

Preliminary Results of a Radiation Survey
Conducted on Matagorda Island, Calhoun County,
Texas



**Survey Conducted by the Texas Natural Resource
Conservation Commission Emergency Response Program on
June 3 to June 6, 2002**

Radiation Monitoring on Matagorda Island

Introduction

On June 3-6, 2002, the TNRCC Emergency Response (ER) Staff accompanied the ER Program Contractor (Boots and Coots) to recover abandoned containers of hazardous and unknown waste on Matagorda Island. Prior to recovery, each container was monitored with a radiation detection instrument to determine whether the container contained radioactive material/waste. No drums of radioactive material/waste were found, however, random radiation surveys showed high levels of gamma radiation in some portions of the beach. High levels of gamma radiation appeared to be in areas between the wet sand and the sand dunes on the north end of the island (between beach access roads 1 and 2 and with some isolated areas up to the “J Hook” on the North end of the island). These levels ranged between approximately 12-52 Micro Roentgen (μR) per hour (hr) and were 3-13 times background level of approximately 4 $\mu\text{R/hr}$. A background radiation level was measured at the State Park Island Headquarters on the bay side of the island. A Ludlum Micro R meter, Model 19, was used to perform the surveys.



Sample Collection

The TNRCC staff collected 3 soil/beach sand samples. Samples 1 and 2 were collected from areas with elevated readings. Sample No.3 was collected from an area with background radiation level. In addition, two water samples (non-potable well water) were collected from a faucet inside the State Park Island Headquarters.



The sand samples were submitted to the Texas Department of Health (TDH), Bureau of Laboratories in Austin, Texas and analyzed for radiological parameters. The water samples were submitted to the laboratory for radiological, metals, and non-metals analyses.

Sample Results

Note: Results for the water samples have not been received from the TDH laboratory as of the date of this report.

The results of sand samples are shown below. Results are in microcurie (μCi) per gram. However, because the radium -226 (Ra-226) concentrations in samples 1 and 2 are several times the cleanup standards, the results of radium-226, gross alpha, and gross beta are also shown in picocurie (pCi) per gram (g).

Note: Curie is a measure of radioactivity
 $1 \mu\text{Ci} = 10^{-6}$ curie
 $1 \text{ pCi} = 10^{-12}$ curie
Ra-226 cleanup standards are 5 pCi/g), averaged over the first 15 centimeters of soil below the surface and 15 pCi/g), averaged over each 15 centimeters thick layer of soil below the first 15 centimeters below the surface

SAMPLE No. 1

Gamma scan

Thallium (Tl)-208	$8.8 \times 10^{-6} \pm 3 \times 10^{-7}$	
Bismuth (Bi)-212	$1.5 \times 10^{-5} \pm 1 \times 10^{-6}$	
Lead (Pb)-212	$9.0 \times 10^{-6} \pm 5 \times 10^{-7}$	
Bismuth (Bi)-214	$3.5 \times 10^{-5} \pm 1 \times 10^{-6}$	
Lead (Pb)-214	$2.5 \times 10^{-5} \pm 1 \times 10^{-6}$	
Radium (Ra)-226	$5.6 \times 10^{-5} \pm 5 \times 10^{-6}$	56 pCi/g
Actinium (Ac)-228	$2.4 \times 10^{-5} \pm 1 \times 10^{-6}$	
Uranium (U)-238	$6.8 \times 10^{-6} \pm 1.2 \times 10^{-6}$	

Gross alpha
 $4.1 \times 10^{-4} \pm 4.4 \times 10^{-5}$ (410 pCi/g)
Gross beta
 $2.12 \times 10^{-4} \pm 1.2 \times 10^{-5}$ (212 pCi/g)
SAMPLE No. 2**Gamma scan**

Thallium (Tl)-208	$7.8 \times 10^{-6} \pm 3 \times 10^{-7}$	
Bismuth (Bi)-212	$1.5 \times 10^{-5} \pm 2 \times 10^{-6}$	
Lead (Pb)-212	$1.0 \times 10^{-5} \pm 1 \times 10^{-6}$	
Bismuth (Bi)-214	$3.1 \times 10^{-5} \pm 1 \times 10^{-6}$	
Lead (Pb)-214	$2.5 \times 10^{-5} \pm 1 \times 10^{-6}$	
Radium (Ra)-226	$6.2 \times 10^{-5} \pm 7 \times 10^{-6}$	62 pCi/g
Actinium (Ac)-228	$2.2 \times 10^{-5} \pm 1 \times 10^{-6}$	
Uranium (U)-238	$8.6 \times 10^{-6} \pm 1.7 \times 10^{-6}$	

Gross alpha
 $4.02 \times 10^{-4} \pm 4.5 \times 10^{-5}$ (402 pCi/g)
Gross beta
 $2.03 \times 10^{-4} \pm 1.2 \times 10^{-5}$ (203 pCi/g)
SAMPLE No. 3 (Background Sample)**Gamma scan**

Potassium (K)-40	$7.4 \times 10^{-6} \pm 1.1 \times 10^{-6}$
Radium (Ra)-226	$< 3.9 \times 10^{-6}$
Uranium (U)-238	$< 2.1 \times 10^{-6}$

Gross alpha
 $< 1.2 \times 10^{-5}$
Gross beta
 $< 1.2 \times 10^{-5}$
Conclusions

The source and extent of the areas with elevated gamma radiation are currently unknown. These levels should have no significant risk, as long as members of the public are not camping, sleeping, etc. at areas where elevated gamma radiation were detected. However, this is an item of concern and should be addressed and appropriate actions should be taken.

Recommendations

*Conduct further research (historical background, geological info., etc.) to

determine the cause/source of elevated concentrations/readings

*Involvement of appropriate personnel and/or agencies to resolve this issue

*Perform a detailed survey to determine the extent of elevated radiation levels

*Collect more samples if needed, and other solutions as appropriate.

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