RESUBMITTAL OF PRIOR APPLICATIONS AND SUPPLEMENTS FOR APPROVAL TO TRANSPORT THE SENTINEL (LCG) - 25C RADIOISOTOPE THERMOELECTRIC GENERATOR AS A TYPE B( ) PACKAGE

TES-3210

AUGUST 1986

REVISION 1
OCTOBER 1986

TELEDYNE ENERGY SYSTEMS

110 WEST TIMONIUM ROAD
TIMONIUM, MARYLAND 21093

Preface to Revision 1

Revision 1 is in response to a NRC request * to supply component drawings for each of the Sentinel 25 series generators for the following components:

R1
10/86

Shield Body
Shield Plug
Generator Housing (Shield Vessel)
Generator Housing Lid (Shield Vessel Lid)

Only one Sentinel (LCG)-25C was constructed: serial number SN-003 built mid 1967. In response to the NRC request, a summary of the information provided for this unit follows.

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1 U.S. NRC Letter FCTC: CEW 71-4888, dated 23 Sept 86 from Charles E. MacDonald to John W. McGrew with enclosure.

Sentinel (LCG) - 25C
SN-003
Constructed mid 1967

Component/Assembly	Drawing No.	Remarks
Top Assembly	001-C1000, Sheets 1,3	Included w/ Aug 86 included.
Shield Body	001-70009	Included w/ Rev 1 - Shield Body for the 25C unit is Detail-001.
Shield Plug	001-70010	Included w/ Rev 1.
Shielding Specificaton (Tungsten Alloy)	001-80003	Included w/ Rev 1 (Appendix D).
Generator Housing	001-70012	Included w/ Aug 86 submittal.
Forging Specification (Al Alloy 6061-T6)	001-80004	Included w/ Rev 1 (Appendix D) appropriate to generator housing (001-70012).
Generator Housing Lid	001-40004	Included w/ Rev 1.

R1
10/86

TABLE OF CONTENTS

TABLE OF CONTENTS Con't

APPENDIX A

DRAWING LIST

(August 1986)

The following drawings are included with and form part of this report.

Fuel Capsule - all Sentinel (LCG) - 25 units

Isotopes, Inc. Drawings:

001-20000		Fuel Capsule Assembly
001-20001		Housing
001-20002		End Cap
001-20003		Liner, Capsule

Sentinel (LCG) 25C
Isotopes, Inc. Drawings:

001-C10000	Sheet 1	Assembly 25C, 25C3
	Sheet 3	Generator Assembly 25C
001-70012		Housing 25C
001-70009		Shield Body
001-70010		Shield Plug
001-40004		Lid

R1 10/86

Shipping Pallet-all Sentinel (LCG) - 25 units

001-90039	Pallet assembly (sheets 1,2,3)

APPENDIX D

Specifications for Shield and Generator Housing Materials

R1 10/86

Included herein are the specifications for:

	Spec. No., Title
Tungsten Alloy, Shield Body and Shield Plug	001-80003, Shielding Specification
Forging Specification for Generator Housing	001-80004, Forging Specification

SECURITY REVIEW	(UNCL.) CONF. SECRET DI RD GP: 1 2 3 4
CLASSIFIER	Gary L. Stowe 7/13/67

DRAWN BY W. Miller Jr	DATE 7-7-67
CHECKER H KELLY	7/13/67
APPROVED A.J. Stieb	m.y.
APPROVED	

MARTIN COMPANY
A DIVISION OF MARTIN MARIETTA CORPORATION
FRIENDSHIP INTERNATIONAL AIRPORT, MARYLAND 21240

FORGING SPECIFICATION

MATERIAL	REV	SIZE	CODE IDENT NO.	
		A	38597	001-80004
		SCALE		SHEET 1 OF 5

001-3 FORM MM-1112A (12-65)

REVISIONS

SYM	SHEET	DESCRIPTION	DATE	APPROVED

REV	SIZE	CODE IDENT NO.	
	A	38597	001-80004
	SCALE		SHEET 2

FORM MM-1111 (12-65)

INDEX

SHEET	REV	SHEET	REV	SHEET	REV

REV	SIZE A	CODE IDENT NO. 38597	001-80004
	SCALE		SHEET 3

FORM MM-1112 (12-65)

SPECIFICATIONS

1.0 SCOPE

1.1 Purpose - This specification establishes the requirements for a forging billet suitable for machining to finish dimensions for use as a pressure vessel for deep sea immersion.

20. APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein. Unless otherwise designated, referenced documents shall be to the issue in effect on July 7, 1967 except that the supplier may use later issued and/or superseding documents when such requirements would not cause degradation, non-interchangeability, re-qualification, increased cost or schedule delay.

QQA-367
6061-T6 Forging

3.0 REQUIREMENTS

3.1 General - The forging shall be in accordance with the requirements of this specification and any referenced specification and/or other documents specified herein. In case of conflict between the requirements of this specification and any referenced document, the requirements of this specification shall govern.

3.1.1 Material - The forging shall be fabricated from Aluminum Alloy of the composition 6061-T6, per QQA-367.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Inspection - The forging shall be inspected and verified per the requirements of QQA-367.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging - The packaging shall conform to consolidated freight classification rules and Interstate Commerce regulations to insure safe delivery to the destination at lowest weight and smallest size.

6.0 NOTES

6.1 Definitions

6.1.1 Manufacturer or Vendor - The manufacturer or vendor shall be the industrial organization awarded the Procurement Agreement of which this specification forms a part.

