U. S. NUCLEAR REGULATORY COMMISSION
REGION V

Report No. 70-25/82-07

Docket No. 70-25 License No. SNM-21 Safeguards Group 1

Licensee: Energy Systems Group

Rockwell International Corporation

Canoga Park, California 91304

Facility Name: Headquarters Site and Santa Susanna Field Laboratory

Inspection at: Headquarters Site and Santa Susanna Field Laboratory

Inspection Conducted: August 23-27, 1982

Inspectors: B. L. Brock — 9/29/82
B. L. Brock, Fuel Facilities Inspector — Date Signed

P. R. Zurakowski — 9/29/82
P. R. Zurakowski, Radiation Specialist — Date Signed

Approved by: R. D. Thomas — 9/29/82
R. D. Thomas, Chief, Materials Radiation Protection Section — Date Signed

Approved by: H. E. Book — 9/29/82
H. E. Book, Chief, Radiological Safety Branch — Date Signed

Summary:

Inspection on August 23-27, 1982 (Report No. 70-25/82-07)

Areas Inspected: Organization, facility modifications and changes, internal review and audit, safety committee activities, required calibrations/tour of facilities, employee training, criticality safety, environmental programs, emergency planning, radioactive waste management, transportation activities, and radiation protection.

The inspection involved 60 inspector-hours onsite by two NRC inspectors.

Results: One item of noncompliance (reported by the licensee) was identified in one area inspected and no items of noncompliance were identified in the other eleven areas inspected.

DETAILS

1. Persons Contacted

*F. W. Feiler, Vice President and Controller, Finance and Administration
*R. J. Tuttle, Manager, Radiation and Nuclear Safety Unit
J. D. Moore, Health and Safety Engineer
V. J. Schaubert, Manager Nuclear Materials Management Unit
R. M. Micklich, Training Specialist
R. McCurnin, Manager, Nuclear Operations
E. Babcock, Manager, Rockwell International Hot Laboratory (RIHL)
R. R. Garcia, Health Physcs Representative and Criticality Coordinator
J. F. Lang, Engineer In-Charge, Building 055
F. H. Badger, Health and Safety Engineer
D. J. Elliott, Engineer
P. H. Waite, Senior Nuclear Mechanic
D. L. Mowder, Chemical Engineer
A. Montoya, Quality Assurance Analyst
F. F. Couture, Fire Protection Engineer (Emergency Coordinator)
D. C. Allen, Staff Assistant, Nuclear Materials Management Unit
M. M. Klenck, Member of Technical Staff
I. R. Dominick, Vault Custodian

*Denotes persons attending the exit interview.

2. Organization

The licensee's organization in the health and safety areas is unchanged with regard to structure. The licensee had informed us of an upper management personnel change wherein Mr. F. W. Feiler has succeeded Mr. R. G. Jones as Vice President and Controller, Finance and Administration effective June 3, 1982.

3. Facility Changes and Modifications

a. Building 001

Decontamination efforts in Room 118-11 of Building 001 have been completed. Decontamination work for several rooms of the 11B and 11D series is in progress. Unless other work can be found for the ATR Fuel Fabrication Facility, the entire facility will be decontaminated and decommissioned in 1983. A grid pattern has been marked on many walls of this facility in preparation for this major decontamination effort. Present plans call for conversion of the entire building into office spaces and manufacturing areas for nonnuclear products.

b. Radioactive Waste Storage Yard - 511

The radioactive waste storage yard next to Building 131 is being phased out. This fenced-in-area will be thoroughly surveyed and any necessary decontamination work will be performed within the next few months. Future storage of radioactive waste will be at the Santa Susanna Field Laboratory near the RMDF (DOE Facility).

c. Building 004

Present plans call for the north end of the hot chemistry area to be decontaminated and isolated from the rest of the hot chemistry area by constructing barrier walls. The newly decontaminated area will then be used for nonnuclear work. This modification will reduce the hot chemistry area to approximately one third of its present size.

d. Building 020

A major modification to the SEFOR declading glove box in decontamination room four will be completed within the next few weeks. The glove box is being fitted with remote manipulators and additional shielding in order to reduce the high exposures received by workers in recent months.

e. Building 055

There have been no changes in Building 055. Unless other work can be found for this facility, decommissioning is still planned in the latter part of 1983.

4. Internal Review and Audit

The radiation and nuclear safety staff continues to make weekly reports of the monitoring of radiation and nuclear safety aspects of production procedures. The weekly reports cover the weigh room, the vault, ATR production area and the hot lab. The quarterly review conducted June 18-25, 1982 included the Quality Assurance Laboratory, the Metallurgy Laboratory, the Chemistry Laboratory, the Waste Storage Yard, the Santa Susanna Vault, the RMDF, the L-85 Reactor, and the NMDF.

