 Vdc	400k ohms	06	0 to 10 Vdc	1k ohms	06	24 ± 2 Vdc
07	4 to 20 mAdc	249 ohms	07	4 to 20 mAdc	1050 ohms ¹	07	48 ± 2 Vdc
08	10 to 50 mAdc	100 ohms	08	10 to 50 mAdc	600 ohms ¹	08	117Vac/125Vdc
09	0 to 1 mAdc 50 ohms		09	0 to 180 mVdc	3.12k ohms		
10	0 to 132 Vac	5M ohms	10	0 to 3.5 Vac	1.65k ohms		
11	0 to 20 mAdc	249 ohms	11	0 to 20 mAdc	1050 ohms ¹		
12	0 to 50 mAdc	100 ohms	12	0 to 50 mAdc	600 ohms ¹		
13	50 to 10 mAdc	100 ohms	13	1 to 5 Vdc	249 ohms		
14	Variable	1E06 ohms					
15	0 to 8 Vdc	429k ohms					
16	-10 to 10 Vdc	2.1M ohms					
17	-2 to 15 Vdc	2.4M ohms					
18	5 to 1 Vdc	2.1M ohms					
19	3.6 to 11.6 Vdc	2.2M ohms					
20	2 to 10 Vdc	2.2M ohms					
21	-2 to 2 Vdc	2.1M ohms					
22	-20 to 20 mAdc	2.3M ohms					
23	-4 to 4 Vdc	2.2M ohms					
24	1 to 2 Vdc	3.0M ohms					
25	0 to 4 Vdc						

Notes:

- 1.) These are not output impedances but the output drive capabilities of the current output modules.
- 2.) Some combinations may require alternate specification, consult NUS before ordering.
- 3.) Other input and output ranges may be available or can be engineered. Alternate terminal arrangements and multiple output models are also available.
- 4.) This list is complete as of 02/94.

(2) Model DCA300-07-07-08 is a four channel analog, encapsulated isolator with an input range of 4 to 20 mAdc on two channels and an output range of 4 to 20 mAdc on both channels and uses a 120 Vac power source.

1.2 PERFORMANCE SPECIFICATION

The Series 300 encapsulated analog isolators are designed for several input and output ranges, which are listed in Table 1. The devices have been designed, tested, and qualified to the environmental and performance specifications listed below.

1.2.1 Physical

Width:	7.44 inches
Height:	2.6 inches
Length:	8.0 inches
Weight:	less than 9.4 pounds
Channels per unit:	1, 2, 3 or 4
Reference:	Figure 1

1.2.2 Electrical

Power Requirements:	See Table 1 for available voltage ranges
Accuracy:	$\pm 0.1\%$ of Output Full Scale (FS)
Linearity:	Better than 0.1% of FS
Temperature Stability:	$\pm 0.05\%$ of FS/ $^{\circ}\text{C}$
Dielectric Withstand:	1000 Vac and 3000 Vdc - Input to Output 1000 Vac and 1000 Vdc - Input to Case
Output Fault Withstand:	480 Vac, 140 Vdc at 20 amps
Frequency Response:	DC to 20 Hz or as specified
Surge Withstand:	Per IEEE-472-1974
Impedance:	As shown on Table 1 for each model

1.2.3 Environmental

Normal Conditions

Temperature:	35 to 122°F (5 to 50°C)
Humidity:	0 to 95% noncondensing
Pressure:	Atmospheric
Radiation:	10 ⁴ Rads TID

Abnormal Conditions (The Series 300 isolator will maintain its isolation for all listed conditions, operating or not.. However, the accuracy, drift and some other specifications may not be achieved until conditions return to normal as defined above.)

Temperature:	35 to 135°F (2 to 57°C) (200 hour maximum while operating)
Humidity:	0 to 95% noncondensing

1.3 QUALIFICATION

The Series 300 analog isolators are designed to perform the isolation functions specified by IEEE-384-1981. Type testing has been performed in accordance with the Class 1E qualification requirements of IEEE-323-1974/1983. Seismic qualification has been performed by analysis in accordance with the requirements of IEEE-344-1975/1987. A full qualification report is available with each order.

2.0 INSTALLATION

The Series 300 Class 1E isolators are shipped fully assembled and ready for use.

2.1 UNPACKING AND INSPECTION

- (1) If external damage to the shipping container is evident, request an agent of the carrier be present when the container is opened. File a claim with the carrier and notify NUS as soon as possible if damage is discovered.
- (2) Verify that the equipment received is in accordance with the enclosed packing lists and certificate of conformance.
- (3) Inspect the isolators for any damage that may have occurred during shipment, such as broken terminal blocks or fuse holders.
- (4) Prior to returning material to NUS, obtain a Return Material Authorization by contacting:

NUS Instruments, Inc.
440 West Broadway
Idaho Falls, ID 83402-3638
Phone: (208) 529-1000
ATTN: Manager, Specialty Electronics

Package the material for shipment in accordance with NQA-1, Level B, and ship per the instructions provided with the Return Authorization.

2.2 SITE REQUIREMENTS

- (1) Storage of the equipment prior to installation shall be in accordance with NQA-1, Level B. It is recommended that the units be replaced in the original packing for storage.
- (2) The equipment is designed for use in a "mild environment" as defined by 10CFR50.49 and is to be used under the conditions stated in section 1.2.3.

2.3 PREINSTALLATION CHECKS

The Series 300 Class 1E isolators are electrically conditioned, calibrated, and extensively tested prior to shipment. The unit may be checked for functionality prior to installation by completing the first portion of the calibration procedure in section 4.2.

2.4 ISOLATOR MOUNTING

Refer to **Figure 1** for mounting dimensions and typical installation. The encapsulated isolators must be mounted to a flat surface by bolting through the four mounting holes with the four 1/4-20 UNC by 2.5-inch round head bolts supplied with each unit. The mounting holes are on 4.00 inch ± 01 inch by 5.00 ± 01 inch centers. Mounting may be made by inserting the bolts through the unit and screwing them into either tapped holes in the mounting surface or through 0.312 inch diameter clearance holes to nuts and lock washers. The potted surface must be fully supported by, and in full contact with the flat surface of the mount. Thermal grease is not necessary. The isolator may be mounted at any angle.

2.5 WIRING

2.5.1 General

Loss of power to the isolator will not affect the input signals in any way. The isolator is not designed to isolate the output from the power source. It is the responsibility of the user to maintain separation between Class 1E and non-1E signal cables. The Series 300 isolator is designed with the following separation criteria:

- (1) All connections to input terminal block TB1 are to be Class 1E.
- (2) Outputs are to be non-Class 1E.
- (3) Power to the isolator is to be non-Class 1E.

or

- (1) All connections to the input block TB1 are to be non-Class 1E.
- (2) Outputs are to be Class 1E.
- (3) Power to the isolator is to be Class 1E.

2.5.2 Electrical Connections

Electrical connections are made to the isolator via two terminal blocks. The input terminals (TB1) are on the left side of the isolator and the output and power terminals (TB2) are on the right side of the isolator. TB1 and TB2 terminal screws are #6-32 binder head. All terminals, fuses and adjustments are clearly marked on the unit. Units with fewer than four channels will use the channels in numerical sequence (ie. - an OCA will use channel one only, a DCA will use channels one and two, etc.) The channels that are loaded and their input and output ranges are listed on the faceplate of the unit.

(1) Input and output signal connections

Each channel has terminals for connecting positive, negative, and shield. The positive output is fused at 1/4 ampere (Fuses F1.1, F1.2, F1.3, and F1.4).

Input and output signal conductors are to be 24 AWG to 16 AWG copper. Twisted pair or shielded conductors may be used as desired.

(2) Power Connection

Power and grounding terminals are numbers 13, 14, 15, 16, and 17 of terminal block TB2. Power connections are made as shown in Table 3 depending on the power source required for the isolators. Grounding connections also must be made in accordance with Table 3 and the caution note therein.

Power cable is to be three conductor 18 AWG, minimum, copper.

The power source is to be as specified on Table 1 for the unit (listed on the faceplate also). All power is fused on the hot leg. (Fuses F2 and F3).

Table 2: SIGNAL CONNECTIONS

	TB1	TB2	OUTPUT FUSE
	<u>INPUT</u>	<u>OUTPUT</u>	<u>NUMBER</u>
CH1 +	1	1	F1.1
CH1 -	2	2	
CH1 Shld	3	3	
CH2 +	4	4	F1.2
CH2 -	5	5	
CH2 Shld	6	6	
CH3 +	7	7	F1.3
CH3 -	8	8	
CH3 Shld	9	9	
CH4 +	10	10	F1.4
CH4 -	11	11	
CH4 Shld	12	12	

Table 3: POWER CONNECTIONS

<u>TB2</u>	<u>Power Source</u>		
	<u>01</u>	<u>02 thru 07</u>	<u>08</u>
13	+	+	Line
14	common	-	Neutral
15	-	NC	NC
16	Building Ground	Building Ground	
17	Surge Ground		SurgeGround

CAUTION: Terminals 16 and 17 must be jumpered together unless the user connects a dedicated surge ground to terminal 17.

3.0 THEORY OF OPERATION

The Class 1E analog isolator performs three functions: input-to-output isolation, output-to-input isolation, and signal conditioning. Isolation between inputs and outputs is via physical separation of input and output circuitry and the isolation amplifier. The isolation amplifier is an integrated-circuit, transformer-coupled isolation amplifier that has a continuous isolation rating of 3000 volts DC and 1000 volts AC rms.

The Series 300 consists of an I/O conditioning circuit board and a power supply circuit board. The component values on the I/O board are changed depending on the specified input and output ranges. In the amplifier, isolation of both the signal and power is accomplished with a miniature toroid transformer with multiple windings. A pulse generator on the output side of the amplifier provides a two-part waveform to the transformer. One part of the waveform is rectified and filtered to provide isolated power to the input amplifier and to the output amplifier. The other part of the waveform is modulated with the signal from the input amplifier and coupled to the output amplifier through windings on the toroid transformer.

The input amplifier is operated with gain. The amount of gain is determined by the nominal magnitude of the input signal. The output amplifier has a nominal gain of two and is provided with a zero offset adjustment and a gain adjustment that allows calibration of the channel's output signal. Current loop outputs require additional components that convert the amplifier output voltage signal to current loop levels.

Surge protection for the input is provided by resistors at the input by a varistor across the inputs. Varistors are applied across the power input and the signal output to protect these terminals.

4.0 MAINTENANCE

The Series 300 analog isolators are fully encapsulated, thus preventing any maintenance or repair of the internals. Unit maintenance therefore consists only of the following:

- (1) cleaning of the module enclosure and terminals,
- (2) performing calibration and zero adjustments,
- (3) failure investigation and repair, and
- (4) changing of output and power fuses.

4.1 CLEANLINESS

Cleaning of the modules to remove accumulated dust, condensate, etc, should be done periodically. This is necessary for continued compliance with isolation specifications and will preclude the possibility of shorts at the input, output, and power terminals. Use a non-caustic circuit board cleaner, compressed air or just wipe with a clean cloth.

WARNING: DO NOT spray any agent or water on any part of the module when it is energized. This could result in damage to the device and/or electrical shock.

Calibration should be checked annually or at other periodic times to be established by the user. The following equipment is needed to perform calibration on the Series 300 analog isolators:

- (a) Digital Multimeter (DMM) accurate to ± 0.001 volts (or ± 0.03 mA as appropriate for the inputs and outputs of the isolator) - must meet plant calibration requirements. (Two meters will be convenient.)
- (b) Stable DC voltage (or current) source. Calibration is not necessary provided all settings are verified by the calibrated DMM from above.

- (1) Apply power to the module. Allow fifteen minutes (not necessary when performing functional check only) for the module to warm up.
- (2) Connect an adjustable DC source to the CH 1 module input.

NOTE: Verify that the isolator needs adjustment before making any actual changes to the potentiometer settings to avoid unnecessary changes. This is accomplished by injecting the minimum and maximum input and observing whether the output changes appropriately.

3) Apply 0% of input span to the input of CH 1 and measure the output of the isolation amplifier at the CH 1 output.
4) Adjust the ZERO potentiometer for CH 1 on the front of the module until the output is at the minimum span $\pm 0.1\%$

- (5) Apply 100% of input span to the input of CH 1 and measure the output of the isolation amplifier at the CH 1 output.
- (6) Adjust the SPAN potentiometer for CH 1 on the front of the module until the output is at the maximum span $\pm 0.1\%$.
- (7) Repeat steps 3-6 as often as needed until the minimum and maximum spans occur at the output without further adjustment.
- (8) Perform steps 2-7 above for all remaining channels installed in the module.

4.3 FAILURE

Failure of the isolator unit may result from any of the following.

<u>Failure</u>	<u>Corrective Action</u>
(1) Loss of input power	Restore power
(2) Loss of input signal	Check input signal source and wiring

- (3) Failure of input power fuses F2 and/or F3 Replace fuses. Note: fuses must be the same size and type that were shipped with the original equipment
- (4) Failure of output signal fuses (F1.1, F1.2, F1.3 or F1.4) Replace fuses. Note: Fuses must be the same size and type that were shipped with the original equipment.
- (5) Internal failure of electronics Replace with new isolator unit.

4.4 RECOMMENDED SPARE PARTS

NOTE: A failure of this type is considered extremely unlikely and is not expected to occur during the qualified lifetime of the isolator. Such a failure will most likely be due to an external fault or transient condition and the entire signal and all power circuits should be checked prior to restoring the isolator to service. Because the isolator is encapsulated and repair is impossible, the spare parts are limited to fuses or an entire unit.

Table 4 provides the recommended spare parts based on the number of Series 300 isolators in use.

4.5 LONG TERM STORAGE

Storage of the equipment prior to installation shall be in accordance with NQA-1, Level B. It is recommended that the units be replaced in the original packing for storage.

4.6 SURVEILLANCE

All modules should be powered up for at least 1/2 hour every 5 years to reform electrolytic capacitors internal to these devices. No load needs to be applied to the devices during reforming. A check for the presence of voltage across the output terminals will serve as a minimal test that the device is still serviceable.

Table 4: RECOMMENDED SPARE PARTS

<u>Isolators</u>	<u>Number of Spares</u>		
	<u>Fuses</u>		<u>Replacement</u>
	<u>Power</u>	<u>Output</u>	<u>Units</u>
1 to 5	10	20	1
6 to 10	20	40	1
11 to 20	40	80	2

- (1) The recommended power fuse is a Littlefuse series 273. Size as specified in Table 5.
- (2) The recommended output signal fuse is a Littlefuse number 273.250.

Table 5: SERIES 300 POWER FUSE SIZE

<u>Unit with:</u> <u>Fuse size in:</u> <u>Power Source</u>	<u>Output Type</u>		
	<u>Voltage Output</u> <u>(Amps)</u>	<u>Up to 20 mA Output</u> <u>(Amps)</u>	<u>Up to 50 mA Output</u> <u>(Amps)</u>
± 15 Vdc	.500	.500	N/A
28 Vdc	.500	.750	01.5
5 Vdc	003	005	005
12 Vdc	.750	01.5	003
15 Vdc	.750	01.5	003
24 Vdc	.750	01.5	003
48 Vdc	.500	.750	.750
117 Vdc	003	005	005

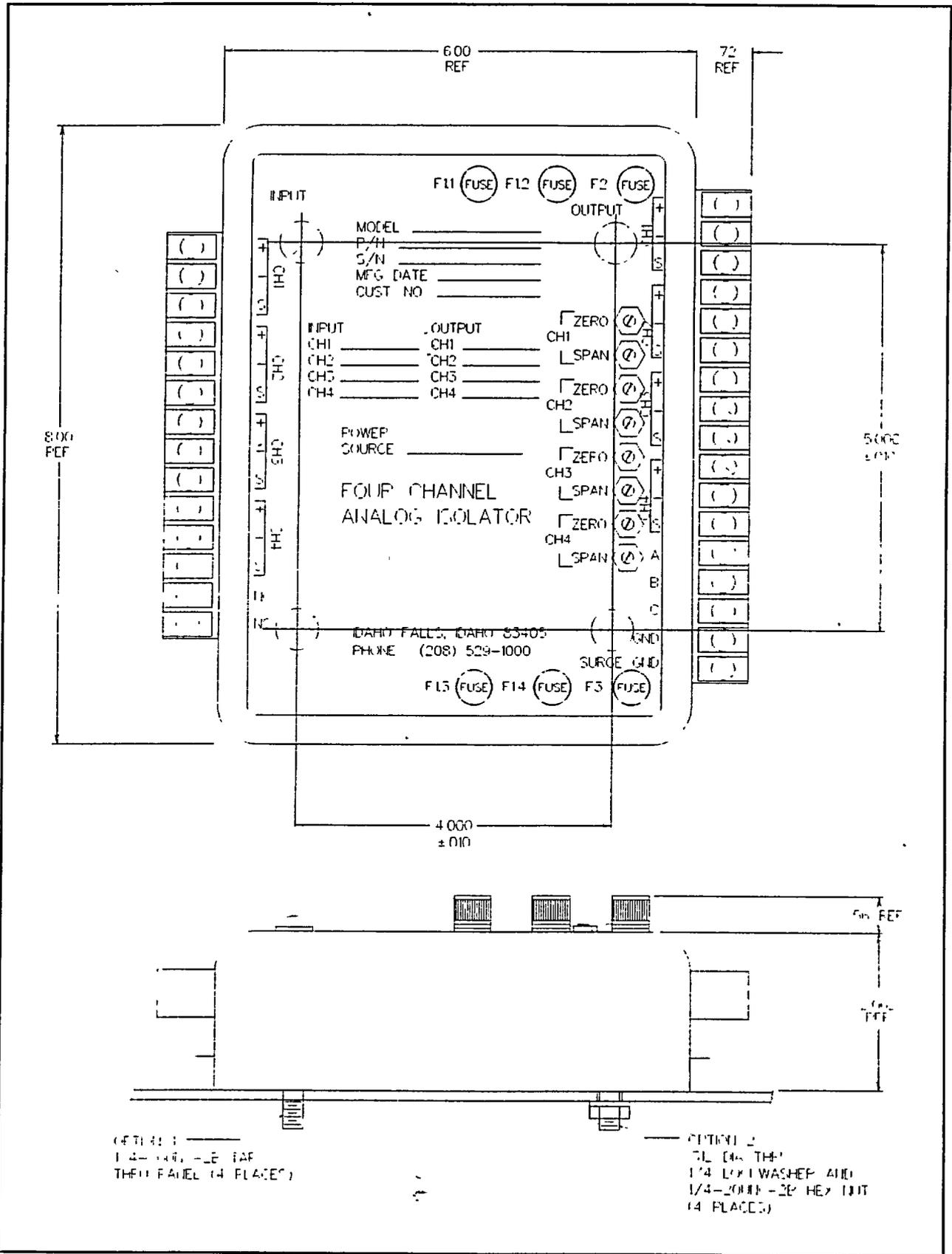


Figure 1: Mounting Details

Attachment 14

Product Information Bulletin for Firmware Verification and Validation

Victoreen
Model 94X UDR
Product Information Bulletin

MODEL 94X DIGITAL RATEMETER

PRODUCT INFORMATION BULLETIN

Subject: Firmware Verification and Validation

The Victoreen 94X Series Digital Ratemeters were originally designed in 1984, for the purpose of upgrading the 1960s vintage Analog Ratemeters that were currently being used in the nuclear power industry. Since its introduction, well over 1000 units have been successfully installed and are in operation on a daily basis.

The 94X Series Digital Ratemeter (UDR) is a microprocessor based device, whose operation is controlled by the installed firmware. The basic functions of the Digital Ratemeter are to convert the input pulses from the detector into a digital value, and to compare this value with an operator entered alarm setpoint. When the alarm setpoint is exceeded, a relay, operated in the fail-safe mode, changes state, advising plant personnel that a significant change in radiation level has occurred. The relay contact output may be interlocked with a plant annunciator or a process control interlock.

At the time of the Digital Ratemeter's initial design, formal firmware verification and validation (V & V) requirements were not in widespread use in the industry. Formal V & V documentation, therefore, does not exist for this device. The basic firmware itself, however, has been in use since 1985, and has been an extremely reliable product for Victoreen's customers. We believe the large installed base of UDR radiation monitors is sufficient to justify an exemption to formal V & V documentation. The actual firmware installed in each Digital Ratemeter, including changes, is controlled and verified as follows:

- All firmware/software releases and changes are controlled under Engineering Instruction EI001. This document controls the following items:
 - Final Product Master Set: Media required to produce copies of the firmware/software for shipment.
 - Source Files: Files and data required to reproduce the Final Product Master Set.
 - Software Control Document: Provides information necessary to modify or reproduce the Final Product Master Set. Include information on editors, compilers, development system, assemblers, linkers, etc. used in developing the master set. A revision history summary is now also required.
 - Preparation of a second Final Product Master Set for off-site storage.
 - Part Numbering Format
 - Defines the firmware/software as a document, and imposes generic document review and change control measures.

- All firmware changes are controlled under our generic Document Control Procedure, S.O.P. 410.307. This requires definition of changes and review by Engineering and Quality Assurance.

