UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

MEMORANDUM TO: Ross A. Scarano, Chief
Nuclear Materials Branch
Division of Nuclear Materials Safety, RIV

FROM: Larry W. Camper, Chief
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST;
DEPARTMENT OF THE ARMY, WHITE SANDS
MISSILE RANGE; LICENSE NO. 30-02405-10;
CONTROL NO. 465180

I am responding to your technical assistance request (TAR) (Attached) dated May 15, 1996, regarding an exemption request by White Sands Missile Range (WSMR). The facility has an irradiator which apparently does not comply with several of the requirements of 10 CFR 36. The applicant wishes to be granted certain exemptions based upon its current procedures and twenty years of experience irradiating flammables and explosives safely. In addition, the applicant requests an exemption from the requirement that certain records be kept at the irradiator based on irradiator records located at another building on the Range.

Specifically, the TAR requests the following exemptions. The requirement, the applicant's justification for the exemption from the requirement and our responses are as follows:

A. 36.23(c) A radiation monitor must be provided to detect the presence of high radiation levels in the radiation room of a panoramic irradiator before personnel entry. The monitor must be integrated with personnel access door locks to prevent room access when radiation levels are high. Attempted personnel entry while the monitor measures high radiation levels, must activate a visible and audible alarm to make the individual entering the room aware of the hazard.

Contact: Anthony S. Kirkwood, NMSS
(301) 415-6140

Justification: "Operation of the WSMR, Gamma Range Facility (GRF) requires the participation of two independent people, a certified facility operator (FO) and a Health Physics Monitor (HPM). Access to the exposure cell is controlled by two separate doors . . . The outer door is electrically interlocked and physically locked during operations. The FO and HPM have control of the only keys to this door. . . The inner or exposure cell shielded door is also electrically interlocked and physically locked using the operator's console key. The operator has the only key to this door."

WSMR's letter dated February 10, 1994, indicates that "the (HPM) prevents access to the cell if radiation levels are high. Because the outer door is physically locked and the (HPM) is required to unlock the door for entry to the inner hallway, there is an integration of the detection of radiation levels and the door locks. **This door serves as the backup access control** (emphasis added).

In addition WSMR's application dated May 22, 1988, Supplement E-12-1, Safety and Reliability Features of the System, § 8., indicates that "In the event that any interlock is broken, or a power failure occurs during an operation, automatic sequential return of all sources at the exposure head is initiated."

Response: The statements of consideration (SOC) regarding 10 CFR 36.23(c) (A radiation monitor must be integrated with personnel access door locks to prevent room access when radiation levels are high) state the following:

> "The purpose is to provide an additional level of protection in case of some failure of the source movement mechanism combined with a failure of the operator to make the required radiation survey upon entry into the radiation room."

If WSMR chooses to pursue an exemption to 10 CFR 36.23(c), their submission should provide clear justification or information showing why the licensee is unable to meet the regulatory requirements of 10 CFR 36.23(c) without an exemption.

The SOC for 10 CFR 36.23(b)states the following:

> "This section also requires an independent backup access control system on panoramic irradiators. The purpose of the backup system is to provide a redundant means of preventing a person from being accidentally exposed to the source. In case of failure of the interlocks on the door or barrier combined with a failure to follow operating procedures (emphasis added), the backup system should warn the person entering the radiation room of the danger and automatically cause the sources to return to their shielded position. The system must also alert another person of the entry."

10 CFR 36.23(b), applies to each entrance to a radiation room (emphasis added) at a panoramic irradiator. Detection of entry while the sources are exposed must automatically (emphasis added) cause the sources to return to their fully shielded position and must also activate a visible and audible alarm to make the individual entering the room aware of the hazard. In the licensee's diagram numbered E-1-10, both the Roll Up Door and the North Door appear as entrances to the radiation room. The licensee may need an exemption from 10 CFR 36.23(b). We suggest Region IV review the licensee diagram and pertinent information to determine if such an exemption is necessary or have the licensee describe how independent backup access control systems function for both the Roll Up Door and the North Door entrances [e.g. interlocked fences meet the intent of 10 CFR 36.23(b)].

B. 36.69(a) Irradiation of explosive material is prohibited unless the licensee has received prior written authorization from the Commission. Authorization will not be granted unless the licensee can demonstrate that the detonation of the explosive would not rupture the sealed sources, injure personnel, damage safety systems, or cause radiation over exposures of personnel.

Justification: WSMR's letter dated May 2, 1994, addressed to RIV, indicates that "the vast majority of explosives irradiated at the GRF are electric squibs, or squib like devices. These are small electronically activated explosives used to initiate a more powerful charge for separation and cutting operations. . . (Model) M905, (is) typical of the type we have safely irradiated for the past 20 years. . . This group presents no significant hazard, as its small explosive charge would not be able to damage the GRF or hinder fire fighting. . . When explosives are involved the tester must demonstrate to the Test Plan Approval Committee (TPAC) that detonation of the explosive would not rupture the sealed sources, injure personnel, damage safety systems, or cause radiation over exposures of personnel."

Response: The SOC indicates that "the reason for these prohibitions is that irradiation can cause chemical reactions that would cause a fire or explosion of flammable or explosive materials."

In order to demonstrate that the detonation of the explosive would not rupture the sealed sources, injure personnel, damage safety systems, or cause radiation over exposures of personnel, WSMR needs to provide to the region, the safety evaluation criteria used by its TPAC to approve irradiation of explosives. The criteria should contain information on minimum distances from the explosive to the sealed sources and other limits such as the quantities and types of explosives that may be irradiated as well as evaluations of radiation induced chemical reactions that may cause detonations. In addition, the licensee should provide information on the expected temperature and internal and external forces imposed on the sources, if a fire or explosion were to occur. We would like to refer as much information as possible to an appropriate expert for analysis prior to making a decision on this issue.

C. 36.69(b) Irradiation of more than small quantities of flammable material (flash point below 140°F) is prohibited in panoramic irradiators unless the licensee has received prior written authorization from the Commission. Authorization will not be granted unless the licensee can demonstrate that a fire in the radiation room could be controlled without damage to sealed sources or safety systems and without radiation over exposures of personnel.

Justification: WSMR indicates in its letter of March 30, 1994, that number 2 diesel, gasoline, kerosene, and JP4 fuels, in other than small quantities, have been safely irradiated while contained in vehicles and equipment during the past 20 years. The TPAC, Nuclear Effects Directorate (NED), "reviews all test plans, with particular emphasis on those plans which include explosives and flammables. . . authorization will not be granted unless the tester can demonstrate that a fire in the radiation room could be controlled without damage to sealed sources or safety systems. Based on our need to perform a unique Department of Defense quality assurance function and the demonstrated effectiveness of our TPAC to control potential hazards, we request that you grant us approval to irradiate greater than small quantities of flammable materials with a flash point below 140° Fahrenheit, and small class C explosives."

WSMR also indicates that their fire protection system required by 10 CFR 36.27(b), is supplemented by onboard systems, within the vehicles that are irradiated.