No discrepancies with requirements or procedures were identified.

5. Safety Committee Activities

The Fuels Committee of the Nuclear Safety Review Panel met April 12, 1982 for their second review of the SEFOR fuel decladding operation. Their most significant finding was to suggest simplifying the Nuclear Safety Analyses to permit three fuel rods of any type to be in the RIHL. They concluded such a change may present a safeguards problem but it would not present a criticality problem. They also concluded that a figure clarifying the leak testing operation should be provided. Additionally, several comments were made on the Nuclear Safety Analysis for the SEFOR operations scheduled for the RMDF. The comments included an improved description of the welding fixture and the inclusion of a shield cover to prevent intrusion of stray water during the wait period prior to completion of the welding. It was also specified that double 6M drums would be used for product shipments. Also, the Criticality Safeguards Advisor pointed out that six locations on the storage rack did not have the specified surface-to-surface spacing (this criteria relates to isolation margins in case of flooding). Rebuilding the storage racks was not recommended in that storage will be in double 6M drums pending shipment.

6. Required Calibrations/Tour of Facilities

During this inspection all facilities where licensed material is used or stored were visited with the exception of Building 055. During the tour particular emphasis was placed on checking both fixed and portable radiation detection equipment for timely calibration. The fixed equipment also included criticality alarms and fixed air samplers. All equipment observed during the tour carried current calibration stickers and appeared to be operating properly. No violation of good radiation or criticality safety practices were noted during the tour. Criticality safety limits and radiation warning signs were properly posted where required. Forms NRC-3 and Part 19 posting requirements were also observed to be posted in appropriate places in the various facilities visited.

While touring the vault in Building 001 a vacuum gauge indicated that one of the two powder storage vacuum systems was not under vacuum though the vacuum pump's motor was running. The problem was traced to the failure of the belt drive between the motor and the vacuum pump. The belt was replaced and the system returned to normal operation. The UAl_x powder stored in the system, (less than 200 grams) was in the normal stainless steel container with a slip fit lid. In the previous inspection report (82-03), UAl_x powder was reported as involved in a small pyrophoric event resulting from vacuum storage problems. The current observation points up the need to assure system maintenance and performance through periodic vacuum gauge reading and belt replacement.

7. Employee Training

Current training is directed toward preparing those employees for access to the controlled area who will be needed for the decontamination work and who will be needed to specially package and carefully handle some large pieces of equipment during its removal from the area. Employees currently being trained are from Quality Assurance, Facilities and Engineering, Steam Generator Support, and the Hot Cells. The employees from the Hot Cells are those who have been restricted from receiving an additional dose during the current quarter from the decladding of irradiated SEFOR fuel. The Hot Cell employees (6 persons) will have access to the area for about six months. This will permit them to aid in the decontamination effort when their individual doses from decladding irradiated fuel approaches 80 percent of the quarterly limit (see Section 13, paragraph e).

A followup of the employee who had received training in radiation safety but had twice failed to achieve a passing grade during testing revealed that the individual had been denied access and given responsibilities outside of the controlled access area. The employee was a member of the janitorial staff.

8. Criticality Safety

The licensee's ATR fuel fabrication operation is currently processing fuel compacts, fuel plates and fuel assemblies from the last blend of product UAl_x powder this licensee plans to manufacture. Criticality detectors are still operational and tested regularly. Criticality limits were still posted and adhered to.

The criticality safety study for SEFOR decladding, approved in mid-May, was prepared by the Criticality Safeguards Auditor.

During the tour of the fabrication area, it was pointed out by the Criticality Safeguards Auditor that the rack used to hold 12 fuel plates, in the fuel plate cleaning tank (an acid bath), spaces the plates such that although k-effective increases initially during plate loading it subsequently decreases because of the increased material density. A possession limit of 40 plates is in effect for the cleaning room. In other areas of the fabrication plant where water moderation of fuel plates occurs, the plates are evaluated singly in a piece of equipment or the plates are confined to a planar array.

The licensee continues to periodically evaluate the buildup of sludge in his waste liquid retention tanks (6 foot diameter vertical cylinder). Though previous efforts indicated little if any enriched uranium in the sludge, not surprising for this facility's dry process, some question remained because of the questionable sampling technique last used. Recent efforts were made when the tank had just been emptied, thus the undisturbed sludge (4 inches deep) provided a more representative sample. The results from measurements of four separate samples by beta counting indicated that less than 100 grams of U-235 was in the sludge. Larger samples, 178 grams and 706 grams, subsequently taken and measured by high resolution gamma spectrometry indicated that the U-235 content of the sludge in the tank was 19.2 grams and 15.3 grams respectively. Both values are consistent with the first result of less than 100 grams U-235 in the sludge in the tank. The U-235 content of the sludge was on the order of tens of parts per million with a total content of about 20 grams U-235.

