

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

Region V

Report No. 70-25/79-04 (IE-V-315)  
Docket No. 70-25 Licensee No. SNM 21 Safeguards Group 1  
Licensee: Energy Systems Group, Rockwell International  
8900 DeSoto Avenue  
Canoga Park, California 91304  
Facility Name: Energy Systems Group  
Inspection at: Canoga Park, California  
Inspection Conducted: June 4-8, 1979  
Date of Last Material Control and Accounting Visit: December 4-8, 1978 and January 2-3, 1979  
Type of Inspection: Unannounced Material Control and Accounting  
Inspectors: G. H. Hamada July 9, 1979  
G. H. Hamada, Statistician/Chemist Date Signed  
L. R. Norderhaug 7/10/79  
L. R. Norderhaug, Accountant Date Signed  
A. Wieder July 9, 1979  
A. Wieder, Accountant Date Signed  
Approved by: L. R. Norderhaug 7/10/79  
L. R. Norderhaug, Chief, Safeguards Branch Date Signed

Areas Inspected: Facility Organization, Facility Operation, Measurement and Statistical Controls, Shipping and Receiving, Storage and Internal Control, ID and Associated Limit of Error, and Records and Reports. The inspection involved 102 inspector hours onsite by three NRC inspectors and was begun during the regular hours.

Results: The licensee was found to be in compliance with NRC requirements in the seven areas examined during the inspection.

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The principal activity at the Santa Susana site is the Hallam spent fuel decladding operation. A small research and development effort involving the fuel blanket for the FFTF program is also conducted at the Santa Susana site. Depleted uranium only is being used in this project.

The licensee is preparing for two other decladding projects which are scheduled to begin in fiscal 80 and fiscal 81 respectively.

EBR-I-Mark IV, a Pu-alloy type fuel is scheduled to start in early fiscal 80. Fermi is not scheduled until fiscal 81; however, one test element is expected to arrive any day now to permit tests to be completed within fiscal 79 (September 30, 1979). This one test element is for the purpose of establishing the various technical and financial parameters needed to provide the basis for performing the work.

7. MC 85206B - Measurement and Statistical Controls

No items of noncompliance were noted.

An Inventory Difference (ID) averaging approximately 170 grams U-235 per period has persisted for almost the entire duration of the ATR project. It was indicated in a prior inspection report (Report No. 70-25/78-07, IE-V-271), that the licensee was fabricating a new sampling device for sampling  $UO_2$  powder. Recently, several powder batches were sampled using both the new and old sampling devices. This dual sampling procedure will be continued until sufficient data have been collected to provide a more reliable basis for establishing whether or not a systematic sampling error can be observed and if so to determine its magnitude. The reason for examining this particular aspect of the measurement program as a potential contributor to the ID anomaly is because uranium concentration is known to vary with particle size in the ATR process. The coarse particles (greater than 300 mesh) have significantly lower uranium concentration than the fine particles (less than 100 mesh) or the particles in the acceptable size range (-100 to +300 mesh). Recycled material, consisting essentially of coarse particles, often assays at 69-70 percent uranium versus the makeup or target value of 71.5 percent uranium. Coarse particles, however, constitute only about 1 kg out of 18 kg of material per batch. It might be noted that although the makeup process is carefully controlled to achieve the target value of 71.5 percent uranium, the actual assay value of the  $UA1x$  powder is more nearly 71.3 percent. This is due primarily to oxygen pickup by the alloy during processing. A typical oxygen value for  $UA1x$  powder is 0.3 percent by weight. When corrected for this effect, the 71.3 percent agrees reasonably well with the 71.5 percent target value. This seems to indicate that sampling is not a major factor in the ID anomaly. On the other hand, the ID anomaly may not be the result of a single factor alone, but may be due to a combination of factors, including sampling.

Waste barrel measurement is another area which might provide a partial answer to the ID anomaly. The waste category, however, appears not to be large enough to substantially affect the ID. The amount of solid waste



made, recovery results on six have been obtained. The recovery results for the single shipment of solid waste barrels has also been obtained. (See Paragraph 8 for the "recovery" procedure used by Oak Ridge). The following are the results that have been obtained for scrap.

