



Hawaii Agriculture Research Center

Administration: P.O. Box 100, Kunia, HI 96759

Ph: 808-621-1350/Fax: 808-621-1399

<http://www.harc-hspa.com>

27 April 2023

Janine F. Katanic, PhD, CHP

Senior Health Physicist

Materials Inspection Branch

Division of Radiological Safety & Security

US NRC, Region IV

1600 East Lamar Boulevard

Arlington, TX 76011-4511

SUBJECT: Hawaii Agriculture Research Center (HARC) / NRC Inspection Report 030-06839/2022-001

Dear Dr. Katanic:

This letter outlines HARC's plans to complete the disposal of its radioactive waste, to decommission its work site at 94-340 Kunia Rd., Waipahu, HI 96797, and to terminate its license. An attached Gantt chart provides a timeline for the major action steps and the following table provides added information. The obstacles that delayed activity, including temporary growing pains of our RSO's joining a nation-wide association and repairing our liquid-scintillation counter (LSC) have put us back on track to complete these tasks.

Submit Low-Level Radioactive Waste Form to WA DoH:

After consultation with Eileen Kramer, who is responsible for this form, the completed document with payment was sent to her office, and acknowledgement of delivery from the USPS received.

Receive notice of permit status for the Low-Level Radioactive Waste Form from WA DoH:

The form states that it takes a minimum of 5 weeks to process.

Finalize contract agreement with TGA and PCS for waste disposal:

We have had numerous calls and email exchanges with TGA and PCS to determine the best way to dispose of our radioactive waste. Nothing we have is outside their expertise.

Have PCS repack the drums as necessary and crate the compactor:

We acknowledge PCS' experience to more expediently pack the drums as required to meet all of NRC's requirements. Therefore, HARC is outsourcing this task to PCS.

Transport barrels and crate to PCS after clean survey achieved:

Prior to the transport of the barrels and crated compactor from HARC, our Decommissioning Plan requires a clean survey be obtained. Once that is achieved, the waste can be turned over to PCS.

Decommission site:

A copy of the Decommissioning Plan is attached for NRC's review. Note, that this procedure was conducted on a grander scale when HARC's Aiea site was decommissioned.

PCS will transport the material from Hawai'i to California:

TGA subcontracts PCS to handle activities conducted in Hawaii.

TGA will transport the material from California to Washington:

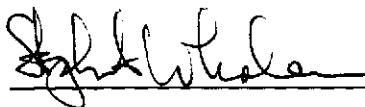
Once TGA finds the best depositories that we are allowed to send waste to, it will do so (this is not a static situation). For example, HARC has some mixed waste that WA will not accept.

Terminate license:

We understand that we are held responsible from "cradle to grave", but also that we will receive an acknowledgement letter from TGA once shipment is received at Turlock, CA. We would appreciate a confirmation of this from NRC. The procedure we would follow is described in NRC Form 314, Certificate of Disposition of Materials.

We believe that outsourcing tasks to TGA and its subcontractor, PCS, who have performed these operations in Hawaii, we will meet our timeline, barring events we (or your alternative contractor) have no control over.

Sincerely,



Stephanie Whalen

Executive Director



Blake Vance

Assistant Director, Facilities

C: R. Fitch, RSO

M. Fritz, Executive Assistant

Attachments: *Grantt Chart - Radioactive Waste Material Tasks Apr 27, 2023a.pdf*
DECOM - plan 1.pdf
TGA Waste inventory HARC 042723.pdf
Rad inventory 041522 mlw By Drum & Isotope BY 042723.pdf

Timeline of activities to execute to achieve the absolute February 2024 deadline.

Tasks	RP	2023									2024		
		Q2			Q3			Q4			Q1		
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Submit Low-Level Radioactive Waste Form to WA DoH.	2	█											
Receive notice of permit status for the Low-Level Radioactive Waste Form from WA DoH.	2			█									
Finalize contract agreement with TGA and PCS for waste disposal.	2		█										
Have PCS repack the drums as necessary and crate the compactor	3			█									
Transport barrels and crate to PCS after clean survey.	2			█									
Decommission Site	1				█								
PCS will transport the material from Hawai'i to California.	3				█	█	█						
Terminate License	1						█	█	█				
TGA will transport the material from California to Washington	4						█	█	█				

Responsible Party (RP):

- 1. R. Frick
- 2. B. Vance
- 3. PCS = Pacific Commercial Services, Inc.
- 4. TGA = Thomas Gray and Associates, Inc.

