NRC 8/27/90

SAFETY LIGHT CORPORATION

4150-A OLD BERWICK ROAD, BLOOMSBURG, PA 17815

717-784-4344 FAX 717-784-1402

7 August 1990

U.S. Nuclear Regulatory Commission
Division of Fuel Cycle & Material Safety
Material Licensing Branch
Washington, D.C. 20555

Gentlemen:

It has been brought to my attention recently that a Safety Evaluation Report was either never issued or, if it was issued, was misplaced somewhere along the line.

The licensed device I am referring to is Safety Light Corp. Model No. 880-12-6-XX. This device, which is a commercial exit sign, was licensed back in 1977 under NRC License #37-00030-09G.

The prototype test reports and the safety analysis is a part of the correspondence in that license.

Attached to this correspondence is information, which you may require, that was formatted after a similar Safety Evaluation Report for a different model of Safety Light Corp. commercial exit sign.

Should you have any further questions, please contact the undersigned.

Regards,
SAFETY LIGHT CORPORATION

Larry Harmon

Larry Harmon
Plant Manager

LH:cwl
enclosure

B
19

SAFETY LIGHT CORPORATION

MODEL: 880-12-6-XX (XX Denotes the useful life of the sign.)

MANUFACTURER/DISTRIBUTOR: Safety Light Corporation
4150-A Old Berwick Rd.
Bloomsburg, PA 17815

SEALED SOURCE MODEL DESIGNATION: Safety Light Corp. Model LAB-785 Light Source (Maximum of 12 per device)

ISOTOPE	MAXIMUM ACTIVITY
Hydrogen-3	25 Curies Total

LEAK TEST FREQUENCY: Not Required

PRINCIPLE USE: (W) Self-Luminous Applications

CUSTOM DEVICE: No

DESCRIPTION:

The exit sign consists of an aluminum backplate, a foam insert, vinyl light-source tray, up to twelve light sources, a plexiglass diffusor and a faceplate in an aluminum frame. There is a male and female mounting bracket. The female bracket is attached to the structure. The male bracket is pop-riveted to the backplate. The sign then slides into the female bracket and is anchored by the use of setscrews. The light sources are mounted with a silicone adhesive into the vinyl source tray. The source tray, diffusor and faceplate are bonded together with a high strength double sided adhesive tape.

LABELING: The sign is labeled in accordance with the requirements of Section 32.51, 10 CFR 32.

CONDITIONS OF NORMAL USE:

The device will be installed generally on building structures and in ambient environs. The device is used as a means to mark egress.

PROTYPE TESTING: See Safety Light Corp. USNRC License #37-00030-9G.

EXTERNAL RADIATION LEVELS: There is no detectable radiation at any accessible surface of the device.

QUALITY ASSURANCE AND CONTROL: Safety Light Corp. has in place, an adequate organizational structure and sufficient personnel to assure that the device is manufactured in accordance with our Quality Assurance Program.

SAFETY LIGHT CORPORATION

The Quality Assurance Program covers the following subjects:

1. Quality Assurance Organization
2. General Quality Assurance Policy
3. Specs and/or Engineering Drawing Control & Revision
4. In-coming Inspections
5. Test Procedures
6. Operating Procedures
7. Non-conforming Items Policy (Rejects)
8. Document Control
9. Equipment Calibrations
10. Quality Audits & Reports

UNITED STATES RADIUM CORPORATION
NUCLEAR PRODUCTS DEPARTMENT
Bloomsburg, Pennsylvania 17815

QUALITY ASSURANCE PROGRAM
Isolite Self-Luminous Aircraft
Safety Devices

Prepared BY:
D. B. Cowan
Nuclear Div. Engineer

Approved BY:
W. E. Umstead
Division Manager

Revised BY:
J. D. McGraw
Plant Manager

3-9-78
Rev. F

REVISIONS

Sym.	Description	Date	Approval
A	Re-written	5-24-72	
B	Add to 2.2, 2.4.2, 4.2.4.1, 6.3	8-23-72	
	Added 3.2.7, 3.8, 4.2.4.4		
	Added Form 84-51		
C	Added 1.4, 3.6, 6.3.1, 7.0 cover	11-13-74	
	sheet		
	Added to 2.4.3, 2.4.5, 4.2.4.3,		
	Table of Contents updated 4.2.4.4,		
	Organization Chart, Title page.		
D	Revised 2.2		
	Reviewed and audited	2-20-76	
E	Added Section 8.0		
	Revised Table of Organization		
	Reviewed and Audited	2-28-77	
F	Revised 2.3		
	Revised 4.2.4.4		
	Revised 5.5		
	Added 6.4		
	Reviewed and Audited	3-9-78	

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GENERAL

1.1 Purpose: This document is to provide written procedures and general guidance for a program that U. S. Radium Self-Luminous "Isolite" Aircraft Markers will conform with all appropriate specifications.

1.2 Scope: The Quality Control and Assurance program established by the document is to include, but not be restricted to, the control and inspection of all purchased supplies and materials, the first article of each production lot, each completed production lot of subassemblies, each lot of completed product and packaging and shipping. It also is to establish a system of documentation of these inspection results. The documentation is also to provide a means of statistical analysis of discrepancies in the various stages of the manufacturing of the product and vendor supplied materials and components.

