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## **Statement of Sriram Gopal on Setting Cleanup Standards to Protect Future Generations**

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Hello, my name is Sriram Gopal and I am the Staff Scientist at IEER. The report being presented today traces some of the basic principles of radiation protection and their history. The principal scientific basis for radiation protection has been, and continues to be, to set limits on the maximum allowable exposures to individuals at greatest risk from man-made radiation sources. While the exposures of personnel working on a nuclear site can be measured through the use of film badges, urine monitoring, and other methods, the general public outside of nuclear facilities does not have such protection. As a result, conservative approaches to estimating doses have been developed to protect people offsite. This also serves to limit population dose in most cases.

In the late 50s and early 60s, the Atomic Energy Commission, a predecessor of the Department of Energy, published Chapter 0524 of its official manual which established the first regulations designed to protect offsite populations. To limit offsite doses, the maximum allowable concentrations of radionuclides were specified at the site boundary. The concepts of radiation protection were further refined to establish the concepts of the "critical group" and the "maximally exposed individual." This is a hypothetical offsite person, usually located at or near the site boundary, who would receive the maximum dose from a facility's operations. The International Commission on Radiological Protection defines the critical group as a small, homogenous subset of the general population with characteristics such as lifestyle or diets that would cause them to have higher exposures than the rest of the population. In practice, the maximally exposed individual is a member of the critical group whose exposures are the highest

of the group, and therefore of the entire general population. The idea behind these principles is that if the critical group and the maximally exposed individuals are adequately protected, then the general population will be as well. This is necessarily a statistical concept and does not cover all possible contingencies, but it prevents the general population from getting high radiation doses with a very high degree of probability.

The "subsistence farmer" scenario was developed as an extension of the maximally exposed individual in order to create protection standards for future populations whose habits and lifestyles cannot be predicted. This approach assumes that institutional memory of contamination will be lost and that some people would unknowingly use contaminated water for drinking and growing all of their own food. Further, it assumes that such exposure would last a lifetime, and not just a few years. This is an intentionally conservative, but reasonable, approach designed to give the maximum amount of protection to future populations. If the predicted dose and risk of the subsistence farmer is minimized and is less than allowable limits, it will ensure that the rest of the public is protected as well. It is reasonable because there are subsistence farmers today. Also, many people today prefer to eat locally grown food. The term "subsistence farmer" should not be confused with any connotation of poverty in this regulatory context. A better term would be "self-sufficient farmer."

Some current official proposals for radioactive waste management and cleanup of contaminated sites are discarding the subsistence farmer scenario using the argument that if public access to the contaminated site is prevented, then there will be no need to establish conservative cleanup standards because no one will be exposed. However, it is not realistic to assume that institutional control and public memory will exist long enough to prevent unnecessary exposure to the future public because some of the contaminants in question have half-lives of thousands of years. Conservative approaches to estimating doses have been developed to protect people who have no way of knowing how much individual dose they may be getting. Creating restrictions while the public eye is still on the site is no guarantee that those restrictions will hold for the very long periods of time involved. The historical record does not support such a view.