A Bibliography on Radioisotope Power Supplies

August, 1963

Facsimile Price $2.00
Microfilm Price $1.00

Available from the Office of Technical Services
Department of Commerce
Washington 25, D. C.

Daniel M. Axelrod
&
Joseph P. Novarro
Reactor Development Division

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE
DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.
DISCLAIMER

 Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.
A

BIBLIOGRAPHY

ON

RADIOISOTOPE POWER SUPPLIES

AUGUST, 1963

DANIEL M. AXELROD
Project Engineer

and

JOSEPH NOVARRO
Nuclear Engineering Trainee

REACTOR DEVELOPMENT DIVISION
NEW YORK OPERATIONS OFFICE
U. S. ATOMIC ENERGY COMMISSION
FOREWORD

This Bibliography on Radioisotope Power Supplies (RIPS) was prepared as a supporting attachment to "Recommendations for a Program Development Plan for Radioisotope Power Supplies, FY 1964-FY 1968" (NYO 10609, August, 1963). The emphasis in this listing is on reports issued under AEC Division of Reactor Development RIPS systems development contracts. However, selected additional references of interest in the RIPS development program have also been included. Since timeliness was a more important consideration than completeness in issuing this Bibliography, it should not be considered a complete listing of all reports in this field.

In addition to its use by the Atomic Energy Commission and AEC RIPS contractors, the bibliography should be useful to potential RIPS users and firms interested in performing work for the Commission in this field.
**TABLE OF CONTENTS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>1</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>11</td>
</tr>
<tr>
<td><strong>INTRODUCTION AND EXPLANATORY NOTES</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>OBTAINING AEC-SPONSORED REPORTS</strong></td>
<td>2</td>
</tr>
<tr>
<td>Figure: Form OR-540 (copy)</td>
<td>3</td>
</tr>
<tr>
<td><strong>I. BIBLIOGRAPHIES, SUMMARY REPORTS, AND KEY ADMINISTRATIVE DOCUMENTS</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>II. SNAP DEVELOPMENT PROGRAM - GENERAL REPORTS - CONTRACT AT(30-3)-217</strong></td>
<td>5 - 7</td>
</tr>
<tr>
<td><strong>III. RIPS FOR SPACE APPLICATIONS</strong></td>
<td>8 - 9</td>
</tr>
<tr>
<td>A. SNAP 1</td>
<td></td>
</tr>
<tr>
<td>B. SNAP 1A</td>
<td>10</td>
</tr>
<tr>
<td>C. SNAP 3 and TRANSIT IV A &amp; B</td>
<td>11</td>
</tr>
<tr>
<td>D. SNAP 9A</td>
<td>12</td>
</tr>
<tr>
<td>E. SNAP 11</td>
<td>13</td>
</tr>
<tr>
<td>F. IMP</td>
<td>14</td>
</tr>
<tr>
<td><strong>IV. RIPS FOR TERRESTRIAL APPLICATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>A. SNAP 7A, B, C, D</td>
<td>15 - 16</td>
</tr>
<tr>
<td>B. SNAP 7E</td>
<td>17</td>
</tr>
<tr>
<td>C. Cesium 137 Generator</td>
<td>18</td>
</tr>
<tr>
<td>D. MFP Generator</td>
<td>19</td>
</tr>
<tr>
<td><strong>V. RIPS RESEARCH AND DEVELOPMENT</strong></td>
<td></td>
</tr>
<tr>
<td>A. Thermionic R &amp; D</td>
<td></td>
</tr>
<tr>
<td>Advanced SNAP Technology - Contract AT(30-3)-217, Task V and SNAP 13 Contract AT(30-1)-3060</td>
<td>20</td>
</tr>
<tr>
<td>Barium Vapor Filled Thermionic Development</td>
<td>21</td>
</tr>
<tr>
<td>B. Other Research &amp; Development Reports</td>
<td>22</td>
</tr>
<tr>
<td><strong>APPENDIX I. Selected Additional References in Unclassified Literature</strong></td>
<td>23 - 24</td>
</tr>
<tr>
<td><strong>APPENDIX II. Unclassified Summary of Radioisotope Power Supplies</strong></td>
<td>25</td>
</tr>
<tr>
<td><strong>APPENDIX III. Sample List of Specifications and Drawings for a Radioisotope Power Supply</strong></td>
<td>26 - 27</td>
</tr>
</tbody>
</table>
INTRODUCTION AND EXPLANATORY NOTES

This list represents a selected bibliography of AEC-sponsored reports pertaining to radioisotope power supplies, with emphasis on systems development reports.

Distribution

Because of security classification and the nature of the program, the distribution of these were categorized into the following:

Limited --- Atomic Energy Commission Offices
(copies not available for distribution

Special --- (Government and industry installations as
UC-33 (prescribed by the cognizant AEC Operations
C-92A (Office
(Obtain from DTIE, Oak Ridge)

Classification

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNCL</td>
<td>Unclassified</td>
</tr>
<tr>
<td>CDI</td>
<td>Confidential - Defense Information</td>
</tr>
<tr>
<td>CRD</td>
<td>Confidential - Restricted Data</td>
</tr>
<tr>
<td>SDI</td>
<td>Secret - Defense Information</td>
</tr>
<tr>
<td>SRD</td>
<td>Secret - Restricted Data</td>
</tr>
</tbody>
</table>

Author

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWD</td>
<td>Martin Company, Nuclear Division</td>
</tr>
<tr>
<td>TRW</td>
<td>Thompson-Ramo-Wooldridge Co.</td>
</tr>
<tr>
<td>GI</td>
<td>General Instrument Corp.</td>
</tr>
</tbody>
</table>
OBTAINING AEC-SPONSORED REPORTS

AEC Contractors

AEC Contractors may obtain the reports they require for performance of their contract free of charge. Form OR-540, Official Report Request, (shown on the next page), should be completed to obtain any of the following AEC reports. Those reports which are determined to be applicable to the work of the contractor by the Division of Technical Information Extension (DTIE), Oak Ridge, will be transmitted. In the case of classified reports, a statement of the applicability of the report to the work being performed will expedite the review, particularly when new projects are initiated.

