NUREG/CR-5911
BNL-NUREG-52334

Source Term Evaluation for Radioactive Low-Level Waste Disposal Performance Assessment

Prepared by
M. G. Cowgill, T. M. Sullivan

Brookhaven National Laboratory

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Manuscript Completed: July 1991
Date Published: January 1993

Prepared by
M. G. Cowgill, T. M. Sullivan

Brookhaven National Laboratory
Upton, NY 11973

Prepared for
Division of Low-Level Waste Management and Decommissioning
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555
NRC FIN L1409

ABSTRACT

Information compiled on the low-level radioactive waste disposed at the three currently operating commercial disposal sites during the period 1987-1989 have been reviewed and processed in order to determine the total activity distribution in terms of waste stream, waste classification and waste form. The review identified deficiencies in the information currently being recorded on shipping manifests and the development of a uniform manifest is recommended (the NRC is currently developing a rule to establish a uniform manifest). The data from waste disposed during 1989 at one of the sites (Richland, WA) were more detailed than the data available during other years and at other sites, and thus were amenable to a more in-depth treatment. This included determination of the distribution of activity for each radionuclide by waste form, and thus enabled these data to be evaluated in terms of the specific needs for improved modeling of releases from waste packages. From the results, preliminary lists have been prepared of the isotopes which might be the most significant from the aspect of the development of a source term model.

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EXECUTIVE SUMMARY

Assessment of the performance of low-level radioactive waste (LLW) disposal facilities depends, among other things, on the availability of a radionuclide inventory (source term) evaluation methodology which can be applied to specific waste streams. Methodologies currently in use tend to treat this source term in a general manner and take little account of the characteristics of the original waste streams or of the forms in which the wastes are being disposed. These two factors, in practice, are often related, in that the characteristics of the waste stream tend to dictate the form in which the waste is finally disposed. The final form is the more important of the two in determining the release mechanisms and rates of the individual isotopes. Thus, the development of a methodology which incorporates information on the characteristics of the waste streams and, particularly, the waste forms will lead to an enhancement of the current ability to assess LLW disposal facility performance.

The objective of this report is to provide a preliminary assessment of data from waste shipment manifests, in order to determine where the emphasis should be placed in constructing a source term evaluation methodology. The assessment is based primarily on information compiled by Roles for the U.S. Nuclear Regulatory Commission (NRC) [Roles, 1990] from shipping manifests which accompanied LLW disposed at the three currently operating commercial disposal sites (Barnwell, SC, Beatty, NV, and Richland, WA) during the period 1987 through 1989. The Roles report was prepared primarily as a data source for use by others and is essentially a compilation showing the volume, activity and radionuclide distributions of this waste, variously defined in terms of the original waste stream, the waste form immediately prior to disposal and the waste classification. These data have now been evaluated in terms of the specific needs of the source term modeler, with emphasis being placed on the activity of the wastes and on the distribution of radionuclides in the different sorbent and solidification media.

A major problem encountered in evaluating the data available is that, currently, there is no common shipping manifest information practice. (The NRC currently has a proposed rule out for public comment to establish a uniform manifest.) The manifests presently in use were developed by the existing disposal site operators, Chem-Nuclear Systems, Inc., and U.S. Ecology, Inc. Both types of manifest contain all the basic information currently required for regulatory purposes but they are not interchangeable. A common manifest reporting system will simplify and improve the evaluation of wastes disposed in the future.

The amount of LLW disposed at Barnwell during the period 1987-1989 was far in excess of that at the other two sites combined, both in terms of volume and activity. There were also site-to-site variations in the activity distribution between the various waste streams and waste classifications. At Barnwell, about 80% of the activity from the disposal of activated equipment and components, practically all of which was designated Class C waste. By contrast, both at Beatty and at Richland, Class B wastes contributed most of the activity, with the largest contribution being made by the "dry solids" waste stream.

Activity-based analyses of the form in which the waste has been disposed were performed only on the Beatty and Richland data, the information available in this area from Barnwell being limited to waste volumes. About 75% of the

activity disposed at Beatty was in cement-based waste forms, in sharp contrast to Richland where less than 28% of the activity was in such waste forms. At Richland, about 70% of the activity was contained in wastes for which mixing with sorbents or solidification media was not required or not mentioned.

That a substantial portion of the activity disposed during the period 1987-1989 can be categorized as not requiring any sorbent or solidification media or had none identified is of great concern from the source term modeling aspect. Current manifests provide little information on the actual forms in which this very large fraction of the total activity was disposed. Some of this activity is traceable to activated hardware and components which may possibly have been disposed in their original condition. However, most, if not all, of the waste would have been placed in containers before disposal. The containers, in turn, constitute the primary barriers isolating the waste from the environment. A source term model needs to incorporate information of the effectiveness of such barriers; that is, the manner and rate of degradation of the containers must be known. The shipping manifests currently in use provide little information of relevance in this area. It is recommended that manifests be revised to include more information on the containers and, specifically, on the material(s) of manufacture.

The radionuclide inventories at the three sites were analyzed in terms of those isotopes which are relatively long-lived (half-life greater than about 30 years) and those which are relatively short-lived (half-life less than about 30 years). Over the three year period evaluated, the relatively short-lived isotopes together comprised over 95% of the total activity.

Only the data available on wastes disposed at Richland during 1989 contained sufficient detail to allow processing to determine which isotopes were contained in which waste forms and to what extent they were present in those waste forms. These data have been evaluated using relationships which take into account the activity of the isotope, its half-life and its radiotoxicity properties. Two preliminary lists have been prepared of the isotopes which might be the most significant, based on these criteria alone, in the development of a source term model. Each list contains twenty isotopes, one group based on relatively short-lived radionuclides and the other on the long-lived ones.

These lists also indicate which are the most prevalent forms in which each of these isotopes are disposed. Thus, of the short-lived isotopes, Cs-137 and Sr-90 are by far the most significant when account is taken of half-life and radiotoxicity. For these two isotopes, most of the activity was in Class B or C waste and has been disposed in a form which required no sorbent or solidification media or for which no such media were noted on the manifest. The principal waste streams involved were dewatered resins and compacted dry active wastes. Similarly, when considering only half-life and radiotoxicity properties. Th-232 appears to be the most important of the long-lived isotopes for source term modeling, followed by U-238. The largest amounts of Th-232 (including natural thorium) were found in dry solid waste (unstabilized Class A) and were associated with sorbent media. By contrast, only a small portion of U-238 activity was associated with sorbent. Over 25% of the activity was disposed of in cement-based media and the majority, representing more than 50%, was contained in wastes for which mixing with sorbents or solidification media was not required or not mentioned.

The lists are intended only as initial guidance and will be subject to revision following further analysis. It is re-emphasized, for example, that the evaluation was based only on the half-life and radiotoxicity properties of the radionuclides. No account has been taken of the mobility of these isotopes within the waste and after release into the surrounding environment.

ACKNOWLEDGEMENTS

The authors wish to thank Mr. Mark Thaggard of the U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, for his critical review and useful suggestions for improving this report. Grateful acknowledgements are also due to Ms. A. Lopez of Brookhaven National Laboratory for her assistance in preparing this report.

1. INTRODUCTION

Assessment of the performance of radioactive low-level waste (LLW) disposal facilities depends, among other things, on the availability of a radionuclide inventory (source term) evaluation methodology which can be applied to specific waste streams. Methodologies currently in use tend to treat this source term in a general manner and take little account of the characteristics of the original waste streams or of the forms in which the wastes are being disposed. These two factors, in practice, are often related, in that the characteristics of the waste stream tend to dictate the form in which the waste is finally disposed. The final form is the most important factor in determining the release mechanisms and rates of the individual isotopes. Thus the development of a methodology which incorporates information on the characteristics of the waste streams and, particularly, the waste forms will lead to an enhancement of the current ability to assess LLW disposal facility performance.

Two technical letter reports prepared under this contract with the NRC have dealt with the identification of significant radionuclides in LLW (Task 1) [Bowerman, 1990A] and methods of grouping the LLW streams (Task 2) [Bowerman, 1990B]. Under this task of the contract, one objective is to provide a step-by-step example of the procedure for taking waste shipment manifest data and translating it into the form necessary for performance assessment modeling. The other objective is the selection of the models themselves.

The present report describes the results of a preliminary assessment of waste shipment manifest data to determine where the emphases should be placed in constructing a source term evaluation methodology which takes into consideration waste characteristics (for example, the chemical composition, the disposal form of the waste and the container system). This assessment is based primarily on the information published in a report issued by the U.S. Nuclear Regulatory Commission [Roles, 1990]. The information reported therein was taken from the shipping manifests which accompanied LLW disposed at the three currently operating disposal sites (Barnwell, SC, Beatty, NV, and Richland, WA) during the period 1987 through 1989, a data base much expanded over that used in preparing [Bowerman, 1990A] and [Bowerman, 1990B]. [Roles, 1990] is essentially a compilation showing the volume, activity and radionuclide distributions of this waste; although some evaluation of the data is presented, the report was prepared primarily as a data source for use by others. The present report is an attempt to evaluate the data in [Roles, 1990] in terms of the specific needs of the source term modeler. Although it reiterates some of the observations already made in [Roles, 1990], it concentrates on the distribution of radionuclides in the different sorbent and solidification media, and offers recommendations on which radionuclides and media should receive prime consideration in assembling a source term model. The present report also identifies informational needs not satisfied in contemporary shipping manifests, thereby supplementing the list of problems and inconsistencies pointed out in [Roles, 1990].

2. COMMENTS ON THE DATA AVAILABLE

There is a considerable amount of data to be found in [Roles, 1990] but, as the author points out, there are several factors which lead to complications when analysis of certain facets of the data are attempted. The root cause of these complications lies in the fact that the three disposal facilities do not have a common manifest information system and that they store the information in different formats. These differences are discussed in some detail in [Roles, 1990] but, briefly, from the point of view of the present analysis, the two most important are:

> Barnwell (operated by Chem-Nuclear Systems, Inc.) stores manifest information as summarized across entire shipments whereas Beatty and Richland (both of which are operated by U.S. Ecology, Inc.) record individual container information
>
> Waste streams are described differently, depending on the manifest specified by the disposal site operators. The Barnwell manifest listed thirteen different options for waste stream descriptions for the entire three year period. The U.S. Ecology site manifests contained twelve options in 1987 but nineteen for 1988 and 1989.

The end result of this is that considerably more detailed information is available on the waste delivered to Beatty and Richland than there is on that delivered to Barnwell. At the same time, Barnwell received more waste, in terms of both volume and activity, over the three year period in question than have the other two sites combined:

Facility	Volume (1987-89) (cu. ft.)	Activity (1987-89) (Ci)
Barnwell	2.991E+6	1.166E+6
Beatty	5.420E+5	6.247E+4
Richland	1.368E+6	1.783E+5

Consequently, some of the analyses described later in this report have, of necessity, been performed on only a minor portion of the total waste disposed. Furthermore, as will become evident, the distribution of the types of waste disposed (and the forms in which they are disposed) varies from site to site and from year to year, thus imposing yet other restrictions on the validity of any predictions based on these analyses. However, the major objective of the current task is to develop a methodology for handling data. The data themselves are of secondary importance; the main emphasis is on lessons learned during the transcription of those data to models. The first of these lessons is readily apparent from the above: a universal manifest reporting system should be developed and implemented.

3. DATA EVALUATION

The present evaluation was focused primarily on the activity of the waste rather than the waste volume. With this in mind, the main purposes were to determine which were the predominant waste streams and waste forms, in what waste classifications did the wastes fall, and what were radioactive isotope distributions within the waste forms. The last of these is particularly relevant in any assessment of what release mechanisms are likely to be most applicable to the radionuclides considered to be of significant concern.

3.1 Waste Stream Classification and Activity

Tables 1 through 3 summarize the information available for each site for the years 1987 through 1989 on the waste streams, their classifications, their activity and the fraction of the total activity disposed at that site that this represents.

Waste streams from twelve different categories were disposed at Barnwell from 1987 through 1989, one of which appeared only in 1989 ("Other"). By far the most significant contribution (over 79%) to activity over the subject disposal period came from waste described as "Equipment, components." Practically all of this waste stream was judged to be Class C. "Resin" waste contributed over 12% of the total activity, but this activity was spread evenly over the three classifications A, B and C. Activity (principally Class B) of "Solid non-combustibles" comprised about 4.7% of the total while another 1.4% was categorized as "Combustible plus Noncombustible" (again, mostly Class B). The remaining waste streams combined contributed less than 2% of the total activity disposed over the three year period.

Waste streams disposed at Beatty during the period 1987-1989 were divided into 21 different categories (Table 2), two of which were used only during 1987 ("Filter Media" and "Vials") and another two only in 1989 ("Activated Reactor Hardware" and "Evaporator Bottoms"). Over 81% of the activity was derived from waste described as "Dry Solid," 4% from "Non-Cartridge Filter Media" and 3.5% from "Solidified Resins." "Solidified Liquids" and "Evaporator Bottoms" each contributed about 3% of the activity but, for the latter, this was accumulated over just one year (1989). Other waste streams which comprised each at least 1% of the total activity were "Activated Reactor Hardware" (1989 only), "Compacted Dry Active Waste" and "Gas." Most of the "Dry Solid" was categorized as Class B but a tenth portion of it qualified as Class C. All the "Activated Reactor Hardware" was Class C, as was about a third of the "Compacted Dry Active Waste" and "Solidified Liquids."

The waste disposed at Richland over the same period came from 22 different waste streams, two of which were used only in 1987 ("Filter Media" and "Vials") and one only in 1989 ("Evaporator Bottoms"). The major contributors to the activity over this time period were described as "Dry Solid" (45.9%), "Solidified Liquids" (24%), "Dewatered Resins" (13.3%) and ""Activated Reactor Hardware" (12.4%). The largest proportion of the combined activity of these four waste streams was Class B, but one of the waste streams ("Activated Reactor Hardware") was almost 100% Class C.

The following is a summary list of the major waste streams which together made up about 95% or more of the total activity at each of the three disposal sites during 1987-89:

Barnwell	Beatty	Richland
Equipment, components.....79.8% Resin.....12.4% Solid noncombustibles.. 4.7%	Dry solid.....81.4% Non-cartridge filter media..... 4.1% Solidified resins..... 3.5% Evaporator bottoms..... 3.0% Solidified liquids..... 2.9%	Dry solid.....45.9% Solidified liquids.....24.0% Dewatered resins.....13.3% Activated reactor hardware.....12.4%

It is obvious that the waste streams which made the most significant contributions to the disposed activity varied from site to site, even when averaged over a three year period.

A similar site-by-site comparison can be made with regard to the classifications of the waste streams:

Class	Percent of Total Activity at Each Site		
	Barnwell	Beatty	Richland
AU (A, unstabilized)	1.2	10.81	8.47
AS (A, stabilized)	3.96	3.84	0.004
A (total)	5.08	14.65	8.47
BS (B, stabilized)	11.19	73.94	63.28
CS (C, stabilized)	83.73	11.41	28.25

Again, site-to-site variations are apparent. The proportions of Classes A, B and C waste disposed at Beatty and Richland are not too dissimilar, but the mix at Barnwell is radically different. Whereas the majority (over 60%) of the activity disposed at the two U.S. Ecology-operated sites is contained in Class B waste, the predominant portion (over 83%) of activity disposed at Barnwell is Class C. There is one further subtle distinction in the Class A wastes. At Beatty and Richland, most of thi class of waste is unstabilized whereas at Barnwell, about three quarters of it is stabilized. Apparently, this is because of a site-specific requirement (more stringent than that required by 10 CFR Part 61) that LLW containing more than 1 microcurie/cc be solidified or stabilized.

3.2 Sorbent and Solidification Media

[Roles, 1990] contains only limited information on the sorbent and solidification media used at Barnwell. That which is presented treats the waste in terms of volume disposed and cannot be used in any evaluation based on activity. However, this is not the case at Beatty and Richland, and Tables 4 and 5 summarize the data at each site in terms of sorbent or solidification media, waste class, activity and fraction of total activity disposed.

Over half (59%) of the activity disposed at Beatty during the period 1987-1989 (Table 4) was solidified in "Concrete (2500 psi)," practically all of this being Class B. About 10% of the activity was associated with a category described as "Other" (again, almost all being Class B), 9.5% was solidified in "Structural Concrete" (about half of which was Class B) and 8.9% of the activity required no sorbent or solidification media (a high proportion of this was Class C).

The same time period at Richland (Table 5) saw more than a half (57.9%) of the activity not requiring any sorbent or solidification media, with most of the activity being found in waste classified as "B" or "C." Another 26.8% (predominantly Class B) was solidified in "Structural Concrete" while 12.3% of the total activity had no entry in the "sorbent or solidification media" column ("(Blank)"). More than half of the waste in this last category was Class C.

If the various media descriptions are grouped into four simplified subcategories ("cement-based," "sorbents," "none required or noted" and "other"), the data in Tables 4 and 5 can be reduced to (approximately):

Media	Percent of Total Activity	
	Beatty	Richland
cement-based	75.2	27.7
sorbents	0.6	1.5
none required or noted	10.7	70.2
other	13.5	0.6

This compilation shows that, even when averaged over a three-year period, there are few similarities in the activity distributions among the forms in which the waste was disposed at these two sites. However, from the aspect of source term modeling, it is apparent that emphasis will need to be placed on cement-based waste forms and on waste packages for which no solidification or sorbent media has been identified. The details of such modeling will be treated in a later report.

3.3 Radionuclides

The radionuclides contained in the wastes disposed at each of the three sites are reported for each of the three years in [Roles, 1990]. Information is presented on the total activity of each radionuclide and also on the amount of activity to be found in each waste classification. The data are summarized in

Tables 6, 7 and 8 in the current report for, respectively, Barnwell, Beatty and Richland. These tables list the total activity of each radionuclide for the three year disposal period 1987 through 1989, the percentage of the total disposed activity that this represents, and the half-life of the radionuclide as reported in [Walker, 1977].

In the tables, the same abbreviations are used as in [Roles, 1990]. That is: U-NAT means natural uranium; U-DEP depleted uranium; TH-NAT natural thorium; and TRU an unspecified mixture of transuranic isotopes. U-NAT contains over 99% U-238 and has been assigned the half-life of that isotope (4.47E+9 years). U-DEP has been assigned the same half-life (the depletion refers to the reduced amount of U-235, present in U-NAT at a level of about 0.7%). Similarly, TH-NAT is essentially all Th-232 and its half-life is thus 1.40E+10 years. In addition, for some elements, the suffix "-NOS" has been attached when the isotopic numbers were not provided. The alert reader will also note that some isotopes have been assigned a half-life of zero. These are stable isotopes and the data entries represent anomalies of some sort. However, the activities reported for these isotopes are not significant.

The five isotopes at each site which contributed most to the total activity at that site are listed below:

Barnwell		Beatty		Richland	
Isotope	Percent	Isotope	Percent	Isotope	Percent
Fe-55	46.34	H-3	56.19	H-3	62.56
Co-60	32.59	Co-60	23.46	Fe-55	11.64
Mn-54	4.69	Cs-137	9.10	Co-60	9.26
Ni-63	3.78	Fe-55	6.72	Cs-137	4.80
H-3	2.78	Mn-54	1.34	Sr-90	3.51

Not surprisingly, the isotope fractions vary from site to site, reflecting the differences in the waste streams disposed at each site. However, when developing source term models, it is perhaps of more relevance to consider whether the radionuclides are relatively short-lived (say, half-life of about 30 years or less) (this would include Cs-137 which has a half-life of 30.17 years) or long-lived (half-life greater than about 30 years). Using this as a basis, two separate compilations can be made, one for the short-lived isotopes and the other for those which are long-lived:

(a) Isotopes with a half-life of about 30 years or less

Barnwell		Beatty		Richland	
Isotope	Percent	Isotope	Percent	Isotope	Percent
Fe-55	46.34	H-3	56.19	H-3	62.56
Co-60	32.59	Co-60	23.46	Fe-55	11.64
Mn-54	4.69	Cs-137	9.10	Co-60	9.26
H-3	2.38	Fe-55	6.72	Cs-137	4.80
Co-58	2.78	Mn-54	1.34	Sr-90	3.51
All	95.97	All	99.02	All	98.42

(b) Isotopes with a half-life of greater than about 30 years

Barnwell		Beatty		Richland	
Isotope	Percent	Isotope	Percent	Isotope	Percent
Ni-63	3.78	Ni-63	0.582	Ni-63	1.28
U-238*	0.105	U-238*	0.220	C-14	0.228
Th-232	0.096	C-14	0.092	U-238*	0.036
C-14	0.029	Ra-226	0.065	Th-232**	0.022
Ni-59	0.016	Am-241	0.007	Ni-259	0.010
All	4.03	All	0.98	All	1.58

In the above listing, U-238* signifies the inclusion of U-NAT and U-DEP along with U-238; similarly, Th-232** includes Th-NAT with Th-232.

This preliminary breakdown indicates the degree to which the LLW is composed primarily of isotopes with relatively short lives. These radionuclides contributed at least 95% of the total activity of each of the three sites over the three year period under examination. Furthermore, most of this activity (at least 80%) represented the combined activities of three isotopes - Fe-55, Co-60 and H-3. Of the long-lived radionuclides, more than half the activity in this group was provided by Ni-63 but other significant contributions came from the uranium-containing wastes and C-14.

3.4 Radionuclide Distribution in Waste Forms

Ultimately, the activity of a radionuclide is of less importance, from the aspect of source term modeling, than the manner and degree with which it is contained by the various waste packages. These, in turn, determine the rate at which it is released from the waste package into the disposal site environment

and, subsequently, becomes available for transportation into the biosphere. Thus the modeler needs to know not only what are the most prevalent radionuclides (and how long they are likely to remain of concern) but also the media (including the container) in which they are retained. It is at this point that most of the information available lacks the desired specificity. Of the nine batches of information (from disposal at each of three sites for each of three years) presented in [Roles, 1990], only one, for waste disposed at Richland in 1989, contains sufficient detail to attempt the desired analysis. This represents about seven percent of the total waste disposed at the three sites during the period 1987 through 1989.

LLW has been disposed at Richland in nearly forty different forms (see Table 5), including some ten percent or so for which no information has been provided on the form of the waste, identified as (BLANK) in Table 5. To simplify the analysis of the 1989 data, some of these media have been consolidated into what might be termed "generic" categories:

"CEMENT" - includes CHEM-NUCLEAR CEMENT, CONCRETE (2500 PSI), DELAWARE CUSTOM MEDIA, LN TECH CEMENT, STOCK EQUIPMENT CEMENT, STRUCTURAL CONCRETE, and WESTINGHOUSE-HITTMAN CEMENT

"SORBENT" - includes AQUASET, AQUASET I AND II, AQUASET II, CELETOM, CHEMSIL 30, CHEMSIL 3030, CHEMSIL 50, DICAPERL HP200, FLOOR DRY/SUPERFINE, FLORCO, FLORCO X, HI DRI, OTHER SORBENT, PETROSET I AND II, PETROSET II, SAFE-N-DRI, SAFE-T-SORB, SOLID-A-SORB, SPEEDI DRI, and ZONOLITE GRADE#4.

The two groupings are based on assumed similarities with regard to retention of nuclides. While there are data available to provide some basis for the "CEMENT" grouping, there is little information in the general literature on the retention abilities of the various "SORBENTS." Such information (for example, on solution-solid partition coefficients) may be available as proprietary information held by the sorbent manufacturers but currently this data void severely restricts the ability to model release of radionuclides from the sorbent media.

By incorporating the media consolidations described above, the 1989 Richland data were processed to produce Tables 9 and 10 which group, respectively, the short-lived and the long-lived isotopes. These tables list the sorbent and solidification media and the waste classifications associated with each isotope, the total activity of each isotope and each combination of isotope/media/classification, and the fraction of the total activity disposed at Richland during 1989.

As it stands at the moment, the shipping manifests do not provide supplemental information in cases where the sorbent or solidification media are described as NONE REQUIRED or (BLANK). Yet, at Richland alone, these two categories, NONE REQUIRED and (BLANK), constituted over 70% of the activity disposed in the period 1987 through 1989. In other words, existing manifests provide little information on the actual waste forms used for over 70% of the activity disposed at Richland during that period.

3.5 Waste Containers

It is appropriate to highlight at this point that there is limited information available on the waste containers. The containers provide a critical barrier between the waste and the environment before disposal (during transportation and storage) and afterwards. If the container is made of a degradation-resistant material, allowance can be made for this property in the modeling. However, the information on containers reported in the manifests appears to be minimal, essentially confined to detailing the number of containers and their volume and thus complying with one of the requirements of 10 CFR 20.311(b). For example, the manifest used by U.S. Ecology in 1987 listed the following types of containers:

Drums (subdivided into the categories "overpack," "56," "30," "5," and "other")

Boxes (subdivided into "1st size," "2nd size," and "3rd size")

Cask Liners, and

Other.

The only information requested is for the container volume, the number of packages, and the calculated volume per container type. There is no provision for identifying the container materials or for amplification of the category "Other." As a result of this lack of additional information, the modeler is forced to make educated guesses about whether the container is made of a degradation-resistant material or not.

This can be done to some extent using the Tables 9 and 10. For example, considering the data on Cs-137, this isotope is contained in waste of all four classifications, including both stabilized and unstabilized Class A. In many instances, a solidification medium is identified and it is reasonable to assume that these solidifications were carried out in carbon steel drums or liners, the containers being used as molds while solidification takes place. No claims would be made that these containers provide enhanced stability of the waste package over any extended period of time, the stability, when required, being provided by the solidification medium. However, for a very large proportion (nearly 90%) of the Cs-137 activity, no solidification or sorbent medium was deemed to be required. Practically all of this is either Class B or Class C, meaning that stability had to be provided. In the absence of a solidification media, it must be assumed that this stability was provided by the waste containers. That is, the waste was placed in high integrity containers (HICs) which would be made of degradation-resistant material (or materials). A similar approach might be taken when there is no entry at all on the manifest for the solidification or sorbent media (i.e. (BLANK)). HICs may also be used to provide stability when the waste is mixed in with a sorbent.

