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Tritium Laboratory
6 March 2024

SWAB REPORT # 1082

SWAB DATE: 3 March 2025

R/V F.G. Walton Smith
Radioisotope Van #625.3.08

James Happell Digitally signed by James Happell
Date: 2024.03.10 11:00:55 +07'00'

James D. Happell

Distribution:
SWAB Committee
Don Cucchiara
Clay Dundas

COMMENTS TO SWAB REPORTS 15 December 2021

The LSC is now a Quantulus GCT 6220, with the SWAB counting assay having background cpm of 0.3 & 1.2 for ^{3}H & ^{14}C. This replaces an LSC with background cpm of 1.6 & 5.5 for ^{3}H & ^{14}C.

All samples are counted for 60 minutes, the instrument background is subtracted, and activities are reported in dpm/m^2. Bucket blank activities are not subtracted. Counting errors (2 standard deviations) are also reported in dpm/m^2. An error larger than the activity indicates that the activity is not significantly different from zero. All activities significantly above background will be in **bold**.

Criteria for SWAB Results

Category	^{3}H (dpm/m^2)	^{14}C (dpm m^2)	Recommendations
A	<500	<50	No action
B*	500-10,000	50-10,000	Needs cleaning before any natural tracer work. Decks in radiation vans with activities above 1000 dpm/m^2 should be cleaned.
C**	10,000-100,000	10,000-50,000	Must be cleaned before any use.
D***	>100,000	>50,000	May be a health hazard. Notify local radiation safety official.

Note: ^{14}C and ^{35}S have peak energies of 156 and 167 KeV, respectively; thus ^{35}S will be registered as ^{14}C by our counting techniques. Categories A, B and C are not a health hazard.

Recommended Cleaning Proceedure

Wearing ordinary household rubber gloves:

^{3}H: Wash and scrub with radioactive cleanup detergent such as COUNT-OFF (50 ml COUNT-OFF to 4 liters of water), using sponges to distribute solution and reabsorb it.

^{14}C: Wash with 1% sulfuric or 2% hydrochloric (muriatic) acid with good ventilation (will dissolve carbonates, releasing $^{14}CO_2$). Follow up with wash as if for ^{3}H.

Disposal of Cleaning Materials (gloves, sponges, etc)

Categories A & B dispose as ordinary garbage, C & D contact your institution's radiation safety office.

Note: If category C or D is encountered, we try to notify the insitution promptly by phone or email.

REPORT FOR SWAB # 1082

LOCATION: Miami, FL
VESSEL: *R/V F.G. Walton Smith*

DATE: 3 March 2024
TECHNICIAN: Charlene Grall

Sample #	Sample Identification	^{3}H dpm/m^{2} activity	±	error	^{14}C dpm/m^{2} activity	±	error
1	1st Vial Bkgnd	0	±	0	0	±	0
2	Initial bucket blank	43	±	22	17	±	10
	Main Lab (Figure 1)						
3	Benchtop port of sink	-404	±	27	**4533***	±	**89**
4	Aft port benchtop	-33	±	13	**243***	±	**23**
5	Port benchtop between port stateroom entrances	-13	±	7	**136***	±	**19**
6	Deck inside door to wet lab	-7479	±	97	**107996*****	±	**432**
7	Deck inside mess hall	-1048	±	36	**15222****	±	**161**
8	Deck inside forward starboard stairs	-1039	±	37	**15081****	±	**161**
9	Deck inside forward port stairs	-702	±	31	**9697***	±	**129**
10	Deck between starboard and center benchtop	-5312	±	80	**79923*****	±	**368**
11	Deck between port and center benchtop	-3543	±	65	**53952*****	±	**302**
12	Deck below sink	-6040	±	95	**75809*****	±	**364**
13	Port side of center benchtop	-33	±	273	**75***	±	**16**
14	Starboard side of center benchtop	-26	±	519	**56***	±	**15**
15	Starboard benchtop	-144	±	13	**2179***	±	**62**
	Wet Lab (Figure 1)						
16	Inside Haier freezer top	5	±	8	19	±	13
17	Inside Haier refrigerator bottom	-28	±	0	21	±	14
18	Deck in center of lab	-67071	±	294	**971213*****	±	**1263**
19	Benchtop port of forward sink	-11	±	1	**968***	±	**42**
20	Benchtop port of aft sink	-13	±	5	**177***	±	**21**
21	Top of Haier chest freezer	-26	±	5	**512***	±	**32**

Sample #	Sample Identification	^{3}H dpm/m^{2} activity	error	^{14}C dpm/m^{2} activity	error
	Radioisotope Van 625.3.08 (Figure 2)				
22	Inside undercounter freezer	19	± 9	**85***	± **16**
23	Inside undercounter refigerator	20	± 8	**132***	± **19**
24	Stainless benchtop adjacent to LSC	-82	± 10	**1415***	± **51**
25	Top of LSC	-60	± 11	**661***	± **36**
26	Inside and beside fume hood	25	± 4	**618***	± **34**
27	Sink area	687	± 59	**784***	± **37**
28	Deck between LSC and fume hood	-14158	± 506	**25936****	± **244**
29	Deck in front of refrigerator and freezer	-73009	± 1237	**118181*****	± **532**
30	Deck outside van entrance	-19754	± 637	**32725****	± **278**
31	Final bucket blank	-17	± 0	20	± 13