Other Organizations

Firms who do not hold AEC contracts but wish to obtain reports should contact DTIE, Oak Ridge. Access to classified reports will require appropriate clearances and establishing a need-to-know.

For further information consult the following references (available free from DTIE):

TID 485 - Technical Information Services of the USAEC - comprehensive descriptions of all the services available to the contractor at DTIE.

NYO 2834 - Guide to AEC Report Preparation and Dissemination - fully describes report format requirements and services of DTIE.

Availability of AEC Technical Information - Glossary of terms describing procedures for acquiring reports.
OFFICIAL REPORT REQUEST (Not to be used for reports required under an access permit)

For U. S. Atomic Energy Commission
Office of Technical Information Extension
P. O. Box 62
Oak Ridge, Tenn.

PLEASE NOTE: Use only for specifically identified reports. Submit separate forms for each item requested. Staple together the three forms for each request.

If report is classified, outside the categories which you are authorized to receive, please furnish justification with this request.

The Office of Technical Information Extension can frequently supply unclassified reports only on loan in full-size copy or for retention in microcard form. In order to expedite the filling of your request, please indicate your preference should OTI Extension stock of full-size copies be depleted. ___ Loan in full-size copy ___ Microcard retention

If report number is not known or if report is not an AEC series, include the information requested below.

Send to: (enter complete mailing address)

This report is required in connection with work for the U. S. Government under contract No.

Requested for ________________________________ Signed ________________________________

FORM OR-540(REV 7-60)
I. BIBLIOGRAPHIES, SUMMARY REPORTS, AND KEY ADMINISTRATIVE DOCUMENTS

Bibliographies

1. Bibliography of SNAP Reports, MND-P-2413, Aug. 1960
   Lists reports prepared under Contract AT(30-3)-217. (Unclassified)
   (Many of the references listed have been included in this bibliography).


   June 1961 (contract AT(30-3)-217)
   Volume I - List of References (Unclassified)
   Volume II - Abstracts of Key References (S-RD)
   Volume III - Abstracts of Key References (Unclassified)


Summary Reports


2. Radioisotope-Fueled Generator Compendium and Parametric Study. C. Fink & T. Bustard, June 1963 MND-2994 (C-RD)

Key Administrative Documents


2. Present and Potential Annual Availability of Isotopic Power Fuels, Div. of Isotopes Development, April 1962

3. Classification Guide for the Isotopic Power Program - CG-RIP-1 AEC Division of Classification, May 1962, C-DI
<table>
<thead>
<tr>
<th>Report No.</th>
<th>Title</th>
<th>Date</th>
<th>Distribution</th>
<th>Author</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>MND-1001</td>
<td>Power from Radioisotopes Survey Report</td>
<td>10/56</td>
<td>Special</td>
<td>F. Hittman</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-1002</td>
<td>Power from Radioisotopes Conceptual Design Report</td>
<td>1/57</td>
<td>Special</td>
<td>K. Johnson</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-1138</td>
<td>Interim Hazards Analysis Report</td>
<td>8/57</td>
<td>Special</td>
<td>S. Clark</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-1086</td>
<td>Radioisotope Fueled Auxiliary Power Unit Quarterly Progress Report No. 1</td>
<td>5/57</td>
<td>Special</td>
<td>C. Silverstein</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-1123</td>
<td>Report No. 2</td>
<td>8/57</td>
<td>Special</td>
<td>K. Johnson</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-P-1175</td>
<td>Report No. 3</td>
<td>10/57</td>
<td>&quot;</td>
<td>K. Johnson</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-P-3001</td>
<td>Report No. 4</td>
<td>2/58</td>
<td>&quot;</td>
<td>K. Johnson</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3002</td>
<td>Report No. 5</td>
<td>5/58</td>
<td>&quot;</td>
<td>K. Johnson</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3003</td>
<td>Report No. 6</td>
<td>9/58</td>
<td>&quot;</td>
<td>K. Johnson</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3004</td>
<td>Report No. 7</td>
<td>11/58</td>
<td>&quot;</td>
<td>K. Johnson</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3005</td>
<td>Report No. 8</td>
<td>2/59</td>
<td>&quot;</td>
<td>K. Johnson</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3006</td>
<td>Report No. 9</td>
<td>6/59</td>
<td>&quot;</td>
<td>D. Harvey</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3007</td>
<td>Report No. 10</td>
<td>10/59</td>
<td>&quot;</td>
<td>D. Harvey</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3008</td>
<td>Report No. 11</td>
<td>11/59</td>
<td>&quot;</td>
<td>D. Harvey</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-3009</td>
<td>SNAP Programs Quarterly Report No. 12 (Classified Section)</td>
<td>3/59</td>
<td>Special</td>
<td>D. Harvey</td>
<td>SDI</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------</td>
<td>--------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-3009-1</td>
<td>SNAP Programs Quarterly Report No. 1 (Unclassified Section)</td>
<td>5/60</td>
<td>Special</td>
<td>J. Morse</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-3010</td>
<td>SNAP Programs Quarterly Report No. 2</td>
<td>7/60</td>
<td>Special</td>
<td>D. Harvey</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-3011</td>
<td>SNAP Programs Quarterly Report No. 3</td>
<td>8/60</td>
<td>Special</td>
<td>D. Harvey</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2047</td>
<td>Hazards Summary Report - Three-Watt Polonium-210 Fueled Thermoelectric Generator</td>
<td>6/59</td>
<td>Limited</td>
<td>W. Crane</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2048</td>
<td>Hazards Summary Report for Two-Watt Strontium-90 Fueled Thermoelectric Generator</td>
<td>6/59</td>
<td>Limited</td>
<td>W. Crane</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2049</td>
<td>Hazards Summary Report for Two-Watt Promethium-147 Fueled Thermoelectric Generator</td>
<td>6/59</td>
<td>Limited</td>
<td>W. Crane</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2148</td>
<td>Ten Watt Radioisotope Thermoelectric Power Supply for Project Transit Satellite</td>
<td>1/60</td>
<td></td>
<td>D. J. Knight</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2333</td>
<td>Summary Report of Americium Process to be Performed by Martin Company</td>
<td>3/60</td>
<td>Limited</td>
<td>G. Dix</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2347</td>
<td>Final Hazards Summary Report of Americium Process to be Performed by Martin Co.</td>
<td>5/60</td>
<td>Special</td>
<td>J. Watcher</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2354</td>
<td>Nuclear 1.0-Watt Power Supply for Space Applications</td>
<td>6/60</td>
<td>Special</td>
<td>D. Knighton</td>
<td>UNCL</td>
</tr>
</tbody>
</table>
## II. SNAP Development Programs - General Reports - CONTRACT AT(30-3)-217 (Cont'd)