- All firmware operated products are subjected to a functional test prior to shipment by an independent Test Department.

- All customer specific firmware changes are identified and controlled by the assignment of a unique part number. Specific test procedures are prepared to verify the change requested has been properly implemented.

The firmware in the UDR does not contain a sophisticated operating system. Its operation is a basic clock-controlled loop, repeating once each second. That is, from the main loop program, the firmware jumps to a specific series of program subroutines. In the event the firmware does not complete all of the subroutines (up to 31) and return to the main loop, the hardware "Watchdog" timer will time out, illuminating the FAIL lamp, and de-energizing the FAIL relay.

Attachment 15

**Electrical/Instrumentation Safety-Related Components
RG&E Procedures IP-PES-2 and A-405**

ATTACHMENT 15

Electrical Components Purchased Safety Related

Description	Vendor
Relays	Westinghouse
Ratemeters	Inovision
Detectors	Inovision
Isolators	NUS
Terminal Blocks	Spectrum

Electrical Components Dedicated per RG&E Procedures IP-PES-2 and A-405

Description	Vendor
Fuse Blocks	Rero Corp
Fuses	Newark Electronics
Pushbutton/Hand Switches	Wesco
Switch Contact Blocks	Westinghouse & Wesco
Indicating Light Sockets	Wesco

ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

CONTROLLED COPY NUMBER 4

PROCEDURE NO. A-405

REV. NO. 10

EVALUATION OF COMMERCIAL GRADE ITEMS

FOR SAFETY RELATED APPLICATIONS


RESPONSIBLE MANAGER

12-16-97
EFFECTIVE DATE

CATEGORY 1.0

A-405EVALUATION OF COMMERCIAL GRADE ITEMS
FOR SAFETY RELATED APPLICATIONS**1.0** **PURPOSE:**

1.1 The purpose of this procedure is to provide the necessary instruction to evaluate Commercial Grade Items for use in Safety Related applications. The Commercial Grade Item Engineering Evaluation (CGIEE) is used to document the technical evaluation, critical characteristics, acceptance criteria and acceptance methods required for item dedication. This procedure is in accordance with the Rochester Gas and Electric Ginna Station Quality Assurance Manual.

1.2 The scope of this procedure is limited to those items that satisfy the definition of "Commercial Grade" as defined by 10CFR21.

1.3 Items evaluated using the methods/requirements identified in this procedure are items for which deficiency reporting requirements indicated in 10CFR21 will become the responsibility of Rochester Gas and Electric (RG&E) at the time of "dedication" as a basic component (safety related).

1.4 Dedication is defined as the point in time after which a commercial grade item is accepted for use in a safety related application and deficiency reporting becomes the responsibility of the party performing the acceptance. RG&E Ginna Station considers this point in time to be after final sign-off of the QA-07 or following completion of outstanding Conditional Release documents, if applicable.

2.0 **REFERENCES:**

2.1 Code of Federal Regulations - Title 10 Part 21, "Reporting of Defects and Noncompliance".

2.2 EPRI NP-5652 "Guideline for the Utilization of Commercial Grade Items in Nuclear Safety-Related Applications".

2.3 IP-PES-2 "Control of Procurement Documents Prepared at Ginna Station".

2.4 A-700, "Conditional Release Program".

2.5 A-701, "Receipt and Acceptance of Material/Parts".

2.6 QA-707, "Conducting Commercial Grade Supplier Surveys".

- 2.7 IP-CAP-1, "Abnormal Condition Tracking Initiation or Notification (ACTION) Report
- 2.8 QA-709, "Approved Commercial Grade Supplier Listing".
- 2.9 IP-MTE-1, "Calibration and Control of Measuring and Test Equipment".
- 2.10 NRC Regulatory Guide 1.123, Revision 1, (7/77) "Quality Assurance Requirements for the Control of the Procurement of Items and Services for Nuclear Power Plants".
- 2.11 QA-702, "Supplier Surveillance".
- 2.12 QE-601, "Distribution and Control of Documents by the Controlled Document Method".
- 2.13 Letter from Robert Mecredy to USNRC; 10 CFR Part 21 30 Day Report R.E. Ginna Nuclear Power Plant Docket No. 50-244 dated November 6, 1996.
- 2.14 Technical Evaluation 96-566 Rev. 1; Refurbishment of U.S. Electric Service Water Pump Motors.
- 2.15 Action Report 97-0346, "Procurement Controls For PCRs 96-38 and 39".

3.0 INSTRUCTIONS:

3.1 RESPONSIBILITIES:

3.1.1 PROCUREMENT ENGINEERING:

1. Prepares and approves the CGIEE (Similar to Attachment A) in accordance with this procedure.
2. Assigns control numbers for CGIEE.
3. Maintains CGIEE tracking system.
4. Reviews scope of generic evaluations to avoid duplication.
6. Forwards approved original CGIEE to Document Control.
7. Completes Attachment B - Request for Commercial Survey.
8. Provides technical assistance for surveys and surveillance as necessary.

3.1.2 NUCLEAR ASSESSMENT:

1. Reviews CGIEE requiring Source Surveillance for compliance with this Procedure.
2. Responsible for performing Commercial Grade Surveys of vendors in accordance with QA-707.
3. Responsible for performing source surveillance of vendors (the verification of critical characteristics by witnessing quality activities before releasing the item for shipment), in accordance with QA-702.
4. Performs audits of Procurement Engineering to assure compliance with this procedure.
5. Maintains Commercial Grade Suppliers List (CGSL).

3.1.3 NUCLEAR ENGINEERING SERVICES:

1. Reviews CGIEEs for technical accuracy, applicability and completeness of critical characteristics and acceptance criteria.
2. Provides technical assistance for resolution of technical issues relating to original design basis and requirements of technical specifications.
3. Approves CGIEEs.

3.2 METHODS:

- 3.2.1 The methods defined below, used when performing a Commercial Grade Item Engineering Evaluation, are in accordance with EPRI NP-5652 and NRC Generic Letter 89-02. When used singularly or in combination these methods of verifying an item's acceptance, used in conjunction with or in addition to receiving inspection activities per A-701, will yield a result which will allow Rochester Gas and Electric to assume 10CFR21 reporting responsibilities. Procurement Engineering shall determine which of, or combination of the following three (3) methods will be implemented.

3.2.2 METHOD 1: Special Tests and Inspections

Method 1 will typically be used as the acceptance method of an item when the technical design information associated with that item can be obtained. This information will be used to determine and verify the critical characteristics of the item. When using this method, the Procurement Engineer completing the evaluation must determine the critical characteristics, which shall include part number verification if applicable, acceptance criteria for the item, the sample size, and the tests or inspections necessary for verification of those critical characteristics. The tests and inspections may vary from item to item and could range from receipt inspection activities including part number verification to pre- or post-installation tests. Destructive testing of a representative subset of a homogeneous set is also encompassed by Method 1. All testing/inspections shall be performed by RG&E, an RG&E approved vendor, or under source surveillance.

NOTE: When Method #1, "Special Tests and Inspections", is invoked for complex components, the preferred time to perform the inspections is during the manufacturing process. The manufacturer's past performance history should be considered during selection of acceptance methods, however, verification of acceptance and 10 CFR 50 Part 21 reportability responsibility resides with RG&E.

3.2.3 METHOD 2: Commercial Grade Survey of Supplier

Method 2 will typically be used when the vendor of the item controls the activities associated with that item's critical characteristics in accordance with a documented Quality Assurance Program. A formal Quality Assurance Manual is desirable although not an essential requirement. Method 2 will require the support of Rochester Gas and Electric Quality Assurance, as a Commercial Survey of the vendor must be completed prior to procurement of commercial grade items from the vendor. Once a vendor's quality program has been surveyed and approved by Q.A., the vendor will be placed on the Commercial Grade Suppliers List (CGSL) and the item will be accepted based on a Certificate of Conformance from the vendor combined with receipt inspection as identified in the QA-07. The Certificate of Conformance from the vendor will document that the vendor invoked the controls of the quality program surveyed by RG&E Q.A. Additionally, the Procurement Engineer must assure that the vendor is maintained on the CGSL. If the vendor is not on the CGSL, it is the responsibility of the Procurement Engineer to process a Request for Commercial Survey (similar to Attachment B) in accordance with this procedure and forward to Quality Assurance for acknowledgment and performance in accordance with QA-707. When requesting a survey, the Procurement Engineer shall identify, as a minimum, the scope of items to be procured from the vendor, the item's critical characteristics and the aspects of the vendor's quality program which shall be verified.

3.2.4 METHOD 3: Source Verification

Method 3 is typically used when the vendor maintains an item-specific design, fabrication, assembly, testing, or inspection controls which may be substantiated by source verification for a specific commercial grade item in order that the identified critical characteristics may be verified. When using Method 3 the Procurement Engineer must identify the critical characteristics, acceptance criteria and the method which will be used to verify acceptance of those critical characteristics at the vendor's facility. The Procurement Engineer must also complete a Request for Source Surveillance in accordance with A-401 and forward to Quality Assurance for acknowledgment and performance in accordance with QA-702. The results of the surveillance shall be documented and evaluated. Verification that the surveillance was performed shall be documented during receipt inspection of the item.

3.3 CGIEE PREPARATION AND CONTENT:

3.3.1 The purpose of performing a CGIEE is to document the evaluation of the item based on the safety function which it performs. When complete, the CGIEE will act as a specification by which the Procurement Documents and receiving documents will be prepared to ensure the item procured is the item received and it will perform its intended safety function.

3.3.2 The CGIEE (Attachment A) covered by this procedure will:

- a. Document design and functional requirements.
- b. Document the critical characteristics and acceptance criteria which must be verified to accept the item as a basic component for its intended safety-related application.
- c. Document appropriate methods of verifying critical characteristics.

3.3.3 Procurement Engineering determines whether an existing CGIEE can be utilized to evaluate the item or if a new CGIEE is required. It is the Procurement Engineer's responsibility to make the determination:

- a. If a CGIEE has already been approved for the item and application.
- b. If an existing CGIEE has already been approved on an identical item, but requires a revision to include a new application.
- c. If an existing CGIEE has been approved for similar commodity items which exhibit the same critical characteristics but requires a revision to include the new item.

- 3.3.4 When preparing or revising a CGIEE, the Procurement Engineer shall research the applicable plant records (e.g., UFSAR, Drawings, Specifications, Codes and Standards, Vendor Manuals, etc.) to the extent necessary to ensure approved design and performance requirements are maintained. Attachment A (or similar) shall then be completed in accordance with the instruction sheet.
- 3.3.5 When completing a CGIEE, the Procurement Engineer must identify the item completely in Section A of Form 1. CGIEE containing more than one item must have a Form 1 completed for each item or have the items completely identified within a table contained within the CGIEE.
- 3.3.6 Section B of Form 1 is intended to document the component(s) in which the item will be used. In the case of commodity items "N/A" shall be entered in all lines of Section B.
- 3.3.7 Section C shall be used to document the safety function(s) the item performs.
- 3.3.8 Section D shall be used to document any limitations in the item's application/use in the plant. This section should be used when an item has multiple applications, some of which are not covered by the evaluation being performed. An example would be an item which has multiple applications, some of which require Environmental Qualification testing which cannot be performed at the time the CGIEE is completed.
- 3.3.9 Form 2 shall be used to document the specific critical characteristics selected which will be verified to ensure the item received is the item specified and that the item will perform its intended safety function. Additionally, Form 2 will document the method by which the critical characteristics will be verified and the acceptance criteria used to accept the item. Multiple items may be identified on Form 2 since the Material I.D. and P/N provide the link back to the specific Form 1 for each item.
- 3.3.9.1 Similar items which have identical critical characteristics and acceptance methods and differ only in acceptance criteria may be simplified through the use of form 2A. Form 2 shall be used to identify the critical characteristics and acceptance methods as they apply to all items. The acceptance criteria may be written to reference form 2A for the specific acceptance criteria for each item.
- 3.3.10 Each critical characteristic to be verified by Method 1 shall be specified with the acceptance criteria identified as a minimum and a maximum (+/- tolerances are not acceptable), when applicable. Nominal measurements shall not be specified. The receiving acceptance criteria for a Method 1 CGIEE is obviously that the critical characteristics be within the acceptance limits. The measurements shall be specified consistent with the accuracy required.

Example:	<u>Critical Characteristics</u>	<u>Acceptance Criteria</u>	<u>Method of Acceptance</u>
	Length	7-5/16" Min. - 7-7/16" Max.	Physical measurement
	Diameter	2.375" Min. 2.500" Max.	Physical measurement

3.3.11 The critical characteristics and acceptance criteria for a Method 2 CGIEE will be identified on the Form 2 in a manner similar to the example below. When Method 2 is selected, the Certificate of Conformance from the approved Commercial Grade Supplier will be the method of acceptance based on Q.C. document review at receipt inspection.

Example:	<u>Critical Characteristics</u>	<u>Acceptance Criteria</u>	<u>Method of Acceptance</u>
	Dimensions	Certificate of Conformance to the Purchase Order Requirements	Survey Based Documentation

3.3.12 The critical characteristics and acceptance criteria for a Method 3 CGIEE will be identified on the Form 2 in a manner similar to the example below. When Method 3 is selected, the Source Verification will be the method of acceptance based on Q.C. document review at receipt inspection.

Example:	<u>Critical Characteristics</u>	<u>Acceptance Criteria</u>	<u>Method of Acceptance</u>
	Dimensions	Dimensions are within vendors Acceptance limits as verified by surveillance	Source Surveillance

3.3.13 Form 3 shall be used to document the engineering basis for choosing the critical characteristics for dedication. In essence, this is the thought process the responsible engineer used in arriving at the particular critical characteristics for item dedication.

3.3.14 Due to the complex nature of, and difficulties encountered in the dedication of new motors, references 2.13 and 2.14 shall be reviewed to incorporate lessons learned from the dedication of Service Water Pump Motors.

3.4 CGIEE REVIEW AND APPROVAL:

3.4.1 Upon completion of a CGIEE Procurement Engineering shall forward the CGIEE to Nuclear Assessment.

- 3.4.2 Nuclear Assessment shall review the CGIEE for incorporation of proper quality requirements.
- 3.4.2.1 If questions concerning the CGIEE are identified, Nuclear Assessment shall contact the responsible Procurement Engineer for resolution.
- 3.4.2.2 If the CGIEE is acceptable, Nuclear Assessment shall sign the CGIEE and forward to Nuclear Engineering Services for review and approval.
- 3.4.3 The System Engineering Manager or designee shall review the CGIEE for technical accuracy.
- 3.4.3.1 If the CGIEE is found to be unsatisfactory, the CGIEE shall be returned to the responsible Procurement Engineer for correction and reentry into the review process.
- 3.4.3.2 If the CGIEE is acceptable, the System Engineering Manager or designee shall sign the approval line and forward the CGIEE to the Procurement Engineering group secretary for transmittal to Document Control for distribution in accordance with QE-601.
- 3.5 CGIEE TRACKING:
- 3.5.1 A tracking system will be established and maintained by Procurement Engineering to:
- a. Issue control numbers for each CGIEE (CGIEE No.). The control number assigned to each CGIEE will consist of a year designator, sequential number, and Revision number. Example: CGIEE No. 89-080 Rev. 2.
 - b. Maintain a categorized data base of evaluated items to provide coordination and to preclude duplication of effort between groups.
- 3.6 CGIEE REVISIONS:
- 3.6.1 A CGIEE shall be revised when any of the following conditions exist:
- a. An item is added to an existing CGIEE.
 - b. An additional component is determined to be applicable to an existing CGIEE.
 - c. The Critical Characteristics, Acceptance Criteria or Acceptance Method requires changes.

3.6.2 All revisions performed as a result of modifying an existing CGIEE shall be identified by revision bar in the right margin beside the affected text unless otherwise noted.

4.0 **RECORDS:**

4.1 The records shall be controlled in accordance with QE-601, "Distribution and Control of Documents by the Control Number Method".

| 4.2 Records submitted for retention shall include the approved CGIEE, attachments,
| and purchase order records, if applicable.

Attachment A

COMMERCIAL GRADE ITEM ENGINEERING EVALUATION

**ROCHESTER GAS & ELECTRIC CORPORATION
89 EAST AVENUE
ROCHESTER, NEW YORK 14649**

CGIEE No. 1.

Revision #: 2.

Prepared By: _____ 3. _____ Date

Reviewed By: _____ 4. _____ Date
Nuclear Assessment

Approved By: _____ 5. _____ Date
System Engineering Manager

COMMERCIAL GRADE ITEM
ENGINEERING EVALUATION
(FORM 1)

CGIEE No. __ Rev. __

A. ITEM IDENTIFICATION INFORMATION

Material I.D. No. _____ 6. _____

Description _____ 7. _____

Manufacturer/Part No. _____ 8. _____

Catalog No./Rev./Page (Attach) _____ 9. _____

Commodity Item [] yes 10. [] no (If "Yes", N/A Section B.)

B. INTENDED USE

Equipment Identification Number (EIN) _____ 11. _____

Equipment Description _____ 12. _____

Equipment Safety Function(s) _____ 13. _____

C. ITEM SAFETY FUNCTION: _____ 14. _____

D. RESTRICTIONS: _____ 15. _____

Attachment A
COMMERCIAL GRADE ITEM ENGINEERING EVALUATION
(FORM 2A)

CRITICAL CHARACTERISTICS (FROM FORM 2)

MAT'L ID	P/M	1.	22.	2.	3.	4.	5.
21.							
		A					
		C					
		C	23.				
		E					
		P					
		T					
		A					
		N					
		C					
		E					
		C					
		R					
		I					
		T					
		E					
		R					
		I					
		A					

**Commercial Grade Item Engineering
Evaluation Instructions for Attachment A**

Cover Sheet

1. CGIEE No. - A traceable identifier obtained from Procurement for tracking purposes.
2. Revision - Current revision level of CGIEE.
3. Prepared By/Date - Signature and date of evaluator preparing the CGIEE.
4. OA Reviewed By/Date - Signature and date of Nuclear Assurance/Quality Assurance's review of the CGIEE.
5. Approved By/Date - System Engineering Manager.
6. Material I.D. No. - A unique identifier established for Inventory Control and plant tracking purposes.
7. Description - The complete identification of the item.
8. Manufacturer Name/Part No. - In most cases this should be the name of the manufacturer of the item and the manufacturer's part number. Distributors should not be specified.
9. Catalog No./Rev./Page (Attach) - The catalog number, any revisions and, if available, the page number of the item. A copy may need to be attached for Acceptance Plan criteria for required verifications.
10. Commodity Item - If the item has a generic application throughout the plant which would lead itself to bulk procurement. Check the appropriate block.
11. Equipment Identification Number (EIN) - RG&E Ginna Tag Number assigned to the equipment as shown on the P&ID's, if available.
12. Equipment Description - A brief generic description by noun name for the parent component of the item.
13. Equipment Safety Functions - The component's performance activities in nuclear safety related functions.
14. Item Safety Function - The function(s) the item performs which supports the component's safety related function(s).
15. Restrictions - Define specific or limited use requirements as explained in Section 3.3.9.

**Commercial Grade Item Engineering
Evaluation Instructions for Attachment A**

FORM 2

16. Material I.D. - Each identifier associated with a Form 1 shall be included. If a Form 2A is to be used (reference Section 3.3.10.1), this block shall reference Form 2A.
17. P/N (Part Number) - The vendor's specific part number, catalog number, or other number unique to the item corresponding to each Material I.D. identified on the appropriate Form 1. If a Form 2A is to be used, this block shall reference Form 2A.
18. Critical Characteristics - Identifiable and measurable attributes/variables of a commercial grade item, which once selected to be verified, provide reasonable assurance that the item received is the item specified and will perform its intended safety function. This form shall document those characteristics which will be used in conjunction with, or in addition to, the Receiving Inspection activities defined in A-701 to provide such assurance.
19. Acceptance Criteria - Acceptable ranges (Min. - Max.) or other acceptance criteria, as applicable. If a Form 2A is to be used, the criteria may be written generically with reference to Form 2A for specifics corresponding to each item.
20. Acceptance Methods - State the method to be used to verify the respective characteristic (Ex: Physical Measurement, Documentation Review).

Form 2A

NOTE: This form may be used when dedicating similar items that have identical critical characteristics and acceptance methods, but differ in their specific acceptance criteria.

21. Material I.D. / P/N (part Number) - The Material I.D. and P/N for each item identified on a Form 1 shall be included to identify its corresponding acceptance criteria.
22. Critical Characteristics - Each critical characteristic identified on Form 2 shall be identified as a column heading in order to correlate the corresponding acceptance criteria for each item.
23. Acceptance Criteria - The acceptance criteria for each item shall be identified in the rows corresponding to each Material I.D. The criteria shall correspond to the critical characteristics identified as column headings.
24. Basis For Determination of Critical Characteristics for Acceptance - Document the basis for selecting the identified critical characteristics.

Attachment B
ROCHESTER GAS AND ELECTRIC CORPORATION
 Inter-Office Correspondence

SUBJECT: REQUEST FOR COMMERCIAL SURVEY

TO: Quality Assurance

Please be advised that a survey of the supplier listed below is required. Please schedule a survey at the earliest possible date.