In reality, the lack of data often forces the modeler to adopt a very conservative approach; that is, to assume that the container material is carbon steel. Credit can be taken for its resistance to degradation (primarily due to corrosion) but this is much less than that for HICs. Such an approach is not unreasonable in many instances because carbon steel drums and liners are in common use (for example, as pointed out above, they are often used molds into

which cement-based mixtures and other solidification media are poured). However, it is known that a significant number of HICs are in use providing stability for, mostly, Class B and Class C wastes. By inference, such containers must be made of material which is resistant to degradation, in order to ensure that the waste will remain in a structurally stable form for 300 years. The wastes disposed in HICs probably include some of those (for example, DEWATERED RESINS) for which the sorbent or solidification media are described as NONE REQUIRED, but there are no indications to this effect in the available data. They may also be involved when no media information is provided; i.e., (BLANK). However, the modeler cannot take full advantage of the projected longevity of the container because the material of construction has not been identified. (Some allowance can probably be factored in, for example, by assuming that, when HICs are used to contain Class B and Class C wastes, these will be made of thicker material than is the case with Class A waste containers.)

3.6 Analysis of the Richland 1989 Data

Identification of the most significant radionuclides can be based on any of several factors, as has been indicated in [Bowerman, 1990A]. For the current analysis, attention has been focused on three: the total activity of each radionuclide, its half-life and its radiotoxicity. The information on the activity of each radionuclide (including the portions to be found in each waste form) are shown in Tables 9 and 10. These two tables also implicitly include consideration of half-life, Table 9 being based on relatively short-lived isotopes (half-life equal to about 30 years) and Table 10 being devoted to the longer-lived isotopes (half-life greater than about 30 years). The third factor, radiotoxicity, has been evaluated using the methods suggested in [Bowerman, 1990A].

[Bowerman, 1990A] proposes the use of an artificial measure of toxicity, called the "toxicity indicator" (TI). TI is defined by the equation:

$$TI = (\log [1 + t_{1/2}])/ALI,$$

where $t_{1/2}$ is the half-life of the isotope in years, and
ALI is the annual limit for intake by ingestion, in mCi [ICRP, 1979].

This indicator provides a system for rating the toxicity of individual isotopes taking into account their half-lives. However, it does not take into account the actual amount of isotope present in a disposal inventory. Conceivably, an isotone with a fairly high toxicity indicator may be present in only very small amounts and may be of less concern, in a source term evaluation, than an isotope with a lower indicator but present in very large amounts. [Bowerman, 1990A] suggests that radiotoxicity analysis can be further refined by multiplying the TI of each radionuclide by the total inventory for that nuclide, thereby producing an "Inventory-Based Toxicity Factor" (ITOX). This type of analysis has been applied to the Richland 1989 data, with the results summarized in Tables 11 and 12, for, respectively, short-lived and long-lived radionuclides.

Nearly one third of the isotopes in Table 11 are listed as having a TI value of 0.000. In many instances, this is not, strictly speaking, true, the calculated value actually being greater than zero but less than 0.0005. Such values have little meaning in the present analysis and the isotopes concerned

were assigned the value of zero. These very low values are associated with isotopes which have a very short half-life, of the order of seconds or minutes, usually in combination with a high ALI value. For example, Zn-63 has a half-life of 38.1 minutes and an ALI value of 24.324 mCi, resulting in a TI of about 0.000001 mCi^{-1}. The remainder of the isotopes with TI values of 0.000 reflect anomalies in the original shipping manifest data, where occasionally a stable (non-radioactive) isotope is reported as having an activity level.

It is readily apparent from Tables 11 and 12 that the isotopes contributing the most activity were not necessarily those of the most toxic nature. Among the shorter-lived isotopes in Table 11, although the same six isotopes appear at the top in both lists, their relative rankings are different. The activity of H-3 comprised more than 50% of the total inventory but the isotope itself is not considered very toxic. Thus when toxicity is taken into account, this isotope is ranked only sixth in the ITOX list. That particular list is headed up by Sr-90, the activity of which was only the fourth largest. The disparity is even more noticeable among the long-lived isotopes (Table 12). Here, the isotope with most activity is Ni-63 but its low toxicity reduces it to thirteenth place in the ITOX list. From the point of view of toxicity of inventory, natural thorium would be of prime concern although, on activity alone, it would be ranked only fourth.

A variation on the ITOX method involves consideration of the time required to reduce the current inventory of a radionuclide to a level of activity equivalent to the annual limit for intake for that nuclide. This can be accomplished by first calculating the number, n, of half-lives necessary to reduce the inventory to the ALI by use of the following relationship:

$$(\text{Activity}) \times (0.5)^n = \text{ALI}.$$

The half-life of the radionuclide is then multiplied by n to give the equivalent time.

This "inventory reduction" (IRED) method has particular application when considering the very numerous relatively short-lived isotopes listed in Table 11. The resulting values of n and the equivalent years are given in Table 13 which also contains, for comparative purposes, the total activity of each isotope and the ITOX value. Somewhat more than a third of the isotopes listed in Table 11 were eliminated from consideration in the preparation of Table 13 because they appeared to be of insignificant concern. The criteria of insignificance were: a toxicity indicator (or ITOX value) of zero or an inventory activity level less than the ALI value for the particular isotope.

The IRED calculations indicate that the activity due to the Cs-137 and Sr-90 inventories will remain of concern for the longest time, a ranking similar to that obtained by the ITOX method. However, there are few other correspondences between the two ranking systems among the rest of the isotopes. The IRED calculations also point to the importance of container materials. If the container materials can be guaranteed to isolate totally the waste for more than a decade, then the inventory of three-quarters of the isotopes listed in Table 13 will have decayed to below their ALI value in that time period. That being the case, there would be little need to include these isotopes in a source term evaluation.

For the sake of completeness, IRED calculations were performed on the long-lived isotopes in Table 12, using the same criteria of insignificance to eliminate about a fifth of them from consideration. The results are given in Table 14. The exercise was essentially of only academic interest as decay-to-ALI times are, with three exceptions, in the thousands, millions and even larger numbers of years. It is not possible to guarantee that even the most degradation-resistant materials currently available will be able to isolate completely the waste for such time periods. The three exceptions among the isotopes in Table 14 are Bi-207, Ag-108M, and Po-209. The presence of the former in the listing is due to the arbitrary decision to use a half-life of about 30 years as the delineation between short- and long-lived isotopes (Bi-207 has a half-life of 38 years). In addition, the activity of this isotope is only very slightly in excess of the isotope's ALI value. The half-life of Po-209 is 102 years and that of Ag-108M is 130 years, both longer than that of Bi-207, but their activity inventory is so small that they can decay to their respective ALI values in about 200 years or less.

3.7 Most Significant Isotopes for Source Term Modeling

The results of the analyses performed on the Richland 1989 data have been used to determine which radionuclides might receive priority in assembling a source term model. Prime consideration was given to the IRED value of the inventory. While this factor is probably of limited usefulness in evaluating the long-lived isotopes, perhaps almost all of which should be included in the model, it is thought to be very appropriate when considering the short-lived isotope inventory. Those isotopes of the latter category which are considered the twenty most significant are listed in Table 15, together with the waste form media in which they are disposed. For each isotope, the media are ranked based on the proportion of the isotope that the media contain, the highest proportion being rated uppermost. The proportions themselves are not included in Table 15 but can be found in Table 9. Generally, of the solidification media, Envirostone and bitumen are only included individually when the proportion of the waste incorporated in them is above or close to that portion solidified in cement-based media. Otherwise, they are included under the term "Other solidification media." Of the short-lived isotopes, by far the most significant appear to be Cs-137 and Sr-90. By reference to Table 9, it can be determined that, in both cases, most of the activity was in Class B or Class C waste, and had been disposed in a form which required no sorbent or solidification media or for which no such media were noted on the manifest. Also, although the relevant information has not been reproduced in the present report, it might be noted that the principal waste streams involved were dewatered resins and compacted dry active waste.

It was indicated above that IRED values are of limited usefulness in evaluating the long-lived isotopes. Consequently, the ranking of these isotopes has been based on the ITOX values, with the results shown in Table 16. The waste form media ranking is based on the activity data in Table 10. The most important long-lived isotope for source term modeling appears to be Th-232 (including natural thorium), followed by U-238 (including both natural and depleted uranium). The largest amounts of Th-232 activity were found in dry solid waste (Class A, unstabilized) and were associated with various sorbent media. U-238 was also found predominantly in unstabilized Class A wastes but only a very small amount of the activity was associated with sorbent media. More than half of the U-238 activity fell into the "none required" category and over a quarter was disposed of in cement-based media.

The lists could be further refined by consideration of the original waste streams which bore the isotopes. Such an analysis, in which the sorbent or solidification media category would be subdivided to show the contributions of the different waste streams to a particular waste form, has not been attempted because its additional complications are not justified at this stage in model development due to a lack of data. However, the nature of the original waste stream is of relevance in determining the degree to which the radionuclides can be retained by the waste form. For example, Cs-137 found originally in evaporator bottoms and solidified in cement is likely to be bonded differently (and subject to different release mechanism and rates) from that of the same radionuclide found in a cement-based solidification of a waste stream containing ion exchange resins. Similarly, although release mechanisms of Ni-63 from activated hardware are probably different from those from compacted dry active waste, both waste streams may appear under the same waste form category of "None Required." Consequently, although the importance of the character of the original waste stream is not treated in the current report, the modeling refinements demanded by such differences will be evaluated at a later stage in the model development.

The rankings shown in Tables 15 and 16 provide some initial guidance on what isotopes should receive prime consideration when assembling a source term model and in what kinds of waste forms they are likely to be found. It should be understood that the decision to identify twenty isotopes in each group was purely arbitrary and is not intended to indicate that only these isotopes should be included in a source term model. In particular, it is emphasized that the preceding analysis is concerned only with identifying which radionuclides should be included in a source term model based on their contributions to the activity and toxicity of the total disposed inventory. It does not take into account the mobility of the radionuclides within the waste and after release from the waste form.

4. SUMMARY AND RECOMMENDATIONS

An attempt has been made to evaluate information derived from LLW shipping manifests in terms of the specific needs associated with the development of a source term model. The information examined resulted from disposal at three sites (Barnwell, SC, Beatty, NV, and Richland, WA) during the period 1987 through 1989 and is contained in [Roles, 1990]. During the evaluation, emphasis was placed on the activity of the wastes (as opposed to their volumes), on determining the distribution of radionuclides in the different sorbent and solidification media, and on identifying informational needs not satisfied in contemporary shipping manifests. Summary and recommendations follow.

1. Currently, there is no common shipping manifest information practice, a factor which hinders considerably the ability to evaluate the data reported. This problem has been highlighted previously in [Roles, 1990] and it is recommended that efforts be made to develop a uniform manifest. It is recognized that this may not be a simple task as the sited States and compacts probably will have their individual requirements.

2. Not unexpectedly, site-to-site variations in the activity distribution among waste streams and waste classifications were noted, even when the information was averaged over a three year period. At Barnwell, about 80% of the activity came from disposal of activated equipment and components, practically all of which were designated Class C waste. By contrast, at both Beatty and Richland, Class B wastes contributed most of the activity, with the largest contribution being made by the "dry solids" waste streams.

3. Activity-based analyses of the forms in which the waste has been disposed were performed only on the Beatty and Richland data, the information available in this area from Barnwell being restricted to waste volumes. About 75% of the activity disposed at Beatty was in cement-based waste forms, in sharp contrast to Richland where less than 28% of the activity was in such waste forms. At Richland, about 70% of the activity was contained in wastes for which mixing with sorbents or solidification media was not required or not mentioned.

4. The fact that over 70% of the activity disposed at Richland was categorized as not requiring any sorbent or solidification media or had none identified is of great concern from the source term modeling aspect. Under current manifest practices there is very little information on the actual forms in which this very large fraction of the total activity was disposed.

5. Some of the activity referred to in Item 4 is found in activated hardware and components which may have been disposed in their original condition. However, much of the waste would have been placed in containers before disposal. The containers, in turn, constitute the primary barriers isolating the waste from the environment. A source term model needs to incorporate information of the effectiveness of such barriers; that is, the manner and rate of degradation of the containers

must be known. The shipping manifests provide little information of relevance in this area. Thus it is recommended that manifests be revised to include more information on the containers, and, specifically, the material(s) of manufacture. The NRC currently has a proposed rule under review to establish a uniform manifest.

6. Although only a small portion of the disposed activity is associated with sorbent media, there is essentially no information in the open literature on the ability of the different sorbents to retain radionuclides in a disposal site environment. This lack of information (for example, on solution-solid partition coefficients) severely restricts the ability to model the release of the radionuclides from the sorbent media into the disposal site environment.

7. An analysis of the radionuclide inventories at the three sites revealed that isotopes which were relatively long-lived (half-life greater than about 30 years) constituted less than 5% of the disposed activity at each site over the three year period evaluated.

8. Only the data available on wastes disposed at Richland during 1989 contained sufficient detail to allow processing to determine which isotopes were contained in which waste forms and to what extent they were present in those waste forms. These data have been evaluated using a relationship which takes into account the activity of the isotope, its half-life and its radiotoxicity properties. From the results, two preliminary lists have been made, identifying a total of forty isotopes which might be the most significant from the aspect of the development of a source term model. Each list contains twenty isotopes, one group based on relatively short-lived isotopes and the other on the long-lived isotopes. The lists also indicate which are the most prevalent forms in which each of these isotopes are disposed. The lists are intended only as initial guidance and will be subject to revision following further analysis.

5. REFERENCES

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TABLE 1

BARNWELL WASTE STREAM CLASSIFICATION AND ACTIVITY
FOR 1987 THROUGH 1989

WASTE STREAM	CLASS	ACTIVITY (Ci)	FRACTION OF TOTAL ACTIVITY
AIR FILTERS	A	.39005000E+2	.33770450E-4
AIR FILTERS	CS	.11900000E+2	.10302995E-4
Subtotal (AIR FILTERS)		.50905000E+2	.44073446E-4
BIOLOGICAL	A	.14894000E+2	.12895195E-4
Subtotal (BIOLOGICAL)		.14894000E+2	.12895195E-4
COMBUSTIBLE + NONCOMBUSTIBLE	A	.47140E+4	.40813716E-2
COMBUSTIBLE + NONCOMBUSTIBLE	BS	.11326E+5	.98060279E-2
COMBUSTIBLE + NONCOMBUSTIBLE	CS	.14926000E+3	.12922900E-3
Subtotal (COMBUSTIBLE + NONCOMBUSTIBLE)		.16189260E+5	.14016628E-1
EQUIPMENT, COMPONENTS	A	.61110500E+3	.52909347E-3
EQUIPMENT, COMPONENTS	BS	.35851400E+4	.31040069E-2
EQUIPMENT, COMPONENTS	CS	.91740E+6	.79428306E+0
Subtotal (EQUIPMENT, COMPONENTS)		.92159624E+6	.79791616E+0
CARTRIDGE/MECHANICAL FILTERS	A	.12069000E+4	.10449315E-2
CARTRIDGE/MECHANICAL FILTERS	BS	.15410E+4	.13341946E-2
CARTRIDGE/MECHANICAL FILTERS	CS	.49780E+4	.43099423E-2
Subtotal (CARTRIDGE/MECHANICAL FILTERS)		.77259000E+4	.66890686E-2
FILTER MEDIA	A	.15721000E+4	.13611210E-2
FILTER MEDIA	BS	.74720000E+3	.64692424E-3
FILTER MEDIA	CS	.14342700E+4	.12417880E-2
Subtotal (FILTER MEDIA)		.37535700E+4	.32498333E-2
INCINERATOR ASH		.00000E+0	.00000E+0
INCINERATOR ASH	A	.70000000E-4	.6060585E-10
Subtotal (INCINERATOR ASH)		.70000000E-4	.6060585E-10
OTHER (1989)	BS	.46220000E+3	.40017182E-3
Subtotal (OTHER)		.46220000E+3	.40017182E-3
RESIN	A	.47920E+5	.41489039E-1
RESIN	BS	.57870E+5	.50103729E-1
RESIN	CS	.37900E+5	.32813743E-1
Subtotal (RESIN)		.14369E+6	.12440651E+0
SOLID COMBUSTIBLES	A	.14667000E+2	.12698658E-4
SOLID COMBUSTIBLES	BS	.13000E+3	.11255373E-3
Subtotal (SOLID COMBUSTIBLES)		.14466700E+3	.12525239E-3

TABLE 1 (cont.)

BARNWELL WASTE STREAM CLASSIFICATION AND ACTIVITY
FOR 1987 THROUGH 1989

WASTE STREAM	CLASS	ACTIVITY (Ci)	FRACTION OF TOTAL ACTIVITY
SOLID NONCOMBUSTIBLES	A	.87820000E+3	.76034378E-3
SOLID NONCOMBUSTIBLES	BS	.52119E+5	.45124524E-1
SOLID NONCOMBUSTIBLES	CS	.88926000E+3	.76991951E-3
Subtotal (SOLID NONCOMBUSTIBLES)		.53886460E+5	.46654788E-1
SOLIDIFIED LIQUIDS	A	.16839000E+4	.14579172E-2
SOLIDIFIED LIQUIDS	BS	.14697000E+4	.12724632E-2
SOLIDIFIED LIQUIDS	CS	.43361500E+4	.37542299E-2
Subtotal (SOLIDIFIED LIQUIDS)		.74897500E+4	.64846104E-2
Grand Total		1,155,003.851	

TABLE 2

BEATTY WASTE STREAM CLASSIFICATION AND ACTIVITY
FOR 1987 THROUGH 1989

WASTE STREAM	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
ACTIVATED REACTOR HARDWARE (1989)	CS	.10789959E+7	.17271765E-1
Subtotal (ACTIVATED REACTOR HARDWARE)		.10789959E+7	.17271765E-1
ANIMAL CARCASSES IN LIME & SORBENT	AU	.29248000E+4	.46818024E-4
Subtotal (ANIMAL CARCASSES/LIME/SORBENT)		.29248000E+4	.46818024E-4
AQUEOUS LIQUID IN VIALS IN SORBENT	AU	.20752200E+3	.33218579E-5
Subtotal (AQUEOUS LIQUID/VIALS/SORBENT)		.20752200E+3	.33218579E-5
BIOLOGICAL (non-carcass waste)	AU	.49123480E+4	.78633215E-4
Subtotal (BIOLOGICAL)		.49123480E+4	.78633215E-4
COMPACTED DRY ACTIVE WASTE	AS	.62906710E+4	.10069638E-3
COMPACTED DRY ACTIVE WASTE	AU	.45833710E+6	.73367196E-2
COMPACTED DRY ACTIVE WASTE	CS	.22950E+6	.36736974E-2
Subtotal (COMPACTED DRY ACTIVE WASTE)		.69412977E+6	.11111113E-1
DEWATERED RESINS	AU	.90506360E+5	.14487585E-2
Subtotal (DEWATERED RESINS)		.90506360E+5	.14487585E-2
DRY SOLID	AS	.13677269E+5	.21893555E-3
DRY SOLID	AU	.14756615E+7	.23621293E-1
DRY SOLID	BS	.44074541E+8	.70551249E+0
DRY SOLID	CS	.53101695E+7	.85001246E-1
Subtotal (DRY SOLID)		.50874050E+8	.81435397E+0
EVAPORATOR BOTTOMS (1989)	AU	.18726430E+7	.29975877E-1
Subtotal (EVAPORATOR BOTTOMS)		.18726430E+7	.29975877E-1
CARTRIDGE-TYPE FILTER MEDIA	AU	.44696052E+5	.71546117E-3
Subtotal (CARTRIDGE-TYPE FILTER MEDIA)		.44696052E+5	.71546117E-3
NON-CARTRIDGE FILTER MEDIA	AS	.14493003E+7	.23199323E-1
NON-CARTRIDGE FILTER MEDIA	AU	.10941879E+7	.17514947E-1
Subtotal (NON-CARTRIDGE FILTER MEDIA)		.25434883E+7	.40714270E-1
FILTER MEDIA (1987)	AS	.15325300E+4	.24531600E-4
FILTER MEDIA (1987)	AU	.68127000E+3	.10905263E-4
FILTER MEDIA (1987)	BS	.44351750E+4	.70994984E-4
Subtotal (FILTER MEDIA)		.66489750E+4	.10643184E-3
GAS	AU	.68097213E+5	.10900495E-2
GAS	BS	.11490150E+7	.18392578E-1
Subtotal (GAS)		.12171122E+7	.19482627E-1

TABLE 2 (cont.)

BEATTY WASTE STREAM CLASSIFICATION AND ACTIVITY
FOR 1987 THROUGH 1989

WASTE STREAM	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
NON-AQU. LIQUID in VIALS/SORBENT	AU	.26200000E+0	.41939012E-8
Subtotal (NON-AQU. LIQUID/VIALS/SORBENT)		.26200000E+0	.41939012E-8
NON-COMPACTED DRY ACTIVE WASTE	AS	.20000E+3	.32014513E-5
NON-COMPACTED DRY ACTIVE WASTE	AU	.17632416E+5	.28224660E-3
NON-COMPACTED DRY ACTIVE WASTE	BS	.53477120E+4	.85602198E-4
Subtotal (NON-COMPACTED DRY ACTIVE WASTE)		.23180128E+5	.37105025E-3
OTHER	AU	.24237258E+5	.38797200E-3
OTHER	BS	.80000E+2	.12805805E-5
Subtotal (OTHER)		.24317258E+5	.38925258E-3
SOLIDIFIED LIQUIDS	AS	.21028441E+5	.33660765E-3
SOLIDIFIED LIQUIDS	AU	.77246787E+6	.12365091E-1
SOLIDIFIED LIQUIDS	BS	.48900E+6	.78275484E-2
SOLIDIFIED LIQUIDS	CS	.50754E+6	.81243230E-2
Subtotal (SOLIDIFIED LIQUIDS)		.17900363E+7	.28653570E-1
SOLIDIFIED OIL	AU	.38653020E+4	.61872881E-4
Subtotal (SOLIDIFIED OIL)		.38653020E+4	.61872881E-4
SOLIDIFIED RESINS	AS	.90679338E+6	.14515274E-1
SOLIDIFIED RESINS	AU	.81556668E+6	.13054985E-1
SOLIDIFIED RESINS	BS	.46857693E+6	.75006311E-2
Subtotal (SOLIDIFIED RESINS)		.21909369E+7	.35070890E-1
SORBED AQUEOUS LIQUIDS	AU	.64832690E+4	.10377935E-3
Subtotal (SORBED AQUEOUS LIQUIDS)		.64832690E+4	.10377935E-3
SORBED NON-AQUEOUS LIQUIDS	AU	.17971200E+3	.28766961E-5
Subtotal (SORBED NON-AQUEOUS LIQUIDS)		.17971200E+3	.28766961E-5
VIALS (1987)	AU	.23519060E+4	.37647562E-4
Subtotal (VIALS)		.23519060E+4	.37647562E-4
Grand Total		62,471,666.674	

TABLE 3

RICHLAND WASTE STREAM CLASSIFICATION AND ACTIVITY
FOR 1987 THROUGH 1989

WASTE STREAM	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
ACTIVATED REACTOR HARDWARE	AS	.51890000E+3	.29051563E-5
ACTIVATED REACTOR HARDWARE	AU	.78602220E+4	.44006887E-4
ACTIVATED REACTOR HARDWARE	CS	.22214436E+8	.12437157E+0
Subtotal (ACTIVATED REACTOR HARDWARE)		.22222815E+8	.12441848E+0
ANIMAL CARCASSES IN LIME & SORBENT	AU	.94801431E+5	.53076311E-3
Subtotal (ANIMAL CARCASSES/LIME/SORBENT)		.94801431E+5	.53076311E-3
AQUEOUS LIQUID IN VIALS IN SORBENT	AU	.42186225E+5	.23618728E-3
Subtotal (AQUEOUS LIQUID/VIALS/SORBENT)		.42186225E+5	.23618728E-3
BIOLOGICAL (non-carcass waste)	AU	.91913230E+4	.51459299E-4
Subtotal (BIOLOGICAL)		.91913230E+4	.51459299E-4
COMPACTED DRY ACTIVE WASTE	AS	.29550000E+2	.16544106E-6
COMPACTED DRY ACTIVE WASTE	AU	.47358792E+6	.26514684E-2
COMPACTED DRY ACTIVE WASTE	CS	.10730265E+7	.60075349E-2
Subtotal (COMPACTED DRY ACTIVE WASTE)		.15466440E+7	.86591688E-2
DEWATERED RESINS	AS	.29869198E+6	.16722816E-2
DEWATERED RESINS	AU	.31570158E+7	.17675129E-1
DEWATERED RESINS	BS	.66075049E+7	.36993322E-1
DEWATERED RESINS	CS	.13658632E+8	.76470548E-1
Subtotal (DEWATERED RESINS)		.23721845E+8	.13281108E+0
DRY SOLID	AS	.63656130E+4	.35639046E-4
DRY SOLID	AU	.56475046E+7	.31618585E-1
DRY SOLID	BS	.64016541E+8	.35840829E+0
DRY SOLID	CS	.12272947E+8	.68712338E-1
Subtotal (DRY SOLID)		.81943359E+8	.45877485E+0
EVAPORATOR BOTTOMS (1989)	AU	.92189122E+5	.51613763E-3
Subtotal (EVAPORATOR BOTTOMS)		.92189122E+5	.51613763E-3
CARTRIDGE-TYPE FILTER MEDIA	AS	.87774529E+5	.49142172E-3
CARTRIDGE TYPE FILTER MEDIA	AU	.15790923E+6	.88441961E-3
CARTRIDGE TYPE FILTER MEDIA	BS	.41472054E+6	.23218886E-2
CARTRIDGE-TYPE FILTER MEDIA	CS	.33512696E+6	.18762694E-2
Subtotal (CARTRIDGE-TYPE FILTER MEDIA)		.99559126E+6	.55739994E-2
NON-CARTRIDGE FILTER MEDIA	AU	.15113936E+7	.84618132E-2
NON-CARTRIDGE FILTER MEDIA	BS	.21780769E+5	.12194361E-3
Subtotal (NON-CARTRIDGE FILTER MEDIA)		.15331744E+7	.85837568E-2

TABLE 3 (cont.)