<table>
<thead>
<tr>
<th>Report No.</th>
<th>Title</th>
<th>Date</th>
<th>Distribution</th>
<th>Author</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>MND-P-2355</td>
<td>Advance Thermoelectric Power System Final Report</td>
<td>6/60</td>
<td>Limited</td>
<td>R. Harvey</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2356</td>
<td>Preliminary Operational Safety Report for Thermoelectric Generator</td>
<td>5/60</td>
<td>Special</td>
<td>D. Knighton</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2363</td>
<td>Preliminary Safety Analysis Low Power Ce-144 Generator</td>
<td>6/60</td>
<td>Special</td>
<td>G. Dix</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2364</td>
<td>Final Safety Analysis on Polonium Fueled Generator</td>
<td>6/60</td>
<td>Special</td>
<td>C. Riggs</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2366</td>
<td>Preliminary Safety Analysis Report Curium Fueled Generator for Lunar and Satellite Missions</td>
<td>6/60</td>
<td>Special</td>
<td>C. Riggs</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2372</td>
<td>Thermoelement Optimization Code</td>
<td>6/60</td>
<td>Special</td>
<td>T. Bustard</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2373</td>
<td>13-Watt Curium Fueled Thermoelectric Generator for Six-Month Space Mission</td>
<td>7/60</td>
<td>Special</td>
<td>J. Bloom</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-FILM-P-2144</td>
<td>Nuclear Field Loading Mock-up</td>
<td>9/59</td>
<td>Limited</td>
<td>-</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-FILM-P-2146</td>
<td>Isotopic-Power Testing for Space Use</td>
<td>3/60</td>
<td>Limited</td>
<td>-</td>
<td>UNCL</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------</td>
<td>--------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-1229</td>
<td>Hazards Summary Report, 1/58 SNAP I</td>
<td>1/58</td>
<td>Special</td>
<td>S. Clark</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-P-1519</td>
<td>SNAP I Re-Entry Evaluation Study</td>
<td>9/58</td>
<td>Limited</td>
<td>G. Dix</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-1957</td>
<td>Test Program and Cell Requirement for SNAP I</td>
<td>5/59</td>
<td>Limited</td>
<td>W. Crane</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2128</td>
<td>SNAP I Dynamic Mercury Loop Tests of Selected Material</td>
<td>4/60</td>
<td>Special</td>
<td>J. McGrew</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2309</td>
<td>Mercury Boiler Development Report SNAP I</td>
<td>6/60</td>
<td>Special</td>
<td>J. Jicha</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2350</td>
<td>SNAP I Radioisotope Fueled Turbenelectric Power Conversion System Summary</td>
<td>6/60</td>
<td>Special</td>
<td>J. Keenan</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2375</td>
<td>SNAP I Power Conversion System Development</td>
<td>6/60</td>
<td>Special</td>
<td>Thompson-Ramo</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2376</td>
<td>SNAP I Power Conversion Turbine Development</td>
<td>6/60</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2377</td>
<td>SNAP I Power Conversion Alternator Development</td>
<td>6/60</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2378</td>
<td>SNAP I Power Conversion Pump Development</td>
<td>6/60</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2379</td>
<td>SNAP I Power Conversion Bearing Development</td>
<td>6/60</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2380</td>
<td>SNAP I Power Conversion Controls Development</td>
<td>6/60</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------------</td>
<td>-------</td>
<td>--------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-2381</td>
<td>SNAP I Power Conversion-Condensor-Radiator Development</td>
<td>6/60</td>
<td>Special</td>
<td>Thompson-Ramo</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2382</td>
<td>SNAP I Power Conversion- Materials Development</td>
<td>6/60</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-FILM-P-1655</td>
<td>Space Nuclear Auxiliary Power (color 9 min)</td>
<td>12/58</td>
<td>Limited</td>
<td>-</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-FILM-P-1736</td>
<td>SNAP I Hazards Test</td>
<td>2/59</td>
<td>Limited</td>
<td>-</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-FILM-P-2042</td>
<td>SNAP I Corrosion Test</td>
<td>5/59</td>
<td>Limited</td>
<td>-</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-FILM-P-2293</td>
<td>SNAP I Burst Test</td>
<td>12/59</td>
<td>Limited</td>
<td>-</td>
<td>SDI</td>
</tr>
</tbody>
</table>
### SNAP-1A CONTRACT AT(30-3)-217 Task 2