Date Shipped	Document Number	Shippers Value		Recovered Value		Difference	
		U(gms)	Ux(gms)	U(gms)	Ux(gms)	U	Ux
6/22/76	LAL-FZB-02	16399	15280	16111	15019	-288	-261
9/16/76	LAL-FZB-03	20491	19093	20559	19149	+68	+56
12/14/76	LAL-FZB-05	24287	22626	24368	22692	+81	+66
4/20/77	LAL-FZB-06	31733	29561	31704	29534	-29	-27
9/24/77	LAL-FZB-07	27043	25188	27187	25319	+144	+131
12/13/77	LAL-FZB-08	31538	29380	31554	29393	+16	+13
		151491	141128	151483	141106	-8	-22

When the results of the first shipment of scrap became known, ESG challenged the accuracy of the recovered data (SR difference of 261 gms U-235) on the basis that these were reject and test plates which could be traced to highly precise and accurate measurements, and it was unlikely, in their opinion, that ESG's value was biased high by a quantity as large as 261 gms. United Nuclear (UNC), through the DOE, was requested to respond to ESG's position on this issue. In the interim, additional results for recovered scrap were obtained and it can be seen in the above Table that when the six shipments are considered as a whole, the SR difference virtually disappears. Although the original inquiry has not been specifically resolved to date, in light of the mitigating effect of the overall results, the initial concerns have become less important at this time.

Recovery (at Oak Ridge) of the 106 waste barrels yielded the following results.

	U-235 Results in Grams			Total
	Combustibles	Noncombustible (Salvage)	Noncombustible (Discard)	
Gamma Scan by Oak Ridge	1148.3	300.9	334.8	1784.0
Chemical Analysis by Oak Ridge	1336.8	-----	-----	-----
Adjusted Total	1336.8	300.9	334.8	1972.5

Oak Ridge's estimate of the best U-235 value for the 106 drums of solid waste is 1972.5 grams U-235. As can be seen in the table above, this value was obtained by combining the chemical recovery results for the combustible fraction with the gamma scan results for the noncombustible (salvage) and noncombustible (discard) categories. It might be noted that Oak Ridge's gamma scan value for the combustible fraction is biased by about 14 percent when compared to the value obtained by chemical recovery of this same fraction. Yet, the noncombustible fractions, which were measured only by NDA, were not corrected for this apparent bias. In addition, supplemental information obtained at ESG's request indicated that Oak Ridge did not attempt to correct for density of the material in its NDA measurements. Also, the calibration standards were fabricated out of combustible material and the same factors were used for all three material categories. Since combustibles constitute material of low density and noncombustibles generally are material of higher density, the procedures used by Oak Ridge to measure the SNM content of the noncombustible fractions could result in a significant negative bias in the measurement data. At this point, it is not obvious that the Oak Ridge result for the waste barrels is the better value.

In the near future, another set of 106 waste barrels is scheduled to be shipped to Oak Ridge for recovery. The results from this second set should shed more light on the relative merits of the respective measurements.

9. MC 85210B - Storage and Internal Controls

No items of noncompliance were noted.

The internal material transfer voucher population for this inspection period was randomly sampled. The total population of transfers was examined for sequence continuity and documented explanations for apparent missing, lost, or unused transfers in a given series.

The random sampling included a review for: (1) nature of the transaction, (2) authorized signatures, (3) reasons or explanations given in support of a particular adjustment, correction or write-off, and (4) mathematical extensions and summations.

Appointments of three new MBA custodians and alternate custodians were checked for the appropriate written delegations of authority.

Internal procedures require that known accountability data differences identified against any item, container or process be documented, evaluated and recorded as identified during operations. Documentation (Form 737-S-3, Material Value Difference) of this nature prepared and recorded for the audit period were examined.

Essentially, all of the material left over from both the EBR-II and the plutonium programs are being stored in the Department of Energy vault

located in the exempt area at the Santa Susana site. For EBR-II, the material is in the form of solid waste contained in 135 fifty-five gallon barrels with a total SNM value of 4.185 kg U-235 (6.278 kg U). There are 75 other items of mixed (Pu-U)  $O_2$ ,  $PuO_2$ , and  $UO_2$  from the plutonium program with a total plutonium content of 2.625 kg, of which 418 gms are in the form of pure  $PuO_2$  powder. Four of these items are containers of  $UO_2$  powder (93 percent enriched) with a U-235 content of 5.321 kg U-235 (5.714 kg U). The ultimate disposition of these materials is in the hands of the DOE.

