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U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION V

IE Inspection Report No. 70-25/76-01 (IE-V-100)

Licensee Rockwell International  
Atomics International Division  
8900 DeSoto Avenue

Docket No. 70-25

License No. SNM-21

Canoga Park, California

Priority 1

Facility \_\_\_\_\_

Category 1

Location Canoga Park, California

Group 1

Type of Facility Fuel Fabrication

Type of Inspection Special Inspection, Mat'l Acct., Announced

Dates of Inspection January 14, 1976

Dates of Previous Inspection October 20-24, 1975

Principal Inspector *G. Hamada*  
G. Hamada Chemist/Statistician

1/30/76  
Date

Accompanying Inspectors None

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

Other Accompanying Personnel: None

Reviewed by *V. N. Rizzolo*  
V. N. Rizzolo, Chief, Safeguards Branch

1/30/76  
Date

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SUMMARY OF FINDINGS

Enforcement Action

None.

Licensee Action on Previously Identified Enforcement Items

Not applicable.

Other Significant Findings

This was a special inspection.

Management Interview

Conducted on January 14, 1976 with the following:

V. Schaubert, Nuclear Materials Manager  
J. Dong, Statistician

Discussion

A special inspection was conducted at Rockwell International, Atomic International Division, Canoga Park, on January 14, 1976. This was a followup on the investigation by the licensee to isolate and resolve the problem of the MUF's for both the material balance intervals ending June 23, 1975 and August 26, 1975 exceeding the LEMUF specifications but not 1.5 times the specifications. A collateral effort included an investigation to determine what steps would be needed to bring the calculated LE's down to a level within the LEMUF specifications. Earlier investigations by the licensee had traced the difficulties to the measurement of a category of material labeled contaminated glass and UAL + Glass which are both derived from the glass molds. Although the investigations initially sought for a resolution of the problem in the analytical laboratory, it soon became apparent that virtually all of the difficulties could be attributed to preparation of the material for sampling and sampling itself.

There are some inherent problems with this material. Although the contaminated glass is ground to a size suitable for sampling, the material is not completely homogeneous because the uranium alloy is extremely hard and is not readily amendable to grinding. With care, a reasonably good sample may be obtained and the average of the results

could provide a reasonably good estimate of the SNM content of this material. Up to the time in question, the measurement results were within the expected range for this type of material. For the period ending June 23, 1975 and particularly for the period ending August 26, 1975, the analytical results differed significantly from prior results for this material type and appeared to be more erratic. Since some of the values seemed to be about an order of magnitude too high, an investigation was conducted by the licensee to check for some of the more obvious sources of error such as calculation errors or calibration errors. When the investigation revealed that these results were analytically accurate, a resampling and reanalysis program was initiated. While the results this time were closer to the expected range (based on historical data), the data for the UAL + Glass material still appeared erratic, and as a consequence, a third set of samples was taken and reanalyzed. Although the results of the third set were only marginally better than those of the second set, and the spread of replicates was still relatively large, because they were now in the expected order of magnitude range, the results were combined and the mean value used for calculating the SNM content of this material. The licensee has an ongoing effort to examine this problem and to find a better way to treat the material to make it more homogeneous and/or to devise a sampling procedure that will provide more representative samples.

Side stream materials, such as contaminated glass, have been significant contributors to the MUF fluctuations that have been manifested recently. For example, the original MUF evaluation for the period ending June 23, 1975 resulted in a MUF of 274.42 grams U-235 against a LEMUF specification of 300 grams isotope. A second MUF evaluation based on resampling and reanalysis of contaminated glass and UAL + Glass yielded a MUF of 438.12 grams U-235. For the next material balance period which ended on August 26, 1975, the original MUF evaluation gave a negative MUF (MUF gain) of 611.30 grams isotope against a LEMUF specification of 489 grams isotope. A second MUF evaluation based on reanalysis of side stream material resulted in a negative MUF of 485.69 grams isotope, and a third reanalysis gave a MUF gain of 558.29 grams U-235.