Decommissioning Survey Plan

Facility: Hawaii Agriculture Research Center

Address: Kunia Substation
94-340 Kunia Road
Waipahu, HI 96797

Survey Area: Restricted area within Kunia Substation

Prepared By: Ronald Frick, M.S., CHP, DABR

Background/Laboratory use history

Use within this laboratory has been restricted to the storage and handling of radioactive materials and waste transferred from our previous Aiea facility in late 2009. There has been no receipt of additional radioactive material beyond what was transferred from our previous facility. Any other use and handling of material has been related to sorting and re-packaging this waste, and the transfer of radioactive materials, which were previously held outside of the waste drums, into the waste drums.

Following the packaging of the waste for shipment, the lab will be surveyed according to the following procedure. If this survey reveals residual contamination requiring decontamination, the waste generated by this decontamination will be added to the waste, and the survey will be repeated. Following removal of the waste containers from the facility, another final status survey will be performed.

Survey Units

The survey area will be considered to be one survey unit. Based on site history, the restricted area will be considered to be a Class 2 area (not likely to have concentrations of residual activity that exceed the DCGL).

Survey Guidelines

Subpart E of 10 CFR 20, Radiological Criteria for License Termination, states that AA site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably

achievable. NRC NUREG-1757, *Consolidated NMSS Decommissioning Guidance*, provides tables which list the residual surface concentrations in dpm/100 cm² for radionuclides which would result in a TEDE of less than 25 mrem/year for a building occupancy scenario. For the unsealed materials used at this facility, C-14 has the most restrictive concentration (3,700,000 dpm/100 cm²). NUREG 1556, Vol 7, *Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope*, sets the removable and non-removable contamination limits for beta-gamma emitters at 1000 and 5000 dpm/100 cm², respectively.

Based on these documents, we have set a removable contamination guideline of 1,000 dpm/100 cm² for all beta-gamma emitters and a surface contamination guideline of 5,000 dpm/100 cm² for all beta-gamma emitters. These contamination levels are above the minimum detectable activities of the survey equipment used, and can be reasonably achieved using standard decontamination methods.

Survey Design

A statistical analysis to determine the necessary number of wipe samples per survey unit was not performed. A minimum number of 30 samples per survey unit was established based on guidance provided by Nuclear Regulatory Commission staff.

Instrumentation

For the final status survey, scan surveys will be performed using a Bicon Analyst survey meter with Thermo HP308 100 cm² beta scintillation probe.

Wipe samples will be analyzed using the Beckman LS6500 liquid scintillation counter. Efficiency and Minimum Detectable Activity determinations are attached.

Survey Description

All floors, walls, work benches, sinks, and fume hoods within the restricted area will be surveyed using the 100cm² beta scintillation probe.

Wipe samples will be performed using dry filter paper over at least 100 cm², and counted in the LSC. Wipes of sink traps will be taken using six inch Q-tip single tip applicators and counted in the LSC. For each sink, the trap will be removed, and a sample will be taken within the trap bend.

Any area with contamination exceeding the DCGL will be decontaminated and surveys repeated.

Survey Results

Results of the survey and any necessary decontamination efforts will be tabulated and provided in the final decommissioning status survey.

Efficiency/MDA Determinations

Scan surveys

Bicron Analyst/Thermo HP308 100 cm² beta scintillation probe

Measured efficiency for C-14: 9.6%

Background count rate: 350 cpm = 5.8 cps

Based on the information in MARSSIM, the minimum detectable count rate for scanning surveys is determined by the following equation (assuming a scan rate of one probe width per second):

$$Scan \ MDCR = \frac{dN\sqrt{5.8cps} \ H \ 60}{\sqrt{p}}$$

d = 1.38, based on a requirement of 95% correct detections, and an acceptable rate of false positives equal to 60%.

p is assumed to be 0.5

$$Scan \ MDCR = 283 \ cpm$$

For a detection efficiency of 9.6%, and a probe area of 100 cm², the **minimum detectable concentration is 2,945 dpm per 100 cm²**, which is below the DCGL of 5,000 dpm/100 cm².