6.1.2 Martin - Martin shall be the Martin Marietta Corporation, Nuclear Division, Baltimore, Maryland 21203.

	SIZE	CODE IDENT NO.	
REV	A	38597	001-80004
	SCALE		SHEET 5

FORM MM-1112A (12-65)

REVISIONS: SEE SHEET 2	REV LEVEL	
	DWG	THIS SHEET

SECURITY REVIEW | UNCL CONF. SECRET | DI RD GP: 1 2 3 4
CLASSIFIER 5/29/78

ISOTOPES
NUCLEAR SYSTEMS DIVISION
A TELEDYNE COMPANY BALTIMORE, MD.

EFFECTIVE ON	CALC WT	DASH NUMBER	NEXT ASSEMBLY	USED ON	NEXT ASSY	FINAL ASSY	TEST
			APPLICATION		QTY REQ'D		

CONTRACT NO.
DRAWN BY KELLY DEPT 1554 DATE 5/29/78
CHECKER
APPROVED W. McDonald
CUST REP

MARTIN MARIETTA CORPORATION
BALTIMORE, MARYLAND 21203

SPECIFICATION
SHIELD VESSEL CASTING

SIZE A | CODE IDENT NO. 30850 | 001-80005
SCALE | SHEET 1 OF 8

001-27

FORM MM-1110 (6/67)

REVISIONS

SYM	PAGE	DESCRIPTION	DATE	APPROVED

CHG.	CODE IDENT NO.	SIZE	
	38597	A	001-80005
	SCALE		PAGE 2

E-348 (2/63)

INDEX

PAGE	CHG.	PAGE	CHG.	PAGE	CHG.

CHG	CODE IDENT NO.	SIZE	
	38597	A	001-80005
	SCALE	SHEET	PAGE 3

E-654 (7-61)

1.0 Scope

This specification covers the casting and inspection of an iron biological shield for either a surface or an underwater radioisotope thermoelectric generator pressure vessel.

2.0 Applicable Documents

2.1 The following documents form a part of this specification to the extent specified herein.

a.) Federal Specification QQ-I-652b, "Iron Castings, Gray".

b.) ASTM Specification A48-64, "Standard Specification for Gray Iron Castings".

3.0 Requirements

3.1 General Casting Requirements

3.1.1 The cast parts shall meet the requirements of Federal Specification QQ-I-652b, Class 40 and ASTM Specification A48-64, Gray Iron Castings, ASTM Designation A48, Class 40B, and shall be fabricated and controlled to the Meehanite process or equivalent and Meehanite recommendations for pressure tight castings. This casting is the equivalent of Meehanite GC type. (Equivalency of process and control shall be determined by Isotopes Engineering Department)

3.1.2 No chaplets are permitted.

3.1.3 The castings shall be cleaned by sand blasting or an equivalent method.

3.1.4 All burns, fins, sharp edges, etc., are to be ground off flush with the contour.

3.1.5 The castings shall be uniform in quality and condition, free from foreign material and from internal and/or external defects detrimental to performance. Defects revealed by machining which adversely affect the performance of the casting shall be cause for rejection. Minor voids, not exceeding 0.15 (5/32) inch in depth on as cast surfaces, or exposed by machining in non-critical areas shall be blended in.

3.1.6 Critical Areas

3.1.6.1 The tops of the side walls (Surface A) in which "O" ring seal grooves will be machined, must be free from all visible voids, blemishes, and inclusions.

3.1.6.2 All areas within two (2) inches of all lifting lugs and attachment holes (9 places) shall be free of cracks as proven by dry powder or die check method.

3.1.7 The vessel shall be cast in such a manner as to permit the use of the casting in either of the environments of paragraph 3.3.

3.1.8 The casting shall be stress relieved by the vendor according to a schedule approved by [illegible] Isotopes.

3.2 Description

See Drawing 001-70036

3.3 Environment and Use

The castings are to be used to form an undersea pressure vessel which shall be fabricated so as to operate successfully in the following environments.

3.3.1 Temperature: 0°F to 200°F.

3.3.2 Pressure: 1.5 atmosphere on the inside, and either ambient etc. up to 1500 psi hydrostatic pressure on the outside.

3.3.3 Atmosphere: Argon inside, seawater or ambient air outside.

4.0 Quality Control Provisions

4.1 General - Certification shall be furnished by the Vendor stating that the material has been sampled, tested and inspected in accordance with the provisions of ASTM-A48-64 and this specification. In addition, the Vendor shall furnish with this certification the results

4.1 General (cont'd)

of the tests required by paragraph 4.3 of this specification.

4.2 Test Bars - The Vendor shall furnish with each casting, or each melt, two cast test bars. Test bars shall be processed in accordance with ASTM-A48-64.

4.3 Vendor Tests - The Vendor shall perform the following tests and shall furnish copies of test results to Isotopes with each casting.

4.3.1 The casting shall be checked for dimensional conformance to drawing. Deviation shall be cause for rejection.

4.3.2 A general visual inspection of the casting shall be made for conformance with the requirements of paragraph 3.1 of this specification.

4.3.3 All areas in vicinity of surfaces designated critical by paragraph 3.1.6 shall be inspected by the dry powder or dye check method for conformance to paragraph 3.1.5. Deviation shall be cause for rejection.

4.4 Defects revealed by machining at Isotopes that are detrimental to the performance of the casting shall be cause for rejection.

4.5 If the casting shall leak or exhibit "weeping" when subjected to the hydrostatic tests required to meet requirements of paragraph 3.3.2, the casting shall be rejected if the leak is attributable to a casting defect. Isotopes will perform this test.

5.0 Notes

5.1 Definitions

5.1.1 Vendor - The Vendor shall be the industrial organization awarded the procurement agreement of which this specification becomes a part.

5.1.2 Isotopes shall be Isotopes, Nuclear Systems Division, P. O. Box 4937, Middle River, Maryland 21220.