RICHLAND WASTE STREAM CLASSIFICATION AND ACTIVITY
FOR 1987 THROUGH 1989

WASTE STREAM	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
FILTER MEDIA (1987)	AS	.48607964E+5	0.27214056E-3
FILTER MEDIA (1987)	AU	.12183783E+5	.68213133E-4
FILTER MEDIA (1987)	BS	.28469952E+6	.15939422E-2
Subtotal (FILTER MEDIA)		.34549127E+6	.19342959E-2
GAS	AU	.21338200E+3	.11946580E-5
Subtotal (GAS)		.21338200E+3	.11946580E-5
NON-AQU. LIQUID IN VIALS/SORBENT	AU	.18195000E+2	.10186802E-6
Subtotal (NON-AQU. LIQUID/VIALS/SORBENT)		.18195000E+2	.10186802E-6
NON-COMPACTED DRY ACTIVE WASTE	AU	.10512391E+6	.58855543E-3
NON-COMPACTED DRY ACTIVE WASTE	BS	.11543667E+6	.64629331E-3
NON-COMPACTED DRY ACTIVE WASTE	CS	.40180085E+5	.22495554E-3
Subtotal (NON-COMPACTED DRY ACTIVE WASTE)		.26074067E+6	.14598042E-2
OTHER	AS	.20488000E+2	.11470580E-6
OTHER	AU	.78630405E+5	.44022667E-3
OTHER	BS	.96340000E+3	.53937707E-5
OTHER	CS	.14640000E+3	.81964712E-6
Subtotal (OTHER)		.79760693E+5	.44655480E-3
SOLIDIFIED CHELATES	AU	.44766623E+5	.25063411E-3
Subtotal (SOLIDIFIED CHELATES)		.44766623E+5	.25063411E-3
SOLIDIFIED LIQUIDS	AS	.12428530E+5	.69583394E-4
SOLIDIFIED LIQUIDS	AU	.19620767E+7	.10985044E-1
SOLIDIFIED LIQUIDS	BS	.40040E+8	.22417180E+0
SOLIDIFIED LIQUIDS	CS	.85874833E+6	.48078593E-2
Subtotal (SOLIDIFIED LIQUIDS)		.42873353E+8	.24003429E+0
SOLIDIFIED OIL	AS	.63731200E+3	.35681075E-5
SOLIDIFIED OIL	AU	.68661920E+4	.38441629E-4
Subtotal (SOLIDIFIED OIL)		.75035040E+4	.42009737E-4
SOLIDIFIED RESINS	AS	.27029226E+6	.15132805E-2
SOLIDIFIED RESINS	AU	.79098391E+5	.44284678E-3
SOLIDIFIED RESINS	BS	.15194467E+7	.85069001E-2
Subtotal (SOLIDIFIED RESINS)		.18688374E+7	.10463027E-1
SORBED AQUEOUS LIQUIDS	AU	.92809172E+6	.51960909E-2
Subtotal (SORBED AQUEOUS LIQUIDS)		.92809172E+6	.51960909E-2

TABLE 3 (cont.)

RICHLAND WASTE STREAM CLASSIFICATION AND ACTIVITY
FOR 1987 THROUGH 1989

WASTE STREAM	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
SORBED NON-AQUEOUS LIQUIDS	AS	.83484900E+3	.46740545E-5
SORBED NON-AQUEOUS LIQUIDS	AU	.20268480E+4	.11347678E-4
Subtotal (SORBED NON-AQUEOUS LIQUIDS)		.28616970E+4	.16021733E-4
VIALS (1987)	AU	.11871000E+2	.66461960E-7
Subtotal (VIALS)		.11871000E+2	.66461960E-7
Grand Total		178,613,448.337	

TABLE 4

BEATTY SORBENT AND SOLIDIFICATION MEDIA AND ACTIVITY
FOR 1987 THROUGH 1989

SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
(BLANK)	AS	.33055620E+4	.52912979E-4
(BLANK)	AU	.10995666E+7	.17601045E-1
(BLANK)	BS	.10859058E+5	.17382372E-3
(BLANK)	CS	.23526510E+4	.37659488E-4
Subtotal for (BLANK)		.11160839E+7	.17865441E-1
AQUASET	AU	.48330300E+3	.77363551E-5
Subtotal for AQUASET		.48330300E+3	.77363551E-5
AQUASET I AND II	AU	.12325100E+3	.19729103E-5
Subtotal for AQUASET I AND II		.12325100E+3	.19729103E-5
AQUASET II	AU	.12031600E+3	.19259290E-5
Subtotal for AQUASET II		.12031600E+3	.19259290E-5
CELETOM	AU	.21000E+2	.33615238E-6
Subtotal for CELETOM		.21000E+2	.33615238E-6
CHEM-NUCLEAR CEMENT	AS	.44767000E+4	.71659685E-4
CHEM-NUCLEAR CEMENT	AU	.68210020E+4	.10918552E-3
CHEM-NUCLEAR CEMENT	BS	.99109502E+6	.15864712E-1
Subtotal for CHEM-NUCLEAR CEMENT		.10023927E+7	.16045557E-1
CHEMSIL 3030	AU	.23859340E+4	.38192257E-4
Subtotal for CHEMSIL 3030		.23859340E+4	.38192257E-4
CONCRETE (2500 PSI)	AS	.19565730E+4	.31319366E-4
CONCRETE (2500 PSI)	AU	.56879510E+4	.91048491E-4
CONCRETE (2500 PSI)	BS	.35797180E+8	.57301465E+0
CONCRETE (2500 PSI)	CS	.13269655E+7	.21241078E-1
Subtotal for CONCRETE (2500 PSI)		37131790E+8	.59437809E+0
DELAWARE CUSTOM MEDIA	AS	.15325300E+4	.24531600E-4
DELAWARE CUSTOM MEDIA	AU	.67160E+4	.10750473E-3
Subtotal for DELAWARE CUSTOM MEDIA		.82485300E+4	.13203633E-3
DIATOMACEOUS EARTH	AU	19852790E+4	.31778870E-4
Subtotal for DIATOMACEOUS EARTH		.19852790E+4	.31778870E-4
ENVIROSTONE	AU	.28020080E+4	.44852461E-4
ENVIROSTONE	CS	.32800E+5	.52503801E-3
Subtotal for ENVIROSTONE		.35602008E+5	.56989047E-3

TABLE 4 (cont.)

BEATTY SORBENT AND SOLIDIFICATION MEDIA AND ACTIVITY
FOR 1987 THROUGH 1989

SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
FLOOR DRY/SUPERFINE	AS	.30251444E+6	.48424263E-2
FLOOR DRY/SUPERFINE	AU	.17881349E+5	.28623134E-3
FLOOR DRY/SUPERFINE	BS	.44351750E+4	.70994984E-4
FLOOR DRY/SUPERFINE	CS	.11000E+4	.17607982E-4
Subtotal for FLOOR DRY/SUPERFINE		.32593097E+6	.52172606E-2
HI DRI	AU	.44774000E+2	.71670890E-6
Subtotal for HI DRI		.44774000E+2	.71670890E-6
HITTMAN GROUT	AU	.16166412E+6	.25877991E-2
Subtotal for HITTMAN GROUT		.16166412E+6	.25877991E-2
NONE REQUIRED	AS	.57236870E+4	.91620526E-4
NONE REQUIRED	AU	.74199171E+6	.11877251E-1
NONE REQUIRED	BS	.12791230E+6	.20475250E-2
NONE REQUIRED	CS	.46640183E+7	.74658138E-1
Subtotal for NONE REQUIRED		.55396460E+7	.88674536E-1
NOT APPLICABLE	AU	.10000000E-2	.1600725E-10
Subtotal for NOT APPLICABLE		.10000000E-2	.1600725E-10
OPALEX	AU	.25000E+2	.40018141E-6
Subtotal for OPALEX		.25000E+2	.40018141E-6
OTHER	AS	.14473030E+4	.23167350E-4
OTHER	AU	.14534094E+5	.23265097E-3
OTHER	BS	.63000E+7	.10084571E+0
Subtotal for OTHER		.63159813E+7	.10110153E+0
OTHER SOLIDIFICATION MEDIA	AU	.20253793E+7	.32420766E-1
Subtotal for OTHER SOLIDIFICATION MEDIA		.20253793E+7	.32420766E-1
OTHER SORBENT	AU	.59492000E+2	.95230371E-6
Subtotal for OTHER SORBENT		.59492000E+2	.95230371E-6
OTHER STABILIZATION MEDIA	AS	.45445400E+4	.72745618E-4
OTHER STABILIZATION MEDIA	BS	.97934485E+5	.15676624E-2
Subtotal for OTHER STABILIZATION MEDIA		.10247902E+6	.16404080E-2
PETROSET	AU	.10100000E+0	.16167329E-8
Subtotal for PETROSET		.10100000E+0	.16167329E-8

TABLE 4 (cont.)

BEATTY SORBENT AND SOLIDIFICATION MEDIA AND ACTIVITY
FOR 1987 THROUGH 1989

SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
PETROSET I AND II	AU	.64226000E+4	.10280820E-3
Subtotal for PETROSET I AND II		.64226000E+4	.10280820E-3
PETROSET II	AU	.39158810E+4	.62682512E-4
Subtotal for PETROSET II		.39158810E+4	.62682512E-4
SAFE-N-DRI	AU	.20859500E+4	.33390336E-4
Subtotal for SAFE-N-DRI		.20859500E+4	.33390336E-4
SAFE-T-SORB	AU	.25098900E+3	.40176453E-5
Subtotal for SAFE-T-SORB		.25098900E+3	.40176453E-5
SPEEDI DRI	AU	.25235600E+3	.40395272E-5
Subtotal for SPEEDI DRI		.25235600E+3	.40395272E-5
STOCK EQUIPMENT CEMENT	AU	.82610000E+2	.13223594E-5
Subtotal for STOCK EQUIPMENT CEMENT		.82610000E+2	.13223594E-5
STRUCTURAL CONCRETE	AS	.32878286E+6	.52629117E-2
STRUCTURAL CONCRETE	AU	.16177838E+7	.25896281E-1
STRUCTURAL CONCRETE	BS	.28615801E+7	.45806048E-1
STRUCTURAL CONCRETE	CS	.10989709E+7	.17591510E-1
Subtotal for STRUCTURAL CONCRETE		.59071178E+7	.94556751E-1
WESTINGHOUSE-HITTMAN CEMENT	AS	.17445384E+7	.27925274E-1
WESTINGHOUSE-HITTMAN CEMENT	AU	.10254511E+7	.16414659E-1
Subtotal for WESTINGHOUSE-HITTMAN CEMENT		.27699895E+7	.44339933E-1
ZONOLITE GRADE#4	AU	.11101896E+5	.17771089E-3
Subtotal for ZONOLITE GRADE#4		.11101896E+5	.17771089E-3

TABLE 5

RICHLAND SORBENT AND SOLIDIFICATION MEDIA AND ACTIVITY
FOR 1987 THROUGH 1989

SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
(BLANK)	AS	.19607911E+6	.10977847E-2
(BLANK)	AU	.39184112E+7	.21937940E-1
(BLANK)	BS	.53337931E+7	.29862214E-1
(BLANK)	CS	.12526599E+8	.70132454E-1
Subtotal for (BLANK)		.21974883E+8	.12303039E+0
AQUASET	AU	.61129590E+5	.34224517E-3
Subtotal for AQUASET		.61129590E+5	.34224517E-3
AQUASET I AND II	AU	.41544480E+4	.23259435E-4
Subtotal for AQUASET I AND II		.41544480E+4	.23259435E-4
AQUASET II	AU	.48801270E+4	.27322281E-4
Subtotal for AQUASET II		.48801270E+4	.27322281E-4
ASPHALT	AS	.57400860E+4	.32136919E-4
ASPHALT	AU	.23776590E+5	.13311758E-3
Subtotal for ASPHALT		.29516676E+5	.16525449E-3
BITUMEN (ATI & Waste Chem)	AU	.11107810E+6	.62189105E-3
Subtotal for BITUMEN (ATI & Waste Chem)		.11107810E+6	.62189105E-3
CELETOM	AU	.31929500E+3	.17876313E-5
Subtotal for CELETOM		.31929500E+3	.17876313E-5
CHEM-NUCLEAR CEMENT	AS	.37636926E+5	.21071720E-3
CHEM-NUCLEAR CEMENT	AU	.75718620E+4	.42392451E-4
CHEM-NUCLEAR CEMENT	CS	.14640000E+3	.81964712E-6
Subtotal for CHEM-NUCLEAR CEMENT		.45355188E+5	.25392930E-3
CHEMSIL 30	AU	.44902200E+3	.25139316E-5
Subtotal for CHEMSIL 30		.44902200E+3	.25139316E-5
CHEMSIL 3030	AU	.45127812E+5	.25265629E-3
Subtotal for CHEMSIL 3030		.45127812E+5	.25265629E-3
CHEMSIL 50	AU	.35180220E+4	.19696288E-4
Subtotal for CHEMSIL 50		.35180220E+4	.19696288E-4
CONCRETE (2500 PSI)	AS	.31487100E+3	.17628627E-5
CONCRETE (2500 PSI)	AU	.38748068E+6	.21693813E-2
CONCRETE (2500 PSI)	BS	.15005601E+6	.84011600E-3
CONCRETE (2500 PSI)	CS	.65306742E+5	.36563171E-3
Subtotal for CONCRETE (2500 PSI)		.60315830E+6	.33768919E-2

TABLE 5 (cont.)

RICHLAND SORBENT AND SOLIDIFICATION MEDIA AND ACTIVITY
FOR 1987 THROUGH 1989

SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
DELAWARE CUSTOM MEDIA	AS	.13151900E+3	.73633313E-6
DELAWARE CUSTOM MEDIA	AU	.41909759E+5	.23463943E-3
Subtotal for DELAWARE CUSTOM MEDIA		.42041278E+5	.23537577E-3
DIATOMACEOUS EARTH	AU	.12984000E+2	.72693294E-7
Subtotal for DIATOMACEOUS EARTH		.12984000E+2	.72693294E-7
DICAPERL HP200	AU	.40326600E+3	.22577583E-5
Subtotal for DICAPERL HP200		.40326600E+3	.22577583E-5
DICAPERL HP500	AU	.13075000E+2	.73202774E-7
Subtotal for DICAPERL HP500		.13075000E+2	.73202774E-7
ENVIROSTONE	AS	.59349280E+4	.33227777E-4
ENVIROSTONE	AU	.64291008E+5	.35994494E-3
ENVIROSTONE	BS	.35625151E+6	.19945391E-2
ENVIROSTONE	CS	.29524000E+3	.16529550E-5
Subtotal for ENVIROSTONE		.42677268E+6	.23893648E-2
FLOOR DRY/SUPERFINE	AS	.43283369E+5	.24232984E-3
FLOOR DRY/SUPERFINE	AU	.17255894E+7	.96610275E-2
FLOOR DRY/SUPERFINE	BS	.69179393E+5	.38731346E-3
FLOOR DRY/SUPERFINE	CS	.19534682E+6	.10936848E-2
Subtotal for FLOOR DRY/SUPERFINE		.20333990E+7	.11384355E-1
FLORCO	AU	.47282000E+2	.26471690E-6
Subtotal for FLORCO		.47282000E+2	.26471690E-6
FLORCO & FLORCO X	AU	.31770900E+3	.17787518E-5
Subtotal for FLORCO & FLORCO X		.31770900E+3	.17787518E-5
FLORCO X	AU	.12930000E+2	.72390965E-7
Subtotal for FLORCO X		.12930000E+2	.72390965E-7
HI DRI	AU	.33894110E+5	.18976236E-3
Subtotal for HI DRI		.33894110E+5	.18976236E-3
LN TECH CEMENT	AS	.13765309E+6	.77067595E-3
LN TECH CEMENT	BS	.60951577E+6	.34124853E-2
LN TECH CEMENT	CS	.15591722E+6	.87293104E-3
Subtotal for LN TECH CEMENT		.90308608E+6	.50560923E-2

TABLE 5 (cont.)

RICHLAND SORBENT AND SOLIDIFICATION MEDIA AND ACTIVITY
FOR 1987 THROUGH 1989

SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
NONE REQUIRED	AS	.74886119E+5	.41926360E-3
NONE REQUIRED	AU	.53523268E+7	.29965978E-1
NONE REQUIRED	BS	.61259625E+8	.34297319E+0
NONE REQUIRED	CS	.36642884E+8	.20515187E+0
Subtotal for NONE REQUIRED		.10332972E+9	.57851031E+0
OTHER	AS	.85199750E+4	.47700635E-4
OTHER	AU	.25465960E+5	.14257582E-3
OTHER	BS	.22903564E+6	.12822978E-2
Subtotal for OTHER		.26302158E+6	.14725743E-2
OTHER SOLIDIFICATION MEDIA	AU	.85808530E+5	.48041472E-3
Subtotal for OTHER SOLIDIFICATION MEDIA		.85808530E+5	.48041472E-3
OTHER SORBENT	AS	.83484900E+3	.46740545E-5
OTHER SORBENT	AU	.46011720E+4	.25760501E-4
Subtotal for OTHER SORBENT		.54360210E+4	.30434556E-4
OTHER STABILIZATION MEDIA	AS	.15287945E+6	.85592355E-3
Subtotal for OTHER STABILIZATION MEDIA		.15287945E+6	.85592355E-3
PETROSET	AU	.46200000E+2	.25865913E-6
Subtotal for PETROSET		.46200000E+2	.25865913E-6
PETROSET I AND II	AU	.16846600E+3	.94318765E-6
Subtotal for PETROSET I AND II		.16846600E+3	.94318765E-6
PETROSET II	AU	.69096000E+2	.38684657E-6
Subtotal for PETROSET II		.69096000E+2	.38684657E-6
SAFE-N-DRI	AU	.39523073E+5	.22127713E-3
Subtotal for SAFE-N-DRI		.39523073E+5	.22127713E-3
SAFE-T-SORB	AU	.10793369E+5	.60428646E-4
Subtotal for SAFE-T-SORB		.10793369E+5	.60428646E-4
SOLID-A-SORB	AU	.41682240E+4	.23336563E-4
Subtotal for SOLID-A-SORB		.41682240E+4	.23336563E-4
SPEEDI DRI	AS	.35048930E+4	.19622783E-4
SPEEDI DRI	AU	.26367828E+6	.14762509E-2
SPEEDI DRI	BS	.56081370E+4	.31398178E-4
Subtotal for SPEEDI DRI		.27279131E+6	.15272719E-2

TABLE 5 (cont.)

RICHLAND SORBENT AND SOLIDIFICATION MEDIA AND ACTIVITY
FOR 1987 THROUGH 1989

SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
STOCK EQUIPMENT CEMENT	AU	.17530000E+1	.98144905E-8
Subtotal for STOCK EQUIPMENT CEMENT		.17530000E+1	.98144905E-8
STRUCTURAL CONCRETE	AS	.52914069E+5	.29624907E-3
STRUCTURAL CONCRETE	AU	.21513525E+7	.12044740E-1
STRUCTURAL CONCRETE	BS	.44790945E+8	.25077028E+0
STRUCTURAL CONCRETE	CS	.86674862E+6	.48526504E-2
Subtotal for STRUCTURAL CONCRETE		.47861960E+8	.26796392E+0
WESTINGHOUSE-HITTMAN CEMENT	AU	.18486030E+5	.10349741E-3
Subtotal for WESTINGHOUSE-HITTMAN CEMENT		.18486030E+5	.10349741E-3
ZONOLITE GRADE#4	AS	.58887150E+4	.32969046E-4
ZONOLITE GRADE#4	AU	.21929751E+5	.12277771E-3
ZONOLITE GRADE#4	BS	.21718323E+6	.12159400E-2
Subtotal for ZONOLITE GRADE#4		.24500170E+6	.13716867E-2

TABLE 6

RADIONUCLIDES DISPOSED AT BARNWELL
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
FE-55	.2700E+1	.53538E+6	46.339071812
CO-60	.5270E+1	.37656E+6	32.592627445
MN-54	.8560E+0	.54230E+5	4.693802279
NI-63	.1000E+3	.43666E+5	3.779449942
H-3	.1233E+2	.32159E+5	2.783477549
CO-58	.1940E+0	.28622E+5	2.477337430
CS-137	.3017E+2	.22287E+5	1.929020310
ZN-65	.6680E+0	.14783E+5	1.279522019
CS-134	.2062E+1	.96670E+4	0.836713749
CR-51	.7592E-1	.90010E+4	0.779069045
SR-90	.2900E+2	.51607E+4	0.446677216
AG-110M	.6904E+0	.39144E+4	0.338808048
SB-125	.2730E+1	.29011E+4	0.251100678
NB-95	.9600E-1	.27058E+4	0.234196758
CE-144	.7790E+0	.21418E+4	0.185380522
ZR-95	.1750E+0	.14632E+4	0.126645242
Y-91	.1610E+0	.13268E+4	0.114839330
PM-147	.2623E+1	.13214E+4	0.114371940
TH-232	.140E+11	.11131E+4	0.096342823
SR-89	.1380E+0	.89290E+3	0.077283719
U-238	.447E+10	.79960E+3	0.069208267
HF-181	.1160E+0	.76716E+3	0.066400641
I-131	.2200E-1	.75967E+3	0.065752181
FE-59	.1220E+0	.61460E+3	0.053195849
U-DEP	.447E+10	.40790E+3	0.035305218
HF-175	.1920E+0	.33800E+3	0.029255120
C-14	.5730E+4	.33138E+3	0.028682135
CE-141	.8900E-1	.32717E+3	0.028317745
RU-103	.1080E+0	.26148E+3	0.022632038
NI-59	.8000E+5	.18026E+3	0.015602154
RU-106	.1008E+1	.17153E+3	0.014846541
KR-85	.1072E+2	.13091E+3	0.011330733
CO-57	.7420E+0	.12521E+3	0.010837378
SB-124	.1650E+0	.89712E+2	0.007764897
PU-241	.1470E+2	.89310E+2	0.007730103
BA-140	.3500E-1	.74550E+2	0.006452572
SB-122	.7452E-2	.61420E+2	0.005316123
TE-125M	.1590E+0	.57194E+2	0.004950347
AG-110	.7769E-6	.40182E+2	0.003477897
SN-113	.3150E+0	.39624E+2	0.003429600
I-125	.1640E+0	.39114E+2	0.003385458
LA-140	.4592E-2	.35425E+2	0.003066162
TA-182	.3150E+0	.35290E+2	0.003054477

TABLE 6 (cont.)

RADIONUCLIDES DISPOSED AT BARNWELL
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
XE-131M	.3300E-1	.29123E+2	0.002520701
P-32	.3900E-1	.26769E+2	0.002316954
BA-131	.3200E-1	.25721E+2	0.002226245
TC-99	.2130E+6	.23155E+2	0.002004149
BI-207	.3800E+2	.22765E+2	0.001970393
CS-136	.3600E-1	.20295E+2	0.001756606
XE-131	.0000E+0	.19627E+2	0.001698788
S-35	.2390E+0	.11581E+2	0.001002377
XE-133	.1400E-1	.10155E+2	0.000878952
SR-92	.3094E-3	.98930E+1	0.000856275
CO-59	.0000E+0	.97530E+1	0.000844157
I-133	.2374E-2	.79420E+1	0.000687409
BE-7	.1460E+0	.75050E+1	0.000649585
U-234	.2440E+6	.63950E+1	0.000553510
BA-133	.1070E+3	.57390E+1	0.000496731
CD-109	.1240E+1	.48600E+1	0.000420651
CM-242	.4460E+0	.45900E+1	0.000397281
U-235	.7040E+9	.42970E+1	0.000371921
MO-99	.7537E-2	.42230E+1	0.000365515
CE-143	.3767E-2	.27800E+1	0.000240619
EU-154	.8200E+1	.25510E+1	0.000220798
I-129	.1590E+8	.22930E+1	0.000198467
NB-94	.2000E+5	.22270E+1	0.000192755
RH-105	.4053E-2	.22210E+1	0.000192236
NB-97	.1400E-3	.16330E+1	0.000141342
CS-135	.2300E+7	.15050E+1	0.000130263
TRU	.0000E+0	.14320E+1	0.000123945
XE-133M	.6000E-2	.14260E+1	0.000123425
TC-99M	.6872E-3	.13520E+1	0.000117020
CO-56	.2150E+0	.12500E+1	0.000108192
BA-137M	.4855E-5	.11690E+1	0.000101181
RA-226	.1600E+4	.11430E+1	0.000098931
NI-65	.2880E-3	.10150E+1	0.000087852
CU-64	.1451E-2	.89800E+0	0.000077725
AM-241	.4320E+3	.87800E+0	0.000075994
I-134	.1000E-3	.85800E+0	0.000074263
PU-239	.2411E+5	.73200E+0	0.000063357
CM-244	.1811E+2	.63500E+0	0.000054962
PU-238	.8774E+2	.61100E+0	0.000052884
RU-105	.5068E-3	.55500E+0	0.000048037
GD-153	.6620E+0	.52600E+0	0.000045527
EU-155	.4760E+1	.50000E+0	0.000043277
IR-192	.2030E+0	.39400E+0	0.000034102

TABLE 6 (cont.)