<table>
<thead>
<tr>
<th>Report No.</th>
<th>Title</th>
<th>Date</th>
<th>Distribution</th>
<th>Author</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>MND-P-2042-1</td>
<td>Marriage of APU and Nose Cone</td>
<td>6/59</td>
<td>Limited</td>
<td>-</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2042-2</td>
<td>Field Loading of APU</td>
<td>6/59</td>
<td>&quot;</td>
<td>-</td>
<td>CDI</td>
</tr>
<tr>
<td>MND-P-2042-3</td>
<td>Quick Change Field Loading Isotope Cask</td>
<td>6/59</td>
<td>&quot;</td>
<td>-</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-2042-4</td>
<td>Field Loading Arrangement</td>
<td>6/59</td>
<td>&quot;</td>
<td>-</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2042-5</td>
<td>Operating Characteristics</td>
<td>6/59</td>
<td>&quot;</td>
<td>-</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-P-2042-6</td>
<td>Energy Characteristics</td>
<td>6/59</td>
<td>&quot;</td>
<td>-</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-P-2042-7</td>
<td>SNAP 1A Thermoelectric Generator</td>
<td>6/59</td>
<td>&quot;</td>
<td>-</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2042-8</td>
<td>Transportation Dolly</td>
<td>6/59</td>
<td>&quot;</td>
<td>-</td>
<td>CDI</td>
</tr>
</tbody>
</table>

**NOTE:** MND-P-2042-1 through 8 includes slide and glossy print lecture cards for each title and commentary on slide set.

<table>
<thead>
<tr>
<th>Report No.</th>
<th>Title</th>
<th>Date</th>
<th>Distribution</th>
<th>Author</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>MND-P-2184</td>
<td>SNAP 1A Preliminary Operational Hazards Summary</td>
<td>2/60</td>
<td>Special</td>
<td>G. Dix</td>
<td>SDI</td>
</tr>
<tr>
<td></td>
<td>Report for Task 2 Thermoelectric Generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MND-P-2291</td>
<td>Summary Report, Aerodynamic Re-entry Analysis,</td>
<td>2/60</td>
<td>Special</td>
<td>R. Oehrli</td>
<td>SDI</td>
</tr>
<tr>
<td></td>
<td>Task 2 Thermoelectric Generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MND-P-2335</td>
<td>Interim Report on Safety Procedures for Task 2</td>
<td>6/60</td>
<td>Special</td>
<td>L. Klein</td>
<td>UNC</td>
</tr>
<tr>
<td></td>
<td>Thermoelectric Generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MND-P-2352</td>
<td>Final Report on SNAP 1A Hazards</td>
<td>6/60</td>
<td>Special</td>
<td>G. Dix</td>
<td>UNC</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------------------------------</td>
<td>------</td>
<td>--------------</td>
<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-2101-I</td>
<td>SNAP III Thermoelectric Environmental Tests</td>
<td>8/59</td>
<td>Special</td>
<td>L. Gross</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-2101-II</td>
<td>SNAP III Thermoelectric Environmental Tests</td>
<td>10/59</td>
<td>Limited</td>
<td>L. Gross</td>
<td>SDI</td>
</tr>
<tr>
<td>MND-P-2101-III</td>
<td>SNAP III Thermoelectric Environmental Tests</td>
<td>1/60</td>
<td>Special</td>
<td>L. Gross</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-2322</td>
<td>SNAP III Topical Report</td>
<td>2/60</td>
<td>Special</td>
<td>R. Harvey</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-2358</td>
<td>Nuclear Safety Test Report for the SNAP III Generator</td>
<td>6/60</td>
<td>Special</td>
<td>T. Dobry</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-2368</td>
<td>Operational Testing of SNAP III Generator</td>
<td>6/60</td>
<td>Special</td>
<td>R. Wilson</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-2369</td>
<td>Conceptual Design of a SNAP III Generator Fueled with Ce-144</td>
<td>6/60</td>
<td>Special</td>
<td>R. Wilson</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-2370</td>
<td>Conceptual Design of a SNAP III Type Generator Fueled with Po-210</td>
<td>6/60</td>
<td>Special</td>
<td>R. Wilson</td>
<td>UNC</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>--------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-2700-2</td>
<td>Quarterly Progress Report No. 2</td>
<td>2/62</td>
<td>&quot;</td>
<td>Paul J. Dick</td>
<td>CRD</td>
</tr>
<tr>
<td>MND-P-2700-3</td>
<td>Quarterly Progress Report No. 3</td>
<td>5/62</td>
<td>&quot;</td>
<td>Charles R. Fink</td>
<td>CRD</td>
</tr>
<tr>
<td>MND-P-2725</td>
<td>Specification for Thermal Environment Test SNAP 9A-SNAP 11</td>
<td>2/62</td>
<td>&quot;</td>
<td>T. J. Dobry</td>
<td>CRD</td>
</tr>
<tr>
<td>MND-P-2775</td>
<td>Preliminary Safety Analysis SNAP 9A Transit Mission</td>
<td>4/62</td>
<td>&quot;</td>
<td>T. J. Young</td>
<td>CRD</td>
</tr>
<tr>
<td>MND-P-2775-2</td>
<td>SNAP 9A Radioisotope-Fueled Generator Final Safety Analysis for Transit Mission</td>
<td>3/63</td>
<td>C-92A</td>
<td>T. J. Dobry</td>
<td>SRD</td>
</tr>
<tr>
<td>MND-P-2874</td>
<td>Feasibility Report No. 8 for Transfer and Test of SNAP 9A Units at Johns Hopkins Applied Physics Laboratory</td>
<td>2/63</td>
<td>C-92A</td>
<td>MND</td>
<td>UNC</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------</td>
<td>-------</td>
<td>--------------</td>
<td>--------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-2811-1</td>
<td>SNAP 11-Surveyor Program Quarterly Progress Reports</td>
<td>4/62</td>
<td>C-92A</td>
<td>MND</td>
<td>CDI</td>
</tr>
<tr>
<td>MND-P-2811-2</td>
<td>&quot;</td>
<td>7/62</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2811-3</td>
<td>&quot;</td>
<td>10/62</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2811-4</td>
<td>&quot;</td>
<td>1/63</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
</tbody>
</table>
TABLE 1