9. Environmental Programs

The licensee's environmental sampling program continues. Measurements are made of soil, vegetation, air and water samples. The results are provided in an annual environmental program report to the Commission. Additionally, the licensee issues a semi-annual effluent report which lists the releases from the facilities operations. The FERMI decladding operation in the hot cells was the principle contributor to the releases of 3.5×10^{-14} uCi/cc of principally beta activity that occurred during this 6 months period. This was well within the unrestricted area limit of 4×10^{-12} uCi/cc. The environmental monitoring methods and their affect on results were discussed. The licensee pointed out some changes in data handling whereby negative values resulting from, for example, subtracting a background larger than a measurement will be treated algebraically rather than assuming they represent zero value. The effect will be to decrease somewhat the values reported for low count rate samples. The licensee is planning to use high resolution gamma spectrometry to determine pCi of alpha activity per gram of soil by radionuclide identification and their known additional alpha emitting isotopes present at equilibrium in their decay chains. With regard to soil sample measurement results, it was pointed out by the licensee that measurement of alpha activity in soil samples varies significantly depending on the sample preparation steps being used. Basically, if one counts the soil sample without leaching it, measurement results will be quite different from those obtained from someone who leaches samples and counts the separated material. One needs therefore to be aware of the sample preparation technique used for each of the data sets being compared. The annual environmental report (not yet received) will be discussed in the next inspection report.

10. Emergency Planning

The licensee continues to conduct emergency drills annually. The drills are unnanounced except to assigned observers. Each drill is conducted according to a preplanned scenario. The practice of providing additional information related to the emergency to participants by use of signs at strategic locations in the drill area continues. Critiques are held following the drills and recommendations for improvements are recorded and the responsibility for the improvement is assigned.

Records reflecting the depth of backup personnel for reentry teams were reviewed and found adequate. The three man team consisted of a Captain, a Health Physicist and a Fireman. The Captain, from Operations, functions as Damage Control Officer, the Health Physicist assesses Radiation Safety and the Fireman assesses the Fire Threat. These positions have backup depths of 5, 4 and about 80 persons respectively. Training records of all team members (and backup persons) are kept on a tickler file and a training delinquency report is periodically issued. This report facilitates reminding the reentry team members of needed refresher training. The second reminder is sent to their supervisor to assure the training is obtained expeditiously. An emergency team similar to the reentry team has responsibility for reentry into nonnuclear facilities.

During emergencies, delegation of authority is to higher management to assure that more knowledge and experience is brought to the problem area.

It was noted during the inspection that considerable responsibility rested with the Emergency Coordinator. It appeared that developing some depth via a backup for the Emergency Coordinator would be prudent.

11. Radioactive Waste Management

As was pointed out in paragraph 3.b of this report, the waste storage yard next to Building 131 is being phased out. Six wooden boxes approximately 6' X 6' X 5' containing radioactive waste were observed in storage waiting transportation to a low level waste disposal site. After these boxes are removed from the yard, a close out survey will be performed by the licensee to determine if the area meets the NRC criteria for unrestricted use.

An examination of the six boxes indicated that the waste was properly packaged and labeled. There were no stains or discolorations on the boxes indicating that a leak had occurred. The boxes appeared to be constructed in such a way so that they would withstand the normal rigors of transportation without leaking.

Building 131 is used partly for the storage of contaminated laundry. The laundry is transported by Interstate Laundry to their facility in Walnut Creek, California approximately twice a month. The licensee presently plans to maintain this storage area at least as long as NRC licensed activity continues at the Desoto Facility.

12. Transportation Activities

The review of transportation activities was limited during this inspection to those associated with the one shipment of radioactive waste that occurred since the last inspection. This shipment involved mainly the corroded drums discussed in Reports 81-10 and 82-03. These drums were repackaged as per DOE instructions and shipped in May 1982 to DOE's Hanford Site near Richland, Washington. The Manager of the licensee's Nuclear Materials Management Unit assured the inspectors that all applicable NRC and DOT regulations were observed during this shipment and there were no incidents of any kind associated with this transportation activity.