Response: The SOC indicates that "the reason for these prohibitions is that irradiation can cause chemical reactions that would cause a fire or explosion of flammable or explosive materials." In order to demonstrate that a fire or explosion in the radiation room could be controlled without damage to sealed sources or safety systems and without radiation over exposures of personnel, WSMR needs to provide the safety evaluation criteria used by its TPAC to approve irradiation of flammables. The criteria should contain information on minimum distances from the flammable to the sealed sources and other limitations such as limits on the temperature, ignition sources and evaluation of the explosive potential that may be induced by irradiating flammable or explosive material. We would like to refer as much information as possible to an appropriate expert for analysis prior to making a decision on this issue.

D. 36.81 Certain records shall be maintained at the irradiator. 36.81(a) specifies, in part, a copy of the license, license documents and amendments, 36.81(b) specifies, in part, records of individual training tests and safety reviews, 36.81(d) specifies, in part, records of the annual evaluations of the safety performance of irradiator operators, and 36.81(d) specifies, in part, a copy of the current operating and emergency procedures.

Justification: Irradiator records are "maintained at a centrally located facility (Building #21225-Main Laboratory Building) that houses the Health Physics oversight staff. Access to the GRF (Building #21230) is controlled by Building #21225. Additionally, copies of Safety Standard Operating Procedures and the license are co-located at the irradiator. WSMR feels that under the above conditions, they have complied with the intent of 10 CFR 36.81."

Response: If the Region considers the distance between the two buildings reasonable and finds the procedures for day to day operations and emergencies are adequate and at the GRF, then we see no need to grant WSMR an exemption to 10 CFR 36.81.

While reviewing WSMR's license application, we noted that interlocks can be bypassed. WSMR's May 22, 1988, application, Supplement E-22-2, Interlocks, indicates that "in the event that an emergency occurs, the interlock(s) can be bypassed ONE TIME ONLY by using the Interlock Override switch and the appropriate jumper(s) and jack(s) in the bypass panel.

As a result of the recent inspection, the facility logs indicated that interlocks were bypassed frequently. The Region should have WSMR describe under what circumstances and under whose authority interlocks can be bypassed and describe the security measures to prevent unauthorized individuals from bypassing the interlocks, and if they are bypassed, what additional controls are in place to demonstrate that the licensee still meets regulatory and license requirements (i.e., door interlock).

Attachment: RIV TAR dtd 5/15/96

WSMR

1st issue – provide adequate info that they can't meet requirements (no exploration)
- roll-up/side door interlocks

2nd issue – provide safety criteria TPAC uses to approve explosives + flammable inside

3rd issue – records location down to region

10 CFR 36.23(c) door locks integrated w/ monitors
use HF Tech's to substantiate integration of monitors w/ doors

36.23(b) back-up access control must lower sources if interlocks fail. Applies to ea. entrance (roll-up door outside door (north)
In case of failure of interlocks

36.69(a) explosives; demonstrate that detonation would not rupture source
(b) flammables

36.81 records maintenance at facility

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9812280286

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Attachment: RIV TAR dtd 5/15/96
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Contact: Anthony S. Kirkwood, NMSS
(301) 415-6140

R. A. Scarano

ROUTING AND TRANSMITTAL SLIP

DATE: October 9, 1996

	INITIAL	DATE
1. ASKirkwood	_____	__/__/__
2. SLBaggett	_____	__/__/__
3. LWCamper	_____	__/__/__

ACTION:	CIRCULATED:	FOR YOUR INFO:
APPROVAL:	COMMENT:	SEE ME:
AS REQUESTED:	NOTE AND RETURN:	PREPARE REPLY:
COORDINATION:	PER CONVERSATION:	

TICKET NUMBER: IMNS-5383
DUE TO DIVISION:
DUE TO NMSS:
DUE TO EDO:

REMARKS:

MEMORANDUM TO: Ross A. Scarano, Chief
Nuclear Materials Branch
Division of Nuclear Materials Safety, RIV

FROM: Larry W. Camper, Chief
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST DATED MAY 15, 1996, (CONTROL NUMBER 465180) REGARDING WHITE SANDS MISSILE RANGE

ORIGINATOR: ASKIRKWOOD

ROOM NO./BLDG.:T8J10
PHONE NO.: 415-4160

Contact: Anthony S. Kirkwood, NMSS
(301) 415-6140

bcc w/encl. to DMB (IE36)

bcc w/o encl. distrib. by RIV:
JLieberman, D/OE (2) (7 H5)
LJChandler, Asst. GC/OGC (15 B18)
HLThompson, DEDS (17 G21)
CPaperiello, D/NMSS (T8F5)
LWCamper, IMAB/NMSS (T8F5)
RIV Cordinator, OEDO (17 G21)

bcc w/encl. distrib. by RIV:
SLBaggett, SCDB/IMNS/NMSS (T8F5)
LJCallan, RA
SJCollins, DRA
WLBrown, RC
RAScarano
CLCain
DBSpitzberg
LLHowell
FAWenslawski
RABrown
GFSanborn, EO
BHenderson, PAO
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NMI&FC/DB and NMLB Inspectors (10)

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12/16/96	12/16/96	12/16/96	12/17/96

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

DEC 19 1996

CAL 96-005A

Dr. John Meason
Commander
U.S. Army White Sands Missile Range
ATTN: STEWS-DT (Maeson)
White Sands Missile Range
White Sands, New Mexico 88002-5048

SUBJECT: CONFIRMATORY ACTION LETTER RESPONSE

Dear Dr. Meason:

This refers to your letter dated November 15, 1996, in response to our Confirmatory Action Letter (CAL) dated October 24, 1996.

After reviewing your response, we find additional information is required. Specifically, Item 2 of your response stated that a validation study would be done to support design changes. Please confirm that a report of the results of this study will be submitted to the NRC. Also, Item 6 of the CAL specified that proposed changes to existing procedures or any new procedures developed in response to other actions specified in the CAL would be submitted to the NRC. In addition, if you determine that procedural changes are not necessary, you are to provide the bases for your decision to the NRC. Please confirm this notification in writing after you have completed the engineering analyses and validation study specified in the CAL.

Your confirmation of the items noted above should be provided to the Region IV office within 15 days of the date of this letter.

Should you have any questions concerning this letter, please contact Robert A. Brown at (817) 860-8130 or Linda Howell at (817) 860-8213.