As of May 6, 1979, the inventory in the waste yard (MBA-41) consisted of 354 drums of solid waste and 4 containers of absolute filters. Two of the containers contain absolute filters (12 per container) that were installed on August 19, 1978, and removed on March 17, 1979. The other two contain filters that were installed on January 26, 1978, and removed on August 19, 1978. The U-235 content of these containers is 78.22 gms and 90.43 gms, respectively. The total SNM inventory in the waste yard as of May 6, 1979, was 2897 gms U-235 (3110 gms element). A total of 331 containers have been reviewed for disposition by EG&G and it has been determined that 106 barrels are to be shipped to Oak Ridge for recovery, and 2 barrels and 2 filter containers are cleared for shipment to burial.

10. MC 85214B - ID and Associated Limit of Error

No items of noncompliance were noted.

The ATR program has had a long standing unexplained Inventory Difference (ID). This ID (loss) averages approximately 170 grams U-235 per period over the last 15 material balance intervals. During this 30 month period, the U-235 ID never exceeded the limit of error (LE) constraint, nor did it exceed both the associated (calculated) LE and 300 gms, except in one instance. This exception was for the period January 3, 1979 to March 5, 1979, where the U-235 ID was 302 gms and LEID was 126 gms. For six of the last eight inventory intervals, the ID exceeded the calculated LEID. The magnitude of the ID calculates to approximately 0.27 percent of throughput. Looking at this difference from the standpoint of powder analysis, an absolute difference of 0.2 percent; i.e., a powder assay of 71.5 percent uranium instead of the 71.3 percent usually obtained would account for the ID. However, evidence obtained to date, as discussed in Paragraph 8 of this report, does not indicate an analytical bias large enough to account for the ID. ESG is investigating the powder sampling procedure to determine if a systematic sampling error could be contributing to the ID. (See Paragraph 8 for a discussion of the sampling experiment.)

11. MC 85216B - Records and Reports

No items of noncompliance were noted.

Data contained in Forms NRC-742, Material Status Report, prepared by the Energy Systems Group (ESG) were verified to the Company's Material Control and Accounting Records. Selected material balance information from the Company records was traced to subsidiary MBA records as an additional test of the material accountability records system.

Documented transfers of special nuclear material to offsite facilities were reviewed and found to be appropriately supported by the receiver's Part 70.42 written certification.

ESG's Material Status Reports, NRC-742s to the Nuclear Regulatory Commission, for reporting identification symbols LAL and ZAZ were found to accurately represent the recorded activity for the semi-annual period ending March 31, 1979.

Reconciliation of physical inventory results to plant ledger balances for physical inventories conducted November 13, 1978, January 2, 1979, March 5, 1979, and May 7, 1979, were found to be timely and posted adjustments were determined to be proper.





UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION V  
1990 N. CALIFORNIA BOULEVARD  
SUITE 202, WALNUT CREEK PLAZA  
WALNUT CREEK, CALIFORNIA 94596  
October 22, 1979

*Safeguards  
(Working copies)*

Docket No. 70-25

Energy Systems Group  
Rockwell International  
8900 De Soto Avenue  
Canoga Park, California 91304

Attention: Mr. R. G. Jones  
Vice President and Controller

Gentlemen:

Subject: NRC Inspection of Energy Systems Group

This refers to the inspection conducted by Messrs. G. Hamada and Y. Kobori of this office on September 20-21, 1979 of activities authorized under NRC License No. SNM-21. It also refers to the discussion of our inspection findings with members of the staff at the conclusion of the inspection.

The areas examined during the inspection included your program for controlling and accounting for special nuclear material pursuant to applicable provisions of Part 70, Title 10, Code of Federal Regulations, and specific requirements of NRC License No. SNM-21. Within these areas, the inspection consisted of selective examinations of procedures and records, interviews with personnel and observations by the inspectors.

No items of noncompliance with NRC requirements were identified within the scope of this inspection.

In accordance with Section 2.790(d) of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, documentation of findings of your control and accounting procedures for safeguarding special nuclear materials are exempt from disclosure; therefore, the inspection report will not be placed in the Public Document Room and will receive limited distribution.

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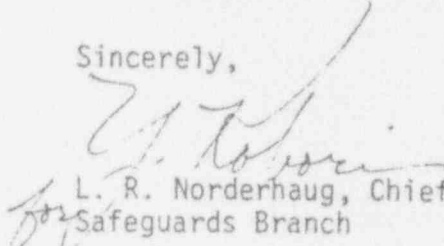
Energy Systems Group

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October 22, 1979

Should you have any questions concerning this inspection, we will be glad to discuss them with you.

Sincerely,



L. R. Norderhaug, Chief  
Safeguards Branch

Enclosure:  
IE Inspection Report  
No. 70-25/79-08 (IE-V-339)