1.3 Single Standard Quality Control: There will be no distinction between the quality level required for an item intended for military use and an identical or similar item for commercial use.

1.4 Quality Control Manual: Division Quality Control Manual 84-6000 included by reference.

SECTION 2

ORGANIZATION

2.1 Quality Control Responsibility: Where practical, the responsibility for quality of the product will be divorced from production responsibility. Figure 1 Organization Chart.

2.2 Review of Procedures and Systems: Quality Control Procedures and Systems are to be periodically reviewed and revised when necessary. Revisions are to be recorded and initialed on the revision sheet of this document. It will be the responsibility of the person initialing the revision to assure that all copies of this document are updated. Complete review of procedures and systems are to be carried out annually. This review is to be noted and initialed on the revision sheet of this document. An audit is to be carried out at this time to assure that the manual is being used and also to determine if the manual is adequate.

2.3 Availability of Quality Control Procedures and Documents. These procedures and documents are to be readily available to all U. S. Radium personnel involved with this Quality Control and Assurance program. A copy of the original Manual and all revisions shall be issued to the Chief Inspector. They are to be made available to authorized customer representatives at any reasonable time.

2.4 Control of Drawings and Specifications

2.4.1 Specifications: All specifications that pertain to each product are to be incorporated into the engineering drawing of that product. If necessary, this may be accomplished by designating the specification as an attachment to that drawing.

2.4.2 Revisions: All revisions of engineering drawings, including specifications, are to be accompanied by a letter change, a note of what change, effective date and authorizing initials. Design and/or specification changes by a customer, when the product is being manufactured to customer design, are to be promptly incorporated, by revision, into the engineering drawing. These changes are not to be instituted in production until customer approval has been obtained, if it is required by contract or purchase order requirements.

2.4.3 Availability: Appropriate drawings are to be made available to production and quality control personnel as specified in the various quality control procedures (see Par. 1.4).

2.4.4 Preparation of Inspection Specification and Check List (84-36 Rev. 1-72): This form which serves as a procedure for each inspection is to be prepared by engineering and reviewed by production supervision prior to approval.

2.4.5 Vendor Selection: Vendors with a good reputation are to be initially selected. Vendors performance record as determined by, product quality, response to non-conforming materials rejections, and prompt deliveries will be used as a basis for their continuance or discontinuance on the approved vendors list. These discrepancy records are to be maintained by Engineering. Vendors are subject to approval provision of SQA 84-1000.

SECTION 3

INSPECTION PROCEDURES

3.1 Sample Inspection Plan: Sample plan to be in accordance with customer purchase order or contract requirements. If there are no customer requirements sample plan to be in accordance with MIL-STD-105 Normal Procedure, Inspection Level II with an AQL as specified in the Inspection Specification and Check List.

MIL - STD - 105 Level II Normal

AQL			1.0%			2.5%			4.0%		
LOT SIZE			Sample Size	AC	RE	Sample Size	AC	RE	Sample Size	AC	RE
2	To	8	#	-	-	5	0	1	3	0	1
9	To	15	13	0	1	5	0	1	3	0	1
16	To	25	13	0	1	5	0	1	3	0	1
26	To	50	13	0	1	8	0	1	8	1	2
51	To	90	13	0	1	13	1	2	13	1	2
91	To	150	20	0	1	20	1	2	20	2	3
151	To	280	32	1	2	32	2	3	32	3	4
281	To	500	50	1	2	50	3	4	50	5	6
501	To	1200	80	2	3	80	5	6	80	7	8
1201	To	3200	125	3	4	125	7	8	125	10	11
3201	To	10,000	200	5	6	200	10	11	200	14	15
10,000	To	35,000	315	7	8	315	14	15	315	21	22
35,001	To	150,000	500	10	11	500	21	22	315	21	22

Instructions:

1. # Perform 100% Inspection for these Lot Sizes.
2. If sample size equals the lot size perform 100% inspection.

3.2 Forms

3.2.1 Receiving Inspection Record: Q. C. Form NO. 46-12. This form to record the receipt of materials or components from a vendor, to document their inspection and to identify them until their incorporation in a product.

3.2.2 Inspection Ticket: Q.C. Form No. 46-6 Rev. 10-63. This form to document the inspection of manufactured components and to identify them until their incorporation in a product.

3.2.3 Set-Up Inspection Sheet:Q.C. Form 84-4. This form to document inspection control of each set-up prior to the production of a lot of components.

3.2.4 Defective Material Report: Q.C. Form 84-32. This form to document receipt or manufacture of defective materials.

3.2.5 Inspection Specification and Check List: Q.C. Form 84-36 Rel. 1-72 This form is to act as a detailed procedure for inspection of each item.

3.2.6 Inspection Report: Q.C. Form 84-50. This form is to provide documentation of inspections performed per Inspection Specification and Check List. It will also service to show reoccuring discrepancies by a vendor or by a manufacturing process.

3.2.7 Nuclear Products Work Order: Form 84-51. This form is to authorize the production of components, assemblies or completed parts and to request services to Nuclear Products Department. It shall specify any special requirements such as Quality Control Inspections, etc.