13. Radiation Protection

All areas where licensed materials are stored or used were visited during this inspection. Most of the licensee's activities requiring intensive Health Physics efforts are concentrated in Building 020; therefore, the inspectors expended much more time in this area looking into routine radiation protection matters and one overexposure incident.

a. Some specific points noted during the tour were:

(1) Portable radiation detection instruments utilized in Building 020 are calibrated every quarter by the licensee's instrument repair and calibration shop. A computerized tickler file is used to insure timely calibration.

(2) The precision Victoreen Radicon (used mainly in the "hot cell" area) is calibrated every six months.

(3) The Building 020 Health Physicist spends 6 to 8 hours per week performing necessary routine surveys in Building 055. The Engineer in Charge of Building 055 still spends 80-90% of his time in Building 055. However, recently he has been helping out with some of the "hot jobs" currently in progress in Building 020.

(4) Both air samples and smears for Buildings 020 and 055 are counted on an NMC ACS-70 automatic sample changer. The instrument is a thin window proportional gas flow counter. This instrument expedites the extensive routine monitoring program listed below:

HEALTH PHYSICS SCHEDULE

MONDAY

Change Air Samples

Smear mockup and hallways and clean side of change line

Count air samples in Building 055

TUESDAY

Smear: Hot and Cold Change Rooms and Clean Service

WEDNESDAY

Count Air Samples
Smear Operating Gallery

Quarterly Survey tools in Shop Area

THURSDAY

1st. Thurs/month:

Smear Service Gallery, Storage Room, and Slave Shop

2nd. Thurs/month:

Smear Airlock and Room 139, 141 and Hall

3rd. Thurs/month:

Smear and Survey Basement

4th Thurs/month:

Smear Office Area and Dock

FRIDAY

1st Fri/month:

Survey Oper. Gallery and Mockup and Slave Shop

2nd Fri/month:

Quarterly Survey Perimeter Fence and Building Walls

3rd. Fri/month:

Quarterly Survey of Service Gallery, Storage Room, Hot S.S. Rooms 139 and 141

4th Fri/month

Survey Airlock and Metallograph Hot & Cold Change.

Change Air Samples in Building 055

In addition to these routine surveys, there are many others related to current programs that are done each day.

(5) In order to reduce the chance for an overexposure, TLD finger rings for personnel involved with "hot" jobs like SEFOR are now evaluated twice a day with an "in house" TLD Reader.

(6) In-cell prefilters are normally changed after each job by Building 020 personnel.

(7) Building 020 absolute filters were tested on April 26 and July 26, 1982. None showed unexceptable leakage rates. All absolute filters in the "hot cell" exhaust were replaced on April 26.

(8) A crimper device associated with the SEFOR project failed on July 13, 1982 and resulted in a spill. Because the spill was not discovered for several hours, contamination levels of up to 50,000 DPM of alpha activity per wipe were generated near the apparatus. The spill was discovered before the end of the shift and was cleaned up. Two persons were found to be contaminated. After decontamination, bioassays were submitted for analysis.

It does not appear that any NRC guidelines, regulations or license conditions were violated. The incident was a serious one, but technically not reportable. Results from the special plutonium bioassay had not been received as of the day of the inspection. It is not anticipated that any serious internal exposures occurred.

b. Bioassay Data

The licensee's bioassay program includes in vivo lung counts by an independent mobile laboratory. On February 19, 1982 twenty-one persons were counted for U-235. There were two positive measurements indicating a maximum deposition of 63 and 67 micrograms. This corresponds to MPLB's of 25.7% and 27.3%.

On May 19, 1982 14 persons were counted for U-235 content in their lungs. One positive result corresponding to 14.2% MPLB was found. The two positive results found in the February 19 count were recounted and found to be negative.

c. Urinalysis

Special urinalyses (fission product) were performed on samples submitted by four men involved in the nonreportable spill mentioned in paragraph 13.a.(8). All results were negative. Discussions with licensee representatives disclosed that this is a good indication that the special plutonium bioassay submitted after the same incident may also be negative. A followup on this point will be made during the next inspection (82-07-01).

d. Film Badge Results

An examination of the 1982 film badge results indicated a quarterly high whole body exposure of 1450 mrem. This individual's exposure file contained complete NRC-4 and 5 information. This same individual also received a quarterly high hand exposure of 32.96 rem. This overexposure is discussed in the next section entitled "Reported Overexposure". All other exposures were found to be within NRC limitations.

e. Reported Overexposure - Review

On July 19, 1982 the licensee reported to Region V by telephone that an apparent overexposure to a hand of one of their employees had occurred during the latter part of the 2nd quarter. 18 rem dose to the hand was received from State licensed materials and 15 rem dose to the hand was received from NRC licensed materials. A letter dated July 23, 1982 outlining the details of the apparent overexposure was received by Region V on July 26, 1982. Because the letter indicated that the licensee had taken prompt and responsible action to correct the situation that led to the over-exposure (32.96 rem to the right hand), the investigation of the incident by Region V was postponed until the next routine inspection.

