THE ETHICAL DILEMMA POSED BY OVERLY CONSERVATIVE ENVIRONMENTAL STANDARDS

A. John Ahlquist and Thomas M. Gerusky
Office of Environmental Restoration; EM-46
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20879-1290
USA

The searing introduction of the public to the human health effects from large doses of ionizing radiation came from the nuclear weapon explosions at Hiroshima and Nagasaki, Japan at the end of World War II. The horrors of a war using such weapons are part of the human consciousness. This introduction created fear and concern over ionizing radiation from man-made radionuclides or natural radionuclides enhanced by man's activities. This leads to a public over-emphasis on reducing exposure to man-made ionizing radiation whatever the expense might be. A study that evaluated costs of 500 life saving interventions found that radiation control activities had a median cost of $27 million (US) per life per year and were four of the top ten most expensive [up to $34 billion (US) per life per year]. [Tengs, 1994]

We were personally involved in a cleanup in northwestern Alaska where 1.1E8 Bq (3 mCi) of ^{137}Cs, buried over one meter deep in a mound 51 km from the nearest village, were removed because of fear and mistrust even though there was no physical hazard to anyone from the buried material. In the late 1950's an experiment, called Project Chariot, was proposed under the United States Plowshare Program (peaceful uses of nuclear explosives) to create a harbor along the northwestern coast of Alaska using nuclear explosives to move earth. The nuclear experiment was never conducted. However, as part of the extensive ecological and environmental studies in preparation for the experiment, the United States Geological Survey did tracer experiments in 1962 to determine how fallout radionuclides [total of 9.6E8 Bq (26 mCi) at the time of the experiment] might move through the tundra. At the end of the five day experiment, and in violation of the license authorizing use of the material, the material (contaminated soil, vegetation, wood and plastic) was buried on site in a mound about two meters high. (The material was to have been removed from the site.)

A combination of factors lead to the decision to remove the mound. The mound was re-discovered in September 1992, 30 years after burial. It reminded people of a difficult political battle against Project Chariot that was waged at that time by the local populace as well as a number of other residents in the Alaska. The concern felt in those days was rekindled by this rediscovery. The mound's location in a pristine hunting area, where people are dependent upon hunting, caused significant local concern about contamination of the food supply. The facts that the burial was in violation of the license and that the license permitted 1.85E11 Bq (5 Ci) to be used [although all evidence indicated only 9.6E8 Bq (26 mCi) was used] fueled the public outrage because some felt that the remaining 1.84E11 Bq (4.974 Ci) were used on site and were now missing. Also, the re-discovery occurred two months before a major election. The outrage created pressure on the politicians to act quickly and decisively. The Department of Energy (DOE) accepted the responsibility for subsequent activities. The isolated location meant that investigation, and removal, if necessary, could not proceed along normal investigative lines where surveys and sampling and analysis are followed by a risk assessment and presentations to affected stakeholders before a decision on the appropriate remedial action. The cost of setting up the infrastructure to do the assessment work was so high that the extra cost of doing actual mound removal (which was the only acceptable alternative to the local populace) did not add that much more to the cost. Surveys were done, the mound was removed, and the contaminated soil was shipped to Nevada for burial in five weeks during the summer of 1993. Total costs were around $7 million (US). Fortunately, this work in a harsh environment where the only form of transportation to and from the location was by small aircraft landing on short dirt airfields, was accomplished without any injury to the workers although worker risk was always a prime concern.

This removal is a classic example of what Dr. Peter Sandman, a specialist in risk communication, talks about when he says that risk is the hazard (known to most technical people as the technical risk of probability times consequences), plus the public concern or outrage, i.e.,

$$\text{RISK} = \text{HAZARD} + \text{OUTRAGE}$$

Thus, hazard, or technical risk, can be zero and the "risk" can still be high because of public outrage. [Sandman, 1993] In ethical debates this concept might be framed with the understanding that one cannot divorce ethics from community and the values of that community. Often, the community value on man-made radiological contamination of the environment is not equal to biological likelihood of damage from that contamination. Therein lies the ethical dilemma that confronts many in the radiological protection community. How much effort, time, money and worker risk should be expended to mitigate a non-hazard as understood by the professional? How much better would society be if the money were not spent or were spent on higher priority activities? Most radiation protection professionals have probably confronted this dilemma sometime in their careers.