3.3 Receiving Inspection

3.3.1 Procure copies of purchase order, applicable drawings and specifications.

3.3.2 Obtain the proper "Inspection Specification and Check List" (84-36 Rev. 1-72) and "Inspection Report" from vendor file.

3.3.3 Check all materials to insure that the number and product conform with the purchase order requirements and specifications.

3.3.4 Material certifications and test reports are to be filed in the vendor file.

3.3.5 Note the invoices lot size and refer to the sample plan specified in Inspection Specification and Check List to determine the sample size required.

3.3.6 Select a random sample of the specified size from the total quantity in the lot.

3.3.7 Perform the inspection as directed by the Inspection Specification and Check List and record on Inspection Report.

3.3.8 Lot Acceptance: The lot will be accepted when the total number defects found in the sample does not exceed the acceptance number specified in the sample plan in use. Record inspection in Inspection Report and form 46-12 Receiving Inspection. Attach proper Receiving Inspection copy to materials or components.

3.3.9 Lot Rejection: The lot shall be rejected when the total number of defects found meets or exceeds the rejection number of the sample plan. Note this on form 46-12 and Inspection Report. Notify engineering for disposition of parts or materials.

3.3.10 Products will be periodically sampled and tested to assure compliance with purchase order requirements, this is to include all products accepted on the basis of certification and/or test reports. This activity and the results of such are to be entered on the appropriate Inspection Report. This sampling and testing is to be carried out on a yearly basis unless the suppliers performance record indicates more frequent testing.

3.4 Set-up Inspection

3.4.1 Fill out Form No. 84-4 Setup Inspection Sheets from Form No. 84-36 Inspection Specification and Check List for the required Job No.

3.4.2 Manufacturing is not to proceed until the complete setup has been verified by Quality Control Personnel or under a deviation from Engineering.

3.5 Component Inspection (Pre-Finish)

3.5.1 Obtain Form No. 84-36 Inspection Specification and Check List and Form No. 84-50 Inspection Report from the job no. file.

3.5.2 Note the lot size and refer to the Inspection Specification and Check List to determine the sample size required.

3.5.3 Select a random sample of the specified size from the total quantity in the lot.

3.5.4 Perform the inspection as directed by the Inspection Specification and Check List and record this on the Inspection Report.

3.5.5 Lot Acceptance: The lot will be accepted when the total number of defects found in the sample does not exceed the acceptance number specified in the sample plan in use. Complete Form No. 46-6, Inspection Ticket. Attach the proper copy to the components.

3.5.6 Lot Rejection: The lot shall be rejected when the total number of defects found meets or exceeds the rejection number of the sample plan. Note this on the Inspection Report and Inspection Ticket. Notify Engineering so that appropriate corrective action may be taken.

3.6 Final Inspection

3.6.1 Obtain Form No. 84-36 Inspection Specification and Check List and Form No. 84-50 Inspection Report from the Job No. File.

3.6.2 Note the lot size and refer to Inspection Specification and Check list to determine the sample size required.

3.6.3 Select a random sample of the specified size from the total quantity in the lot.

3.6.4 Perform the inspection as directed by the Inspection Specification and Check List and record this on the Inspection Report. Use serial numbers to identify the lot.

3.6.5 Lot acceptance: The lot will be accepted when the total number of defects found in the sample does not exceed the acceptance number specified in the sample plan being used. Complete form No. 46-6 Inspection Ticket. Attach the proper copy to the products. Use serial numbers to identify the lot.

3.6.6 Lot Rejection: The lot shall be rejected when the total number of defects found meets or exceeds the rejection number of the sample plan. Note this on the Inspection Report and Inspection Ticket. Notify Engineering so that appropriate corrective action may be taken.

6.4 BRIGHTNESS MEASUREMENT PROCEDURE

Purpose: To determine brightness of self-luminous light sources.

Principle: Comparison of brightness of a known standard with the unknown sample using a microphotometer (other suitable devices can be substituted, if necessary).

Equipment: American Instrument Co. Photomultiplier Microphotometer Model No. 10-213 with various apertures and fiber optics.

(Note: Instrument is normally left on in the "Zero Adjust" position.)

Standards:

LS105	(used for measuring L1614 sources)
LS110	(used for measuring 4009 sources)
#173	(used for measuring 150YT and low brightness 4009 sources)
LS50	(used for measuring 38mT sources)

Other standards are available for these and other colors.

Procedure:

A. Large devices incorporating Tritium gas.

1- Insert 1/8" fiber optic in holder over photomultiplier tube.

2- Adjust photometer zero with "Zero Adjust" knob.

3- Open shutter on photomultiplier tube holder.

4- Place fiber optic against face of appropriate standard.

5- Adjust "Meter Multiplier" switch until meter deflection is within range of the value of the standard.

6- Using "Sensitivity" knob, adjust meter deflection to correlate with the value of the standard.

rocedure (continued):

7- Close shutter and adjust meter zero, if necessary, using "Dark Current" knob.

8- Open shutter and check meter deflection against standard. Repeat steps 6 and 7 as necessary until no adjustment is necessary.

9- Remove standard.

10- Place fiber optic against sample to be measured and record observed values in log.

Note: On illuminated legend signs, measure one point on centerline of each letter. On illuminated background signs, measure a minimum of three points, upper left quadrant, center, and lower right quadrant.