Upon arrival at the licensee's facilities on August 23, 1982, two NRC inspectors expended approximately 3 man days reviewing the circumstances preceding the incident and the corrective actions taken by the licensee. The inspectors concluded after the investigation that: (1) the licensee's written report to Region V was correct with respect to all essential details, (2) the licensee took prompt and responsible corrective action to prevent the incident from happening again and (3) there was no evidence that the violation was in any way "willfull" or caused by management irresponsibility or gross negligence. It was also disclosed that the employee involved

in the incident was well trained and had performed the specific tasks leading to the incident at least eight times. In addition it was found that utilizing essentially the same procedures and tools, the licensee has been processing this identical radioisotope without an overexposure incident for the past 13 years. Although the licensee is rewriting this procedure as part of their corrective action, there was no violation of the procedure as written.

The most probable causes of the incident were:

1. The normal 3 day decay period (although not specifically called for in the procedure) for the radioisotope involved was not observed, rather only 1.8 days of decay occurred.

2. The aluminum capsule used in the reactor irradiation of the radioisotope contained impurities that may have caused short lived radioisotopes to be generated that contributed to the exposure.

3. The technician involved may have inadvertantly placed his hand closer to the radioisotope than intended in order to shorten the handling time.

4. Although the Health Physicist in charge made a survey prior to the handling operation that caused the exposure, he did not remain for the entire operation in order to keep his exposure to a minimum.

5. Even though the technican involved had an operating monitoring instrument, he was more interested in completing the work quickly rather than in performing additional surveys. The employee's feeling was that the dose rate was somewhat higher than normal.

6. SECOND QUARTER EXPOSURE HISTORY

DATES	RIGHT HAND	LEFT HAND
April 23-27, 1982	0.16 rem	0.17 rem
May 22, 1982	1.40	0.54
June 4-9, 1982	18.07	3.65
June 22-28, 1982	13.33	8.78
	32.96 rem	13.14 rem

It should be noted that the licensee routinely uses contract provided dosimeters (TLD's) which were read monthly, thus the April TLD results were available in early May and the May TLD results were available in early June. However, when a new NRC licensed project (SEFOR) got underway and the potential for higher exposures was recognized, the licensee requested a telephone report on the TLD results for the June work. Even though the elevated exposures for the new project were anticipated, the exposure to the hands experienced by the employee from processing the State licensed material was not known until July 6, 1982 and therefore could not be evaluated for prevention of the overexposure. When the exposures for the second quarter were totaled for both the State of California licensed project and the NRC licensed project an overexposure to the right hand of the employee was identified. The licensee instituted an investigation of the overexposure and a TLD reader being evaluated for other work was transferred to the hot cell area. Some 50 additional TLD chips for finger rings were acquired and a chemical engineer was assigned to measure twice daily TLD finger rings used by employees working on projects where the chance for elevated exposures existed. The licensee has thus established a mechanism whereby exposure will be followed at small exposure increments to preclude any employee from again accumulating elevated exposures that can result in another overexposure. The licensee indicated he is setting a limit of about 80% of the 10 CFR 20.101 Radiation Dose Standards as a constraint on the use of an employee for potential elevated exposure work. Thus an employee who has reached, for example, 15 rem to the hands would not be permitted to work in those activities that result in elevated exposures. The licensee is tracking closely different repetitive operations in the project (SEFOR) to establish clearly the exposures resulting from each different operation. Thus, the licensee can readily control personnel exposures. Additionally, the licensee has used this information to modify tools and automate operations that previously contributed a significant fraction of an employee's exposure when done manually, to further reduce employee exposures. Other changes the licensee plans for personnel exposure reduction include allowing at least 3 days of capsule decay (State licensed source) before unloading, design and fabrication of a shield block for use in loading previously irradiated wires into holders, and modification of an exposure report form to make exposure data more readily interpreted.

The 32.96 rem exposure of the employee's right hand during the second quarter of 1982 exceeded the regulatory limitation of 18 3/4 rem in 10 CFR 20.101(a) and was therefore identified as an item of noncompliance.

14. Exit Interview

The scope and the results of the inspection were discussed with licensee representatives on August 27, 1982. The licensee was informed that the overexposure that he reported as required, was identified as an item of noncompliance in the health physics category.

The inspectors concluded that the licensee conducted a thorough investigation, took prompt corrective action and has effectively precluded recurrence of such overexposures.