SUBJECT: COMMERCIAL SURVEY

SUPPLIER/MANUFACTURER: _____ 1. _____

ADDRESS: _____ 2. _____

CITY, STATE, ZIP CODE: _____

TELEPHONE NO.: _____ 3. _____

CONTACT NAME: _____ 4. _____ **TITLE:** _____ 5. _____

ADDITIONAL INFORMATION: _____ 6. _____

COMMODITY/MATERIAL DESCRIPTION: _____ 7. _____

CRITICAL CHARACTERISTICS: _____ 8. _____

CGIEE NO.: _____ 9. _____

PREPARED BY: _____ 10. _____ **DATE:** _____

APPROVED BY: _____ 11. _____ **DATE:** _____

***Q.A. ACKNOWLEDGMENT:** _____ 12. _____ **DATE:** _____

*Return to Preparer

Instructions for Attachment B

REQUEST FOR COMMERCIAL SURVEY

1. Supplier/Manufacturer - Name of organization who is supplying the item.
2. Address - Complete address of Supplier/Manufacturer being surveyed.
3. Telephone No. - Area Code and phone number of Supplier/Manufacturer being surveyed.
4. Contact Name - Individual at Supplier/Manufacturer to be contacted to schedule a survey.
5. Title - Professional title of the contact at the Manufacturer/Supplier.
6. Additional Information - Any additional information to support the survey.
7. Commodity/Material Description - A generic noun name description of the item(s) being surveyed.
8. Critical characteristics - Identifiable and measurable attributes/variables of the item.
9. CGIEE No. - A traceable identifier obtained from Procurement for tracking purposes.
10. Prepared By - Signature and date of individual preparing the request for survey.
11. Approved By - Signature and date of the authorized Procurement Engineering individual who has reviewed the request for completeness and accuracy.
12. Q.A. Acknowledgment - Signature and date of the Quality Assurance individual acknowledging receipt of the Request for Commercial Survey form.



NUCLEAR OPERATIONS GROUP
INTERFACE PROCEDURE

IP-PES-2
Revision 9
Page 1 of 25

Controlled Copy # 4

CONTROL OF PROCUREMENT DOCUMENTS PREPARED FOR GINNA STATION

Charles A. Gaskill Jr.
Responsible Manager

Robert C. Mecredy
Robert C. Mecredy
Vice President
Nuclear Operations Group

11-17-00
Effective Date



1.0 PURPOSE

To provide the instructions for preparation, review and approval of procurement and upgrade documents for safety related (SR), safety related-environmentally qualified (SREQ) and safety significant (SS) materials, parts, components and services. This Interface Procedure is in accordance with the Rochester Gas and Electric (RG&E) Nuclear Policy Manual.

NOTE This procedure is also addressing processes and documents that are affected by a transition of existing databases. Documents produced by the databases are similar in their elements. Consideration to that effect is requisite to implementation of this procedure.

2.0 REFERENCES

2.1 Source Documents

- 2.1.1 ND-PES, "Control of Procurement Activities"
- 2.1.2 ANSI N45.2, Quality Assurance Program Requirements for Nuclear Power Plants
- 2.1.3 Purchasing Manual - Strategic Supply Management Department
- 2.1.4 NRC Inspection Procedure IP-38701

2.2 Development Documents

- 2.2.1 A-302.1, Component Classification Request/Re-Analysis
- 2.2.2 A-801, Inventory Control of Materials, Parts, and Components at Ginna Station
- 2.2.3 A-1006, Environmentally Qualified Equipment Maintenance Program
- 2.2.4 IP-CAP-1, Abnormal Condition Tracking Initiation or Notification (ACTION) Report



2.2.5 IP-SEP-4, Operating Experience Program

2.3 Use Documents

2.3.1 A-300, Preparation and Disposition of A Technical Staff Request

2.3.2 A-302.2, Evaluation of Parts to Determine Safety Classification

2.3.3 A-405, Evaluation of Commercial Grade Items for Safety Related Applications

2.3.4 A-407, Evaluation of Items for In-Storage Maintenance Requirements

2.3.5 A-701, Receipt and Acceptance of Materials/Parts

2.3.6 A-805, Control of Consumable Materials at Ginna Station

2.3.7 EP-3-P-0126, Equivalency Evaluation

2.3.8 IP-EQP-1, Control of Environmental Qualification Equipment Master Lists

2.3.9 IP-PES-3, Quality Review of Purchase Requisition Packages

2.3.10 IP-RDM-3, Ginna Records

2.3.11 IP-TQS-4, Training Work Requests (TWRs)

3.0 INSTRUCTIONS

3.1 Responsibilities

3.1.1 RG&E Personnel

Initiate Material Request Forms, Outline Agreement Releases, Request for Material Upgrade Forms, Letters of Intent, and Request for Bids. Evaluate bids and suppliers, as appropriate.



3.1.2 Inventory Analyst

Initiate Ginna Material Requirement Planning (MRP) Worksheets

3.1.3 Procurement Engineer

- A. Complete Purchase Requisitions and Request for Material Upgrade Forms
- B. Initiate Component Classification Information Request Forms, as necessary
- C. Coordinate issuance of Letters of Intent
- D. Prepare Technical Evaluations and Parts Safety Classification Analyses, as necessary
- E. Prepare QA-07s, as necessary
- F. Establish shelf-life and in-storage maintenance requirements
- G. Provide resolution to vendor technical discrepancies

3.1.4 Purchasing

- A. Issue purchase orders (PO)
- B. Approve and issue Letters of Intent
- C. Issue and evaluate Requests for Bids
- D. Signs off Acknowledgments
- E. Resolves Vendor Commercial Conflicts
- F. Issue and Evaluate Supplier Qualification Questionnaire

3.1.5 Nuclear Assessment

- A. Review PC-1 and PC-2 purchase requisitions/purchase orders and request for material upgrades
- B. Prepare and/or review QA-07 forms



(Step 3.1.5 contd)

- C. Perform commercial surveys, vendor surveillances, vendor audits and procurement compliance audits
- D. Review letters of intent
- E. Perform Supplier Quality Evaluations
- F. Evaluate/Resolve vendor quality discrepancies

3.2 Requests for Bids and Bid Evaluations

- 3.2.1 The responsible engineer and/or discipline manager shall determine and document whether or not bid evaluations are to be performed on services or engineered items purchased to specification requirements.
- 3.2.2 A Request for Bids shall be initiated by submitting a letter of transmittal to Purchasing which is accompanied by the procurement requirements (applicable specifications, including Quality Assurance (QA) requirements, drawings, etc.). The letter shall reference the accompanying documents, provide a list of recommended bidders, and indicate when the bids are required.
- 3.2.3 The responsible Buyer shall review the letter of transmittal and accompanying documents for completeness.
- 3.2.4 The Buyer shall review the list of recommended bidders supplied by the initiator or responsible engineer. If he/she knows of other suppliers capable of providing the item or service or if there are other capable suppliers on the Qualified Suppliers' List (QSL), he/she shall recommend these suppliers to the initiator. The responsible Buyer shall finalize the prospective bidder's list.
- 3.2.5 The Buyer shall prepare the requests for bid and send them to the prospective bidders with the necessary specifications and drawings attached. A copy of the bid request letter, which will identify all bidders, shall be sent to the initiator.
- 3.2.6 Purchasing shall receive each bid and forward a copy to the initiator who will evaluate the bid for technical issues. If the bid requires evaluation for quality issues, Purchasing shall forward a copy of the bid to QA.



- 3.2.7 The bid evaluator shall summarize the basic technical requirements for the item or service and compare each bidder's response against those requirements. These requirements may include, but are not limited to design information, materials, welding, testing and examination, documentation, code stamping, inspection, cleaning and preparation, marking and identification. The bid evaluator shall document resolution of exceptions and inquiries with the supplier. Results of bid evaluations shall be approved by the responsible discipline manager and returned to responsible Buyer for inclusion into the purchase order files.
- 3.2.8 QA shall evaluate each bid to determine the supplier's ability to meet the QA and quality verification requirements contained in the procurement documents, as appropriate.
- 3.2.9 The responsible QA Engineer shall determine whether the bidder is presently fully qualified, is capable of being qualified or does not appear to be capable of being qualified within the required schedule. The bid evaluation shall be documented. If the bidder is not fully qualified but is capable of being qualified, the documentation shall include comments concerning specific program deficiencies to be corrected or resolved and an estimate of the impact the corrections to the bidders program will have on costs and/or delivery. The bid evaluator shall document resolution of exceptions and inquiries with the supplier. Results of bid evaluations shall be approved by the QA Manager and returned to the responsible Buyer for inclusion in to the purchase order files.
- 3.2.10 Purchasing shall evaluate the bids commercially.
- 3.2.11 The initiator shall recommend to Purchasing a bidder to be the supplier. This recommendation shall be in writing. Also, if the bidder selected as the supplier did not submit the lowest bid, the recommendation shall include justification for this selection.
- 3.2.12 If no bids are received, Purchasing shall assist the initiator in the selection and qualification of new bidder sources.



3.2.13 Purchasing shall assist in the negotiations between the initiator and bidders when changes or exceptions are encountered during bid evaluation. Purchasing is responsible for the commercial aspects of the bid process and negotiations.

3.3 Preparation and content of Material Request (MR) Form

Procurement of services and items which are not established in inventory shall be initiated by completion of a MR Form (similar to Attachment 1) in accordance with the instructions provided.

3.4 Ginna Material Requirement Planning (MRP) Worksheets

Procurement of items which have previously been established as stock items and assigned material identification numbers shall be initiated by an Inventory Analyst. This will be accomplished by initiation of an MRP worksheet and will be processed when an item has reached its minimum stock level or when a future need for the item has been identified.

3.5 Letters of Intent

3.5.1 Letters of Intent may be utilized with suppliers of materials, services, parts and components to reserve space in production schedules. Letters of intent shall clearly indicate that the supplier is not authorized to perform engineering, procurement, fabrication, or any other quality affecting activity until an approved purchase order or contract is received.

3.5.2 Letters of Intent shall be coordinated by a Procurement Engineer, reviewed by QA and approved and issued by Purchasing.

3.6 Supplier Evaluation

3.6.1 When the need to qualify a supplier not on the QSL or on the Commercial Grade Supplier's List (CGSL) is determined by a Procurement Engineer, a Request for Supplier Evaluation/Audit," (similar to Attachment 2) is completed and forwarded to QA.



3.6.2 For services and engineered items procured via the PC-1 method only, each participating organization performs an independent evaluation to determine whether or not the supplier has the capability to provide items or services that conform to the procurement requirements. Each of these organizations shall perform and document their evaluations prior to completing the initial Purchase Requisition. Strategic Supply Management shall complete their commercial evaluation prior to issuing the initial Purchase Order. Strategic Supply Management and QA are required to perform appropriate evaluation in all cases.

3.6.3 The supplier qualification evaluation for canceled/surplus nuclear plant equipment procured through other NRC licensed utilities shall be documented separately for each purchase order. Since this equipment has been previously constructed, completed and stored, only QA will participate in the supplier evaluation. A Supplier Evaluation Notification Form shall be completed by QA for each subject order. The manufacturer or supplier will not be added to the QSL/CGSL.

3.7 Preparation and Content of Procurement Documents

3.7.1 The requestor must provide the information required per attachment 1 to facilitate processing of the MR. The MR is forwarded to the Procurement Administrative Specialist for assignment of a MR number. MR forms with insufficient or incorrect information can be returned to the requestor throughout the process for corrections or additions.

3.7.2 The Procurement Administrative Specialist shall forward original or copies of MR forms and/or stock requisitions, as necessary, to the Chemical Control Coordinator (CCC).

3.7.3 The CCC or designee shall review applicable MR Forms and stock requisitions in accordance with A-805, return originals to the Procurement Administrative Specialist and advise of any necessary changes.



3.7.4 The MR shall be forwarded to a Procurement Engineer for classification and evaluation. If, at any time during the preparation of the Procurement Documents, incorrect information is encountered on a MR or stock requisitions the Procurement Engineer shall contact the initiator or responsible work group for resolution. MRs and attachments shall not be altered without concurrence of the initiator.

3.7.5 The Procurement Engineer shall determine the safety classification of the items requested and assure that approved plant design is maintained.

- A. Items which will be procured in accordance with the safety classification of the parent component, as identified in the Configuration Management Information System (CMIS), require no further evaluation. The safety classification of the item shall be designated in accordance with the safety classification of the parent component.
- B. Items which will not be procured to the highest safety classification of the parent component require the Procurement Engineer to perform a safety classification of the item in accordance with A-302.2, unless specifically exempted by an applicable Nuclear Directive.
- C. Procurement of services shall be evaluated based on the safety classification of the items/components affected and the level of RG&E Quality Program involvement during implementation of the activities.

EXAMPLE: Services which do not involve vendor 10CFR50 Appx. B Program and will be implemented using RG&E QA Program requirements may be purchased non-safety.

3.7.6 The Procurement Engineer shall review IP-EQP-1 to determine if the component is Environmentally Qualified (EQ).

- A. If the MR is for an EQ component which is not listed, the Procurement Engineer shall:



(Step 3.7.6 contd)

1. Obtain the concurrence of the EQ Coordinator regarding applicable specifications, test reports, etc.
 2. Submit new test reports to the EQ Coordinator for approval prior to ordering components.
- B. If the component is listed the Procurement Engineer shall review the applicable EEQ1 and EEQ1A forms to determine if EQ requirements apply to the requested items. If EQ requirements apply and the item has been qualified in accordance with IEEE 323, the Procurement Engineer shall include adequate information in the procurement documents to assure the item is supplied in accordance with the Qualification Reports specified in the EQ package.
1. If EQ requirements apply but the item was qualified under Division of Operating Reactors (DOR) criteria, the Procurement Engineer shall request the Nuclear Engineering Services (NES) EQ Coordinator to initiate an EEQ-2 waiver form.
 2. If EQ requirements apply but the item has not been qualified in accordance with IEEE 323 or DOR criteria the NES EQ coordinator shall be contacted for direction.
- C. If the MR is for vendor repair of EQ equipment, the Procurement Engineer shall obtain EQ Coordinator concurrence for all specifications.

3.7.7 The Procurement Engineer shall determine the procurement method based on the safety classification of the item and the availability of a qualified vendor.

NOTE In some instances it may be prudent to procure an item PC-4 (non-safety) and have the item "upgraded" in accordance with Section 3.13 of this Interface Procedure upon arrival of the material at Ginna Station.



- 3.7.8 The three quality methods of procurement are the Qualified Supplier Method (Procurement Class 1), Commercial Grade Dedication Method (Procurement Class 2) and Safety Significant Method (Procurement Class 3).
- A. The Procurement Class 1 (PC-1) Method shall be utilized for the procurement of Safety Related items from vendors maintained on the RG&E Qualified Suppliers List (QSL). Procurement documents processed via the PC-1 Method will invoke the vendors 10CFR50, Appendix B QA Program and the reporting requirements of 10CFR21.
1. The Procurement Engineer shall review the Qualified Suppliers List (QSL) to assure all suppliers of items procured by the PC-1 method have current approval by QA. For those suppliers maintained on the QSL with restrictions the Procurement Engineer shall assure proper incorporation of the restrictions into the Procurement Documents. If the supplier is not maintained on the QSL, the Procurement Engineer shall complete a Request for Supplier Evaluation/Audit (similar to Attachment 2). See Section 3.6
- B. The Procurement Class 2 (PC-2) Method is used to purchase Commercial Grade Items for use in Safety Related applications. A Commercial Grade Item (CGI) and Commercial Grade Dedication (CGD) are defined as follows:



(Step 3.7.8 contd)

Commercial Grade Dedication

Dedication is an acceptance process undertaken to provide reasonable assurance that a commercial grade item to be used as a basic component will perform its intended safety function and, in this respect, is deemed equivalent to an item designed and manufactured under a 10CFR Part 50, Appendix B, quality assurance program. This assurance is achieved by identifying the critical characteristics of the item and verifying their acceptability by inspections, test, or analysis performed by the purchaser or third-party dedicating entity after delivery, supplemented as necessary by one or more of the following: commercial grade surveys; product inspections or witness at hold points at the manufacturer's facility; and analysis of historical records for acceptable performance.

Tests conducted to verify material properties may be performed by an RG&E qualified vendor or RG&E Inspections Environmental Compliance (IEC). When IEC is responsible for performing the independent analysis, the testing activities shall be conducted in accordance with approved Materials Laboratory IEC procedures and acceptance of test results shall be governed by MAT-ADM-04, "Guidelines for Acceptance of Material Verification Test Results." Procurement Engineering accepts the tolerances and limitations described in this procedure and relies on the expertise of IEC personnel to select the proper methods and interpret the results. Material verifications performed within these guidelines provides the necessary reasonable assurance that the item will be capable of performing its intended safety related function as required by EPRI NP-5652, "Guideline for the Utilization of commercial Grade Items in Nuclear Safety Related Applications."

Commercial Grade Item

An item is a commercial grade item if its critical characteristics can be verified during the dedication process.



(Step 3.7.8 contd)

- C. Items, excluding measuring and test equipment (M&TE) calibration services, procured by the PC-2 Method require an evaluation to be performed in accordance with A-405. The requirements for M&TE calibration services procured via the PC-2 Method will be extracted directly from Interface Procedure IP-MTE-1, "Calibration and Control of Measuring and Test Equipment."
 - 1. If the procurement method is determined to be PC-2, the Procurement Engineer shall review the Commercial Grade Item Engineer Evaluation (CGIEE) computer files to determine if a previous evaluation (CGIEE) exists for the items and, if so, shall prepare the Procurement Documents and Acceptance Plan, if required, in accordance with the existing CGIEE. If the CGIEE is applicable but requires revision, the CGIEE shall be revised in accordance with A-405.
 - 2. If a previously completed CGIEE does not exist, the Procurement Engineer shall perform an evaluation of the item in accordance with A-405.

- D. The Procurement Class 3 (PC-3) Method shall be utilized for the procurement of items which are classified as Safety Significant. Safety Significant items are items which are not required to perform a safety related function but which are subject to enhanced quality requirements. The procurement requirements for Safety Significant items may vary from item to item, but in all instances safety significant items shall be processed through QC receiving inspection, as a minimum, prior to acceptance.

3.7.9 If a potential design change is identified, a Technical Staff Request (TSR) shall be initiated in accordance with A-300.

- A. If the TSR is classified as a Technical Evaluation (TE) in accordance with A-300, the Engineering Manager or designee will assign the TSR to the Procurement or System Engineer for disposition.



(Step 3.7.9 contd)

- B. The Procurement or System Engineer shall evaluate the configuration changes and prepare the Technical Evaluation in accordance with EP-3-P-0126.
- C. Procurement of items, identified as having a potential design change may proceed prior to resolution of the TE, however, evidence of final approval of the TE shall be a condition of acceptance. This shall be accomplished by identification of the TE number on the receiving documents (QA-07) with QC responsible for the verification activity.

3.7.10 The Procurement Engineer shall review the Operational Assessment information to identify industry notices or bulletins that should be considered when assessing potential sources for procurement.

- A. If Operational Assessment information is found concerning the items being evaluated, the Procurement Engineer shall reference the initiating documents (i.e., Nuclear Regulatory Commission (NRC) Bulletins, Notices, Institute of Nuclear Power Operations (INPO) Significant Operating Event Reports, Vendor Part 21's, etc.) on the Procurement Analysis Form (PAF) (similar to Attachment 3).
- B. If the initiating documents identify specific problems with an item, the Procurement Engineer shall ensure the appropriate requirements or testing are incorporated into the procurement and/or receiving documents to prevent unchecked acceptance of affected items.

3.7.11 All contracted training services associated with accredited training programs shall be coordinated through the Manager, Training Development and Evaluation by issuing a Training Work request per IP-TQS-4.



3.7.12

A PAF shall be completed by the Procurement Engineer. The PAF is used to gather technical and quality information which will be established in the Materials Management System (MMS) Spare Parts data base and printed on the Purchase Requisition. The information included in Attachment 11 shall be considered and included or referenced, as appropriate, in the PAF. The PAF shall be included in the Purchase Requisition package.

- A. The Procurement Engineer shall complete a PAF for items which have not been previously evaluated and items which have been evaluated but require technical or quality changes to the data base.
- B. If the item has previously been evaluated and the technical and quality requirements have not changed, the Procurement Engineer shall document on the MRP "Approved for Typing," sign and date, prepare QA-07s as necessary, and forward to the Procurement Administrative Specialist for processing per Section 3.8 of this Interface Procedure.
- C. The Procurement Engineer shall consider the following for potential inclusion in procurement documents per NRC IP 38701:
 - 1. Specific identification of equipment, supplies, consumables (chemicals, welding rods, etc), or serviced purchased. (PC-1, PC-2 and PC-3)
 - 2. Identification of any test, inspection, and acceptance requirements and any special instructions for fabrications, packaging, shipping, or storage. (PC-1, PC-2 and PC-3)
 - 3. Requisite technical requirements. (PC-1, PC-2 and PC-3).
 - 4. Access to the supplier's plant or records for purposes of audit. (PC-1)
 - 5. Requisite documentation to certify the item being procured. (PC-1, PC-2, PC-3)



(Step 3.7.12 contd)

6. Requirement for the contractor/supplier to provide a QA program consistent with Appendix B to 10 CFR 50. (PC-1)
7. Requirement to ensure that each procurement document for a system or component, when applicable, specifies that provisions of 10 CFR 21.31 apply. (PC-1)
8. Requirement for contractor/supplier to implement their RG&E approved QA Program for commercially dedicated items. (PC-2)

3.7.13 If any special activities or controls (material analysis, dimensional checks, Hold/Witness Points, etc.) are required, beyond standard receipt inspection activities (Reference 2.3.5), for any items in the MR package, the Procurement Engineer shall complete an QA-07 (similar to Attachment 4) in accordance with the instructions contained in this Interface Procedure. The QA-07(s) will be included with the MR package.