Liquid Scintillation Counter

Note: Sample detection efficiency for all LSC samples is conservatively based on efficiency for tritium.

Detection efficiency for H-3 was determined using a H-3 scintillation standard. Minimum detectable activity for a 1 minute count was determined using the following equation:

$$MDA \ (dpm) = \frac{3.00 + 4.65\sqrt{CR_B}}{\epsilon\sqrt{t}}$$

Beckman LS 6500 LSC

H-3 Standard current activity = 35,499 dpm

Measured net cpm = 20379

Detection efficiency = 57.4%

Background count rate = 40 cpm

Wipe area = 100 cm²

MDA = 56 dpm/100cm²

Description of Radioactive Waste/Material										
Drum	#	Isotope	Activity	x. Activity	Physical Form	Content	Intermediate container	Old lot #	Note	Labelled as these numbers and then changes to numbers in Column B (#)
1	15	¹⁴ C	<0.1 µCi	0.1	Solid	Metal frig rack, 14" x 15"	Black plastic trash bag	090619-2		
1	4	¹⁴ C	<1 µCi	1	Liquid	¹⁴ C standard	20-ml glass vial	090619-7	3-5 are in a plastic box	
1	6	¹⁴ C	<1 µCi	1	Liquid	¹⁴ C standard	20-ml glass vial	090619-7	6-8 are in a plastic box	
1	7	¹⁴ C	<1 µCi	1	Liquid	¹⁴ C standard	20-ml glass vial	090619-7	6-8 are in a plastic box	
1	17	¹⁴ C	<1 µCi	1	Solid	Empty ¹⁴ C vial, paper towels, gloves	Plastic bag	040101		
1	22	¹⁴ C	<1 µCi	1	Solid	Soil, paper, plastic	800-ml Mason jar	040801		
1	49	¹⁴ C	<1 µCi	1	Solid	Gloves, pipet tips, paper, foil, etc.	Plastic bag	060301		
1	65	¹⁴ C	<1 µCi	1	Solid	Soil	800-ml Mason jar	4-15-1993		
1	86	¹⁴ C	<0.01 mCi	10	Liquid	14C Progesterone in 0.5ml benzene, dried, in a glass vial	Plastic container	891008	in doubled clear plastic bag	34
1	1	¹⁴ C	-10 µCi	10	Solid	Gloves, pipet tips, paper towels, foil, etc	plastic bag	021101		
1	68	¹⁴ C	<50uCi	50	Liquid	4,4'-DDT-RING-UL-14C in toluene, dried Eppendorf tubes	Plastic container	030205	in doubled clear plastic bag	16
1	70	¹⁴ C	<50uCi	50	Liquid	14C Adenine in a glass vial	Plastic container	031101	in doubled black plastic bag	18
1	71	¹⁴ C	<50uCi	50	Liquid	14C Glucose in a glass vial	Plastic container	031102	in doubled black plastic bag	19
1	73	¹⁴ C	<50uCi	50	Liquid	14C Phenylalanine in a glass vial	Plastic container	031103	in doubled black plastic bag	21
1	74	¹⁴ C	<50uCi	50	Liquid	14C Ornithine-Carboxy in a glass vial	Plastic container	00906	in doubled black plastic bag	22
1	79	¹⁴ C	<50uCi	50	Liquid	14C C6A-64250 in a glass tube	Plastic container	880503	in doubled clear plastic bag	27
1	80	¹⁴ C	<50uCi	50	Liquid	14C trans-cinnamic acid in ethanol in a glass vial	Plastic container	070403	in doubled black plastic bag	28
1	81	¹⁴ C	<50uCi	50	Liquid	3 glass vials of 14C Toluene, 10 ml, 4.90x1015 dpm/g, 2 unopened	150-ml glass container		in doubled clear plastic bag	29
1	69	¹⁴ C	<50uCi	50	Solid	Pentachlorophenol UL 14C in a glass vial	Plastic container	030303	in doubled clear plastic bag	17
