

# Committee on Resources

## Full Committee

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### Testimony

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**Statement of Allan C.B. Richardson  
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The People of Enewetak, Republic of the Marshall Islands**

**on May 11, 1999, before the  
Committee on Resources  
Don Young, Chairman  
U.S. House of Representatives**

Mr. Chairman and members of the Committee, thank you for the opportunity to testify on the radiological rehabilitation of atolls in the Marshall Islands. I appear this morning at the request of the Embassy of the Republic of the Marshall Islands. Last October I was retained by the People of Enewetak to advise them on radiological standards for cleanup of their atoll: standards that would assure adequate protection of their future health. Recently I have been asked to similarly assist the People of Bikini. I hope that I can be of assistance in these matters, based on my personal experience in the establishment of major national standards and international guidance for protection of workers and members of the public from radiation for almost thirty years - - at the U.S. Environmental Protection Agency (EPA) from its formation in 1970 until my retirement early last year, as an expert to the International Atomic Energy Agency (IAEA) since the early 1980s, and for the International Commission on Radiological Protection (ICRP) during the 1990s. These standards and guidance have ranged from the current United States standards for workers, standards for environmental releases from the nuclear power industry, and standards for cleanup and disposal of uranium mill tailings, to development of International recommendations for response to nuclear accidents, for exemption of radioactive sources from regulation, and for managing releases of radioactive materials outside national boundaries.

On December 21 of last year the Nuclear Claims Tribunal of the Republic of the Marshall Islands adopted standards that define the degree of cleanup required to bring the radioactively contaminated atolls in the Marshall Islands to an adequate and appropriate level of health protection. My purpose today is to review the rationale that was advanced for that decision and to describe the standard that was adopted. I will not address the specific measures available to achieve it - - those will be described by others in later testimony. The identification of a cleanup standard has been relatively straight-forward. I will address it in two parts: 1) What is the relevant standard for cleanup of similar contamination in the United States and, 2) Is this standard appropriate for use in the Marshall Islands?

### **What standard applies to similar situations in the U.S.?**

The nuclear testing program in the Marshall Islands was the final element in the U.S. program to develop nuclear weapons - - a program that located all of its other elements in the continental United States. The U.S.-based elements involved sites that are now all part of the massive cleanup underway by the U.S.

Department of Energy (DOE). These sites contain more than 99% of the soils and other materials contaminated with man-made radioactivity in the United States. Table 1 provides a summary of the projected volumes of contaminated materials involved in the cleanup at these and at other U.S. sites. The volume of contaminated soils at the DOE sites exceeds that at all other U.S. sites by more than a factor of one hundred. (By way of providing a perspective on these volumes relevant to cleanup of the Marshall Islands, at one site that has already been cleaned up and that is of comparable size to Enewetak (Fernald in Ohio), more than twenty times as much contaminated soil was removed as was removed from all the islands of Enewetak during the 1978-80 partial cleanup. Surprisingly, since doing cleanups at a remote location like Enewetak might be expected to be more costly, the costs in current dollars reflected an almost identical ratio.) These DOE sites comprise the vast majority of all cleanup of man-made radioactivity in the U.S. and they therefore provide the model for how comparable situations are being handled in the United States today.

The cleanup of the DOE sites is being carried out under the oversight of EPA and the host States through the Comprehensive Environmental Restoration, Compensation and Liability Act (CERCLA), commonly known as "Superfund." General criteria for the level of health protection to be achieved in Superfund cleanups were established by regulation in March 1990 (they are codified at 40 CFR in Section 300.430(e)(2)(i)). Under these general criteria all contaminants are treated consistently. This means that radioactive contaminants, which are carcinogens, are not treated as special cases with acceptable risk levels that are different from those required for other carcinogenic materials. The criterion for cleanup of carcinogens is that the lifetime risk to an individual should not exceed  $10^{-4}$ , or about one in ten thousand. In August 1997, EPA issued more detailed guidance for implementing this criterion for radioactive contaminants. Using the dose units common to radiation protection, the criterion was specified as 15 millirems effective dose equivalent per year. This dose level corresponds to a lifetime risk of three in ten thousand, the upper extreme of risk permitted under the regulation.

### **Is this standard appropriate for use in the Marshall Islands?**

The question may be simply restated as whether or not to apply the biblical maxim that one should behave toward others as one would have others behave toward oneself. (Matthew 7:12). The answer - - for radioactive contamination - - has been expressed in a straight-forward manner in guidance issued by the International Atomic Energy Agency (IAEA) in 1985 as Safety Series No. 67, entitled **Assigning a Value to Transboundary Radiation Exposure**. In the Summary and Recommendations, the IAEA states:

*"As a basic principle, policies and criteria for radiation protection of populations outside national borders from releases of radioactive substances should be at least as stringent as those for the population within the country of release."*

The United States was instrumental in founding the IAEA - - it was created in 1957 after a speech by President Dwight D. Eisenhower advocating the establishment of such an agency to promote the peaceful development and safety of nuclear power. Since 1957 the United States has consistently promoted worldwide acceptance of IAEA safeguards and safety standards, and these pronouncements of the IAEA are generally accepted rules and standards in this field that are obligatory as customary international law. In addition, the United States has endorsed the above principle in other areas, such as the Basel Convention, which forbids the disposal of toxic and hazardous materials in foreign countries unless they meet the standards applicable in the country of origin, and an analogous IAEA statement that applies specifically to radioactive wastes. In short, it would be inconsistent with the U.S. initiative that created the IAEA and our

continuous strong support of the IAEA if the United States did not satisfy this IAEA principle when considering our decisions for the Marshall Islands.