A. If a supplier surveillance is required a "Request for Supplier Surveillance" (similar to Attachment 6) shall be completed in accordance with the instructions provided, and included in the package for review. Supplier surveillance should be considered when the item or service is vital to plant safety and

1. It is difficult to verify quality characteristics of the item after receipt on site.
2. The item or service is complex in design, manufacture, inspection or test.
3. The item is a new product design or manufacturing concept not purchased before.

3.7.14 The Engineering Manager or designee shall review the PAF and attachments for technical adequacy.



3.8 Purchase Requisition Review and Approval

- 3.8.1 The Procurement Administrative Specialist shall assign a Purchase Requisition (PR) number to the MR. All purchase requisitions for SR and SS items shall be printed with a notation indicating the requisition is for nuclear related items or services.
- 3.8.2 The Procurement Administrative Specialist shall generate and proofread the Purchase Requisition (similar to Attachment 5), and forward all attachments including QA-07s to the responsible Procurement Engineer.
- 3.8.3 The responsible Procurement Engineer shall review the PR for completeness and accuracy. The Procurement Engineer shall sign the "Prepared By" line of the PR.
- 3.8.4 The Engineering Manager or designee shall review the PR and attachments for technical adequacy and sign the "Approved By" line of the PR and attachments, as applicable.
- 3.8.5 The PR package shall receive a "quality" review to verify proper inclusion of quality standards, quality assurance program requirements, method of procurement, and applicable acceptance criteria. This review shall be performed by the following individuals:
- For PC-1 and PC-2 PRs, the quality review shall be performed by Quality Assurance.
 - For PC-3 PRs, quality reviews are not required.
- 3.8.6 For PC-1 and PC-2 PRs the quality reviewer shall review the PR package and QA/07 forms in accordance with IP-PES-3. The quality reviewer shall add quality related receipt inspection requirements to the QA-07, if not already included, via supplemental sheets (similar to Attachment 4). If potential changes to the PR are identified they shall be resolved with the originating Procurement Engineer and incorporated, as necessary, into the PR package.



3.8.7 The PR package shall be forwarded to the Procurement Administrative Specialist for administrative processing and approvals in accordance with the current company approval authorization lists.

3.9 Purchase Order (PO) Placement

3.9.1 The Purchasing Group (Site Buyer) shall initiate a PO (similar to Attachment 10). For complex procurement, contracts may be employed. Contracts shall be issued with a purchase order. The purchase order shall reference the contract and shall be the controlling document for all procurement.

3.9.2 PC-1, and PC-2 purchase orders involving a distributor or selling agent not on the QSL or the CGSL, acting on behalf of a supplier on the QSL or CGSL, must be addressed to the supplier in care of the respective distributor or selling agent or require the distributor/sales office that represents the QSL or CGSL vendor, to pass on all requirements of the Purchase Order either by submitting a copy of the RG&E Purchase Order or by duplicating all RG&E requirements into the order placed. Also, the distributor /sales office shall in no way physically affect, examine, or test the items identified in the Purchase Order, and may only act as the authorized sales agent.

3.9.3 Purchase orders for nuclear safety-related and safety-significant materials, equipment and services, shall be printed with a notation indicating the purchase order is for nuclear related items or services. The purchase order number is marked on the purchase requisition.

3.9.4 Each item being procured is separately identified on the purchase order by inserting a number in the item column adjacent to the item it represents.

3.9.5 The PO shall be checked for accuracy by a Site Buyer. This shall include, as a minimum:

1. A check to verify that all specific information on the purchase requisition has been accurately transposed to the purchase order.



(Step 3.9.5 contd)

2. A review of the suppliers QSL/CGSL listing, as applicable, for inclusion of restrictions.

3.9.6 Authorized purchasing personnel signs the original purchase order.

3.9.7 The original purchase order and the associated documents are sent to the supplier.

3.9.8 The original purchase requisition is filed in the purchase order file.

3.9.9 PO File Copy of the purchase order is also filed in the purchase order file.

3.9.10 The originating department copy and a copy of the approved original purchase order are transmitted to the originating department with the applicable QA-07 form(s), if originally attached.

NOTE All Departments print their own material received documents at the receiving location.

3.9.11 After PO placement, Purchasing shall forward the PO and one copy to the Procurement Administrative Specialist.

3.9.12 Upon receipt of the PO, the Procurement Administrative Specialist shall place a copy of the PO into the PR package and forward the PO/PR package to the Quality Control Receipt Inspection Area.

NOTE The PO/PR package shall as a minimum consist of the following items: the approved PO, the approved Purchase Requisition, and Material Request Forms and/or stock requisition. The following items shall be included, as applicable: Supplier Evaluation Forms, QA-07s, Procurement Analysis Forms, Request for Supplier Surveillance Forms, and PO Change Forms.



3.10 Changes to Purchase Requisitions and Purchase Orders

3.10.1 Changes involving only quantity, cost or accounting, do not require review by Procurement Engineering or QA.

3.10.2 Changes involving technical or quality requirements shall be processed through the review and approval process. If the MMS Spare Parts data base requires alteration as a result of a change, the PAF shall be completed in parallel with the change form. Acceptance Plans which require modification as a result of the change will be included with the PR package when forwarded to QA.

3.10.3 In some cases, Procurement Documents may be changed via one-line through the affected area, initial of the person making the change and the date of the change. All changes made via one-line, initial and date must be reviewed for concurrence by the personnel who performed the original review, or equivalent.

3.10.4 PO changes shall be initiated by completion of a Material Request form, by the originator, or a Purchase Order Change Form (similar to Attachment 10) by Procurement Engineering.

3.10.5 The new approved purchase requisition states information similar to the following:

EXAMPLE: This is a change order to the existing order number to:
(Delineate new information)

3.10.6 The new purchase order becomes a change to the original purchase order.

3.11 Telephone and Verbal Purchase Orders

3.11.1 If the indicated procurement method is PC-1, the telephoning or verbal placement of a purchase order with a supplier is prohibited.



- 3.11.2 If the indicated procurement method is PC-2 or PC-3, the telephoning or verbal placement of a purchase order with a supplier is allowable only under the following conditions:
- A. An approved purchase requisition has been received by the Procurement Administrative Specialist.
 - B. The responsible buyer places the telephone or verbal purchaser order directly with the supplier.
 - C. The confirming hardcopy purchase order is issued by the following day of business.
- 3.12 Outline Agreement Contract Release Order Processing**
- 3.12.1 When an Outline Agreement Release is initiated, the form shall be forwarded to the Procurement Administrative Specialist.
- 3.12.2 The Procurement Administrative Specialist shall review and forward as necessary the Contract Release Order to the CCC.
- 3.12.3 The CCC shall review the Contract Release Order per A-805 and return it to the Procurement Administrative Specialist.
- 3.12.4 The Procurement Administrative Specialist forwards the Contract Release Order to the procurement engineer for preparation of QA-07s as applicable.
- 3.12.5 Upon completion of the QA-07s, the Contract Release Order shall be signed by the responsible Procurement Engineer.
- 3.12.6 A copy of the Contract Release Order and the original QA-07s shall be forwarded, as a package, to QA for review and preparation of supplemental QA-07s, as required.



- 3.12.7 Upon completion of the QA-07 forms, Quality Assurance shall sign the copy of the Contract Release Order and forward the entire package to the Quality Control Receipt Inspection Area.
- 3.12.8 Technical and quality changes required for previously completed Contract Release Orders shall be implemented by preparation of a Change Order. A Change Order will be completed by indicating the change from the requirements of the original Contract Release Order. The Change Order will then be processed in the same manner as an original requisition.
- 3.13 Preparation, Review and Approval of Request for Material Upgrades**
- 3.13.1 Upon identification of an item which is required for Safety Related or Safety Significant use, but which was not procured accordingly, the following methodology shall be used to initiate an "upgrade" of that item.
- 3.13.2 The individual requesting the item upgrade shall complete a Request for Material Upgrade (RMU) (similar to Attachment 7) and forward to the Procurement Administrative Specialist.
- 3.13.3 The Procurement Administrative Specialist shall assign an RMU number from the RMU tracking log and forward to the Manager - I&C/Electrical Systems or designee for assignment to a Procurement Engineer for evaluation.
- 3.13.4 The Procurement Engineer shall perform a safety analysis (if one does not exist for the intended application) in accordance with A-302.2.
- 3.13.5 If the safety analysis identifies the application as Non-Safety related (NS), the Procurement Engineer shall sign the RMU on the "Prepared By" line, and forward the RMU to the Manager - Strategic or designee.
- 3.13.6 The Manager - Strategic or designee shall indicate approval by signature on the "Approved By" line of the RMU and "N/A" the Quality Assurance "Reviewed By" line and the RMU shall be returned to the Requestor for incorporation into the work package. The item may be released for use.



- 3.13.7 If the item's safety classification is SS, the Procurement Engineer shall identify the acceptance criteria on the RMU and Acceptance Plan, if required, and the RMU package shall be forwarded to the Engineering Manager or designee for approval. Upon approval, the completed RMU package shall be forwarded to QC Receipt Inspection for completion.
- 3.13.8 If the item's safety classification is SR, the Procurement Engineer shall review the CGIEE computer files to determine if a CGIEE, which includes the item/application, has been previously completed.
- 3.13.9 If a CGIEE exists for the item/application and dedication is possible/practical, an Acceptance Plan shall be prepared in accordance with the CGIEE, substituting the RMU number in place of the PO number. The Procurement Engineer shall then sign the "Prepared By" line of the RMU and the RMU package shall be processed per Sections 3.13.13 through 3.13.15 of this Interface Procedure.
- 3.13.10 If a CGIEE does not exist for the item/application, the Procurement Engineer shall complete a CGIEE in accordance with A-405 and further processing of the RMU will be suspended pending CGIEE approval. Upon CGIEE approval, the Procurement Engineer shall complete a QA-07, as necessary, in accordance with the CGIEE, substituting the RMU number in place of the PO number. The Procurement Engineer shall then sign the "Prepared By" line of the RMU and the RMU package shall be processed per Sections 3.13.13 through 3.13.15 of this Interface Procedure.
- 3.13.11 If dedication of the item is not possible/practical, the Procurement Engineer shall indicate the problems preventing dedication in the "Comments" section of the RMU, sign the RMU on the "Prepared By" line, and forward the RMU to the Engineering Manager or designee.
- 3.13.12 If dedication of the item is not possible the Engineering Manager or designee shall sign the "Approved By" line of the RMU and a copy of the RMU shall be returned to the requestor for information. The original RMU shall be forwarded to QA for signature and submittal to Central Records. No further action is necessary.



- 3.13.13 The Engineering Manager or designee shall review the completed RMU, and QA-07, as applicable and indicate approval by signature on the "Approved By" line of the RMU and forward the RMU package to Nuclear QA.
- 3.13.14 QA shall review the RMU package and indicate review by signature on the "Reviewed By" line of the RMU. Supplemental QA-07 forms shall be prepared, when required, in accordance with A-701 and the RMU package shall be forwarded to QC for the upgrade implementation.
- 3.13.15 Upon completion of the upgrade, the completed package shall be reviewed and submitted to Central Records by QC.

4.0 RECORDS

- 4.1 The records shall be controlled in accordance with IP-RDM-3.
- 4.2 Records to be maintained shall include:
- A. Purchase Requisition/PO Package
 - B. Completed Request for Material Upgrade Packages
 - C. Bid Evaluations
 - D. Supplier Evaluation
 - E. Supplier Qualification Questionnaires

5.0 ATTACHMENTS

- 5.1 Attachment 1 - Material Request Form and Instructions
- 5.2 Attachment 2 - Request for Supplier Evaluation/Audit and Instructions
- 5.3 Attachment 3 - Procurement Analysis Form
- 5.4 Attachment 4 - QA-07 (Nuclear Procurement Control Form) and Instructions
- 5.5 Attachment 5 - Purchase Requisition Form and Instructions



- 5.6 Attachment 6 - Request for Supplier Surveillance and Instructions
- 5.7 Attachment 7 - Request for Material Upgrade and Instructions
- 5.8 Attachment 8 - Purchase Order Change Form and Instructions
- 5.9 Attachment 9 - Purchase Order - Original
- 5.10 Attachment 10 - RG&E Terms and Conditions of Purchase

Attachment 1 (contd)
Material Request Form Instructions

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Required to be provided by requestor

1. Prepared By: Name of individual requesting material/item/service.
2. Date: Date the Material Request is generated.
- 3.* Requisition #: An identifier established for tracking purposes.
4. Supplier: The name and address of the organization furnishing the part.
- 5.* P.O. #: The number given to a purchase order for tracking purposes and identification.
6. Date Required: Date material or services is to be received.
7. Delivery Attn: The individual to be contacted at the time of receipt.
8. QA: If the intended application is SR or SS, "QA" shall be marked by the requestor. If the intended application is NS, "Non-QA" shall be marked by the requestor.
9. Equipment Used In: Equipment Identification Number (EIN) of component in which item is to be used, as applicable.
10. Item#: Sequential number, used as a list number, to separate each distinct category of the material request.
11. Quantity: The number of parts required per line item.
12. Part Number: A unique numerical/alpha numerical identification affixed by stamp, tagging or packaging by the supplier.
13. Description: An adequate and correct noun name for the part, material or service requested.
14. Mat'l. I.D.: (Material Identification Number) A unique identifier established for stockroom and plant tracking purposes.
15. Account #: Chargeable account number to be billed.
16. Min.: The minimum amount to be maintained in stock, if applicable.
17. Max.: The maximum amount to be maintained in stock, if applicable.
18. Each: The cost of the individual item.
19. Total: The total cost of item (Quantity x Each = Total).

Attachment 1 (contd)
Material Request Form Instructions

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20. Authorized by: Signature of approval by authorized personnel.
21. Work Order #s: The Ginna Station Maintenance Work Order Number associated with the requested material, if applicable.
22. Estimated Total Costs: Approximate cost for the entire Material Request.
23. Estimate When Costs Will Be Paid: This item is not used currently.
- 24.** Confirm - [] Yes [] No: Confirm block marked "yes" indicates a call to vendor within 24 hours.
- 25.** Expedite - [] Yes [] No: Expedite block marked "yes" indicates contact to be made with vendor within 5 days.

* Note: Information is provided by others.

** Note: No block marked = standard processing.

**Rochester Gas and Electric Corporation
Inter-Office Correspondence**

SUBJECT: Request for Supplier Evaluation/Audit

TO: Quality Assurance

Please be advised that an Evaluation/Audit of the Supplier listed below is required for possible placement on the Qualified Suppliers List (QSL) or Commercial Grade Suppliers List (CGSL). Please schedule an Evaluation/Audit at the earliest possible date, to verify the vendor has the necessary program attributes to be placed on the respective list and to assure the implementation of the program is utilized for the specific material, equipment or service to be supplied.

Request for: QSL:_____ CGSL:_____

Supplier/Manufacturer:_____ (1) _____

Address:_____ (2) _____

City, State, Zip Code:_____

Telephone Number:_____ (3) _____

Contact Name:_____ (4) _____ Title:_____ (5) _____

Specific Material, Equipment or Service:_____ (6) _____

Basis for QSL/CGSL Placement (include NUPIC, other utilities, etc.):_____ (7) _____

Prepared By:_____ (8) _____ Date:_____

*Q.A. Acknowledgment:_____ (9) _____ Date:_____

*Return to Preparer
Copy to Purchasing QA Coordinator for SQQ Transmittal

Attachment 2 (contd)
Request For Supplier Evaluation/Audit Instructions

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1. Supplier/Manufacturer: Name of organization who is supplying the item.
2. Address: Complete address of Supplier/Manufacturer.
3. Telephone No.: Area Code and phone number of Supplier/Manufacturer.
4. Contact Name: Individual at Supplier/Manufacturer to be contacted.
5. Title: Professional title of the contact at the Manufacturer/Supplier.
6. Specific Material, Equipment or Service: Identify the specific material, equipment or service to be supplied. For CGSL suppliers, include critical characteristics of interest.
7. Basis: Document the basis or reasoning for the request. This may be previous experience or information furnished by the supplier such as audits performed by other utilities.
8. Prepared By: Signature and date of individual preparing the request for Supplier Evaluation/Audit.
9. Q.A. Acknowledgment: Signature and date of the QA individual acknowledging receipt of the Request for Supplier Evaluation/Audit.

Attachment 3
Procurement Analysis Form

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Report ZMMR0013
Date: 01/26/2000

Rochester Gas and Electric Corporation
Materials Management Report
Ginna Procurement Analysis Form

Page: 1
Time: 08:40:50

Material: 9092498

Safety Class: SR

Material Description: PUMP VAC METAL BELLOWS MOD MB602 W/MOTOR

Purchase Order Text/Standard and Common Text:

PUMP, VACUUM, METAL BELLOWS, MODEL MB602, W/MOTOR,
115/230VAC, 1/2 HP

- INCLUDE 'ZPE1.000' OBJECT TEXT ID ST
- INCLUDE 'ZPE1.002' OBJECT TEXT ID ST
- INCLUDE 'ZPE1.004' OBJECT TEXT ID ST
- INCLUDE 'ZPE1.005' OBJECT TEXT ID ST
- INCLUDE 'ZPE1.006' OBJECT TEXT ID ST
- INCLUDE 'ZPE1.009' OBJECT TEXT ID ST
- INCLUDE 'ZPE1.034' OBJECT TEXT ID ST
- INCLUDE 'ZPE2.002' OBJECT TEXT ID ST
- INCLUDE 'ZPE2.022' OBJECT TEXT ID ST
- INCLUDE 'ZPE2.025' OBJECT TEXT ID ST
- INCLUDE 'ZPE2.027' OBJECT TEXT ID ST

**FOR INFORMATION
ONLY**

PURCHASE ORDERS SHALL SPECIFY THAT ALL MATERIAL OR ITEMS PROCURED BY INOVISION AS SAFETY-RELATED SHALL BE PROCURED FROM SUB-TIER VENDORS THAT HAVE BEEN AUDITED BY INOVISION. OBJECTIVE EVIDENCE OF THE AUDIT SHALL BE MAINTAINED AND BE MADE AVAILABLE TO RG&E UPON REQUEST.

MM/PP Status: Min Remaining Shelf Life: 0 Total Shelf Life: 0

Vendor Number: 4580
Vendor Name: VICTOREEN, INC.
Vendor Part #: 101-64

Vendor Number: 9287
Vendor Name: INOVISION RADIATION
Vendor Part #: NL01-64

Procurement Engineering Information

Internal Comments:
M93718 FMEA; 1 Proc Cl;
SLEF:PEGG1 RISM:00355

EINs (BOMs)					
EIN	SC	EIN	SC	EIN	SC
EAAG01	SS	EACP01	SS		

Acceptance Plan (Y/N)

Prepared By: _____ Date: _____

Approved By: _____ Date: _____

QA-07 (NUCLEAR PROCUREMENT CONTROL FORM)

(1.) (Source Surveillance required? YES ___ NO ___)

<u>P.O. NUMBER: NO-</u> (2.)	<u>ITEM NO.:</u> (3.)	<u>QTY RECEIVED:</u> (4.)	<u>CGIEE NO.:</u> (5.) <u>REV.</u>
<u>REQ. NO.:</u> - (6.)	<u>MID #</u> (7.)	<u>QTY ORDERED:</u> (8.)	<u>COND. REL. NO.:</u> (9.)
	<u>PC CLASS:</u> (10.)	<u>S. S. RPT. NO.:</u> (11.)	<u>PER/ACTION NO.:</u> ** (12.)

<i>CRITICAL CHARACTERISTIC or ATTRIBUTE TO BE VERIFIED</i>	<i>ACCEPTANCE CRITERIA</i>	<i>SAM. SIZE</i>	<i>VERIFICATION METHOD</i>	<i>RESP. GRP.</i>	<i>SIGNATURE & DATE</i>
(13.)	(14)	(15)	(16)	(17)	(18)

COMMENTS/ADDITIONAL INSTRUCTIONS/NOTES ETC. (**LIST ADDITIONAL PFR's/ACTION REPORTS's HERE)

(19.)

QUANTITY RELEASED FOR SHIPMENT: (20.) RELEASED BY: (21.) DATE: (21.) (SOURCE SURV. ONLY)

PLAN APPROVED BY: (22.) DATE: / / (22.)

