



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-4005**

July 20, 2006

MEMORANDUM TO: Jack E. Whitten, Chief  
Nuclear Materials Licensing Branch  
Division of Nuclear Material Safety

FROM: D. Blair Spitzberg, Chief */RA/ R. J. Evans for*  
Fuel Cycle & Decommissioning Branch  
Division of Nuclear Material Safety

SUBJECT: SAFETY EVALUATION REPORT FOR HAWAII AGRICULTURE  
RESEARCH CENTER, KUNIA SUBSTATION, KUNIA, HAWAII

Enclosed is the Safety Evaluation Report for Hawaii Agriculture Research Center, Kunia Substation, Kunia, Hawaii, Materials License No. 53-00515-01. By letter dated December 2, 2005, the Hawaii Agriculture Research Center requested a license amendment to remove the Kunia Substation, as a location of use, for unrestricted use in accordance with 10 CFR 20.1402. Enclosed to the licensee's letter was a final status survey report dated September 2005.

The enclosed Safety Evaluation Report is FCDB staff's evaluation of the radiological consequences of the proposed licensing action. This Safety Evaluation Report was prepared using the guidance provided in NUREG-1757, Volume 1, Revision 1, Appendix G, "Template for a Safety Evaluation Report."

The facility meets the criteria of a Group 2 decommissioning site. Group 2 refers to a site that is not required to submit a decommissioning plan and uses the NRC's screening criteria to demonstrate compliance with 10 CFR Part 20, Subpart E requirements. Table 1.2 of NUREG-1757, Volume 1, provides the principle regulatory features of the seven decommissioning groups. Provided below is a status of each of the principle regulatory features for a Group 2 project:

Principle Regulatory Feature	Status
NEPA Compliance - completion of an Environmental Assessment	EA & FONSI were published in the Federal Register on June 29, 2006 (71 FR 37122)
Restricted or Unrestricted Use	Licensee requested unrestricted use
DP Required - Yes or No	No
DP Review Documentation	Not Applicable

Radioactive Material Disposition Documentation	At the conclusion of the experiments, the contaminated soil and plant material were either sampled and free-released or shipped offsite for disposal
Method for Demonstrating Site is Suitable for Release - Survey or Demonstration	Final status survey report was submitted by letter dated December 2, 2005
Confirmatory or Side-by-Side Survey	None
Closeout Inspection	None
FRN Used to Inform the Public of Staff Actions	FONSI announcement, with no opportunity for hearing, is the only publicly required notification per NUREG-1757
Documentation Used to Support License Termination	License is not being terminated; amend license to remove Kunia Substation from License Condition 10

The NRC staff considered whether a consultation with EPA is required per the EPA-NRC Memorandum of Understanding dated October 9, 2002. An EPA consultation was not required because the contamination was limited to internal building surfaces only; there was no groundwater or outdoor soil contamination resulting from previous licensed operations.

In summary, the review of the final status survey report is complete. The results of the final survey meet the criteria of NUREG-1757 and similar guidance documents; therefore, FCDB approves the final status survey report. Please issue a license amendment to License No. 53-00515-01 authorizing the removal of the Kunia Substation from License Condition 10 for unrestricted use as requested by the licensee in its December 2, 2005, letter.

License amendment information should be sent to the following individuals:

(Licensee)  
Hawaii Agriculture Research Center  
ATTN: Stephanie A. Whalen  
President and Director  
99-193 Aiea Heights Drive, Suite 300  
Aiea, HI 96701-3911

(State of Hawaii)  
Russell Takata, Branch Manager  
Department of Health, Radiation Section  
Noise Radiation and Indoor Air Quality  
Branch  
591 Ala Moana Blvd., Rm. 133  
Honolulu, HI 96813

Docket No.: 030-06839  
License No.: 53-00515-01  
Control No.: 470798

Enclosure: Safety Evaluation Report

Jack E. Whitten, Chief

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bcc w/enclosure (via ADAMS e-mail distribution):

LDWert

CLCain

DBSpitzberg

JEWhitten

RSBrowder

BSAiferink

RJEvans

RIV Nuclear Materials File - 5<sup>th</sup> Floor

SUNSI Review Completed: BSA ADAMS: ☒ Yes ☐ No Initials: BSA

☒ Publicly Available ☐ Non-Publicly Available ☐ Sensitive ☒ Non-Sensitive

DOCUMENT NAME: s:\DNMS\!Fcdb\!BAS\Hawaii AG SER.wpd final s:\ltrs-memos\2006

RIV:DNMS:FCDB	DNMS:NMLB	C:FCDB
BSAiferink	RSBrowder	DBSpitzberg
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## **SAFETY EVALUATION REPORT**

