SWAB REPORT # 1017

SWAB DATE: 26 October 2021

R/V Atlantic Explorer and Van #625.5.02

James Happell
Digitally signed by James Happell
Date: 2021.11.01 17:25:16 -04'00'

Dr. James D. Happell
Associate Research Professor

Distribution:
SWAB Committee
Quentin Lewis
Rod Johnson
Typical LSC instrument background values for $^3$H and $^{14}$C are 2 and 5 cpm, respectively. The LSC is a Tricarb 2910 TR with the low level counting option.

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.

### Criteria for SWAB Results

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

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 Procedure

- **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 institution promptly by phone or email.
## Report for Swab #1017

**Location:** St. Georges, Bermuda  
**Date:** 26 October 2021  
**Vessel:** R/V Atlantic Explorer  
**Technician:** Charlene Grall

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Sample Identification</th>
<th>$^3$H dpm/m$^2$ Activity</th>
<th>Error</th>
<th>$^{14}$C dpm/m$^2$ Activity</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Vial Bkgnd</td>
<td>0 ± 0</td>
<td>0</td>
<td>0 ± 0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Initial bucket blank</td>
<td>13 ± 109</td>
<td>14</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

### Aft Lab (Figure 1)

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Sample Identification</th>
<th>$^3$H dpm/m$^2$ Activity</th>
<th>Error</th>
<th>$^{14}$C dpm/m$^2$ Activity</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Inside fume hood</td>
<td>-19 ± 289</td>
<td>26</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Deck in front of fume hood</td>
<td>-12 ± 185</td>
<td>-17</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Forward benchtop</td>
<td>-6 ± 86</td>
<td>3</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Benchtop forward of sink</td>
<td>-1 ± 11</td>
<td>-25</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Port sink area</td>
<td>20 ± 273</td>
<td>-40</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Deck below -80 °C freezer #2</td>
<td>-1 ± 42</td>
<td>7</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Inside DEAD Cospolich refrigerator</td>
<td>-14 ± 211</td>
<td>-6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Inside LIVE Cospolich refrigerator</td>
<td>-11 ± 169</td>
<td>-34</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Deck at forward entrance</td>
<td>13 ± 125</td>
<td>-20</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Center benchtop</td>
<td>-3 ± 47</td>
<td>-20</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Deck below sink area</td>
<td>-17 ± 256</td>
<td>-16</td>
<td>93</td>
<td></td>
</tr>
</tbody>
</table>

### Forward Lab (Figure 1)

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Sample Identification</th>
<th>$^3$H dpm/m$^2$ Activity</th>
<th>Error</th>
<th>$^{14}$C dpm/m$^2$ Activity</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Starboard side of forward benchtop</td>
<td>-7 ± 101</td>
<td>-3</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Port side of forward benchtop</td>
<td>11 ± 2</td>
<td>-26</td>
<td>148</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Port benchtop forward of sink</td>
<td>-15 ± 236</td>
<td>-7</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Port benchtop aft of sink</td>
<td>9 ± 76</td>
<td>-9</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Port sink area</td>
<td>-24 ± 363</td>
<td>-9</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Center benchtop</td>
<td>-25 ± 380</td>
<td>-8</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Deck inside starboard entrance</td>
<td>-2 ± 31</td>
<td>-11</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Deck inside aft entrance</td>
<td>-4 ± 65</td>
<td>-2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Deck in front of sink</td>
<td>-4 ± 57</td>
<td>-31</td>
<td>173</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Deck inside Enviro Room</td>
<td>-1 ± 15</td>
<td>-22</td>
<td>126</td>
<td></td>
</tr>
</tbody>
</table>

### Main Lab (Figure 1)

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Sample Identification</th>
<th>$^3$H dpm/m$^2$ Activity</th>
<th>Error</th>
<th>$^{14}$C dpm/m$^2$ Activity</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Deck inside forward entrance</td>
<td>-12 ± 188</td>
<td>-8</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Port sink area</td>
<td>-21 ± 322</td>
<td>-20</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Center benchtop opposite of sink</td>
<td>4 ± 62</td>
<td>-3</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Deck inside aft entrances</td>
<td>35 ± 76</td>
<td>-31</td>
<td>176</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Benchtop adjacent to laminar flow hood</td>
<td>13 ± 155</td>
<td>-22</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Port benchtop forward of sink</td>
<td>11 ± 210</td>
<td>-20</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td>Sample #</td>
<td>Sample Identification</td>
<td>(^3)H dpm/m²</td>
<td>(^{14})C dpm/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------</td>
<td>------------------</td>
<td>--------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>activity error</td>
<td>activity error</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Port benchtop aft of sink</td>
<td>10 ± 116</td>
<td>-15 ± 83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Starboard Benchtop</td>
<td>0 ± 8</td>
<td>-19 ± 105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Intermediate bucket blank</td>
<td>-34 ± 526</td>
<td>-18 ± 104</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Radiation Van #625.5.02 (Figure 2)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Sink area</td>
<td>26 ± 37</td>
<td>17 ± 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Benchtop adjacent to sink</td>
<td>156 ± 57</td>
<td>-8 ± 775</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Benchtop adjacent to fume hood</td>
<td>21 ± 52</td>
<td>-6 ± 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Inside fume hood and adjacent benchtop</td>
<td>69 ± 52</td>
<td>-8 ± 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Top of LSC</td>
<td>57 ± 67</td>
<td>-31 ± 65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Inside freezer</td>
<td>-3 ± 41</td>
<td>-5 ± 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Inside refrigerator</td>
<td>506* ± 72</td>
<td>46 ± 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Benchtop adjacent to LSC</td>
<td>8 ± 120</td>
<td>-26 ± 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Deck in front of and below fume hood</td>
<td>86 ± 50</td>
<td>6 ± 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Deck between LSC and freezer</td>
<td>113 ± 55</td>
<td>-6 ± 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Deck inside entrance</td>
<td>108 ± 50</td>
<td>18 ± 28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Final bucket blank</td>
<td>-10 ± 152</td>
<td>-26 ± 14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

Please note that the error reported for each isotope is the two-standard deviation counting error. The reports may now contain values less than zero. When 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. All areas tested on the ship were free from isotope contamination that requires cleaning. Minor \(^3\)H contamination was detected in the radioisotope van but no action is necessary.
Figure 2
SWAB #1017
26 October 2021