QUALITY ASSURANCE

QA-07 (Nuclear Procurement Control Form) Instructions

1. Source Surveillance Required: Check Box "Yes" if Source Surveillance applies.
2. P.O. NUMBER: Applicable number given to purchase order for tracking purposes and identification.
3. ITEM NO.: PO Line Item Number corresponding to this Material I.D. (See #8.).
4. QTY. RECEIVED: Receipt Inspection to enter the quantity of this item received and inspected.
5. CGIEE NO., REV.: The number and revision of the Commercial Grade Item Engineering Evaluation associated with the Material ID of the item, as applicable.
6. REQ. NO.: The unique identifier associated with this purchase order.
7. MID #: The Material Identification number, uniquely identified with the line item of the purchase order. Once accepted and placed into Inventory, this item will be tracked by the MID #.
8. QTY ORDERED: The quantity required of this item as indicated on the purchase order.
9. COND. REL. NO.: The Conditional Release Number, if applicable, if item is to be allowed release from QC Hold prior to its final acceptance.
10. PC CLASS: The Procurement Classification level, to be entered as 1, 2, or 3, as applicable.
11. S.S. RPT. #: The QA Source Surveillance Report Number, to be entered by the Q.A. Engineer performing the Source Surveillance, if applicable.
12. PER/ACTION NUMBER: To be entered by Receipt Inspection or Source surveillance personnel, as applicable. If Procurement Evaluation Requests or ACTION reports are generated during the receipt inspection or source surveillance process for this item, additional PERs/ACTION reports may be added under "COMMENTS/ADDITIONAL INSTRUCTIONS/NOTES ETC." (Instruction Step 20).
13. CRITICAL CHARACTERISTICS OR ATTRIBUTE TO BE VERIFIED: Those characteristics or quality attributes which must be verified to accept the item.
14. ACCEPTANCE CRITERIA: The inspection or quality ranges, tolerances, etc., to be inspected or verified.

QA-07 (Nuclear Procurement Control Form) Instructions

15. SAMPLE SIZE: The sample size required to achieve assurance that all items are acceptable. This may be as much as 100%, or can be in accordance with MIL STD 105D or other statistical industry recognized inspection standard (consider quantity involved).
16. VERIFICATION METHOD: The method to be used to verify the respective characteristic, include apparatus as applicable, i.e.; Physical Measurement/Calibrated Instrument.
17. RESPONSIBLE GROUP: The organization responsible for verifying the respective characteristic, e.g.; QC, I&C, etc.
18. SIGNATURE & DATE: The signature of the personnel performing the inspection and the date inspection is performed.
19. COMMENTS/ADDITIONAL INSTRUCTION/NOTES ETC: Used as necessary to add additional information including additional PERs or ACTION reports.
20. QUANTITY RELEASE FOR SHIPMENT: Enter quantity released for shipment from the supplier as a result of source surveillance.
21. RELEASED BY:, DATE: Signature of responsible individual releasing item for shipment during Source Surveillance and date released.
22. PLAN APPROVED BY:, DATE: Signature of individual approving this QA-07 and date approved.

Purchase Requisition Form

Item	Qty	Uom	Mat.no.	Description	Del.date	Price
0001	1	EA	9008977	MOTOR 1HP 1800RPM 460VAC 3PH 182TY FRAME	05/21/1999	500.00
<p>Vendor Material: 11705 safety Class : SR * MOTOR, 1 HP, 1800 RPM, 460VAC, 3 PH, 182TY FRAME, * H INSL, SF 1.0, DESIGN B, KVA CODE M, 50 °C, FAN COOLED * RELIANCE, S.O# 1YF882942A6, FOR MODEL K-III ANALYZER * * * 1.000 ITEMS AND/OR SERVICES CONTAINED IN THIS / PURCHASE ORDER SHALL BE FURNISHED TO A / QUALITY ASSURANCE PROGRAM IN ACCORDANCE WITH / THE APPLICABLE REQUIREMENTS OF ANSI N45.2-1971 / OR EQUIVALENT, THAT SHALL COMPLY WITH ALL / APPLICABLE REQUIREMENTS OF 10CFR50 APPENDIX B. / ALL APPROPRIATE TECHNICAL AND QUALITY ASSURANCE / REQUIREMENTS SHALL BE CONVEYED TO LOWER TIER / SUBCONTRACTORS AND/OR SUPPLIERS. * 1.005 ALL NONCONFORMING CONDITIONS SHALL BE IDENTIFIED / AND DISPOSITIONED BY THE VENDOR IN ACCORDANCE / WITH THE VENDOR'S QA PROGRAM REQUIREMENTS. ALL / NONCONFORMANCES TO THE TECHNICAL OR QUALITY / REQUIREMENTS OF THIS PURCHASE ORDER WHICH ARE / DISPOSITIONED "USE AS IS" OR "REPAIR" SHALL BE / SUBMITTED TO RG and E PROCUREMENT ENGINEERING FOR / RESOLUTION PRIOR TO SHIPMENT. * 1.006 A CERTIFICATE OF CONFORMANCE SHALL ACCOMPANY / EACH SHIPMENT. THE CERTIFICATE SHALL, AS A / MINIMUM: /</p>						

PURCHASE REQUISITION		
ROCHESTER GAS AND ELECTRIC CORP	Purchase requisition: 10004513	
Purchase order no.	Track.no.: INVENTORY	Origin.: SMITHM Prepared by
Vendor 4829 DELPHI CONTROL SYSTEMS INC. 2806 METROPOLITAN PLACE POMONA US 91767	FOR NUCLEAR PURCHASES ONLY Procurement Class: PC-1 ___ PC-2 ___ PC-3 ___ Reviewed PQA: _____	Reviewed by Approved by Req.date: 02/11/2000

Page: 1

Purchase Requisition Form Instructions

1. Requisition Number: A traceable identifier obtained from procurement for tracking purposes.
2. PO No.: The number assigned to a purchase order for tracking purposes and identification.
3. Vendor No.: Unique numerical figure assigned to a specific manufacturer or supplier.
4. Vendor: Manufacturer or supplier's name, address, phone no. and sales representative.
5. Required: The date items are needed.
6. Originator: The person originating the Purchase Requisition.
7. Prepared By: The responsible Procurement Engineer who reviews the PR for completeness and accuracy.
8. Approved By: The Engineering Manager or designee.
9. Reviewed By: For PR's exceeding \$250,000, per published authorization list.
10. Quality Review: For PC-1 and PC-2 PRs, the quality review shall be performed by Quality Assurance. For PC-3 PRs, the quality review may be performed by Procurement Engineering or Quality Assurance.
11. Approved By: Per published company authorization list.
12. Requisition Date: The date the purchase requisition was issued.
13. Procurement Class: Enter 1, 2, or 3, as applicable.
14. Purchasing: Purchasing Agent signature.
15. Item: Sequential number, used as a list number, to separate each distinct category of the PR.
16. Qty.: The amount required per line item number.

Purchase Requisition Form Instructions

17. Mat. I.D.: A unique identifier established by the stockroom for warehouse and plant tracking purposes.
18. Description: An adequate complete identification of the part, material or service requested (Ex: Valve, Check, ½ inch, 150# Rating, 316 S.S.).
19. Est. Total P.O. Value: Estimate of total numerical dollar value of the purchase order.

Request for Supplier Surveillance

Please be advised that a surveillance of the vendor listed below is required. Please schedule a surveillance at the earliest possible date.

Vendor: _____ (1) _____

Address: _____ (2) _____

Contact: _____ (3) _____ Ph.#:(____) _____ (4) _____

Title: _____ (5) _____

Purchase Requisition and Items Affected: _____ (6) _____

PR#: _____ Item#: _____

PR#: _____ Item#: _____

PR#: _____ Item#: _____

PR#: _____ Item#: _____

Procurement Class: _____ (7) _____

[] PC-1 [] PC-2 [] PC-3

Reason For Surveillance: _____ (8) _____

Acceptance Plan Attached: Yes No (9)

_____ (10) _____
(Requestor) (Date)

_____ (11) _____
(Q.A. Acknowledgment) (Date)

Request for Supplier Surveillance Instructions

1. Vendor: Name of the vendor on which the surveillance will be performed.
2. Address: Address of the vendor on which the surveillance will be performed.
3. Contact: Name of the person to be contacted at the vendors' facility to arrange surveillance. N/A if QSL requirement.
4. Ph.#: Phone number of the person to be contacted to arrange surveillance. N/A if QSL requirement.
5. Title: The title of the vendor contact in (3), above. N/A if QSL requirement.
6. Purchase Requisition and Items Affected: List the Purchase Requisition numbers and line item numbers adjacent to the Purchase Requisition involved in the surveillance activities.
7. Procurement Class: Check the applicable Procurement Class.
8. Reason for Surveillance: Identify the initiating document and a brief explanation for the requested surveillance, e.g. CGIEE# 91-123 requires surveillance of dimensional checks, QSL requirement, etc.
9. Acceptance Plan Attached: If Acceptance Plans are required (for example dedication requirements) check appropriate box and complete a Supplier Surveillance Acceptance Plan in accordance with the instructions for attachment 6A.
10. Requestor: Signature of the individual requesting the Supplier Surveillance and date requested.
11. Q.A. Acknowledgment: Signature and date of the QA individual acknowledging receipt of the Request for Supplier Surveillance Form (to be returned by Q.A. to the requestor when acknowledged).

Request for Material Upgrade

UG - (1.) - B - UG

Material ID# _____ (2) _____ Work Order # _____ (3) _____

Location of Material: _____ (4) _____

Vendor: _____ (5) _____ Purchase Order # _____ (6) _____

Description: _____ (7) _____

Application/Equipment Identification Number (EIN): _____ (8) _____

Requested By: _____ (9) _____ Date: _____

** (For Procurement Engineering Use Only) **

Safety Classification: _____ (10) _____ Analysis No. _____ (11) _____

Comments: _____ (12) _____

Prepared By: _____ (13) _____ Date: _____

Approved By: _____ (14) _____ Date: _____

QA Reviewed By: _____ (15) _____ Date: _____

Request for Material Upgrade Instructions

1. UG- -B-UG: An "Upgrade" number to be assigned by the Engineering Manager - or designee for tracking purposes.
2. Material I.D.#: A unique identifier established for stockroom and plant tracking purposes.
3. Work Order #: The Ginna Station Maintenance Work Order Number associated with the requested material.
4. Location of Material: The actual physical location of the material.
5. Vendor: Organization supplying the item.
6. PO #: The number given to a purchase order for tracking purposes and identification.
7. Description: An adequate and complete identification for the material or item to be upgraded.
8. Application/Equipment Identification Number (EIN): The Ginna Station tag number assigned to the equipment from the P&ID or ECCD.
9. Requested By/Date: The name of the individual requesting upgrade of the item or material, and the date requested.
10. Safety Classification: The safety classification of the item.
Example: Safety Related (SR)
 Safety Significant (SS)
 Non-Safety Related (NS)
11. Analysis No.: The tracking number assigned to the Safety Analysis.
12. Comments: The responsible Procurement Engineer shall provide comments as necessary. If dedication of the item is not possible, justification shall be identified here.
13. Prepared By/Date: The signature of the responsible Procurement Engineer upon completion of the R.M.U. and the QA-07, and the date completed.
14. Approved By/Date: The signature of the Engineering Manager or designee indicating final approval of the R.M.U. and the date approved.
15. Quality Assurance Reviewed By/Date: The signature of the Nuclear Assessment designee indicating review and the date review is completed.

Attachment 8

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Purchase Order Change Form

Purchase Requisition No.: _____ (1) _____ Vendor: _____ (2) _____

Please consider this as supplement number __ (3) __ to purchase order number __-__(4)-__-__ for the following:

Remarks/Reason for P.O. Change:

_____ (6) _____

Applicable Documents: _____ (7) _____

CGIEE: _____ - _____ Rev.: _____ TSR/TSEE: _____ - _____ Rev.: _____

QSL _____ (8) _____ CGSL _____ Date _____ Restrictions (Y/N): _____

Applicable to Order (Y/N): _____

(9)
(Prepared By)

(Date)

(10)
(Approved By)

(Date)

Purchase Order Change Form Instructions

1. Purchase Requisition Number: The number of the purchase requisition corresponding to the purchase order.
2. Vendor: The name of the vendor identified on the P.O.
3. Supplement number: The sequential number of the supplement for the purchase order.
4. PO #: The number of the purchase order to be changed.
5. Supplemental verbiage as it is to be identified on the purchase order.
6. Remarks/Reason for P.O. Change: The justification for the purchase order to be changed and any remarks applicable to the change.
7. Applicable Documents: Any documents such as CGIEEs or TSR/TSEEs which are applicable to the P.O. change.
8. QSL/CGSL/Date/Restrictions/Applicability: Vendor listed on QSL or CGSL for items or services being procured. Date of QA Evaluation, restrictions against vendor, and applicability of restrictions to purchase.
9. Prepared By: The signature and date of the person requesting the supplement.
10. Approved By: The signature and date of the responsible Manager for supplements involving pricing and quantity changes. For supplements involving technical or quality requirements, the Engineering Manager or designee.

Purchase Order - Original



NY STATE SALES TAX PERMIT NO DP000121 EMP IDENTIFICATION NO 16 0612110
NOTICE YOUR FEDERAL TAX ID NUMBER MUST APPEAR ON ALL INVOICES

FILE COPY

BILL TO P O BOX 40660
ROCHESTER NY 14604

JULIAN A MCDERMOTT CORP
1639 STEPHEN STREET
RIDGWOOD NY 11385

Nuclear Related Purchase Order

PO number/date
4500006340 / 02/04/2000
Contact person/Telephone
Jeffrey Wyatt/716-771-3275
Fax number 716-771-3907
Our reference 10004390 G
Your person responsible
JOHN BOC

Fax number: 718-381-0229

Your vendor number with us
6148

Please deliver to:
Ginna Station
1503 Lake Road
Ontario NY 14519

Delivery date:

Deliv terms: DPC-Dest, Frght Prpd & Chrgd Back-
Payt terms: Net due in 30 Days

Currency USD

Item	Material Order qty.	Unit	Description	Price per unit	Net value
------	------------------------	------	-------------	----------------	-----------

Unless RGE receives notice within 48 hours of (Vendor's) receipt of a facsimile of the Purchase Order Terms and Conditions and other documents related to the product or service provided (hereinafter "the Terms") of (Vendor's) objection to the Terms, the facsimile shall be sufficient to bind the parties and no further document shall be necessary to establish the relationship.

Your quotation proposal is incorporated into this Purchase Order only to the following extent: price, quantity, work scope, specification, freight terms and payment terms. Supplier's performance elsewhere shall be deemed acceptance of (Vendor's) terms and conditions.

This purchase order is subject to the terms and conditions printed on the last page thereof and to any further instructions.

Approved by

Department Manager
Strategic Supply

RG&E Terms and Conditions of Purchase

ROCHESTER GAS AND ELECTRIC CORPORATION TERMS AND CONDITIONS OF PURCHASE

1 ACCEPTANCE

Any acceptance of this Order must be limited to the terms hereof and objection is hereby made to any different or additional terms. Seller shall not modify or waive the terms and conditions set forth herein without the express written consent of Buyer. Any quotation of Seller is incorporated in and made a part of the Order only to the extent of specifying the nature and description of goods or services ordered and then only to the extent that such quotation is consistent with the terms of this Order. Supplier's performance hereunder shall be deemed acceptance of owner's terms and conditions.

2 TIME IS OF THE ESSENCE

Time is of the essence for this Order. Buyer reserves the right without liability to terminate this Order at any time as to any goods not delivered or services not performed in accordance with the terms of this Order. Any provisions herein for delivery of goods or services by installments shall not be construed as making the obligations of Seller severable. Unless otherwise provided, the prices quoted in this Order include delivery of goods f.o.b. destination.

3 WARRANTY

Seller warrants that all goods supplied or services performed under this Order will conform to the specifications contained herein and will be free from defects in design, material or workmanship. Unless otherwise specified, all goods will be new and of best quality. To the extent that Seller knows or has reason to know of the purpose for which the goods or services are intended, Seller warrants that said goods or services shall be fit for such purpose. Any services performed under this Order shall be rendered by qualified personnel in accordance with the best accepted practice.

If the goods or services of Seller are or become defective at any time within one year from delivery or completion and Buyer so notifies Seller within a reasonable time after discovery of the defect (though such discovery may be after said one year period), Seller shall thereupon correct such defect at its sole expense. Corrective work shall be performed in the most expeditious manner consistent with Buyer's requirements and in a manner concurred in by it. Goods or services used in correcting defects shall be warranted for the remainder of said one year period.

4 INSPECTION AND REJECTION

All goods furnished or services performed under this Order shall be subject to inspection by Buyer upon delivery or performance and for a reasonable time thereafter, and Buyer reserves the right to reject any defective or non-conforming goods or services. Payment for all or any of the goods supplied or services performed hereunder shall not constitute acceptance by Buyer.

5 TITLE AND RISK OF LOSS

Unless otherwise provided in this Order, title and risk of loss shall pass to Buyer only at the time and place of delivery at Buyer's address as specified in this Order.

6 ASSIGNMENTS

Any assignment of this Order or of any interest in this Order or of any payments due hereunder without Buyer's prior written approval shall be void.

7 PRESENCE ON BUYER'S PREMISES

When Seller's employees or agents are on Buyer's premises for any reason, their presence and that of Seller shall be as an independent contractor. Seller shall maintain (i) adequate coverage for worker's compensation or employers' liability, public liability, and property damage, or (ii) the insurance and limits specified in the attachment to this Order. Upon request, Seller will furnish Buyer certificates of insurance satisfactory to Buyer evidencing such insurance coverage. The provision of any insurance hereunder shall not be construed to limit or alter any liability of Seller to Buyer arising out of this Order. Seller will also furnish, if requested, adequate waivers of lien with respect to goods and services supplied hereunder in form satisfactory to Buyer.

8 INDEMNITY

Seller agrees to defend, indemnify and save harmless Buyer from any and all claims, damages, costs, liability or expense (including attorneys' fees) of any kind occurring or asserted against Buyer, its employees or agents in connection with work being performed or goods delivered by Seller or its agents or contracts under this Order, except that nothing herein shall be construed to require indemnification of Buyer to the extent of its negligence.

9 PRICE PAYMENT

Buyer may by written change order make any changes, including additions to or deletions from the quantities originally ordered or in the specifications or drawings to be followed by Seller. If any such change affects the amount due or the time of performance hereunder, an equitable adjustment shall be made. Any change orders issued by Buyer to this Order shall be effective at the same prices applicable to this Order. Seller represents that its price to Buyer for goods or services hereunder shall be as low as the lowest price charged by Seller to others for comparable goods or services in comparable quantity. Unless otherwise specified, all payments shall be net, 30 days after the later of (i) receipt of goods or rendering of services, or (ii) presentation of a proper invoice.

10 AUDIT AND RECORDS

For goods and/or services ordered by and billed to Buyer on a cost reimbursable basis, Seller shall keep accurate records and accounts for all direct and indirect charges, disbursements, costs or expenses incurred by Seller or its subcontractors in the performance of the work. Upon reasonable prior notice at Seller's place of business, Buyer shall have the right to audit such records and accounts up to two (2) years after payment of the final invoice for the work.

11 TERMINATION

In addition to any remedy for default by Seller, Buyer shall have the right to terminate this Order in whole or in part, at any time upon written or telegraphic notice to Seller in the event of such termination. Buyer will make an equitable termination payment to Seller for work or materials in progress to date of termination. No amounts shall be paid for anticipated profits, unabsorbed overhead, lost shop space or the like. Buyer's payment to Seller shall in no event exceed the total price of this Order.

12 MODIFICATION OF CONDITIONS

The terms and conditions set forth in this Order shall not be modified or waived without the express written consent of Buyer.

13 GOVERNING LAW

The contract arising from this Order and the parties' performance hereunder shall be governed by and construed in accordance with the laws of the State of New York.

14. Supplier agrees to comply with all laws, rules, regulations and executive orders that apply to the goods or services to be provided.

Attachment 16

RG&E Electrical Specification EE-100

D0973163

Technical Specification
Ginna Station

Fuse Requirements

EWR 4530

Rochester Gas and Electric Company
89 East Avenue
Rochester, New York 14649

EE-100

Revision 11

7/12/02

Effective Date

Prepared by: Paul W. Smith
Assigned Engineer

7/12/02
Date

Reviewed by: J. E. Prod
Independent Reviewer

7/12/02
Date

Category 4.61.1

Reviewed At

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Technical Specification

1.0 Objective

1.1 The objective of this specification is to establish the requirements necessary to insure the fuses in safety related AC and DC distribution systems perform their intended functions during normal and abnormal system conditions. In addition, all fuses in the Main Control Board shall be in accordance with this specification. System operability can be demonstrated provided the requirements established herein are satisfied in the selection and testing of fuses.

