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Pacific Northwest Laboratory

Monthly Report to the Nuclear Research and Applications Division for February 1976

March 1976

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Battelle
Pacific Northwest Laboratories

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PACIFIC NORTHWEST LABORATORY
MONTHLY REPORT TO THE
NUCLEAR RESEARCH AND APPLICATIONS DIVISION
FOR FEBRUARY 1976

H. T. Fullam

March 1976

Battelle
Pacific Northwest Laboratories
Richland, Washington 99352

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STRONTIUM HEAT SOURCE DEVELOPMENT PROGRAM

At Hanford, strontium is separated from the high-level waste, then converted to the fluoride, and doubly encapsulated in small, high-integrity containers for subsequent long-term storage. The fluoride conversion, encapsulation and storage take place in the Waste Encapsulation and Storage Facilities (WESF). This encapsulated strontium fluoride represents an economical source of ^{90}Sr if the WESF capsule can be licensed for heat source applications under anticipated use conditions. The objectives of this program are to obtain the data needed to license $^{90}SrF_2$ heat sources and specifically the WESF $^{90}SrF_2$ capsules. The information needed for licensing can be divided into three general areas:

1. *Long-term SrF_2 compatibility data.*
2. *Chemical and physical property data on $^{90}SrF_2$.*
3. *Capsule property data such as external corrosion resistance, crush strength, etc.*

The current program is designed to provide the required information.

LONG-TERM COMPATIBILITY TESTS

Preparation of the compatibility test couples containing $^{90}SrF_2$ is continuing. To date, 120 couples have been fabricated and 90 remain to be fabricated. The couples to be tested for 1000 hr were placed on test early in February, and the 22,500- and 30,000-hr couples were placed on test in mid-February. The 7500- and 15,000-hr couples will be placed on test as soon as they are fabricated (which should be by mid-March).

The 1000-hr tests with nonradioactive SrF_2 have been completed and the couples are now being sectioned. Analyses of the test specimens will start as soon as the couples are sectioned.

Compatibility testing of the two full-size WESF $^{90}SrF_2$ capsules at ARHCO has been delayed. ARHCO management has requested an additional engineering analysis to see if the capsules will overheat the concrete wall of the cell where they are to be stored. ARHCO's Plant Engineering Section is conducting the study; the completion date has not yet been determined.

SHORT-TERM COMPATIBILITY STUDIES

The topical report (BNWL-1967) summarizing the results of the short-term compatibility tests has been issued. A paper on the containment of $^{90}SrF_2$ was presented at the AIME national meeting in Las Vegas in February.

Additional short-term tests of potential containment materials using nonradioactive SrF_2 were started in February. The tests are being carried out at 800°C and will last for 1500 and 4400 hr. Materials being tested include:

1. Hf-0.25Pt-0.25Pd
2. Niobium
3. Molybdenum
4. Ta-10 W
5. Mo-50 Re
6. W-26 Re
7. Platinum
8. Iridium
9. Rhenium
10. Hastelloy C-4
11. Hastelloy B
12. Hastelloy S
13. Inconel 671
14. Ni 200
15. Rene 41
16. Udimet 700
17. 316L SS
18. Ingot iron

In addition, TZM, Haynes Alloy 25, and Hastelloy C-276 are being tested as reference specimens. A number of other materials will be tested as soon as they are obtained. They include:

1. Ir-0.3 W
2. Incoloy 800
3. Inconel Alloy 617
4. Ductile cast iron
5. Hastelloy B-2
6. JS-777 Alloy
7. Monel Alloy 400
8. TD Nickel
9. TD Ni-Cr

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