RADIONUCLIDES DISPOSED AT BARNWELL
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
CA-45	.4470E+0	.31300E+0	0.000027091
TE-125	.0000E+0	.30700E+0	0.000026572
CM-243	.2850E+2	.26700E+0	0.000023110
SE-75	.3290E+0	.22700E+0	0.000019648
NA-24	.1715E-2	.22000E+0	0.000019042
TRU-NOS	.0000E+0	.18700E+0	0.000016186
NA-22	.2601E+1	.18700E+0	0.000016186
PB-210	.2230E+2	.18000E+0	0.000015580
SC-46	.2300E+0	.16000E+0	0.000013849
PR-NOS	.0000E+0	.15000E+0	0.000012983
U-236	.2342E+8	.13700E+0	0.000011858
PU-240	.6537E+4	.13700E+0	0.000011858
TL-204	.3770E+1	.11900E+0	0.000010300
CS-138	.6126E-4	.11100E+0	0.000009607
SR-85	.1790E+0	.10200E+0	0.000008828
XE-135	.1000E-2	.92000E-1	0.000007963
NP-239	.6438E-2	.90000E-1	0.000007790
AS-76	.3002E-2	.81000E-1	0.000007011
IN-111	.7753E-2	.74000E-1	0.000006405
CM-248	.3390E+6	.63000E-1	0.000005453
PU-242	.3760E+6	.60000E-1	0.000005193
GE-68	.7860E+0	.49000E-1	0.000004241
I-126	.3560E-1	.47000E-1	0.000004068
EU-152	.1340E+2	.45000E-1	0.000003895
PO-210	.3790E+0	.42000E-1	0.000003635
CL-36	.3010E+6	.39000E-1	0.000003376
TE-132	.8904E-2	.36000E-1	0.000003116
I-132	.2610E-3	.35000E-1	0.000003029
TL-201	.8333E-2	.27000E-1	0.000002337
ND-NOS	.0000E+0	.24000E-1	0.000002077
K-40	.128E+10	.23000E-1	0.000001991
RB-86	.5100E-1	.21000E-1	0.000001818
NP-237	.2140E+7	.20000E-1	0.000001731
GA-67	.8938E-2	.18000E-1	0.000001558
IN-114	.2280E-5	.13000E-1	0.000001125
PR-144	.3287E-4	.12000E-1	0.000001039
RH-106	.9481E-6	.11000E-1	0.000000952
IN-114M	.1356E+0	.11000E-1	0.000000952
CE-139	.3770E+0	.11000E-1	0.000000952
AU-198	.7386E-2	.10000E-1	0.000000866
CF-252	.2640E+1	.90000E-2	0.000000779
AG-108M	.1300E+3	.80000E-2	0.000000692
Y-88	.2920E+0	.70000E-2	0.000000606

TABLE 6 (cont.)

RADIONUCLIDES DISPOSED AT BARNWELL
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
PO-218	.5803E-5	.60000E-2	0.000000519
AM-242	.1829E-2	.40000E-2	0.000000346
SN-117M	.3800E-1	.30000E-2	0.000000260
W-187	.?728E-2	.20000E-2	0.000000173
SI-NOS	.0000E+0	.20000E-2	0.000000173
P-33	.6900E-1	.20000E-2	0.000000173
HG-203	.1280E+0	.20000E-2	0.000000173
U-237	.1800E-1	.10000E-2	0.000000087
RH-103	.0000E+0	.10000E-2	0.000000087
PA-234	.7648E-3	.10000E-2	0.000000087
PA-233	.7400E-1	.10000E-2	0.000000087
LA-141	.4490E-3	.10000E-2	0.000000087
AU-195	.5040E+0	.10000E-2	0.000000087
YB-169	.8800E-1	.38000E-3	0.000000033
CS-144	.3171E-7	.35000E-3	0.000000030
NB-93	.0000E+0	.32000E-3	0.000000028
CR-57	.6659E-6	.20000E-3	0.000000017
DY-NOS	.0000E+0	.10000E-3	0.000000009
ND-147	.3011E-2	.90000E-4	0.000000008
TH-228	.1913E+1	.69999E-4	0.000000006
AM-243	.7380E+4	.40000E-4	0.000000003
TH-230	.7700E+5	.20000E-4	0.000000002
PU-234	.1000E-2	.20000E-4	0.000000002
I-123	.1507E-2	.20000E-4	0.000000002
TE-129M	.9200E-1	.10000E-4	0.000000001
BI-210	.1373E-1	.10000E-4	0.000000001
Y-90	.7306E-2	.00000E+0	0.000000000

TABLE 7

RADIONUCLIDES DISPOSED AT BEATTY
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
H-3	.1233E+2	.35105E+5	56.188731394
CO-60	.5270E+1	.14659E+5	23.464497461
CS-137	.3017E+2	.56848E+4	9.099037181
FE-55	.2700E+1	.41962E+4	6.716398082
MN-54	.8560E+0	.83630E+3	1.338573880
CR-51	.7592E-1	.50178E+3	0.803144328
NI-63	.1000E+3	.36374E+3	0.582198808
CO-58	.1940E+0	.25778E+3	0.412600233
U-238	.447E+10	.13672E+3	0.218832741
KR-85	.1072E+2	.10718E+3	0.171557698
SR-90	.2900E+2	.10428E+3	0.166909583
I-125	.1640E+0	.89410E+2	0.143108801
CS-134	.2062E+1	.83400E+2	0.133489252
C-14	.5730E+4	.57376E+2	0.091835484
ZN-65	.6680E+0	.52950E+2	0.084751270
P-32	.3900E-1	.48431E+2	0.077518201
FE-59	.1220E+0	.48122E+2	0.077023619
RA-226	.1600E+4	.40867E+2	0.065411334
IR-192	.2030E+0	.21778E+2	0.034857661
S-35	.2390E+0	.19855E+2	0.031779725
SB-124	.1650E+0	.14145E+2	0.022640353
CO-57	.7420E+0	.11427E+2	0.018289948
AG-110M	.6904E+0	.44140E+1	0.007065007
AM-241	.4320E+3	.40970E+1	0.006557619
I-131	.2200E-1	.28840E+1	0.004616103
PM-147	.2623E+1	.28290E+1	0.004528071
NI-59	.8000E+5	.24660E+1	0.003947056
NB-95	.9600E-1	.15920E+1	0.002548140
PU-241	.1470E+2	.13870E+1	0.002220019
CE-144	.7790E+0	.12160E+1	0.001946318
U-234	.2440E+6	.11630E+1	0.001861487
TH-232	.140E+11	.10560E+1	0.001690224
NA-22	.2601E+1	.96300E+0	0.001541369
GD-153	.6620E+0	.79600E+0	0.001274070
ZR-95	.1750E+0	.79000E+0	0.001264467
TC-99	.2130E+6	.73200E+0	0.001171632
AG-108M	.1300E+3	.72500E+0	0.001160428
EU-155	.4760E+1	.69900E+0	0.001118813
SB-125	.2730E+1	.67400E+0	0.001078798
EU-154	.8200E+1	.67200E+0	0.001075597
CA-45	.4470E+0	.64000E+0	0.001024378
PB-210	.2230E+2	.63100E+0	0.001009973
PO-210	.3790E+0	.59000E+0	0.000944348

TABLE 7 (cont.)

RADIONUCLIDES DISPOSED AT BEATTY
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
TL-201	.8333E-2	.47900E+0	0.000766683
U-DEP	.447E+10	.47300E+0	0.000757079
CD-109	.1240E+1	.46900E+0	0.000750677
U-NAT	.447E+10	.26700E+0	0.000427358
RA-225	.4055E-1	.26500E+0	0.000424156
AU-195	.5040E+0	.15900E+0	0.000254494
PU-238	.8774E+2	.15100E+0	0.000241689
IN-111	.7753E-2	.13600E+0	0.000217680
PU-239	.2411E+5	.10400E+0	0.000166461
SR-89	.1380E+0	.10000E+0	0.000160059
CM-242	.4450E+0	.96000E-1	0.000153657
CL-36	.3010E+6	.91000E-1	0.000145654
SC-46	.2300E+0	.89000E-1	0.000142453
SR-85	.1790E+0	.88000E-1	0.000140852
XE-133	.1400E-1	.86000E-1	0.000137651
AG-110	.7769E-6	.86000E-1	0.000137651
CE-141	.8900E-1	.82000E-1	0.000131248
RB-86	.5100E-1	.73000E-1	0.000116843
TH-NAT	.140E+11	.67000E-1	0.000107240
SE-75	.3290E+0	.65000E-1	0.000104038
Y-90	.7306E-2	.63000E-1	0.000100837
U-235	.7040E+9	.62000E-1	0.000099237
BA-133	.1070E+3	.61000E-1	0.000097636
SM-151	.9300E+2	.59000E-1	0.000094435
TL-204	.3770E+1	.57000E-1	0.000091234
SR-91	.1087E-2	.55000E-1	0.000088032
SN-113	.3150E+0	.54000E-1	0.000086432
I-129	.1590E+8	.48000E-1	0.000076828
NB-94	.2000E+5	.47000E-1	0.000075228
CM-244	.1811E+2	.41000E-1	0.000065624
RU-103	.1080E+0	.36000E-1	0.000057621
PU-240	.6537E+4	.32000E-1	0.000051219
NB-93M	.1360E+2	.32000E-1	0.000051219
I-124	.1142E-1	.31000E-1	0.000049618
TC-99M	.6872E-3	.30000E-1	0.000048018
GE-68	.7860E+0	.30000E-1	0.000048018
U-233	.1592E+6	.29000E-1	0.000046417
TE-123	.120E+14	.29000E-1	0.000046417
RU-106	.8938E-2	.25000E-1	0.000040015
GA-67	.2140E+0	.25000E-1	0.000040015
CS-136	.3600E-1	.24000E-1	0.000038414
Y-88	.2920E+0	.20000E-1	0.000032012
TA-182	.3100E+0	.19000E-1	0.000030411

TABLE 7 (cont.)

RADIONUCLIDES DISPOSED AT BEATTY
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
PT-195M	.1100E-1	.13000E-1	0.000020808
EU-152	.1340E+2	.11000E-1	0.000017606
U-236	.2342E+8	.10000E-1	0.000016006
TA-181	.0000E+0	.10000E-1	0.000016006
NI-65	.2880E-3	.10000E-1	0.000016006
BA-140	.3500E-1	.10000E-1	0.000016006
LA-140	.4529E-2	.90000E-2	0.000014405
W-178	.5900E-1	.70000E-2	0.000011204
TE-125M	.1590E+0	.70000E-2	0.000011204
I-123	.1507E-2	.60000E-2	0.000009604
PT-195	.0000E+0	.50000E-2	0.000008003
HF-181	.1160E+0	.50000E-2	0.000008003
SC-47	.9432E-2	.40000E-2	0.000006402
IN-114	.2280E-5	.40000E-2	0.000006402
PU-242	.3760E+6	.30000E-2	0.000004802
AC-227	.2177E+2	.30000E-2	0.000004802
YB-169	.8800E-1	.20000E-2	0.000003201
TH-230	.7700E+5	.20000E-2	0.000003201
NA-24	.1715E-2	.20000E-2	0.000003201
MO-99	.7537E-2	.20000E-2	0.000003201
CM-243	.2850E+2	.20000E-2	0.000003201
BE-7	.1460E+0	.20000E-2	0.000003201
W-185	.2060E+0	.10000E-2	0.000001601
TH-235	.1312E-4	.10000E-2	0.000001601
TH-228	.1913E+1	.10000E-2	0.000001601
IN-114M	.1356E+0	.10000E-2	0.000001601
I-121	.2420E-3	.10000E-2	0.000001601
HF-175	.1920E+0	.10000E-2	0.000001601
CO-56	.2150E+0	.10000E-2	0.000001601
CF-252	.2640E+1	.10000E-2	0.000001601
BI-207	.3800E+2	.10000E-2	0.000001601
AM-243	.7380E+4	.10000E-2	0.000001601
AG-105	.1130E+0	.10000E-2	0.000001601
RA-228	.5750E+1	.45600E-3	0.000000730
BI-210	.1373E-1	.41100E-3	0.000000658
PB-203	.5950E-2	.38999E-3	0.000000624
NI-61	.0000E+0	.36000E-3	0.000000576
CU-67	.7043E-2	.32299E-3	0.000000517
P-33	.6900E-1	.27000E-3	0.000000432
HG-203	.1280E+0	.25999E-3	0.000000416
CL-32	.9418E-8	.20400E-3	0.000000327
SN-111	.6716E-4	.14600E-3	0.000000234
U-239	.4470E-4	.14300E-3	0.000000229

TABLE 7 (cont.)

RADIONUCLIDES DISPOSED AT BEATTY
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
IN-113	.0000E+0	.13500E-3	0.000000216
NP-237	.2140E+7	.12999E-3	0.000000208
OS-191	.4200E-1	.10000E-3	0.000000160
CL-38	.7077E-4	.10000E-3	0.000000160
AS-76	.3002E-2	.85000E-4	0.000000136
CM-241	.8986E-1	.78999E-4	0.000000126
CS-135	.2300E+7	.63000E-4	0.000000101
K-40	.128E+10	.43999E-4	0.000000070
SN-119	.0000E+0	.40000E-4	0.000000064
AL-26	.7300E+6	.40000E-4	0.000000064
NA-20	.1413E-7	.30000E-4	0.000000048
CA-47	.1244E-1	.28000E-4	0.000000045
XE-127	.1000E+0	.26999E-4	0.000000043
TE-123M	.3280E+0	.26999E-4	0.000000043
SN-125	.2644E-1	.25999E-4	0.000000042
RU-105	.5068E-3	.23000E-4	0.000000037
ZR-97	.1918E-2	.20999E-4	0.000000034
TM-171	.1920E+1	.20000E-4	0.000000032
SB-122	.7452E-2	.19000E-4	0.000000030
PA-231	.3280E+5	.18000E-4	0.000000029
V-48	.4378E-1	.10000E-4	0.000000016
TB-158	.1500E+3	.10000E-4	0.000000016
TB-157	.1500E+3	.10000E-4	0.000000016
BR-85	.5460E-5	.10000E-4	0.000000016
BA-137	.0000E+0	.10000E-4	0.000000016
U-232	.7200E+2	.99999E-5	0.000000016
SR-86	.0000E+0	.99999E-5	0.000000016
SN-119M	.8030E+0	.99999E-5	0.000000016
RB-83	.2360E+0	.99999E-5	0.000000016
PR-147	.2589E-4	.99999E-5	0.000000016
PA-233	.7400E-1	.99999E-5	0.000000016
ND-147	.3011E-2	.99999E-5	0.000000016
MO-93	.3500E+4	.99999E-5	0.000000016
HO-166	.3059E-2	.99999E-5	0.000000016
EU-157	.1729E-2	.99999E-5	0.000000016
CD-115	.6107E-2	.99999E-5	0.000000016
CD-113	.900E+16	.99999E-5	0.000000016
BI-214	.3770E-4	.99999E-5	0.000000016
BA-137M	.4855E-5	.99999E-5	0.000000016
SN-131	.1585E-5	.90000E-5	0.000000014
CE-139	.3770E+0	.90000E-5	0.000000014
RI-205	.4200E-1	.90000E-5	0.000000014
FE-57	.0000E+0	.69999E-5	0.000000011

TABLE 7 (cont.)

RADIONUCLIDES DISPOSED AT BEATTY
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
W-188	.1900E+0	.60000E-5	0.000000010
TE-129M	.9200E-1	.30000E-5	0.000000005
TB-160	.1980E+0	.30000E-5	0.000000005
PT-193	.5000E+2	.30000E-5	0.000000005
PO-208	.2898E+1	.30000E-5	0.000000005
PA-234	.7648E-3	.30000E-5	0.000000005
TA-179	.1820E+1	.19999E-5	0.000000003
GD-148	.9300E+2	.19999E-5	0.000000003
DY-159	.3950E+0	.19999E-5	0.000000003
CU-64	.1451E-2	.19999E-5	0.000000003
AU-198	.7386E-2	.19999E-5	0.000000003

TABLE 8

RADIONUCLIDES DISPOSED AT RICHLAND
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (CI)	PERCENT OF TOTAL ACTIVITY
H-3	.1233E+2	.11174E+6	62.559669136
FE-55	.2700E+1	.20782E+5	11.635345974
CO-60	.5270E+1	.16532E+5	9.256039527
CS-137	.3017E+2	.85739E+4	4.800226138
SR-90	.2900E+2	.62772E+4	3.514404432
CS-134	.2062E+1	.25373E+4	1.420553599
NI-63	.1000E+3	.21115E+4	1.182198413
ZN-65	.6680E+0	.19204E+4	1.075190768
CO-58	.1940E+0	.18686E+4	1.046204037
MN-54	.8560E+0	.13699E+4	0.766970702
CR-51	.7592E-1	.13561E+4	0.759278231
PM-147	.2623E+1	.87044E+3	0.487324751
S-35	.2390E+0	.45281E+3	0.253513945
C-14	.5730E+4	.40768E+3	0.228248601
SB-124	.1650E+0	.29532E+3	0.165341096
P-32	.3900E-1	.20965E+3	0.117374565
NI-63AM	.1000E+3	.17055E+3	0.095484055
NB-95	.9600E-1	.15581E+3	0.087235084
AG-110M	.6904E+0	.14328E+3	0.080221162
I-125	.1640E+0	.14186E+3	0.079425042
SB-125	.2730E+1	.10344E+3	0.057912437
KR-85	.1072E+2	.80418E+2	0.045022789
ZR-95	.1750E+0	.66972E+2	0.037494917
FE-59	.1220E+0	.59294E+2	0.033196315
U-238	.447E+10	.54101E+2	0.030288964
I-131	.2200E-1	.40302E+2	0.022563462
TH-NAT	.140E+11	.39762E+2	0.022261137
RU-106	.1008E+1	.37019E+2	0.020725443
CE-144	.7790E+0	.29564E+2	0.016551689
TE-125M	.1590E+0	.20225E+2	0.011323160
NI-59	.8000E+5	.18371E+2	0.010285181
CO-57	.7420E+0	.15586E+2	0.008725972
SR-89	.1380E+0	.15574E+2	0.008719253
PU-241	.1470E+2	.13417E+2	0.007511636
BE-7	.1460E+0	.11680E+2	0.006539160
U-NAT	.447E+10	.10312E+2	0.005773272
LA-140	.4592E-2	.95150E+1	0.005327064
CD-109	.1240E+1	.90860E+1	0.005086884
SN-113	.3150E+0	.76820E+1	0.00430084[illegible]
BA-140	.3500E-1	.71600E+1	0.004008595
RA-226	.1600E+4	.46520E+1	0.002604467
TC-99	.2130E+6	.45580E+1	0.002551840
CA-45	.4470E+0	.43300E+1	0.002424192

TABLE 8 (cont.)

RADIONUCLIDES DISPOSED AT RICHLAND
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
PO-210	.3790E+0	.39960E+1	0.002237199
TC-99M	.6872E-3	.28310E+1	0.001584963
SE-75	.3290E+0	.25270E+1	0.001414765
RU-103	.1080E+0	.20170E+1	0.001129237
CE-141	.8900E-1	.19160E+1	0.001072691
NA-22	.2601E+1	.17900E+1	0.001002149
SM-151	.9300E+2	.14890E+1	0.000833631
AG-110	.7769E-6	.14110E+1	0.000789962
XE-133	.1400E-1	.11340E+1	0.000634881
U-234	.2440E+6	.89700E+0	0.000502194
SC-46	.2300E+0	.81600E+0	0.000456845
IN-111	.7753E-2	.77900E+0	0.000436131
NI-65	.2880E-3	.76900E+0	0.000430532
CL-36	.3010E+6	.74100E+0	0.000414856
SR-85	.1790E+0	.73900E+0	0.000413736
CS-136	.3600E-1	.66200E+0	0.000370627
TL-201	.8333E-2	.63600E+0	0.000356071
AM-241	.4320E+3	.59700E+0	0.000334236
GD-153	.6620E+0	.54900E+0	0.000307363
IR-192	.2030E+0	.44300E+0	0.000248018
I-129	.1590E+8	.42800E+0	0.000239620
U-235	.7040E+9	.42600E+0	0.000238500
I-123	.1507E-2	.41400E+0	0.000231782
RB-86	.5100E-1	.38300E+0	0.000214426
PU-239	.2411E+5	.35800E+0	0.000200430
GA-67	.8938E-2	.34600E+0	0.000193711
EU-155	.4760E+1	.27900E+0	0.000156201
HF-181	.1160E+0	.24000E+0	0.000134366
CM-242	.4460E+0	.22900E+0	0.000128208
TH-232	.140E+11	.22800E+0	0.000127648
SN-119M	.8030E+0	.19200E+0	0.000107493
BA-133	.1070E+2	.18800E+0	0.000105254
RH-106	.9481E-6	.16500E+0	0.000092377
SR-92	.3094E-3	.15500E+0	0.000086778
EU-152	.1340E+2	.15000E+0	0.000083979
GE-68	.7860E+0	.14400E+0	0.000080620
MO-99	.7537E-2	.12900E+0	0.000072222
PB-210	.2230E+2	.12500E+0	0.000069982
PU-238	.8774E+2	.12300E+0	0.000068863
I-133	.2374E-2	.11600E+0	0.000064944
CD-113M	.1460E+2	.11100E+0	0.000062144
PU-240	.6537E+4	.10500E+0	0.000058785
XE-131M	.3300E-1	.10200E+0	0.000057106

TABLE 8 (cont.)

RADIONUCLIDES DISPOSED AT RICHLAND
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
TE-123M	.3280E+0	.88000E-1	0.000049268
XE-131	.0000E+0	.82000E-1	0.000045908
RB-83	.2360E+0	.79000E-1	0.000044229
NB-97	.1400E-3	.61000E-1	0.000034151
Y-90	.7306E-2	.58000E-1	0.000032472
TE-123	.120E+14	.56000E-1	0.000031352
HG-203	.1280E+0	.55000E-1	0.000030792
ZR-97	.1918E-2	.52000E-1	0.000029113
AU-195	.5040E+0	.50000E-1	0.000027993
NA-24	.1715E-2	.44000E-1	0.000024634
U-DEP	.447E+10	.37000E-1	0.000020715
RU-104	.0000E+0	.35000E-1	0.000019595
IN-114M	.1356E+0	.32000E-1	0.000017916
EU-154	.8200E+1	.32000E-1	0.000017916
SM-153	.5331E-2	.31000E-1	0.000017356
NB-94	.2000E+5	.28000E-1	0.000015676
CM-243	.2850E+2	.28000E-1	0.000015676
P-33	.6900E-1	.27000E-1	0.000015116
I-124	.1142E-1	.26000E-1	0.000014556
XE-127	.1000E+0	.25000E-1	0.000013996
SR-91	.1087E+2	.23000E-1	0.000012877
U-233	.1592E+6	.22000E-1	0.000012317
TL-204	.3770E+1	.22000E-1	0.000012317
SN-119	.0000E+0	.22000E-1	0.000012317
CS-127	.7078E-3	.21000E-1	0.000011757
CM-244	.1811E+2	.19000E-1	0.000010637
ZR-89	.8961E-2	.15000E-1	0.000008398
TL-202	.3751E-1	.14000E-1	0.000007838
NP-239	.6438E-2	.13000E-1	0.000007278
AG-108M	.1300E+3	.11000E-1	0.000006158
YB-169	.8800E-1	.90000E-2	0.000005039
TH-228	.1913E+1	.90000E-2	0.000005039
IN-114	.2280E-5	.90000E-2	0.000005039
TA-182	.3150E+0	.80000E-2	0.000004479
GA-68	.1296E-3	.80000E-2	0.000004479
RA-223	.5750E+1	.70000E-2	0.000003919
Y-88	.2920E+0	.60000E-2	0.000003359
PU-242	.3760E+6	.60000E-2	0.000003359
CS-144	.3171E-7	.60000E-2	0.000003359
BI-207	.3800E+2	.60000E-2	0.000003359
ZR-88	.2280E+0	.50000E-2	0.000002799
W-188	.1900E+0	.50000E-2	0.000002799
TE-125	.0000E+0	.50000E-2	0.000002799

TABLE 8 (cont.)

RADIONUCLIDES DISPOSED AT RICHLAND
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
RB-88	.3368E-4	.50000E-2	0.000002799
CU-67	.7043E-2	.50000E-2	0.000002799
CS-133	.0000E+0	.50000E-2	0.000002799
CO-59	.0000E+0	.50000E-2	0.000002799
BI-204	.1290E-2	.50000E-2	0.000002799
SB-122	.7452E-2	.40000E-2	0.000002239
PT-195	.0000E+0	.40000E-2	0.000002239
I-121	.2420E-3	.40000E-2	0.000002239
SR-95	.8245E-6	.30000E-2	0.000001680
CE-137	.1027E-2	.30000E-2	0.000001680
NP-237	.2140E+7	.20000E-2	0.000001120
I-128	.4756E-4	.20000E-2	0.000001120
CS-131	.2700E-1	.20000E-2	0.000001120
CO-56	.2150E+0	.20000E-2	0.000001120
AS-73	.2200E+0	.20000E-2	0.000001120
ZR-90M	.2539E-7	.10000E-2	0.000000560
ZN-63	.7250E-4	.10000E-2	0.000000560
TH-230	.7700E+5	.10000E-2	0.000000560
RH-102	.5670E+0	.10000E-2	0.000000560
RH-101	.3000E+1	.10000E-2	0.000000560
K-42	.1411E-2	.10000E-2	0.000000560
I-135	.7517E-3	.10000E-2	0.000000560
I-132	.2610E-3	.10000E-2	0.000000560
CF-252	.2640E+1	.10000E-2	0.000000560
CE-143	.3767E-2	.10000E-2	0.000000560
CA-47	.1244E-1	.10000E-2	0.000000560
U-232	.7200E+2	.41299E-3	0.000000231
I-137	.7770E-6	.40000E-3	0.000000224
DY-159	.3950E+0	.39300E-3	0.000000220
CE-139	.3770E+0	.33199E-3	0.000000186
PB-214	.5099E-4	.21000E-3	0.000000118
AU-193	.2009E-2	.20200E-3	0.000000113
FE-53	.1620E-4	.20000E-3	0.000000112
CE-147	.1776E-5	.17000E-3	0.000000095
K-40	.128E+10	.12799E-3	0.000000072
U-236	.2342E+8	.11799E-3	0.000000066
CD-115	.6107E-2	.11499E-3	0.000000064
DY-165	.2660E-3	.10999E-3	0.000000062
SC-41	.1900E-7	.10799E-3	0.000000060
AM-243	.7380E+4	.10600E-3	0.000000059
SN-117M	.3800E-1	.10000E-3	0.000000056
TE-132	.8904E-2	.99999E-4	0.000000056
RB-95	.1205E-7	.99999E-4	0.000000056

TABLE 8 (cont.)