Finally, in spite of pressure to do otherwise, the record demonstrates that in past decisions dealing with permission for habitation, as well as the previous incomplete attempts to clean up some of the atolls in the Marshall Islands, the United States has consistently elected to conform to existing U.S. radiation standards and guidance. There is no compelling reason to depart from that precedent now. It is enough to observe that if the contaminated atolls in the Marshall islands were part of the United States, they would be cleaned up under the provisions of CERCLA, under the regulations that apply to all the other elements of the nuclear weapons complex. The Marshallese are entitled to the same level of protection from the radioactive contamination created by the U.S. nuclear weapons program that we provide to U.S. citizens.

The Nuclear Claims Tribunal of the Republic of the Marshall Islands, in a ruling on December 21, 1998, adopted the U.S. standard of 15 millirems per year, based on its concurrence with the above rationale.

### **What are the risks from residual contamination under the standard?**

The standard requires cleanup (or other measures to reduce exposure) that limits the lifetime risk to the reasonably maximum exposed individual to one in three thousand. In simple terms, this means that in a population of 3000 such individuals the most likely result is that one person would be expected to contract cancer (with a two out of three chance of death) over the normal lifetime of that population. In actuality, the risks would be lower, because most of the population is expected to be exposed at less than the reasonably maximum exposure rate. Subsequent populations would also be at risk, but at even lower levels, due to the natural decay of radioactivity. To put this in perspective, the anticipated future populations of atolls like Enewetak and Bikini are estimated to be of the same order of size as the above example, based on the ability of the atolls to support the necessary level of agriculture.

There remains some uncertainty in these risk estimates, above and beyond the scientific uncertainty inherent in risk estimation, due to provisions under EPA's regulations for Superfund that allow for the use of so-called "institutional controls." This is both an important strength and a potential weakness of the standard. Institutional controls are measures that reduce exposure using means that do not remove the contamination, but instead depend on continuing intervention by man to control exposure. An example unique to cleanup of the Marshall Islands is the use of potassium on food crops to suppress uptake of the principle contaminant, radioactive cesium. This control measure has the important advantage that it not only greatly reduces the amount of contaminated soil that must be removed and thereby avoids unnecessary and potentially serious environmental damage, but it also significantly reduces the cost of remediation. The potential weakness is that if this control measure is not carefully maintained until the radioactivity has decayed to safe levels (up to a century in some cases), the risks can be much higher than those permitted by the standard. On balance, due to the fragile ecosystem of the atolls, the net benefit of avoiding unnecessary removal of precious soil appears to greatly outweigh the dangers of failure to maintain institutional control. However, this is a judgment properly made by the inhabitants, who must maintain this control, and who would have to live with the consequences of more drastic alternative forms of remediation.

I hope that these remarks have provided some insight into the basis for the selection of a standard for cleanup of the remaining contamination in the Marshall Islands. Thank you for providing the opportunity to present these comments, and for your attention. I will be pleased to answer any questions that you may have.

Table 1. United States Radiation Contaminated Sites [\(1\)](#)

	Type of radioactive contamination *	Soil volume (cubic meters)
<b>Federal</b>		
DOE sites		
Major sites		
<i>Fernald</i>	AEA	2,100,000
<i>Hanford</i>	AEA	23,600,000
<i>Idaho NEL</i>	AEA	720,000
<i>Nevada Test Site</i>	AEA	16,000,000
<i>Oak Ridge</i>	AEA	133,000
<i>Rocky Flats</i>	AEA	460,000
<i>Savannah River</i>	AEA	19,000,000
<i>Los Alamos</i>	AEA	9,800,000
<i>Weldon Springs</i>	mostly NORM	480,000
Other sites (43)	mostly AEA	480,000
FUSRAP sites (30)	NORM/AEA	1,790,000
DOD sites		
<i>Aberdeen &amp; Bomarc</i>	AEA	21,000
All others (145)	AEA/NORM	?
Other Federal sites (2)	NORM	?
<b>Non-Federal</b>		
NRC sites		
Nuclear power (199)	AEA	32,000
Byproduct licensees (1994)	AEA	60,000
Rare earth mill sites (17)	NORM	120,000
Others under Superfund		

1. Sources: DOE's CERCLA annual report to Congress for FY 1996, DOE/EM-0330 (1997); Linking Legacies, DOE/EM-0319 (1997); Radiological criteria for license termination.,U.S.NRC 62 F.R. 39058-92, July 21, 1997.

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