

# Cumulative Exposure

## **Topic: Development of Remediation Standards Based on Cumulative Exposure**

### **Description of the issue:**

The terms “cumulative risk” or “cumulative exposure” have different meanings to different parties. From the perspective of remediation of contaminated sites, the term “cumulative exposure risk” has a more narrow and focused definition. In its simplest form, it is the combined or cumulative health risk posed as a result of the exposure to hazardous substances discharged from a site via multiple exposure pathways. Members of the environmental justice community view “cumulative risk” or “cumulative exposure” from a much larger, more holistic, perspective. This would include health risks from not only exposure to contaminants from discharges but also from exposure to asbestos materials in homes, lead based paints, contaminants in food, and exposures from surrounding sources (such as industrial operations in the community as well as general atmospheric pollution). There is strong concern from the Environmental Justice community that the existing standards and remediation goals are not adequately protective when people are exposed to several contaminants at a remediation site, particularly when added to their exposure from other media that have other environmental impacts.

### **DEP’s Current Authority:**

The Brownfield and Contaminated Site Remediation Act, at N.J.S.A. 58:10B-12d, prohibits the Department from developing remediation standards based on the cumulative effects of more than one contaminant at a site. Development of soil remediation standards based on cumulative risk would require a change to the statute.

### **Background:**

The Department’s current Soil Cleanup Criteria and proposed soil remediation standards for direct exposure are based on a single exposure pathway (either ingestion or inhalation – whichever is more stringent). The rationale is if the standard is protective for the more sensitive exposure pathway, it will be protective for the other exposure pathway. Pursuant to the Brownfield and Contaminated Site Remediation Act, the risk management factor to be applied to all soil remediation standards is one in a million ( $1 \times 10^{-6}$ ) excess cancer risk for carcinogens and a hazard quotient of one ( $HQ = 1$ ) for non-carcinogens.

### **Stakeholder comments:**

With regard to the more holistic approach of “cumulative risk”, it was mentioned that the Department’s Policy, Planning and Science group and the Environmental Justice Advisory Council are each developing white papers on this issue. There appeared to be a consensus opinion among the stakeholders that this effort was worthwhile and should not be duplicated by the Site Remediation stakeholder process. There also appeared to be agreement that this issue is complex and that more research is needed to better characterize and understand it.

With regard to the site remediation approach to “cumulative risk”, there were many suggestions but no consensus recommendations. Several stakeholders, including environmental justice advocates, felt that the current approach to developing remediation standards may not be as protective as using a cumulative risk approach and a legislative change is needed to allow consideration of cumulative risk in remediation standards development. Other stakeholders,

## Cumulative Exposure

including those representing the regulated community, thought the current approach resulted in protective remediation standards. These stakeholders felt that if a cumulative risk approach were to be used by the Department, then a strict risk management level of  $1 \times 10^{-6}$  (for carcinogens) would have to be changed to a risk range ( $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ ) as is used by USEPA in the Superfund program. Other stakeholders representing environmental interests felt that the current  $10^{-6}$  risk management factor should not be changed. There was additional discussion concerning potential synergistic effects as the result of exposure to multiple contaminants. There was agreement that the scientific community does not have a clear understanding of cumulative and synergistic effects associated with these complex and varied exposures. There also appeared to be agreement that more research is needed on the cumulative effects of environmental contaminants. However, several stakeholders representing environmental interests advocated for use of the “precautionary principle” to protect against health risk where there is basis to believe that there is danger from exposure to contaminants, without waiting for scientific research to prove such harm beyond any doubt.

Several stakeholders stated that cumulative impacts should also be considered when prioritizing sites for clean up and in the remedy selection process. If a site is in an area suffering from cumulative exposures, that site should be prioritized for clean up.

Several stakeholders recommended that the DEP begin implementing cumulative risk assessment in its permitting, remediation, and enforcement activities, perhaps through requirement of a “mini-NEPA” environmental impact assessment, and to make legislative changes to enable this if necessary.

There was consensus agreement that the Brownfield and Contaminated Site Remediation Act would have to be amended to allow for a cumulative risk approach in the development of remediation standards if assessing a site for cumulative risk were a desired change.

### **Other States:**

The Department is not aware of any states that have developed remediation standards using the more holistic approach to cumulative risk. With regard to the site remediation approach to cumulative risk, the USEPA incorporates cumulative risk in evaluating sites where site risk from exposure to carcinogens in the range of  $10^{-6}$  to  $10^{-4}$  is deemed acceptable. A review of several state programs indicates that some states (Florida, Georgia, Nebraska) do evaluate cumulative risk in site remediation. Other states (including Alaska, Arizona, California, Colorado, Connecticut, Delaware, Iowa, Massachusetts and Pennsylvania) incorporate the concept of cumulative in evaluating and remediating sites. All of these states employ a risk range of either  $10^{-6}$  to  $10^{-5}$  or  $10^{-6}$  to  $10^{-4}$  for carcinogens.