Sincerely,

Ross A. Scarano, Director
Division of Nuclear Material Safety

cc w/enclosure:
NRC Public Document Room
New Mexico Radiation Control Program Director

9612230061

bcc w/encl. to DMB (IE36)

bcc w/o encl. distrib. by RIV:
JLieberman, D/OE (2) (7 H5)
LJChandler, Asst. GC/OGC (15 B18)
HLThompson, DEDS (17 G21)
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WLBrown, RC
RAScarano
CLCain
DBSpitzberg
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12/16/96		12/16/96		12/16/96		12/17/96			

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

DEPARTMENT OF THE ARMY

U.S. ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-

REPLY TO ATTENTION OF

STEWS-DT-O (70)

15 Nov 96

RECEIVED
NOV 22 1996

MEMORANDUM FOR U.S. Nuclear Regulatory Commission, Region IV,
611 Ryan Plaza Drive, Suite 400, ATTN: Dr. Callan,
Arlington, TX 76011

SUBJECT: Engineering Study of the Gamma Range Facility (GRF) Source Carrier and Transfer Process

1. Pursuant to your 24 Oct 96 letter (Docket Number: 030-0935, License Number: 30-02405-01, Confirmatory Action Letter, U.S. Nuclear Regulatory Commission, Region IV), this organization respectfully submits the following enclosed plan and proposed schedule to be incorporated in License Number 30-02405-01, by reference.

2. Please find the enclosed plan and schedule as this organization's approach in addressing the GRF Medium Source Carrier Failures. This organization will utilize an outside consulting agent (Mechanical Engineering Department, New Mexico State University) to perform the actual study. In general, the study will determine the underlying causes of the failure of the source carrier and capsule assembly. As a result of the engineering analysis, develop a set of design modifications and/or operating procedural changes. Based on the findings and conclusions of the study, conduct a validation study to support the design changes.

3. Subject study will specifically address failures to GRF Medium Sources #5 and #8 (Serial Nos. 175-90-4 and 175-90-1), but will also include an assessment of all other medium, large, and cesium sources. Once the engineering analysis is complete White Sands Missile Range will submit to the NRC for review any design modifications and/or operations procedural changes. Prototype testing will follow new design and procedural changes to validate and support the effectiveness prior to final implementation.

4. Request your issuance of this submittal in the form of a license amendment.

IE-07

9812280253

STEWS-DT-O
SUBJECT: Engineering Study of the Gamma Range Facility (GRF) Source Carrier and Transfer Process

5. Any questions in this regard, please contact either Mr. Roland Penny or Mr. Richard Williams, 505-678-4161 or 2699.

FOR THE COMMANDER:

John L. Meason

DR. JOHN L. MEASON
Director
Applied Technology, Test and Simulation

Encl

CF:
Cdr, TECOM, ATTN: AMSTE-SM-S (Mr. Aaserude), APG, MD 21005-5055
Cdr, AMC, ATTN: AMSCF-P (Mr. J. Manfre), 5001 Eisenhower Avenue, Alexandria, VA 22333-0001

Department of Mechanical Engineering

New Mexico State University
Box 30001/Las Cruces, New Mexico 88003-0001 USA
Telephone (505)646-3502 FAX (505)646-6111

DATE: 11/13/96

TO: Mr. Roland Penny
Division Chief
Operations and Support Division
STEWS-DT-O
WSMR, NM 88002

FROM: Edgar Conley
Associate Professor
econley@nmsu.edu
(505)646-5698

RE: Failure Analysis and Remediation

Dear Sir,

This proposal responds to the NRC Region IV letter dated 10/24/96. Three objectives and a schedule to obtain them within a reasonable time frame are proposed.

1. The first objective is to determine the underlying causes of the failure of the cobalt source carrier/capsule assembly. We propose an engineering evaluation of the assembly that will include, but not be limited to, the effects of the assembling operation (e.g. preload), material properties (particularly those related to fatigue strength), potentially destructive vibrational modes of the assembly, stress concentrations in both the capsules and carriers, short and long term effects of gamma radiation on the material properties, and operating parameters that affect carrier accelerations. We shall also assess the two remaining carriers and, based upon their nominal use, evaluate the expected residual life. During this phase, we shall rely on the DATTS staff to

provide the pneumatic conveyor system operating information which is required to model the carrier accelerations and resulting stresses.

2. The second objective is to generate and submit for review a set of design changes in any or all of the components that affect the physical loads imposed on the source capsules. This plan will have as its basis the engineering evaluation of step one. Potential design changes will include, but not be limited to, the design and assembly of the carriers and capsules, the pneumatic conveyance, the operating procedures and parameters that affect the system operation, and the air handling system.

Inherent in the engineering evaluation of step one is a sensitivity analysis which should help indicate the most critical among the many engineering parameters that affect the carriers. Thus, the evaluation should provide some indication of the loading conditions that should be confirmed - by a series of field and/or laboratory tests, if necessary. This decision, whether to conduct such tests at the WSMR site or at the PI's laboratories, and which tests to conduct, shall be made in concert with the DATTS staff.

Finally, the above mentioned sensitivity analysis should help indicated the most economic means toward sensible design changes, those that maintain the effectiveness of the facility, if such changes are deemed necessary.

3. The third objective is to propose for review a validation study to determine the extent to which the design changes under consideration as a result of step two ameliorate the potential for capsule/carrier failure during the anticipated lifetime.

Schedule:

Engineering Evaluation	duration 6 months	Jan '97 - June '97
Design Modifications	duration 2 months	July '97 - Aug '97
Validation Study	duration 12 months	Sept '97 - Aug '98

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

December 17, 1996

Brigadier General Laws
Commander
Department of the Army
ATTN: STEWS-CG
White Sands Missile Range
White Sands, New Mexico 88002-5048

SUBJECT: NRC INSPECTION REPORT 030-09345/96-01

Dear General Laws:

On October 3, 1996, the NRC completed a special inspection of your Gamma Range Facility. The enclosed report presents the results of that inspection.

The inspection was initiated in response to notification provided by White Sands Missile Range (WSMR) staff that a cobalt-60 source was identified as leaking during a leak test performed on April 24, 1996. WSMR had previously provided written notification of another leaking source of the same model, strength, and approximate age by letter dated June 23, 1994. In addition, cobalt-60 sources of the same model and strength were previously found to be leaking in 1982 and 1983. The inspection included examination of the Gamma Range Facility, the irradiator and source transfer system, and source carriers used in the irradiator, all of which are unique. The inspectors also reviewed information relating to th radiator design and previous analyses of the use of sealed sources in the system comp sted by WSMR and its contractor. Site visits were conducted on April 30 through May 1, and on August 28-29, 1996.

Although no violations of NRC regulations or the license were identified, significant concerns were identified regarding the continued use of sealed sources (both cesium-137 and cobalt-60), with source carriers supplied by WSMR, in the Gamma Range Facility. These concerns were described in a Confirmatory Action Letter (CAL) issued by the NRC on October 24, 1996. Because actions deemed necessary to address concerns identified during this inspection are specified in the CAL, no response to this letter is necessary. Our evaluation of your response to the CAL will be communicated by separate correspondence.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter will be placed in the NRC Public Document Room.

Should you have any questions concerning the enclosed report, please contact Mr. Robert Brown at (817) 860-8130 or Ms. Linda Howell at (817) 860-8213.