With respect to the fairly large calculated LE on MUF for isotope, although side stream measurements impact on the LEMUF because of their relatively large random error components, the major contributor to the LE (isotope) is the LE associated with materials added to process. For example, for the material balance period ending August 26, 1975, the LE (isotope) associated with materials added to process calculates to 546.41 grams, which by itself already exceeds the LEMUF (isotope) specifications of 489 grams. The principal cause of this large LE can be traced to the method used by the licensee to perform and use receiver's measurements on high enriched uranium metal buttons obtained from Oak Ridge. An actual example is presented below.

On September 8, 1975, the licensee received a shipment of high enriched uranium metal buttons from Oak Ridge with total element weight of 296,421 grams and an enrichment value (average) of 66.71%. This represented 14 different batches, each with a slightly different enrichment value, contained in 23 separate containers. Each container was sampled, and the samples were composited into three separate composite samples consisting of 8, 7 and 8 samples per composite. The three composite samples were sent out to a contractor laboratory for isotopic analysis.

TABLE I

Composition of Composite Samples  
(Based on Shipper's Enrichment Values in %)

| <u>Composite A</u> | <u>Composite B</u> | <u>Composite C</u> |
|--------------------|--------------------|--------------------|
| 66.77              | 66.80              | 66.77              |
| 66.53              | 66.80              | 66.72              |
| 66.72              | 66.53              | 66.74              |
| 66.65              | 66.65              | 66.74              |
| 66.69              | 66.65              | 66.69              |
| 66.86              | 66.79              | 66.65              |
| 66.74              | 66.84              | 66.74              |
| 66.83              | -                  | 66.74              |
| $\bar{x} = 66.724$ | $\bar{x} = 66.723$ | $\bar{x} = 66.724$ |

TABLE 2

Contractor Laboratory Results in %

|                                  |
|----------------------------------|
| Composite A = 66.767             |
| Composite B = 66.603             |
| Composite C = 66.794             |
| $\bar{x} = 66.721$               |
| LE (95% Conf. Interval) = +0.257 |
| $\bar{x} = 66.721 \pm 0.385\%$   |

In Table 2, the relatively large LE of 0.385% reflects the relatively wide range of enrichment results for the composite samples. Since the contractor laboratory had previously demonstrated that the error component (95% confidence interval) of mass spectrometric measurements was on the order of 0.09% (for a single determination), there was no apparent reason to doubt the validity of the results obtained for the composites. It might be noted that the average value for the three composites is almost exactly the expected value for the composites (see Table I). It is also very close to Oak Ridge's assigned average enrichment for this shipment.

Because the raw stock material was randomly added to process, the licensee was compelled to use the LE given in Table 2 (0.385%) to propagate the error components in the material balance. Had the licensee maintained traceability of raw stock added to process by composite group, i.e., if the metal buttons represented by a given composite analysis were added to process as a composite group, that enrichment value determined for a given composite could have been used individually as each group was added to process. Had this been done, the error component (LE) would have been significantly smaller since now the error associated with each of the values, i.e., the mass spectrometry errors which are small, would have been applicable.

Another technique that might help to alleviate the problem would be to perform the compositing in a different manner. Rather than taking consecutive composites, i.e., compositing the samples from the first eight containers, then another from the next seven containers, and another from the last eight containers, which is what was done, two samples from each container would be taken and the samples from the entire 23 containers would be composited into two duplicate composites. It would appear that this arrangement might very well give error components that more nearly reflect the errors due to isotopic analyses.

The above considerations were discussed with the licensee and constitute other alternatives for potential future application. In addition, the licensee was reminded of the provisions contained in 70.51e(6) where higher limits might be obtained if sufficient justification could be made for such a request. While the licensee was fully aware of this, because it would require a significant expenditure of effort to provide this justification, and also, since the EBR-II program is expected to be completed within the next six months or so, it is not clear at this time which course of action would be the most appropriate to take.

Region V will watch this situation closely over the next several material balance periods and will give it appropriate attention during the next routine inspection of this facility.

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