HAWAII AGRICULTURE RESEARCH CENTER, KUNIA SUBSTATION, KUNIA, HAWAII

### **1.0 Executive Summary**

By letter dated December 2, 2005, the Hawaii Agriculture Research Center requested amendment of Materials License No. 53-00515-01 to remove the Kunia Substation as a location of use. This Safety Evaluation Report is the NRC staff's evaluation of the radiological consequences of the proposed request. Based on the results of this evaluation, NRC staff recommends approval of the licensee's request to release the Kunia Substation for unrestricted use and to remove the building from License Condition 10.

### **2.0 Facility Operating History**

#### **2.1 License Number/Status/Authorized Activities**

Materials License No. 53-00515-01 authorizes the Hawaii Agriculture Research Center to possess radioactive material, in both sealed and unsealed form, for conducting tracer studies in plants and soils and for laboratory analysis of samples. Condition 10 states that licensed material may be used only at the licensee's facilities located at 99-193 Aiea Heights Drive; Aiea, Hawaii and at the Kunia Substation; Kunia Road, Kunia, Hawaii.

#### **2.2 License History**

Radioactive material was used by the Hawaii Agriculture Research Center at the Kunia Substation from 1975-1998. The licensee conducted a historical review and concluded that the radionuclide of concern was carbon-14. The licensee requested by letter dated November 22, 1994, that NRC expand the licensed area within the greenhouse to include the entire 4,000 ft<sup>2</sup> area. Historical records show no use or storage of material outside the greenhouse as requested; therefore, the licensee's final status surveys were only performed in the area in the immediate vicinity of the greenhouse. The NRC concurs that the area surveyed for final status survey adequately reflected those areas attributable to past licensed operations.

The licensee possessed a total of 11.5 millicuries (4.26E+8 becquerels) of carbon-14 for experiments. For these experiments, carbon-14 was applied to the soil within several large planter boxes inside the caged restricted area. At the conclusion of these experiments, the contaminated soil and plant material were either sampled and free-released or shipped offsite for disposal. The last shipment of contaminated soil and waste was made in May 1998.

#### **2.3 Previous Decommissioning Activities**

Docket file records indicate that two plots of land located at the Kunia Substation were previously used for land application of radioactive material. In the first instance, an

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activity of approximately 10 millicuries ( $3.7\text{E}+8$  becquerels) of a carbon-14 labeled compound was applied to a 3750 ft<sup>2</sup> (348 m<sup>2</sup>) plot during 1984. This plot was decommissioned, and the NRC released the property from the license in May 1993 (Amendment 53). In the second instance, on two occasions (1979 and 1982), seeds treated with a carbon-14 compound were planted in a 1600 ft<sup>2</sup> (149 m<sup>2</sup>) plot. This plot was also decommissioning, and the NRC released the property from the license in April 1996 (Amendment 57). These plots of land were not included in the current review for unrestricted release of the Kunia Substation, because they were previously reviewed and approved by NRC for unrestricted release.

## 2.4 Spills

In the final status survey report (FSSR), the licensee states that no incidents involving spills or releases of radioactive material occurred during the operational history of the Kunia Substation. A review of the docket file was conducted by the NRC staff, and no record of a spill or other radiological incident was identified in the file.

## 2.5 Prior Onsite Burials

There is no evidence that the licensee buried radioactive material at the facility.

# 3.0 Facility Description

## 3.1 Site Location and Description

The Kunia Substation, located in Kunia, Hawaii, is a 4,000 ft<sup>2</sup> (372 m<sup>2</sup>) building that housed a 300 ft<sup>2</sup> (28 m<sup>2</sup>) radiologically restricted area. The restricted area was located near the center of the building and was enclosed by wire fencing from floor to roof (caged). The area was established as a restricted area in 1975, and was used for agricultural experiments involving carbon-14.

## 3.2 Population Distribution

According to a licensee representative, the Kunia Substation is currently located in a former sugar cane field. There are no homes in the immediate vicinity of the Kunia Substation (within several hundred yards), although homes are being constructed in the general area. It is anticipated that homes will be constructed near the Kunia Substation at some point in the near future.

## 3.3 Current/Future Land Use

The licensee plans to use the former radiologically restricted area for storage and other agricultural experiments not involving use of byproduct material.