Sincerely,

Ross A. Scarano, Director
Division of Nuclear Materials Safety

Docket: 030-09345
License: 30-02405-10

Enclosure:
NRC Inspection Report 030-09345/96-01

cc w/enclosure:
New Mexico Radiation Control Program Director

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 030-09345
License: 30-02405-10

Report: 030-09345/96-01

Licensee: Department of the Army

Facility: Gamma Range Facility

Location: White Sands Missile Range,
New Mexico

Dates: April 30 through October 3, 1996

Inspectors: R. A. Brown, Sr. Radiation Specialist
T. W. Rich, Acting Section Chief
Commercial Section, NMSS
B. Smith, Health Physicist

Approved: L. L. Howell, Chief
Nuclear Materials Inspection
and Fuel Cycle/Decommissioning Branch
Division of Nuclear Materials Safety

Attachments:

1. Supplemental Inspection Information
2. Source Leakage History

EXECUTIVE SUMMARY

Department of the Army
White Sands Missile Range, New Mexico
NRC Inspection Report 030-03545/96-01

This special inspection focused on the operation and maintenance of the licensee's Gamma Range Facility (GRF), with particular emphasis on the circumstances relating to four leaking cobalt-60 sources over the past 13 years.

Program Overview and Background

- This facility has had a history of leaking sources between 1982 and 1996. Although the licensee and source manufacturer had conducted evaluations of two of four leaking cobalt-60 sources, no determination had been made about the root cause of the source failures.

- A number of changes had been made to the source and carrier designs since each was initially reviewed by the NRC. The changes had not been evaluated to determine potential impacts on source integrity.

Operations and Maintenance

- Several problems were identified involving transfer of some sources (including one of the leaking sources) in the system between 1994 and 1996; however, a detailed evaluation of the cause of the problems was not conducted.

- Operational data maintained for the system was found lacking in detail for both routine and non-routine operation and maintenance. Some concerns were identified involving activities performed by system operators and whether certain activities had been reviewed by technical managers.

Radiation Safety Program Management

- The inspectors were unable to establish whether the radiation protection committee and the radiation safety officer had a clear understanding of certain activities occurring at the gamma range facility. Specifically, activities relating to the recent decontamination of the system after a leaking source was identified had not been reviewed nor approved by the committee. In addition, the committee had not been apprised of problems observed in the source transfer system during the past two years.

Report Details

1 Program Overview

1.1 Inspection Scope (87100, 83822, 87103)

This portion of the inspection included a review of the license application, supporting documents, and logs and records provided by the licensee. These documents describe the operation of the GRF program. The inspection also included examination of GRF systems and observation of cobalt-60 source loading.

1.2 Observations and Findings

The Department of the Army is authorized under NRC License 30-02405-10 to operate a custom panoramic-type irradiator, primarily for radiation effects studies. Materials irradiated range from small integrated circuit boards to large military vehicles. The irradiator is operated by the Army's Directorate for Applied Technology Test and Simulation (DATTS).

The irradiator houses cobalt-60 and cesium-137 sealed sources. The cobalt-60 sources used in the system consist of four sources of 13,000 curies and four containing 4100 curies (referred to as the "large" and "medium" sources). The sources are manufactured by Neutron Products, Inc. (NPI) (Model NPI-16-4000), and are a similar to cobalt-60 sources used in teletherapy systems. The sources are placed in source carriers supplied by WSMR at the manufacturer's facility. Once loaded in the system at WSMR, the cobalt-60 sources are exchanged approximately every 5 years. In addition, four cesium-137 sources are stored in the GRF. These have not been used in 3 to 5 years.

2 Background

2.1 Inspection Scope (87100, 83822)

The inspectors reviewed historical data relating to leaking sources submitted to the NRC by WSMR, toured the GRF facility, discussed operations and maintenance with WSMR personnel, and reviewed log books and other records documenting operation and maintenance of the GRF.

2.2 Observations and Findings

The Army has operated the GRF since 1974. It is a custom designed, pneumatically operated panoramic irradiator. The cobalt-60 sources used in the system are made with double encapsulation of 304L stainless steel and loaded in custom "carriers" supplied by WSMR. A threaded plug is placed on one end of the carrier and welded shut to prevent unthreading during use and to seal the carrier. The sealed sources have belleville springs between the secondary encapsulation and the pneumatic carrier which act as "shock absorbers." Transfer and positioning of the sources

from their shielded storage position to the exposure assembly (approximately 16 feet) is achieved by a pneumatic transfer system. Belleville springs are also used as shock absorbers in the transfer tubes to reduce impact stress at the exposure head. The transfer systems for the four medium cobalt-60 sources used in the system are the same. No differences have been noted by the licensee or by the inspectors during this inspection.

Some changes have been made in the source specifications since the GRF was initially reviewed by the NRC. The cobalt-60 sources approved for use in the system were similar to NPI sources designed for use in teletherapy units. As noted above, the sources are fitted with a "carrier," or outer capsule, supplied by WSMR to the source manufacturer. The carrier has one end wall that is thinner than the remaining walls, referred to by WSMR and the manufacturer as a "window." In 1975 WSMR identified a failure of the carrier for a medium cobalt-60 source. This failure did not result in contamination of the unit. However, the three remaining medium cobalt-60 sources were examined, and windows on these carriers were found bulging. A modification was subsequently made to the source carrier to strengthen the carrier window. WSMR personnel stated that "the new design was verified in 1976 using 2000 test transfers." No detailed evaluation of this modification was available to the inspectors.

In the late 1970's, a design change was made to change the source from a single piece of rod stock to a piece of flat stock welded onto the rod stock. This change also included modification of the outer capsule specifications. No analysis was done to determine the impact of this design change.

In 1982 and 1983, external contamination was identified on cobalt-60 sources in positions 5 and 8 (these are medium size sources) by survey and leak test at the exposure head. The sources were removed from service pending a scheduled source change. Upon return of the sources to NPI (following source exchange), NPI performed a visual inspection and provided a written report of its findings to WSMR. NPI found that two of the four cobalt-60 sources returned from WSMR were easily removed from the source carriers. The source identified as leaking, by WSMR's evaluation, was easily removed from its carrier. However, NPI stated that both the inner and outer stainless steel windows at the end of the source capsules "fell off, leaving the bare cobalt-60 slug exposed." When the window end of the carriers from the two remaining sources were cut, NPI representatives stated that they observed the stainless steel window end of the source bulging through the center of the belleville washer (spring) placed inside the source carrier. No further efforts were taken to remove the remaining two sources from their carriers.

As a result of these findings, in early October 1984, WSMR installed a timing device to limit the time that positive air pressure was applied to the pneumatic transfer tubes to move the sources. Prior to this, a minimum constant pressure was used to transfer the sources; this allowed the source carrier to accelerate throughout its travel in the source tube. Installation and use of the timer allowed the source to decelerate before it arrived at the exposure head, thereby reducing impact on the sources and carriers. In addition to installation of the timer, the full circumference

of the source end caps were welded rather than spot welded as in the past. Again, no detailed evaluation of the effects of these changes was performed by WSMR.

