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Space and Naval Warfare Systems Center Pacific

Safety Office and Communications Technology Branch

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Introduction

•Communication and Safety are two important parts of a SPAWAR 's world wide effort to create advanced technology. Luis Alcantar is working in the Communication Technology branch, and Alexandro Robles is working in the Safety & Environmental Engineering Branch at SSC Pacific.

• Communicating clearly and being aware of what projects consists of can mean life or death in today's advanced world of technology and warfare. When being safe is as simple as being aware of your surroundings and knowing what area you are entering, good communication might be thwarted through technology.

• The Communications Technology Branch provides free technical assistance to state and local first responders to aid in their communications interoperability improvements.

• Communication is not always possible, and for that reason this branch tests and examines communication devices to ensure that public safety along with the military have the best technology to communicate and enforce safety.

•The Safety & Environmental Engineering Office ensures Occupational Health and Safety compliance for SSC Pacific . Specifically the Safety Office supports a safe and healthy workplace for all personnel. The Navy achieves these conditions through an aggressive and comprehensive program fully endorsed by the Secretary of the Navy(SECNAV) and implemented through the appropriate chain of command.

• The Safety Office issue Personal Protective Equipment (PPE) and provides monitoring and measuring equipment. For the Radiation Safety Program, PPE is part of the spill clean up kits and monitoring and measuring equipment includes alpha, beta,/ gamma, and neutron meters and dosimetry. Showing employees how to use the meters requires practical experience. One half of this project's work promotes hands-on experience for safety employees by working through meter operation and output analysis with a goal of expanding existing capabilities.

Alexandro Robles working with RADIAC instruments to create efficiency determinations.

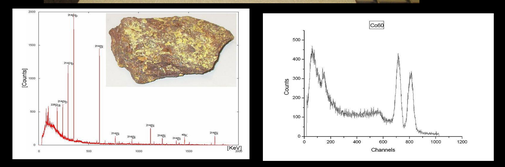
Luis Alcantar setting up a gateway connection with an AC 1000.

Method

• Working with the RSO (Radiation Safety Officer) Alexandro was provided with eight- hour radworker safety training before work began. He was then issued a dosimeter to later verify if any harmful radiation exposure occurred. With the RSO he prepared to test a hypothesis: prompt-reading RADIACs rival cumulative-count ratemeters in performance.

• We worked with a portable RADIAC "frisker" Geiger-Muller (GM) and a "pancake probe" count rate meter. We designed our measurements to supply data for a minimum detectable activity (MDA) equation given in a RADIAC manual. We counted lab standards which have activities in the exempt-size radioactive material (RAM) range. We recorded results. We kept in mind a long range goal of establishing a multichannel analyzer (MCA) capability.

• With an MCA, we could verify the identity of each isotope. An MCA shows you the beta/ gamma energy spectrum of a sample and allows identification by comparing results to known characteristic energy peaks.



Multichannel analyzer- shows you the energy spectrum of a sample and allows identification by characteristic energy peaks.

• Field strength measurements were collected for two handheld radio transmitters. The field strength changes depending on the output power and distance between transmitter and receiver.

• The field strength was measured using different types of receivers (Signal Hawk and PR100), and two different handheld radios were used as transmitters.

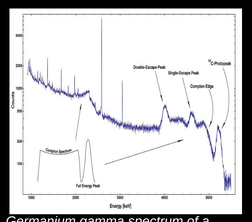
• Two PRC 152 radios and two PRC 148 radios were tested twice at different distances, to ensure that the data collected was consistent.

Signal Hawk Receiver

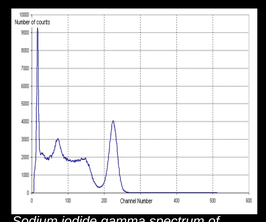
Results

• Our results verified the hypotheses. The portable RADIAC exhibited sensitivity nearly equal to lab measurements for samples in terms of minimum detectable activity - typically 0.005 uCi/100cm^2 = 5 pCi/100cm^2 . Our proof lies in the calculations (provided separately).

• Efficiency is determined for nuclides of concern using check sources with multiple instruments. We took the average of the results to create computations and standard deviations to apply chi square test, and we were then able to assign a +/- value: 35 cpm above background +/-2.5 at 95% certainty.



Germanium gamma spectrum of a radioactive Am-Be-source

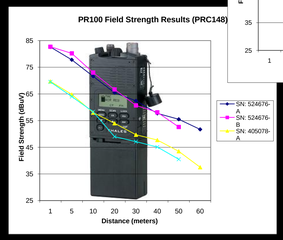


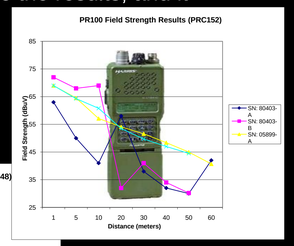
Sodium iodide gamma spectrum of cesium 137

Use of more sophisticated equipment gives you more useful information with regard to peaks which are more visible and counts which are more quantitative. These two differences can be combined to ascertain the activity and the isotopic identity of the material under test

• Both radios had different field strengths when they were both placed in the same distances. Still both radios showed a decay in field strength as the distance increased.

• The PRC 148 radios had a smooth decay on field strength, but the PRC 152 radios had a field strength that was not constant. Also a theoretical curve was calculated to compare the results, and it had a similar slope.





Conclusion

• At the Safety and Communication branches of SPAWAR we worked toward communicating clearly and safely to complete all tasks .We produced Naval, Joint and National knowledge superiority through quality research, development, acquisition, test and evaluation (RDAT&E).

• We enhanced safety and improved communication by successfully testing equipment, and by finding out what the best equipment for the various tasks can contribute to strengthen science and technology research here at SPAWAR.

Acknowledgments

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