## 3.4 Meteorology and Climatology

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A review of the meteorology and climatology for the Hawaii Agriculture Research Center is not necessary because all licensed operations occurred inside of the Kunia Substation.

### 3.5 Geology and Seismology

A review of the geology and seismology for the Hawaii Agriculture Research Center is not necessary because all licensed operations occurred inside of the Kunia Substation.

### 3.6 Surface Water and Groundwater Hydrology

A review of the surface water and groundwater hydrology for the Hawaii Agriculture Research Center is not necessary because all licensed operations occurred inside of the Kunia Substation.

### 3.7 Natural Resources

A review of the natural resources for the Hawaii Agriculture Research Center is not necessary because all licensed operations occurred inside of the Kunia Substation.

### 3.8 Ecology/Endangered Species

A consultation with the U.S. Fish and Wildlife Service was not conducted because all licensed operations occurred inside of the Kunia Substation. There were no incidents or spills that resulted in the release of radioactive material to the environs of the building.

## 4.0 Radiological Status of Facility

### 4.1 Contaminated Structures

Historically, only agricultural experiments involving carbon-14 were performed in the Kunia Substation. As part of the final status survey, surface sampling was conducted on the floors and walls of the caged restricted area. Scan surveys of all areas of the caged restricted area, and the area immediately surrounding the caged area identified no areas distinguishable from background radiation levels. All wipe samples were below the licensee's approved removable contamination guideline level of 200 disintegrations per minute (dpm)/100 cm<sup>2</sup>. No contaminated structures were identified during the final status survey.

### 4.2 Contaminated Systems and Equipment

There were no contaminated systems or equipment in the Kunia Substation at the time of the final status survey. Equipment and fixtures were surveyed by the licensee, and none of these items exceeded the respective DCGLs. The material was subsequently free released or disposed of appropriately.

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#### 4.3 Surface and Subsurface Soil Contamination

Since licensed material was used only within the Kunia Substation and there were no spills or releases, no surface or subsurface soil contamination could have occurred outside of the Kunia Substation restricted area located within the building.

#### 4.4 Surface Water and Groundwater

Since licensed material was used only within the Kunia Substation and since there were no documented releases of radioactive material to the sewer, no surface or groundwater contamination could have occurred.

### 5.0 Dose Modeling Evaluations

#### 5.1 Unrestricted Release using Screening Criteria

Section 2.5 of NUREG-1757, Volume 2, "Consolidated NMSS Decommissioning Guidance," provides two general approaches for demonstrating compliance with 10 CFR Part 20, Subpart E dose criteria. The two major approaches include the dose modeling approach or the FSSR and derived concentration guideline levels (DCGLs) approach. The licensee chose to use the second approach by submittal of an FSSR with proposed DCGLs for the caged restricted area, and the first approach for the soil surfaces surrounding the caged restricted area.

By letter dated December 2, 2005, Hawaii Agriculture Research Center submitted a FSSR to the NRC for the Kunia Substation. Regulation 10 CFR 20.1402, Radiological Criteria for Unrestricted Use, states in part that a site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent not to exceed 25 millirems (0.25 mSv) per year to an average member of the critical group. The NRC's NUREG-1757, Volume 1, Revision 1, "Consolidated NMSS Decommissioning Guidance," Table B.1 provides screening values for building surface contamination that are equivalent to 25 millirems (0.25 mSv) per year. The NRC-approved screening value for carbon-14 is  $3.7\text{E}+6$  disintegrations per minute ( $6.18\text{E}+4$  becquerels)/ $100\text{ cm}^2$ . Assuming a loose/removable contamination fraction of 10-percent, the removable surface contamination screening value is  $3.7\text{E}+5$  disintegrations per minute/ $100\text{ cm}^2$  ( $6.18\text{E}+3$  becquerels / $100\text{ cm}^2$ ). In summary, the licensee's final status survey results were well below the NRC-approved screening values.

A second method to demonstrate compliance with 10 CFR 20.1402 is the use of dose modeling. The licensee conducted dose modeling to estimate potential doses to members of the public from carbon-14 radioactivity in soil. The licensee conservatively assumed that all 11.5 millicuries ( $4.26\text{E}+8$  becquerels) of carbon-14 were dispersed into the area soil resulting in a soil activity of 26 picocuries (57.7 becquerels) per gram. Using Version 6.3 of the RESRAD modeling code with all default parameters, including the default carbon-14 activity of 100 picocuries (222 becquerels) per gram, the model calculated a peak dose of 132 millirems (1.32 mSv) per year. The peak dose occurs at

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4.28 years. The licensee discontinued use of carbon-14 at Kunia Substation in 1998. Dose modeling further demonstrates that by the seventh year (2005), the annual dose drops to below 0.03 millirems ( $3E-4$  mSv) per year. Through dose modeling of potential soil contamination, the licensee conservatively demonstrated that the annual total effective dose equivalent is currently less than the 25-millirem (0.25 mSv) regulatory limit.