RADIONUCLIDES DISPOSED AT RICHLAND
1987 THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
MN-51	.8789E-4	.99999E-4	0.000000056
EU-151	.0000E+0	.99999E-4	0.000000056
CS-141	.7959E-6	.99999E-4	0.000000056
CS-139	.1790E-4	.99999E-4	0.000000056
TL-208	.5810E-5	.81000E-4	0.000000045
SB-126	.3400E-1	.80000E-4	0.000000045
IN-113	.0000E+0	.80000E-4	0.000000045
SN-117	.0000E+0	.76000E-4	0.000000043
CE-134	.8333E-2	.76000E-4	0.000000043
AM-247	.4186E-4	.72999E-4	0.000000041
PB-212	.1215E-2	.60999E-4	0.000000034
C-15	.777CE-7	.60000E-4	0.000000034
AC-228	.6988E-3	.51999E-4	0.000000029
BI-210	.1373E-1	.51000E-4	0.000000029
Y-91	.1610E+0	.43000E-4	0.000000024
TE-129M	.9200E-1	.41999E-4	0.000000024
TE-127M	.2990E+0	.41999E-4	0.000000024
ND-147	.3011E-2	.41999E-4	0.000000024
PR-143	.3700E-1	.41000E-4	0.000000023
ND-144	.215E+16	.40000E-4	0.000000022
TB-158	.1500E+3	.38999E-4	0.000000022
PO-208	.2898E+1	.32999E-4	0.000000018
W-181	.3320E+0	.31000E-4	0.000000017
GD-159	.2123E-2	.30000E-4	0.000000017
BI-206	.1710E-1	.25000E-4	0.000000014
EU-153	.0000E+0	.23000E-4	0.000000013
PO-209	.1020E+3	.21999E-4	0.000000012
CM-241	.8986E-1	.20999E-4	0.000000012
RE-184	.1040E+0	.20000E-4	0.000000011
CU-64	.1451E-2	.19999E-4	0.000000011
SC-47	.9432E-2	.17999E-4	0.000000010
PB-203	.5950E-2	.17000E-4	0.000000010
TH-229	.7340E+4	.15999E-4	0.000000009
BI-205	.4200E-1	.15999E-4	0.000000009
PA-233	.7400E-1	.15000E-4	0.000000008
PU-236	.2850E+1	.11999E-4	0.000000007
SC-50	.3253E-5	.10999E-4	0.000000006
PT-193	.5000E+2	.10999E-4	0.000000006
CD-107	.7420E-3	10999E-4	0.000000006
TM-170	.3530E+0	.10000E-4	0.000000006
TH-227	.5129E-1	.10000E-4	0.000000006
SN-111	.6716E-4	.10000E-4	0.000000006
RA-224	.1000E-1	.10000E-4	0.000000006

TABLE 8 (cont.)

RADIONUCLIDES DISPOSED AT RICHLAND
THROUGH 1989

ISOTOPE	HALFLIFE (YEARS)	TOTAL ACTIVITY (Ci)	PERCENT OF TOTAL ACTIVITY
PB-206	.0000E+0	.10000E-4	0.000000006
NB-96	.2671E-2	.10000E-4	0.000000006
NB-88	.2720E-4	.10000E-4	0.000000006
ZR-85	.1500E-4	.99999E-5	0.000000006
TB-160	.1980E+0	.99999E-5	0.000000006
SR-81	.4947E-4	.99999E-5	0.000000006
SM-145	.9320E+0	.99999E-5	0.000000006
PM-145	.1770E+2	.99999E-5	0.000000006
PM-143	.7260E+0	.99999E-5	0.000000006
PA 234	.7648E-3	.99999E-5	0.000000006
MN-57	.3025E-5	.99999E-5	0.000000006
AG-108	.4589E-5	.99999E-5	0.000000006
AC-227	.2177E+2	.99999E-5	0.000000006
AM-244	.1153E-2	.79999E-5	0.000000004
CR-56	.1117E-4	.69998E-5	0.000000004
BR-82	.4030E-2	.59998E-5	0.000000003
SI-32	.2800E+3	.50000E-5	0.000000003
I-126	.3560E-1	.50000E-5	0.000000003
NB-93	.0000E+0	.39999E-5	0.000000002
PA-231	.3280E+5	.30000E-5	0.000000002
RE-187	.500E+11	.29998E-5	0.000000002
TL-210	.2473E-5	.19999E-5	0.000000001
TB-157	.1500E+3	.19999E-5	0.000000001
TA-179	.1820E+1	.19999E-5	0.000000001
IN-113M	.1890E-3	.19999E-5	0.000000001
HF-175	.1920E+0	.19999E-5	0.000000001
AG-105	.1132E+0	.19999E-5	0.000000001

TABLE 9

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
AG-105	NONE REQUIRED	AU	.20000000E-2	.2018942E-10
	TOTAL FOR AG-105		.20000000E-2	.2018942E-10
AG-110	(BLANK)	AU	.39000000E-1	.39369376E-9
AG-110	CEMENT	AU	.31577200E+3	.31876273E-5
AG-110	NONE REQUIRED	AU	.10926090E+4	.11029573E-4
AG-110	SORBENT	AU	.20000E+1	.20189423E-7
	TOTAL FOR AG-110		.14104200E+4	.14237783E-4
AG-110M	(BLANK)	AU	.56499460E+4	.57034577E-4
AG-110M	(BLANK)	CS	.33250E+4	.33564917E-4
AG-110M	CEMENT	AU	.26452600E+3	.26703137E-5
AG-110M	CEMENT	CS	.79050000E+1	.79798697E-7
AG-110M	ENVIROSTONE	AU	.31114600E+3	.31409292E-5
AG-110M	ENVIROSTONE	BS	.17900E+3	.18069534E-5
AG-110M	NONE REQUIRED	AU	.21060450E+4	.21259917E-4
AG-110M	NONE REQUIRED	CS	.51502000E+4	.51989785E-4
AG-110M	OTHER SOLIDIFICATION MEDIA	AU	.31000000E-1	.31293606E-9
AG-110M	SORBENT	AU	.48303000E+2	.48760487E-6
AG-110M	SORBENT	CS	.35795000E+2	.36134021E-6
	TOTAL FOR AG-110M		.17077897E+5	.17239645E-3
AS-73	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
AS-73	SORBENT	AU	.52000000E+0	.52492502E-8
	TOTAL FOR AS-73		.53000000E+0	.53501973E-8
AU-195	(BLANK)	AU	.20000000E-2	.2018942E-10
AU-195	NONE REQUIRED	AU	.67830000E+1	.68472431E-7
AU-195	SORBENT	AU	.49500000E+0	.49968824E-8
	TOTAL FOR AU-195		.72800000E+1	.73489502E-7
BA-133	(BLANK)	AU	.35000000E+0	.35331491E-8
BA-133	CEMENT	AU	.39000000E-1	.39369376E-9
BA-133	ENVIROSTONE	AU	.90000000E-1	.90852407E-9
BA-133	NONE REQUIRED	AU	.27473000E+2	.27733202E-6
BA-133	SORBENT	AU	.50210000E+1	.50685548E-7
	TOTAL FOR BA-133		.32973000E+2	.33285293E-6
BA-140	(BLANK)	AU	.34626000E+2	.34953949E-6
BA-140	ENVIROSTONE	AU	.37600000E+0	.37956116E-8
BA-140	NONE REQUIRED	AU	.21453700E+3	.21656892E-5

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
BA-140	NONE REQUIRED	BS	.29600E+3	.29880347E-5
BA-140	SORBENT	AU	.16210000E+1	.16363528E-7
BA-140	SORBENT	CS	.12901000E+2	.13023187E-6
	TOTAL FOR BA-140		.56006100E+3	.56536544E-5
BE-7	CEMENT	CS	.29149000E+3	.29425075E-5
BE-7	NONE REQUIRED	AU	.57400000E+1	.57943646E-7
BE-7	SORBENT	AU	.18038700E+4	.18209548E-4
	TOTAL FOR BE-7		.21011000E+4	.21209999E-4
BI-204	NONE REQUIRED	AU	.50000E+1	.50473559E-7
	TOTAL FOR BI-204		.50000E+1	.50473559E-7
BI-205	SORBENT	AU	.14000000E-1	.14132596E-9
	TOTAL FOR BI-205		.14000000E-1	.14132596E-9
BI-206	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
BI-206	SORBENT	AU	.15000000E-1	.15142067E-9
	TOTAL FOR BI-206		.25000000E-1	.25236779E-9
BI-210	CEMENT	AU	.33000000E-1	.33312549E-9
BI-210	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR BI-210		.34000000E-1	.34322020E-9
BR-82	SORBENT	AU	.20000000E-2	.2018942E-10
	TOTAL FOR BR-82		.20000000E-2	.2018942E-10
C-15	NONE REQUIRED	AU	.60000000E-1	.60568271E-9
	TOTAL FOR C-15		.60000000E-1	.60568271E-9
CA-45	(BLANK)	AU	.93900000E+1	.94789345E-7
CA-45	CEMENT	AU	.33326000E+2	.33641636E-6
CA-45	NONE REQUIRED	AU	.36375100E+3	.36719615E-5
CA-45	SORBENT	AU	.18823170E+4	.19001447E-4
	TOTAL FOR CA-45		.22887840E+4	.23104615E-4
CA-47	NONE REQUIRED	AU	.19000000E+0	.19179952E-8
CA-47	SORBENT	AU	.50000000E-2	.5047355E-10
	TOTAL FOR CA-47		.19500000E+0	.19684688E-8

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
CD-109	(BLANK)	AU	.30520000E+2	.30809060E-6
CD-109	CEMENT	AU	.16991700E+3	.17152631E-5
CD-109	NONE REQUIRED	AU	.56275000E+2	.56807991E-6
CD-109	SORBENT	AU	.59428000E+2	.59990854E-6
	TOTAL FOR CD-109		.31614000E+3	.31913422E-5
CD-113M	CEMENT	AU	.11131000E+3	.11236423E-5
	TOTAL FOR CD-113M		.11131000E+3	.11236423E-5
CD-115	NONE REQUIRED	AU	.30000000E-2	.3028413E-10
CD-115	SORBENT	AU	.11000000E-1	.11104183E-9
	TOTAL FOR CD-115		.14000000E-1	.14132596E-9
CE-134	NONE REQUIRED	AU	.76000000E-1	.76719810E-9
	TOTAL FOR CE-134		.76000000E-1	.76719810E-9
CE-137	SORBENT	AU	.27930000E+1	.28194530E-7
	TOTAL FOR CE-137		.27930000E+1	.28194530E-7
CE-139	NONE REQUIRED	AU	.13000000E+0	.13123125E-8
CE-139	SORBENT	AU	.12200000E+0	.12315548E-8
	TOTAL FOR CE-139		.25200000E+0	.25438674E-8
CE-141	(BLANK)	AU	.62420000E+2	.63011191E-6
CE-141	(BLANK)	BS	.22700000E+1	.22914996E-7
CE-141	CEMENT	AU	.21272000E+2	.21473471E-6
CE-141	CEMENT	CS	.15448000E+2	.15594310E-6
CE-141	ENVIROSTONE	AU	.69000E+2	.69653512E-6
CE-141	ENVIROSTONE	BS	.23000000E+0	.23217837E-8
CE-141	NONE REQUIRED	AU	.33115000E+2	.33428638E-6
CE-141	SORBENT	AU	.35409800E+3	.35745173E-5
CE-141	SORBENT	CS	.49652000E+2	.50122263E-6
	TOTAL FOR CE-141		.60750500E+3	.61325879E-5
CE-143	SORBENT	AU	.67600000E+0	.68240252E-8
	TOTAL FOR CE-143		.67600000E+0	.68240252E-8

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
CE-144	(BLANK)	AU	.10396180E+4	.10494644E-4
CE-144	(BLANK)	BS	.57000000E+1	.57539858E-7
CE-144	(BLANK)	CS	.95000E+2	.95899763E-6
CE-144	CEMENT	AU	.74430000E+1	.75134940E-7
CE-144	CEMENT	BS	.30370000E+1	.30657640E-7
CE-144	CEMENT	CS	.67534000E+2	.68173627E-6
CE-144	ENVIROSTONE	AU	.38800E+3	.39167482E-5
CE-144	ENVIROSTONE	BS	.33800000E+1	.34120126E-7
CE-144	NONE REQUIRED	AU	.42947300E+3	.43354062E-5
CE-144	NONE REQUIRED	BS	.18500000E+2	.18675217E-6
CE-144	NONE REQUIRED	CS	.14446400E+5	.14583224E-3
CE-144	SORBENT	AU	.32303000E+2	.32608947E-6
CE-144	SORBENT	CS	.31554400E+3	.31853257E-5
	TOTAL FOR CE-144		.16851932E+5	.17011539E-3
CE-147	SORBENT	AU	.17000000E+0	.17161010E-8
	TOTAL FOR CE-147		.17000000E+0	.17161010E-8
CF-252	CEMENT	AU	.50000000E-2	.5047355E-10
CF-252	NONE REQUIRED	AU	.40000000E-2	.4037884E-10
	TOTAL FOR CF-252		.90000000E-2	.9085240E-10
CM-241	ENVIROSTONE	AU	.21000000E-1	.21198895E-9
	TOTAL FOR CM-241		.21000000E-1	.21198895E-9
CM-242	(BLANK)	AU	.32800000E+0	.33110655E-8
CM-242	(BLANK)	BS	.10600000E+0	.10700394E-8
CM-242	(BLANK)	CS	.36300000E+1	.36643804E-7
CM-242	BITUMEN (ATI & Waste Chem)	AU	.10430000E+1	.10528784E-7
CM-242	CEMENT	AU	.62600000E+0	.63192896E-8
CM-242	CEMENT	BS	.99000000E-1	.99937648E-9
CM-242	CEMENT	CS	.14600000E+1	.14738279E-7
CM-242	ENVIROSTONE	AU	.37000000E-1	.37350434E-9
CM-242	ENVIROSTONE	BS	.44200000E+0	.44618626E-8
CM-242	NONE REQUIRED	AU	.34720000E+1	.35039839E-7
CM-242	NONE REQUIRED	BS	.35530000E+2	.35866511E-6
CM-242	NONE REQUIRED	CS	.27000000E-1	.27255722E-9
CM-242	SORBENT	AU	.14360000E+1	.14496006E-7
CM-242	SORBENT	CS	.41045000E+2	.41433745E-6
	TOTAL FOR CM-242		.89281000E+2	.90126597E-6

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
CM-243	(BLANK)	BS	.22000000E-1	.22208366E-9
CM-243	(BLANK)	CS	.68800000E+0	.69451618E-8
CM-243	CEMENT	AU	.68000000E-1	.68644041E-9
CM-243	CEMENT	BS	.90000000E-2	.9085240E-10
CM-243	CEMENT	CS	.48000000E-1	.48454617E-9
CM-243	NONE REQUIRED	AU	.10010000E+1	.10104806E-7
CM-243	NONE REQUIRED	CS	.20000000E-2	.2018942E-10
CM-243	SORBENT	AU	.59000000E-1	.59558800E-9
CM-243	SORBENT	CS	.38600000E+1	.38965588E-7
	TOTAL FOR CM-243		.57570000E+1	.58115256E-7
CM-244	(BLANK)	AU	.34000000E-1	.34322020E-9
CM-244	(BLANK)	BS	.22000000E-1	.22208366E-9
CM-244	BITUMEN (ATI & Waste Chem)	AU	.33600000E+0	.33918232E-8
CM-244	CEMENT	AU	.50700000E+0	.51180189E-8
CM-244	CEMENT	BS	.90000000E-2	.9085240E-10
CM-244	CEMENT	CS	.48000000E-1	.48454617E-9
CM-244	ENVIROSTONE	AU	.17000000E-1	.17161010E-9
CM-244	ENVIROSTONE	BS	.10360000E+1	.10458121E-7
CM-244	NONE REQUIRED	AU	.76500000E+0	.77224546E-8
CM-244	SORBENT	AU	.22900000E+0	.23116890E-8
CM-244	SORBENT	CS	.10000000E-2	.1009471E-10
	TOTAL FOR CM-244		.30040000E+1	.30324514E-7
CO-56	CEMENT	AU	.46600000E+0	.47041357E-8
CO-56	NONE REQUIRED	AU	.62600000E+0	.63192896E-8
CO-56	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR CO-56		.10930000E+1	.11033520E-7
CO-57	(BLANK)	AU	.79710000E+1	.80464948E-7
CO-57	(BLANK)	BS	.34200000E+0	.34523914E-8
CO-57	(BLANK)	CS	.44600000E+2	.45022415E-6
CO-57	BITUMEN (ATI & Waste Chem)	AU	.10568100E+3	.10668192E-5
CO-57	CEMENT	AU	.90613000E+2	.91471213E-6
CO-57	CEMENT	BS	.80899800E+3	.81666017E-5
CO-57	CEMENT	CS	.62890000E+2	.63485643E-6
CO-57	ENVIROSTONE	AU	.28370000E+2	.28638697E-6
CO-57	ENVIROSTONE	BS	.42000000E+0	.42397790E-8
CO-57	NONE REQUIRED	AU	.97132400E+3	.98052359E-5
CO-57	NONE REQUIRED	BS	.85970000E+3	.86784238E-5
CO-57	NONE REQUIRED	CS	.14340E+4	.14475816E-4
CO-57	SORBENT	AU	.73477500E+3	.74173419E-5
CO-57	SORBENT	CS	.57957300E+3	.58506224E-5
	TOTAL FOR CO-57		.57292570E+4	.57835198E-4

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
CO-58	(BLANK)	AU	.41968997E+5	.42366493E-3
CO-58	(BLANK)	BS	37437E+5	.37791573E-3
CO-58	(BLANK)	CS	.7670300E+5	.68311218E-3
CO-58	BITUMEN (ATI & Waste Chem)	AU	.87863200E+3	.88695369E-5
CO-58	CEMENT	AU	.17353457E+5	.17517814E-3
CO-58	CEMENT	BS	.18434322E+5	.18608917E-3
CO-58	CEMENT	CS	.13613800E+5	.13742738E-3
CO-58	ENVIROSTONE	AU	.10954368E+5	.11058118E-3
CO-58	ENVIROSTONE	BS	.15100E+3	.15243015E-5
CO-58	NONE REQUIRED	AU	.26141119E+5	.26388706E-3
CO-58	NONE REQUIRED	BS	.10508171E+6	.10507695E-2
CO-58	NONE REQUIRED	CS	.83825077E+5	.84619000E-3
CO-58	OTHER SOLIDIFICATION MEDIA	AU	.13875290E+4	.14006705E-4
CO-58	SORBENT	AU	.10780170E+5	.10882271E-3
CO-58	SORBENT	CS	.77125330E+4	.77855798E-4
	TOTAL FOR CO-58		.44339001E+6	.44758944E-2
CO-60	(BLANK)	AU	.35471795E+6	.35807756E-2
CO-60	(BLANK)	BS	.10132060E+6	.10228022E-2
CO-60	(BLANK)	CS	.37403E+5	.37757251E-3
CO-60	BITUMEN (ATI & Waste Chem)	AU	.74693680E+4	.75401118E-4
CO-60	CEMENT	AS	.10000000E-2	.1009471E-10
CO-60	CEMENT	AU	.17523662E+6	.17689632E-2
CO-60	CEMENT	BS	.92754387E+5	.93632881E-3
CO-60	CEMENT	CS	.11130646E+5	.11236066E-3
CO-60	ENVIROSTONE	AU	.40647900E+3	.41032884E-5
CO-60	ENVIROSTONE	BS	.19630E+5	.19815919E-3
CO-60	NONE REQUIRED	AU	.10827391E+6	.10929939E-2
CO-60	NONE REQUIRED	BS	.16344E+6	.16499402E-2
CO-60	NONE REQUIRED	CS	.73703454E+7	.74401514E-1
CO-60	OTHER SOLIDIFICATION MEDIA	AU	.84327040E+4	.85125717E-4
CO-60	SORBENT	AU	.63301980E+4	.63901525E-4
CO-60	SORBENT	CS	.37190E+5	.37542233E-3
	TOTAL FOR CO-60		.84940873E+7	.85745364E-1
CR-51	(BLANK)	AU	.46648693E+6	.47090511E-2
CR-51	(BLANK)	BS	.52620E+4	.53118374E-4
CR-51	(BLANK)	CS	.17200E+4	.17362904E-4
CR-51	BITUMEN (ATI & Waste Chem)	AU	.81903000E+2	.82678719E-6
CR-51	CEMENT	AU	.15465870E+4	.15612350E-4
CR-51	CEMENT	CS	.53838220E+4	.54348132E-4
CR-51	ENVIROSTONE	AU	.12000E+3	.12113654E-5
CR-51	ENVIROSTONE	BS	.55300000E+0	.55823756E-8

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
CR-51	NONE REQUIRED	AU	.60407834E+5	.60979968E-3
CR-51	NONE REQUIRED	BS	.25000E+5	.25236779E-3
CR-51	NONE REQUIRED	CS	.42828E+6	.43233632E-2
CR-51	OTHER SOLIDIFICATION MEDIA	AU	.12820300E+3	.12941723E-5
CR-51	SORBENT	AU	.61352510E+4	.61933591E-4
CR-51	SORBENT	CS	.46407260E+4	.46846792E-4
	TOTAL FOR CR-51		.10051938E+7	.10147141E-1
CR-56	NONE REQUIRED	AU	.70000000E-2	.7066298E-10
	TOTAL FOR CR-56		.70000000E-2	.7066298E-10
CS-127	NONE REQUIRED	AU	.20640000E+2	.20835485E-6
	TOTAL FOR CS-127		.20640000E+2	.20835485E-6
CS-134	(BLANK)	AU	.97740920E+4	.98666643E-4
CS-134	(BLANK)	BS	.90148E+5	.91001809E-3
CS-134	(BLANK)	CS	.28306700E+5	.28574798E-3
CS-134	BITUMEN (ATI & Waste Chem)	AU	.31480700E+3	.31778859E-5
CS-134	CEMENT	AU	.35129146E+5	.35461860E-3
CS-134	CEMENT	BS	.48226217E+5	.48682976E-3
CS-134	CEMENT	CS	.22432100E+3	.22644558E-5
CS-134	ENVIROSTONE	AU	.37968100E+3	.38327703E-5
CS-134	ENVIROSTONE	BS	.38030E+5	.38390189E-3
CS-134	NONE REQUIRED	AU	.13836988E+5	.13968040E-3
CS-134	NONE REQUIRED	BS	.59147E+6	.59707192E-2
CS-134	NONE REQUIRED	CS	.17391E+6	.17556521E-2
CS-134	OTHER SOLIDIFICATION MEDIA	AU	.11281560E+4	.11388409E-4
CS-134	SORBENT	AU	.75453800E+3	.76168437E-5
CS-134	SORBENT	CS	.39867000E+3	.40244568E-5
	TOTAL FOR CS-134		.10320393E+7	.10418139E-1
CS-136	(BLANK)	AU	.32900000E+0	.33211602E-8
CS-136	(BLANK)	CS	.31100000E+1	.31394554E-7
CS-136	CEMENT	AU	.28900E+3	.29173717E-5
CS-136	NONE REQUIRED	AU	.93580000E+1	.94466314E-7
CS-136	NONE REQUIRED	BS	.26500E+3	.26750986E-5
CS-136	SORBENT	AU	.31700000E+1	.32000236E-7
CS-136	SORBENT	CS	.85810000E+1	.86622723E-7
	TOTAL FOR CS-136		.57854800E+3	.58402753E-5

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
CS-137	(BLANK)	AU	.16416343E+5	.16571825E-3
CS-137	(BLANK)	BS	.13245E+6	.13370445E-2
CS-137	(BLANK)	CS	.40975100E+5	.41363183E-3
CS-137	BITUMEN (ATI & Waste Chem)	AU	.63413400E+3	.64014000E-5
CS-137	CEMENT	AS	.10000000E-2	.1009471E-10
CS-137	CEMENT	AU	.61581692E+5	.62164944E-3
CS-137	CEMENT	BS	.54987116E+5	.55507909E-3
CS-137	CEMENT	CS	.31681000E+3	.31981056E-5
CS-137	ENVIROSTONE	AU	.14504360E+4	.14641733E-4
CS-137	ENVIROSTONE	BS	.15684E+6	.15832546E-2
CS-137	NONE REQUIRED	AU	.23283261E+5	.23503781E-3
CS-137	NONE REQUIRED	BS	.10769E+7	.10870995E-1
CS-137	NONE REQUIRED	CS	.31665245E+7	.31965152E-1
CS-137	OTHER SOLIDIFICATION MEDIA	AU	.22320670E+4	.22532073E-4
CS-137	SORBENT	AU	.17183700E+4	.17346450E-4
CS-137	SORBENT	CS	.16719000E+4	.16877348E-4
	TOTAL FOR CS-137		.47379817E+7	.47828560E-1
CS-139	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR CS-139		.10000000E-2	.1009471E-10
CS-141	NONE REQUIRED	AU	.10000000E-2	.1009471E-10
	TOTAL FOR CS-141		.10000000E-2	.1009471E-10
CS-144	NONE REQUIRED	AU	.15690000E+1	.15838603E-7
CS-144	NONE REQUIRED	CS	.29300000E+1	.29577505E-7
	TOTAL FOR CS-144		.44990000E+1	.45416108E-7
CU-64	SORBENT	AU	.70000000E-2	.7066298E-10
	TOTAL FOR CU-64		.70000000E-2	.7066298E-10
CU-67	SORBENT	AU	.31980000E+1	.32282888E-7
	TOTAL FOR CU-67		.31980000E+1	.32282888E-7
DY-159	NONE REQUIRED	AU	.60000000E-2	.6056827E-10
DY-159	SORBENT	AU	.38700000E+0	.39066535E-8
	TOTAL FOR DY-159		.39300000E+0	.39672217E-8
DY-165	NONE REQUIRED	AU	.10000000E-2	.1009471E-10
	TOTAL FOR DY-165		.10000000E-2	.1009471E-10
EU-151	NONE REQUIRED	AU	.10000000E-2	.1009471E-10
	TOTAL FOR EU-151		.10000000E-2	.1009471E-10