The NRC conducted an inspection on May 16, 1984, to review the circumstances associated with the leaking sources noted above. The purpose of the inspection was to determine whether prolonged use of the sources, under the stresses associated with use in the GRF irradiator could result in leakage or failure. The NRC was unable to determine whether repeated use of the sources could cause stress fractures or other indicators of potential source failure. This matter was considered "unresolved" pending the result of an analysis by WSMR of the effects of repeated impacts on the sources over a substantial period of time.

In response to the 1984 NRC inspection, WSMR hired a contractor to perform an engineering analysis to determine why the sources failed. The contractor's report stated that the only probable failure mode was fatigue failure after approximately 520,000 frontal impacts with the exposure head. However, the sources found leaking in 1982 and 1983 (as well as during subsequent events) were subjected to less than 10,000 cycles. Also, the report did not accurately reflect the source/carrier design. Specifically, the analysis did not consider the carrier design with internal belleville springs. The assumption used for the model was a solid slug. Also in 1984, the state of Maryland, which approved the source design for NPI, reviewed information provided by WSMR and the source manufacturer. State representatives concluded that the probable cause of the contamination identified in the system was from rupture of the source encapsulation after impact. (It should be noted that the state's review did not include physical examination of the sources or GRF system.) The state also indicated in its written summary that it did not believe that the standard teletherapy source design was suitable to withstand substantial impact stresses and suggested that use of this particular source design in the GRF system be evaluated further.

Further changes were made to the source carriers (supplied by WSMR and manufactured by an independent contractor) in the mid 1980's. Although the exact date of the change was not known by the licensee, records appeared to indicate that the carriers were heat treated after the mid 1980's, although licensee representatives could not provide justification or documentation of an evaluation indicating that heat treatment of the source carriers was necessary.

The licensee next reported problems with leaking sources on June 23, 1994, and April 29, 1996. The two sources found leaking on these dates were also medium cobalt-60 sources in positions 5 and 8. The source identified as leaking in 1994 was secured in the system and was not used further after contamination was identified in that channel at the exposure head. The source identified as leaking in 1996 was secured and was not used after leakage was identified. The leakage was identified during testing performed prior to removing the medium cobalt-60 sources from the system during a routine source exchange.

As noted above, Region IV initiated a reactive inspection after the licensee's April 29, 1996 report was received. Following discussions with WSMR and the

source manufacturer, the licensee and manufacturer made arrangements to visually inspect the leaking sources at the manufacturer's facility in Maryland. NRC inspectors observed this inspection, as did licensee representatives.

An NRC inspector present during NPI's evaluation of the leaking sources (from channels 5 and 8) on July 30, 1996, made the following observations. Removable contamination tests performed by NPI on July 30 identified levels of contamination above 0.005 microcurie on the outer surface of the source carriers. Helium bubble tests were performed on both carriers, although no bubbles were observed. The source removed from channel number 5 was machine cut at the threaded end plug of the source carrier and the source was successfully removed from the carrier. The outer encapsulation of the source was deformed; the end cap was convex and showed signs of weld failure. Attempts were made to separate the outer and inner capsules; however, the end cap broke off (the window end of the source capsule). The inner capsule weld failed at what appeared to be the end cap of the inner capsule. Examination of the belleville springs inside the carriers showed apparent deformation. NPI staff machine cut the threaded end plug of the carrier for the source removed from channel 8 but were unable to get the source out of the carrier. No further attempts were made to free the source due to the risk of damaging the source capsule.

Based on observation of the leaking sources and associated carriers, the inspector concluded that the source and carrier configuration may have concentrated stresses on the source capsules.

2.3 Conclusions

Based on historical review of changes in the source design, a review of the carrier design, and review of circumstances associated with the leaking sources and the results of the licensee's reviews, the inspectors concluded that the cause of the source failures may have related to the carrier and source configuration. The inspectors also concluded that the evaluation completed by WSMR's contractor in 1984 did not take into account all factors associated with source design and use in the system. In addition, the licensee had not completed evaluations of the potential impact of changes made in source and carrier design.

3 Operations and Maintenance

3.1 Inspection Scope (87103)

The inspectors reviewed procedures and operations and maintenance logs and discussed operational practices and documented information with GRF personnel. The inspector review also included examination of the GRF systems.

3.2 Observations and Findings

WSMR had maintained daily operations logs in which GRF operators noted items related to use of the device. A review of the logs revealed that operators generally recorded the type of use (or experiment conducted) of the GRF, any problems encountered and on occasion, instructions provided by technical managers responsible for operation of the GRF.

In reviewing logs for the period October 1973 to August 1996, it was noted that the four medium sources received roughly equal use until 1994. The exception to this was periods when cobalt-60 sources loaded in channels 5 and 8 were leaking and subsequently taken out of service, or when difficulties were experienced in moving the sources. Information developed through the inspectors' review of operational data is summarized below.

- From October 1993 to December 1994, the cobalt-60 source in channel 5 was not used, and the operators relied upon using sources in channels 6, 7, and 8. The operators were unable to use source number 5 because it could not be moved out of the "lock block," or its shielded position. When the cobalt-60 source in channel 8 was found leaking in June 1994, WSMR removed the source in channel 5 and loaded a "dummy" source to test the pneumatic transfer system. The operators replaced the cobalt-60 source in channel 5 in December 1994 and attempted to use it on December 22. A note in the operators' log indicated that the source "did not blow back into storage." No further information was recorded about the actions taken to return the source to its storage position.

- In January 1995 a dummy source was again placed in channel 5 for testing. A note entered in the log on January 11 indicated that the dummy source could not be moved out of the lock block.

- During this same period, the source in channel 10 (a "large" cobalt-60 source) was stuck and could not be moved from its storage position. The operators successfully moved the source in channel 10 from its shielded position in April 1995; however, the logs noted that it became stuck again in May 1995. The source in channel 12 (also a "large" cobalt-60 source) became stuck in the storage position in May 1995 as well.

- From January 1995 to December 1995, sources in channels 6, 7, 9 and 11 were primarily used; sources in channels 5, 10 and 12 could not be moved properly. Some problems were experienced with moving the source in channel 11 in 1995. This was remedied by exchanging airline regulators for channels 10 and 11.

- In December 1995, all sources in the system were downloaded for system maintenance. During this maintenance cycle, the "lock block"

or shielded storage area, was dismantled to further investigate problems observed in moving some of the sources from the storage location during operation. Significant damage was noted in some of the belleville springs located in the lock block (these springs are used to reduce impact on the sources as they arrive at the back of the lock block). The belleville spring on channel 12 was cracked in half, and cracks were observed on the springs for channels 5 and 10. These springs were replaced. The licensee later determined that the springs used in the lock block in 1994 and 1995 had the wrong internal diameter.