1.2 Recent revisions of EE-100 include the following:

1.2.1 Fuses being installed in safety significant or non-safety applications do not need to be tested in accordance with this specification. This is based on the high reliability of fuses previously dedicated in accordance with this specification and the fact that these fuses do not perform a safety related function. The only exception to this is all fuses installed in the Main Control Board are required to be purchased/dedicated in accordance with this specification.

1.2.2 This revision specifies the following fuse types as being acceptable for specific applications defined in Table I of this specification:

Bussman type GBB and Littelfuse Type 3AG

1.2.3 The number of commercial grade fuses required to be destructively tested has been reduced. This was based on the fact that fuses previously tested per this specification have demonstrated a high statistical reliability. In addition, the present method of measuring the resistance of 100% of the fuse lots and performing the functional testing on the fuses with the highest and lowest resistance values provides reasonable assurance the fuse batch will perform its safety related functions.

1.2.4 Revision 9 incorporates a clarification in the destructive testing of A2Y fuses to apply different current levels to large fuses over 30 amps versus current levels to fuses rated 30 amps and less. Attachment VI A2Y curve added for reference.

- 1.2.5 Revision 10 incorporates a change to the acceptance criteria for ferrule diameter measurements performed during receipt inspections to account for out-of-round shape caused by crimping process. Revision 10 requires a controlled copy of DC fuse drawing 03022 to be used for verifying proper fuse type and size in a panel instead of affixing drawings to the panel for reference.
- 1.3 The requirements outlined in this specification shall be utilized for the purchase of all fuses for installation or plant stock. Existing fuses in safety related and safety significant AC distribution systems shall also be replaced with the exception of fuses internal to equipment. These fuses are only required to be replaced if they are relied upon to perform isolation. The fuses installed in the safety related and safety significant DC distribution systems were upgraded per EWR 3341 to include the requirements of previous revisions of this specification.
- 1.3.1 Although not required, if fuses installed in non-safety and safety significant systems are easily accessible they should be replaced with fuses satisfying the requirements of this specification. Fuses installed in office equipment (i.e., computers, coffee makers, radios, etc.) that do not perform any safety functions shall not be replaced as part of this specification. All removed fuses shall not be returned to plant stock.
- 1.4 The AC distribution system consists of four non-class 1E 4160 Volt buses, two non-class 1E 480 volt buses, four class 1E 480 volt buses and various low voltage distribution systems. The fuses associated with these systems provide AC power to both safety and non-safety systems. Even though requirements herein focus on the safety related systems, they may also be applied to safety significant and non-safety systems.
- 1.5 There are five (5) DC battery systems in service at Ginna Station. The A and B systems are safety related and operate independently. The fuses associated with these two systems provide DC control power to both safety and non-safety loads. The three remaining DC systems are the Technical Support Center system, the Security system and the backup DC fire protection system which are designated as non Class 1E. Even though requirements herein focus on the safety related, they may be applied to the safety significant and non-safety systems.

1.5.1 The class 1E DC distribution configuration is described in detail on two dedicated series of drawings (10909 and 03022 series). The dedicated series were developed to identify the circuit arrangement and specific fuse information such as ampere rating and type.

1.6 Fuses utilized as isolation devices prevent malfunctions in one section of a circuit from causing unacceptable effects in other sections of the circuit or other circuits. Isolation devices are also used to electrically isolate non-class 1E circuits from class 1E circuits. This is consistent with Regulatory Guide 1.75.

1.6.1 The distribution systems contain main, branch and supplementary fuses which are defined as follows:

Supplementary Fuses:

These fuses are sized for specific loads, that is, individual protection for specific components of a circuit.

Branch Fuses:

The last isolation device between the power source and the load.

Main Fuses:

Fuses that feed one or more isolation devices.

1.7 During normal operating conditions, fuses must be able to carry rated load conditions and not cause spurious loss of loads. Under fault conditions, fuses used as isolation devices must be able to isolate the faulted portion of the system without interrupting the continuity of service to the remaining system. Fuses used as isolation devices must be able to interrupt postulated magnitudes of overload and short circuit current.

1.7.1 The ability to selectively trip faulted branches without tripping the unfaulted branches is the general definition of fuse coordination. Coordination also

includes the ability of a fuse to serve as an isolation device consistent with reference 2.13. Isolation of faulted non-safety loads is required without compromising the operability of safety related and safety significant loads.

- 1.8 This specification will serve as a design guide in selecting and coordinating fuses in the safety related and safety significant distribution systems. Coordination is required and can be accomplished by applying the requirements of section 5 of this specification.
- 1.9 All fuses protecting safety related loads or serving as isolation devices for non-safety loads, must be class 1E components.
 - 1.9.1 No existing fuses are located in a harsh environment, therefore environmental qualification of fuses is not required.
 - 1.9.2 Existing holder configurations are considered adequate provided they are correctly installed. EWR 2831, Class 1E Anchor Verification, included a fuse holder review in which standard anchorage was analyzed and found acceptable (i.e., would safely withstand a seismic event) provided all mounting holes in the fuse holder are utilized.
- 1.10 Prior to installation, a combination of inspections and tests shall be performed to provide assurance that commercial grade dedicated fuses are as marked and will respond to faults as assumed in the system design.
 - 1.10.1 The inspection requirements include a verification of the characteristics listed below for all fuses.
 - a) Batch or date number on fuses or cartons.
 - b) Freedom from damage and defects.
 - c) Current rating (amperes).
 - d) Legible fuse markings.
 - 1.10.2 Commercial grade dedication testing requirements consist of both nondestructive and destructive testing. Nondestructive and destructive testing shall be performed in accordance with the test requirements described in section 6. Attachment I to this specification details sampling requirements needed to conduct both nondestructive and destructive tests for fuses purchased commercial grade to achieve a high level of reliability for those installed in the safety related distribution systems at Ginna Station.

1.10.3 All fuses purchased for Ginna Station shall be procured to the requirements of this specification. The commercial grade dedication testing information shall be documented on Attachment II and forwarded to Electrical Engineering Services. If fuse types are identified that have unsatisfactory results, this specification will be revised to include adequate replacements and the unacceptable fuses will be removed from Ginna Station. Vendor test data for fuses purchased safety related is not required.

1.11 Instructions for replacement of an existing fuse or installation of a fuse into the distribution systems are detailed in Attachment III to this specification.

2.0 References

2.1 Design Criteria, AC Fuses and Breakers, EWR 4530.

2.2 Design Criteria, DC Fuse Coordination, EWR 3341.

2.3 RG&E Drawings:

33013-1936, Sh. 1 & 2
10909-Series
03022-Series
10904-392

2.4 Letter from Bussmann to Joseph E. Pacher from Steve Schaffer, "AC and DC Fuse Ratings", Dated April 11, 1991.

2.5 Letter from Bussmann to Joseph E. Pacher from Steve Schaffer, "DC Fuse Ratings", Dated March 1, 1991.

2.6 Letter From Gould Shawmut to Joe Pacher from Joe McNulty, "DC Fuse Ratings", Dated 12/14/90.

2.7 ANSI/NEMA Standards Publication FU 1-1987, "Low Voltage Cartridge Fuses"

2.8 ANSI N45.2.2-1972, "Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants".

2.9 Bussmann Low-Peak Dual-Element Time-Delay Fuses (Class RK1), Bulletin LP-RK1, March 1989.

2.10 Bussmann Component Protection For Electrical Systems, Bulletin EDP-3, 1975.

2.11 Bussmann Electronic and Small Dimension Fuses, Catalog SFB.

- 2.12 IEEE-141 (1976), "Recommended Practice for Electric Power Distribution for Industrial Plants".
- 2.13 IEEE-242 (1986), "Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems".
- 2.14 IEEE-308 (1974), "Standard Criteria For Class 1E Power Systems For Nuclear Power Generating Systems".
- 2.15 IEEE-323 (1984), "Standard For Qualifying Class 1E Equipment For Nuclear Power Generating Stations".
- 2.16 IEEE-336 (1985), "IEEE Standard Installation, Inspection, and Testing requirements for Power, Instrumentation and Control Equipment at Nuclear Facilities".
- 2.17 IEEE-344 (1987), "Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations".
- 2.18 IEEE-384 (1981), "IEEE Standard Criteria For Independence of Class 1E Equipment and Circuits".
- 2.19 National Electric Code (NEC) latest revision.
- 2.20 RG&E Specification EE-35, "Electrical Soldering Specification", Rev. 2, 6/9/92.
- 2.21 UL Standard 198B-1982, "Safety Standard for Class H Fuses."
- 2.22 UL Standard 198C-1981, "Safety Standard for High-Interrupting Capacity Fuses, Current Limiting Type."
- 2.23 UL Standard 198D-1982, "Safety Standard for Class K Fuses."
- 2.24 UL Standard 198E-1987, "Safety Standard for Class R Fuses."
- 2.25 UL Standard 198G-1981, "Fuses for Supplementary Overcurrent Protection."
- 2.26 UL Standard 198H-1982, "Safety Standard for Class T Fuses."
- 2.27 UL Standard 198L-1987, "DC Fuses For Industrial Use".
- 2.28 ICEA P-32-382, "Short Circuit Characteristics of Insulated Cable", 1969.

- 2.29 U.S. Nuclear Regulatory Commission Regulatory Guide 1.75, Revision 2, September, 1978.
- 2.30 EPRI CGI Joint Utility Task Group Commercial Grade Item Evaluation for UL 198E Listed Fuses.
- 2.31 IP-RDM-1, Drawing Change Requests (DCR)
- 2.32 EP-3-P-0123, Drawing Control
- 2.33 A-60, Ginna Station DC fuse Program
- 2.34 QCIP-7.7, Receipt Inspection of AC and DC Fuses
- 2.35 LTP-DCF, Destructive and Non-destructive Testing of Class 1E DC Distribution System Fuse Types
- 2.36 GME-00-99-ACFUSES, Replacement or Inspection of AC Fuses
- 2.37 GME-00-99-DCFUSES, Replacement or Inspection of DC Fuses
- 2.38 M-57, Replacement of NIS Instrument and/or Control Power Fuses for Source, Intermediate or Power Range Drawers.

3.0 Material

- 3.1 Currently there are numerous generic types of fuses in service at Ginna Station. Some of the generic types have been found unsuitable for nuclear application and will be replaced with higher quality fuses. In addition, several generic fuse types were found to have similar characteristics and an attempt will be made to standardize and reduce the number of different types.
 - 3.1.1 The fuses found unsuitable for nuclear service are those that have paper cartridges. The manufacturer has indicated that this type of fuse absorbs moisture which results in a significant change in the response characteristic. Specifically, Amptrap OT series fuses will be replaced with a higher quality fuse having similar characteristics.
- 3.2 State-of-the-art fuses carry a UL classification which affords some degree of configuration control as well as assurances that the fuses will meet minimum performance standards. The fuses acceptable for applications at Ginna Station are shown in Table 1.

3.2.1 The UL system for product endorsement, as it applies specifically to fuses, takes two forms. The first is that a fuse is UL Listed which also includes a class description of K1, K5, R, J, etc. as shown along with description on Table 2. A fuse is "UL Listed" only if UL develops a specific test specification for a given class and the manufacturer uses this specification under the supervision of a UL inspector on a random sample bases. The second way that UL will sanction fuses is to give them a UL recognition endorsement. The recognition sanction means that no specific UL test specification exists and that the manufacturer develops a test specification on their own then submits it to UL for review and approval. There is no on site inspection by UL for those fuses sanctioned as UL recognized. Manufacturers have also found that several of their higher quality fuses were in existence prior to the UL system endorsement. Therefore, many fuses available today are treated as similar to the UL listed fuses. It is the manufacturer and/or user's responsibility to certify or qualify such fuses.

3.2.2 Table 1 details the preferred types of fuses that were selected for safety related system applications at Ginna Station. The fuse type, description, AC and DC interrupting ratings, and AC and DC voltage ratings are shown. The fuses selected should result in the fewest number of different types of fuses. Other fuse types can be utilized but they shall be subject to the testing and inspection requirements identified in this specification. As new types of fuses are utilized in the safety related and safety significant distribution systems at Ginna Station, this specification shall be revised to include them.

3.2.2.1 Included in Table 1 are the acceptable fuse type replacements. This shall be utilized to standardize the types of fuses installed in Ginna Station and reduce the number of fuse types required in plant stock.

4.0 Fuse Selection

4.1 Table 1 lists the preferred fuse types for use on the existing distribution systems. Other fuse types may be used provided the technical information regarding the fuse types is incorporated into this specification and appropriate testing is performed.

4.2 The following factors must be examined when selecting a fuse for installation into the distribution systems:

4.2.1 Voltage Rating

4.2.1.1 The applicable maximum RMS AC or DC voltage rating of a fuse must be equal to or greater than the voltage of the circuit in which the fuse is applied, depending on whether the system is AC or DC. The voltage rating is based on the ability of the fuse to quickly extinguish the arc current after the fuse element has melted and to prevent the system open voltage from re-striking across the opened fuse element. The fuse voltage rating is not a measure of the fuses ability to withstand a specified voltage while carrying current. A fuse should never be applied where the system voltage exceeds the fuse voltage rating. For power systems of 600 volts and less, fuses of higher voltage rating can be applied on circuits of a lower system voltage, (i.e., a 600 volt fuse can be used in a 208 volt circuit).

4.2.1.2 The 125 VDC system is equalized approximately every eighteen months at 140 VDC. Under normal operating conditions the system voltage is approximately 133.5 VDC. As a result of these voltage levels the fuses installed in the DC distribution system shall have a minimum DC voltage rating of 140 volts.

4.2.1.3 Currently the only exceptions to the 140 VDC rating for DC fuses are "end-of-line" applications where the fuses have a voltage rating of 125 VDC. These fuses are Bussmann type AGC, MDL, GBB, and certain sizes of BAF and Littelfuse. Use of these fuses is presently acceptable based on the following. During fault conditions the circuit voltage drop would reduce the voltage at the fuse. Each DC load has a positive and negative fuse. If one fuse clears and voltage conditions permit a restrike the second fuse will clear and the combination of both fuses would prohibit further restrikes. In addition, these fuses have not had a history at Ginna of improper clearing during short circuit or overload conditions.

4.2.2 Ampere Rating

4.2.2.1 Every fuse is designated by an ampere rating which has been determined by the manufacturer under specified test circuit conditions. In choosing a fuse ampere rating, consideration must be given to the type of load and code requirements for the specific application. To provide reliable overload and short circuit protection, the ampere rating should never exceed the current carrying capacity of the circuit. Generally, the fuse

ampere rating is selected at 125% of the load current.

4.2.3 Interrupting Rating

4.2.3.1 The interrupting rating is the maximum available short circuit current that an over-current protective device can safely interrupt without unacceptable damage to itself. This rating is a number assigned by the manufacturer. Section 110-9 of the National Electric Code requires sufficient interrupting ratings wherever over-current protective devices are installed.

4.2.3.2 All fuses utilized as isolation devices shall have interrupting ratings in excess of the available fault current for the portion of the circuit that they are installed.

4.2.3.3 The interrupting rating of the fuse is typically different for AC and DC currents. Table 1 provides both the AC and DC interrupting ratings. A 200,000 amp AC interrupting is sufficient for AC applications and a 20,000 amp DC interrupting rating is satisfactory for DC applications at Ginna Station. When installing fuses with interrupting ratings less than these values, the available short circuit current must be evaluated.

4.2.3.4 The interrupt rating of a fuse is a critical characteristic. The interrupting capability is verified by the fuse manufacturer during UL testing. Values for specific UL classes are in Table 2. The industry standard is not to verify this characteristic during dedication testing. Commercial grade surveys, testing and UL input concluded the 110% current carrying capacity, 135% clearing time, 200% clearing time and 500% clearing time tests are adequate to give reasonable assurance the tested fuse will meet all design requirements of the applicable UL Standard including current interrupting capability, (reference 2.30).

4.2.4 Current Limiting Range

4.2.4.1 The current limiting range is the range of RMS symmetrical available current that is equal to or less than the interrupting rating in which the total clearing time is less than a 1/2 cycle.

4.2.5 Energy Let-Through

4.2.5.1 The energy that the fuse will let through expressed as ampere-squared-seconds, (I^2t), when fuse is operating in current limiting range.

4.2.6 Peak Let-Through Current

4.2.6.1 The maximum instantaneous current that a fuse will let

through before clearing.

4.2.7 Overloads

4.2.7.1 An overload is a current larger than normal, but flowing within the normal path. Overloads usually are in the range of one to six times normal. Rapid removal of overloads is not generally necessary except for certain delicate components such as semiconductors. The chief damage expected under overload conditions is thermal and most often appears as insulation deterioration resulting in failure of equipment.

4.2.8 Ambient Temperature

4.2.8.1 The percent of rating and opening times are affected by the ambient temperature. The effects of temperature on Dual-Element and Non-Dual Element fuses are shown in Figure 1. When sizing fuses, the worst case ambient temperatures (highest and lowest) shall be assumed. It is important that components in contact with fuses not be operating at excessive temperatures because the excess heat will cause the fuse to open before it should.

4.3 The ampere ratings and fuse types for all fuses selected shall satisfy the coordination criteria established in section 5.0.

4.4 The cables that are fed directly down stream from a fuse shall be adequately protected from short circuit damage. This shall be demonstrated by plotting the allowable short circuit current curve for the cable against the fuse time-current characteristic curve. Cable allowable short circuit currents shall be obtained from the applicable section of ICEA Publication P-32-382.

5.0 Coordination

5.1 Coordination is achieved when the isolation device closest to the fault or overload clears without interrupting the operability of the remaining system. A main fuse or breaker supplying several branch fuses and breakers is coordinated if the branch fuse or breaker clears all potential conditions, before the main fuse or breaker clears. This type of selectivity is required because it assures that safety related and safety significant loads will remain operable during and after a fault on a non-safety load.

5.2 Coordination between a main and branch isolation device can be demonstrated by:

- 1) Maintaining a minimum ampere ratio for the main and branch fuses as shown in Table 3 (main fuse to branch fuse only).
- 2) The continuous ratings of an upstream isolation devices being larger than downstream isolation devices with sufficient margin for all other loads supplied power by the upstream device.
- 3) Ensuring that the response characteristics of the main fuse or breaker envelopes the branch fuse or breaker curve with sufficient margin. When a current limiting fuse is upstream of a circuit breaker coordination can not be assured, unless the current limiting characteristics of the fuse are evaluated.
- 4) Verifying that the I^2t values of the main fuse exceeds the I^2t values of the branch fuses with sufficient margin (main fuse to branch fuse).

5.2.1 The requirements for comparing continuous ratings as in 2) above, overlaying one response characteristic over another as in 3) above and for comparing the I^2t values as in 4) above apply specifically when coordinating different type fuses to each other.

5.2.2 When coordinating the same series fuses to each other, the only requirement is the minimum fuse ratio requirement be satisfied as indicated in Table 3 and that sufficient margin exists between the continuous ratings for other branch circuits.

5.2.3 When coordinating a fuse to a breaker, evaluating the continuous ratings as in 2) above and overlaying the response characteristics as in 3) above is required.

5.2.4 The published I^2t values for the proposed fuse types and the response characteristics for the preferred fuses are available from the fuse manufacturer catalogs. Response characteristic curves for breakers must be obtained from the breaker manufacturer catalogs.

6.0 Receipt Inspection/Testing

6.1 Fuses purchased for installation into the safety related distribution systems may be purchased safety related or commercial grade.

- 6.2 Upon receipt of safety related or commercial grade fuses, an inspection process of the four critical characteristics listed below shall be performed:
- a) Batch or date code number on fuse or cartons.
 - b) Freedom from damage and defects.
 - c) Current rating (amperes).
 - d) Legible fuse markings.
- 6.2.1 Fuses purchased safety related shall have the vendor dedication plan reviewed and deemed acceptable by Nuclear Engineering Services.
- 6.3 Fuses purchased as commercial grade shall have their characteristics verified by a series of inspections and nondestructive and destructive testing as outlined in Attachment I.
- 6.3.1 Upon receipt of commercial grade fuses that are to be dedicated, testing shall be performed to verify operability of the fuses. The specific test and or measurement requirements are outlined below:
- a) **Physical Dimension Verification**

All outside dimensions and the configuration as defined in the applicable UL standard are critical to ensure proper fit in fuse holders.

The outside dimensions of fuses shall be measured to ensure that the tolerances as specified by the vendor or, absent vendor tolerances, as outlined in the applicable UL standard are satisfied.

For UL Class supplementary overcurrent protection fuses and fuses not covered by a specific UL class the following tolerances shall be adhered to if vendor tolerances are not available. These tolerances are identical to the requirements of UL for similar fuses.

o Ferrule type fuses shall be within the tolerances stated in specific vendor catalog or vendor supplied information. If no vendor information is available, then fuses shall be within the tolerances listed below of catalog stated length and diameter:

<u>Fuse Size</u>	<u>Length Tolerance</u>	<u>Diameter Tolerance</u>
0-60A	±0.03"	±0.006"

Note: When measuring ferrule diameter, the ferrule may be slightly out-of-round due to the crimping process. In that case, measure the minimum and maximum diameters on the ferrule, and calculate an average diameter for the ferrule. That average value must be within the diameter tolerance specified above, and the maximum diameter measured cannot be greater than the maximum diameter tolerance determined above (vendor max. or +0.006").