Another place where this dilemma occurs is in the setting of environmental standards for the cleanup of radionuclide contamination of soil. The United States Environmental Protection Agency is being pressed to set a single risk level for contaminates in soil and is giving consideration to a lifetime cancer risk of 1E-6. When the pathway analysis is done, cleanup is not feasible for a number of radionuclides (such as ^{137}Cs, ^{90}Sr, ^{232}Th) because the calculated concentrations are a fraction of background concentrations or are below detection levels of laboratory instruments. Besides, a risk level of 1E-6 is well below the natural background lifetime risk which ranges from 1E-3 to 1E-2.

It is interesting that for radon, the outrage factor is generally low to non-existent. In areas where the radiation protection professional might urge radon mitigation, the public is often apathetic. Is this because radon is a natural substance and ubiquitous? Or is it because the action falls to the individual and his/her pocketbook and is not something that can be blamed on others? Or, might it be a combination of these factors?

What might be done? As a matter of ethics, radiation protection professionals should speak out wherever the opportunity presents itself. Seek out ways to communicate beyond the typical dry, technical approach always hedging for uncertainty however small.

The United States Congress is currently considering legislation that would make funding for environmental cleanup based on risk. This would mandate that technical considerations be given primacy in funding priorities. This would significantly reduce the dilemma of the radiation protection professional.

The DOE is working diligently on interactions with community and regulatory stakeholders at DOE sites. This has led to some interesting results. At one facility, activists were given play money equal to the budget for environmental restoration and the costs for desired remedial activities and then asked to prioritize activities based on the money available. Various taxes and infrastructure charges were taken away before actual prioritization could begin. Several activists completely changed their positions on their individual items of concern when faced with the decision of how to prioritize across the whole site. At another site, when the activists were given access to areas that were formally off limits, their fears subsided and consequently their opposition to the DOE priorities also subsided. Across the complex, community groups are involved in future land use planning. Their recommendations have often been in favor of recreational and industrial uses for land lightly contaminated with radioactive materials. This mitigates the need to clean up to the more conservative residential-farmer scenario at much larger costs.

Another communication method is to bring in unbiased professors, who are skilled teachers, to teach risk assessment to stakeholders. Courses, given free of charge, have been taught by Dr. Genevieve Roessler (radiation risk) and Dr. Margit von Braun (chemical risk). Attendees have included national laboratory scientists, regulators, DOE staff, and representatives of women's groups, Native American tribes, homeowners associations, Congressional staff, etc. There is an interesting synergism that occurs when this mix of people learns together. Mistrust is replaced by understanding and comraderie. This enables all stakeholders to talk from a common basic technical understanding.

The communication efforts must be strong, deliberate and unending to overcome what we call the information half-life factor. Over time, knowledge of events decays away (similar to radioactive decay) among those who did know and a new generation appears that has no political awareness of past events. Any event that triggers a new wave of concern among those who have forgotten or were unaware of a past event creates a political firestorm which overcomes reasoned debate, as happened in Project Chariot. In new situations, it is better that the public learn of a possible concern by our proactive approach to informing them rather than learning from newspaper headlines or television soundbites.

REFERENCES

Tengs, T.O., et.al., "Five Hundred Life-Saving Interventions and Their Cost Effectiveness" , Center for Risk Analysis, Harvard School of Public Health, Boston, MA, July 1994. (draft report)

Sandman, P.M. "Responding to Community Outrage: Strategies for Effective Risk Communication" American Industrial Hygiene Association, 1993.