- Following the December 1995 maintenance, all cobalt-60 sources were used, with exception of the source in channel 8, which was identified as leaking in 1994. Problems were observed in moving the source in channel 5 in January 1996; however, the problem was not noted in the operations log. The technical staff reported that a problem was identified with a solenoid on the airline for channel 5 and that the airline was subsequently exchanged for one connected to the channel for a larger cobalt-60 source. The technical staff indicated that channel 5 was operated with the replacement airline for approximately 2 months. The airline exchanged and connected with channel 5 operates at a pressure of 40 pounds per square inch (psi), whereas the normal air pressure for channel 5 is 20 psi. No evaluation of the effects of this change was completed, nor was it recorded in the operations log or in a separate memo.

- Several notations were found indicating that operators had made changes to the timer settings and had bypassed some system interlocks. In addition, several notations were found indicating that operators had bypassed the negative air pressure system during operation.

Based on review of the operations logs and memos maintained documenting problems with the system, the inspectors noted that from 1994 to 1996, the sources in channels 6 and 7 (both medium sources identical to those found leaking in 1994 and 1996) had been used more frequently than the sources in channels 5 and 8. The source in channel 8 was removed from use in June 1994 and a number of problems were observed during this period relating to transferring the source in channel 5 from the lock block to the exposure head. With exception of the 2-month period when the channel 5 was operated at a higher air pressure, there were no differences identified between the sources in channels 5 and 8 and those in channels 6 and 7, nor were differences noted in the transfer systems for these sources. The licensee was unable to provide any information indicating why sources in channels 5 and 8 had repeatedly been found leaking, and the same model sources in channels 6 and 7 had never been found to leak. Operational data appeared to indicate that in recent years, the sources in channels 6 and 7 may have undergone more cycling that the sources in channels 5 and 8.

The inspectors' review of the operations logs identified several concerns regarding the level of detail in documentation of problems and how they were resolved. In some instances, a problem was noted and there was no documentation of efforts taken to correct the problem and in some instances, problems were not documented. Some additional documents were available documenting steps taken by GRF personnel to correct or address problems, but the inspectors still found documentation of problems, corrective actions, and modifications to the system to be lacking in detail or in some instances, not available. In addition, a few instances were identified when it appeared that GRF operators had taken steps to move a source with high pressure when this type of action required approval by the technical manager for the system. Also, a few entries in the operator's logs indicated that they had operated the GRF system with the negative pressure air system bypassed. The log did not indicate contact with the technical manager for the system who should have approved this type of activity (according to the manager). Inspectors noted that operating the system under high pressure (in the transfer tubes) without negative pressure in the shroud which covers the transfer tubes could have significant consequences if a source was leaking. The inspectors also noted some log entries indicating adjustments had been made to the timer settings; however, the reasons for the adjustments were not documented nor were any evaluations of the effect of these changes documented.

A lack of detail was also noted in special memos documenting resolution of problems and in documented plans for removing contaminated sources from the system or performing special maintenance. For example, when the belleville springs were removed from the lock block in December 1995 and found to be incorrectly sized, little documentation was maintained on steps taken to correct this problem (the springs were replaced) and to prevent future errors in obtaining hardware for the system. The GRF staff had photographed the springs removed from the system, but no procedures or written instructions were completed on what specifications should be given to procure new springs in the future. Records maintained by various individuals documenting activities related to decontaminating the GRF system and removing the cobalt-60 sources in 1996 had varying levels of detail, and some documented activities that may not have been made known to technical managers. For example, in August 1996 while the licensee was decontaminating the GRF, the operations log indicated that a small torch and a grinder were used to remove the magnet from Position 5 on the face plate of the exposure head. The face plate was still contaminated, and this activity had not been reviewed by the technical manager of the system.

In addition, some log entries and department memos noted that maintenance had been performed on the system, but there was no detailed description about what was done to the system nor a documented analysis or evaluation of system modifications. For example, on at least two occasions the regulators (air lines) were switched from source channels declared temporarily out of service to other channels when problems were experienced moving sources in the transfer system. There was no indication of whether these changes were appropriately reviewed, and in one instance, the exchange resulted in applying air pressure of 40 psi to a source

that was normally transferred using 20 psi. No evaluation of the consequence of this change was performed.

In other instances, the inspectors observed that detailed instructions for maintenance activities were missing. The inspectors noted, as had licensee representatives, that some screws were missing from the outer cover of the exposure head and negative pressure shroud. Licensee representatives indicated that these may have not been replaced following previous maintenance activities. Licensee representatives also indicated that contamination on the outside of the source transfer tubes may have occurred as a result of air flow created by the missing screws. The inspectors also noted that there were no procedures or specifications for routine maintenance involving system hardware and no procedures addressing filter changes for the air handling system. In fact, a filter on the negative exhaust fan had not been changed in 20 years of system operation. It was recently changed as a result of the most recent contamination incident when it was found to have radiation levels of 3 milliroengtens per hour.

Some concerns were also noted regarding specific details in operating procedures. These primarily involved a lack of detail in certain sections and inconsistencies between written procedures and verbal instructions provide by the technical manager. For example, procedures relating to operation of the source transfer system and actions to be taken when a source became stuck appeared to indicate that the operators could switch the system regulators to use bottled gas at high pressure to move a source. (This operation requires that the air systems be manually switched and that care be taken on the pressure applied to a source transfer tube.) The technical manager stated that he did not expect any operator to manually switch the air supply to the system and that only he or his designee could perform that activity. Other aspects of the procedures lacking detail included actions to be taken when operators experienced problems.

The inspectors also noted that survey procedures lacked detail. In discussing how previous leaking sources were initially detected, licensee representatives noted that they were identified through surveys performed at the exposure head. Specifically, surveys performed by the health physics staff identified a small, but notable, increase in radiation levels at a particular position on the exposure head (corresponding to a port location). Inspectors noted through their review of documents, that in some instances the increase in radiation levels were very small when leaking sources were identified in 1983 and 1994. In contrast, the most recent leaking source was not identified until the increase in radiation levels at the exposure head was more notable. In addition, radiation levels in other parts of the system were much higher than was normally detected. The health physics staff attributed the failure to note the potential of a leaking source when radiation levels were notably increased to differences in survey techniques between the operations and health physics staff. The inspectors noted to the RSO and health physics staff that consideration should be given to modifying WSMR's survey procedures, since routine radiation surveys had been successful in identifying leaking sources in the past. Specifically, the inspectors noted that modifications in survey techniques,

with corresponding procedural guidance, could assist the operations staff in early detection of a leaking source.

In summary, the inspectors identified a number of concerns based on their review of the operations logs and other records documenting problems and maintenance on the GRF system. These included: (1) a lack of detail in some records and failure to document certain activities; (2) failure to perform analyses or evaluations of problems involving stuck sources before attempts were made by operators to free or move the sources; (3) instances where it appeared that operators may have conducted activities that should have had prior review by a technical manager; and (4) a lack of procedures or specifications for routine and non-routine maintenance activities. Based on the inspectors' review, it appeared that some activities relating to operation of the system may not have received adequate review by technical specialists and managers, in part, due to a lack of detail in operators' records, and partially due to the fact that information about operation of the system was not recorded or was not consolidated in a single group of records. In addition, some problems observed in operating the system, such as frequent number of stuck sources in 1994-1996, appeared to have not received thorough analysis to determine the cause of the problem.