<table>
<thead>
<tr>
<th>REPORT NO.</th>
<th>TITLE</th>
<th>DATE</th>
<th>DISTRIBUTION</th>
<th>AUTHOR</th>
<th>CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------------------</td>
<td>-------</td>
<td>--------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-2483-2</td>
<td>SNAP-7 Programs - Strontium 90 Fueled Thermoelectric Generator Development Quarterly Progress Report</td>
<td>4/61</td>
<td>Special</td>
<td>W. West</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2483-3</td>
<td>&quot;</td>
<td>7/61</td>
<td>Special</td>
<td>W. West</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2483-4</td>
<td>&quot;</td>
<td>10/61</td>
<td>Special</td>
<td>W. West</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2483-5</td>
<td>&quot;</td>
<td>1/62</td>
<td>Special</td>
<td>W. A. McDonald</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2483-6</td>
<td>&quot;</td>
<td>4/62</td>
<td>Special</td>
<td>W. A. McDonald</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2483-7</td>
<td>&quot;</td>
<td>7/62</td>
<td>Special</td>
<td>W. A. McDonald</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2613</td>
<td>SNAP-7A Final Safety Analysis-Ten Watt Strontium-90 Fueled Generator for an Unattended Light Buoy</td>
<td>1/62</td>
<td>Special</td>
<td>MND</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2720</td>
<td>SNAP-7A Strontium-90 Fueled Thermoelectric Generator Power Source for Five-Watt U. S. Coast Guard Light Buoy Final Report</td>
<td>2/62</td>
<td>Special</td>
<td>MND</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2661</td>
<td>Instructional Manual-SNAP-7A Electric Generation Station</td>
<td>1/62</td>
<td>Special</td>
<td>MND</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2614</td>
<td>SNAP-7C Final Analysis-Ten Watt Strontium-90 Fueled Generator for an Unattended Meteorological Station</td>
<td>5/61</td>
<td>Special</td>
<td>MND</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2707</td>
<td>SNAP-7C Strontium-90 Fueled Thermoelectric Generator Power Source Five-Watt U.S. Navy Weather Station - Final Report</td>
<td>8/61</td>
<td>Special</td>
<td>MND</td>
<td>&quot;</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------------------</td>
<td>--------</td>
<td>--------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-2640</td>
<td>Instruction Manual SNAP-7C Electric Generation System</td>
<td>10/61</td>
<td>Special</td>
<td>MND</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2762</td>
<td>SNAP-7B Final Safety Evaluation of a Sixty Watt Strontium-90 Fueled Generator for a U. S. Coast Guard Automatic Light Station</td>
<td>4/62</td>
<td>Special</td>
<td>V. G. Kelly, H. N. Berkow</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2836</td>
<td>SNAP-7B Strontium-90 Fueled Thermoelectric Generator Power Source - Thirty Watt U. S. Coast Guard Automatic Light Station</td>
<td>4/63</td>
<td>Special</td>
<td>C. N. Young</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2834</td>
<td>Instruction Manual - SNAP-7B Electric Generation System</td>
<td>3/63</td>
<td>Special</td>
<td>MND</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2664A</td>
<td>SNAP-7D Final Safety Evaluation of a Sixty Watt Strontium-90 Fueled Generator for a U. S. Navy Boat Type Weather Station</td>
<td>5/62</td>
<td>Special</td>
<td>V. G. Kelly, H. N. Berkow</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2835</td>
<td>SNAP-7D Strontium-90 Fueled Thermoelectric Generator Power Source, Thirty-Watt U. S. Navy Floating Weather Station</td>
<td>3/63</td>
<td>Special</td>
<td>C. N. Young</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2786</td>
<td>Instruction Manual SNAP-7D Electric Generation System</td>
<td>3/63</td>
<td>Special</td>
<td>MND</td>
<td>&quot;</td>
</tr>
</tbody>
</table>
### IVB.