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
EU-152	CEMENT	AU	.28400000E+0	.28668981E-8
EU-152	NONE REQUIRED	AU	.19301000E+2	.19483803E-6
EU-152	SORBENT	AU	.25400000E+0	.25640568E-8
	TOTAL FOR EU-152		.19839000E+2	.20026899E-6
EU-153	NONE REQUIRED	AU	.23000000E-1	.23217837E-9
	TOTAL FOR EU-153		.23000000E-1	.23217837E-9
EU-154	CEMENT	AU	.19800000E+0	.19987529E-8
EU-154	NONE REQUIRED	AU	.47250000E+1	.47697513E-7
EU-154	SORBENT	AU	.20090000E+1	.20280276E-7
	TOTAL FOR EU-154		.69320000E+1	.69976543E-7
EU-155	CEMENT	AU	.70000000E-1	.70662983E-9
EU-155	NONE REQUIRED	AU	.57840000E+1	.58387813E-7
EU-155	NONE REQUIRED	CS	.26221000E+2	.26469344E-6
EU-155	SORBENT	AU	.92200000E+0	.93073244E-8
	TOTAL FOR EU-155		.32997000E+2	.33309520E-6
FE-53	NONE REQUIRED	AU	.20000000E+0	.20189423E-8
	TOTAL FOR FE-53		.20000000E+0	.20189423E-8
FE-55	(BLANK)	AU	.79584844E+6	.80338607E-2
FE-55	(BLANK)	BS	.91184E+5	.92047621E-3
FE-55	(BLANK)	CS	.48760E+5	.49221815E-3
FE-55	BITUMEN (ATI & Waste Chem)	AU	.26113989E+5	.26361319E-3
FE-55	CEMENT	AU	.14355086E+6	.14491046E-2
FE-55	CEMENT	BS	.13628768E+5	.13757848E-3
FE-55	CEMENT	CS	.81310705E+5	.82080814E-3
FE-55	ENVIROSTONE	AU	.76039200E+3	.76759381E-5
FE-55	ENVIROSTONE	BS	.46570E+5	.47011073E-3
FE-55	NONE REQUIRED	AU	.62890708E+5	.63486358E-3
FE-55	NONE REQUIRED	BS	.12968E+6	.13090822E-2
FE-55	NONE REQUIRED	CS	.13248608E+8	.13374088E+0
FE-55	OTHER SOLIDIFICATION MEDIA	AU	.34916732E+5	.35247435E-3
FE-55	SORBENT	AU	.20702574E+5	.20898652E-3
FE-55	SORBENT	CS	.11868E+6	.11981312E-2
	TOTAL FOR FE-55		.14863214E+8	.15003986E+0

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
FE-59	(BLANK)	AU	.33562228E+5	.33880102E-3
FE-59	(BLANK)	BS	.22780E+4	.22995753E-4
FE-59	(BLANK)	CS	.27100E+3	.27356669E-5
FE-59	BITUMEN (ATI & Waste Chem)	AU	.39916000E+2	.40294052E-6
FE-59	CEMENT	AU	.32639700E+3	.32948836E-5
FE-59	CEMENT	CS	.83630200E+3	.84422277E-5
FE-59	NONE REQUIRED	AU	.57278800E+3	.57821298E-5
FE-59	NONE REQUIRED	BS	.25600E+3	.25842462E-5
FE-59	OTHER SOLIDIFICATION MEDIA	AU	.21780000E+3	.21986282E-5
FE-59	SORBENT	AU	.58938000E+3	.59496213E-5
FE-59	SORBENT	CS	.27589600E+3	.27850906E-5
	TOTAL FOR FE-59		.39225707E+5	.39597221E-3
GA-67	NONE REQUIRED	AU	.71238000E+2	.71912708E-6
GA-67	SORBENT	AU	.14113600E+3	.14247272E-5
	TOTAL FOR GA-67		.21237400E+3	.21438543E-5
GA-68	(BLANK)	AU	.70000E+1	.70662983E-7
GA-68	NONE REQUIRED	AU	.80000000E-2	.8075769E-10
	TOTAL FOR GA-68		.70080000E+1	.70743741E-7
GD-153	CEMENT	AU	.70005000E+2	.70668030E-6
GD-153	NONE REQUIRED	AU	.44651000E+2	.45073898E-6
GD-153	SORBENT	AU	.14602300E+3	.14740601E-5
	TOTAL FOR GD-153		.26067900E+3	.26314794E-5
GE-68	(BLANK)	AU	.12000000E+1	.12113654E-7
GE-68	NONE REQUIRED	AU	.63132000E+2	.63729935E-6
GE-68	SORBENT	AU	.19904000E+2	.20092514E-6
	TOTAL FOR GE-68		.84236000E+2	.85033815E-6
H-3	(BLANK)	AU	.25991062E+5	.26237228E-3
H-3	(BLANK)	BS	.79004600E+3	.79752867E-5
H-3	(BLANK)	CS	.22510000E+3	.22723196E-5
H-3	BITUMEN (ATI & Waste Chem)	AU	.15803000E+4	.15952673E-4
H-3	CEMENT	AU	.79845297E+6	.80601527E-2
H-3	CEMENT	BS	.15934894E+7	.16085817E-1
H-3	CEMENT	CS	.18002000E+3	.18172500E-5
H-3	ENVIROSTONE	AU	.22741310E+4	.22956697E-4
H-3	ENVIROSTONE	BS	.42200E+3	.42599684E-5
H-3	NONE REQUIRED	AU	.16355877E+7	.16510787E-1
H-3	NONE REQUIRED	BS	.54302931E+8	.54817244E+0
H-3	NONE REQUIRED	CS	.14687557E+6	.14826665E-2

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
H-3	OTHER SOLIDIFICATION MEDIA	AU	.12345717E+5	.12462645E-3
H-3	SORBENT	AU	.23757612E+6	.23982625E-2
H-3	SORBENT	CS	.29914100E+4	.30197422E-4
	TOTAL FOR H-3		.58761712E+8	.59318256E+0
HF-175	NONE REQUIRED	AU	.20000000E-2	.2018942E-10
	TOTAL FOR HF-175		.20000000E-2	.2018942E-10
HF-181	NONE REQUIRED	AU	.53500000E+0	.54006708E-8
	TOTAL FOR HF-181		.53500000E+0	.54006708E-8
HG-203	CEMENT	AU	.10000000E-2	.1009471E-10
HG-203	NONE REQUIRED	AU	.36321000E+2	.36665003E-6
HG-203	SORBENT	AU	.30900000E+0	.31192659E-8
	TOTAL FOR HG-203		.36631000E+2	.36977939E-6
I-121	CEMENT	AU	.90000000E-2	.9085240E-10
I-121	NONE REQUIRED	AU	.10000000E-2	.1009471E-10
I-121	SORBENT	AU	.36540000E+1	.36886077E-7
	TOTAL FOR I-121		.36640000E+1	.36987024E-7
I-123	CEMENT	AU	.20000000E-2	.2018942E-10
I-123	NONE REQUIRED	AU	.32807000E+2	.33117721E-6
I-123	SORBENT	AU	.15234200E+3	.15378486E-5
	TOTAL FOR I-123		.18515100E+3	.18690460E-5
I-124	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
I-124	SORBENT	AU	.26000E+2	.26246251E-6
	TOTAL FOR I-124		.26010000E+2	.26256345E-6
I-125	(BLANK)	AU	.11057080E+4	.11161803E-4
I-125	CEMENT	AU	.22083410E+4	.22292566E-4
I-125	ENVIROSTONE	AU	.10000000E-2	.1009471E-10
I-125	NONE REQUIRED	AU	.25980919E+5	.26226989E-3
I-125	SORBENT	AU	.24461406E+5	.24693084E-3
	TOTAL FOR I-125		.53756375E+5	.54265512E-3
I-128	NONE REQUIRED	AU	.17600000E+1	.17766693E-7
	TOTAL FOR I-128		.17600000E+1	.17766693E-7

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
I-131	(BLANK)	AU	.65011200E+3	.65626933E-5
I-131	BITUMEN (ATI & Waste Chem)	AU	.35700000E+0	.36038121E-8
I-131	CEMENT	AU	.63050000E+1	.63647158E-7
I-131	ENVIROSTONE	AU	.11500000E+0	.11608918E-8
I-131	NONE REQUIRED	AU	.15016240E+4	.15158461E-4
I-131	NONE REQUIRED	BS	.12300E+4	.12416495E-4
I-131	SORBENT	AU	.44147500E+3	.44565629E-5
I-131	SORBENT	CS	.22200000E+2	.22410260E-6
	TOTAL FOR I-131		.38521880E+4	.38886728E-4
I-133	NONE REQUIRED	AU	.10447000E+2	.10545945E-6
	TOTAL FOR I-133		.10447000E+2	.10545945E-6
IN-111	(BLANK)	AU	.10000000E+0	.10094711E-8
IN-111	CEMENT	AU	.30900000E+0	.31192659E-8
IN-111	NONE REQUIRED	AU	.16149900E+3	.16302858E-5
IN-111	SORBENT	AU	.15056000E+3	.15198598E-5
	TOTAL FOR IN-111		.31246800E+3	.31542744E-5
IN-113	NONE REQUIRED	AU	.70000000E-1	.70662983E-9
IN-113	SORBENT	AU	.20000000E-2	.2018942E-10
	TOTAL FOR IN-113		.72000000E-1	.72681925E-9
IN-114	NONE REQUIRED	AU	.39500000E+0	.39874112E-8
IN-114	SORBENT	AU	.52720000E+1	.53219321E-7
	TOTAL FOR IN-114		.56670000E+1	.57206732E-7
IN-114M	NONE REQUIRED	AU	.21288000E+2	.21489622E-6
IN-114M	SORBENT	AU	.19850000E+1	.20038003E-7
	TOTAL FOR IN-114M		.23273000E+2	.23493423E-6
IR-192	NONE REQUIRED	AU	.12130000E+1	.12244885E-7
IR-192	SORBENT	AU	.40000000E-2	.4037884E-10
	TOTAL FOR IR-192		.12170000E+1	.12285264E-7
KR-85	(BLANK)	AU	.63500100E+5	.64101521E-3
KR-85	CEMENT	AU	.50000000E-2	.5047355E-10
KR-85	NONE REQUIRED	AU	.14971010E+4	.15112803E-4
KR-85	SORBENT	AU	.60655400E+3	.61229879E-5
	TOTAL FOR KR-85		.65603760E+5	.66225105E-3

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
LA-140	(BLANK)	AU	.34666000E+2	.34994328E-6
LA-140	ENVIROSTONE	AU	.43300000E+0	.43710102E-8
LA-140	NONE REQUIRED	AU	.24503600E+3	.24735678E-5
LA-140	NONE REQUIRED	BS	.34100E+3	.34422967E-5
LA-140	SORBENT	AU	.27000000E-1	.27255722E-9
	TOTAL FOR LA-140		.62116200E+3	.62704514E-5
MN-51	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR MN-51		.10000000E-2	.1009471E-10
MN-54	(BLANK)	AU	.18844975E+6	.19023459E-2
MN-54	(BLANK)	BS	.24180E+5	.24409013E-3
MN-54	(BLANK)	CS	.80036000E+4	.80794036E-4
MN-54	BITUMEN (ATI & Waste Chem)	AU	.89823460E+4	.90674195E-4
MN-54	CEMENT	AU	.89608330E+4	.90457027E-4
MN-54	CEMENT	BS	.12986185E+5	.13109179E-3
MN-54	CEMENT	CS	.11841240E+4	.11953390E-4
MN-54	ENVIROSTONE	AU	.78180000E+1	.78920457E-7
MN-54	ENVIROSTONE	BS	.97280000E+3	.98201357E-5
MN-54	NONE REQUIRED	AU	.14814722E+5	.14955035E-3
MN-54	NONE REQUIRED	BS	.30233E+5	.30519342E-3
MN-54	NONE REQUIRED	CS	.39782320E+6	.40159106E-2
MN-54	OTHER SOLIDIFICATION MEDIA	AU	.36564460E+4	.36910769E-4
MN-54	SORBENT	AU	.18271610E+4	.18444663E-4
MN-54	SORBENT	CS	.21523000E+4	.21726848E-4
	TOTAL FOR MN-54		.70423429E+6	.71090422E-2
MO-99	NONE REQUIRED	AU	.11366000E+2	.11473649E-6
MO-99	SORBENT	AU	.37520000E+1	.37875359E-7
	TOTAL FOR MO-99		.15118000E+2	.15261185E-6
NA-22	(BLANK)	AU	.65000000E+0	.65615627E-8
NA-22	CEMENT	AU	.19811000E+2	.19998633E-6
NA-22	NONE REQUIRED	AU	.38322300E+3	.38685257E-5
NA-22	SORBENT	AU	.27023000E+3	.27278940E-5
	TOTAL FOR NA-22		.67391400E+3	.68029676E-5
NA-24	NONE REQUIRED	AU	.15000000E-1	.15142067E-9
	TOTAL FOR NA-24		.15000000E-1	.15142067E-9

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
NB-95	(BLANK)	AU	.38258455E+5	.38620808E-3
NB-95	(BLANK)	BS	.47200E+4	.47647040E-4
NB-95	(BLANK)	CS	.18300E+4	.18473322E-4
NB-95	BITUMEN (ATI & Waste Chem)	AU	.14200000E+0	.14334490E-8
NB-95	CEMENT	AU	.34580880E+4	.34903402E-4
NB-95	CEMENT	BS	.56290000E+1	.56823133E-7
NB-95	CEMENT	CS	.16014200E+4	.16165873E-4
NB-95	ENVIROSTONE	AU	.66300100E+3	.66928041E-5
NB-95	ENVIROSTONE	BS	.58700000E+1	.59255959E-7
NB-95	NONE REQUIRED	AU	.13553825E+5	.13682195E-3
NB-95	NONE REQUIRED	BS	.97887500E+4	.98814611E-4
NB-95	NONE REQUIRED	CS	.78400000E+2	.79142541E-6
NB-95	OTHER SOLIDIFICATION MEDIA	AU	.95000000E+1	.95899763E-7
NB-95	SORBENT	AU	.13807270E+4	.13938041E-4
NB-95	SORBENT	CS	.21524620E+4	.21728483E-4
	TOTAL FOR NB-95		.77506269E+5	.78240345E-3
NB-96	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
	TOTAL FOR NB-96		.10000000E-1	.10094711E-9
NB-97	CEMENT	AU	.10432000E+2	.10530803E-6
NB-97	NONE REQUIRED	AU	.39149000E+2	.39519787E-6
	TOTAL FOR NB-97		.49581000E+2	.50050591E-6
NI-65	NONE REQUIRED	AU	.76218500E+3	.76940380E-5
	TOTAL FOR NI-65		.76218500E+3	.76940380E-5
NP-239	NONE REQUIRED	BS	.12900000E+2	.13022178E-6
	TOTAL FOR NP-239		.12900000E+2	.13022178E-6
P-32	(BLANK)	AU	.38884300E+3	.39252580E-5
P-32	CEMENT	AU	.16080500E+3	.16232801E-5
P-32	NONE REQUIRED	AU	.16484158E+5	.16640282E-3
P-32	SORBENT	AU	.36896482E+5	.37245935E-3
	TOTAL FOR P-32		.53930288E+5	.54441072E-3
P-33	NONE REQUIRED	AU	.82600000E+0	.83382220E-8
P-33	SORBENT	AU	.34110000E+1	.34433062E-7
	TOTAL FOR P-33		.42370000E+1	.42771[illegible]E-7
PB-206	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
	TOTAL FOR PB-206		.10000000E-1	.10094711E-9

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
PB-210	CEMENT	AU	.75952000E+2	.76671356E-6
PB-210	NONE REQUIRED	AU	.74000000E-1	.74700868E-9
PB-210	SORBENT	AU	.18670000E+1	.18846827E-7
	TOTAL FOR PB-210		.77893000E+2	.78630739E-6
PM-147	NONE REQUIRED	AU	.27106730E+4	.27363463E-4
PM-147	NONE REQUIRED	CS	.68687E+6	.69338153E-2
PM-147	SORBENT	AU	.24345000E+2	.24575576E-6
	TOTAL FOR PM-147		.68961101E+6	.69614245E-2
PO-208	NONE REQUIRED	AU	.32000000E-1	.32303078E-9
	TOTAL FOR PO-208		.32000000E-1	.32303078E-9
PO-210	(BLANK)	AU	.31449270E+4	.31747132E-4
PO-210	CEMENT	AU	.23000000E+1	.23217837E-7
PO-210	ENVIROSTONE	AU	.15000000E+1	.15142067E-7
PO-210	NONE REQUIRED	AU	.12382000E+2	.12499272E-6
PO-210	SORBENT	AU	.19100000E+0	.19280899E-8
	TOTAL FOR PO-210		.31613000E+4	.31912412E-4
PU-236	CEMENT	AU	.10000000E-2	.1009471E-10
PU-236	NONE REQUIRED	AU	.10000000E-2	.1009471E-10
	TOTAL FOR PU-236		.20000000E-2	.2018942E-10
PU-241	(BLANK)	AU	.36889000E+2	.37238382E-6
PU-241	(BLANK)	BS	.11620000E+3	.11730055E-5
PU-241	(BLANK)	CS	.47800000E+2	.48252723E-6
PU-241	BITUMEN (ATI & Waste Chem)	AU	.53980000E+1	.54491255E-7
PU-241	CEMENT	AU	.92800000E+1	.93678926E-7
PU-241	CEMENT	BS	.10629000E+2	.10729669E-6
PU-241	CEMENT	CS	.15091000E+2	.15233929E-6
PU-241	ENVIROSTONE	AU	.16280000E+1	.16434191E-7
PU-241	ENVIROSTONE	BS	.84800000E+2	.85603157E-6
PU-241	NONE REQUIRED	AU	.52542600E+3	.53040241E-5
PU-241	NONE REQUIRED	BS	.40092000E+3	.40471719E-5
PU-241	NONE REQUIRED	CS	.23850080E+4	.24075968E-4
PU-241	SORBENT	AU	.21460000E+2	.21663251E-6
PU-241	SORBENT	CS	.41306000E+3	.41697217E-5
	TOTAL FOR PU-241		.40735890E+4	.41121707E-4
RA-228	NONE REQUIRED	AU	.69700000E+1	.70360142E-7
RA-228	SORBENT	AU	.20000000E-2	.2018942E-10
	TOTAL FOR RA-228		.69720000E+1	.70380331E-7

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
RB-83	NONE REQUIRED	AU	.90000E+1	.90852407E-7
RB-83	SORBENT	AU	.33000E+2	.33312549E-6
	TOTAL FOR RB-83		.42000E+2	.42397790E-6
RB-86	CEMENT	AU	.30080000E+1	.30364893E-7
RB-86	NONE REQUIRED	AU	.59564000E+2	.60128142E-6
RB-86	SORBENT	AU	.10305600E+3	.10403206E-5
	TOTAL FOR RB-86		.16562800E+3	.16719669E-5
RB-88	SORBENT	AU	.50100000E+1	.50574506E-7
	TOTAL FOR RB-88		.50100000E+1	.50574506E-7
RB-95	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR RB-95		.10000000E-2	.1009471E-10
RH-101	NONE REQUIRED	AU	.10000E+1	.10094711E-7
	TOTAL FOR RH-101		.10000E+1	.10094711E-7
RH-102	NONE REQUIRED	AU	.10000E+1	.10094711E-7
	TOTAL FOR RH-102		.10000E+1	.10094711E-7
RH-106	(BLANK)	AU	.51000000E-1	.51483030E-9
RH-106	NONE REQUIRED	AU	.16527800E+3	.16684337E-5
	TOTAL FOR RH-106		.16532900E+3	.16689486E-5
RU-103	(BLANK)	AU	.12061700E+3	.12175938E-5
RU-103	(BLANK)	CS	.22500000E+2	.22713101E-6
RU-103	CEMENT	AU	.17570000E+1	.17736408E-7
RU-103	CEMENT	CS	.11738000E+2	.11849172E-6
RU-103	ENVIROSTONE	AU	.27900000E+0	.28164246E-8
RU-103	ENVIROSTONE	BS	.63000000E+0	.63596685E-8
RU-103	NONE REQUIRED	AU	.29061400E+3	.29336646E-5
RU-103	SORBENT	AU	.29708400E+3	.29989773E-5
RU-103	SORBENT	CS	.10648600E+3	.10749454E-5
	TOTAL FOR RU-103		.85170500E+3	.85977166E-5
RU-104	SORBENT	CS	.34670000E+2	.34998366E-6
	TOTAL FOR RU-104		.34670000E+2	.34998366E-6

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
RU-106	(BLANK)	AU	.17750000E+2	.17918113E-6
RU-106	(BLANK)	CS	.80230000E+3	.80989873E-5
RU-106	CEMENT	CS	.97670000E+1	.98595051E-7
RU-106	ENVIROSTONE	BS	.27700000E+1	.27962352E-7
RU-106	NONE REQUIRED	AU	.54419400E+3	.54934816E-5
RU-106	NONE REQUIRED	CS	.24033500E+5	.24261125E-3
RU-106	SORBENT	AU	.70820000E+1	.71490749E-7
RU-106	SORBENT	CS	.42670000E+2	.43074135E-6
	TOTAL FOR RU-106		.25460033E+5	.25701169E-3
S-35	(BLANK)	AU	.52934300E+3	.53435650E-5
S-35	CEMENT	AU	.87365340E+4	.88192794E-4
S-35	NONE REQUIRED	AU	.55393857E+5	.55918502E-3
S-35	SORBENT	AU	.20561750E+6	.20756495E-2
	TOTAL FOR S-35		.27027724E+6	.27283709E-2
SB-122	NONE REQUIRED	AU	.34680000E+1	.35008460E-7
	TOTAL FOR SB-122		.34680000E+1	.35008460E-7
SB-124	(BLANK)	AU	.60136020E+4	.60705579E-4
SB-124	(BLANK)	BS	.47914E+5	.48367802E-3
SB-124	(BLANK)	CS	.44767000E+4	.45190996E-4
SB-124	CEMENT	AU	.13480400E+3	.13608075E-5
SB-124	NONE REQUIRED	AU	.19796700E+3	.19984198E-5
SB-124	NONE REQUIRED	BS	.83535000E+3	.84326176E-5
SB-124	OTHER SOLIDIFICATION MEDIA	AU	.12129680E+4	.12244562E-4
SB-124	SORBENT	AU	.14800000E+0	.14940173E-8
SB-124	SORBENT	CS	.40439000E+2	.40822005E-6
	TOTAL FOR SB-124		.60825978E+5	.61402072E-3
SB-125	(BLANK)	AU	.30433000E+2	.30721236E-6
SB-125	(BLANK)	BS	.24280E+4	.24509960E-4
SB-125	(BLANK)	CS	.75900000E+2	.76618663E-6
SB-125	BITUMEN (ATI & Waste Chem)	AU	.18859000E+2	.19037617E-6
SB-125	CEMENT	AU	.85133000E+3	.85939311E-5
SB-125	CEMENT	BS	.29459000E+2	.29738011E-6
SB-125	CEMENT	CS	.86804000E+2	.87626137E-6
SB-125	ENVIROSTONE	AU	.27954000E+2	.28218757E-6
SB-125	ENVIROSTONE	BS	.22200E+3	.22410260E-5
SB-125	NONE REQUIRED	AU	.40005390E+4	.40384288E-4
SB-125	NONE REQUIRED	BS	.46412000E+4	.46851577E-4
SB-125	NONE REQUIRED	CS	.14962760E+5	.15104475E-3

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
SB-125	OTHER SOLIDIFICATION MEDIA	AU	.52920000E+2	.53421215E-6
SB-125	SORBENT	AU	.53802000E+2	.54311569E-6
SB-125	SORBENT	CS	.45862000E+3	.46296367E-5
	TOTAL FOR SB-125		.27940580E+5	.28205210E-3
SB-126	NONE REQUIRED	AU	.80000000E-1	.80757695E-9
	TOTAL FOR SB-126		.80000000E-1	.80757695E-9
SC-41	(BLANK)	AU	.50000000E-1	.50473559E-9
SC-41	SORBENT	AU	.58000000E-1	.58549329E-9
	TOTAL FOR SC-41		.10800000E+0	.10902288E-8
SC-46	(BLANK)	AU	.32300000E+0	.32605919E-8
SC-46	CEMENT	AU	.48280000E+1	.48737269E-7
SC-46	NONE REQUIRED	AU	.38007000E+2	.38366971E-6
SC-46	SORBENT	AU	.53617100E+3	.54124917E-5
	TOTAL FOR SC-46		.57932900E+3	.58481593E-5
SC-47	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR SC-47		.10000000E-2	.1009471E-10
SC-50	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
	TOTAL FOR SC-50		.10000000E-1	.10094711E-9
SE-75	BITUMEN (ATI & Waste Chem)	AU	.53500000E+0	.54006708E-8
SE-75	CEMENT	AU	.16900000E+2	.17060063E-6
SE-75	NONE REQUIRED	AU	.22232500E+4	.22443068E-4
SE-75	SORBENT	AU	.18747500E+3	.18925061E-5
	TOTAL FOR SE-75		.24281600E+4	.24511575E-4
SM-153	(BLANK)	AU	.31400000E+2	.31697395E-6
SM-153	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
	TOTAL FOR SM-153		.31410000E+2	.31707490E-6
SN-111	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
	TOTAL FOR SN-111		.10000000E-1	.10094711E-9
SN-113	(BLANK)	AU	.54000000E+0	.55117127E-8
SN-113	CEMENT	AU	.16436300E+3	.16591971E-5
SN-113	CEMENT	CS	.20320000E+2	.20512454E-6
SN-113	ENVIROSTONE	AU	.10000000E+0	.10094711E-8
SN-113	NONE REQUIRED	AU	.53822700E+3	.54332465E-5
SN-113	NONE REQUIRED	BS	.23600E+3	.23823520E-5