1	67	¹⁴ C	100uCi	100	Liquid	HOE057742 [3,4 14C] in a glass vial	Metal can	901005	in doubled clear plastic bag	15
1	77	¹⁴ C	<100uCi	100	Liquid	3 mg Caffeic acid in a small glass vial in a small plastic tube	50-ml Falcon tube	70503	in doubled clear plastic bag	25
1	89	¹⁴ C	<100uCi	100	Liquid	44 Eppendorf tubes with unknown materials, dried to ~0.5ml	Ziploc bag		in doubled clear plastic bag	37
1	11	¹⁴ C	<100uCi	100	Liquid	"20800"	20-ml glass vial	090619-7	9-12 are in a plastic box	
1	12	¹⁴ C	<100uCi	100	Liquid	"119500"	20-ml glass vial	090619-7	9-12 are in a plastic box	
1	13	¹⁴ C	<100uCi	100	Liquid	936 vials, each contains 5 ml liquid	7-ml glass scintillation vials in 5 cardboard trays in a black trash bag			
1	14	¹⁴ C	<100uCi	100	Liquid	~3.5 liter of liquid, possible used ³ H cocktail	4-liter brown glass jug			
1	82	¹⁴ C	<100uCi	100	Solid	14C GS14254, fiber, 431300 cpm/gm fiber (0.21 mgm, GS14254) in a plastic vial			in doubled clear plastic bag	30
1	83	¹⁴ C	<100uCi	100	Solid	14C Atrazine, fiber, 1022000 cpm/gm (0.38 mgm, Atrazine) in a plastic vial			in doubled clear plastic bag	31
1	84	¹⁴ C	<100uCi	100	Solid	14C Ametryne 777,800 cpm/gm (0.25 mgm, Ametryne) in a plastic vial			in doubled clear plastic bag	32
1	2	¹⁴ C	<100µCi	100	Solid	Four 1-gal Nalgene containers. Two labeled "cold waste" and are empty. Two labeled "hot waste". One of them has ~2 ml liquid.	double black plastic trash bags			
1	46	¹⁴ C	<100uCi	100	Solid	Tube racks, paper towels, empty bottles, etc.	Plastic tupperware in clear plastic bag			
1	72	¹⁴ C	<250uCi	250	Liquid	14C Nicotinamide in ethanol in a glass vial	Plastic container	021104	in doubled black plastic bag	20
1	78	¹⁴ C	<250uCi	250	Liquid	14C Phenylalanine in a glass vial	Plastic container	070518	in doubled black plastic bag	26
1	85	¹⁴ C	<1mCi	1000	Solid	14C Acetic acid sodium salt in a glass vial in a plastic bag	Plastic container	860801	in doubled black plastic bag	33
1	87	¹⁴ C	<1mCi	1000	Solid	14C Acetic acid sodium salt in a glass vial in a plastic bag	Plastic container	860802	in doubled black plastic bag	35
1	3	³ H	<1 µCi	1	Liquid	³ H standard	20-ml glass vial	090619-7	3-5 are in a plastic box	
1	5	³ H	<1 µCi	1	Liquid	³ H standard	20-ml glass vial	090619-7	3-5 are in a plastic box	
1	8	³ H	<1 µCi	1	Liquid	³ H standard	20-ml glass vial	090619-7	6-8 are in a plastic box	
1	21	³ H	<10 µCi	10	Solid	Paper towels, gloves, plastic dry waste	Plastic trash bag	080201		
1	47	³ H	<38.5 µCi	38.5	Solid	Gloves, plastics, paper waste	Plastic bag	990401		
1	75	³ H	<100uCi	100	Liquid	3H Thymidine triphosphate in a glass vial	50-ml Falcon tube	981001	in doubled black plastic bag	23
1	76	³ H	<100uCi	100	Liquid	3H Thymidine triphosphate in a glass vial	50-ml Falcon tube	981001	in doubled black plastic bag	24