Comments

Please note that the error reported for each isotope is the two-standard deviation counting error. Reports may now contain values less than zero. Decay counting background samples will be distributed about the background vial, which means that negative values are possible. In the past we rounded the negative values to zero. Values are only significantly above background when they are positive and larger than the error. Please note that we are now using a Quantulus 6220 LSC which counts very near natural background. While the cleanup standards have not changed all values above background will now be in bold. Nearly every area SWAB tested inside the ship was contaminated with ^{14}C or ^{35}S at minor to high levels The deck areas had the largest contamination, expecially the deck of the Wet Lab. Similar patterns of contamination were observed in the rad van. Samples containing ^{14}C were being acidified in the fume hood of the rad van to convert ^{14}C to $^{14}CO_2$ which is then released. During this process it was noticed that the fume hood was not functioning. After this incidence wipe tests of surfaces in the rad van were above background. Cleanup proceedures were undertaken until wipe tests were no longer above background.
It appears from SWAB testing that contamination was tracked from the rad van on peoples shoes and then spread into the ship. The contamination SWAB observed could be related to the non-functiong fume hood.
^{14}C and ^{35}S have very similar beta decay energy and are very hard to distingush on the LSC.
We will wait 90 days (^{35}S half-life is 88 days) and count the samples again. This will give us a better idea of which isotope was tracked into the ship. If it was ^{35}S there will be a significant decrease in activity.
Large negative ^{3}H counts were seen in samples with large positive counts in the ^{14}C channel. This is probaly due to the LSC software over correcting for the spill down of the large counts in the ^{14}C channel into the ^{3}H channel. The contaminated areas inside the ship need to be cleaned. This is one of the largest contamination events inside a ship in the history of the SWAB program. More investigation on how this occurred is strongly encouraged. Additional SWAB samples from the Walton Smith have been collected. The results from those samples will be released in another report.

Figure 1
SWAB #1082
3 March 2024

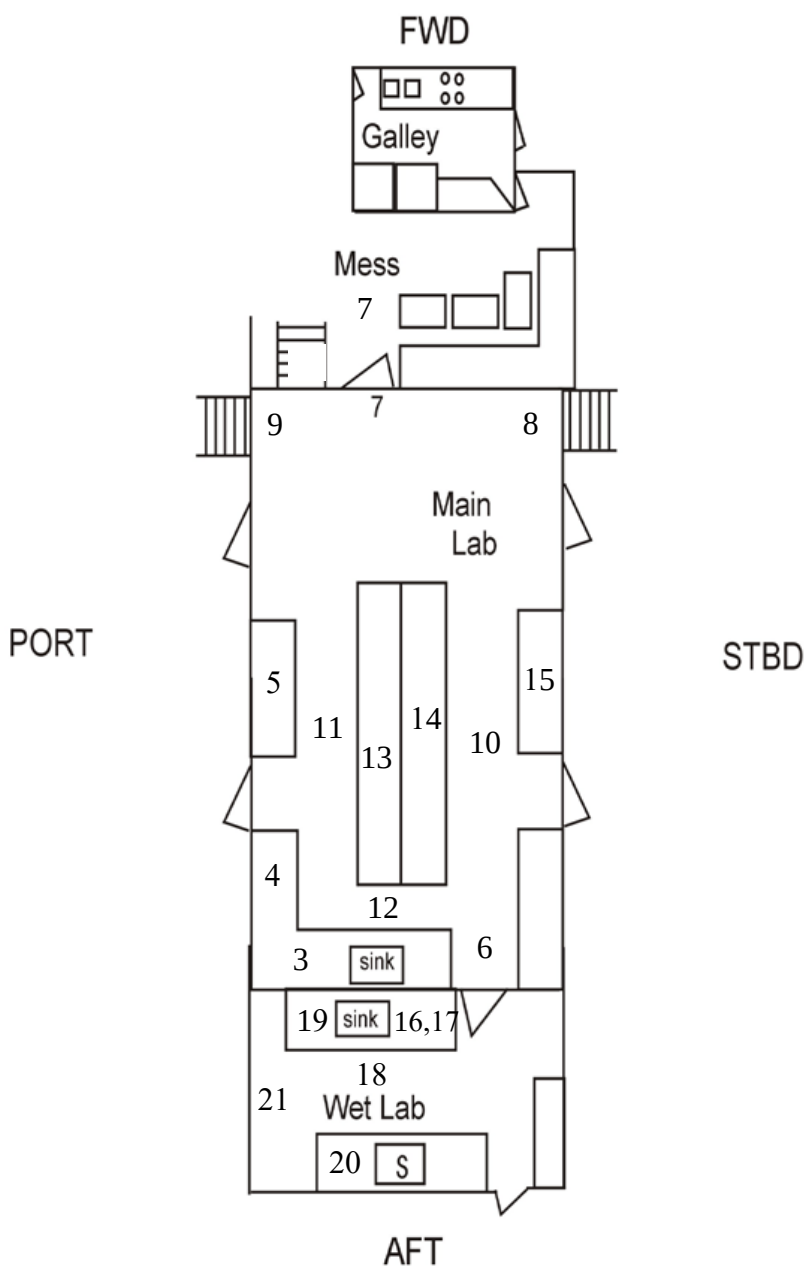

Figure 2
SWAB # 1082
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UNOLS Rad Van 625.3.08