B. Small devices incorporating Tritium gas and devices incorporating Tritium paint.

1- Insert appropriate aperture in holder over photomultiplier tube.

Proceed as in A.2-10 above, only placing standard or sample on aperture.

Note: When measuring dry powders of Tritiated phosphor, tap bottom of vial three times before measuring.

DECAY CORRECTION OF SELF-LUMINOUS STANDARDS

Due to radioactive decay, self-luminous brightness standards must be corrected periodically (nominally, every one-twentieth of a half-life, i.e., every 6 months for Tritium and Krypton-85).

The formula for correction is

$$B = B_O e^{\frac{-0.693t}{T_{\frac{1}{2}}}}$$

where B_O = brightness at some original time

B = brightness after time t

t = elapsed time between time of B_O and time of B

$T_{\frac{1}{2}}$ = half-life of a specific element

$T_{\frac{1}{2}}$ for Tritium = 12.45 yrs

$T_{\frac{1}{2}}$ for Kr-85 = 10.27 yrs

$T_{\frac{1}{2}}$ for Sr-90 = 28 yrs

Section 7.0

Facsimiles of Forms

U. S. RADIUM CORPORATION
BLOOMSBURG, PENNSYLVANIA

Q.C. FORM No. 46-12

Receiving Date _____

RECEIVING-INSPECTION RECORD

RI 43172

Source _____

Address _____

CUSTOMER PARTS ☐ VENDOR PARTS ☐

CARRIER	RAILEX ☐ AIR EX ☐	PARCEL POST ☐	DELIVERED ☐	PICK UP ☐	PREPAID ☐ COLLECT ☐ $

WAYBILL NO.	S.O. OR W.O. NO.	REC. CLERK	REC'D BY
SHIPPERS COUNT	PART NAME		P.O. NO.
U.S.R. COUNT	PART NO.	REV.	U.S.R. NO.

FOR DEPT. ➔	LP ☐	DP ☐	LITHO ☐	BH ☐	LAB ☐	ENG ☐	STORES ☐	OTHER

	ITEM	QUANTITY	VARIATION	DISPOSITION
1	TOTAL RECEIVED			
2	ACCEPTED			
3	ACCEPTED ON VARIATION			
4	TOTAL ACCEPTED			
5	REWORK			
6	RETURN TO SOURCE			
7	HOLD FOR M.R.B.			
8	SCRAP			
9	TOTAL REJECTED			

DATE REC.	DATE INSP.	INSPECTOR	INSP. SPVR	M.R.B. ACTION YES ☐ NO ☐

Remarks:

INSP APPR'VL

ENG APPR'VL

PROD. APPR'VL

APPR'VL

Signed

DATE

N2 7192

INSPECTION TICKET

UNITED STATES RADIUM CORPORATION

Form No. 46-6 Rev. 10-63

JOB No.		Item	DISCREPANCY	Qty.	Disposition
PN/ECL/REV					
BT					
CUSTOMER					
DESCRIPTION					
DEPT.	TYPE INSP.				

INSPECTION	I	II	REVIEW DATA / CORRECTIVE ACTION / SPECIAL INSTRUCTIONS
LOT SIZE			
ACCEPT			
REWORK			
SCRAP			
DATE			

94887

4150 OLD BERWICK ROAD / BLOOMSBURG, PA. 17815

DEFECTIVE MATERIAL REPORT

No._____

SOURCE	COPIES TO DEPARTMENTS								DATE
☐ VENDOR ☐ CUSTOMER ☐ U.S.R.									

JOB No.		CUSTOMER-VENDOR			
PART No.		PART NAME			
DRAWING No.		LOT QUANTITY		INSPECTION QTY.	
PURCHASE ORDER No.	QTY.	QUANTITY	ACC	REJ	MRB
SALES ORDER No.	QTY.	INSP. REPORT No.		DATE	

1. REASON FOR REJECTION:	QTY

ISSUED BY:	DATE	INSPECTED BY:	DATE:

2. CHARACTERISTIC VARIATION

DIMENSION	TOLERANCE		ACTUAL	REMARKS

3. MATERIAL REVIEW BOARD INSTRUCTIONS:

USE AS IS	SCRAP	REWORK	RESPONSIBILITY	RETURN TO VENDOR
QTY.	QTY.	QTY.	☐ USR ☐ VENDOR	QTY.

4. PURCHASE DEPARTMENT INSTRUCTIONS:	VALUE: UNIT $	LOT $

COSTS CHARGED TO			
REWORK		SCRAP	
UNIT $		UNIT $	
LOT $		LOT $	

REWORK BY: VENDOR ☐ U.S.R. ☐

ESTIMATED BY: DATE:

APPROVED BY: DATE:

TITLE:

REWORK BY: DEPT.

DEPT. CHARGED | $ | HRS.