3.3 Conclusions

Several problems relating to the source transfer system were identified from 1994 to 1996; however, a detailed evaluation of the cause(s) of the problems was apparently not performed. Operational data maintained for the system was found lacking in detail for both routine and non-routine operation and maintenance. Some concerns were identified involving activities performed by system operators and whether certain activities had been reviewed by technical managers. Procedures were found lacking detail regarding actions which could be taken by operators to correct abnormal system conditions.

The inspectors noted that procedures should have included instruction on actions to be taken if variation from normal operating conditions is deemed necessary, such as whether supervisory notification and/or approval is required. In addition, changes appeared warranted in documenting operational data to include evaluations of abnormal system conditions and problems, and documenting actions taken to correct problems.

4 Radiation Safety Program Management

4.1 Inspection Scope (87100)

The inspectors reviewed minutes of Radiation Protection Committee (RPC) meetings, DATTS Safety Committee meetings and DATTS Test Plan Committee meetings.

4.2 Observations and Findings

The Radiation Protection Committee meets at quarterly intervals. A review of RPC minutes for meetings held on November 9, 1982, and March 31, 1983, indicated no discussion of the source reported leaking on October 1, 1982. A source discovered leaking on June 23, 1983, was reported at the RPC meeting of June 30, 1983. However, no analysis or concern was noted in the minutes of this meeting. Sources discovered leaking in June 1994 and April 1996 were not discussed in RPC meetings held subsequent to these events.

Interviews were conducted with GRF personnel concerning health physics activities. Subsequent to the identification of a leaking source in April 1996, actions were taken to decontaminate the GRF and associated systems. Minutes of DATTS Safety Committee and RPC meetings did not include a discussion of procedures to be followed in this effort. It was not possible, from reviewing these committee minutes, to determine if the RPC and the RSO were aware of the planned activities or had any input into how they were to be implemented.

Interviews with DATTS/GRF personnel and the RSO indicated that communications concerning GRF activities between the DATTS staff and RSO occurred more frequently than was documented in records. Apparently, DATTS/GRF personnel and the RSO had conversations several times a week concerning a wide range of activities. The RSO stated he was aware of the decontamination plan prior to it's implementation and that his staff had performed surveys while the decontamination effort was underway. However, it was not clear that activities involving decontamination of the GRF were discussed with the RPC. Likewise, the inspectors were unable to confirm whether the RPC had been informed of or discussed the number of problems experienced by GRF personnel with source transfer systems during 1994-1996.

Based on a review of the RPC minutes and discussion with WSMR personnel, the inspectors identified a concern regarding the level of oversight provided by the RPC. Specifically, the inspectors noted that significant efforts were required to decontaminate the GRF in 1996 and that the proposed plan had not been reviewed or discussed with the RPC. Likewise, the inspectors noted concern that actions taken to remove a leaking source and decontaminate the system in 1983 was apparently not reviewed in detail with the RPC. In addition, the inspectors noted that the RPC had apparently not been informed of the number of problems observed with the source transfer system (resulting in stuck sources) over a 2-year interval. The inspectors discussed these concerns with GRF managers and the RSO, noting that the RPC should have been informed of these activities to ensure that the committee charged with oversight of facility operations agreed with the proposed plans. The RSO acknowledged the inspectors' concerns and stated that in the future, the RPC would be informed of significant incidents or findings relating to the GRF and that discussions and decisions concerning activities under the purview of the RPC would be more thoroughly documented.

4.3 Conclusions

Based on a review of the above mentioned committee meetings and discussions with WSMR personnel, the inspectors were unable to establish whether the RPC and RSO had a clear understanding of certain activities occurring at the GRF. This was noted as significant because the RPC is responsible for overseeing the operation of the GRF and must be aware of activities which may require RPC approval. In particular, the inspectors were concerned that a number of problems observed with the source transfer systems over a 2-year period were not discussed with the RPC and recent efforts to decontaminate the GRF were not reviewed with the RPC prior to implementation.

Exit Meeting Summary

The inspection findings, as noted on the report, were discussed with the licensee during a telephonic exit briefing conducted on October 3, 1996. The inspector confirmed with licensee representatives that information as contained in this report was not proprietary and was not required to be withheld from release to the public domain.

ATTACHMENT 1

SUPPLEMENTAL INSPECTION INFORMATION

INSPECTION PROCEDURES USED

IP 87100: Licensed Materials Program
IP 87103: Inspection of Incidents at Nuclear Materials Facilities
IP 83822: Radiation Protection

LIST OF ACRONYMS AND INITIALISMS USED

DATTS	Directorate for Applied Technology Test and Simulation
GRF	Gamma Range Facility
NRC	Nuclear Regulatory Commission
RPC	Radiation Protection Committee
RSO	Radiation Safety Officer
WSMR	White Sands Missile Range

PARTIAL LIST OF PERSONS CONTACTED

George Wenz, Radiation Safety Officer
Lisa Blevins, Physical Science Technician
Richard Williams, Chief, Project Support Branch, DATTS
Doug McDonald, Health Physicist, DATTS
Juan Briones, Mechanical Engineer
Moroni Flores, Health Physics Staff, DATTS

ATTACHMENT 2

SOURCE LEAKAGE HISTORY

- On October 6, 1982, the Army reported to the NRC that a 4100 curie cobalt-60 source was leaking above allowable limits. Measured activity was 0.096 microcuries. The source was located in port 5 at the GRF. A visual inspection did not reveal any structural defects.

- On June 27, 1983, the Army reported to the NRC that a 4100 curie source located in port 8 of the GRF indicated contamination levels of 0.006 microcuries. Although this was below the allowable level of 0.05 microcuries the Army decided to shut down the GRF. A visual inspection indicated no structural defects. The Army surmised that the activity may have been due primarily to contamination of the source carrier.

- By letter dated January 19, 1984, the state of Maryland provided the results of its investigation of the June 27, 1983, leaking source to the NRC Office of State Programs. They concluded that the contamination resulted from a rupture of the source encapsulation. This information was subsequently provided to the Region IV State Agreements Officer.

- The NRC conducted an inspection on May 16, 1984, to review the above mentioned leaking sources. The inspection was focused determining whether prolonged use of the sources, under the stresses involved in their use at the GRF, could result in leakage or failure. The NRC inspector could not establish that the leaking sources were the result of loss of integrity of the sealed sources as used by the Department of the Army. Further, the NRC inspector could not determine whether repeated use could cause stress fractures or other indicators of potential failure. This matter was considered "unresolved" pending the result of an analysis of the effects of repeated impacts on the sources over a substantial period of time.

- On June 23, 1994, the Army reported to the NRC that a 2000 curie source (originally 4100 curies) indicated leakage of 0.12 microcuries. This source was located in port 8 of the GRF.