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
SN-113	SORBENT	AU	.19306850E+4	.19489708E-4
SN-113	SORBENT	CS	.60500000E+1	.61073007E-7
	TOTAL FOR SN-113		.28962910E+4	.29237223E-4
SN-117	SORBENT	AU	.76000000E-1	.76719810E-9
	TOTAL FOR SN-117		.76000000E-1	.76719810E-9
SN-117M	NONE REQUIRED	AU	.10000000E+0	.10094711E-8
	TOTAL FOR SN-117M		.10000000E+0	.10094711E-8
SN-119	NONE REQUIRED	AU	.31000000E+0	.31293606E-8
SN-119	SORBENT	AU	.10000E+1	.10094711E-7
	TOTAL FOR SN-119		.13100000E+1	.13224072E-7
SN-119M	NONE REQUIRED	AU	.13300000E+1	.13425966E-7
SN-119M	SORBENT	AU	.45530000E+1	.45961223E-7
	TOTAL FOR SN-119M		.58830000E+1	.59387190E-7
SR-85	(BLANK)	AU	.77100000E+1	.77830228E-7
SR-85	CEMENT	AU	.15000000E+1	.15142067E-7
SR-85	NONE REQUIRED	AU	.13913000E+2	.14044772E-6
SR-85	SORBENT	AU	.59696800E+3	.60262199E-5
	TOTAL FOR SR-85		.62009100E+3	.62596400E-5
SR-89	(BLANK)	AU	.80000000E-2	.8075769E-10
SR-89	(BLANK)	BS	.49400000E+2	.49867876E-6
SR-89	(BLANK)	CS	.35900000E+1	.36240015E-7
SR-89	CEMENT	AU	.36120000E+1	.36462099E-7
SR-89	CEMENT	BS	.31852000E+2	.32153676E-6
SR-89	CEMENT	CS	.81840000E+1	.82615122E-7
SR-89	NONE REQUIRED	AU	.59789200E+3	.60355475E-5
SR-89	NONE REQUIRED	BS	.97940000E+3	.98867608E-5
SR-89	NONE REQUIRED	CS	.27410100E+3	.27669706E-5
SR-89	SORBENT	AU	.61770000E+1	.62355035E-7
SR-89	SORBENT	CS	.28680300E+3	.28951936E-5
	TOTAL FOR SR-89		.22410190E+4	.22622441E-4
SR-90	(BLANK)	AU	.92874000E+2	.93753627E-6
SR-90	(BLANK)	BS	.47231000E+3	.47678333E-5
SR-90	(BLANK)	CS	.14325000E+2	.14460674E-6
SR-90	BITUMEN (ATI & Waste Chem)	AU	.65870000E+1	.66493867E-7
SR-90	CEMENT	AU	.14736200E+3	.14875769E-5
SR-90	CEMENT	BS	.20746600E+3	.20943035E-5

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
SR-90	CEMENT	CS	.26610000E+2	.26862028E-6
SR-90	ENVIROSTONE	AU	.35160000E+1	.35493007E-7
SR-90	ENVIROSTONE	BS	.36800E+3	.37148539E-5
SR-90	NONE REQUIRED	AU	.15226190E+4	.15370400E-4
SR-90	NONE REQUIRED	BS	.28292600E+4	.28560564E-4
SR-90	NONE REQUIRED	CS	.51420E+7	.51907372E-1
SR-90	OTHER SOLIDIFICATION MEDIA	AU	.11620000E+1	.11730055E-7
SR-90	SORBENT	AU	.40804000E+2	.41190462E-6
SR-90	SORBENT	CS	.14727700E+3	.14867188E-5
	TOTAL FOR SR-90		.51479161E+7	.51966730E-1
SR-92	CEMENT	AU	.41897000E+2	.42293814E-6
SR-92	NONE REQUIRED	AU	.50072000E+2	.50546241E-6
	TOTAL FOR SR-92		.91969000E+2	.92840056E-6
SR-95	NONE REQUIRED	AU	.16320000E+1	.16474569E-7
	TOTAL FOR SR-95		.16320000E+1	.16474569E-7
TA-179	NONE REQUIRED	AU	.20000000E-2	.2018942E-10
	TOTAL FOR TA-179		.20000000E-2	.2018942E-10
TA-182	NONE REQUIRED	AU	.17220000E+1	.17383093E-7
	TOTAL FOR TA-182		.17220000E+1	.17383093E-7
TC-99M	CEMENT	AU	.50000000E-1	.50473559E-9
TC-99M	NONE REQUIRED	AU	.18392300E+3	.18566497E-5
TC-99M	SORBENT	AU	.89456100E+3	.90303356E-5
	TOTAL FOR TC-99M		.10785340E+4	.10887490E-4
TE-123M	NONE REQUIRED	AU	.20000E+2	.20189423E-6
	TOTAL FOR TE-123M		.20000E+2	.20189423E-6
TE-125M	BITUMEN (ATI & Waste Chem)	AU	.45490000E+1	.45920844E-7
TE-125M	CEMENT	AU	.16700E+3	.16858168E-5
TE-125M	ENVIROSTONE	AU	.10180000E+1	.10276416E-7
TE-125M	ENVIROSTONE	BS	.51000E+2	.51483030E-6
TE-125M	NONE REQUIRED	AU	.11961870E+4	.12075163E-4
TE-125M	NONE REQUIRED	CS	.29412600E+4	.29691172E-4
TE-125M	SORBENT	AU	.13200000E+0	.13325019E-8
	TOTAL FOR TE-125M		.43611460E+4	.44024512E-4
TE-132	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR TE-132		.10000000E-2	.1009471E-10

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
TH-227	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
	TOTAL FOR TH-227		.10000000E-1	.10094711E-9
TH-228	CEMENT	AU	.12800000E+0	.12921231E-8
TH-228	NONE REQUIRED	AU	.72830000E+1	.73519786E-7
TH-228	SORBENT	AU	.21600000E+0	.21804577E-8
TH-228	SORBENT	CS	.23000000E-1	.23217837E-9
	TOTAL FOR TH-228		.76500000E+1	.77224546E-7
TL-201	NONE REQUIRED	AU	.44241000E+2	.44660015E-6
TL-201	SORBENT	AU	.13304200E+3	.13430206E-5
	TOTAL FOR TL-201		.17728300E+3	.17896208E-5
TL-202	NONE REQUIRED	AU	.89730000E+1	.90579850E-7
	TOTAL FOR TL-202		.89730000E+1	.90579850E-7
TL-204	CEMENT	AU	.20000000E-2	.2018942E-10
TL-204	NONE REQUIRED	AU	.71240000E+1	.71914727E-7
TL-204	SORBENT	AU	.60000000E-2	.6056827E-10
	TOTAL FOR TL-204		.71320000E+1	.71995485E-7
TM-170	SORBENT	AU	.10000000E-1	.10094711E-9
	TOTAL FOR TM-170		.10000000E-1	.10094711E-9
W-181	NONE REQUIRED	AU	.30000000E-1	.30284135E-9
	TOTAL FOR W-181		.30000000E-1	.30284135E-9
W-188	NONE REQUIRED	AU	.50000E+1	.50473559E-7
	TOTAL FOR W-188		.50000E+1	.50473559E-7
XE-127	NONE REQUIRED	AU	.74480000E+1	.75185414E-7
	TOTAL FOR XE-127		.74480000E+1	.75185414E-7
XE-131M	(BLANK)	AU	.46000000E-1	.4[illegible]435674E-9
XE-131M	BITUMEN (ATI & Waste Chem)	AU	.10000000E-1	.1[illegible]0094711E-9
XE-131M	ENVIROSTONE	AU	.33000000E-1	.3[illegible]312549E-9
XE-131M	NONE REQUIRED	AU	.63570000E+1	.64172083E-7
XE-131M	NONE REQUIRED	BS	.20600000E+2	.20795106E-6
	TOTAL FOR XE-131M		.27046000E+2	.27302157E-6
XE-133	NONE REQUIRED	AU	.53750000E+2	.54259076E-6
XE-133	SORBENT	AU	.14709600E+3	.14848917E-5
	TOTAL FOR XE-133		.20084600E+3	.20274825E-5

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
Y-88	NONE REQUIRED	AU	.19630000E+1	.19815919E-7
Y-88	SORBENT	AU	.10040000E+1	.10135090E-7
	TOTAL FOR Y-88		.29670000E+1	.29951010E-7
Y-90	NONE REQUIRED	AU	.14281000E+2	.14416258E-6
Y-90	SORBENT	AU	.41100000E+0	.41489266E-8
	TOTAL FOR Y-90		.14692000E+2	.14831150E-6
YB-169	NONE REQUIRED	AU	.17000000E+0	.17161010E-8
YB-169	SORBENT	AU	.46000000E-1	.46435674E-9
	TOTAL FOR YB-169		.21600000E+0	.21804577E-8
ZN-63	SORBENT	AU	.10000E+1	.10094711E-7
	TOTAL FOR ZN-63		.10000E+1	.10094711E-7
ZN-65	(BLANK)	AU	.13236484E+5	.13361849E-3
ZN-65	(BLANK)	BS	.27200E+6	.27457616E-2
ZN-65	CEMENT	AU	.69746170E+5	.70406749E-3
ZN-65	CEMENT	CS	.21975000E+2	.22183129E-6
ZN-65	ENVIROSTONE	AU	.43680000E+1	.44093701E-7
ZN-65	ENVIROSTONE	BS	.20000000E-1	.20189423E-9
ZN-65	NONE REQUIRED	AU	.21795642E+6	.22002072E-2
ZN-65	NONE REQUIRED	BS	.61517100E+5	.62099740E-3
ZN-65	OTHER SOLIDIFICATION MEDIA	AU	.30067000E+2	.30351770E-6
ZN-65	SORBENT	AU	.72708900E+3	.73397540E-5
ZN-65	SORBENT	CS	.25741000E+2	.25984797E-6
	TOTAL FOR ZN-65		.63526543E+6	.64128215E-2
ZR-90M	NONE REQUIRED	AU	.93000000E+0	.93880820E-8
	TOTAL FOR ZR-90M		.93000000E+0	.93880820E-8
ZR-95	(BLANK)	AU	.14529500E+3	.14667111E-5
ZR-95	(BLANK)	BS	.30000E+4	.30284135E-4
ZR-95	(BLANK)	CS	.93500E+3	.94385556E-5
ZR-95	CEMENT	AU	.16255040E+4	.16408994E-4
ZR-95	CEMENT	CS	.96509300E+3	.97423358E-5
ZR-95	ENVIROSTONE	AU	.33400E+3	.33716337E-5
ZR-95	ENVIROSTONE	BS	.30200000E+1	.30486030E-7
ZR-95	NONE REQUIRED	AU	.85807610E+4	.86620310E-4
ZR-95	NONE REQUIRED	BS	.59640E+4	.60204861E-4
ZR-95	NONE REQUIRED	CS	.14200000E+2	.14334490E-6
ZR-95	SORBENT	AU	.35775800E+3	.36114639E-5
ZR-95	SORBENT	CS	.13374040E+4	.13500708E-4
	TOTAL FOR ZR-95		.23262035E+5	.23482354E-3

TABLE 9 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE EQUAL TO ABOUT 30 YEARS OR LESS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
ZR-97	CEMENT	AU	.10432000E+2	.10530803E-6
ZR-97	NONE REQUIRED	AU	.39147000E+2	.39517768E-6
	TOTAL FOR ZR-97		.49579000E+2	.50048572E-6

TABLE 10

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE GREATER THAN ABOUT 30 YEARS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
AG-108M	SORBENT	CS	.10000E+1	.10094711E-7
	TOTAL FOR AG-108M		.10000E+1	.10094711E-7
AM-241	(BLANK)	AU	.20937000E+2	.21135298E-6
AM-241	(BLANK)	BS	.56000000E-1	.56530386E-9
AM-241	BITUMEN (ATI & Waste Chem)	AU	.51000000E-1	.51483030E-9
AM-241	CEMENT	AS	.47500000E+0	.47949881E-8
AM-241	CEMENT	AU	.27330000E+1	.27588847E-7
AM-241	CEMENT	BS	.38000000E-1	.38359905E-9
AM-241	CEMENT	CS	.39054000E+2	.39423887E-6
AM-241	ENVIROSTONE	AU	.68500000E+0	.69148776E-8
AM-241	ENVIROSTONE	BS	.86200000E+0	.87016416E-8
AM-241	NONE REQUIRED	AU	.66210000E+1	.66837087E-7
AM-241	NONE REQUIRED	CS	.25509000E+2	.25750600E-6
AM-241	SORBENT	AU	.21640000E+1	.21844956E-7
AM-241	SORBENT	CS	.24510000E+1	.24742138E-7
	TOTAL FOR AM-241		.10163600E+3	.10259861E-5
AM-243	NONE REQUIRED	AU	.30000000E-1	.30284135E-9
AM-243	SORBENT	AU	.41000000E-1	.41388318E-9
	TOTAL FOR AM-243		.71000000E-1	.71672454E-9
BI-207	NONE REQUIRED	AU	.11120000E+1	.11225319E-7
	TOTAL FOR BI-207		.11120000E+1	.11225319E-7
C-14	(BLANK)	AU	.44987910E+4	.45413999E-4
C-14	(BLANK)	BS	.24640000E+3	.24873370E-5
C-14	(BLANK)	CS	.42970430E+4	.43377411E-4
C-14	BITUMEN (ATI & Waste Chem)	AU	.96535000E+2	.97449301E-6
C-14	CEMENT	AU	.19377674E+5	.19561203E-3
C-14	CEMENT	BS	.30957900E+3	.31251108E-5
C-14	CEMENT	CS	.71737717E+5	.72417158E-3
C-14	ENVIROSTONE	AU	.97354000E+2	.98276058E-6
C-14	ENVIROSTONE	BS	.11450E+4	.11558445E-4
C-14	NONE REQUIRED	AU	.94301793E+5	.95194943E-3
C-14	NONE REQUIRED	BS	.34778300E+3	.35107691E-5
C-14	NONE REQUIRED	CS	.18357300E+4	.18531165E-4
C-14	OTHER SOLIDIFICATION MEDIA	AU	.20262700E+3	.20454611E-5
C-14	SORBENT	AU	.12483608E+5	.12601842E-3
C-14	SORBENT	CS	.21096000E+2	.21295804E-6
	TOTAL FOR C-14		.21099873E+6	.21299713E-2

TABLE 10 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE GREATER THAN ABOUT 30 YEARS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
CL-36	CEMENT	AU	.28610000E+1	.28880970E-7
CL-36	NONE REQUIRED	AU	.80749000E+2	.81513789E-6
CL-36	SORBENT	AU	.18058500E+3	.18229535E-5
	TOTAL FOR CL-36		.26419500E+3	.26669724E-5
I-129	(BLANK)	AU	.90000000E-1	.90852407E-9
I-129	(BLANK)	BS	.11700000E+0	.11810812E-8
I-129	(BLANK)	CS	.24000000E-1	.24227308E-9
I-129	BITUMEN (ATI & Waste Chem)	AU	.20920000E+1	.21118137E-7
I-129	CEMENT	AU	.24400000E+0	.24631097E-8
I-129	CEMENT	BS	.13200000E+0	.13325019E-8
I-129	CEMENT	CS	.13500000E+0	.13627661E-8
I-129	ENVIROSTONE	AU	.31000000E-1	.31293606E-9
I-129	NONE REQUIRED	AU	.41516000E+2	.41909206E-6
I-129	NONE REQUIRED	BS	.31220000E+1	.31515690E-7
I-129	NONE REQUIRED	CS	.10471000E+2	.10570172E-6
I-129	OTHER SOLIDIFICATION MEDIA	AU	.31000000E+0	.31293606E-8
I-129	SORBENT	AU	.64480000E+1	.65090702E-7
I-129	SORBENT	CS	.39350000E+1	.39722691E-7
	TOTAL FOR I-129		.68667000E+2	.69317358E-6
K-40	SORBENT	AU	.27000000E-1	.27255722E-9
	TOTAL FOR K-40		.27000000E-1	.27255722E-9
NB-94	NONE REQUIRED	AU	.10460000E+2	.10559068E-6
NB-94	NONE REQUIRED	CS	.13000E+2	.13123125E-6
NB-94	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR NB-94		.23461000E+2	.23683203E-6
ND-144	SORBENT	AU	.40000000E-1	.40378847E-9
	TOTAL FOR ND-144		.40000000E-1	.40378847E-9
NI-59	(BLANK)	AU	.13280000E+2	.13405777E-6
NI-59	(BLANK)	BS	.22000E+2	.22208366E-6
NI-59	(BLANK)	CS	.13400000E+1	.13526913E-7
NI-59	CEMENT	AU	.89650000E+1	.90499092E-7
NI-59	CEMENT	BS	.50239600E+3	.50715428E-5
NI-59	CEMENT	CS	.50896000E+2	.51378045E-6
NI-59	ENVIROSTONE	BS	.12400000E+1	.12517442E-7
NI-59	NONE REQUIRED	AU	.77880000E+1	.78617616E-7
NI-59	NONE REQUIRED	BS	.94700E+3	.95596921E-5
NI-59	NONE REQUIRED	CS	.64910E+4	.65524775E-4

TABLE 10 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE GREATER THAN ABOUT 30 YEARS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
NI-59	SORBENT	AU	.49830000E+1	.50301949E-7
NI-59	SORBENT	CS	.15150000E+2	.15293488E-6
	TOTAL FOR NI-59		.80660380E+4	.81424330E-4
NI-63	(BLANK)	AU	.12843629E+5	.12965273E-3
NI-63	(BLANK)	BS	.10895800E+5	.10998996E-3
NI-63	(BLANK)	CS	.12285E+5	.12401353E-3
NI-63	BITUMEN (ATI & Waste Chem)	AU	.41850200E+3	.42246571E-5
NI-63	CEMENT	AU	.26460262E+5	.26710872E-3
NI-63	CEMENT	BS	.69975375E+5	.70638125E-3
NI-63	CEMENT	CS	.43019780E+4	.43427228E-4
NI-63	ENVIROSTONE	AU	.75762500E+3	.76480061E-5
NI-63	ENVIROSTONE	BS	.39950E+5	.40328374E-3
NI-63	NONE REQUIRED	AU	.14026196E+5	.14159040E-3
NI-63	NONE REQUIRED	BS	.12862E+6	.12983818E-2
NI-63	NONE REQUIRED	CS	.11832561E+7	.11944629E-1
NI-63	OTHER SOLIDIFICATION MEDIA	AU	.16971000E+3	.17131735E-5
NI-63	SORBENT	AU	.35459550E+4	.35795394E-4
NI-63	SORBENT	CS	.13442400E+5	.13569715E-3
	TOTAL FOR NI-63		.15209485E+7	.15353536E-1
NP-237	(BLANK)	BS	.20000000E-2	.2018942E-10
NP-237	CEMENT	AU	.40000000E-2	.4037884E-10
NP-237	CEMENT	BS	.10000000E-2	.1009471E-10
NP-237	ENVIROSTONE	AU	.21000000E-1	.21198895E-9
NP-237	NONE REQUIRED	AU	.56400000E+0	.56934175E-8
NP-237	SORBENT	AU	.40000000E-1	.40378847E-9
	TOTAL FOR NP-237		.63200000E+0	.63798579E-8
PA-231	(BLANK)	AU	.30000000E-2	.3028413E-10
	TOTAL FOR PA-231		.30000000E-2	.3028413E-10
PO-209	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
PO-209	SORBENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR PO-209		.11000000E-1	.11104183E-9
PT-193	CEMENT	AU	.10000000E-2	.1009471E-10
	TOTAL FOR PT-193		.10000000E-2	.1009471E-10

TABLE 10 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE GREATER THAN ABOUT 30 YEARS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
PU-238	(BLANK)	AU	.16600000E+0	.16757221E-8
PU-238	(BLANK)	BS	.10380000E+1	.10478310E-7
PU-238	(BLANK)	CS	.64300000E+0	.64908997E-8
PU-238	BITUMEN (ATI & Waste Chem)	AU	.80000000E-1	.80757695E-9
PU-238	CEMENT	AU	.26100000E+0	.26347198E-8
PU-238	CEMENT	BS	.35000000E-1	.35331491E-9
PU-238	CEMENT	CS	.72000000E-1	.72681925E-9
PU-238	ENVIROSTONE	AU	.14800000E+0	.14940173E-8
PU-238	ENVIROSTONE	BS	.14160000E+1	.14294112E-7
PU-238	NONE REQUIRED	AU	.50340000E+1	.50816779E-7
PU-238	NONE REQUIRED	CS	.31119000E+2	.31413734E-6
PU-238	SORBENT	AU	.32700000E+0	.33009708E-8
PU-238	SORBENT	CS	.56320000E+1	.56853417E-7
	TOTAL FOR PU-238		.45971000E+2	.46406400E-6
PU-239	(BLANK)	AU	.21100000E+0	.21299842E-8
PU-239	(BLANK)	BS	.2[illegible]310000E+1	.2454024[illegible]-7
PU-239	(BLANK)	CS	.24800000E+0	.25034885E-8
PU-239	BITUMEN (ATI & Waste Chem)	AU	.41000000E-1	.41388318E-9
PU-239	CEMENT	AS	.86000000E-1	.86814522E-9
PU-239	CEMENT	AU	.28620000E+1	.28891065E-7
PU-239	CEMENT	BS	.12000000E+0	.12113654E-8
PU-239	CEMENT	CS	.83000000E-1	.83786109E-9
PU-239	ENVIROSTONE	AU	.37000000E-1	.37350434E-9
PU-239	ENVIROSTONE	BS	.13410000E+1	.13537008E-7
PU-239	NONE REQUIRED	AU	.10459000E+2	.10558059E-6
PU-239	NONE REQUIRED	BS	.10000000E-2	.1009471E-10
PU-239	NONE REQUIRED	CS	.94209000E+2	.95101271E-6
PU-239	OTHER SOLIDIFICATION MEDIA	AU	.42000000E-1	.42397790E-9
PU-239	SORBENT	AU	.24600000E+0	.24832991E-8
PU-239	SORBENT	CS	.38360000E+1	.38723314E-7
	TOTAL FOR PU-239		.11625300E+3	.11735405E-5
PU-240	(BLANK)	AU	.62000000E-1	.62587213E-9
PU-240	(BLANK)	BS	.26000000E+0	.26246251E-8
PU-240	(BLANK)	CS	.24700000E+0	.24933938E-8
PU-240	CEMENT	BS	.12000000E+0	.12113654E-8
PU-240	CEMENT	CS	.83000000E-1	.83786109E-9
PU-240	ENVIROSTONE	AU	.21000000E-1	.21198895E-9
PU-240	NONE REQUIRED	AU	.36290000E+1	.36633709E-7
PU-240	NONE REQUIRED	CS	.30074000E+2	.30358836E-6
PU-240	SORBENT	AU	.67000000E-1	.67634569E-9
PU-240	SORBENT	CS	.10000000E-2	.1009471E-10
	TOTAL FOR PU-240		.34564000E+2	.34891362E-6

TABLE 10 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE GREATER THAN ABOUT 30 YEARS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
PU-242	(BLANK)	BS	.20000000E-2	.2018942E-10
PU-242	BITUMEN (ATI & Waste Chem)	AU	.16000000E+0	.16151539E-8
PU-242	CEMENT	AU	.60000000E-2	.6056827E-10
PU-242	CEMENT	BS	.10000000E-2	.1009471E-10
PU-242	CEMENT	CS	.10000000E-2	.1009471E-10
PU-242	ENVIROSTONE	AU	.21000000E-1	.21198895E-9
PU-242	NONE REQUIRED	AU	.48300000E+0	.48757458E-8
PU-242	NONE REQUIRED	CS	.80000000E-2	.8075769E-10
PU-242	SORBENT	AU	.91000000E-1	.91861878E-9
PU-242	SORBENT	CS	.50000000E-2	.5047355E-10
	TOTAL FOR PU-242		.77800000E+0	.78536858E-8
RA-226	(BLANK)	AU	.90000000E-2	.9085240E-10
RA-226	CEMENT	AS	.92250000E+1	.93123717E-7
RA-226	CEMENT	AU	.47264000E+2	.47711646E-6
RA-226	CEMENT	BS	.14590000E+1	.14728184E-7
RA-226	CEMENT	CS	.51222900E+3	.51708041E-5
RA-226	ENVIROSTONE	AU	.41800000E+0	.42195895E-8
RA-226	NONE REQUIRED	AU	.31046700E+3	.31340749E-5
RA-226	SORBENT	AU	.33080000E+2	.33393307E-6
	TOTAL FOR RA-226		.91415100E+3	.92280910E-5
RE-187	NONE REQUIRED	AU	.20000000E-2	.2018942E-10
	TOTAL FOR RE-187		.20000000E-2	.2018942E-10
SM-151	NONE REQUIRED	AU	.14887000E+4	.15027997E-4
	TOTAL FOR SM-151		.14887000E+4	.15027997E-4
TB-157	NONE REQUIRED	AU	.20000000E-2	.2018942E-10
	TOTAL FOR TB-157		.20000000E-2	.2018942E-10
TB-158	NONE REQUIRED	AU	.20000000E-2	.2018942E-10
	TOTAL FOR TB-158		.20000000E-2	.2018942E-10
TC-99	(BLANK)	AU	.38370000E+1	.38733409E-7
TC-99	(BLANK)	BS	.60400000E+0	.60972060E-8
TC-99	(BLANK)	CS	.15300000E+0	.15444909E-8
TC-99	BITUMEN (ATI & Waste Chem)	AU	.27832000E+2	.28095602E-6
TC-99	CEMENT	AU	.78800000E+0	.79546330E-8
TC-99	CEMENT	BS	.52100000E+0	.52593449E-8
TC-99	CEMENT	CS	.10700000E+0	.10801341E-8
TC-99	ENVIROSTONE	AU	.12310000E+1	.12426590E-7

TABLE 10 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE GREATER THAN ABOUT 30 YEARS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
TC-99	ENVIROSTONE	BS	.10352000E+2	.10450045E-6
TC-99	NONE REQUIRED	AU	.89992400E+3	.90844735E-5
TC-99	NONE REQUIRED	BS	.39090000E+1	.39460228E-7
TC-99	NONE REQUIRED	CS	.16988470E+4	.17149371E-4
TC-99	OTHER SOLIDIFICATION MEDIA	AU	.90500000E+0	.91357142E-8
TC-99	SORBENT	AU	.10094000E+3	.10189602E-5
TC-99	SORBENT	CS	.80210000E+1	.80969684E-7
	TOTAL FOR TC-99		.27579710E+4	.27840922E-4
TE-123	NONE REQUIRED	AU	.39976000E+2	.40354620E-6
	TOTAL FOR TE-123		.39976000E+2	.40354620E-6
TH-229	SORBENT	AU	.20000000E-2	.2018942E-10
	TOTAL FOR TH-229		.20000000E-2	.2018942E-10
TH-230	CEMENT	AU	.53100000E+0	.53602920E-8
TH-230	NONE REQUIRED	AU	.10000000E-1	.10094711E-9
TH-230	SORBENT	AU	.18000000E-1	.18170481E-9
	TOTAL FOR TH-230		.55900000E+0	.56429439E-8
TH-232	(BLANK)	AU	.31130000E+2	.31424838E-6
TH-232	CEMENT	AU	.10720000E+1	.10821531E-7
TH-232	NONE REQUIRED	AU	.68591000E+2	.69240638E-6
TH-232	SORBENT	AU	.18930000E+1	.19109289E-7
	TOTAL FOR TH-232		.10268600E+3	.10365855E-5
TH-NAT	(BLANK)	AU	.25280000E+3	.25519431E-5
TH-NAT	CEMENT	AU	.39539700E+3	.39914188E-5
TH-NAT	NONE REQUIRED	AU	.81140700E+3	.81909199E-5
TH-NAT	SORBENT	AU	.64526750E+4	.65137895E-4
	TOTAL FOR TH-NAT		.79122790E+4	.79872177E-4
U-232	NONE REQUIRED	AU	.10000000E-2	.1009471E-10
	TOTAL FOR U-232		.10000000E-2	.1009471E-10
U-233	CEMENT	AU	.10000000E+0	.10094711E-8
U-233	NONE REQUIRED	AU	.21666000E+2	.21871202E-6
	TOTAL FOR U-233		.21766000E+2	.21972149E-6

TABLE 10 (cont.)

