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

Region V

leport No. Docket No.	70-25/79-04 (IE-V			
	70-25	Licensee No. SNM 21	Safeguards Group1	
	Energy Systems Gr			
	8900 DeSoto Avenu			
	Canoga Park, Cali	fornia 91304		
acility Na	me: Energy Syste	ms Group		
nspection	at: Canoga Park,	California		
nspection	Conducted: June	4-8, 1979		
ate of Las	t Material Control	and Accounting Visit: December 4-	8, 1978 and January 2-3, 1979	
ype of Ins	pection: Unanno	unced Material Control and Account	ing	
nspectors:	G. H. Hamada, St G. H. Hamada, St X. H. Hamada, St X. Kobbri, Accou Y. Kobbri, Accou A. Wieder, Accou	atistician/Chemist	July 9, 1979 Date Signed 7/10/79 Date Signed July 9, 1979 (Date Signed	
pproved by	L. R. Norderhá	ug, Chief, Safeguards Branch	Date Signed	

<u>Areas Inspected</u>: Facility Organization, Facility Operation, Measurement and Statistical Controls, Shipping and Receiving, Storage and Internal Control, ID and Assciated 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.

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

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# DETAILS

### 1. Key Persons Contacted

- J. Kim, Measurements Control Coodinator, Statistician
- C. L. Nealy, Manager, Analytical Chemistry
- \*V. J. Schaubert, Manager, Nuclear Materials Management
- \*R. Tuttle, Manager, Operational Safety and Waste Management S. Wode, Management Systems Specialist

\*Denotes those present at the exit interview in addition to R. G. Jones, Vice President and Controller.

# 2. Licensee Action on Previous Inspection Findings

There were no items of noncompliance noted on the previous inspection. (Report 78-07)

3. Exit Interview

Inspection findings were discussed with licensee personnel indicated in Paragraph 1.

4. Unresolved Items

No unresolved items remain outstanding for this facility.

### 5. MC 852028 - Facility Organization

No items of noncompliance were noted.

The inspection results were obtained through discussions with licensee management and review of licensee's fundamental nuclear material control plan (FNMC) and procedures.

6. MC 85204B - Facility Operation

No items of noncompliance were noted.

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Currently, the licensee is engaged in the fabrication of ATR and TRTR fuel plates at the DeSoto Avenue site. Both programs involve the fabrication of plate type fuel containing 93 percent enriched uranium in the form of a uranium-aluminum (UA1x) alloy. The only difference between ATR and TRTR plates is the smaller size of the TRTR plates. The throughput (the larger of additions to or removals from process) for the last six material balance intervals averaged approximately 66.1 kg element (61.5 kg isotope) per interval.

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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, 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 it's 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 UAlx powder is more nearly 71.3 percent. This is due primarily to oxygen pickup by the alloy during processing. A typical oxygen value for UAlx 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

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generated per period is roughly 180 gms U-235 with an increase to roughly 300 gms when prefilters are changed and included in the waste drum category. A barrel measurement intercomparison program with a group from Battelle, Pacific Northwest Laboratories, indicated relatively good agreement in the data. Also, a set of 106 waste drums were partially recovered at Oak Ridge, i.e., the combustible fraction was separated from noncombustible material and ashed and analyzed. The noncombustible fraction was assayed by NDA only. These data indicate that, if anything, ESG's results are high by about 25 percent. The evaluation of this difference is in progress and among the items being reviewed are the measurement. controls used by Oak Ridge in performing these measurements. Of particular concern are the procedures for calibrating and using the NDA system for measuring the noncombustible fraction of the waste. These intercomparison results and ESGs own measurement control data do not support the hypothesis of a large negative bias in the waste measurement data. Therefore, it does not appear that the waste category will substantially affect the ID anomaly.

ESG's analytical laboratory is currently a participant in the SALE program. In addition, the laboratory recently enrolled in the General Analytical Evaluation (GAE) program. The GAE program, like the SALE program is administered by the NBL. Although the SALE and GAE programs have similar objectives, GAE covers other analytical methodologies not included in SALE. For example, emission spectrographic analysis is included in GAE but not SALE. The principal difference, however, is in the pedigree of the "standards" used in the GAE program. GAE "standards" are not blessed with NBS-type certification.

#### 8. MC 85208B - Shipping and Receiving

No items of noncompliance were noted.

Each Form NRC-741, Nuclear Material Transaction Report, for reporting identification symbols ZAZ and LAL was reviewed for the inspection period November 8, 1978 through May 31, 1979. Quantitative data from such shipment and receipt activity were traced to individual ledger entries and/or recorded totals to confirm agreement. Timeliness of each transaction report was also verified and found to be within the criteria for issuing or acknowledging an NRC-741 document.

As of May 6, 1979, eleven shipments of ATR scrap containing 246.863 kg U-235 (264.981 kg U) have been sent to Oak Ridge. One shipment of 106 solid waste barrels also has been sent to Oak Ridge for recovery. Because this is DOE owned material, its disposition and subsequent treatment are dictated by DOE through its prime contractor, EG&G. Once the material leaves ESG, it is under the total control of the DOE. Although the recovery operation of the waste barrels was conducted at Oak Rigde, recovery of scrap was contracted out to United Nuclear at Wood River Junction. The resolution of shipper-receiver (SR) differences becomes somewhat ambiguous under such a setup. To date, of the eleven scrap shipments that have been

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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	Document	Shipper	s Value	Recover	ed Value	Diffe	rence
Shipped	Number	U(gms)	UX(gms)	U(gms)	UX(quis)		02
6/22/76 9/16/76 12/14/76 4/20/77 9/24/77 12/13/77	LAL-FZB-02 LAL-FZB-03 LAL-FZB-05 LAL-FZB-06 LAL-FZB-07 LAL-FZB-08	16399 20491 24287 31733 27043 31538	15280 19093 22626 29561 25188 29380	16111 20559 24368 31704 27187 31554	15019 19149 22692 29534 25319 29393	-288 +68 +81 -29 +144 +16	-261 +56 +66 -27 +131 +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

	Combustibles	Noncombustible (Salvage)	Noncombustible (Discard)	Total
Gamma Scan by Oak Ridge	1148.3	300.9	334.8	1784.0
Chemical Analysis by Oak Ridge	1336.8	are are not will not	47.00 M 44	
Adjusted Total	1336.8	300.9	334.8	1972.5

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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 combusible 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 tht 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) 02, Pu02 and U02 from the plutonium program with a total plutonium content of 2.625 kg, of which 418 gms are in the form of pure Pu02 powder. Four of these items are containers of U02 powder (93 percent enriched) with a U-235 content of 5.321 kg U-235 (5.711 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 abolute 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 ' rmined that 106 barrels are to be shipped to Oak Ridge for recovery, and 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.

Reconcilation 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.

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

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

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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. Energy Systems Group

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) -2-