5. PURCHASE DEPARTMENT APPROVAL		6. QUALITY CONTROL DEPARTMENT APPROVAL	
BY:	DATE	BY:	DATE

OPERATION CODE

RT	Route	LA	Lathe	LOC	Location
ML	Mill	TP	Tap	CD	Counterdrill
DR	Drill	ED	Edge	CB	Counterbore
RM	Ream	FM	Form	CS	Countersink

Q[illegible]Y CONTROL FORM No. 84-4

SET-UP INSPECTION SHEET

MATERIAL	THK & TOL	PO/RI	INSP

LOT IDENTIFY BT	Sub Lot	JOB No.	
DATE START		QUANTITY REQUIRED	MAX: MIN:
FINISH DATE		QUANTITY TO INSPECTION	

CODE	DESIG.	QTY	DIMENSION & TOL	FIRST INSPECTION					SECOND INSPECTION					OPER CLOCK No.	SHIFT	DAT
				ACTUAL	OFF NOM	R	A	INSP	ACTUAL	OFF NOM	R	A	INSP			

3.7 Packaging and Shipping Inspection: This function to be carried out by the person or persons transporting the inner packed units from the production storage area to the Shipping Room.

3.7.1 Obtain the production copy of the Sales Order.

3.7.2 Check customer file to determine if there are any special customer packaging specifications.

3.7.3 Verify that the packaged product or products are as shown on the Sales Order.

3.7.4 Verify the number of units by the serial numbers used for the shipment.

3.7.5 Verify that the labeling and packaging comply with the various regulations for the shipment of radioactive materials.

3.7.6 Stamp production copy of Sales Order and record date of shipment, Item No., No. of units and serial numbers.

3.7.7 File production copy of the sales order in either the open order or the completed order file.

3.8 First Article Inspection

3.8.1 Obtain Form No. 84-36 Inspection Specification and Check List and Form No. 84-4 Set-up Inspection Sheet.

3.8.2 Obtain copies of the appropriate purchase order and/or contract to which the parts must conform.

3.8.3 Perform the inspection as directed by the Inspection Specification and Check List and record all measurements, etc. on the Set-Up Inspection Sheet.

3.8.4 Mark the Set-up Inspection Ssheet boldly with the words "First Article"/

3.8.5 In event the first article should not conform to all requirements it will be the responsibility of Engineering to modify production procedures and/or tooling to produce parts that do conform to all requirements.

SECTION 4

RECORDS AND STAMPS

4.1 Records

4.1.1 All forms as described Section 3 Procedures are to be filled out as required by the procedures and retained as evidence of inspection.

4.1.2 All records are to be retained 5 years or longer if requested by the customer.

4.2 Inspection Stamps: The following system will be used to identify the inspection status of a component or end product, the type of Inspection performed and the identity of the inspector.

4.2.1 Inspection stamps will only be used by authorized Inspection Personnel or other personnel with specific authorization to inspect a designated feature.

4.2.2 Marking of Inspection Identification: When practical the applicable stamp impression will be made directly on a surface of the component or product. Where it is not practical to stamp the component or product the items will be accompanied by a stamped Inspection Ticket to identify them.

4.2.3 Inspection Stamp Designations: The following Stamp Types and configurations will be used to indicate the inspection status and/or disposition.

4.2.3.1 Acceptance, Receiving, Set-up and Component Inspection: This stamp is used to identify parts that are in conformance with applicable Drawing and Specification Requirements. (Facsimile of Stamp)

USRC 07

4.2.3.2 Acceptance: Final Inspection: This stamp is to indicate that the finished product conforms to all specifications and requirements. (Facsimile of Stamp)

4.2.3.3 Rejection: This stamp is to identify all non-conforming components or products (Facsimile of Stamp)

4.2.4 Inspection Stamp, Control and Use: Issuance and use of Inspection stamps will be in accordance with the following requirements.

4.2.4.1 Each Inspector or authorized person will be issued the stamp(s) required to perform his duties. These stamps must be used in all instances.

4.2.4.2 Defective or Worn Inspection Stamps causing illegible impressions will be returned for repair or replacement.

4.2.4.3 Records will be kept on file as to the issuing and possession of each stamp by tool room group leader.

4.2.4.4 The following personnel are authorized to sign and date in ink an inspection in emergency instances: J. D. McGraw and J. J. Hower.

SECTION 5.0

TOOL AND GAGE, CALIBRATION AND CONTROL

5.1 Tool and Gage, Calibration and Control:

Scope: This procedure provides for the maintenance of suitable gages and other inspection, measuring, and testing devices necessary to check supplies for conformance to customer requirements; e.g., procured items fabricated and processed parts. Such instruments will be checked with suitable measuring equipment at established periods to assure continued accuracy, and appropriate records will be maintained.

5.2 Responsibility:

The authority and responsibility for calibration of all gages, measuring and test equipment used by the Quality Control Department is vested in the Quality Control Manager. This individual will be responsible for the maintenance of a tool and gage control system that is in compliance with applicable specifications.

5.3 Records of Calibration:

5.3.1 Control Card: The Quality Control Department will maintain a record card QCF No. 13 for each tool, gage and measuring instrument under its control, listing serial number, description, actual measurements taken, etc.

5.3.2 Inventory: The Quality Control Department maintains an inventory of all applicable tools, gages, and measuring equipment, and will list the descriptions, assigned numbers, and locations. This inventory will be revised periodically.

5.4 Procedure for Calibration:

5.4.1 The tool, gage, or instrument will be assigned a number which will be marked on or affixed to it in a permanent manner.

5.4.2 Actual readings will be recorded during calibration when possible. Additional pertinent data will be inserted on the record card referred to in the preceding section.