**SNAP 7E - CONTRACT AT(30-1)-2958**

<table>
<thead>
<tr>
<th>REPORT NO.</th>
<th>TITLE</th>
<th>DATE</th>
<th>DISTRIBUTION</th>
<th>AUTHOR</th>
<th>CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MND-2821</td>
<td>Instruction Manual SNAP-7E Electric Generation System</td>
<td>6/62</td>
<td>Special</td>
<td>MND</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2761</td>
<td>Final Safety Evaluation of a Ten Watt Strontium-90 Fueled Generator For A Deep Sea Application</td>
<td>5/62</td>
<td>Special</td>
<td>H.N. Berkow, V.G. Kelly</td>
<td>UNCL</td>
</tr>
<tr>
<td>MND-P-2837</td>
<td>SNAP 7E Sr-90 - Fueled Thermoelectric Generator for an Undersea Beacon - Final Report</td>
<td>7/62</td>
<td>Special</td>
<td>MND</td>
<td>UNCL</td>
</tr>
</tbody>
</table>
### IVC. CESIUM-137 GENERATOR

<table>
<thead>
<tr>
<th>Report No.</th>
<th>Title</th>
<th>Date</th>
<th>Distribution</th>
<th>Author</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRC-Cs-0100</td>
<td>Cs-137 Fueled Generator</td>
<td>?</td>
<td>?</td>
<td>Royal Research Corp.</td>
<td>?</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------</td>
<td>------</td>
<td>--------------</td>
<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------</td>
<td>--------</td>
<td>--------------</td>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-3015 II</td>
<td>SNAP Programs - Task 5 Thermionic Isotope Power Systems - Quarterly Progress Reports</td>
<td>6/61</td>
<td>Standard</td>
<td>MND</td>
<td>UNC</td>
</tr>
<tr>
<td>MND-P-3016 II</td>
<td>&quot; &quot; &quot; 9/61</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>CDI</td>
</tr>
<tr>
<td>MND-P-3017 II</td>
<td>SNAP Programs - Task 5 Thermionic Development Program Quarterly Progress Reports</td>
<td>12/61</td>
<td>C-92A</td>
<td>W. E. Kortier</td>
<td>CDI</td>
</tr>
<tr>
<td>MND-P-3018 II</td>
<td>&quot; &quot; &quot; 3/62</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>CDI</td>
</tr>
<tr>
<td>MND-P-3019 II</td>
<td>&quot; &quot; &quot; 6/62</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2890 I</td>
<td>&quot; &quot; &quot; 9/62</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2890 II</td>
<td>&quot; &quot; &quot; 12/62</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-P-2890 III</td>
<td>&quot; &quot; &quot; &quot;SNAP 13&quot; 3/63&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>------</td>
<td>--------------</td>
<td>--------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-2812</td>
<td>Research &amp; Development on Barium Vapor-Filled Thermionic Plasma Energy Converters (Quarterly Reports)</td>
<td>5/62</td>
<td>C-92A</td>
<td>Dr. A.J. Kennedy</td>
<td>CDI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dr. M.E. Talaat</td>
<td>CDI</td>
</tr>
<tr>
<td>MND-2812-2</td>
<td>&quot;</td>
<td>&quot;</td>
<td>10/62</td>
<td>C-92A</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-2812-3</td>
<td>&quot;</td>
<td>&quot;</td>
<td>1/63</td>
<td>Limited</td>
<td>&quot;</td>
</tr>
<tr>
<td>MND-2812-4</td>
<td>&quot;</td>
<td>&quot;</td>
<td>5/63</td>
<td>C-93b</td>
<td>&quot;</td>
</tr>
<tr>
<td>Report No.</td>
<td>Title</td>
<td>Date</td>
<td>Distribution</td>
<td>Author</td>
<td>Classification</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------------------</td>
<td>-------</td>
<td>--------------</td>
<td>-------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>MND-P-2801</td>
<td>SNAP Programs Final Summary Report Task 6 Fuel Technology Development Program</td>
<td>7/62</td>
<td>C-92A</td>
<td>MND</td>
<td>CRD</td>
</tr>
<tr>
<td>MND-P-2953</td>
<td>SNAP Programs Upper Atmosphere Experimental Re-entry Study - Final Summary Report</td>
<td>4/63</td>
<td>C-92A</td>
<td>William Hagis</td>
<td>CRD</td>
</tr>
<tr>
<td>H.W. 71319</td>
<td>Special Radioisotopes for Power</td>
<td>10/16/61</td>
<td>?</td>
<td>C. A. Rohrmann</td>
<td>?</td>
</tr>
<tr>
<td>H.W. 76323</td>
<td>Radioisotopic Heat Sources</td>
<td>2/1/63</td>
<td>UC-2</td>
<td>C. A. Rohrmann</td>
<td>UNCL</td>
</tr>
</tbody>
</table>
APPENDIX I

SELECTED ADDITIONAL REFERENCES IN THE UNCLASSIFIED LITERATURE

1. Space Nuclear Power Applications - Hearings before the Subcommittee on Research, Development, and Radiation of the Joint Committee on Atomic Energy, Congress of the U. S.

