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May 8, 1951

SUBJECT

Report of Invention - Recovery of Tritium From Irradiated Li-Al Slugs

TO

W. I. Patnode

FROM

A. R. Matheson

HWIR-325 COPY NO. *74*

ROUTE LIST

- 1. W. I. Patnode *ga*
- 2. *[Handwritten]*
- 3. *[Handwritten]*
- 4. *[Handwritten]*
- 5. *[Handwritten]*

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A. E. C. Case No. _____
G. E. Case No. HWIR-325

REPORT OF INVENTION

TO: W. I. PATNODE
703 BUILDING - ROOM 2125

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1st REVIEW-DATE:	<u>5/17/73</u>
AUTHORITY	AOC <u>ADC</u> ADD
NAME:	<u>D L Adam</u>
ORG:	<u>AEC</u>
2nd REVIEW-DATE:	<u>10/6/98</u>
NAME:	<u>Job Briggs</u>
ORG:	<u>PNWL-ADD</u>

DD Canon
12-18-98

I: Attached hereto is a description of what may be an invention in:

Recovery of Tritium from Irradiated Li-Al slugs. RLO-CG-5, REV 1 (E.O. UP)
10/16/95

II: The name, title or position, works location, and permanent address of the inventor's is:

A. R. Matheson, Assistant Group Head, Pile Technology Division, Hanford Works, General Electric Company, Richland, Washington

III: Evidence as to when and where the invention was made can be found in the following listed written or pictorial material (Notebook, file reports or drawings, etc.):

p. 47, HW-3306-T, Notebook, A. R. Matheson

APPROVED FOR PUBLIC RELEASE

Job Briggs
10/6/98

IV: The approximate date of the first entry in said written or pictorial material describing or showing said invention is:

March 5, 1951

V: Persons who could testify as to when and where the invention was made include the following:

W. L. Schalliol

Signed: A R Matheson

W M Hart
(Supervisor)
W. M. Hart

5-15-51
Date

Pile Technology Division
(Division)

NOTE: Suggestions for preparing the invention description are contained on the reverse side of this form.

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SUGGESTIONS FOR PREPARING THE INVENTION DESCRIPTION

- I. Attach to this report sheet a description of the invention which is sufficiently detailed so that a person capable of understanding the invention can, from a reading of the description, plus attachments thereto, if any, learn what the invention relates to and how it is made and used. The description need not be a detailed engineering specification giving precise dimensional details for every element, etc., but it should give the reader the essential component parts of the invention and particularly is this true if a certain feature, such as a material, temperature, pressure, etc., is critical. To avoid needless follow-up, the reader of the description should be able to get enough information from reading the description plus attachments thereto, if any, so that he can compare the invention with other practices in the same field. It is of particular importance to mention whether the subject matter of invention is in actual use or such use is contemplated. Wherever possible, drawings, sketches, or photographs, etc., should be used to lessen the amount of written description required.
- II. The invention description plus attachments thereto, if any, should be signed and dated by the inventor(s), and also signed and dated by at least one witness who understands the invention.
- III. Use of regular reports as invention descriptions:
 1. If a report prepared in the regular course of work, such as a Hanford Technology report, satisfies the requirements stated in I. above, then it will not be necessary to prepare a separate invention description. Instead, merely attach a copy of such report to this report sheet and sign it as directed in II above.
 2. Such a report can still be used as the basis of an invention description if it is possible to supplement it readily so that the report plus the supplement meets the requirements stated in I. above. In such a case, attach the report plus the supplementary material to this report sheet and sign them as directed in II above.
 3. In cases other than those described above, prepare a separate invention description and attach it to this report sheet.
- IV. An original and six copies of this report sheet plus the invention description attached thereto should be forwarded to Dr. W. I. Patnode, Building 703

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- #1,2,3,4,5,6,7. W. I. Patnode
- #8. G. E. McCullough
- #9. A. R. Matheson
- #10. 700 Files
- #11. 300 Files
- #12. Pink Copy

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May 8, 1951

REPORT OF INVENTION

This document contains
 2 pages, No. 2
 copies. Serial 2

RECOVERY OF TRITIUM FROM IRRADIATED LI-AL SLUGS

The irradiation of Li-Al slugs produces tritium by a reaction of the Li⁶ isotope with neutrons. It is proposed that the gases thus formed in the metal slug be liberated by dissolving the slug in an anhydrous, non-protonic solvent or acidic gas to liberate the gases. Examples of these solvents or gases are thionyl chloride, SOCl₂, sulfoxyl chloride, SCl₂, phosphoryl chloride, POCl₃, phosgene, COCl₂; sulfur dioxide, SO₂ (l) or (g); sulfur trioxide, SO₃ (l) or (g); fluorine, F₂ (l) or (g); nitrosyl chloride, NOCl₂; and so on. The liberated gases plus the solvent vapor can be passed from the reaction chamber through a cold trap where the condensable gases can be removed and the remaining gases, essentially helium and hydrogen isotopes, separated by means of a palladium thimble. Such a process would permit liberation of the slug gases at relatively low temperatures and obviate the need for high temperature furnaces, and would decrease diffusion losses and resultant contamination hazards as are encountered when hot metals are used to enclose tritium gas.

No experimental work has been done on the effect of these dissolving agents on Li-Al slugs.

A R Matheson
 A. R. Matheson
 Pile Technology Division

ARM:lqd

Witnessed by: C. R. F. Smith
 C. R. F. Smith
 Pile Technology Division

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