1	88	³ H	<1mCi	1000	Liquid	3H Thymidine in a glass vial	Plastic container	891104	in doubled black plastic bag	36
1	9	none	0 µCi	0	Liquid	Background	20-ml glass vial	090619-7	9-12 are in a plastic box	
1	10	none	0 µCi	0	Liquid	Background	20-ml glass vial	090619-7	9-12 are in a plastic box	
1	Total			1251.5						
2	58	¹⁴ C	<100 µCi	100	Solid	Desiccator with an 8-oz funnel, a small mortar, paper towels, a glass	none			
2	59	⁶³ Ni	<1 µCi	1	Solid	Tygon tubing	Plastic bag	020109		
2	60	¹⁴ C	<100uCi	100	Solid	Plastic tube	Plastic bag	090619-3		
2	61	³ H	~50 µCi	50	Solid	Plates, gloves, bench covers, paper towels, etc.	Plastic trash bag	040802		
2	62	³ H	150 µCi	150	Solid	Plates, gloves, bench covers, paper towels, pipet tips, etc.	Orange plastic bag	0208		
2	63	³ H	<0.5 µCi	0.5	Solid	Plates, plastic bags, gloves	Plastic trash bag	051201		
2	64	³ H	<0.5 µCi	0.5	Solid	Plates, pipet tips, paper towels, lab mat, gloves, etc.	Plastic trash bag	071001		
				201						
3	56	¹⁴ C	<20 µCi	20	Slurry	Pineapple waste	Plastic bag	073002		
3	48	¹⁴ C	<2 µCi	2	Solid	Gloves, empty glass bottles, etc.	Plastic bag	070101		
3	54	¹⁴ C	<200 µCi	200	Solid	Twelve 50-ml brown glass screwed cap bottles Ac-GL0367-5A 1x rat	Ziploc bag	97-1125		
3	55	¹⁴ C	<4 mCi	4000	Solid	Twelve 50-ml brown glass screwed cap bottles Ac-GL0367-5A 20x rat	Ziploc bag	97-1125		
3	57	¹⁴ C	<200 µCi	200	Solid	Empty glass volumetric bottles, glass plate, plastic and glass vials	Paper box			
3	50	³ H	<0.5 µCi	0.5	Solid	Plates, gloves, bench covers	Plastic bag	040601		
3	51	³ H	1 µCi	1	Solid	96-well plates, paper towels, gloves, pipet tips, etc.	Plastic trash bag	060601		
3	52	³ H	<0.5 µCi	0.5	Solid	Plates, gloves, bench, etc.	Plastic trash bag	041203		
3	53	³ H	<0.1 µCi	0.1	Solid	Gloves, plastic cups, pipet tips	Plastic bag			
				2.1						
4	16	³ H	<200 µCi	200	Solid with residual liquid	96-well plates, paper towels, gloves, etc.	Three black plastic trash bags	031101, 061101, 050101		
5	18	¹⁴ C	<1 µCi	1	Solid	Paper towels, gloves, plastic dry waste	Plastic trash bag	991029		
5	19	³ H	45 µCi	45	Solid	96-well plates, paper towels, gloves, pipet tips, tubes, vials, etc.	Plastic trash bag	030701		
5	20	³ H	300 µCi	300	Solid	96-well plates, paper towels, gloves, pipet tips, tubes, vials, etc.	Orange plastic bag	030601		
5	23	³ H	~5 µCi	5	Solid	96-well plates, paper towels, gloves, glass jar, etc.	Plastic trash bag	040301		
5	24	³ H	<0.5 µCi	0.5	Solid	96-well plates, paper towels, gloves, pipet tips, etc.	Plastic trash bag	071002		
5	25	¹⁴ C	<1 µCi	1	Solid	Paper towels, gloves, Pasteur pipets, plastic tubes, dry waste	Plastic trash bag	040302		
				350.5						
6	38	¹³⁷ Cs	8 µCi	8	Solid	Red disc	Plastic box		#38 contains both ⁶⁰ Co & ¹³⁷ Cs in the same box, #27-40 in a cardboard box	
