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**TRANSURANIC RADIONUCLIDES
FROM RESUSPENSION IN
THE ENVIRONMENT,
A BIBLIOGRAPHY**

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April 1994

Lawrence
Livermore
National
Laboratory

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Abstract:

The purpose of this project was to compile a bibliography of references containing environmental transuranic radionuclide data. Our intent was to identify those parameters affecting transuranic radionuclide transport that may be generic and those that may be dependent on chemical form and/or environmental conditions (i.e. site specific). An understanding of the unique characteristics and similarities between source terms and environmental conditions relative to transuranic radionuclide transport and cycling will provide the ability to assess and predict the long term impact on man and the environment. An additional goal of our literature review, was to extract the ranges of environmental transuranic radionuclide data from the identified references for inclusion in a data base. Related to source term, these ranges of data can be used to calculate the dose to man from the radionuclides, and to perform uncertainty analyses on these dose assessments.

In an attempt to gather relevant information about the transuranic radionuclides in a variety of environments, we conducted an extensive literature search. In our literature search we identified over 5700 potential written sources of information for review. In addition, we have identified many references which were not found through the literature searches, but which were known to contain useful data. A total of approximately 2600 documents were determined to contain information which would be useful for an in depth study of radionuclides in different environments. The journal articles, books, reports and other documents were reviewed to obtain the source term of the radionuclides studied. Most references containing laboratory study data were not included in our databases. Although these may contain valuable data, we were trying to compile references with information on the behavior of the transuranics in the specific environment being studied.

On the basis of our reviews, we have arbitrarily outlined five general source terms. These are fallout, fuel cycle waste, accidents, disposal sites and resuspension. Resuspension of the transuranic radionuclides is an unique source term, in that the radionuclides can originate from any of the other source terms. If these transuranic radionuclides become resuspended into the air, they then become important as a source of inhaled radionuclides. This bibliography is a compilation of the references containing studies of plutonium and americium in the environment as a result of resuspension.

Introduction:

The issue of transuranic radionuclides in the environment has been the subject of extensive research. For approximately five decades, plutonium and americium have been dispersed into the environment, resulting in widespread low level contamination of soil, water, plants and animals. To compare the transport, uptake, cycling and resuspension of plutonium and americium from various

source terms around the world, it was necessary to summarize information from studies of these radionuclides in different environments. Some logical method of categorizing the source of the transuranic radionuclides had to be devised to use the data from the studies in a predictive manner. Our first task was to identify the source terms which we considered to be of primary importance.

The resuspension of transuranic radionuclides into the environment is an important and unique source term. The study of how these radionuclides become resuspended into the atmosphere, and therefore available for inhalation, is extremely important. Evaluating the behavior of the resuspended transuranic radionuclides in aquatic, terrestrial and atmospheric ecosystems has been the focus of many studies.

The data concerning resuspension includes analyses of different isotopes in different environmental media in different locations. Using these data, we hope to gain a better understanding of the transuranic radionuclide transport, cycling, uptake, and resuspension to evaluate site specific and generic applications.

Methods and Results:

We began by searching several large on-line databases using keywords which we had identified as relevant to transuranic radionuclide transport, uptake and cycling in the environment. These searches were performed from June through September 1992.

The Energy Data Base was the first on-line database we searched. Using our original keyword strategy, the original number of identified items was only 869. On the basis of each abstract provided with the search, only 516 seemed to contain the kind of information relevant to our goals. We adjusted our keyword list by both expanding some areas, and narrowing the focus in others. A second search of the Energy Data Base produced an additional 4258 titles. About 1700 of these items were determined to be of interest.

Next, we expanded our search to the Chem Abstracts Data Base. This search yielded 969 items. Some of these had already been identified through the Energy Data Base searches. In addition to the references identified in our on-line searches, we were already in possession of several references known to contain useful data. A final search was performed with the intent of yielding these known references. This assured us that our keyword list was in fact producing the intended result.

After the final search was completed, we began to obtain all of the identified references. As these were obtained, the reference list at the end of each document was checked for additional references that had not been previously identified. This resulted in further titles being added to our bibliographic database.

To produce our bibliography and environmental source term databases, we have used two commercially available software packages. ProCite ver. 2.0 for the Macintosh was used to produce the bibliography. The source term database was produced using dBase IV, ver. 1.5 on an IBM PS/2. The two different software packages were cross referenced to each other using a common field. The dBase IV database was used to keep track of the information extracted from the references. This allowed us to sort the references using a variety of criteria.

Discussion:

This bibliography is an attempt to provide a resource for information on the behavior of resuspended transuranic radionuclides. Our final on-line database search was in September 1992. There may be additional references of interest in these on-line databases which have been added since that time. References identified by other methods have been included through July 1993.

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