5.4.3 The time interval between calibration periods will be specified based on the type of tool or instrument, prior experience, and anticipated use. A visible card file is used as a "tickler" to identify which gages need to be checked and when.

5.4.4 The calibration period may be increased or decreased by the Quality Control Manager, based on the frequency of use of the tool, gage, or instrument.

5.4.5 Mechanical, electro-mechanical or hand measuring devices will be calibrated using certified gage blocks, surface standards, optical flats, supermicrometer, visual gages or other standard gaging devices as required by MIL-STD-120, "Gage Inspection".

5.4.6 After calibration, results will be posted on the record cards providing a history of accuracy or degree of error, if any. A sticker will be affixed to each item bearing the date when the next calibration is due.

5.4.7 Spot checks will be made at random between stated calibration periods, to ascertain if the instruments are maintaining required tolerance or accuracy.

5.4.8 When a gage or instrument is damaged, it will be withdrawn from use. All such gages will be segregated pending ultimated disposition.

5.4.9 A red tag recording the date, reason for rejection and the inspector's signature will be attached to a rejected or damaged item. This same information will be entered on the Record Card.

5.4.10 Personnel will report promptly any damage to tools, gages, or test equipment, and submit them to the Quality Control Manager for calibration and recertification.

5.4.11 Gages will not be allowed to remain in use when beyond gage tolerance.

5.4.12 The unilateral system of tolerancing shall apply to gaging members. All gage makers' tolerances are to be taken within the part tolerances or limits with the following exception: Gages such as special plug or thread gages, the point of inspection shall be taken approximately 25% from the entering end of the gage, this allowing the entering end of the gage to wear a slight amount. For example, a total length of a gage member is one inch. The check for wear will be made 1/4" back from the entering end. If the gage is within tolerance at this point and for the balance of the length, the slight variation from this point to the entering end should not effect the proper dimensional control of the end product.

5.4.13 The accuracy of electronic devices and test equipment is assured by the maintenance of scheduled calibration at established intervals as requirements may direct. The implementation of the schedule is the responsibility of technicians assigned to this service by the Manager of Engineering and shall include the documentation of appropriate records to substantiate this accomplishment. Certification of this equipment shall be provided as requirements dictate by qualified testing facilities whose reference standards are traceable to the National Bureau of Standards.

5.4.14 Personally owned tools, gages, and measuring equipment cannot be used for inspection or acceptance of material being produced to contractor's requirements. Personally owned tools can be used for checking during manufacturing only when tolerances of the product are not critical. Manufacturing departments supervisor's personally owned tools will be used as reference masters for close tolerance work, and will be inventoried and calibrated in the same manner as company owned tools.

5.4.15 Records on all master gages (gage blocks, surface plates, setting rings, etc.) will be maintained as an integral part of the record system. All such gages will be recertified periodically by approved sources whose reference standards are traceable to the National Bureau of Standards.

5.5 Calibration Frequency

5.5.1 Calibration frequency of mechanical measuring instruments shall be performed at specified intervals as follows:

A. Two (2) months

1. Intre-Micrometer
2. Outside Micrometer
3. Chamfer Micrometer
4. Vernier Caliper
5. Dial Indicators
6. Comparator, Optical Contour
7. Protractor, Vernier
8. Drill Blanks

B. Six (6)Months

1. Inside Micrometer
2. Depth Micrometer
3. Super Micrometer
4. Hole Gages
5. Radius Gages
6. Thickness Gages
7. Wiedemann Coordinate Checker
8. Pla-Check

C. Twelve (12) Months

1. Parallels
2. Height Gages
3. Scales
4. V-Blocks
5. Sine Bar

D. Two (2) years

1. Gage Blocks (Master Set)
2. Thread Wires

E. Five (5) years

1. Squares

2. Gage Blocks (Shop Use)

F. Six (6) years

1. Surface Plates

2. Angle Plates

5.5.2 Exceptions to the above are as follows:

1. Hardness Tester - Checked Each Setup to Master

SECTION 6

MISCELLANEOUS PROCEDURES

6.1 Material Storage: All supplies and materials are to be stored under conditions to prevent contamination, corrosion or deterioration. Materials are to be used on a first in--first out basis. The "Receiving Inspection" form attached or included as per 3.3.8 is to be used to determine which lot is to be withdrawn from the storage area.

6.2 Special Processes

6.2.1 Special Processes - In Plant: Special processes performed in plant are to be controlled by inspection in accordance with the requirements of an "Inspection Specification and Check List" (84-36 Rev. 1-72). This Specification and Check List is to assure the quality of the product and that the procedure for this special process was followed.

6.2.2 Special Processes - Sub Contracted: No special processes are being sub-contracted at present. If the need should arise, customer approved sub-contractors are to be selected, or a procedure for selection will be set up at that time.

6.3 Discrepant Materials Controls: All discrepancies as determined by the various inspection procedures are to be labeled as such and where feasible removed from the work area. Engineering is to be notified immediately. Engineering then has the responsibility of determining.

A. Cause of discrepancy and corrective action.

B. Maintain appropriate records to evaluate any trends in discrepancies.

C. Specify dispostion of discrepant products.

1) Authorize and supervise disposal.

2) Authorize and if necessary prepare special procedures for rework of product.

3) Authorize and if necessary prepare special "Inspection Specification and Check List" to sort entire lot for discrepant and non-discrepant products.