- o Blade type fuses shall be within the tolerances stated in specific vendor catalog or vendor supplied information. If no vendor information is available, then fuses shall be within the tolerances listed below of catalog stated length and diameter:

<u>Fuse Size</u>	<u>Length Tolerance</u>	<u>Blade Thickness Tolerance</u>
61-200A	±0.06"	±0.003"
201 and up	±0.09"	±0.003"

b) Resistance Measurement:

Although not a critical characteristic, fuse resistance is utilized for establishing homogeneity of fuse lots. When performing resistance measurements, the fuses with the largest and smallest resistance values will be removed to be functionally and destructively tested.

c) Functional Non-destructive Test:

The current carrying capacity test ensures the fuse can carry its rated current. Fuses shall be non-destructively tested based on a sampling rate.

d) Functional Destructive Test:

Functional destructive testing shall be performed

to verify the response characteristics of the fuses. Fuses shall be destructively tested based on a sampling rate. The clearing time test shall include applying specific percentages of the fuses continuous current rating, depending on the UL class. These clearing times represent the most difficult portion of the time current characteristic curve (overload region).

- 6.4 Upon completion of all required receipt inspection and/or testing, fuses accepted for safety related use must be marked such that they are easily distinguished from rejected fuses. Safety related fuses accepted for use shall be clearly marked with a green dot on standard fuses and a red dot on glass fuses. Fuses or their packaging shall indicate the P.O. number, batch code or date code number from receipt until use.

7.0 Installation

- 7.1 All DC fuses installed in the safety related and safety significant distribution systems per this specification, whether installed as part of the system evaluation, future modifications or replaced during routine maintenance, shall be in accordance with the dedicated series of drawings that detail fuse information. The fuses installed in the class 1E DC distribution system are described on the RG&E 03022 drawing series. (Fuses installed in the class 1E AC distribution are not described on a separate series of drawings.) Prior to replacement of any fuse, a controlled copy of the appropriate sheet shall be consulted for the "required fuse" for the particular application. Likewise, information regarding any new DC fuse installed for a new system or modification shall be documented on these drawings. Fuses internal to equipment that are required to be replaced per this specification in accordance with section 1.3.1 shall be detailed on these drawings.

- 7.2 Once the required fuse for a specific application has been determined, the steps listed in Attachment III to this specification, Instructions for Fuse Installation, shall be followed.

8.0 Fuse Holders

- 8.1 In general there are three generic types of fuse holders in service on the distribution systems. The

types are listed below:

- a) Ferrule Type: Ferrule type holders have voltage ratings of 250 volts and 600 volts with current ratings of 30 amps (for fuses 30A and less) and 60A (for 31 to 60A). The ferrule type may also include rejection clips designed for class R fuses. The class R holders have the same dimensions as the class H holders but have a rejection feature that only accepts class R fuses. Rejection holders may not be used with fuses without the rejection ring. Ferrule type fuse holders for small dimension end-of-line fuses are designed for fuses rated 30A or less.
- b) Blade Type: Blade type holders are designed for either 250 volt or 600 volt application with ampere ratings of 100A (for 61-100A), 200A (101-200A), 400A (201-400A), 600A (401-600A), 800A (601-800A), and 1000A (801-1000A).
- c) Class L: Class L mountings are used on main fuses rated 601-1200A. The holders are designed with standard hole patterns specific to class L and J fuses.

- 8.1.1 Other generic types of fuse holders may be found in individual systems and equipment.
- 8.2 Fuse holders shall be inspected during fuse replacement per this specification, whenever routine maintenance is performed on the distribution systems or when a fuse holder is available for inspection. Fuse holders exhibiting corrosion shall be cleaned so that contact surfaces are free of contaminants. Bent clips may be adjusted into place so that the fuse fits snugly in holder. Fuse "snugness" is to be determined at the discretion of the individual replacing the fuse. Fuse holders requiring replacement due to significant corrosion, unaligned clips or physical damage shall be replaced with a new holder of a similar type. Standard Ginna Station administrative steps shall be taken for these and other anomalies (e.g., improper conductor terminations) observed during fuse replacement.
- 8.3 Fuse reducers used to adapt smaller fuses to larger holders shall normally be limited to one set. However, several reducers may be used provided that the copper reducers are soldered together before being used with the fuse cartridge. All soldering shall be performed in accordance with RG&E specification EE-35. Fuse reducers must have a voltage rating in excess of the maximum

system voltage for the portion of the distribution system they are installed.

9.0 Documentation Requirements

9.1 Control Configuration Drawings (CCD's) will be used to maintain proper fuse coordination and to identify all the necessary fuse requirements. The appropriate CCD will be consulted whenever fuse replacement is performed in accordance with Attachment III to this specification.

9.2 Once fuse replacement or installation is complete all appropriate CCD drawings shall be revised or created and issued "as built" in accordance with IP-RDM-1 and EP-3-P-0123 procedures. In addition, any panel distribution drawing, one line diagram control schematic, elementary or any other drawing affected by the fuse replacement or installation shall be revised or created as applicable.

9.3 If, during the course of the fuse replacement, an anomalous condition is discovered, follow the documentation requirements specified in Attachment III to this specification so that the condition is reported to Engineering for evaluation.

9.4 Fuse inspections and test results for each fuse lot shall be documented on and retained per Attachment II of this specification.

10.0 Procurement Requirements

10.1 New fuses purchased for installation into the distribution systems may be purchased commercial grade. The purchase order for fuses shall be "45" orders.

10.1.1 The purchase order for fuses shall require the following:

- a) Fuses or their packaging contain a batch code or a data code identification number.
- b) Purchase orders shall also indicate that fuses will be subject to inspection and tests to verify that the fuses supplied meet published product data and UL standards. Fuses or entire shipments may be returned for credit because of test failures or inspection rejections.

10.2 "45" orders shall also be used when fuse holders and

reducers are purchased to ensure that the holders are not damaged and that they have the proper voltage and current rating. In addition, fuse reducers shall be inspected for proper soldering in accordance with section 8.3. Proper holder or reducer to fuse fit is verified during installation.

- 10.3 Fuses and fuse holders shall be shipped in accordance with ANSI/ASME N45.2.2, "Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants".
- 10.4 Fuse quantities purchased shall be sufficient to satisfy destructive testing requirements, installation applications and additional spares for stock.
- 10.5 Attachment IV to this specification summarizes the critical characteristics and acceptance criteria for fuses.
- 11.0 **Quality Assurance and Verification Requirements**
- 11.1 All work shall be controlled using Ginna Station procedures and be consistent with the requirements of 10CFR50 Appendix B.

TABLE I (Page 1 of 3)

PREFERRED FUSES

Manufacturer and Model	Type	Amp Range	AC Volts	Interrupting Rating (AC)	DC Volts	Interrupting Rating (DC)	UL Class	Direct Replacement Fuse For The Following Types
(Bussmann) LPN-RK	Main and Branch	1/10-600	250	300 KA	140	20 KA	Listed RK1 UL-198E	All 250 volt or Less UL Class K, K5, H, RK1 & RK5 Fuses (AC and DC)
(Bussmann) LPS-RK	Main and Branch	1/10-600	600	300 KA	140	20 KA	Listed RK1 UL-198E	All 600 Volt Or Less UL Class K, K5, H, RK1 & RK5 Fuses (AC and DC)
(Shawmut) A2Y	Main or Branch	1-600	NOT FOR AC USE		500	20 KA	N/A	All 250 Volt or Less Non-Time Delay of Fast Acting in DC System of Identical Size (DC ONLY)
(Shawmut) TR	Main or Branch	1-600	NOT FOR AC USE		200	20 KA	RK5	All 250 Volt Or Less Time Delay Fuses In DC System of Identical Size (DC ONLY)
(Bussmann) AGC	Supplementary	1/32-3	125	10 KA	125	10 KA	Supplementary UL-198G	All 250 Volt or Less Non-Time Delay or Fast Acting 1/4 X 1 1/4 Dimension Fuses (AC AND DC)
			250	35 A (0-1A) 100 A (1.1-3.5A)	250	35A (0-1A) 100A (1.1-3A)		
(Bussmann) ABC	Supplementary	1/4-20	125	10 KA (All)	125	10 KA	Supplementary UL-198G	All 250 Volts or Less Non-Time Delay or Fast Acting 1/4 X 1 1/4 Dimension Fuses (AC&DC)
			250	35A (0-1A) 100A (1.1-3.5A) 200A (3.6-10 A) 750A (10.1-15A) 1000A (15.1-20)	250	35A(0-1A) 100A(1.1-3.5) 200A(3.6-20)		
(Bussmann) MDA	Supplementary	1/100-20	250	10 KA (All)	125	10 KA (0-2.8)	Supplementary UL-198G	All 250 Volt or Less Time Delay or Time Lag Fuses 1/4 X 1 1/4 Dimension Fuses (AC and DC)
				35A (0-1A) 100A(1.1-3.5A) 200 A (3.6-10 A) 750 A (10.1-15A) 1000 A (15.1-20)	250	35A(0-1A) 100A(1.1-2.8)		
(Bussmann) MDL	Supplementary	1/100-3	125	10 KA (All)	125	10 KA (0-2.8)	Supplementary UL-198G	All 250 Volt or Less Time Delay or Time Lag Fuses 1/4 X 1 1/4 Dimension Fuses (AC and DC)
			250	35 A (0-1A) 100 A (1.1-3.5A)	250	35A(0-1A) 100A(1.1-2.8)		

**TABLE I (Page 2 of 3)
PREFERRED FUSES**

Manufacturer and Type	Application	Amp Range	AC Volts	Interrupting Rating	DC Volts	Interrupting Rating (DC)	UL Class	Direct Replacement Fuse For The Following Types
(Bussmann) JJN	Main or Branch	15-100	300	200 KA	300	10 KA	T UL-198H	A3T (Gould) JLN (Little Fuse) (AC AND DC)
		101-600	300	200 KA	150	10 KA		
(Bussmann) JJS	Main or Branch	15-400	600	200 KA	300	10 KA (15-400A)	T UL-198H	JLS (Little Fuse) (AC AND DC)
(Bussmann) BAF	Branch Circuit	1/10-30	125	10 KA	150	10 KA (0-3A)	Listed CC UL-198C	All 600 Volt or Less Non-Time Delay or Fast Acting 13/32 X 1 1/2 Dimension Fuse (AC and DC)
			250	35(0-1) 100(1.1-3.5) 200(3.6-10) 750(10.1-15) 1500(15.1-30)	125	10 KA (3.1-15A)		
(Bussmann) FNQ-R	Branch Circuit	1/4-7 1/2	600	200 KA	140	20 KA	Listed CC UL-198C	All 600 Volt or Less Time Delay or Time Lag 13/32 X 1 1/2 Dimension Fuses (AC AND DC)
(Bussmann) KTK-R	Branch Circuit	1/10-30	600	200 KA	300	10 KA (15-30A)	Listed CC UL-198C	All 600 Volt or Less Non-Time Delay or Fast Acting 13/32 X 1 1/2 Dimension Fuse (AC AND DC)
(Bussmann) KLM	Branch Circuit	1/10-30	Not For AC Use		500	100 KA	Not UL Listed	Non-Time Delay or Fast Acting 13/32 X 1 1/2 Dimension Fuse Where a High Intrappt Rating is Required (DC ONLY)
(Shawmut) A4BT	Main	200-2000	600	200 KA	500	100 KA	L UL-198C	All 600 volt or Less UL Class L Fuses (AC AND DC)

**TABLE I (Page 3 of 3)
PREFERRED FUSES**

Manufacturer and Type	Application	Amp Range	AC Volts	Interrupting Rating	DC Volts	Interrupting Rating (DC)	UL Class	Direct Replacement Fuse For The Following Types
(Bussmann) FWA	Semi-conductor	2-800	150	200 KA	140	20 KA	UL Rec-ognized	A13X (Gould) (AC And DC)
(Bussmann) FWX	Semi-conductor	1-1000	250	200 KA	250	10 KA	UL Rec-ognized	A25X (Gould) (AC And DC)
(Bussmann) FWH	Semi-conductor	1-1000	500	200 KA	500	10 KA	UL Rec-ognized	A60P (Gould) (AC And DC)
(Bussmann) FWP	Semi-conductor	1-1000	700	200 KA	700	10 KA	UL Rec-ognized	A60X (Gould) KBC (Bussmann) (AC And DC)
(Shawmut) A13X	Semi-conductor	1-6000	130	8 KA	N/A	N/A	UL Rec-ognized	
(Shawmut) A25X	Semi-conductor	10-30	300	50 KA	N/A	N/A	UL Rec-ognized	
		35-60	250	100 KA				
		70-800	250	10,600 A				
(Shawmut) A60X	Semi-conductor	1-2000	600	100 KA	N/A	N/A	UL rec-ognized	
(Bussmann) FRS-R	Branch	1/10-30	600	200 KA	250	20 KA	RK5	
(Bussmann) GBB	Supplementary *	1-15	125	10 KA	125	10 KA	UL rec-ognized	
(Littelfuse) 3AG	Supplementary *	1/100 - 8	250	10 KA	N/A	N/A	UL Listed	

* Bussman GBB and Littelfuse 3AG fuses are specifically for use as internal protection for appropriate instrumentation modules to replace existing equivalent fuses.

TABLE 2

UL FUSE CLASS

UL CLASS	RATING AC VOLTS	RATING AMPERES	TEMPERATURE RATING (°C) AMPERES
B	600	601 TO 6000	200,000
J	600	1 TO 600	200,000
RS1	250 600	1/10 TO 600	200,000
RS5	250 600	1/10 TO 600	200,000
CS	600	1/10 TO 30	200,000
G	300 TO GROUND	1 TO 60	100,000
T	300 TO GROUND	1 TO 1200	200,000
	600	1 TO 800	200,000
RS	250	1 TO 600	50,000
	600		
R	250	1 TO 600	10,000
	600		
Class E Type S	125	0 to 30	10,000
Supplemental	Up to 600	0 to 30	10,000; 25,000; 50,000; 100,000

TABLE 3

MINIMUM FUSE SELECTIVITY RATIOS (AC APPLICATIONS)

Branch Fuse	Rated Ampere Ratios Main Fuse	
	LPN/LPS	JJN/JJS
LPN/LPS	2:1	3:1
JJN/JJS	3:1	3:1

MINIMUM FUSE SELECTIVITY RATIOS (DC APPLICATIONS)

Branch Fuse	Rated Ampere Ratios Main Fuse		
	A4BT	A2M	TR
A2M	1.5:1	2:1	1.5:1
TR	2:1	2:1	2:2
EAF	5:1	5:1	5:1
MDL	5:1	5:1	5:1
AEC	5:1	5:1	5:1
ACC	5:1	5:1	5:1

Notes:

1. Smaller main fuse to branch fuse ratios can be utilized if the time-current characteristic curves demonstrate coordination is achieved.
2. Information on the various fuse types is displayed on Table 1.

ATTACHMENT I
Revision 8
Simple Sampling Requirements
For Test and Inspections

1.0 Purpose

- 1.1 The purpose of this attachment to EE-100 is to establish the sampling requirements needed to conduct both destructive and nondestructive tests on commercial graded dedicated fuses used in the safety related and safety significant distribution systems. The inspection and testing requirements are also summarized in this attachment.
- 1.2 All fuse types shall undergo an inspection and testing process consistent with the requirements contained in section 6.0 of specification EE-100. Certain inspections and measurements shall be performed on all fuses and certain functional nondestructive and destructive testing shall be performed on a sample bases. Tests are intended to confirm that fuses actually operate within their specification.
- 1.3 The objective of the test program is to achieve a high reliability level for installed fuses. Failures that occur during the inspection or testing process which are attributed to inspection or testing errors shall not be counted as failures in the statistical model.
- 1.4 Test data shall be formally documented and transmitted to Engineering for evaluation on Attachment II.
- 1.5 The visual inspection and measurements are utilized as a screening method for detecting unsatisfactory lots. Only fuse lots that successfully pass the screening process are subjected to the functional testing. The carrying capacity test verifies that the fuse will carry its rated current. The destructive testing verifies that the fuse will clear as required during abnormal operating conditions. The test data for fuses subjected to the functional testing will be applied to the statistical model below:

$$Confidence(\%) = 100 * \left[1 - \sum_{I=0}^J \frac{N!}{I! (N-I)!} R^I (1-R)^{N-I} \right]$$

Where: R= Failure Rate, Desired 0.01
N= Total Number of Fuses Sampled, All Types
J= Total Number of Fuse Failures Per Section 4.0
C= Confidence

2.0 References:

- 2.1 Statistical Quality Control Grant and Leavenworth, 5th Edition, 1980.
- 2.2 MILSTD - 105D.29, April 1963, Sampling Procedures and Tables for Inspection by Attributes.

3.0 General Requirements:

- 3.1 Fuses of identical type and ratings shall be separated into lots. The lots shall essentially be fuses with identical batch numbers and/or date codes.
- 3.2 All inspection and test will be based on the assumption that all fuses from the same lot are essentially alike in quality, performance and materials. Thus, randomly selected samples can be tested to verify the critical characteristics of the entire lot. All tests and inspections must be performed on specific lots for each fuse type and ampere rating. The results shall be documented on Attachment II.
- 3.3 Any anomalous conditions encountered during testing shall be documented on Attachment II. Anomalous conditions such as testing errors, fuse failures, etc. require a detailed explanation such that an evaluation can be made.

4.0 Sampling Requirements

4.1 Inspection:

- 4.1.1 Fuses shall be visually inspected for the following:
 - a) Verification that fuses are separated into the same manufacturer batch numbers and/or date codes.
 - b) Verification that all fuses are free of damage and physical defects. This shall include a verification that blades on blade type fuses are parallel to within $\pm 10^\circ$ for rotated or bent blades. In addition, ferruled fuses shall be inspected for cracks.
 - c) All fuses are properly labeled with current rating and legible fuse markings.
- 4.1.2 All fuses found damaged or dissimilar shall be rejected. The remaining fuses in each lot may be accepted for test.

4.2 Measurements:

4.2.1 Measurements shall consist of the following:

- a) A verification of physical size per section 6.3.1 of specification EE-100 for 100% of fuses.
- b) A verification of fuse element resistance per section 6.3.1 of specification EE-100 for 100% of fuses. Fuses that have the largest and smallest resistance values shall be equally separated from the lot for functional and destructive testing.

4.2.2 If one fuse fails the physical size verification that fuse shall be rejected. If more than one fuse fails, the lot shall be rejected.

4.3 Functional Tests

4.3.1 Functional Non-destructive Tests:

4.3.1.1 Fuses shall undergo a current carrying capacity test. Fuses, with the exception of semiconductor fuses (Bussmann Type FWA, FWX, FWH, and FWP and Shawmut Type A13X, A25X and A60X), shall be capable of carrying 110 percent $\pm 2/-0\%$ of their rated current for a minimum of 30 minutes for fuses rated greater or equal to 400 amps and 15 minutes for fuses rated less than 400 amps. Semiconductor fuses shall be capable of carrying 100 percent $\pm 2/-0\%$ of their rated current for a minimum of 15 minutes. The test shall be performed with a low voltage alternating test current at 48-60 Hz. The test shall be conducted at an ambient temperature of 18-32 degrees C. The current carrying capacity test shall be performed on fuses consistent with the following sampling requirements.

<u>Lot Quantity</u> <u>(Pieces)</u>	<u>Test Quantity</u> <u>(Pieces)</u>
1-10	2
11-25	4
26-100	6
101-1000	10

4.3.1.2 The test quantities shall be equally distributed among the fuses with the largest and smallest resistance values measured per section 4.2.1 (b).

4.3.1.3 Fuses subjected to non-destructive testing that are not used for destructive tests shall be discarded.

4.3.2 Functional Destructive Tests:

- 4.3.2.1 The fuses used for the current carrying capacity test shall be used for the destructive tests with the exception of minimum clearing time for time delay fuses, 500% rating destructive tests which shall be performed with unconditioned (new) fuses. The tables in section 4.3.3 provide testing requirements.
- 4.3.2.2 Functional destructive testing shall be performed to verify the response characteristics of the fuses. The clearing time test shall include applying 135%, 150%, 200% and/or 500% of the rated current to the fuse depending on their UL Class. The Bussmann FWA, FWX, FWH and FWP series semiconductor fuses shall only be tested at 300% of their rated AC current. Shawmut Type A13X, A25X and A60X shall only be tested at the vendor catalog curve 100 second clearing current. Test currents shall be within +10/-0%. Fuses shall be cooled to ambient temperature (18-32 degrees C) before testing. The test shall be performed with a low voltage test alternating current at 48-60 Hz. The timer utilized for testing shall be capable of measuring fuse clearing time within ±1%.