6	34	¹⁴ C	1860.8 dpm	0.000838	Liquid	30ml liquid ACN	50-ml brown glass bottle		#27-40 in a cardboard box; =1,860.8/2,220,000 = 0.0008 µCi	
6	39	¹⁴ C	<8.74 µCi	8.74	Liquid	10 ml in acetonitrile	30-ml brown glass bottle in Ziploc bag		#27-40 in a cardboard box	
									liquid in glass tubes in calibration cell inside plastic box with foam	
6	40	¹⁴ C	<0.1 µCi	0.1	Liquid	calibration cell			#27-40 in a cardboard box	
6	31	¹⁴ C	<8.38 µCi	8.38	Solid	Empty 20-ml brown glass vials	Ziploc bag	090619-7	#27-40 in a cardboard box	
6	32	¹⁴ C	<0.1 µCi	0.1	Solid	Paper towels and other dry wastes	Plastic bag	040803	#27-40 in a cardboard box	
6	33	¹⁴ C	<100µCi	100	Solid	White round "donut"	Plastic box		#27-40 in a cardboard box	
6	36	¹⁴ C	<1860.8 dpm	0.000838	Solid	Empty brown bottle with no lid	None		#27-40 in a cardboard box	
6	37	¹⁴ C	0.148 µCi	0.148	Solid	Blue disc	Plastic box with foam		#27-40 in a cardboard box	
6	43	¹⁴ C	<100µCi	100	Solid	Metal box	Clear plastic bag	090619-6		
6	45	¹⁴ C	<100µCi	100	Solid	Plastic tubing, gloves, paper towels, plastic box, tubes, forceps, "Radio Active" sign, etc.	Clear plastic bag			
"7"	66	¹⁴ C	<0.1 µCi	0.1	Solid	Trash compactor, wooden board (~17"Wx25"Dx35"H) wrapped in cardboard, thin boards in plastic trash bag	Heavy black plastic bag			
				317.5697						
6	26	³ H	~50 µCi	50	Solid	96-well plates, paper towels, gloves, pipet tips, etc.	Plastic trash bag	020501		
6	35	³ H	250 mCi	15600	Solid	Metal fitting, serial number 256 [possibly old ECD]	Plastic box with foam		#27-40 in a cardboard box, "H3 adsorbed on Tri, 7/74 01-46-00 sn 256"	
6	41	³ H	<100µCi	100	Solid	96-well plates, gloves, 600-ml plastic beaker, 500-ml plastic bottle, metal rack (Filtermate) scissors, etc.	Plastic trash bag			
6	42	³ H	<1 µCi	1	Solid	96-well plates, gloves, 50-ml glass beaker, empty glass bottle, etc.	Plastic trash bag	090619-4		
6	44	³ H	<100µCi	100	Solid	Plates	Plastic trash bag in cardboard box			
6	38	⁶⁰ Co	1750 dpm	0.000788	Solid	Metal disc Tracerlab1-30-8?	Plastic box		#38 contains both ⁶⁰ Co & ¹³⁷ Cs in the same box, #27-40 in a cardboard box; =1,750/2,220,000 =0.0008 µCi	
6	27	⁶³ Ni	15 mCi	15000	Solid	Tracor Electron capture detector, S/N 4333	Plastic bag	090619-7	#27-40 in a cardboard box; model:111019-001, date: 2-26-8	
6	28	⁶³ Ni	10 mCi	10000	Solid	Tracor Electron capture detector, S/N 2204	None	090619-7	#27-40 in a cardboard box	
6	29	⁶³ Ni	10 mCi	10000	Solid	Tracor Electron capture detector, S/N 2206	Plastic bag	090619-7	#27-40 in a cardboard box; boilerplate label is illegible, 15 mCi entered as this is the max per HARC's license	
6	30	⁹⁹ Tc	211,400 dpm	0.095225	Solid		Wooden box	090619-7	#27-40 in a cardboard box; =211,400/2,220,000 = 0.095 µCi	
				15851						
				40.674	Total, µCi					