2. Radionuclide Power for Space:

3. Nuclear Energy in Space - Nucleonics. 19-4, 54-100; Apr. '61
   Comprehensive review of Nuclear space programs including:

4. American Rocket Society, Progress in Astronautics and Rocketry series
   Snyder, N. W., Ed., Vol 4: SPACE POWER SYSTEMS, 1961, 632 pages
   Series of Technical Papers on Solar, Nuclear, and Chemical Systems and Power Requirements, including:

5. Other Published Journal Articles
APPENDIX I - 2

c. Kershaw, W. L., "Radioisotope Fueled Thermoelectric Generators,"
   Electro Technology, July 1962

d. Harvey, D. G., "Integrating Isotopic Power Systems,"
   Astronautics, May 1962

e. Morse, J. G., and Harvey, D. G., "Nuclear Energy in Space -
   Radioisotope Auxiliary Power Systems," Aerospace
   Engineering, November 1961

f. Crompton, C. E., "Isotopic Power," Industrial Research,
   October 1961

g. Morse, J. G., "Isotopic Power, "The Military Engineer,
   January-February, 1961

h. Huffman, F. N., and Gross, L. W., "Performance Data and
   Environment Test Results of SNAP III,"
   Ballistic Missiles and Space Technology, Vol. II,
   1961

i. Hagis, W., Dobry, T. and Dix, G., "Nuclear Safety of SNAP III
   for Space Missions," ARS Journal, Dec. 61

6. Forecasts of Space Isotopic Power Requirements

      Memo, Atomic Industrial Forum, Inc., NY, June 1963

   b. "Space Applications of Nuclear - Electric Power", Radio
      Corporation of America N. Y., AED-P5013, March 1963

### APPENDIX II: Summary of Radioisotope Power Supplies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Applications:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. SNAP-1</td>
<td>Ig. vapor</td>
<td>10</td>
<td>33</td>
<td>128</td>
<td>91</td>
<td>Po 210</td>
<td>138 da.</td>
<td>60 da.</td>
<td>Cancelled 1959</td>
<td>Demonstration</td>
<td></td>
</tr>
<tr>
<td>2. SNAP-1A</td>
<td>Pb-Te</td>
<td>125</td>
<td>175</td>
<td>34</td>
<td>24</td>
<td>Ce 144</td>
<td>285 da.</td>
<td>1 yr.</td>
<td>Cancelled 1959</td>
<td>A-F Satellite</td>
<td></td>
</tr>
<tr>
<td>3. SNAP-3</td>
<td>Pb-Te</td>
<td>3</td>
<td>4</td>
<td>5.5</td>
<td>4.75</td>
<td>Po 210</td>
<td>138 da.</td>
<td>90 da.</td>
<td>Demon. 1959</td>
<td>Proof of Principle</td>
<td></td>
</tr>
<tr>
<td>4. SNAP-3</td>
<td>Pb-Te</td>
<td>2.7</td>
<td>4.6</td>
<td>5.5</td>
<td>4.8</td>
<td>Pu 238</td>
<td>86 yr.</td>
<td>5 yr.</td>
<td>Launched 1961</td>
<td>Navy Transit IVA &amp; B</td>
<td></td>
</tr>
<tr>
<td>5. SNAP-9A</td>
<td>Pb-Te</td>
<td>25</td>
<td>27</td>
<td>9.5</td>
<td>20(3)</td>
<td>Pu 238</td>
<td>86 yr.</td>
<td>6 yr.</td>
<td>Flight qualified</td>
<td>Space application</td>
<td></td>
</tr>
<tr>
<td>6. SNAP-11</td>
<td>Pb-Te</td>
<td>25</td>
<td>30</td>
<td>9</td>
<td>6</td>
<td>Cm 242</td>
<td>162 da.</td>
<td>1/4 yr.</td>
<td>Prototype Testing</td>
<td>Surveyor - has power flattening system</td>
<td></td>
</tr>
<tr>
<td>7. IMP</td>
<td>Pb-Te</td>
<td>22</td>
<td>17+</td>
<td>10.6</td>
<td>22.5</td>
<td>Pu 238</td>
<td>86 yr.</td>
<td>3 yr.</td>
<td>Eng. Des. complete</td>
<td>IMP Satellite</td>
<td></td>
</tr>
<tr>
<td>8. SNAP-13</td>
<td>Cs-Vapor</td>
<td>4</td>
<td>4</td>
<td>2.5</td>
<td>Cm 242</td>
<td>162 da.</td>
<td>1/4 yr.</td>
<td>Prototype Testing</td>
<td>Proof of Principle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrestrial Applications:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Sentry</td>
<td>Pb-Te</td>
<td>4.5</td>
<td>1680(4)</td>
<td>20</td>
<td>18</td>
<td>Sr 90</td>
<td>28 yr.</td>
<td>2+ yr.</td>
<td>Operational 1961</td>
<td>Arctic Weather Sta.</td>
<td></td>
</tr>
<tr>
<td>2. SNAP-7A-C</td>
<td>Pb-Te</td>
<td>10</td>
<td>1870(4)</td>
<td>21</td>
<td>20</td>
<td>Sr 90</td>
<td>28 yr.</td>
<td>10 yr.</td>
<td>Oper. 1962; 1961</td>
<td>7A-Buoy</td>
<td></td>
</tr>
<tr>
<td>3. SNAP-7B-D</td>
<td>Pb-Te</td>
<td>60</td>
<td>4600(4)</td>
<td>34.5</td>
<td>22</td>
<td>Sr 90</td>
<td>28 yr.</td>
<td>10 yr.</td>
<td>Oper. 1964</td>
<td>7B-Fixed Light</td>
<td></td>
</tr>
<tr>
<td>4. SNAP-7E</td>
<td>Pb-Te</td>
<td>6.5</td>
<td>8000(5)</td>
<td>56</td>
<td>30</td>
<td>Sr 90</td>
<td>28 yr.</td>
<td>10 yr.</td>
<td>Oper. 1964</td>
<td>Undersea Beacon</td>
<td></td>
</tr>
<tr>
<td>5. Cesium Generator</td>
<td>Pb-Te</td>
<td>5</td>
<td>550</td>
<td>Cs 137</td>
<td>27 yr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Undersea Seismograph</td>
<td></td>
</tr>
<tr>
<td>6. Mixed Fission Products Generator</td>
<td>Bi$_2$Te$_3$</td>
<td>10</td>
<td>20,000(4)</td>
<td>76</td>
<td>65</td>
<td>MFP</td>
<td>--</td>
<td>5 yr.</td>
<td>Concept. Design Demonstration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Specifications apply to single generator. Design Power is generator output. Voltage converter efficiency (typically 75-80%) not included.