## 5.2 Unrestricted Release using Site-Specific Information

The licensee did not request a building release using site-specific information as allowed by NUREG-1757.

## 5.3 Restricted Release using Site-Specific Information

The licensee did not request a restricted release of the building using site-specific information as allowed by 10 CFR 20.1403.

## 5.4 Release Involving Alternate Criteria

The licensee did not request a building release using alternate criteria as allowed by 10 CFR 20.1404.

# 6.0 Decommissioning Activities

## 6.1 Contaminated Structures

Contaminated structures were not identified during the final status survey. All floors and walls were surveyed by the licensee, and none of the surfaces exceeded the respective DCGLs.

## 6.2 Contaminated Systems and Equipment

Contaminated systems and equipment were not identified during the final status survey. Equipment and fixtures were surveyed by the licensee, and none of these items exceeded the respective DCGLs.

## 6.3 Soil

The soil was not impacted by previous licensed operations involving radioactive material at the Kunia Substation; therefore, the site soil was not remediated or sampled.

## 6.4 Surface and Groundwater

The surface and groundwater were not impacted by previous licensed operations involving radioactive material; therefore, the surface and groundwater sources were not sampled.



## 6.5 Schedules

The radioactive material was removed from the Kunia Substation during 1998. The final status survey was conducted during September 2005, and the FSSR was also completed in September 2005. The FSSR was submitted to the NRC for review and approval during December 2005.

## 7.0 Project Management and Organization

The work was conducted by a contractor under the oversight of the Hawaii Agriculture Research Center radiation safety officer. The survey protocols were provided in the FSSR. The NRC staff concluded that the project management and organization were acceptable based on the scope of work.

## 8.0 Radiation Safety and Health Program

The Hawaii Agriculture Center's radiation safety program is reviewed as part of the NRC's routine licensing and inspection program. The workers performing the final status surveys were also required to adhere to the conditions of the Hawaii Agriculture Center's radiation protection program.

The NRC confirmed that the instrumentation used to measure the radioactivity was appropriate for the type of radiation present. The licensee also provided detailed records of instrument calibrations and functional tests.

## 9.0 Environmental Monitoring Program

This program attribute was not reviewed because the decommissioning work was conducted entirely within the Kunia Substation.

## 10.0 Radioactive Waste Management Program

This program attribute was not reviewed. At the conclusion of the licensee's experiments, the contaminated soil and plant material were either sampled and free-released or shipped offsite for disposal. The last shipment of contaminated soil and waste was made in May 1998. The Hawaii Agriculture Research Center's control of radioactive wastes is reviewed as part of the routine NRC inspection program.

## 11.0 Facility Radiation Surveys

### 11.1 Release Criteria

Discussion of the release criteria is provided in Section 5.1 of this Safety Evaluation Report.

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## 11.2 Characterization and Remedial Action Support Surveys

There were no remedial actions or additional characterization surveys required; therefore, this program area was not reviewed.

## 11.3 Final Status Survey Design/Report

The final status survey design included scan surveys for fixed/total contamination and swipe sampling for removable contamination. The surveys included scan surveys of all areas of the caged restricted area, and the area immediately surrounding the caged restricted area. The response and operability of the instrumentation used were verified using carbon-14 check sources. Scan survey results were indistinguishable from background levels. Swipe samples were taken at 65 locations, and most swipe sample results were below the instrument's minimum detectable activity level of 17.3 disintegrations per minute (0.288 becquerels per minute) per swipe sample. The highest sample result was 24 disintegrations per minute per swipe (0.4 becquerels per minute per swipe).

## 12.0 Financial Assurance

License Condition 19 of License 53-00515-01 discusses the possession limits for maintaining compliance with the decommissioning financial assurance requirements of 10 CFR 30.35(d). Since the licensee is not requesting termination of the license, the requirements of License Condition 19 continue to remain in effect.

## 13.0 Restricted Use/Alternate Criteria

The licensee did not request a restricted site release as allowed by 10 CFR 20.1403 or use of alternate criteria as allowed by 10 CFR 20.1404. Therefore, this subject area was not reviewed.

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