

Title: Survey of Radiation Levels in Commercial Canned Tuna

Performed By: Silver Botanicals, Inc.

Date: October 25, 2014

Location: Austin, Texas

Purpose

The purpose of this work is to measure radioactivity levels of a variety of commercial, canned tuna fish purchased in Austin, Texas in October of 2014.

Equipment & Materials

Geiger Counter (Images Scientific Instruments Model#GCA-07) – Calibration Certificate Date: 1/17/14

Canned Tuna Fish Samples

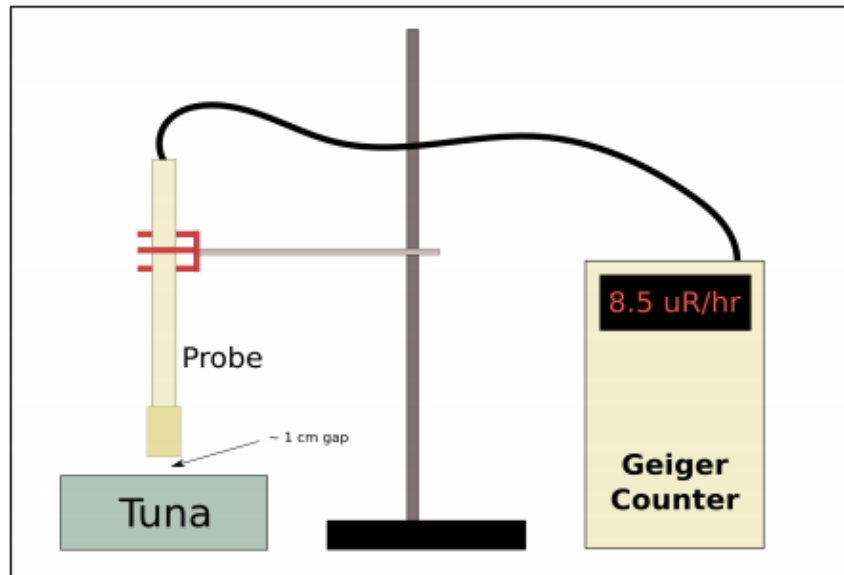
Radiation Measurement Setup

Radiation Check Standard

Can Opener

Setup

Figure 1: Radiation Measurement Setup



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Setup**Figure 1: Radiation Measurement Setup**

Experimental

12 cans of tuna fish (in water) were purchased in Austin, Texas. Cans contained approximately 4 oz. of canned tuna and were packaged in steel cans. Each can was given a sample ID number and its manufacturer, lot number, and “Best By” date recorded (see Table 1). All radiation measurements were made using our testing setup (Figure 1). Measurements were made over a 60-second period and are reported in mR/hr. Prior to measuring tuna samples, five measurements were made with no samples present i.e. background measurements. These measurements, along with historical background measurements, were used to determine a minimum detection limit for aberrant radiation (3sigma detection limit). The sensitivity of the instrument was verified by taking measurements of a known radiation source (uranium ore) and verifying radiations levels within limits of historical data for the standard. For each sample, three, opened-canned measurements were recorded and an average and standard deviation calculated. Background and check standard measurements were made prior, during, and after the samples' analysis.

Table 1: Sample IDs and Information

| Sample/ Can # | Product | Tuna Type | Lot # | “Best By” Date |
|------------------|---|----------------|---|-------------------|
| 1 | BumbleBee – Very Low Sodium – Solid White Albacore | Albacore | 4132S03SKB 09:52 | 5/12/17 |
| 2 | Safeway Kitchens Chunk Light Tuna | Not Identified | SWY 135CDNSOLA AOCJEG F B 18:29 S3521 | 10/3/15 |
| 3 | BumbleBee – Solid White Albacore | Albacore | 4211SCDSKP 23:40 | 7/30/17 |
| 4 | Wild Selections – Solid White Albacore | Albacore | 3225SD2SMN 10:28 | 7/18 |
| 5 | Sustainable Seas – Solid White Albacore | Albacore | HDASB918N | 7/18 |
| 6 | Chicken of the Sea – Chunk Light Tuna | Not Identified | 41350CBDCLP 00:00 | 5/15/17 |
| 7 | StarKist – Chuck Light Tuna | Not Identified | 4 204 SM DB CJWH6 09:09 | 7/23/18 |
| 8 | Sustainable Seas – Solid Light Tuna – No Salt Added | Not Identified | HDJSW 96 18N | 6/26/16 |
| 9 | StarKist – Solid White Albacore | Albacore | 4 140 SM FB SAWH5 08:99 | 5/20/18 |
| 10 | Chicken of the Sea | Albacore | 4155CCBSKP 17:29 | 6/4/17 |
| 11 | Wild Planet - Wild Skipjack Light Tuna | Skipjack | HDJNS 13 11 01 A | 11/1/16 |
| 12 | Safeway Kitchens Solid White Albacore | Albacore | SWY 13ASDNS20BA | 1/29/17 |