RADIONUCLIDES AND ASSOCIATED SORBENT OR SOLIDIFICATION MEDIA
(HALF-LIFE GREATER THAN ABOUT 30 YEARS)

ISOTOPE	SORBENT OR SOLIDIFICATION MEDIA	CLASS	ACTIVITY (mCi)	FRACTION OF TOTAL ACTIVITY
U-234	CEMENT	AU	.17393900E+3	.17558640E-5
U-234	NONE REQUIRED	AU	.69974000E+3	.70636737E-5
U-234	NONE REQUIRED	CS	.28700000E+0	.28971823E-8
U-234	SORBENT	AU	.40000000E-1	.40378847E-9
U-234	SORBENT	CS	.20000000E-2	.2018942E-10
	TOTAL FOR U-234		.87400800E+3	.88228589E-5
U-235	CEMENT	AU	.63190000E+1	.63788484E-7
U-235	NONE REQUIRED	AU	.28593500E+3	.28864314E-5
U-235	NONE REQUIRED	CS	.37000000E-1	.37350434E-9
U-235	SORBENT	AU	.34000000E-1	.34322020E-9
U-235	SORBENT	CS	.10000000E-2	.1009471E-10
	TOTAL FOR U-235		.29232600E+3	.29509467E-5
U-236	NONE REQUIRED	AU	.36000000E-1	.36340962E-9
	TOTAL FOR U-236		.36000000E-1	.36340962E-9
U-238	CEMENT	AU	.19338650E+4	.19521810E-4
U-238	ENVIROSTONE	AU	.39134000E+3	.39504645E-5
U-238	NONE REQUIRED	AU	.90645900E+4	.91504515E-4
U-238	NONE REQUIRED	CS	.50000000E+0	.50473559E-8
U-238	SORBENT	AU	.17079400E+3	.17241162E-5
U-238	SORBENT	CS	.20000000E-2	.2018942E-10
	TOTAL FOR U-238		.11561100E+5	.11670597E-3
U-DEP	CEMENT	AU	.63600000E+0	.64202367E-8
U-DEP	SORBENT	AU	.36600000E+2	.36946645E-6
	TOTAL FOR U-DEP		.37236000E+2	.37588669E-6
U-NAT	(BLANK)	AU	.10090E+4	.10185564E-4
U-NAT	CEMENT	AU	.23746600E+4	.23971508E-4
U-NAT	NONE REQUIRED	AU	.16125000E+2	.16277722E-6
U-NAT	SORBENT	AU	.76534500E+3	.77259373E-5
	TOTAL FOR U-NAT		.41651300E+4	.42045787E-4

TABLE 11

SHORT-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
SORTED BY INVENTORY-BASED TOXICITY FACTOR

ISOTOPE	ACTIVITY (mCi)	TOXICITY INDICATOR (mCi^{-1})	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)
SR-90	5147916.100	54.158	278800840.144
CS-137	4738000.000	13.825	65502850.000
CO-60	8494087.300	4.210	35760107.533
CS-134	1032039.300	5.973	6164370.739
FE-55	14863214.000	0.069	1025561.766
H-3	58761712.000	0.014	822663.968
ZN-65	635265.430	0.821	521552.918
KR-85	65603.760	7.921	519647.383
PO-210	3161.300	51.633	163227.403
I-125	53756.375	2.440	131165.555
MN-54	704234.290	0.139	97883.566
PM-147	689611.010	0.101	69650.712
RU-106	25460.033	1.597	40659.673
SB-125	27940.580	1.051	29365.550
CO-58	443390.010	0.057	25273.231
PB-210	77.893	257.975	20094.447
CE-144	16851.032	1.159	19531.389
PU-241	4073.589	4.263	17365.710
SB-124	60825.978	0.123	7481.595
AG-110M	17077.897	0.423	7223.950
CD-113M	111.310	49.100	5465.321
CM-243	5.757	802.597	4620.551
S-35	270277.240	0.017	4594.713
FE-59	39225.707	0.063	2471.220
RA-228	6.972	341.525	2381.112
P-32	53930.288	0.031	1671.839
CM-244	3.004	522.004	1568.100
NB-95	77506.269	0.019	1395.113
I-131	3852.188	0.350	1348.266
ZR-95	23262.035	0.053	1232.888
CR-51	1005193.800	0.001	1005.194
NA-22	673.914	1.030	694.131
TH-228	7.650	85.909	657.204
SE-75	2428.160	0.229	556.049
CD-109	316.140	1.291	408.137
CM-242	89.281	2.963	264.540
CO-57	5729.257	0.045	257.817
TE-125M	4361.146	0.059	257.308
SR-89	2241.019	0.107	239.789
CA-45	2288.784	0.100	228.878
SN-113	2896.291	0.073	211.429
CS-136	578.548	0.284	164.308
SC-46	579.329	0.111	64.306

TABLE 11 (cont.)

SHORT-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
SORTED BY INVENTORY-BASED TOXICITY FACTOR

ISOTOPE	ACTIVITY (mCi)	TOXICITY INDICATOR (mCi^{-1})	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)
EU-152	19.839	1.414	28.052
CE-141	607.505	0.046	27.945
XE-127	7.448	3.063	22.813
RU-103	851.705	0.024	20.441
SR-85	620.091	0.029	17.983
EU-154	6.932	2.276	15.777
BA-140	560.061	0.028	15.682
XE-133	200.846	0.056	11.247
GD-153	260.679	0.041	10.688
RB-83	42.000	0.170	7.140
RB-86	165.628	0.040	6.625
PO-208	0.032	200.000	6.400
EU-155	32.997	0.166	5.478
IN-114M	23.273	0.207	4.818
TE-123M	20.000	0.224	4.480
GE-68	84.236	0.047	3.959
HG-203	36.631	0.097	3.553
TL-204	7.132	0.420	2.995
LA-140	621.162	0.004	2.485
I-124	26.010	0.088	2.289
BA-133	32.973	0.068	2.242
GA-67	212.374	0.010	2.124
BE-7	2101.100	0.001	2.101
W-188	5.000	0.280	1.400
XE-131M	27.046	0.051	1.379
CF-252	0.009	104.032	0.936
SN-119M	5.883	0.095	0.559
RH-102	1.000	0.361	0.361
Y-88	2.967	0.103	0.306
RH-101	1.000	0.278	0.278
TA-182	1.722	0.147	0.253
AU-195	7.280	0.033	0.240
CO-56	1.093	0.157	0.172
SM-153	31.410	0.004	0.126
ZR-97	49.579	0.002	0.099
IR-192	1.217	0.074	0.090
I-133	10.447	0.006	0.063
PU-236	0.002	27.077	0.054
TL-202	8.973	0.005	0.045
CE-139	0.252	0.171	0.043
MO-99	15.118	0.002	0.030
NP-239	12.900	0.002	0.026

TABLE 11 (cont.)

SHORT-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
SORTED BY INVENTORY-BASED TOXICITY FACTOR

ISOTOPE	ACTIVITY (mCi)	TOXICITY INDICATOR (mCi^{-1})	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)
HF-181	0.535	0.044	0.024
P-33	4.237	0.005	0.021
Y-90	14.692	0.001	0.015
SB-122	3.468	0.004	0.014
AS-73	0.530	0.011	0.006
BI-204	5.000	0.001	0.005
DY-159	0.393	0.011	0.004
YB-169	0.216	0.019	0.004
CU-67	3.198	0.001	0.003
SB-126	0.080	0.034	0.003
TM-170	0.010	0.162	0.002
TH-227	0.010	0.160	0.002
CA-47	0.195	0.006	0.001
SN-117M	0.100	0.010	0.001
CE-143	0.676	0.001	0.001
CM-241	0.021	0.028	0.001
CE-134	0.076	0.006	<0.001
BI-206	0.025	0.014	<0.001
TA-179	0.002	0.129	<0.001
W-181	0.030	0.008	<0.001
BI-210	0.034	0.007	<0.001
BI-205	0.014	0.013	<0.001
HF-175	0.002	0.028	<0.001
CD-115	0.014	0.003	<0.001
AG-105	0.002	0.017	<0.001
NB-96	0.010	0.001	<0.001
SC-47	0.001	0.002	<0.001
BR-82	0.002	0.001	<0.001
ZR-90M	0.930	0.000	0.000
ZN-63	1.000	0.000	0.000
TL-201	177.283	0.000	0.000
TE-132	0.001	0.000	0.000
TC-99M	1078.534	0.000	0.000
SR-95	1.632	0.000	0.000
SR-92	91.969	0.000	0.000
SN-119	1.310	0.000	0.000
SN-117	0.076	0.000	0.000
SN-111	0.010	0.000	0.000
SC-50	0.010	0.000	0.000
SC-41	0.108	0.000	0.000
RU-104	34.670	0.000	0.000
RH-106	165.329	0.000	0.000
RB-95	0.001	0.000	0.000

TABLE 11 (cont.)

SHORT-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
SORTED BY INVENTORY-BASED TOXICITY FACTOR

ISOTOPE	ACTIVITY (mCi)	TOXICITY INDICATOR (mCi^{-1})	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)
RB-88	5.010	0.000	0.000
PB-206	0.010	0.000	0.000
NI-65	762.185	0.000	0.000
NB-97	49.581	0.000	0.000
NA-24	0.015	0.000	0.000
MN-51	0.001	0.000	0.000
IN-114	5.667	0.000	0.000
IN-113	0.072	0.000	0.000
IN-111	312.468	0.000	0.000
I-128	1.760	0.000	0.000
I-123	185.151	0.000	0.000
I-121	3.664	0.000	0.000
GA-68	7.008	0.000	0.000
FE-53	0.200	0.000	0.000
EU-153	0.023	0.000	0.000
EU-151	0.001	0.000	0.000
DY-165	0.001	0.000	0.000
CU-64	0.007	0.000	0.000
CS-144	4.499	0.000	0.000
CS-141	0.001	0.000	0.000
CS-139	0.001	0.000	0.000
CS-127	20.640	0.000	0.000
CR-56	0.007	0.000	0.000
CE-147	0.170	0.000	0.000
CE-137	2.793	0.000	0.000
C-15	0.060	0.000	0.000
AG-110	1410.420	0.000	0.000

TABLE 12

LONG-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
SORTED BY INVENTORY-BASED TOXICITY FACTOR

ISOTOPE	ACTIVITY (mCi)	TOXICITY INDICATOR (mCi^{-1})	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)
TH-NAT	7912.300	12514.450	99018082.735
U-238	11561.100	714.383	8259053.301
U-NAT	4165.100	714.383	2975476.633
RA-226	914.151	1693.653	1548254.584
TH-232	102.686	12514.450	1285058.813
U-234	874.008	498.816	435969.175
C-14	210998.730	1.545	325993.038
AM-241	101.636	1970.254	200248.736
U-235	292.326	654.970	191464.760
PU-239	116.253	811.731	94366.164
I-129	68.667	1337.733	91858.112
NP-237	0.632	78153.260	49392.860
NI-63	1518000.000	0.024	36432.000
U-DEP	37.236	714.383	26600.765
PU-240	34.564	706.437	24417.288
PU-238	45.971	239.211	10996.769
U-233	21.766	481.872	10488.426
TC-99	2757.971	1.971	5435.961
NI-59	8066.038	0.202	1629.340
TH-230	0.559	1813.946	1013.996
TE-123	39.976	24.197	967.299
CL-36	264.195	3.386	894.564
PU-242	0.778	688.041	535.296
SM-151	1488.700	0.146	217.350
AM-243	0.071	2865.271	203.434
NB-94	23.461	3.982	93.422
PA-231	0.003	23893.510	71.681
U-236	0.036	545.982	19.655
TH-229	0.002	7145.573	14.291
PO-209	0.011	743.926	8.183
BI-207	1.112	1.380	1.535
AG-108M	1.000	1.440	1.440
K-40	0.027	33.697	0.910
U-232	0.001	866.207	0.866
ND-144	0.040	14.174	0.567
TB-158	0.002	2.279	0.005
PT-193	0.001	0.100	<0.001
TB-157	0.002	0.040	<0.001
RE-187	0.002	0.020	<0.001

TABLE 13

SHORT-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
(ACTIVITY, ITOX FACTORS AND DECAY TIMES)

ISOTOPE	ACTIVITY (mCi)	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)	HALF-LIFE EXPONENT 'n'	TIME TO DECAY TO ALI VALUE (Years)
SR-90	5147916.100	278800840.144	24.18	701.309
CS-137	4738000.000	65502850.000	25.39	765.875
CO-60	8494087.300	35760107.533	25.42	133.964
CS-134	1032039.300	6164370.739	23.60	48.666
FE-55	14863214.000	1025561.766	20.81	56.176
H-3	58761712.000	822663.968	19.47	240.029
ZN-65	635265.430	521552.918	21.16	14.138
KR-85	65603.760	519647.383	18.89	202.490
PO-210	3161.300	163227.403	20.16	7.640
I-125	53756.375	131165.555	20.92	3.431
MN-54	704234.290	97888.566	18.51	15.841
PM-147	689611.010	69650.712	16.96	44.489
RU-106	25460.033	40659.673	17.04	17.174
SB-125	27940.580	29365.550	15.66	42.745
CO-58	443390.010	25273.231	18.32	3.555
PB-210	77.893	20094.447	17.14	382.122
CE-144	16851.932	19531.389	16.25	12.659
PU-241	4073.589	17365.710	13.88	204.030
SB-124	60825.978	7481.595	16.78	2.769
AG-110M	17077.897	7223.950	14.95	10.321
CD-113M	111.310	5465.321	12.16	177.535
CM-243	5.757	4620.551	11.57	329.779
S-35	270277.240	4594.713	15.61	3.731
FE-59	39225.707	2471.220	15.56	1.899
RA-228	6.972	2381.112	11.49	66.040
P-32	53930.288	1671.839	16.61	0.648
CM-244	3.004	1568.100	10.27	185.999
NB-95	77506.269	1395.113	15.13	1.452
I-131	3852.188	1348.266	17.12	0.377
ZR-95	23262.035	1232.888	14.07	2.462
CR-51	1005193.800	1005.194	15.18	1.152
NA-22	673.914	694.131	10.28	26.749
TH-228	7.650	657.204	10.47	20.023
SE-75	2428.160	556.049	12.13	3.992
CD-109	316.140	408.137	10.19	12.638
CM-242	89.281	264.540	10.69	4.768
CO-57	5729.257	257.817	10.05	7.457
TE-125M	4361.146	257.308	11.98	1.905
SR-89	2241.019	239.789	12.02	1.658
CA-45	2288.784	228.878	10.46	4.677
SN-113	2896.291	211.429	10.80	3.403
CS-136	578.548	164.308	13.39	0.482
SC-46	579.329	64.306	9.48	2.181

TABLE 13 (cont.)

SHORT-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
(ACTIVITY, ITOX FACTORS AND DECAY TIMES)

ISOTOPE	ACTIVITY (mCi)	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)	HALF-LIFE EXPONENT 'n'	TIME TO DECAY TO ALI VALUE (Years)
EU-152	19.839	28.052	4.61	61.812
CE-141	607.505	27.945	9.55	0.850
XE-127	7.448	22.813	9.11	0.911
RU-103	851.705	20.441	8.81	0.952
SR-85	620.091	17.983	7.99	1.431
EU-154	6.932	15.777	3.68	30.183
BA-140	560.061	15.682	10.02	0.351
XE-133	200.846	11.247	10.86	0.152
GD-153	260.679	10.688	5.59	3.702
RB-83	42.000	7.140	6.28	1.482
RB-86	165.628	6.625	8.26	0.421
PO-208	0.032	6.400	3.57	10.337
EU-155	32.997	5.478	3.61	1.718
IN-114M	23.273	4.818	6.43	0.872
TE-123M	20.000	4.480	5.21	1.709
GE-68	84.236	3.959	3.96	3.114
HG-203	36.631	3.553	6.08	0.779
TL-204	7.132	2.995	2.14	8.056
LA-140	621.162	2.485	10.17	0.047
I-124	26.010	2.289	8.91	0.102
BA-133	32.973	2.242	1.02	10.955
GA-67	212.374	2.124	4.71	0.042
BE-7	2101.100	2.101	5.28	0.771
W-183	5.000	1.400	4.21	0.800
XE-131M	27.046	1.379	6.64	0.219
CF-252	0.009	0.936	0.74	1.942
SN-119M	5.883	0.559	1.12	0.901
RH-102	1.000	0.361	0.89	0.503
Y-88	2.967	0.306	1.46	0.425
TA-182	1.722	0.253	1.09	0.342
AU-195	7.280	0.240	0.43	0.216
CO-56	1.093	0.172	1.02	0.218
SM-153	31.410	0.126	5.86	0.031
ZR-97	49.579	0.099	6.52	0.013
IR-192	1.217	0.090	0.17	0.035
I-133	10.447	0.063	6.27	0.015
TL-202	8.973	0.045	1.73	0.057
MO-99	15.118	0.030	3.22	0.026
NP-239	12.900	0.026	2.99	0.019
Y-90	14.692	0.015	1.44	0.010
SB-122	3.468	0.014	2.10	0.015
BI-204	5.000	0.005	2.21	0.003

TABLE 14

LONG-LIVED RADIONUCLIDES IN THE RICHLAND 1989 INVENTORY
(ACTIVITY, ITOX FACTORS AND DECAY TIMES)

ISOTOPE	ACTIVITY (mCi)	INVENTORY-BASED TOXICITY FACTOR (mCi/mCi)	HALF-LIFE EXPONENT 'n'	TIME TO DECAY TO ALI VALUE (Years)
TH-NAT	7912.300	99018082.735	23.22	.32505E+12
U-238	11561.100	8259053.301	19.71	.88088E+11
U-NAT	4165.100	2975476.633	18.23	.81504E+11
RA-226	914.151	1548254.584	18.88	.30211E+5
TH-232	102.686	1285058.813	16.95	.23730E+12
U-234	874.008	435969.175	16.30	.39779E+7
C-14	210998.730	325993.038	16.40	.93998E+5
AM-241	101.636	200248.736	16.20	.69980E+4
U-235	292.326	191464.760	14.40	.10138E+11
PU-239	116.253	94366.164	14.39	.34701E+6
I-129	68.667	91858.112	13.63	.21677E+9
NP-237	0.632	49392.860	12.93	.27670E+8
NI-63	1518000.000	36432.000	14.19	.14192E+4
U-DEP	37.236	26600.765	11.43	.51083E+11
PU-240	34.564	24417.288	12.64	.82645E+5
PU-238	45.971	10996.769	12.47	.10903E+4
U-233	21.766	10488.425	10.98	.17473E+7
TC-99	2757.971	5435.961	9.99	.21289E+7
NI-59	8066.038	1629.340	8.37	.66987E+6
TH-230	0.559	1013.996	7.69	.59230E+6
TE-123	39.976	967.299	6.21	.74503E+14
CL-36	264.195	894.564	7.35	.22118E+7
PU-242	0.778	535.296	6.58	.24757E+7
SM-151	1488.700	217.350	6.78	.63087E+3
AM-243	0.071	203.434	5.72	.42182E+5
NB-94	23.461	93.422	4.44	.88794E+5
PA-231	0.003	71.681	3.99	.13082E+6
U-236	0.036	19.655	1.41	.33105E+8
TH-229	0.002	14.291	1.89	.13845E+5
PO-209	0.011	8.183	2.02	.20654E+3
AG-108M	1.000	1.440	0.89	.11538E+3
BI-207	1.112	1.535	0.04	.15459E+1

TABLE 15

SHORT-LIVED ISOTOPES AND ASSOCIATED SORBENT AND SOLIDIFICATION MEDIA FOR SOURCE TERM MODELING

Isotope	Sorbent or Solidification Media	Isotope	Sorbent or Solidification Media
Cs-137	None required or noted Envirostone Cement Sorbent Other solidification media	Ra-228	None required Sorbent
Sr-90	None required or noted Cement Envirostone Sorbent Other solidification media	Eu-152	None required Cement Sorbent
Pb-210	Cement Sorbent None required	Fe-55	None required or noted Cement Sorbent Other solidification media
Cm-243	Sorbent None required or noted Cement	Cs-134	None required or noted Cement Envirostone Other solidification media Sorbent
H-3	None required or noted Cement Sorbent Other solidification media	Pm-147	None required Sorbent
Pu-241	None required or noted Sorbent Envirostone Cement Bitumen	Sb-125	None required or noted Cement Sorbent Other solidification media
Kr-85	None required or noted Sorbent Cement	Eu-154	None required or noted Sorbent Cement
Cm-244	Envirostone None required or noted Cement Bitumen Sorbent	Na-22	None required or noted Sorbent Cement
Cd-113m	Cement	Th-228	None required Sorbent Cement
Co-60	None required or noted Cement Sorbent Other solidification media	Mn-54	None required or noted Cement Other solidification media Sorbent

TABLE 16

LONG-LIVED ISOTOPES AND ASSOCIATED SORBENT AND SOLIDIFICATION MEDIA FOR SOURCE TERM MODELING

Isotope	Sorbent or Solidification Media	Isotope	Sorbent or Solidification Media
Th-232 (including Th-NAT)	Sorbent None required or noted Cement	Ni-63	None required or noted Cement Envirostone Sorbent Other solidification media
U-238 (including U-NAT, U-DEP)	None required or noted Cement Envirostone Sorbent	Pu-240	None required or noted Cement Sorbent Envirostone
Ra-226	Cement None required or noted Sorbent Envirostone	Pu-238	None required or noted Sorbent Envirostone Cement Bitumen
U-234	None required Cement Sorbent	U-233	None required Cement
C-14	None required or noted Cement Sorbent Envirostone Other solidification media	Tc-99	None required or noted Sorbent Bitumen Envirostone Cement Other solidification media
Am-241	None required or noted Cement Sorbent Envirostone Bitumen	Ni-59	None required or noted Cement Sorbent Envirostone
U-235	None required Cement Sorbent	Th-230	Cement Sorbent None required
Pu-239	None required or noted Sorbent Cement Envirostone Other solidification media	Te-123	None required
I-129	None required or noted Sorbent Bitumen Cement Other solidification media	Cl-36	Sorbent None required or noted Cement
Np-237	None required or noted Sorbent Envirostone Cement	Pu-242	None required Bitumen Sorbent Envirostone Cement

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER (Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

NUREG/CR-5911

BNL-NUREG-52334

2. TITLE AND SUBTITLE

Source Term Evaluation for Radioactive Low-Level Waste Disposal Performance Assessment

3. DATE REPORT PUBLISHED

MONTH: January YEAR: 1993

4. FIN OR GRANT NUMBER

L1409

5. AUTHOR(S)

M. G. Cowgill, T. M. Sullivan

6. TYPE OF REPORT

Technical

7. PERIOD COVERED (Inclusive Dates)

8. PERFORMING ORGANIZATION – NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)

Brookhaven National Laboratory
Upton, NY 11973

9. SPONSORING ORGANIZATION – NAME AND ADDRESS (If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)

Division of Low-Level Waste Management and Decommissioning
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

Information compiled on the low-level radioactive waste disposed at the three currently operating commercial disposal sites during the period 1987 - 1989 have been reviewed and processed in order to determine the total activity distribution in terms of waste stream, waste classification and waste form. The review identified deficiencies in the information currently being recorded on shipping manifests and the development of a uniform manifest is recommended. The data from waste disposed during 1989 at one of the sites (Richland, WA) were more detailed than the data available during other years and at other sites, and thus were amenable to a more in-depth treatment. This included determination of the distribution of activity for each radionuclide by waste form, and thus enabled these data to be evaluated in terms of the specific needs for improved modeling of releases from waste packages. From the results, preliminary lists have been prepared of the isotopes which might be the most significant from the aspect of the development of a source term model.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

Low-Level Radioactive Wastes, Radioactive Waste Disposal, Data - Evaluation, Waste Forms, Performance, Source Terms - Evaluation, Waste Disposal, Radioisotopes, Barnwell, Richland, Beatty.

13. AVAILABILITY STATEMENT

Unlimited

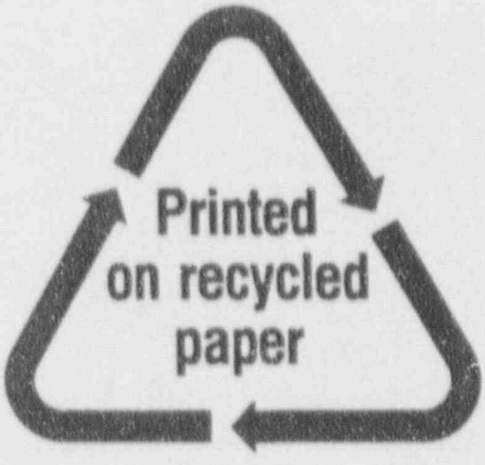
14. SECURITY CLASSIFICATION

(This Page) Unclassified

(This Report) Unclassified

15. NUMBER OF PAGES

16. PRICE



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