4) Obtaining customer disposition or approval on parts that deviate from drawing or specification requirements but that may be functionally satisfactory.

6.3.1 Material Review Procedure as per Division Quality Control Manual procedure 84-6137.

INSPECTION SPECIFICATION AND CHECK LIST

SPECIFICATION NO. ______________________ REV. __________

JOB NO. ______________________

USR P/N ______________________

CUSTOMER OR VENDOR ______________________

USR DWG. NO. ______________________ REV. __________

DESCRIPTION ______________________

PREPARED BY ______________ DATE ______________ APPROVED BY ______

FEATURE	AQL. LEVEL	VALUE	TOLERANCE	REMARKS

INSPECTION REPORT

SPECIFICATION NO. ____________________ REV. ____________

JOB NO. ____________________

USR P/N ____________________

CUSTOMER OR VENDOR ____________________

USR DWG. NO. ____________________ REV. ____________

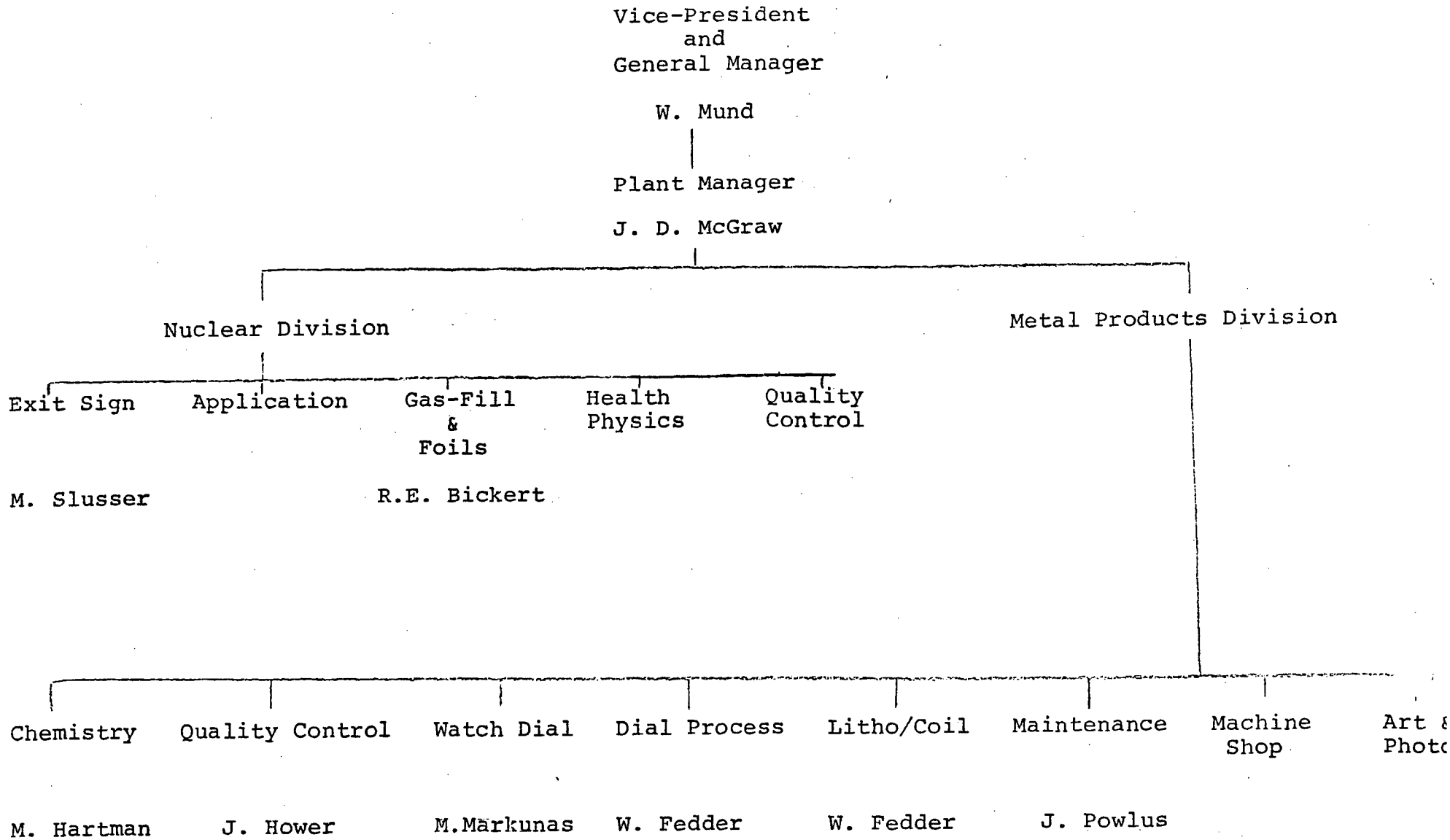
DESCRIPTION ____________________

DATE	P.O. OR W.O NUMBER	LOT SIZE	SAMPLE SIZE	ACC. NO.	REJ. NO.	NO. OF REJECTS	ACCEPT REJECT	INSPECTOR

SECTION 8

SYSTEM PHYSICAL AUDIT FORM

Section	Date and Initials	Date and Initials	Date and Initials	Date and Initials	Date and Initials	Date and Initials	Date and Initia
1.1	3-9-78						
1.2							
1.3							
2.1							
2.2							
2.3							
2.4							
3.1							
3.2							
3.3							
3.4							
3.5							
3.6							
3.7							
3.8							
4.1							
4.2							
5.1							
5.2							
5.3							
5.4							
5.5							
6.1							
6.2							
6.3							
6.4							
7.0							
8.0							