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Table 1: Sample IDs and Information

| Sample/ Can # | Date |
|--|------|
| Product Tuna Type Lot # “Best By” | |
| BumbleBee – Very Low Sodium – Solid | |
| White Albacore | |
| Albacore 4132S03SKB 09:52 5/12/17 | |
| 2 Safeway Kitchens Chunk Light Tuna Not | |
| Identified | |
| SWY 135CDNSOLA AOCJEG F B 18:29 S3521 | |
| 10/3/15 | |
| 3 BumbleBee – Solid White Albacore Albacore 4211SCDSKP 23:40 7/30/17 4 Wild Selections – Solid White Albacore Albacore 3225SD2SMN 10:28 7/18 5 Sustainable Seas – Solid White Albacore Albacore HDASB918N 7/18 6 Chicken of the Sea – Chunk Light Tuna Not | |
| Identified | |
| 41350CBDCLP 00:00 | |
| 5/15/17 | |
| 7 StarKist – Chuck Light Tuna Not | |
| Identified | |
| 4 204 SM DB CJWH6 09:09 | |

7/23/18

8 Sustainable Seas – Solid Light Tuna –
No Salt Added

Not Identified

HDJSW 96 18N 6/26/16

9 StarKist – Solid White Albacore Albacore 4 140 SM FB

SAWH5 08:99

5/20/18

10 Chicken of the Sea Albacore 4155CCBSKP 17:29 6/4/17 11 Wild Planet - Wild
Skipjack Light Tuna Skipjack HDJNS 13 11 01 A 11/1/16 12 Safeway Kitchens Solid
White Albacore Albacore SWY

13ASDNS20BA

1/29/17

Data**Table 2: Radiation Analysis Data**

| Sample ID | Average Measurement (mR/hr) | Standard Deviation |
|----------------|-----------------------------|--------------------|
| Background | 11.9 | 5.7 |
| Check Standard | 115.0 | 11.8 |
| Can#1 | 6.1 | 2.9 |
| Can#2 | 13.9 | 5.5 |
| Can#3 | 8.0 | 2.5 |
| Can#4 | 10.5 | 2.5 |
| Can#5 | 13.3 | 1.4 |
| Can#6 | 9.7 | 1.9 |
| Background | 11.9 | 1.9 |
| Check Standard | 120.8 | 9.4 |
| Can#7 | 7.2 | 1.3 |
| Can#8 | 9.4 | 1.3 |
| Can#9 | 8.6 | 5.3 |
| Can#10 | 9.4 | 1.3 |
| Can#11 | 8.6 | 5.3 |
| Can#12 | 12.5 | 2.5 |
| Background | 10.5 | 3.3 |
| Check Standard | 107.7 | 11.2 |

Results & Discussion

Using background measurements, a minimum detection limit (MDL) was determined. The MDL represents the the minimum detectable signal that can be statistically shown to be outside of normal background radiation levels. For this analysis, the MDL was found to be 25.4 mR/hr. This is in close agreement with Texas Department of Health State Services background levels for Texas of around 34 mR/hr. All background (blank) and check standards measured before, during, and after the analysis were within expected ranges. For all tuna samples measured, none were found to have radiation levels above the MDL. Therefore, it has been found that all tuna fish samples did not exhibit radiation levels outside of normal background radiation.

Data**Table 2: Radiation Analysis Data**

**Sample ID Average Measurement (mR/hr) Standard Deviation Background 11.9
5.7 Check Standard 115.0 11.8**

Can#1 6.1 2.9 Can#2 13.9 5.5 Can#3 8.0 2.5 Can#4 10.5 2.5 Can#5 13.3 1.4 Can#6
9.7 1.9 Background 11.9 1.9 Check Standard 120.8 9.4 Can#7 7.2 1.3 Can#8 9.4 1.3
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