(2) SNAP-1 used a mercury vapor cycle; SNAP-13 is a thermionic device; all others are thermoelectric.

(3) Including fins on generator.

(4) Includes weight of shield. SNAP 7A, G shield weight - 1726 lb.

(5) Includes special pressure vessel for deep sea application.
APPENDIX III - SAMPLE LIST OF SPECIFICATIONS AND DRAWINGS FOR A RADIOISOTOPE POWER SUPPLY
(RIPS FOR INTERPLANETARY MONITORING PROBE)

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN-10073, Rev. 1</td>
<td>June 6, 1963</td>
<td>&quot;Specification for a Radioisotope Fueled Power Supply for Interplanetary Monitoring Probe Satellites&quot; (C-DI)</td>
</tr>
<tr>
<td>MN-10074, Rev. 1</td>
<td>June 7, 1963</td>
<td>&quot;Specification for Environmental Conditions and Environmental Tests for a Radioisotope-Fueled Power Supply for Interplanetary Monitoring Probe Satellites&quot;</td>
</tr>
<tr>
<td>MN-10075, Rev. 1</td>
<td>June 10, 1963</td>
<td>&quot;Specification for an Electric Converter/Regulator for a Radioisotope-Fueled Power Supply for the IMP-C Satellite&quot;</td>
</tr>
<tr>
<td>MN-10076, Rev. 1</td>
<td>June 11, 1963</td>
<td>&quot;Specification for a Safety Program for a Radioisotope-Fueled Generator for Interplanetary Monitoring Probe Satellites&quot;</td>
</tr>
<tr>
<td>To be developed</td>
<td></td>
<td>Specification for Fuel Capsules for A Radioisotope-Fueled Power Supply for Interplanetary Monitoring Probe Satellites</td>
</tr>
<tr>
<td>To be developed</td>
<td></td>
<td>Quality Control Procedures</td>
</tr>
</tbody>
</table>

**DRAWINGS**

- **Master Assembly Drawings**
  - 439 A 1110000: Generator Assembly Drawing (C-RD)
  - 439 A 1110001: Generator External installation
  - To be released: Generator Assembly Torquing Instructions

- **Heat Source Items**
  - To be released: Fuel capsule (C-RD)
  - NSK - 89: Graphite Block Assembly (fueled units)
  - 439 A 1110151: Mica Sheet
  - 439 A 1110153: Capsule end support (fueled units)
  - 439 A 1110157: Stainless Steel Disc Load Distributor (fueled units)

- **Energy Conversion Items**
  - 439 A 111 0200: Module Assembly
  - " 0201: Couple Assembly
  - " 0250: Shoe, Hot Junction
  - " 0251: Thermoelectric Element
  - " 0252: Shoe, Cold Junction
  - " 0253: Insulation, Module Strip
Energy Conversion Items

439 A 111 0254 Lug, Terminal (2 sheets)
  " 0255 Piston and Button (Alignment Details)
  " 0256 Module Bar
  " 0258 Insulation Header Blocks (fueled units)

Heat Rejection and Containment Items

439 A 111 0300 Housing Assembly
  " 0301 Cover, Upper
  " 0350 Body, Housing
  " 0351 Fin
  " 0353 Bolt, Extension
  " 0354 Connector Holddown Ring and Shim
  " 0355 Cover, Bottom (fueled units)

PN 8100 000 Hermetically Sealed Electrical Connector

To be released Generator Finish Specification

Other Items

439 A 111 0400 Wiring Diagram Schematic
  " 0500 Installation Tool (3 sheets)

To be released DC-DC Converter Drawings

Additional or Substitute Drawings for Prototype Units Only

PN 6400 000 Heater Cartridge (Fire rod)
439 A 111 0150 Adapter Electric Heater
  " 0152 Stainless Steel Disc Load Distributor
  " 0156 Disc, mica
  " 0257 Insulation Header Blocks
  " 0352 Cover, Bottom

Note: Additional drawings are required for such items as mockup, test fixtures, conceptual and alternate design studies.