Vice-President
and
General Manager
W. Mund
Plant Manager
J. D. McGraw
Nuclear Division
Metal Products Division
Exit Sign
M. Slusser
Application
Gas-Fill
&
Foils
R.E. Bickert
Health
Physics
Quality
Control
Chemistry
M. Hartman
Quality Control
J. Hower
Watch Dial
M.Markunas
Dial Process
W. Fedder
Litho/Coil
W. Fedder
Maintenance
J. Powlus
Machine
Shop

QUALITY CONTROL PROCEDURES

QUALITY CONTROL PROCEDURE

LAB 785 TRITIUM SELF-LUMINOUS TUBES

1) Visual inspection for cracks and poor seals after filling.

2) Encapsulate in a closed vessel for a minimum of 16 hours.

3) Test the atmosphere in the enclosed vessel for the presence of Tritium. A value in excess of 5×10^{-6} microcuries per cc constitutes a failure.

4) Wash tubes with several flushes of water, then dry with paper towels.

5) Wipe test the tubes with a piece of filter paper.

6) Count the wipe paper with a suitable instrument. Activity on the wipe paper in excess of 5.0×10^{-3} microcuries constitutes a failure.

7) Place the tubes in a dark room for a minimum of 30 minutes.

8) 100% visual inspection of all tubes for brightness.

9) 10% photometric measurement of the tubes versus an appropriate standard.

Appendix

Instrumentation presently being used.*

Step #3	Johnston Model 755B Triton Monitor
Step #6	Eberline Instruments MS-2 Scaler with 2" Internal Proportional Counter.
Step #9	American Instrument Co. Model 10-213 Photomultiplier Microphotometer with a RCA 931A photomultiplier tube.

* Instruments of equal or greater sensitivity may be substituted for any of the above.

PROCEDURE

FOR

TRITIUM GAS-FILLED MARKERS

(Alternate to procedures in
10 CFR 32.55(b) (1))

COMMENT: This test is to be performed on 100% of all units containing Tritium gas.

Purpose: To determine if units containing Tritium gas are leaking; and, if so, to what extent. (NRC regulations limit leakage to 0.1% per unit over 24 hours.)

Principle: Measurement of Tritium concentration in air flowing through a test chamber containing samples.

Equipment: 1) Johnston Laboratories Tritium Monitor Model No. 855.

2) Test chamber designed so that air flow is exhausted 100% through detection instrument.

Note: Ionization chamber-equipped instruments other than Model No. 855 can be substituted providing they are shown to be sensitive enough.

Standards: Triton CL-1 calibrator.

Note: All Triton monitors are factory calibrated and normally need recalibration only after service.

Procedure: 1- Load samples into test chamber.

2- Set "Range" switch on Model 855 to zero and adjust zero to +10% of scale using "Meter Zero" knob.

3- Set "Range" switch to XI and record meter reading in log.

Procedure (continued)

4- Connect Model 855 to test chamber. Allow 30 minutes for equilibration.

5- Record meter reading in log. Reading should not exceed that listed below (based on 25 LPM flow rate). Any reading greater than background should be communicated to department manager immediately. The manager will then see that the leaking device is isolated and the remaining devices retested.

600-1B1-S	and SF's	111 $\mu Ci/m^3$ ($\mu Ci/ml \times 10^{-6}$)
600-1B1-S1	and S1F's	86
604-04		167
604-07		278
604-11		278
616-03		139
616-05		258
737-2-6		236
737-2-8		292
758-D3, 3A		28
758-D4		28
758-14-1, -4		22
880-2-6		416
880-12-6		694

Note 1: Above values based on 25 LPM flow rate. If flowrate changes by more than 10%, values should be re-calculated using formulas (1) and (2) below.

Note 2: Above values represent 0.1% per 24 hour leakage of Tritium content in a single device.

Procedure (continued):

Units other than those listed above can be leak checked in the same manner. Maximum meter reading can be calculated in the following way:

(1) Max. permissible leak rate (μCi/min) =

$$\frac{\text{content in microcuries} \times 0.001}{1440 \text{ minutes}}$$

(2) Max. permissible meter indication (μCi/ml or Ci/m^3) =

$$\frac{\text{max. permissible leak rate } (\mu Ci/min)}{\text{flowrate thru equipment } (ml/min)}$$

EX. A 3.5 Curie unit tested at 10 LPM -

(1) $\frac{3.5 \times 10^6 \times 1 \times 10^{-3}}{1.440 \times 10^{+3}} = 2.43$ μCi/min.

(2) $\frac{2.43 \text{ μCi/min}}{1 \times 10^4 \text{ ml/min}} = 2.43 \times 10^{-4}$ μCi/ml

$= 243 \times 10^{-6}$ μCi/ml

or

243 $\mu Ci/m^3$

On model No. 855, this is 24.3 on the X10 scale.