- On April 29, 1996, the Army reported to the NRC that a leak test of a 1830 curie cobalt-60 source (originally 4100 Curies) indicated the presence of 0.1 microcuries of removable contamination. This source was located in port 5 of the GRF.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

CAL 96-005

OCT 24 1996

Dr. John Meason
Commander
U.S. Army White Sands Missile Range
ATTN: STEWS-DT (Maeson)
White Sands Missile Range
White Sands, New Mexico 88002-5048

SUBJECT: CONFIRMATORY ACTION LETTER

Dear Dr. Meason:

This refers to our inspection of the use of cobalt-60 sources manufactured by Neutron Products, Inc., in the irradiator at the Gamma Range Facility, White Sands Missile Range (WSMR). The inspection was initiated in response to notification provided by WSMR staff that a cobalt-60 source was identified as leaking during a leak test performed on April 24, 1996. WSMR had previously provided written notification of another leaking source of the same model, strength, and approximate age by letter dated June 23, 1994. In addition, cobalt-60 sources of the same model and strength were previously found to be leaking in 1982 and 1983.

The inspection included examination of the Gamma Range Facility, the irradiator and source transfer system, and source carriers used in the irradiator, all of which are unique. The inspectors also reviewed information relating to the irradiator design and previous analyses of the use of sealed sources in the system completed by WSMR and its contractor.

Our review of this matter has identified significant concerns about the continued use of sealed sources (both cesium-137 and cobalt-60), with source carriers supplied by WSMR, in the Gamma Range Facility. Specifically, the recent visual examination (performed on July 30, 1996, at Neutron Product, Inc.'s facility) of one of the leaking sources identified significant damage to the source capsule, allowing contamination to spread to the external surfaces of the source carrier and beyond to the internal surfaces of the irradiator. In addition, based on our review of historical operation of the irradiator and WSMR's response to earlier incidents involving leakage of cobalt-60 sources, we are concerned that changes have been made to the source and carrier design without sufficient analysis of their impact on the integrity of the source capsule over a period of use. Further, we have also noted concerns relating to operating practices which may require further review in order to determine whether they contributed to the source failures.

These concerns were discussed with members of your staff responsible for operation of the Gamma Range Facility during a telephonic exit briefing on October 3, 1996, and will be described in detail in an inspection report which will be forwarded to you in the near future. However, because WSMR has had several incidents involving contamination of the irradiator due to failure of cobalt-60 sources, I find it necessary to request that WSMR take prompt action to address these concerns as described below.

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Pursuant to a telephone conversation between you and Ms. Linda Howell of this office on October 21, 1996, it is our understanding that you will take the following actions:

1. Complete and submit for NRC review an engineering assessment of the failure of two cobalt-60 sources (Neutron Products, Inc., Serial Nos. 175-90-4 and 175-90-1, nominal activity of 4100 curies each) previously used in the irradiator at the Gamma Range Facility. The assessment will focus on identifying the root cause of the failures, for both the source carriers and the manufacturer's source capsules, and any contributing factors, including operating practices at the facility. The assessment will include examination of the remaining two cobalt-60 sources of the same model and nominal activity used in the irradiator between 1990 and 1996 to ensure a full evaluation of potential damage to sources used in the irradiator during this period.

2. Based on the assessment described in Item 1, WSMR will propose and submit for review a design change for the sources and carriers used in the irradiator or, alternatively, provide justification for continued use of the sources and carriers without modification.

3. Based on the findings and conclusions developed under Items 1 and 2, WSMR will complete and submit for review a validation study to support use of a new source and/or carrier design or complete a new validation study to support continued use of the existing sources and carriers. The validation study will include evaluation and appropriate testing of the potential effects of the number of exposure cycles likely to be experienced over the anticipated period of use of all sources in the irradiator. Should WSMR decide to permanently discontinue use of the cesium-137 sources in this system, your response to this letter should describe your plans for disposing of the cesium-137 sources, and the validation study may be limited to the cobalt-60 sources proposed for use in the system.

4. Submit a plan and proposed schedule for accomplishing Items 1 through 3 which will be incorporated in License 30-02405-01 by reference, within 30 days of the date of this letter. This submittal shall be in the form of a license amendment request.

5. Submit, within 30 days of the date of this letter, a description of the interim actions that WSMR plans to implement to ensure that operational controls are sufficient to minimize the risk of further source failures and adequate to provide for prompt identification of source leakage until Items 1 through 3 are completed.

6. Review your procedures relating to operation of the irradiator and air handling systems, based on your findings under Item 1 above and the results of the NRC's inspection, and propose modifications as necessary to address WSMR's and the NRC's inspection findings. Any proposed changes to existing procedures or any new procedures developed in accordance with this letter will be submitted to the

NRC for review, with a request for amendment of the license to incorporate ... procedures by reference. Alternatively, if you determine, based on your evaluation and review, that changes or additions to existing procedures are not warranted, then you will provide a justification to the NRC stating why you believe procedure modifications are not necessary.

Pursuant to Section 182 of the Atomic Energy Act, 42 U.S.C. 2232, you are required to:

1. Notify me immediately if your understanding differs from that set forth above;

2. Notify me if for any reason you cannot complete the actions within the proposed schedule and advise me in writing of your modified schedule in advance of the change; and

3. Notify me in writing when you have completed the actions addressed in this Confirmatory Action Letter.

Issuance of this Confirmatory Action Letter does not preclude issuance of an order formalizing the above commitments or requiring other actions on the part of the licensee; nor does it preclude the NRC from taking enforcement action for violations of NRC requirements that may have prompted the issuance of this letter. In addition, failure to take the actions addressed in this Confirmatory Action Letter may result in enforcement action.

The responses directed by this letter are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, Pub. L. No. 96-511.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, and your response will be placed in the NRC Public Document Room (PDR). To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. However, if you find it necessary to include such information, you should clearly indicate the specific information that you desire not to be placed in the PDR, and provide the legal basis to support your request for withholding the information from the public.

Sincerely,

Samuel J. Collins

L. J. Callan
Regional Administrator

Docket: 030-09345
License: 30-02405-01

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cc:
NRC Public Document Room
New Mexico Radiation Control Program Director

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

bcc:
DMB IE 36
J. L. Lieberman, D/OE (2) (7 H5)
L. J. Chandler, Asst. GC/OGC (15 B18)
H. L. Thompson, DEDS (17 G21)
C. Paperiello, D/NMSS (T8F5)
L. W. Camper, IMAB/NMSS (T8F5)
RIV Coordinator, OEDO (17 G21)
L. J. Callan, RA
T. P. Gwynn, ADRA
W. L. Brown, RC
R. A. Scarano, D/DNMS
G. C. Pangburn, ADD/DNMS
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L. L. Howell, Branch Chief
D. B. Spitzberg, Branch Chief
F. A. Wenslawski, Branch Chief
G. F. Sanborn, EO
B. Henderson, PAO
J. Carson, ORA
RIV Files
NMI&FC/DB File
RIV Materials File - 5th Floor
NMI&FC/DB and NMLB Inspectors (10)

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RC	ADRA	RA		
WLBrown	TPGwynn	LJCallan		
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