4.3.3 Destructive Test Requirements

- 4.3.3.1 UL class H, J, K, L, R, T, RK1, RK5 and Type A2Y fuses are required to clear within the following times:

Fuse Rating (Ampere)	Maximum Acceptable Clearing Time (Minutes)			Minimum Acceptable Clearing Time For Time Delay Fuse (Seconds)
	135 Percent Rating ^a	200 Percent Rating		
			Non-Time Delay	Time Delay
0-30	60	2	4	10 ^b
31-60	60	4	6	10
61-100	120	6	8	10
101-200	120	8	10	10
201-400	120	10	12	10
401-600	120	12	14	10

^aA2Y fuses rated greater than 30 amps are to be tested based on the vendor curve 1000 second clearing current. A2Y fuses are not required to meet UL criteria and therefore the larger sizes may not clear at the UL specified 135% current. A2Y fuses rated 30 amps and less shall be tested at 135%. Maintain 60 minute criteria for maximum acceptable clearing time. See Attachment VI.

^bThis clearing time is reduced to 8 seconds for a fuse rated in the range of 0-30 amperes, 250 volts

Time Delay Fuses

<u>Lot Quantity (Pieces)</u>	<u>Batch Test Quantity (Pieces)</u>		
	<u>135% Test</u>	<u>200% Test</u>	<u>500% Test</u>
1-10	1	1	1
11-25	1	1	2
26-100	2	2	2
101-1000	3	3	4

Non-Time Delay Fuses

<u>Lot Quantity (Pieces)</u>	<u>Batch Test Quantity (Pieces)</u>	
	<u>135% Test</u>	<u>200% Test</u>
1-10	1	1
11-25	2	2
26-100	3	3
101-1000	5	5

4.3.3.2 UL class L fuses are required to clear within the following times:

<u>Fuse Rating (Ampere)</u>	<u>Maximum Acceptable Clearing Time (Minutes)</u>	<u>Minimum Acceptable Clearing Time For Time Delay Fuse (Seconds)</u>
	<u>150 Percent Rating</u>	<u>500 Percent Rating</u>
601-1600	250	2

Time Delay Fuses

<u>Lot Quantity (Pieces)</u>	<u>Batch Test Quantity (Pieces)</u>	
	<u>150% Test</u>	<u>500% Test</u>
1-10	1	1
11-25	2	2
26-100	4	4
101-1000	5	5

4.3.3.3 UL Class CC and G fuses are required to clear within the following times:

Fuse Rating (Ampere)	Maximum Acceptable Clearing Time (Minutes)		Minimum Acceptable Clearing Time For Time Delay Fuse (Seconds)
	135 Percent Rating	200 Percent Rating	200 Percent Rating
	0-30	60	
31-60	60	4	12

<u>Lot Quantity (Pieces)</u>	<u>Batch Test Quantity (Pieces)</u>	
	<u>135% Test</u>	<u>200% Test</u>
1-10	1	1
11-25	2	2
26-100	3	3
101-1000	5	5

4.3.3.4 UL Class Supplementary Overcurrent Protection for miscellaneous and miniature fuses (see UL-198G) are required to clear within the following times:

Fuse Rating (Ampere)	Maximum Acceptable Clearing Time (Minutes)		Minimum Acceptable Clearing Time For Time Delay Fuse (Seconds)
	135 Percent ^a Rating	200 Percent Rating	200 Percent Rating
	0-3	60	
3 1/2-30	60	2	12

^a At least two of the fuses shall clear within 60 minutes. If the third fuse has not cleared at 60 minutes, the current shall be increased to 150 percent of its rating and the fuse shall clear within 5 minutes.

<u>Lot Quantity (Pieces)</u>	<u>Batch Test Quantity (Pieces)</u>	
	<u>135% Test</u>	<u>200% Test</u>
1-10	1	1
11-25	2	2
26-100	3	3
101-1000	5	5

4.3.3.5 The Bussmann FWA, FWX, FWH and FWP series semiconductor fuses shall clear at 300% of the rated AC current within a time equal to or greater than the minimum melting time found on the production time current curves provided with the fuse order, see attachment V. Shawmut Type A13X, A25X and A60X shall be required to clear within the vendor curve 100 second clearing current and time. The sample size shall be the same as the number of fuses subjected to the current carrying capacity test in section 4.3.1.

4.3.4 For a lot size of 25 fuses or less, if 1 of the fuses fails the functional tests, the whole lot shall be rejected. For 26 or more fuses, if 1 fuse of the test quantity fails, the test shall be repeated for another test sample of the same size. If one more fuse fails, the whole lot shall be rejected.

5.0 Acceptance:

5.1 Once the nondestructive testing is completed and those fuse types requiring destructive testing have been tested, all accepted fuses shall be marked consistent with section 6.4 of Specification EE-100 and accepted for use.

4. 110% Load Test (100% for Semiconductors):

#Tested _____, # Failures _____, # Tested Acceptable _____

Completed by: _____
Signature Title Date

5. Performance Test Results:

135% Current Test: (150% for UL Class L)

Tested _____, # Failures _____, # Tested Acceptable _____

Test Current (Amps) _____

Clearing Times (Min: Sec)

<u>Sample</u>	<u>Time (Min: Sec)</u>
1	_____
2	_____
3	_____
4	_____
5	_____

200% Current Test:

Tested _____, # Failures _____, # Tested Acceptable _____

Test Current (Amps) _____

Clearing Times (Min: Sec)

P.O. # _____ Type: _____ Rating: _____ Amps

Batch#/Lot#/Date Code: _____ Manufacturer: _____

<u>Sample</u>	<u>Time (Min: Sec)</u>	<u>Sample</u>	<u>Time (Min: Sec)</u>
1	_____	10	_____
2	_____	11	_____
3	_____	12	_____
4	_____	13	_____
5	_____	14	_____
6	_____	15	_____
7	_____	16	_____
8	_____	17	_____
9	_____	18	_____

500% Current Test (Time Delay Types Only):

Tested _____, # Failures _____, # Tested Acceptable _____

Test Current (Amps) _____

Clearing Times (Min: Sec)

<u>Sample</u>	<u>Time (Min: Sec)</u>	<u>Sample</u>	<u>Time (Min: Sec)</u>
1	_____	6	_____
2	_____	7	_____
3	_____	8	_____
4	_____	9	_____
5	_____	10	_____

Completed by: _____

Signature

Title

Date

P.O. # _____ Type: _____ Rating: _____ Amps

Batch#/Lot#/Date Code: _____ Manufacturer: _____

6. Test Summary

Explanation of any fuse failures or rejection (Also include description of any testing errors):

#Returned to Ginna _____

Reviewed by: _____

Signature

Title

Date

7. Final Acceptance/Rejection:

Remarks: _____

in Lot Rejected _____, # Accepted _____,

Placed in Stock _____

Completed by: _____
QC Date

File with completed P.O.

and send copy to NES Electrical Engineering

P.O. # _____ Type: _____ Rating: _____ Amps

Batch#/Lot#/Date Code: _____ Manufacturer: _____

**Attachment III
Instruction for Fuse Installation
Revision 8**

1.0 Purpose

1.1 The purpose of this Attachment to EE-100 is to establish a procedure for fuse installation/replacement in the safety related and safety significant distribution systems at Ginna Station. Inspection requirements associated with fuse replacement are also outlined in this attachment.

1.2 Fuse installation and replacement performed in accordance with this attachment will provide the necessary assurance that coordination within the distribution systems is accomplished and maintained. In addition, the documentation process associated with fuse installation and replacement shall continually update and control the coordination effort.

2.0 References

2.1 None

3.0 General Requirements

3.1 Prior to acceptance, fuses shall be subjected to a series of inspections and tests to assure a high level of reliability that they will properly respond to faults as assumed in the system design. Fuses accepted for use shall be clearly marked with a green dot on standard fuses and a red dot on glass fuses.

3.2 As stated in section 7.1 of EE-100, control configuration drawings (03022 series) that provide information on particular fuses list all fuse types and sizes in 1E panels. The appropriate drawing will be consulted whenever fuse replacement is performed. The sheet shall identify the fuse #, design amperage, the service or load protected by the fuse, the location of service, the associated elementary drawing (if any) and the required fuse type for the particular application.

4.0 Fuse Installation

4.1 Replacement of an Existing Fuse

The following steps shall be strictly adhered to whenever an existing fuse is being replaced.

- 4.1.1 Determine the "required fuse" for the particular application from the 03022 series control configuration drawing applicable to that cabinet. A fuse requires replacement if a) the existing fuse type differs from that on the controlled configuration drawing, b) the existing fuse is illegible (i.e. the label has been scraped or scratched off) or c) the fuse is being changed out as the result of normal maintenance.
- 4.1.2 If the drawing calls for a fuse and no fuse exists, verify that no service exists and indicate that the position is "spare" on an appropriate document (ie, MDCN, DCR, ACTION, etc.) and submit to engineering. If a service does exist, verify that it is not simply out of service per operations or maintenance.
- 4.1.3 Similarly, if the drawings indicate a "spare" and a fuse exists, use an appropriate document (ie, MDCN, DCR, ACTION, etc.) to specify the undocumented service and submit to Engineering for evaluation. All spare or future positions when not in use shall not have fuses in place.
- 4.1.4 Take appropriate administrative steps to either declare the particular system out of service or install a jumper (for circuits of 40 amps or less) in order to remove the existing fuse. The jumper cable and clips shall have an ampacity greater than or equal to the fuse being jumpered. Record the existing fuse type and size. All work shall be performed in a timely manner.
- 4.1.5 Prior to installation of the new fuse, the fuse holder shall be inspected in accordance with section 8.2 of EE-100. Should the fuse holder need replacement, refer to section 5.0 of this attachment for guidance.
- 4.1.6 Prior to installation of the fuse, verify, if possible, that the device (service) listed on the drawing is correct. If the fuse feeds additional services which do not appear on the drawing (i.e., more than one pair of wires, yet one service listed on drawing), or if the service is incorrect for the position, document any vital information on an appropriate document (ie, MDCN, DCR, ACTION, etc.) and submit to Engineering for evaluation.
- 4.1.7 Install the correct fuse listed on the drawing. To the extent possible, install fuses with the fuse type and current rating facing outward.

4.1.8 If the fuse blows upon installation, replace with the acceptable type of fuse the same size as the original fuse and initiate an appropriate document (ie, FCR, NCR, etc.).

4.2 **Installation of a New Fuse**

4.2.1 Any fuse requiring installation as part of a new system or modification to an existing system shall be listed on the control configuration drawings dedicated to the fuses, in addition to any other applicable construction documents, and issued for construction. Appropriate remarks shall also be included, such as whether or not a fuse clip change is required, the circuit is to be spared, etc.

4.2.2 Selection of a fuse shall be based upon a thorough study of the main and branch fuses and breakers of the affected panel/equipment. The coordination criteria defined in section 5.0 of EE-100 must be demonstrated for any new fuse installed. In addition, the fuse must protect the cable associated with the new system in accordance with section 4.3 of EE-100.

4.2.3 Selection of a particular fuse type for installation into a new system or modification shall be limited to those listed in Table 1 of EE-100. Other fuse types can be utilized but they shall be subject to the testing and inspection requirements identified in this specification. As new types of fuses are utilized in the distribution systems at Ginna Station, Specification EE-100 shall be revised to include these new fuse types.

4.2.4 Install the new fuse per sections 4.1.4 through 4.1.8 of this attachment.

5.0 **Fuse Holder Installation**

5.1 Fuse holders require replacement as a result of

- a) failure to pass inspection criteria defined in section 8.2 of EE-100,
- b) fuse holders installed for a new system or modification, or
- c) the drawings dedicated to the fuse systems specify a fuse holder change is required. Installation of fuse holders shall comply with the following:

- 5.1.1 All fuse holders used in the distribution systems shall be rated at no less than the operating voltage of the system in which they are installed. Various types of fuse holders are described in section 8.1 of EE-100. Fuse holders shall be purchased and inspected per section 10.2 of EE-100.
- 5.1.2 New or replacement fuse holders shall be installed using all mounting hardware provided with the fuse holder (i.e., all mounting holes must be utilized, and fasteners shall be snug tight).
- 5.1.3 Fuse reducers shall be installed in accordance with RG&E drawing 10904-392.
- 6.0 Use of Frank Adams "Pull-Type" Fuse Holders.**
- 6.1 The Frank Adams fuse holder cover can be installed in the fuse holder in either the "on" position or "off" position. Care must be taken when replacing the fuse cover into the fuse holder to insure the proper orientation of the cover. Verifying the correct position of the fuse holder is necessary to insure a circuit that should be energized is "on" or a circuit that should be deenergized is "off".
- 6.1.1 If the circuit is energized, the voltage should be measured across the fuse block after installation and verified that the voltage is essentially 0 volts. This ensures that the fuse block is in the energized "on" position and continuity exists.
- 6.2 General purpose lubricant can be used only on the clips of the Frank Adams fuse holder cover for lubricating purposes. When fuses are installed in the clips, the clips expand resulting in a very tight connection between the fuse holder cover and the fuse holder. A small amount of lubricant will provide for easier installation and removal of the fuse holder cover. The fuse clips should be examined for deformation of the blades or excessive lubricant and dirt before reinstallation. The fuse holder shall be replaced or cleaned and greased as necessary. Lubricants cannot be used on any other fuse holders.

Attachment IV
Specification EE-100, Rev. 8

Critical Characteristics and Acceptance Criteria

Critical Characteristic	Acceptance Criteria	Bases For Critical Characteristic
<p>Visual Inspection</p> <p>1. Markings</p> <p style="padding-left: 20px;">a. Part Number</p> <p style="padding-left: 20px;">b. Current Rating</p> <p style="padding-left: 20px;">c. Voltage Rating</p> <p>2. Damage</p>	<p>Visual inspection to verify that fuse marking are readable and that fuses are not damaged.</p>	<p>Readable markings ensure proper identification of items received and proper design application.</p>
<p>Outside Dimensions</p>	<p>Outside dimensions shall comply with section 6.2.1.a of specification EE-100.</p>	<p>Outside dimensions are critical to ensure that the fuses will properly fit in the fuse holder for which it is designed.</p>
<p>Current Capacity Test</p>	<p>Current capacity test shall be performed in accordance with the sampling and acceptance criteria of section 4.3.1 of Attachment I to EE-100.</p>	<p>Current carrying capacity test verifies fuses ability to carry the designed ampere rating of fuse.</p>
<p>Destructive Test</p>	<p>Destructive test shall be performed in accordance with the sampling and acceptance criteria of section 4.3.2 of Attachment I to EE-100.</p>	<p>The 135%, 200% and/or 500% clearing time test were selected because they represent the most difficult portion of time current characteristic curve.</p>

Apr-07-98 02:06P

ATTACHMENT V

Cooper Industries
Bussmann Division
P.O. Box 14460
St. Louis, MO 63178-4460

TO: MARY LEYER
FAX# 771-3907

FROM: J KOWAL
1-800-322-1577 X 8484

The logo for Cooper Bussmann, featuring the word "COOPER" in a bold, sans-serif font above the word "Bussmann" in a similar font. A horizontal line is positioned between the two words, and a small black triangle is located above the "O" in "COOPER".

Date: April 7, 1998
To: John Kowal
From: Ed Koepke
Subject: Ginna Nuclear Power Plant

John,

I have reviewed the Ginna specification and how to modify this to allow for the FW series of fuses to be qualified

The overall specification is very well written for standard power fuses designed to the old Underwriters Laboratories (UL) standard 198 specification. The new specification is UL Standard 248 is very similar to the old UL 198, except for some minor changes

If Ginna wishes to pursue those slight modifications, I recommend that they purchase the new standard. All power fuses meet the new standard without any modifications in the testing requirements

The problem that Ginna has in qualifying the FW series of fuses is that they are trying to test the FW's to a UL 198 standard that these fuses are not designed to. The FW series, and the competitive equals, are designed for short circuit protection only. The current FW fuses are not designed to open under an overload condition below 300 percent of the fuse rating

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The following are the suggestions that I believe will work for Ginna and meet the qualification process:

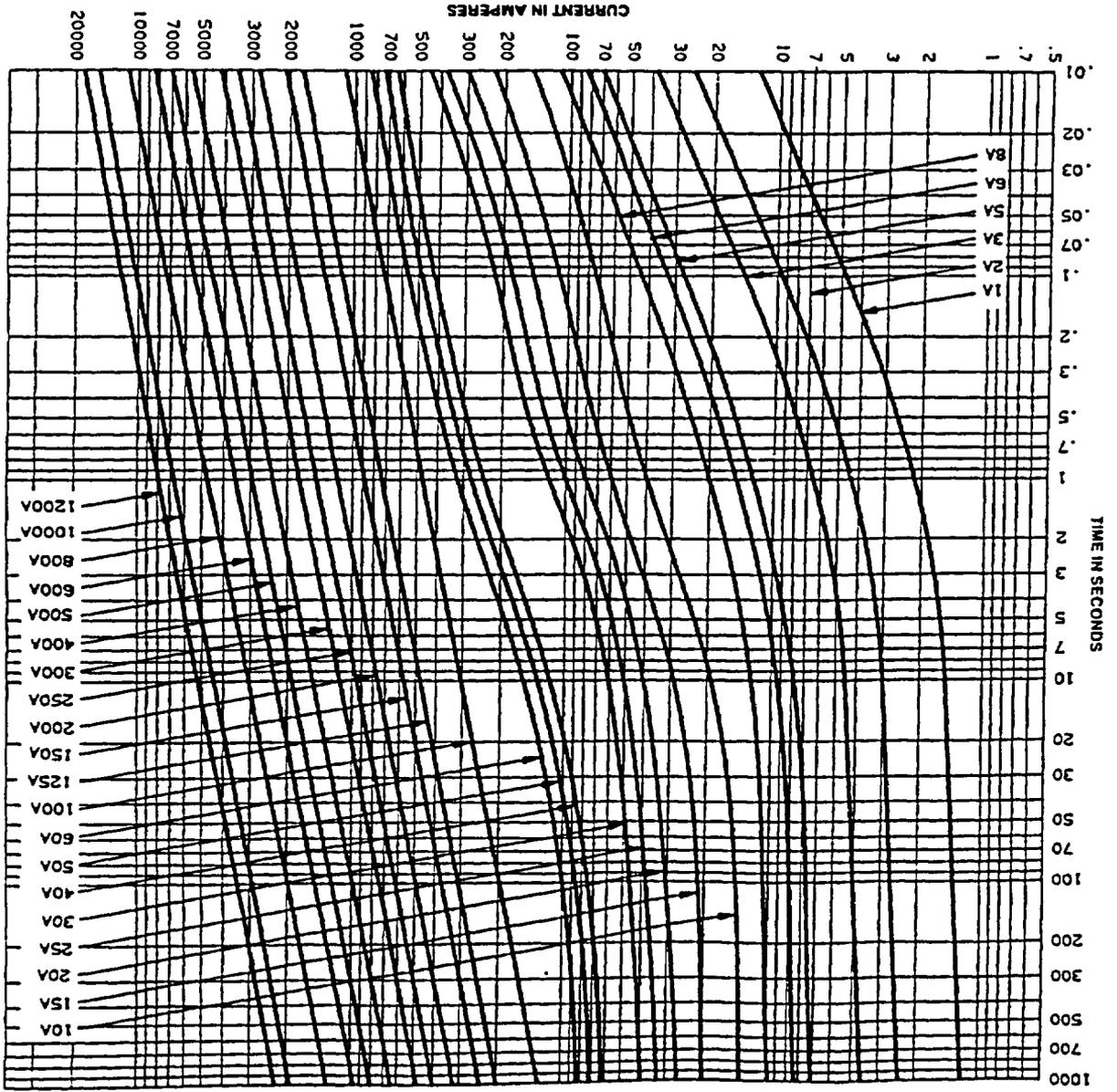
1. The following fuses should all be Bussmann QA Certified with a Certificate of Compliance that the fuses have met the manufacturing resistance tolerances prior to shipping from Bussmann.
 - FWA 2 - 800 amps 150 volt
 - FWX 1 - 1000 amps 250 volt
 - FWH 1 - 1000 amps 500 volt
 - FWP 1 - 1000 amps 700 volt
2. These fuses can be tested to fault currents of 300 to 500 percent of the fuse ampere rating. The opening time shall be equal to or greater than the minimum melting time provided in current production time current curves. These curves should be requested and shipped with every fuse order.
3. Maximum interrupting currents and I^2t data can be performed at Bussmann or at other testing facilities that can generate up to 200,000 amps of available current. These fault currents would be required to verify that the fuse meets the values that are published within Bussmann's catalogs.
4. The FWA, FWX, FWH and FWP fuses are designed to meet a UL recognized specification. These tests occur every year to ensure that the fuses meet the same criteria without changes to the original recognized specification.
5. Bussmann has an open invitation for Ginna personnel to visit our testing facility and oversee some of the testing and the QA process that the FW fuses are manufactured to

Without more sophisticated test equipment, many of the qualified test that Bussmann performs cannot be verified correctly. These tests are very difficult to verify outside of a laboratory environment. That is why I suggest that Ginna visit the Gubany Test Facility.

If you have any further questions, please feel free to contact me

Amp-trap[®]
 Form 600 Fuses
 A2Y/A6Y

Melting Time—Current Data
 1-600 Amperes, 250 or 500 Volts—Types 1A or B
 850-1200 Amperes, 500 Volts—Types 2 or 3



ATTACHMENT VI